UNCLASSIFIED

VOL. II

TECHNICAL MANUAL

for

TECHNIMATIC TRANSMITTER

MODEL TSTE-10K

(MAIN FRAME)

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, ONTARIO

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IN-353

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NOTICE

THE TECHNICAL MATERIEL CORPORATION
COMMUNICATIONS ENGINEERS
700 FENIMORE ROAD MAMARONECK, N. Y.

Warranty

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment (except electron tubes,* fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED:

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise.
4. That any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

Electron tubes*furnished by TMC, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

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At TMC's option any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to TMC, unless a return authorization is issued by TMC.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of TMC Products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

*Electron tubes also include semi-conductor devices.

PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from TMC prior to shipment. The request for return authorization should include the following information:

1. Model Number of Equipment.
2. Serial Number of Equipment.
3. TMC Part Number.
4. Nature of defect or cause of failure.
5. The contract or purchase order under which equipment was delivered.

PROCEDURE FOR ORDERING REPLACEMENT PARTS

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT

TMC's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not with TMC.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

THE TECHNICAL MATERIEL CORPORATION
Engineering Services Department
700 Fenimore Road
Mamaroneck, New York

RECORD OF CORRECTIONS MADE

Change No.	Date of Change	Date Entered	Entered By

FOREWORD

The complete set of technical manuals describing Model TSTE-10K Technimatic Transmitter is divided into five groups as listed below. The manuals in each group are bound together.

1. VOLUME 1: Technical Manual for Auxiliary Frame, Technimatic Transmitter, Model TSTE-10K

   Technical Manual for Sideband Exciter, Model CMRA-1

   Technical Manual for RF Translator, Model CHGR-3A

   Technical Manual for Control Synthesizer, Model HFSA-2

   Technical Manual for Control Terminator, Model LRCD-1

   Technical Manual for Power Supply, Model HFP-1

   Appendix, Auxiliary Frame, Technimatic Transmitter TSTE-10K

2. VOLUME 2: Technical Manual for Main Frame, Technimatic Transmitter, Model TSTE-10K

   Technical Manual for High Voltage Rectifier, Model AX-103

   Technical Manual for Standing Wave Control Unit, Model SWCU-1

   Technical Manual for Meter Panel, Model AX-107

3. Installation Manual for Technimatic Transmitter, Model TSTE-10K

4. Operator's Manual for Technimatic Transmitter, Model TSTE-10K

5. Technical Manual for Transmitter Control, Model LRCM-1

   Technical Manual for Transmitter Control Module, AX-568

   Technical Manual for Remote Gain Control, AX-614

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SECTION 1

GENERAL INFORMATION

1-1. PURPOSE OF EQUIPMENT.

TechniMatiC* Transmitter, Model TSTE-10K (figure 1-1) is a remotely controlled general purpose transmitter that 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) Four-channel independent sideband (ISB) (separate intelligence on each sideband) with suppressed or any degree of carrier.

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

(3) AM operation.

(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 units). Where assigned, corresponding official military designations are also indicated.

* Trademark applied for

TABLE 1-1. MAJOR COMPONENTS

TMC DESIGNATION	MILITARY DESIGNATION
Main Frame Assembly AX-613	
Main Meter Panel AM-126	
10 KW Power Amplifier AX-580	
RF Amplifier Model RFTA-1	
Power Supply AP-126	
Main Power Panel AX-610	
High Voltage Rectifier AX-103 or Solid State Power Supply Model HVRC	
Relay Panel AR-176	
Main Power Supply AP-131	
Harmonic Filter AF-104	
Harmonic Filter AF-105	
2ND AMPL Servo Amplifier AZ-105	
IPA TUNE Servo Amplifier AZ-106	
IPA LOAD Servo Amplifier AZ-107	
PA LOAD Servo Amplifier AZ-108	
PA TUNE Servo Amplifier AZ-109	
Servo Amplifier test cable A-4369	

1-3. DESCRIPTION OF EQUIPMENT.

a. GENERAL. - As shown in figure 1-1, the transmitter consists of an auxiliary frame and a main frame which are bolted together and to

a common base assembly. The two frames house all the components of the transmitter. Primary power connections are made through the base assembly. An output connector is provided at the top of the main frame.

b. AUXILIARY FRAME. - The auxiliary frame houses the exciter components of the transmitter and the standing wave control unit. The frame is divided into a front and rear section by a partition which supports miscellaneous controls, connectors, and terminal boards.

c. MAIN FRAME. - The main frame houses five servo amplifiers, a two-stage rf voltage amplifier, the 1-kw IPA, and 10-kw PA, 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) MAIN METER PANEL AM-126. - The main meter panel, mounted at the top of the main frame, contains five meters. These monitor the PA filament primary voltage, PA screen grid current, PA plate current, r-f plate voltage, and power output. The power output meter is calibrated in kilowatts (average) and contains a second scale for measuring SWR.

(2) 10 KW POWER AMPLIFIER AX-580. - 10 KW power amplifier is mounted below the main meter panel. It contains the PA tube and its automatic tune, loading, bandswitching and power drive-up 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 a plexi-glass window, the power amplifier tuning and loading and band switching controls and their associated counter-type dials, and indicator lamps.

(3) RF AMPLIFIER RITA AND POWER SUPPLY, AP-126. - The rf amplifier and power supply 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 automatic tune, loading and band-switching circuits and all rf 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 rf range, and a monitoring meter and associated meter switch. All major dc and rf voltages in the rf amplifier may be conveniently monitored with this arrangement.

(4) MAIN POWER PANEL AX-610. - The main power panel, mounted at the center front of the main frame, 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 and Standing Wave Control Unit, an automatic load and drive control switch and level adjustment, and an SWR switch associated with the dual purpose PA OUTPUT meter.

(5) 10-KW HIGH VOLTAGE RECTIFIER. - The 10-KW high voltage rectifier, slide-mounted below the main power panel, contains the high-voltage rectifier tubes and their corresponding filament transformers.

Operating as the high-voltage rectifier deck associated with the main power supply, this unit generates 7500 volts dc for the plate of the 10-kw power amplifier tube. A plexi-glass window on the front panel of the high voltage rectifier permits observation of the rectifier tubes. Button connectors at the rear of the unit provide connection for the 3-phase input voltage and the dc output voltage. (These provide a quick disconnection for high voltage rectifier removal).

(6) 10-KW RELAY PANEL. - The 10-KW relay panel is rack-mounted at the bottom of the main frame. This panel contains nine relays which protect the TSTE-10K 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 overlaod indicator lamps. All 1-kw and 10-kw amplifier overload adjustments are also brought out on the relay panel for ease of adjustment.

(7) MAIN POWER SUPPLY AP-131. - The main power supply is mounted at the bottom of the lower rear compartment of the main frame. The power supply contains the PA filament transformer and associated components and diode rectifier stacks associated with High Voltage Rectifier AX-103.

(8) HARMONIC FILTER AF-104 and AF-105. - The harmonic filters AF-104 and AF-105 are mounted at the left-hand side of the PA compartment and operate to reduce the harmonic content of the PA output signal. Harmonic Filter AF-104 is a fixed filter network, whereas Harmonic Filter AF-105 is a switchable filter network which decreases the inductance and capacitance of the filter network as the frequency is increased.

(9) Servo Amplifiers AZ-105 through AZ-109. - The PA compartment houses five servo amplifier plug-in units. These units when controlled by the sense circuits of the RFTA and PA, automatically tune and load the IPA, 2nd amplifier and PA

portions of the transmitter.

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* and CW *With appropriate external unit such as model TIS-3
Tuning Manual: Manual:	All tuning, loading and band-switching controls on front panel. Manual override switch permits complete manual operation.
Remote:	Remote tuning of exciter equipment permits amplifier stages to tune automatically.
Output impedance	50 ohms, unbalanced.
Harmonic suppression	Second harmonic at least 85 db below PEP; third harmonic at least 90 db below PEP.
Primary power requirements (including exciter)	3-phase, 440 volts, 50-60 cps, 25 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 humidity 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

ASSEMBLY OR COMPARTMENT	REFERENCE SYMBOL	TYPE	FUNCTION
RF Amplifier RFTA	V201	8121	RF amplifier
	V202	8121	RF amplifier
	V203	5CX3000	Power amplifier
	V205, V206	12AL5	Detector
High Voltage Rectifier AX-103	V600 thru V605	872A	High voltage rectifier
10-kw Power Amplifier AX-580	V900	4CX5000A	Power amplifier
	V901, V902	5726	Detector
Power Supply AP-126	V2000	5R4	High voltage rectifier
	V2001, V2003, V2005	OB2	Voltage regulator
	V2002, V2004, V2006	OA2	Voltage regulator

TABLE 1-3. DIODE COMPLEMENT

ASSEMBLY OR COMPARTMENT	REFERENCE SYMBOL	TYPE
RF Amplifier RFTA	CR203	1N3070
IPA and PA Load Amplifiers AZ-106 and AZ-109	CR300 CR301 thru CR305	1N4436 1N645
IPA Second Amplifier AZ-105	CR400 CR401 thru CR405	1N4436 1N645

TABLE 1-3. DIODE COMPLEMENT (CON'T)

ASSEMBLY OR COMPARTMENT	REFERENCE SYMBOL	TYPE
IPA and PA Tune Amplifiers AZ-107 and AZ-108	CR500 CR501 thru CR505	1N4436 1N645
Harmonic Filter AF-104	CR400 CR401	DD109-1 DD109-2
Main Power Supply AP-131	CR800A thru CR800F	Matched set of 6 Zener diodes (non-replaceable)
Main Frame Assembly AX-613	CR1000	1N463
Power Supply AP-126	CR2001 CR2002	DD129 DD124
Linear Level Control	CR9001 CR9002 CR9003	DD122 1N3027B 1N463
Master Stepping Switch Assembly	CR91001 CR91002 CR91003	DD122 DD111-1 DD121

TABLE 1-4. FUSE COMPLEMENT

ASSEMBLY OR COMPARTMENT	REFERENCE SYMBOL	TYPE
IPA and PA Load Amplifiers AZ-106 and AZ-109	F300 F301	MDL 1 MDL 1/2
IPA Second Amplifier AZ-105	F400 F401	MDL 1 MDL 1/2
IPA and PA Tune Amplifiers AZ-107 and AZ-108	F500 F501	MDL 1 MDL 1/2
High Voltage Rectifier AX-103	F600 thru F605	MDL 1

TABLE 1-4. FUSE COMPLEMENT (CON'T)

ASSEMBLY OR COMPARTMENT	REFERENCE SYMBOL	TYPE
Relay Panel AR-176	F700 thru F703	MDX 5
	F704	MDL 1
	F705	MDX 5
Power Supply AP-126	F2001	MDL 1/2
	F2002	MDL 1/4
	F2003	MDX 5
	F2004	MDX 3
	F2005	MDX 2
Linear Level Control	F9001	MDL 1
Master Stepping Switch Assembly	F9101	MDL 1

SECTION 2

PRINCIPLES OF OPERATION

2-1. GENERAL.

The main frame portion of the TSTE-10K transmitter essentially houses a four-stage, automatically-tuned (or manually-tuned), linear r-f amplifier, and associated power supply and control components. The circuits in the main frame operate in conjunction with an exciter, and other control circuitry housed in the auxiliary frame of the transmitter (see Technical Manual for Auxiliary Frame, Technimatic Transmitter, Model TSTE-10K).

The discussion in paragraphs 2-2 through 2-8 is limited to the major assemblies housed in the main frame, excluding the automated control tuning circuits. For a description of the automated control tuning circuits, refer to paragraphs 2-9 through 2-15.

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

An r-f signal from the exciter circuits in the auxiliary frame is applied to the input of RF Amplifier RFTA, the IPA. The r-f input signal must be within the frequency range of 2 to 30 mc and may be modulated or unmodulated, since the linear amplifier stages accommodate any type signal with a bandwidth of up to 16-kc. The linear stages of the RFTA raise the level of the input signal to a level as high as 1-kw and drive the 10-kw power amplifier. A sample of IPA r-f is routed to the auxiliary frame for monitoring purposes.

The 10-kw linear power amplifier, operating class AB1, raises the r-f level to 10-kw PEP. A sample of 10-kw power amplifier output is also routed to auxiliary frame for convenient monitoring. A portion of the

high level r-f 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 r-f signal level is exceeded. This control circuit limits high drive peaks which can be developed during multiple signal transmission and suppresses unwanted transmission products. The output of the 10-kw power amplifier is fed into an unbalanced antenna. An indication of SWR on the transmission line is applied to the SWCU in the auxiliary frame. When a preset level of SWR is exceeded, an SWR overload signal from the SWCU automatically removes high voltage from the transmitter, opening up external interlocks line.

High Voltage Rectifier AX-103 functions together with Main Power Panel AX-610 and Main Power Supply AP-126, to produce the high d-c voltages required by the 1-kw IPA and 10-kw PA.

Relay Panel AR-176 contains overload coils that open interlocks, cutting off high voltages to the 1-kw IPA and 10-kw PA stages when preset overload levels are exceeded. The protective circuits sample the IPA and PA plate and 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 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.

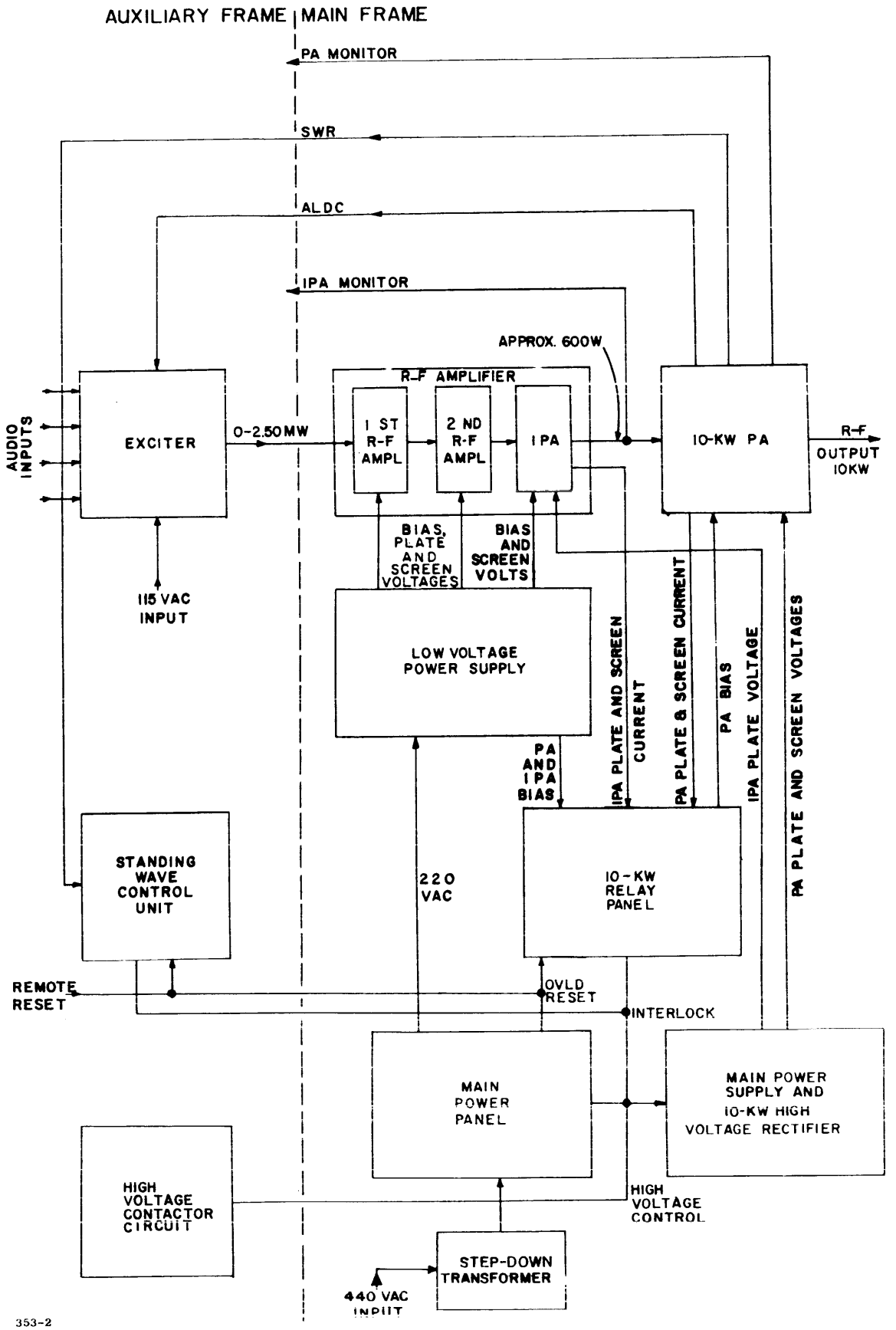


Figure 2-1. Block Diagram, TSTE-10K

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.

2-3. R-F AMPLIFIER. (See sheet 1 of figure 6-1.)

a. FIRST AMPLIFIER. - R-f excitation at a level of up to 200 mw enters the RFTA via jack J208 and is applied to first amplifier V201. Resistor R201 presents the exciter, and coaxial lead from the exciter, with the proper load impedance. The first stage is a class A broad-band amplifier, and is RL/c and transformer coupled to the second stage. Swamping resistors R237 and R204 ensure broad band width. Plate current of V201 can be measured with MULTIMETER M201 by setting MULTIMETER switch S201 at position 1; the meter then indicates the voltage drop across cathode resistor R203.

b. SECOND AMPLIFIER. - The output of V201 is coupled through capacitor C218, autotransformer L213, and capacitor C222 to the grid of V202. The second stage is a class A tuned amplifier. The signal from the plate of V202 is LC coupled to the tuned circuits, capacitor C241 and coils L221 through L229. The desired coil is selected by switches S209 A and S209 B; S209 C shorts out all unused coils. On bands 1 through 6, the output signal is taken from the taps of coils L221 through L225. On bands 7 through 10, coils L226 through L229 and capacitors C242 through C245, in conjunction with capacitor C241, constitute a pi-output configuration. A portion of the output signal is coupled through capacitor C252 and rectified by diode CR203. When MULTIMETER switch S201 is set at its third position, the d-c output of CR203 is connected to MULTIMETER M201, yielding an indication of second stage r-f output voltage.

c. IPA. - The output of V203 is coupled through capacitor C257 to the grid of V203. The IPA is a class AB1 amplifier with a pi-el output configuration. A portion of the output signal is coupled through capacitor C308 to a plate (pin 2) of V205. When MULTIMETER switch S201 is set at its fourth position, MULTIMETER M201 receives the positive d-c rectified r-f voltage from pin 5 of V205, yielding an indication of IPA plate r-f voltage. The output of the IPA is routed to the transmitter 10-kw PA via terminal E203.

2-4 . 10 KW POWER AMPLIFIER.

a. GENERAL. - The 10 KW PA is a remotely controlled power amplifier stage, containing sensing circuits for automatically tuning this stage over a frequency range of 2-30 mc with an average power of 5 KW or 10 KW (PEP). The power amplifier V900, uses a type 4CX5000A tetrode, operating class AB1, to amplify the output of RF Amplifier RFTA. The input to V900 is approximately 1,000 watts; the output is 10,000 watts (PEP) and is matched to a 50-ohm unbalanced transmission line. In the discussion to follow the automatic tuning circuitry will be described in paragraphs 2-9 through 2-15.

b. CIRCUIT ANALYSIS. (See figure 2-2.) - The signal to be amplified by power amplifier V900 is applied to its cathode via DRIVE INPUT jack J901. IPA 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, 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.

Control grid bias for V900 is obtained from Power Supply AP-126. This supply voltage, -410-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 -410-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 1/2 ampere of plate current flows through V900 with no input signal applied (approximately -280 volts at the grid).

The plate output circuit for V900 is a pi-L network consisting of inductors L902 through L905, PA BAND switch S900, and variable capacitors C927 and C928. Switch S900 is a two-section switch with nine positions on each wafer and successively shorts out larger portions of the inductors as the signal frequency is increased. PA TUNE capacitor C927 in the input side of the pi-L network and PA LOAD capacitor C928 in the output side of the pi-L network provide fine tuning and loading, respectively, for the power amplifier output circuit.

Plate voltage for V900 is provided by the 10-kw high voltage rectifier. The high voltage rectifier supplies 7.5 Kv to the plate of V900 through inductors L914, L911, L906, L905, L903,

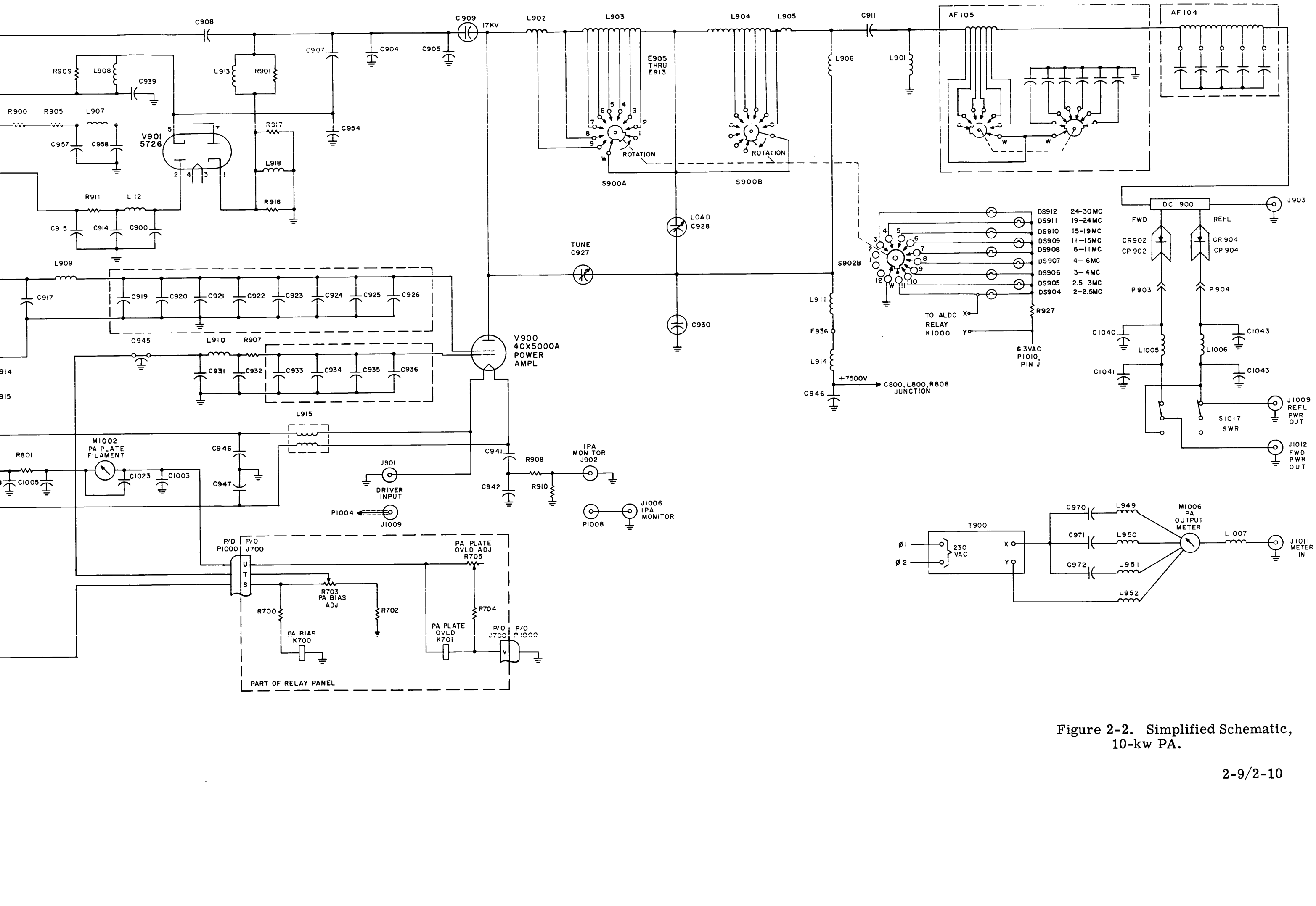
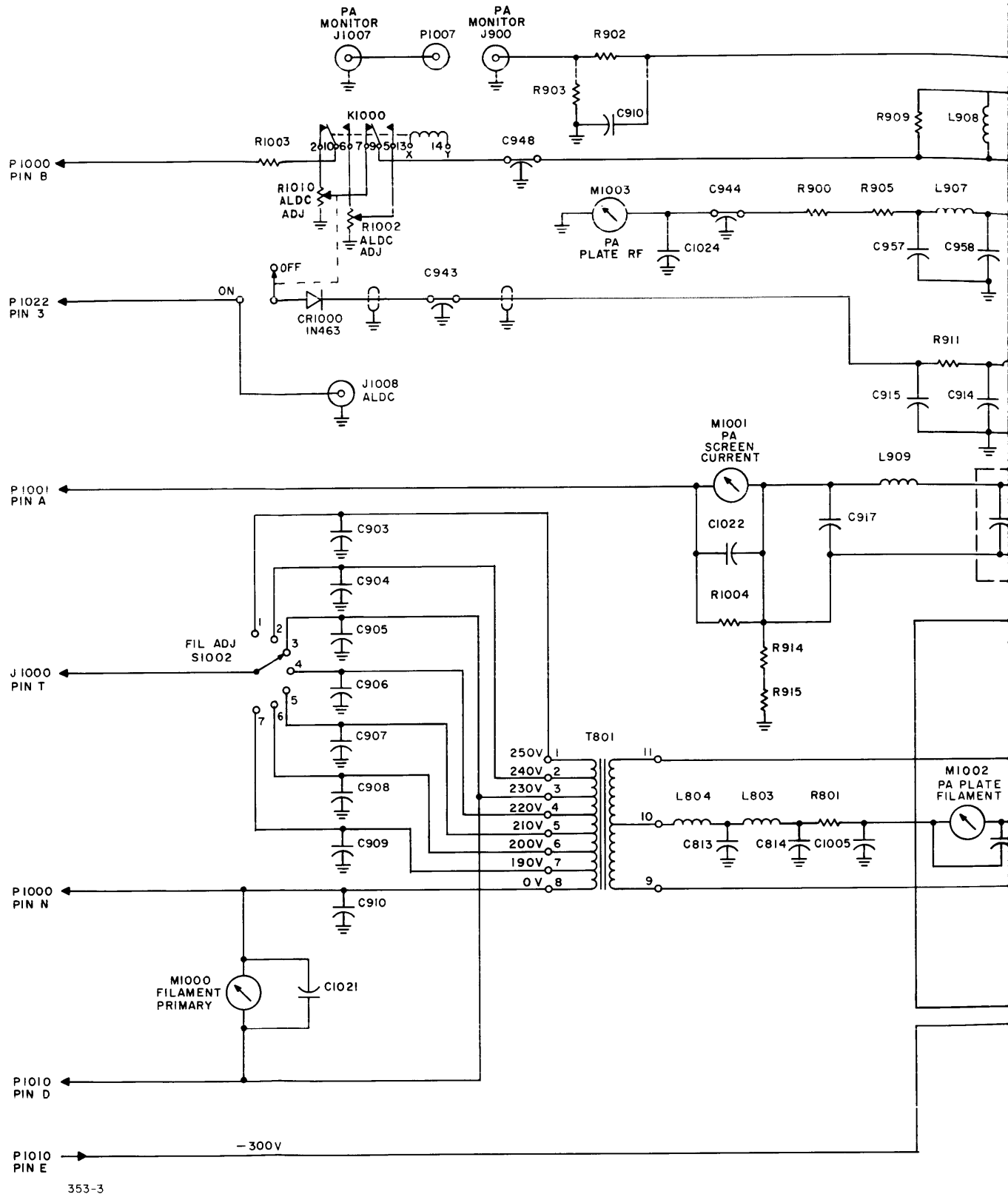


Figure 2-2. Simplified Schematic, 10-kw PA.


PA MONITOR J1007
P1007
PA MONITOR J900
R902
R903
C910
K1000
R1003
26 10 26 60 70 90 59 130 X 140 Y
C948
R909
L908
P1000 PIN B
R1010 ALDC ADJ
R1002 ALDC ADJ
M1003
PA PLATE RF
C944
C1024
R900
R905
L907
C957
C958
OFF
ON
C943
P1022 PIN 3
CR1000 IN463
J1008 ALDC
R911
C915
C914
M1001 PA SCREEN CURRENT
L909
P1001 PIN A
C1022
C917
C903
C904
C905
R1004
R914
R915
FIL ADJ S1002
J1000 PIN T
C906
C907
C908
C909
T801
250V 1
240V 2
230V 3
220V 4
210V 5
200V 6
190V 7
0V 8
11
10
9
L804
L803
R801
M1002 PA PLATE FILAMENT
C813
C814
C1005
P1000 PIN N
C910
M1000 FILAMENT PRIMARY
C1021
P1010 PIN D
P1010 PIN E
-300V
353-3

106660353

and L902. Capacitors C930 and C940 are r-f bypass capacitors.

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

The r-f voltage developed at the plate of V900 is coupled through capacitor C909 to four circuits: a monitor circuit, a plate r-f meter circuit, a fine tune sensing circuit (refer to paragraph 2-11), 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 capacitors C909 and C905 in parallel with C904, with the voltage across capacitors C907 and C954. The r-f voltage developed across capacitor C954 is applied to the cathode of diode rectifier V901A. The cathode is biased by a positive d-c voltage taken from the wiper arm of ALDC control R1010 or control R1002, depending upon whether relay K1000 is energized or de-energized. When bandswitch wafer S902B is placed in the 2 to 2.5 mc position, a ground path is enabled through the bandswitch contacts to energize relay K1000. With relay K1000 energized, control R1002 is connected in series with resistor R1003 across the +800-volt d-c bus (IPA screen supply). In the remaining bandswitch positions of S902B, relay K1000 remains de-energized and ALDC control R1010 is similarly connected to the +800-volt d-c bus.

When the amplitude of the negative portion of the r-f signal applied to cathode of V901A exceeds the bias voltage on the cathode, the tube conducts. The output, a negative voltage proportional to the amplitude of the r-f signal peaks, is filtered by a two-section pi filter and is coupled to ALDC switch S1018. When switch S1018 is in its closed position, this negative d-c voltage is coupled through jack

J1008 to the exciter, which supplies the input signal to the RFTA. When switch S1018 is in the OFF position, the output voltage of diode CR1000 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 r-f 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 developes the r-f 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 r-f 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.

The output of the pi-L network is then coupled through harmonic filters AF105 and AF104 to jack J903. Harmonic filter AF105 contains a seven-section switch with eleven positions on each wafer and successively decreases the inductance and capacitance of each filter network as the frequency is increased. Its prime function is to reduce the second harmonic of signals in the frequency range of 2 to 17 megacycles by 30 db approximately. Harmonic filter AF104 is a fixed filter network that reduces the

second harmonic content over the operating frequency range of 17 to 32 megacycles. This filter attenuates the second harmonic by approximately 50 db at 40 megacycles.

Directional coupler DC900 and SWR switch S1017 provides the means for measuring the output power of the transmitter and SWR of the transmission line on PA OUTPUT meter M1006. Forward power from DC900 is rectified by diode CR902, filtered by pi-filter elements C1040, L1005, and C1041, and applied to the contacts of switch S1017. With switch S1017 normally in the spring loaded position, forward power is routed through FWD PWR OUT jack J1012, and METER IN jack J1011 to PA OUTPUT meter M1006, via circuitry in the auxiliary frame. The meter, which receives its power from transformer T900, 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 the normally spring loaded contacts on SWR switch S1017. From the switch contacts, reflected power is routed through jack J1009, to Standing Wave Control Unit SWCU in the auxiliary frame. When the switch is depressed, the normally closed paths for forward and reflected power are opened. At the same time, the reflected power output is switched over and routed (via jacks J1012 and J1011) to PA OUTPUT meter M1006; the meter now indicates SWR.

The forward and reflected power signals, normally present at jacks J1012 and J1009, may alternately be routed to an associated remote control panel meter. Circuitry for routing these signals to the remote control panel is contained in the auxiliary frame.

2-5. MAIN POWER SUPPLY. (See Figure 2-3.

Three-phase, 440 vac primary power is applied to auto-transformer T802; the output of T802, three-phase 220 vac, is applied to MAIN POWER circuit breaker CB1000. The phase-1, -2, and -3 voltages from CB1000 are routed to the low voltage power supply via pins P, V, and T respectively of plug P1010. The low voltage power supply also receives a phase-3 230-volt input from terminal 3 of transformer T801 via pin O of P1010. The phase-1, -2, and -3 voltages from CB1000 are routed to the main relay panel via pins H, J, and L and Z respectively of plug P1000. Three-phase 220-volt power from CB1000 is also routed into the auxiliary frame. Phase-1 and phase-2 voltage from CB1000 is routed to transformer T900 in the 10-kw PA.

Filament transformer T801 receives phase-3 voltage via switch S1002, and phase-2 voltage from pin N of P1000. The 230-volt power across terminals 3 and 8 of T801 is extended to FILAMENT PRIMARY meter M1000 and to the 10-kw high voltage rectifier. 7.5 vac from the secondary of T801 is routed to the 10-kw PA. The cathode return of the 10-kw power amplifier tube is from the T801 center-tap; ground return is through chokes L803 and L804, resistor R801, PA PLATE CURRENT meter M1002, and the PA PLATE OVLD relay. A positive voltage, proportional to the 10-kw power amplifier tube plate current, is taken from the junction of R801 and L803, and applied to the 10-kw PA sensing circuits.

Three-phase 220-volt power is applied to the primary of transformer T800 from the auxiliary frame when the interlock and control circuits

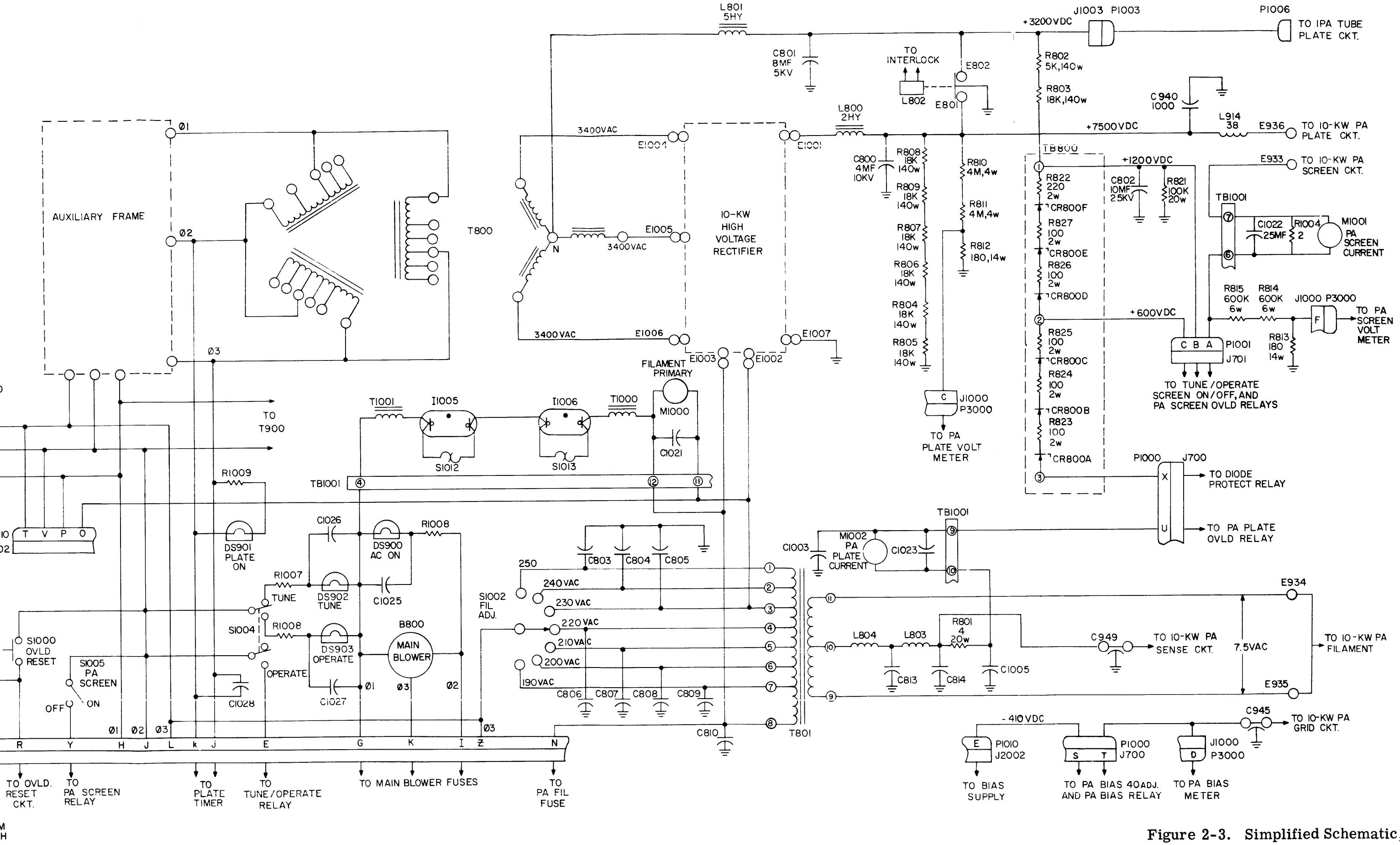
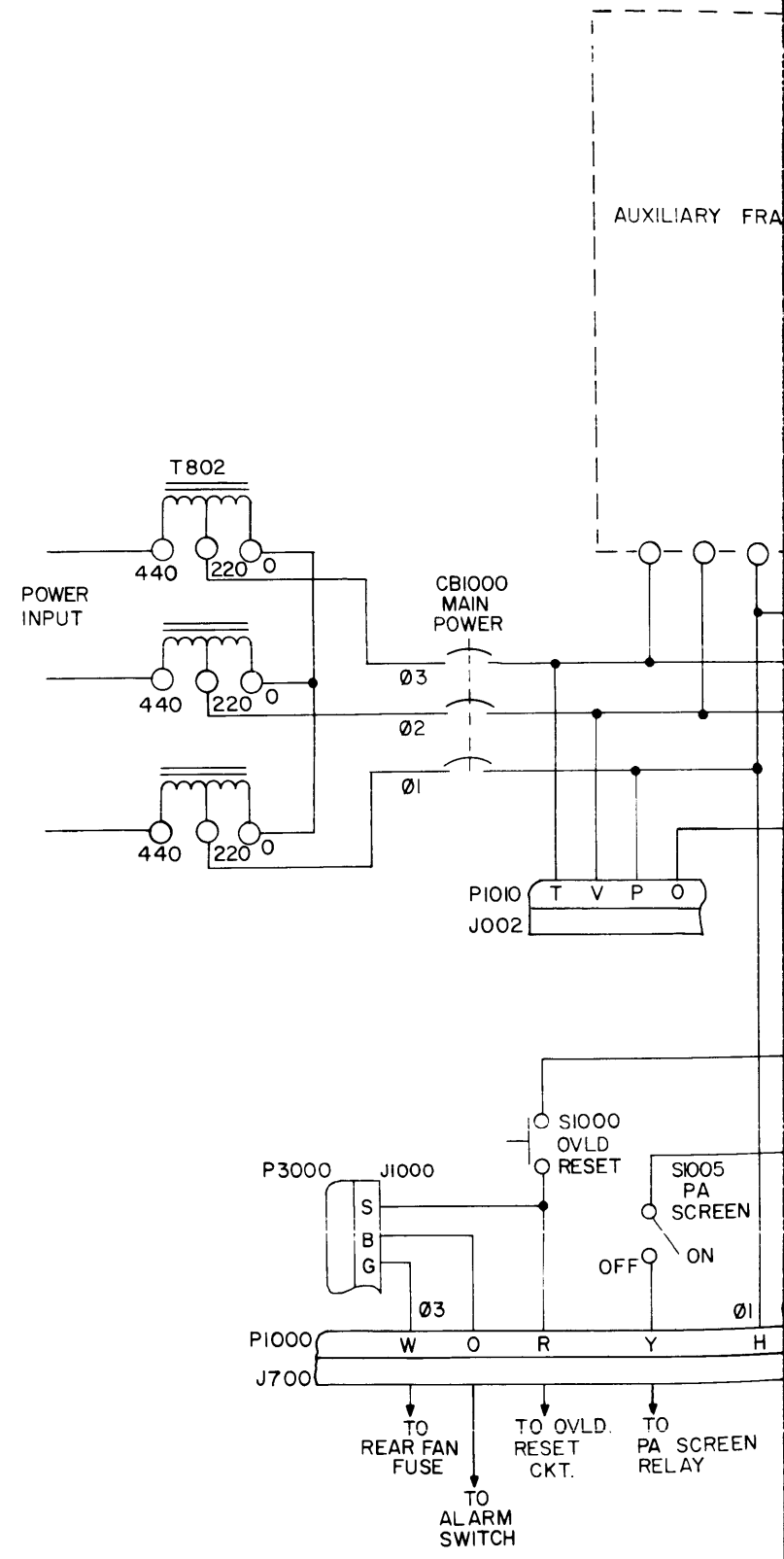


Figure 2-3. Simplified Schematic, Main Power Supply



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are properly set (see paragraph 2-7). The high voltage enable circuits in the auxiliary frame must also be properly set (refer to Technical Manual for Auxiliary Frame, TechniMatiC Transmitter, Model TSTE-10K). Three-phase 6222 vac is applied to the 10-kw high voltage rectifier from the secondary of T801. The +7500-volt output of the 10-kw high voltage rectifier is filtered by choke L800 and capacitor C800. Bleeder resistors R804 through R809 ensure capacitor discharge for personnel safety. Resistors R810 through R812 form a voltage divider; the potential from the junction of resistors R811 and R812 is applied to the PA PLATE VOLTS meter in the auxiliary frame. The +7500-volt output from L800 is applied to the plate circuit of the 10-kw PA.

The +3200-volt output of the 10-kw high voltage rectifier is taken from the neutral terminal of T800 and filtered by choke L801 and capacitor C801. The +3200-volt output from C801 is routed to the IPA tube plate circuit via plug P1006, and to the screen-voltage regulator. Dropping resistors R802 and R803, and zener diodes CR800A through CR800F constitute a shunt regulator. Terminal 1 of TB800 is held at a constant +1200-volt level; terminal 2 is held at a constant +600-volt level. When TUNE/OPERATE switch S1004 is set at OPERATE, +1200 volts from terminal 1 of TB800 is applied to the screen grid of the 10-kw power amplifier tube. When S1004 is set at TUNE, +600 volts from terminal 2 is applied to the screen grid. The zener diodes are returned to ground through the DIODE PROTECT relay in the main relay panel.

Phase-1, phase-2, and phase-3 voltages are applied to MAIN BLOWER B800 from pins G, I, and K respectively of P1000. Lamps DS900, DS902, and DS903 also receive phase-1 voltage from pin G of P1000. DS900 is returned to the phase-2 voltage from pin I of P1000. DS902 and DS903 are returned to phase-2 through dropping resistors and TUNE/OPERATE switch S1004. The main meter panel is illuminated by lamps I1005 and I1006 which receive phase-1 voltage from pin G of P1000, and are returned to phase-3. PLATE ON lamp DS901 receives phase-2 and phase-3 voltages from the high voltage contactor circuit in the auxiliary frame; this power is also extended to the plate timer in the main relay panel.

Phase-2 voltage is routed to the TUNE/OPERATE relay in the main relay panel when TUNE/OPERATE switch S1004 is set at OPERATE. Phase-2 voltage is routed to the PA SCREEN ON/OFF relay in the main relay panel when PA SCREEN switch S1005 is set at OFF. Phase-2 voltage is routed to the overload reset circuits in the main relay panel and in the auxiliary frame when OVLD RESET switch S1000 is depressed; alternately, the overload reset circuits in the main relay panel can receive phase-2 voltage from the remotely-controlled reset circuit in the auxiliary frame. Phase-3 voltage is routed to the REAR FAN in the auxiliary frame from the main relay panel; phase-3 voltage can also be applied to the high voltage alarm circuit in the auxiliary from the ALARM switch in the main relay panel.

2-6. LOW VOLTAGE POWER SUPPLY. (See sheet 4, figure 6-1.)

Three-phase power is applied to the low voltage power supply when the MAIN POWER circuit breaker of the transmitter is set at ON. The power input path is:

Ø1, pin P of jack J2002

Ø2, pin V of jack J2002

Ø3, pin O of jack J2002.

The phase-three voltage is routed through the tapped primary transmitter PA filament transformer; this voltage is set at 230v with respect to phase-two. Phase-two voltage from pin V of J2002 and phase-three voltage from pin T of J2002 is extended via pins A and B of P2001 to the RFTA; this 220v, single-phase voltage is used to operate the blower and band switch motors in the RFTA.

Filament transformer T2002 receives phase-three voltage from pin O of J2002 and phase-two voltage from pin V of J2002 via relay K2002 and FILAMENTS fuse F2003. Relay K2002 is energized by the phase-one voltage from pin P of J2002 and phase-two voltage from F2003 which is routed through pin S of P2001, IPA air switch S203, and pin R of P2001.

Filament voltage for V203 in the RFTA is supplied by secondary 15-19 of T2002; the cathode return of V203 is taken from the center-tap, terminal 16. Filament voltage for all other tubes in the RFTA is taken from terminal 14 of T2002. 6.3 vac is taken from terminal 12 of T2002 and routed to the transmitter PA band indicator lamps. 24 vac is taken from terminals 9 and 10 of T2002 and extended through pins a and b of J2002. 24 vac is also routed to the transmitter PA band switch control circuit and the RFTA band switch control circuit through relay K2001 (when de-energized) and pin K of J2002. Phase-3 voltage from pin O of J2002 is also routed through contacts of K2001 (when de-energized) and pin c of J2002 to the transmitter servo circuits. The coil of relay K2002 receives 24 vdc via pin B of J2002, and actuates whenever SERVOS switch S2001 is at its down (off) position or a ground return is supplied via pin e of J2002.

Three-phase 365 vac from terminals 17, 18, and 19 of T2001 is applied to full-wave rectifier CR2002 through surge-limiting resistors R2029, R2024 and R2025. The positive output of CR2002 is returned to ground via BIAS fuse F2002; the fuse protects the T2001 secondary, CR2002, and filter choke L2003. Negative 420 vdc is routed from L2003 through resistor R2003 and pin M of J2002 to the transmitter IPA BIAS relay. Regulated -410 vdc is taken from the cathode of V2004 and routed to the transmitter PA BIAS relay and PA BIAS ADJ potentiometer via pin E of J2002. Regulated -259 vdc from the cathode of V2005 is applied to a voltage divider, resistors R2002 and R2001. Bias for amplifier V203 in the RFTA is taken from the arm of R2002. During automatic tuning, resistor R2001 is shunted with a 100,000-ohm resistor. The parallel combination of the two resistors serves to increase the bias of V203. In manual tune operation, with SERVOS switch S2001 placed in the OFF position, R2001 is similarly shunted by R2000.

Regulated -151 vdc is taken from the cathode of V2006 and applied to two voltage dividers: R2009, R2008, R2007; and R2006, R2005, R2004. Bias for amplifier V202 in the RFTA is taken from the arm of R2008; bias for amplifier V201 is taken from the arm of V2005.

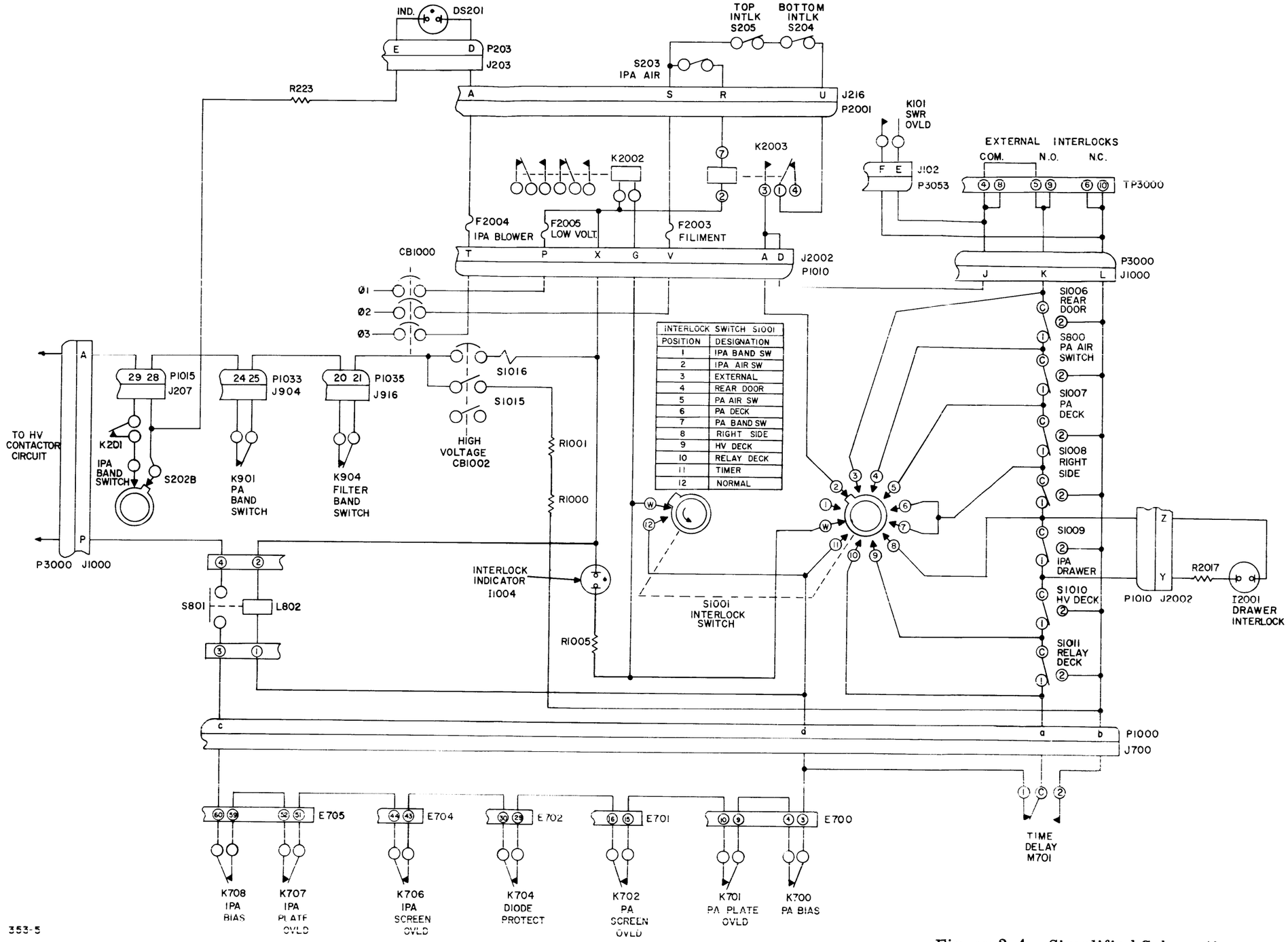
Three-phase 634 vac from terminals 13,14, and 15 of T2001 is applied to full-wave rectifier CR2001 through surge-limiting resistors R2015, R2016, and R2018. The negative terminal at CR2001 is returned to ground via SCREEN fuse F2001; the fuse protects the T2001 secondary, CR2001, and filter choke L2002. Positive 800 vdc is routed from L2002 to the plate circuit of amplifier V202 in the RFTA, and to the transmitter TUNE/OPERATE relay. Positive 400 vdc is routed from terminal 16 of T2001 to the plate circuit of amplifier V201 in the RFTA and to the transmitter TUNE/OPERATE relay. When the transmitter high voltage circuits are active, either the +400 vdc or +800 vdc is routed to the screen grid circuit of amplifier V203 in the RFTA. Regulated +367 vdc from the anode of V2001 is routed to the screen grid of amplifier V202 in the RFTA; regulated +259 vdc from the anode of V2002 is routed to the screen grid of amplifier V201.

2-7. PROTECTIVE INTERLOCK AND HIGH VOLTAGE CONTROL CIRCUITS.

(See Figure 2-4.)

The protective interlocks and the high voltage control circuits are interconnected in such a way that high voltage is removed from the transmitter whenever a potential personnel hazard or equipment damaging condition exists.

Phase-2 voltage is applied to the interlock circuit from MAIN POWER circuit breaker CB1000 via FILAMENTS fuse F2003. One portion of the interlock circuit consists of relay K2003, ten switches, and TIME DELAY relay M701. These components form a series loop that is terminated at the coil of the high voltage shorting relay, L802. The high voltage shorting relay and relay K2002 are energized when the contacts of relays K2003 and M701, and the contacts of the ten switches are closed. L802 and the coil of K2002 are returned to phase-1 via LOW VOLTAGE fuse F2005. Relay K2003 is energized only when the IPA BLOWER is operating. The contacts of TIME DELAY relay M701 close at a preset interval (usually 5 minutes) after the MAIN POWER circuit breaker is set at ON. If HIGH VOLTAGE circuit breaker CB1002 is set at ON when one of the interlock switches is open, relay M701 has not operated, or the SWR overload relay is operated, phase-2 voltage is routed through resistors R1000 and R1001 to the circuit breaker trip coil. The phase-2 to phase-1 current through the circuit breaker causes it to trip, thus preventing the application of high voltage.



INTERLOCK SWITCH S1001	
POSITION	DESIGNATION
1	IPA BAND SW
2	IPA AIR SW
3	EXTERNAL
4	REAR DOOR
5	PA AIR SW
6	PA DECK
7	PA BAND SW
8	RIGHT SIDE
9	HV DECK
10	RELAY DECK
11	TIMER
12	NORMAL

Figure 2-4. Simplified Schematic, High Voltage Control and Protective Interlock Circuit.

INTERLOCK switch S1001 connects INTERLOCK INDICATOR lamp I1004 from phase-1 to the various points in the interlock loop. An open interlock switch may be located by rotating S1001 clockwise from its second position. Phase-2 voltage is applied to I1004 through all positions of S1001 until the position corresponding with the open interlock is reached.

When the first portion of the interlock circuit is closed, phase-2 voltage from relay M701 is applied to a chain of seven protective relays. The contacts of these relays are closed when plate and screen currents of the IPA and 10-kw PA tubes are normal, and the transmitter bias supply and main power supply screen voltage regulator are operating properly. Phase-2 voltage is routed through the relay contacts and switch S801 (part of the high voltage shorting relay) to the high voltage contactor circuit in the auxiliary frame.

The high voltage contactor circuit receives phase-1 voltage via HIGH VOLTAGE circuit breaker CB1002 and the transmitter band switch interlocks. When relay K201, K901, or K904 is energized (to energize an associated band switch motor), the phase-1 path to the high voltage contactors is broken. Arcing of the band switch contacts due to r-f voltage is therefore prevented. Additional control circuitry for the high voltage contactors is contained in the auxiliary frame.

2-8. 10-KW RELAY PANEL.

a. PROTECTIVE RELAY CIRCUITS. - Refer to figure 6-1, sheet 5. Seven relays in the 10-kw relay panel sample five currents and two voltages in the TSTE-10K transmitter. During normal operation, contacts on these seven relays form a series circuit, as shown in figure 2-4. This series circuit permits two contactors to be energized. These contactors, K3000 and K3001, control the application of power to the high voltage rectifier. When one of these seven relays senses an excessive current of a deficient voltage, the relay operates and opens the series circuit. This action de-energizes the two contactors which then removes power from the high voltage rectifier.

Refer to figure 2-5. Relay K700 is energized when the -405-volt d-c output from Power Supply AP-126 is present. 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 -405-volt level which enters the relay panel at pin S of J700. Resistor R700 limits the current in the coil circuit to approximately 15 milliamperes. The relay has four sets of contacts, three of which are connected in parallel. When the relay is energized, three parallel sets of contacts form part of the series circuit which energizes the two contactors. At this time, the fourth set of contacts is open. The bias voltage of -300 volts d-c applied to the grid of V900 is selected by PA BIAS ADJ R703 and monitored by PLATE CURRENT meter M3001.

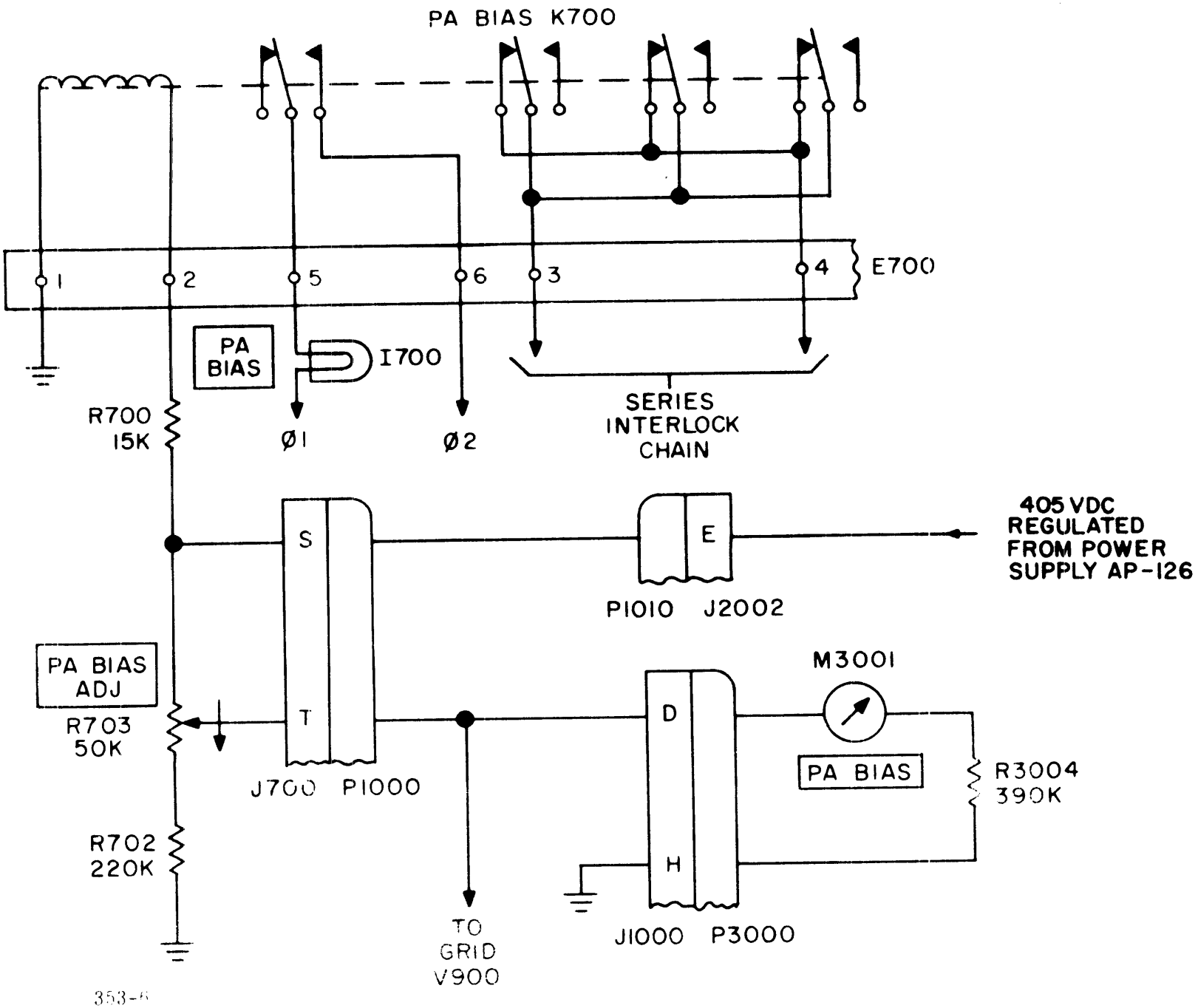


Figure 2-5. Simplified Schematic Diagram, PA Bias Relay, Normal Bias Position

If the -405-volt output of the AP 126 should fail, relay K700 is de-energized. This action opens the three parallel sets of contacts, de-energizing 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.

Refer to figure 2-6. 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 relays K3000 and K3001. 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. The overload coil is set to trip with approximately 2 amperes of PA plate current. 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 is 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 and de-energizing relays K3000 and K3001. The fourth set of

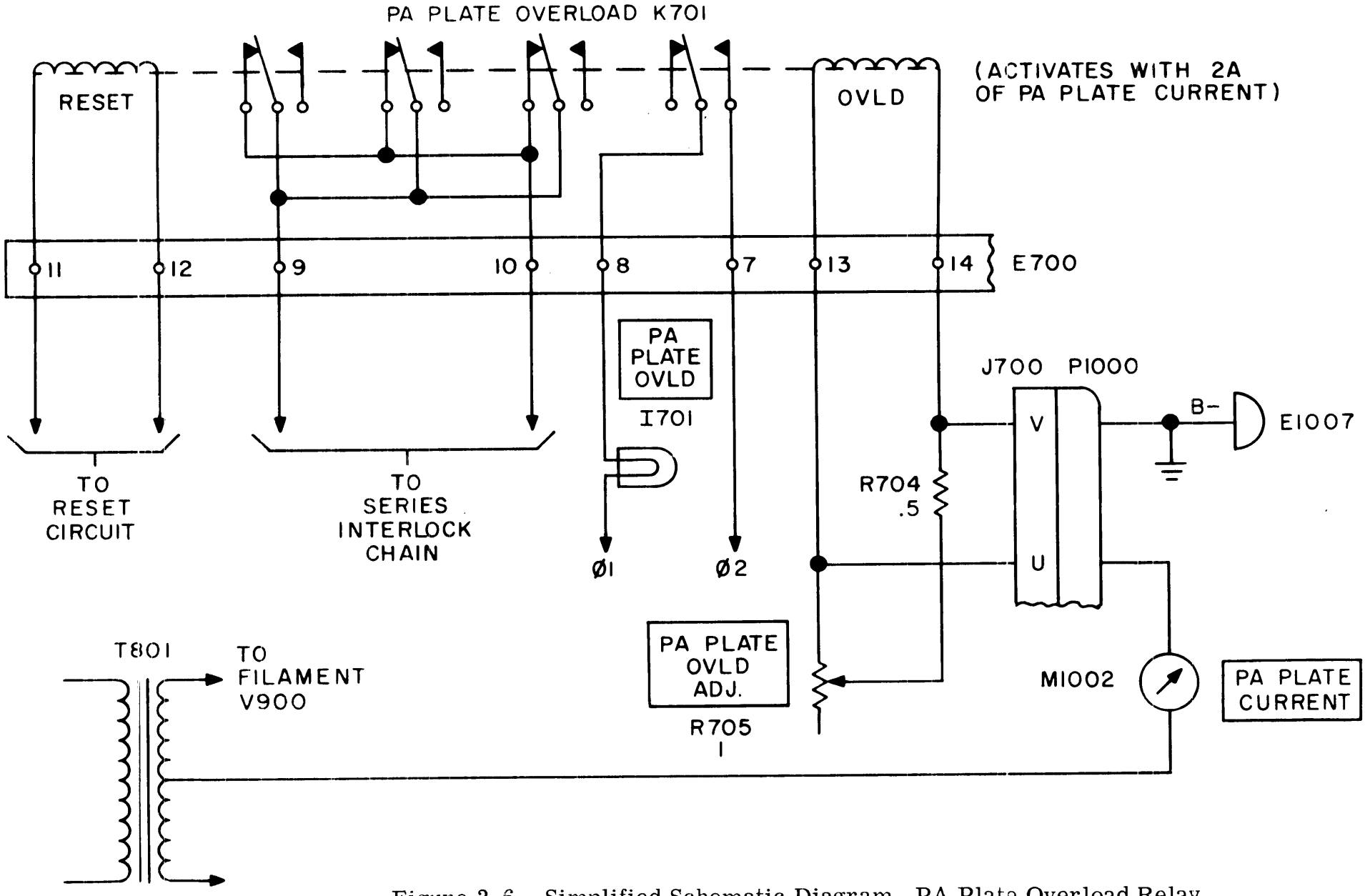


Figure 2-6. Simplified Schematic Diagram, PA Plate Overload Relay, Reset Position

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 indicated by PA PLATE CURRENT meter M1002 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.)

Refer to figure 2-7. 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 K701 is connected in parallel with the reset coils of relays K702, K706, and K707. When OVERLOAD RESET pushbutton switch S1000 is operated, all these relays remain in or return to the reset state.

Refer to figure 2-8. 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. 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 control is set so that the overload coil trips

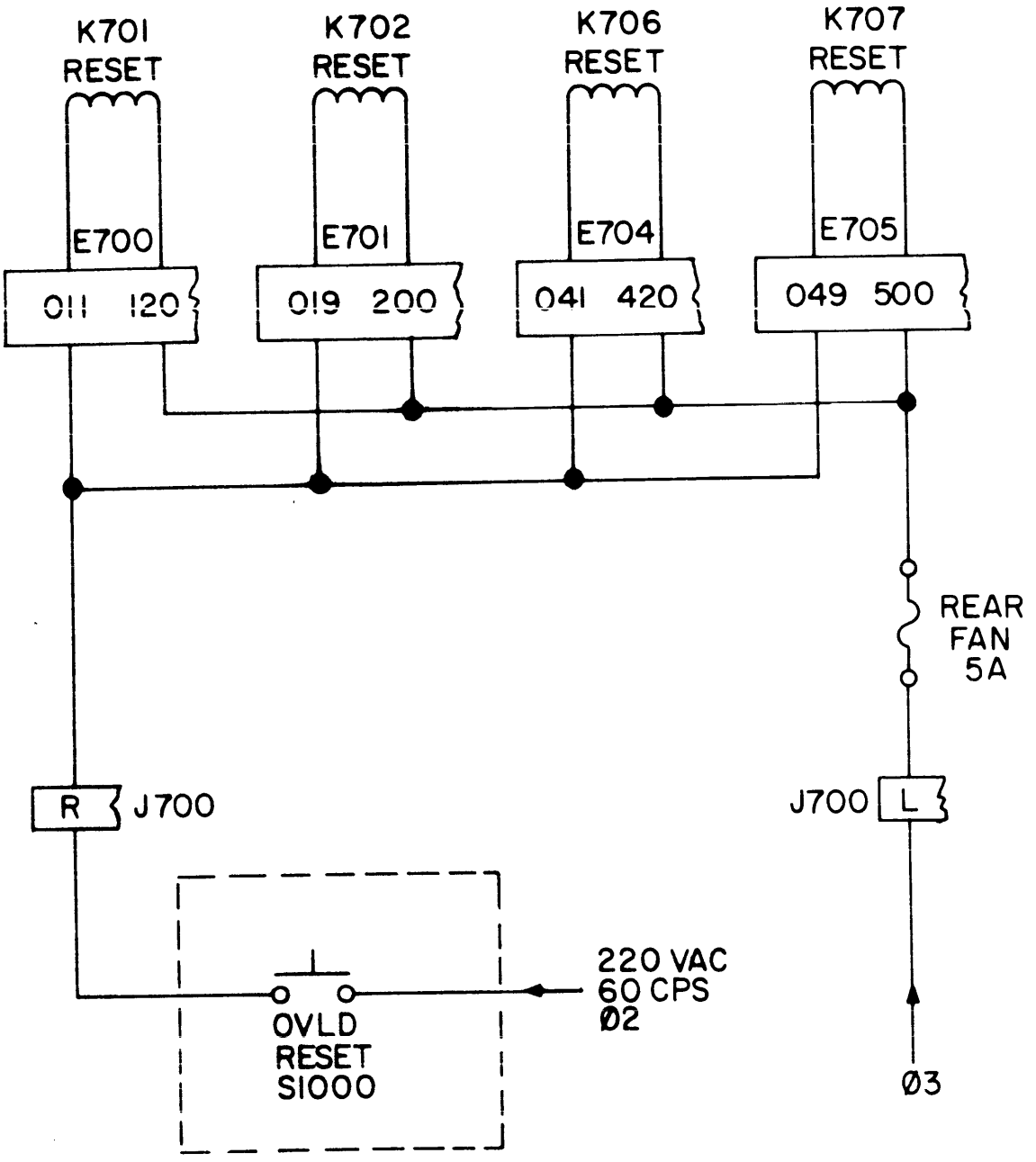


Figure 2-7. Simplified Schematic Diagram, Reset Circuit

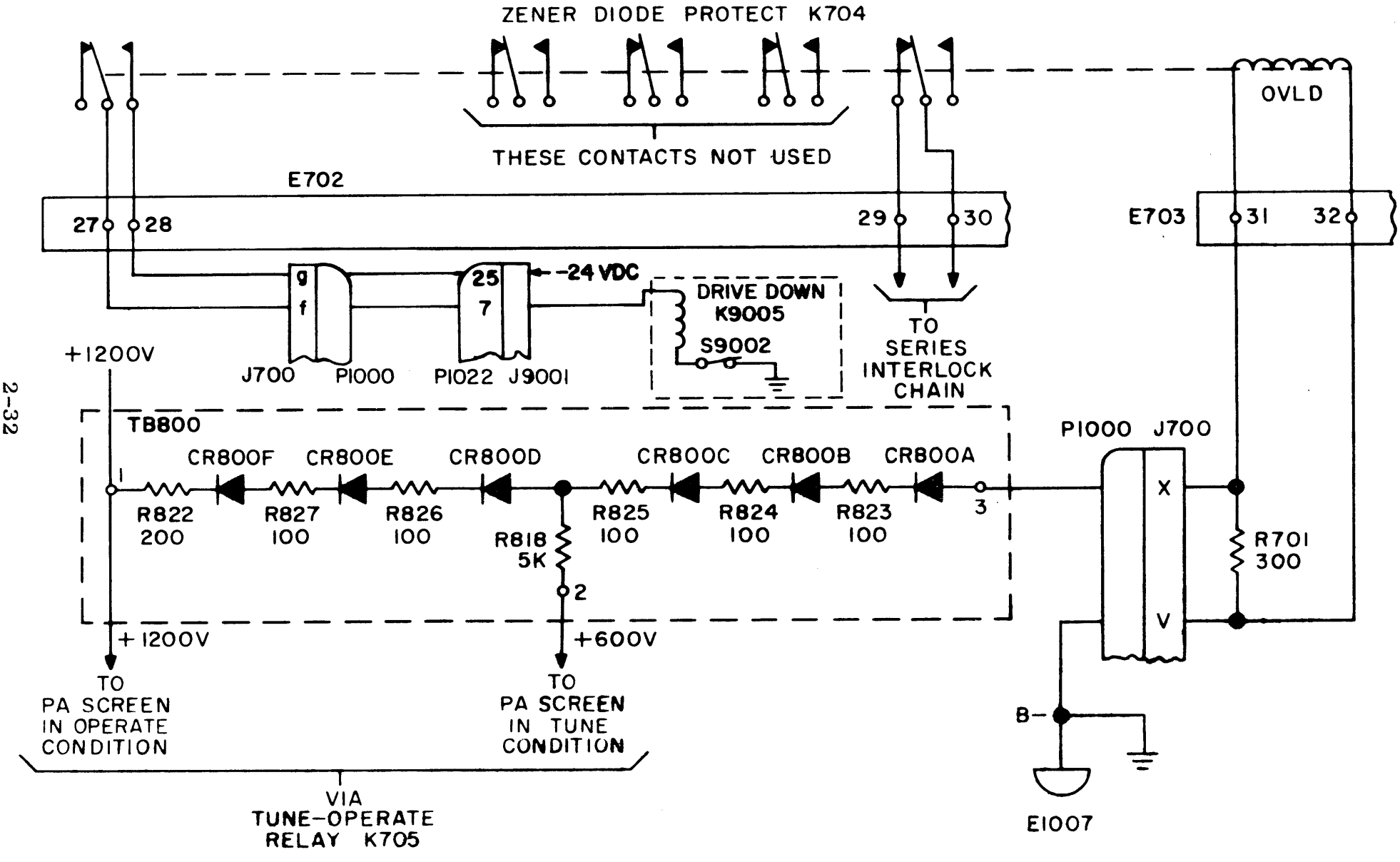


Figure 2-8. Simplified Schematic Diagram, Diode Protect Relay, Normal Diode Current Position

with approximately 80 milliamperes of screen current. The screen current returns to either the 1,200-volt or 600-volt d-c output of the main power supply through relay K705. (Relays K703 and K705 are described in later paragraphs.)

Refer to figure 2-9. Current flow in the screen voltage regulator of the main power supply is sampled by the overload coil of ZENER DIODE PROTECT relay K704. The relay coil is paralleled by R701 in the ground return path of this supply voltage. When excessive current flows in this regulator circuit, relay K704 is energized. When K704 is energized, one set of contacts opens the series interlock chain disabling the high voltage circuit; a second set of contacts connects 24-volts to the coil winding of Drive Down relay K9005.

Refer to figure 2-10. IPA SCREEN OVLD relay K706 functions in a similar manner to that described for PA PLATE OVLD relay K701. The screen current of amplifier V203 enters the relay panel at pin B of J700. 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.

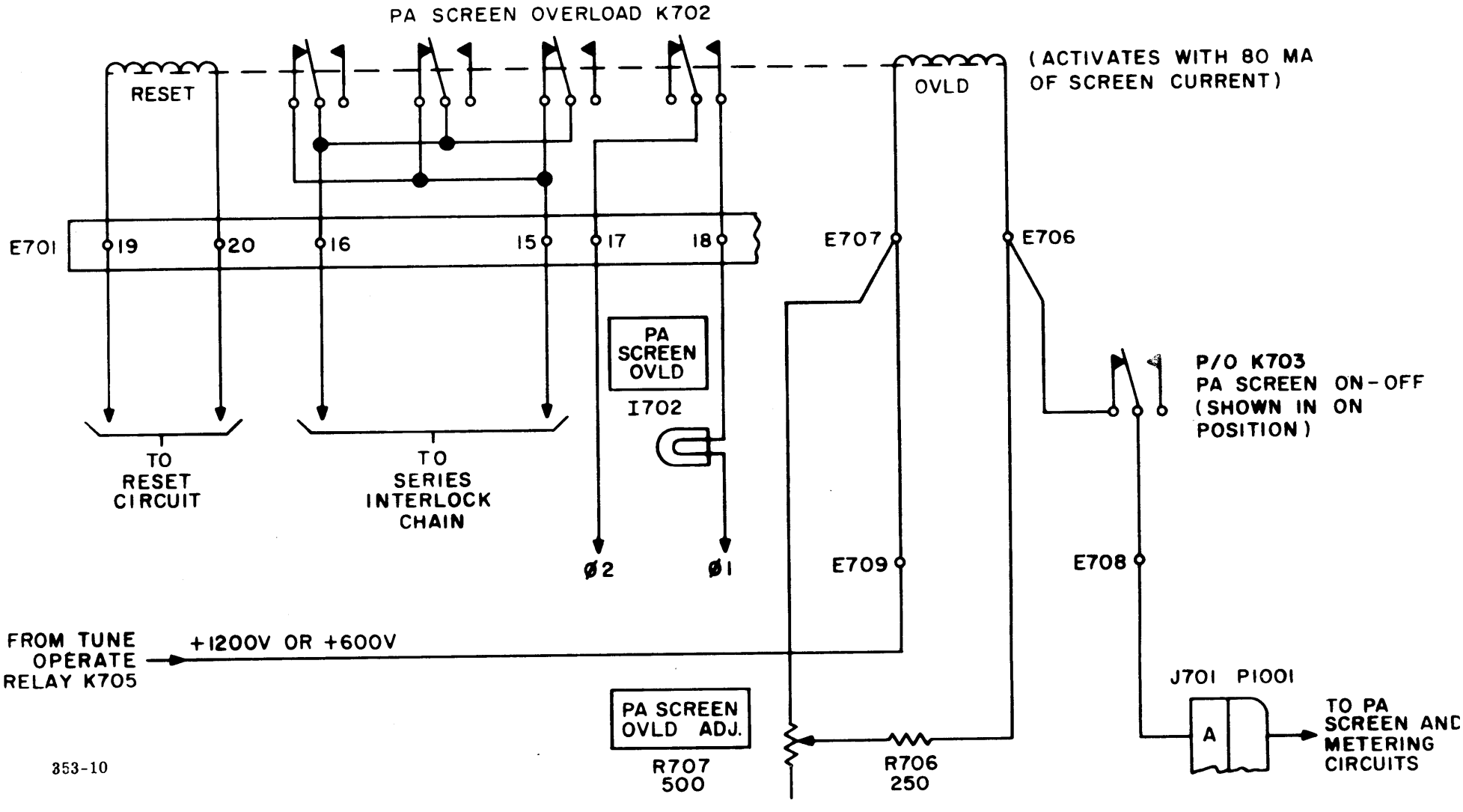


Figure 2-9. Simplified Schematic Diagram, PA Screen Overload Relay, Reset Position

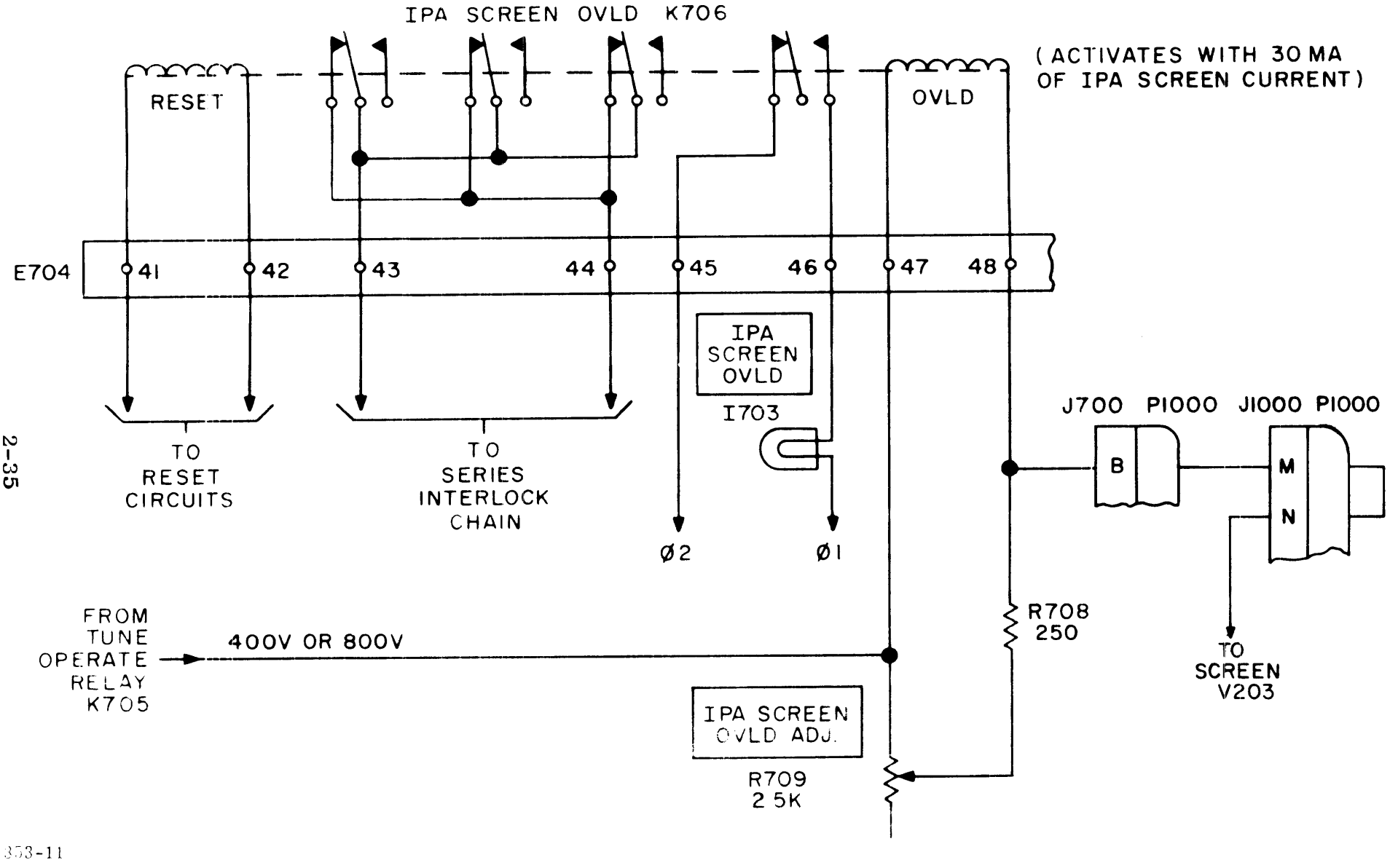


Figure 2-10. Simplified Schematic Diagram, IPA Screen Overload Relay, Reset Position

Relay K705 connects the screen current to the +400- or +800-volt output of Power Supply AP-126. 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 1703. It is necessary to operate the OVERLOAD RESET pushbutton switch to return the relay to its reset state.

Refer to figure 2-11. IPA PLATE OVLD relay K707 also functions in a similar manner to that described for PA PLATE OVLD relay K701. The cathode current of amplifier V203 enters the relay panel at pin A of J700. In the relay panel, the cathode current divides between the overload coil of relay K707 and the series combination of resistor R710 and IPA PLATE OVLD ADJ. control R711. This control determines the relative division of cathode current in these two paths. The overload coil is set to trip with approximately 600 milliamperes of IPA plate current. 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 is open. When the cathode current exceeds the operating limit, the overload coil is energized. This action lights the IPA PLATE OVLD lamp and opens the series interlock chain causing the high voltage rectifier to shut down. It is necessary to operate the OVERLOAD RESET pushbutton switch to return the relay to its reset state.

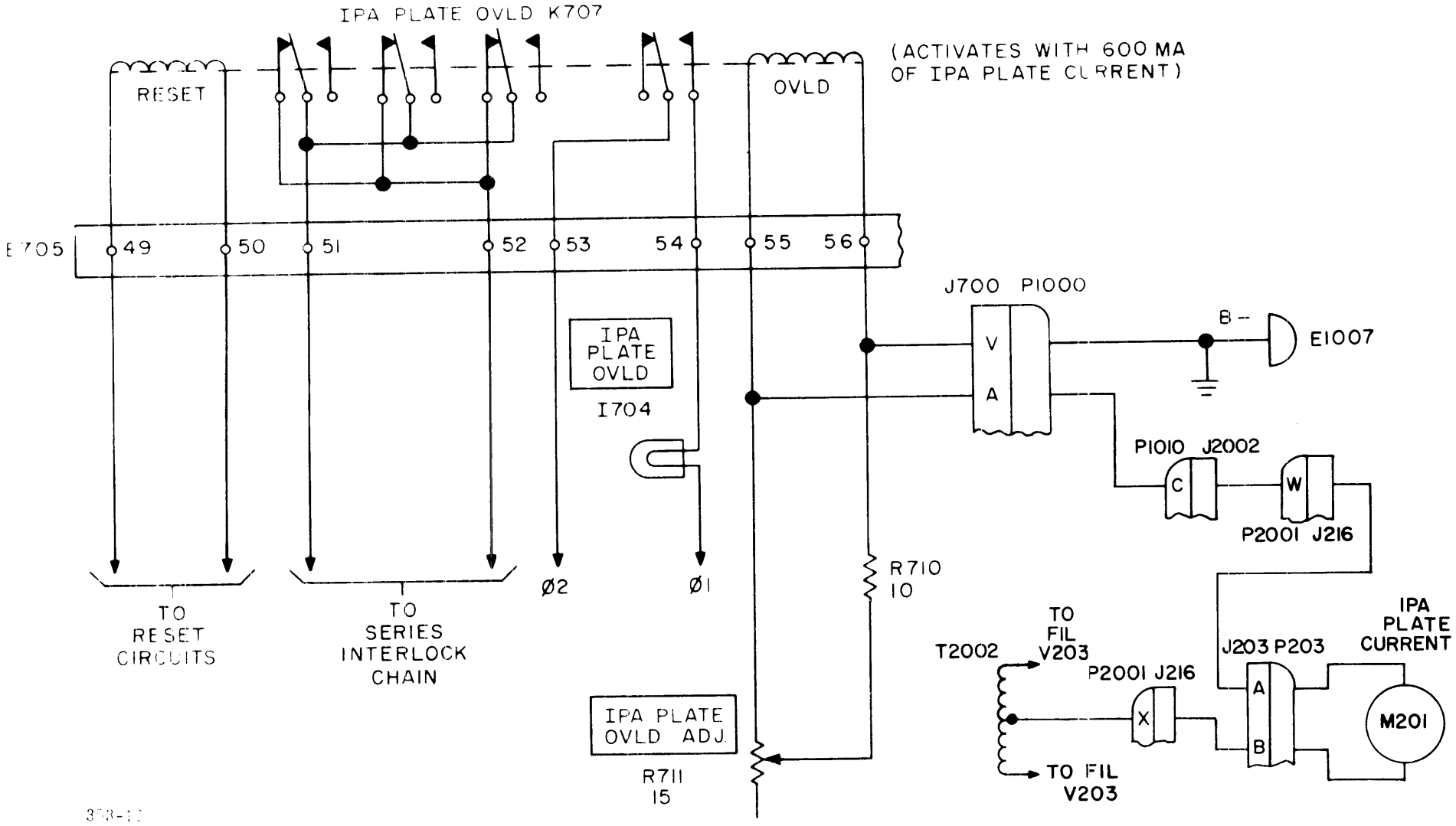


Figure 2-11. Simplified Schematic Diagram, IPA Plate Overload Relay, Reset Position

Refer to figure 2-12. The coil of IPA BIAS relay K708 is connected in series with resistor R712 across the -405-volt dc regulated output of the AP-126 power supply. When the regulated dc output is present, relay K708 is energized and three of its four sets of contacts form part of the series circuit which energizes contactors K3000 and K3001. The fourth set of contacts opens when the relay is energized. When the regulated dc output is not present, relay K708 is deenergized. The three sets of contacts now open the energizing circuit of the contactor, causing the high-voltage rectifier to shut down.

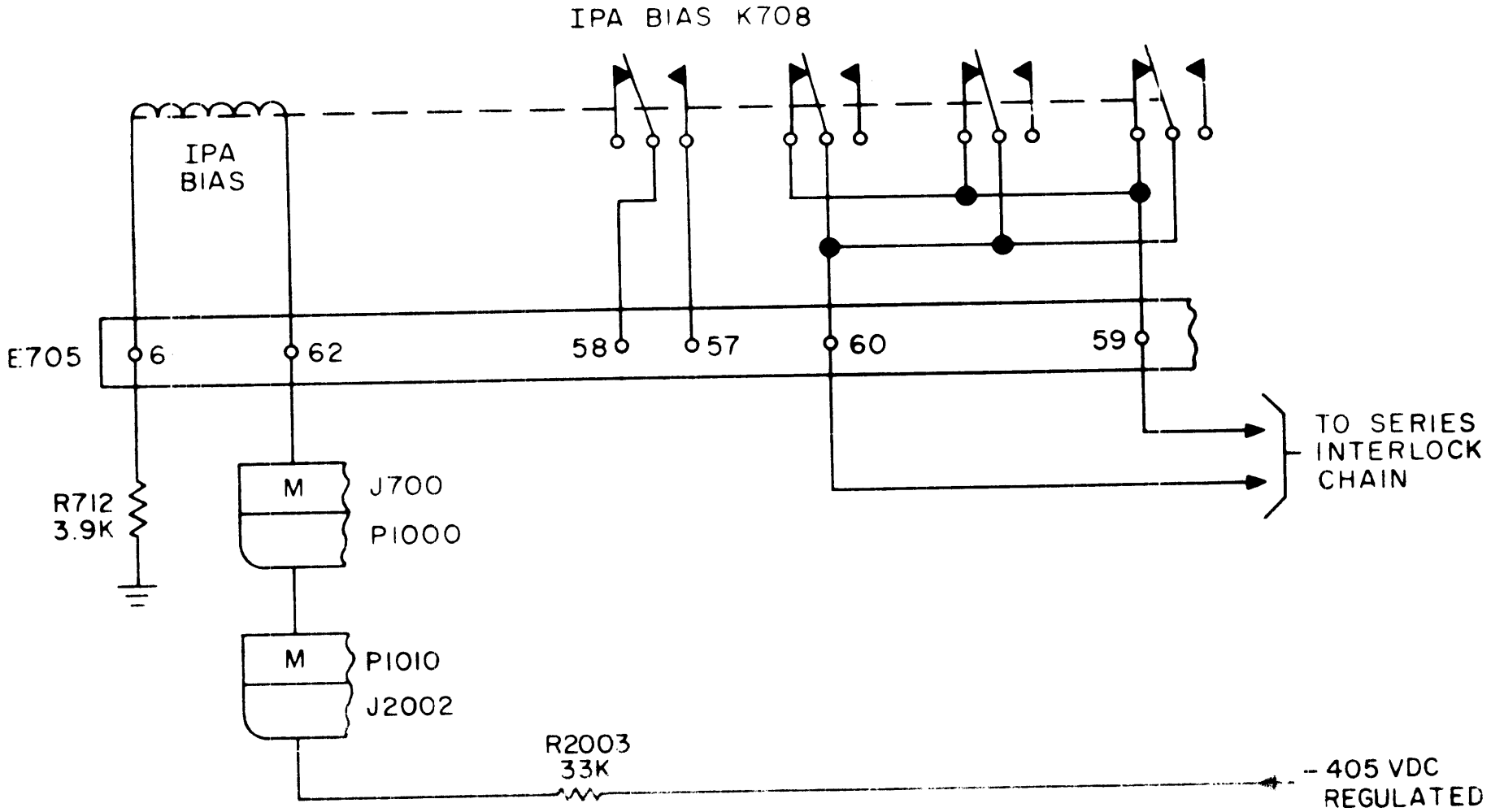


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Figure 2-12. Simplified Schematic Diagram, IPA Bias Relay, Normal Bias Position

b. CONTROL RELAY CIRCUITS.

Refer to figure 6-1 sheet 5. 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 the intermediate power amplifier V203.

Refer to figure 2-13. 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 is removed from V900.)

Refer to figure 2-13. 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 +800- or the +400-volt output of Power Supply AP126 is used as the screen supply voltage for the intermediate 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.

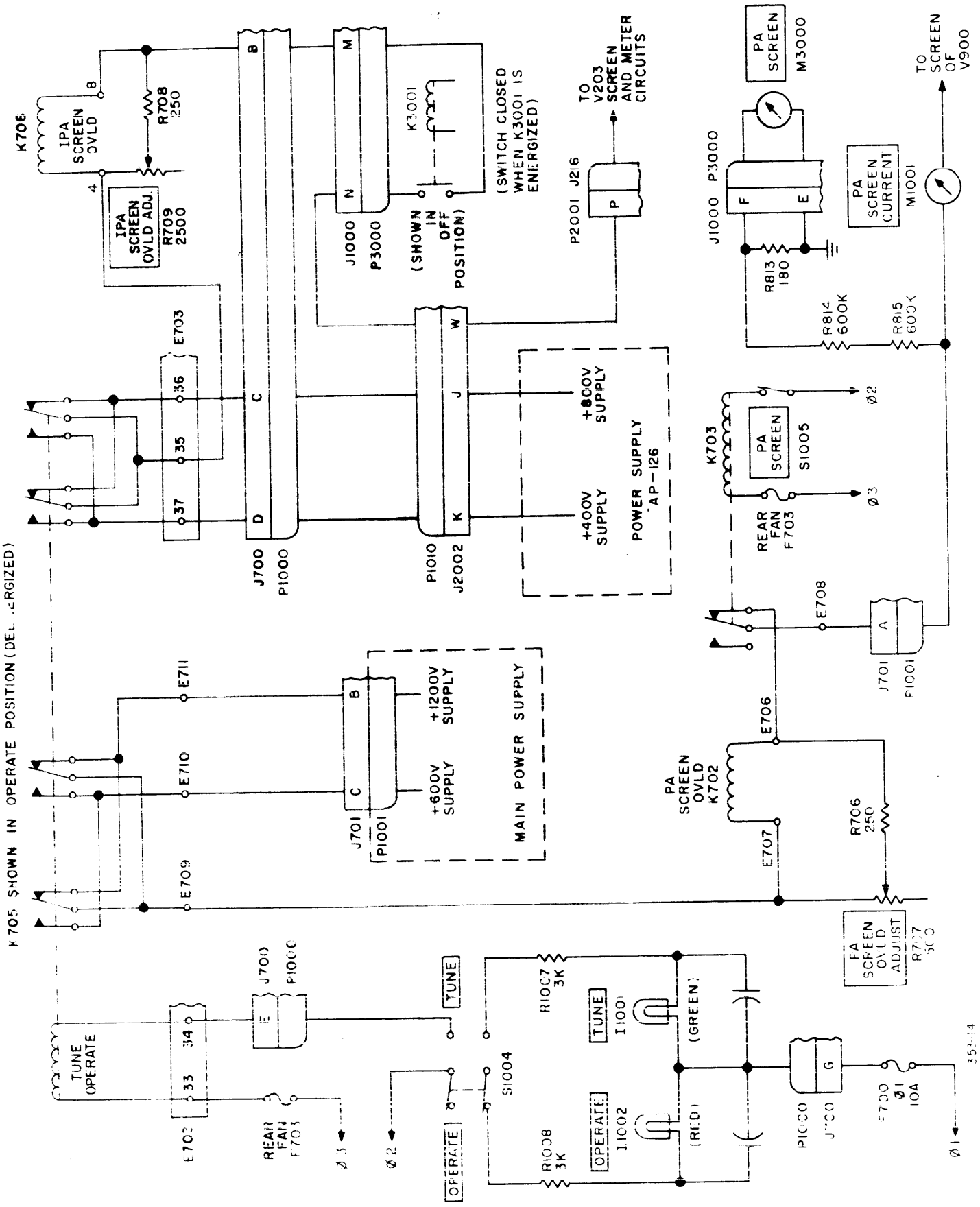

Figure 2-13. Screen Supply and Control Circuits, Simplified Schematic.

Refer to figure 2-13. 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 circuits of V203 and V900.

For purposes of clarity, the complete screen supply circuits for power amplifiers V203 and V900 are shown in figure 2-13. 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 CURRENT meter M1001 to the screen grid circuit of V900. The dc voltage at the input of M1001 is also applied to PA SCREEN VOLTAGE meter M3000 through voltage divider elements R813 through R815.

For intermediate power amplifier V203, the selected screen voltage (either 400 volts or 800 volts) from Power Supply AP-126 is routed through contacts on relay K705, through IPA SCREEN OVLD relay K706, and normally open contacts on contactor K3001 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 the intermediate power amplifier V203.

2-9. TECHNIMATIC CIRCUITS, BLOCK DIAGRAM ANALYSIS.

(See Figure 2-14.)

Band switches and tuning and loading elements in the transmitter r-f circuits are automatically positioned after application of appropriate control signals from the exciter.

An exciter frequency information signal controls the positioning of a master stepping switch that is located in the 10-kw PA compartment. The transmitter's frequency range (2- to 30-mc) is divided into 18 segments. The master stepping switch is positioned to one of its 18 positions which corresponds to that segment of the 2- to 30-mc frequency range to which the exciter is tuned.

A tune command signal is applied to the linear level control assembly in the transmitter concurrently with the TUNE SYNC signal that initiates exciter tune-up. Upon reception of the tune command signal, relays in the linear level control perform the following:

(1) Supplies a fixed output level control signal to the exciter. This signal is derived from circuitry in the master stepping switch assembly, and is preset to compensate for transmitter gain variations within the frequency range.

(2) Supplies a tune-key signal to the exciter. This tune-key signal causes audio channel disabling and full carrier injection for tune-up.

(3) Supplies an enabling signal to the SERVOS OFF relay in the law voltage power supply. The SERVOS OFF relay is then deenergized, and power is supplied to five servo amplifiers and to the band switch control circuits.

Three band switches in the transmitter (IPA, PA, and harmonic filter) are positioned in accordance with control signals from the master stepping switch assembly. The inductive components of the transmitter tuned circuits are therefore adjusted for operation in the selected frequency range.

The five tuning and loading capacitors in the transmitter (2nd AMPL TUNE, IPA TUNE, IPA LOAD, PA TUNE, and PA LOAD) are set at pre-position settings when the associated servo amplifiers are initially turned on. Four of the capacitors (all except 2nd AMPL TUNING) are positioned according to reference signals from the master stepping switch assembly. The capacitor settings are therefore dependent on the selected output frequency. Tuning time is thus minimized.

The IPA sensing circuit generates input signals for the 2nd AMPL servo amplifier, IPA TUNE servo amplifier, and IPA LOAD servo amplifier. The input for the 2nd AMPL servo amplifier is dependent on IPA tube plate current. Since IPA tube plate current increases with excitation, and excitation is dependent on the input circuit resonance, the 2nd AMPL tuning capacitor is adjusted until the required IPA tube plate current is reached.

The IPA sensing circuit also generates outputs that are dependent on the IPA pi network input reactance and input impedance. The IPA tuning capacitor is adjusted to minimize pi input reactance, and the IPA LOAD capacitor is adjusted to bring the pi input impedance to a pre-determined value.

After IPA tuning and loading is accomplished, excitation is applied to the 10-kw PA. The PA sensing circuits generate outputs that are dependent on PA tube plate current, pi input reactance, and pi input impedance. When excitation is applied to the 10-kw PA, plate current increases, and a signal from the sensing circuits trigger the PA TUNE servo amplifier into operation. The PA tuning capacitor is adjusted so as to minimize pi input reactance; the PA loading capacitor is adjusted to bring the pi input impedance to a predetermined value. After tuning and loading of the 10-kw PA is accomplished, a tuning completion signal is applied to the linear level control circuits from the PA LOAD servo amplifier.

Upon reception of the tuning completion signal, the relay circuits in the linear level control disable the servo amplifier and band switch control circuits. The linear level control also disconnects the level control circuits in the stepping switch assembly, and enables its own level control circuit. The linear level control assembly supplies a changing control signal to the exciter so that excitation is increased. Directional coupler DC900 generates a signal proportional to transmitter power output; when output power reaches a pre-determined point (usually 5-kw), the excitation level control signal is stabilized, and the tune-key signal is removed from the exciter.

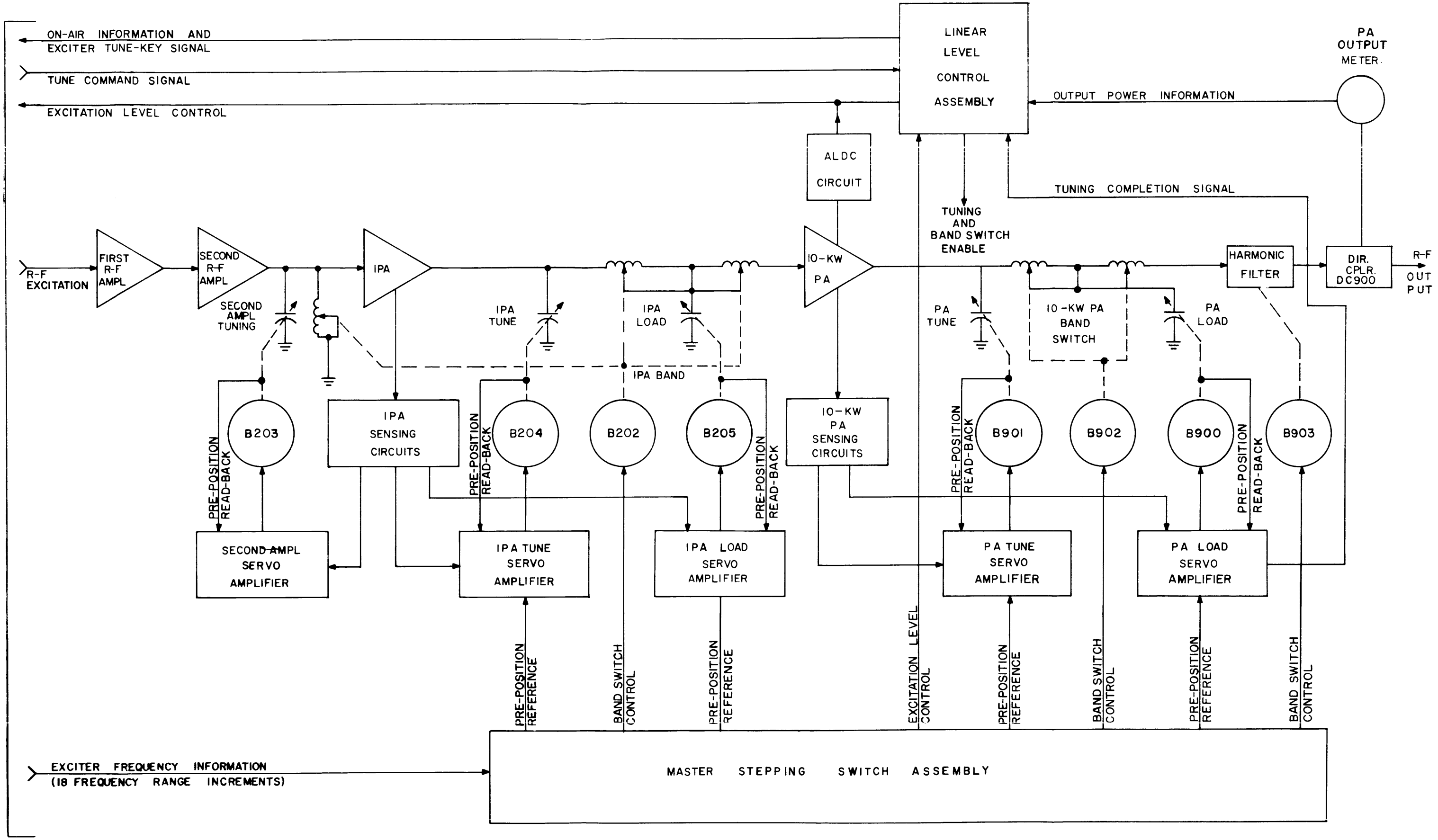

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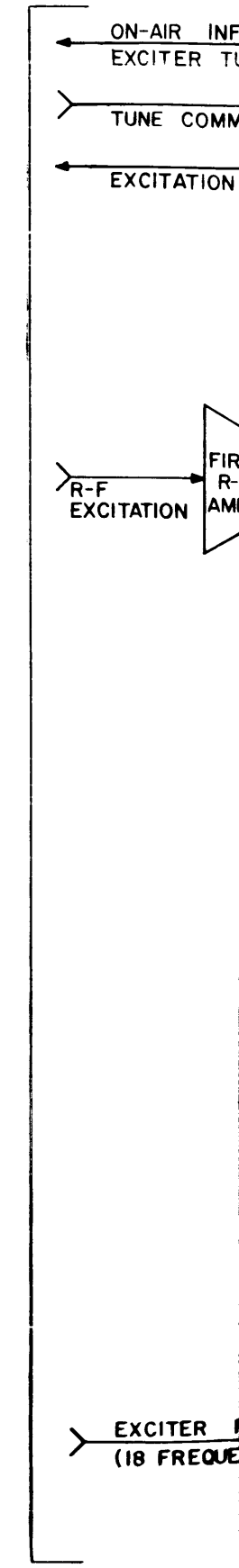
Figure 2-14. TechniMatiC Circuits, Block Diagram



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2-10. AUTOMATIC BAND SELECTION.

a. GENERAL. - There are three bandswitching circuits in the transmitter that are positioned according to the selected carrier frequency. These are the IPA, PA, and Harmonic Filter AF-105 bandswitches. The order signal for operating the bandswitches is controlled by the exciter, which can select one of eighteen frequency bands. A slave (homing) stepping switch (S9101) in the power amplifier section (see figure 6-1) receives the band selection information and drives asscociated control wafers to a position corresponding to the selected band. The band position information relating to the different frequency ranges covered for the IPA, PA, and Harmonic Filter AF-105 bands is given in table 2-1.

The IPA and PA band switching circuits are similar in operation. The filter band switch has an additional control circuit (switch S908) used for manual operation. Since the circuits are similar, only the IPA bandswitching operation will be discussed.

b. FUNCTIONAL ANALYSIS. (See figure 2-15.) - Before the application of tuning command signal to the transmitter, SERVOS OFF relay K2001 in Power Supply AP-126 is energized by a servo control relay in the LLC (Linear Level Control) assembly. Power is therefore removed from the associated servo amplifiers and band switch control circuitry. Upon the application of a tuning command signal, relay K2001 is allowed to de-energize, and power is applied to the servo amplifiers and band switch control circuits. Band switch control relay K201 receives 24 vac from terminal 9 of transformer T2002 via pin T of J216. The 24 vac from terminal 10 of T2002 is routed through contacts of K2001,

TABLE 2-1. IPA, PA, AND FILTER BAND SWITCHING INFORMATION

EXCITER FREQUENCY RANGE (MC)	MASTER STEPPING SWITCH S9101 POSITION	IPA BAND	IPA FREQUENCY RANGE (MC)	PA BAND	PA FREQUENCY RANGE (MC)	L.P. FILTER BAND	L.P. FILTER FREQUENCY RANGE (MC)
2.0- 2.4999	1	2	2-2.5	1	2-2.5	1	2-3
2.5- 2.999	2	3	2.5-3.0	2	2.5-3.0		
3.0- 3.999	3	4	3.0-4.0	3	3.0-4.0	2	3-4
4.0- 4.999	4	5	4.0-7.0	4	4.0-6.0	3	4-7
5.0- 5.999	5						
6.0- 6.999	6			5	6.0-11.0		
7.0- 8.999	7	6	7.0-11.0			4	7-13
9.0-10.999	8						
11.0-12.999	9	7	11.0-15.0	6	11.0-15.0		
13.0-14.999	10					5	13-17
15.0-16.999	11	8	15.0-19.0	7	15.0-19.0		
17.0-18.999	12					6	17-30
19.0-21.999	13	9	19.0-24.0	8	19.0-24.0		
22.0-23.999	14						
24.0-25.999	15	10	24.0-30.0	9	24.0-30.0		
26.0-27.999	16						
28.0-28.999	17						
29.0-30.999	18						

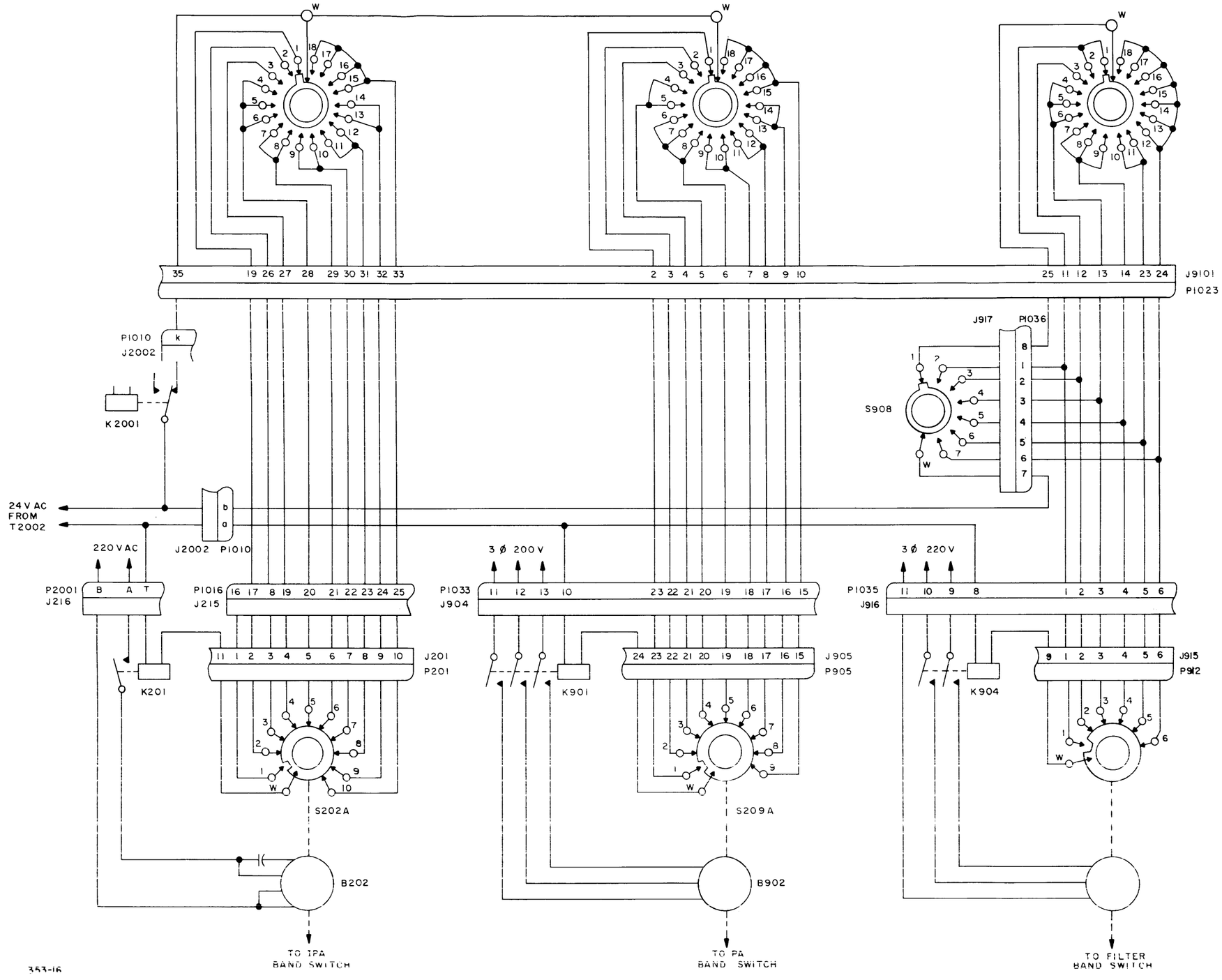


Figure 2-15. Automatic Band Switch Control Circuits

pin k of J2002, a frequency range (band) selector switch in the Stepping Switch Assembly, and pins 17 through 25 of J215. The current path through jack J215 is determined by the selected band (frequency range).

For example, if wafer S9101B is at position 1, and the 24 vac control signal is applied to terminal 17 of J215, and relay K201 is energized through S202A. With K201 actuated, band switch motor B202 is energized; the band switch is rotated until S202A is at position 2. At position 2, the current path to K201 is broken, and band switch motor B202 is de-energized. The band switch will remain at position 2 until a 24 vac band selection signal appears at a different pin of J215.

2-11. AUTOMATIC TUNING AND LOADING. (See Figure 2-16).

Three signals from the auxiliary frame are applied to the transmitter to accomplish automatic tuning, these are:

(1) Frequency range information

(2) A tune command

(3) R-f excitation

The frequency range information signal is applied to the control wafer of master stepping switch S9101. The master stepping switch then positions itself in accordance with the frequency to which the exciter is tuned. The 18 transmitter frequency ranges and the master stepping switch control circuitry are explained in paragraph 2-10.

The tune command signal is applied to the TUNE coil of relay K9009 via pin 13 of P1022 and pin A of J1010. Relay K9009 will latch in its TUNE condition and deenergize relay K2001 in the low voltage power supply (AP-126). When K2001 is deenergized, phase-2 and phase-3 voltages are applied to five servo amplifiers (2nd AMPL, IPA TUNE, PA TUNE, and PA LOAD).

When power is applied to the servo amplifiers, the units automatically begin operating in pre-position mode.

2nd AMPL servo amplifier supplies -20 vdc to pre-position readback potentiometer R222. The signal at the arm of R222 is a d-c voltage analogue of the setting of second amplifier tuning capacitor C241. A positive d-c pre-position reference signal is generated within the 2nd AMPL servo

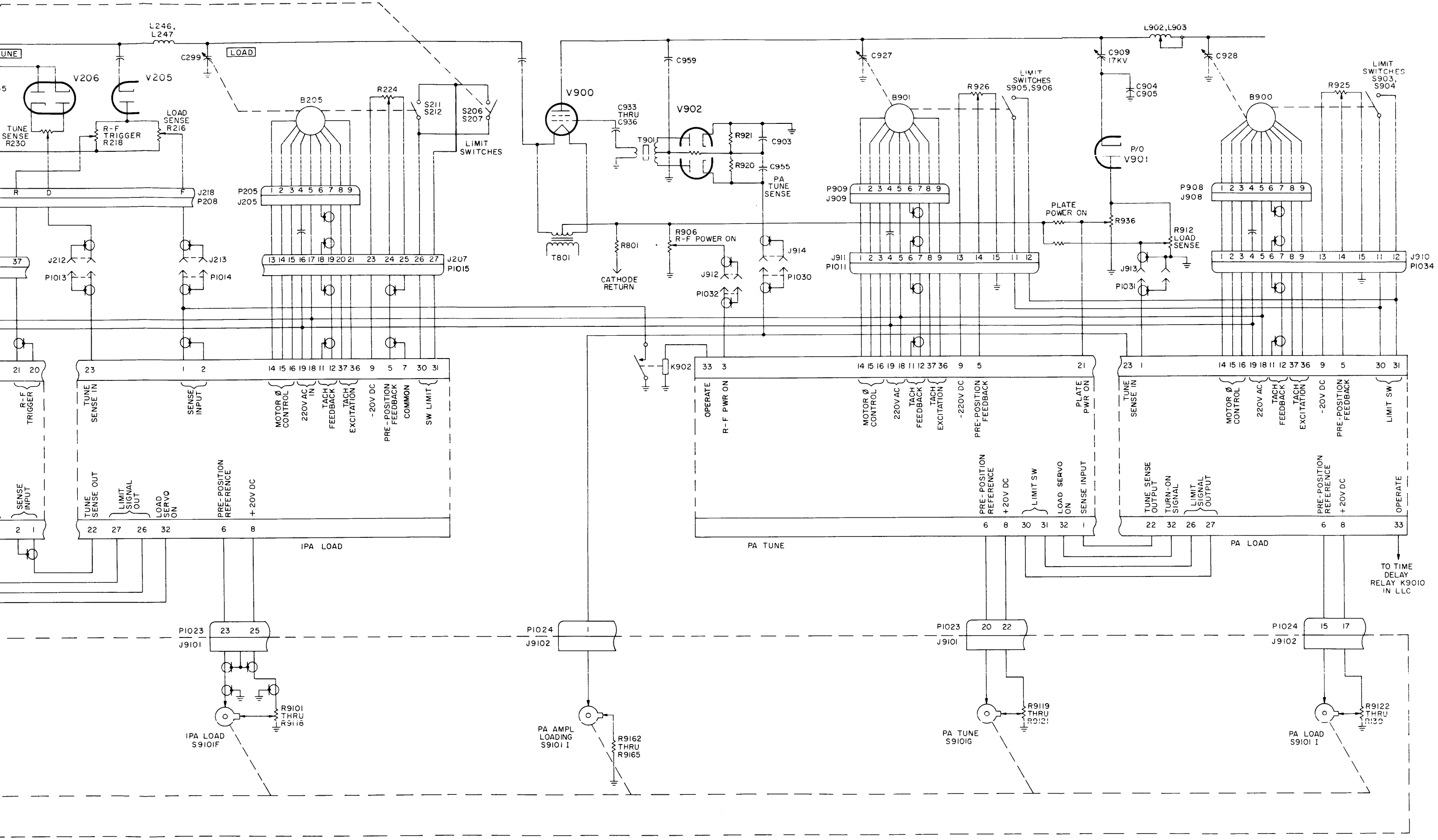
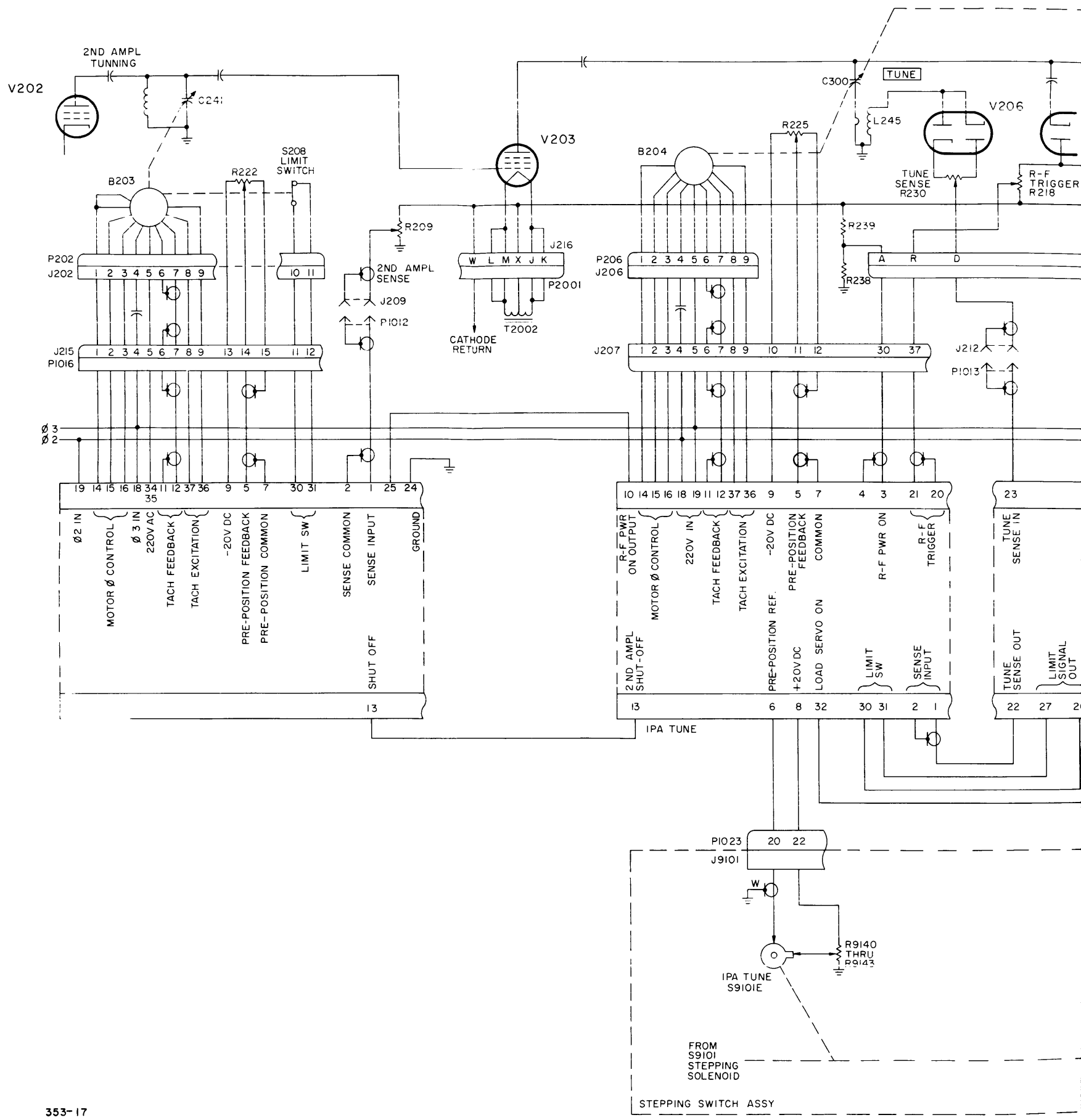


Figure 2-16. Automatic Tuning and Loading Circuits



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amplifier. The servo amplifier supplies power of proper phase to motor B203 so that the motor rotates C241, and the pre-position readback signal from R222 balances out the pre-position reference signal. The pre-position reference signal circuit is adjusted so that the motor stops when C241 is brought to its maximum capacitance setting (plates meshed).

The IPA TUNE, IPA LOAD, PA TUNE, and PA LOAD capacitors are brought to their pre-position settings in a manner similar to that of the 2nd AMPL tuning capacitor. In these cases, however, the pre-position reference signals are dervided from voltage divider circuits external to the servo amplifiers. The IPA TUNE and PA TUNE circuits each have three pre-position reference potentiometers (R9140, R9141, R9142, and R9119, R9120, R9121, respectively). One pair of these potentiometers, depending on the selected frequency range, is connected to the associated servo amplifiers through wafers of switch S9101. The IPA LOAD and PA LOAD circuits each have eighteen pre-position reference potentiometers (R9101-R9118, and R9122-R9139 respectively). The IPA TUNE, IPA LOAD, PA TUNE, and PA LOAD capacitors are, therefore, positioned near the operating points for the particular frequency selected; tuning time is thus minimized.

When the tune command signal is applied to the transmitter, relay K9006 supplies a carrier-key signal to the exciter; excitation is therefore applied to the transmitter. When 2nd AMPL servo amplifier has completed its pre-positioning, it automatically switches to search mode of operation.

In search mode, the 2nd AMPL servo amplifier receives a sense signal from potentiometer R209. The servo amplifier supplies motor B203 with the proper phase voltage so that C241 is rotated towards minimum capacitance. When the second r-f amplifier approaches resonance, IPA tube (V203) plate current increases, and the positive d-c voltage developed across R209 increases. When IPA tube plate current reaches 230 ma, motor B203 stops.

When IPA tube plate current reaches 220 ma, the voltage at the junction of resistors R237 and R238 triggers the IPA TUNE servo amplifier into search mode (assuming that pre-positioning has been accomplished). The IPA TUNE servo amplifier simultaneously supplies a disabling signal to the 2nd AMPL servo amplifier via pin 13 of P1018 and pin 13 of P1017. In search mode, the IPA TUNE servo amplifier accepts an input from the arm of potentiometer R218. The voltage at the arm of R218 is dependent on V203 plate current, and V203 r-f plate voltage. An increase in plate current tends to make this point positive; r-f plate voltage tends to make this point negative. During the pre-position process, capacitor C300 is set to a higher value of capacitance than is used for the selected frequency range. Since excitation is applied to V203, and the stage is not resonated, the arm of R218 is now positive. The IPA TUNE servo amplifier supplies the proper phase voltage to motor B204 so that the capacitance of C300 is decreased. When the IPA tuning circuit approaches resonance, plate current decreases, and plate r-f voltage increases.

The voltage at the arm of R218, therefore, becomes less positive. When this signal reaches 0 vdc, the IPA TUNE servo amplifier automatically goes into operate mode. The IPA LOAD servo amplifier is also enabled by a signal from the IPA TUNE servo amplifier that is routed via pin 32 of P1018 and pin 32 of P1019. A sense signal from the arm of potentiometer R230 is routed through the IPA LOAD servo amplifier into the IPA TUNE servo amplifier via pin 22 of P1019 and pin 1 of P1018. This sense signal is a d-c potential that is dependent upon the phase relationship between fundamental frequency currents and second harmonic currents through capacitor C300. When the IPA pi-tuning network presents a resistive load to tube V203, second harmonic currents through C300 will lead the fundamental signal current by 90^{o}, and the IPA TUNE sense signal will be 0 vdc. When the pi-tuning network is improperly tuned and matched, the IPA TUNE sense signal will be either positive or negative, depending on whether the circuit is inductive or capacitive at the fundamental frequency. The IPA TUNE servo amplifier supplies motor B204 with proper phase voltage so that capacitor C300 is adjusted to make the pi network resistive.

When the IPA LOAD servo amplifier is enabled by the signal at pin 32 of P1019, it accepts a sense signal from the arm of potentiometer R216. This sense signal is a d-c potential that is derived from V203 plate current and r-f plate voltage. When the pi network presents an excessivley high inpedance to the plate of V203, r-f voltage will be high,

and the IPA LOAD sense signal will be negative. When the pi network presents an excessively low impedance to the tube plate, plate current will be high, and the sense signal will be positive.

When C300 is being adjusted to make the pi network non-reactive (in resonance), the IPA LOAD servo amplifier supplies the proper phase voltage to motor B205 so that capacitor C290 keeps the pi network input impedance matched to the plate of V203. When both the TUNE and LOAD sense signals are at 0 vdc, motors B204 and B205 stop, and the IPA stage is properly tuned and loaded.

When the IPA output tuning and loading circuit approaches resonance, excitation is applied to the cathode of V900 (10-kw PA). The cathode of V900 becomes positive (due to IR drop across R801), and a positive signal from the arm of potentiometer R906 is routed to the PA TUNE servo amplifier. This positive d-c signal triggers the servo amplifier into the search mode of operation when V900 plate current reaches 750 ma. During search mode, the PA TUNE servo amplifier accepts an input from potentiometer R932. This signal is dependent on V900 plate current and r-f voltage at the plate of V900. An increase in plate r-f voltage tends to make the servo amplifier input more negative; an increase in plate current tends to make the servo amplifier input more positive. During pre-positioning, tuning capacitor C927 was set at a higher capacitance than would be used for the selected frequency range. During search mode, the PA TUNE servo amplifier supplies the proper phase voltage to motor B901 so that the capacitance

of C927 is decreased. When the PA output tuning circuit approaches resonance, plate current decreases, and plate r-f voltage increases. The PA TUNE servo amplifier input will approach 0 vdc. At this time, the PA TUNE servo supplies an enable signal to the PA LOAD servo amplifier. The PA LOAD servo amplifier now routes a sense signal from V902, via pin 22 of P1021 and pin 1 of P1020, to the PA TUNE servo amplifier. This sense signal is a d-c potential that is dependent on the phase relationship between the V900 plate r-f voltage, and the V900 r-f grid current. When V900 is terminated in a resistive load (pi network is properly resonated and matched), plate r-f voltage is 180° from grid r-f voltage. R-f grid current being capacitive, however, leads the grid r-f voltage by 90°. Under these conditions, the sense signal from V902 is 0 vdc. If the output pi network is not properly adjusted, plate r-f voltage and grid r-f current will be either more or less than 90° apart, depending on whether the load for V900 is capacitive or inductive. The PA TUNE servo amplifier sensing circuit is bridged via wafer I of stepping switch S9101. This bridging lowers loop gain and prevents over-correction of capacitor C927. When the input to the pi network approaches resonance, the PA TUNE servo amplifier supplies 28 vdc to relay K902. The 2nd AMPL, IPA TUNE, and IPA LOAD servo amplifiers are disabled when K902 is energized.

When C927 is being adjusted to make the 10-kw PA pi network non-reactive, the PA LOAD servo amplifier accepts an input from potentiometer R916. This sense signal is a d-c potential that is dependent on plate r-f voltage and d-c plate current. The PA LOAD servo amplifier therefore supplies motor B900 with the proper phase voltage so that capacitor C928 keeps the pi network properly

matched to the plate of V900.

After both the TUNE and LOAD sense signals are brought to 0 vdc, the PA LOAD servo amplifier supplies 28 vdc to relay K9010 via pin 33 of P1021 and pin 11 of P1022. Six seconds thereafter, power is removed from the transmitter servo amplifiers.

If, during the tuning process, 2ND AMP TUNING capacitor C241 is rotated to its extreme minimum capacitance setting (indicating that the stage has failed to tune properly) limit switch S208 is actuated, and the associated servo amplifier is triggered into its pre-position mode. The tuning process for this stage is then repeated. The upper and lower limit switches for the IPA tune and IPA load capacitors are both connected to the IPA LOAD servo amplifier. If one of these capacitors is rotated to either of its limits, the IPA LOAD servo amplifier is triggered into pre-position mode, and this servo amplifier supplies a pre-position trigger to the IPA TUNE servo amplifier. Therefore, both the tuning and loading sequences are completely repeated. Similarly, all of the limit switches for the PA tuning and loading capacitors are connected to the PA LOAD servo amplifier.

2-12. LINEAR LEVEL CONTROL AX590.

a. GENERAL. The LLC (Linear Level Control) functions with associated units of the transmitter as a remotely controlled unit using a motor driven adjustment control. The position of the control arm, which is set by the drive motor determines the amplitude of the output. Once the transmitter is properly tuned, this output, which is a decreasing negative d-c potential, is sent to the exciter for use in driving the power amplifier up to its rated output level. Limit switches, present in the LLC, prevent the drive motor from raising or lowering the adjustment control beyond preset points. Similarly, limit switches in the power amplifier section are preset to control the lower and upper power limits of the transmitter. A -24-volt power supply, a network of interlocking switches and relays are provided to control the drive motor. Power Supply AP-126 supplies 24 volts a-c to the -24-volt power supply and the resultant -24-volt output is used to electrically drive the motor. Zener diode CR9002 also utilizes the output from the -24-volt power supply to provide a regulated -20-volt potential across adjustment control R9002. Relays K9007 and K9008 determine the direction of rotation of the drive motor. The discussion to follow is divided into four sequentially related conditions of LLC control. These are: pre-condition, power drive up, lower power limit,and upper power limit. Each condition will be described in turn.

b. LLC DURING PRE-POSITION.

(1) General. During the pre-position (tune) operation, the LLC in conjunction with Stepping Switch Assembly AX589,

provides a fixed gain control voltage to the exciter and completes a 30-volt d-c path to the fault circuits in the Control Terminator. At the same time the drive motor rotates to a position determined by its lower limit switch, driving the wiper arm to its lower limit. Should the transmitter fail to tune during the pre-position mode of operation, the Control Terminator, when properly conditioned by the Remote Control Panel, sends a reset control voltage to the LLC that starts the tune cycle over again.

(2) Functional Analysis (See Figure 2-16). - When remote control tuning is in effect, the Control Terminator provides a momentary ground (initiate tune command) to pin 13 of J9001, locking latching relays K9002, K9005, K9006, and K9009 in the tune position and momentarily energizes relay K9011. At the same time a slave stepping switch in the Stepping Switch Assembly positions wafer S9010K according to the selected band frequency. When the wafer is moved to its selected position, the tab on the wafer makes contact with one of eighteen pre-aligned potentiometers (See figure 6-1.). The wiper connects to a contact on relay K9002. With relay K9002 energized, the relay contacts close, disconnecting the control arm of potentiometer R9002 and connects a series circuit. This circuit consists of the selected potentiometer in the Stepping Switch Assembly and diode CR9002, connected in series with the -20-volt regulated supply line. As a result, the negative potential developed across the potentiometer is applied to the exciter via jack J1008. This voltage controls the gain of the exciter which in turn controls the output of the IPA and PA stages of the transmitter during automatic tuning and loading.

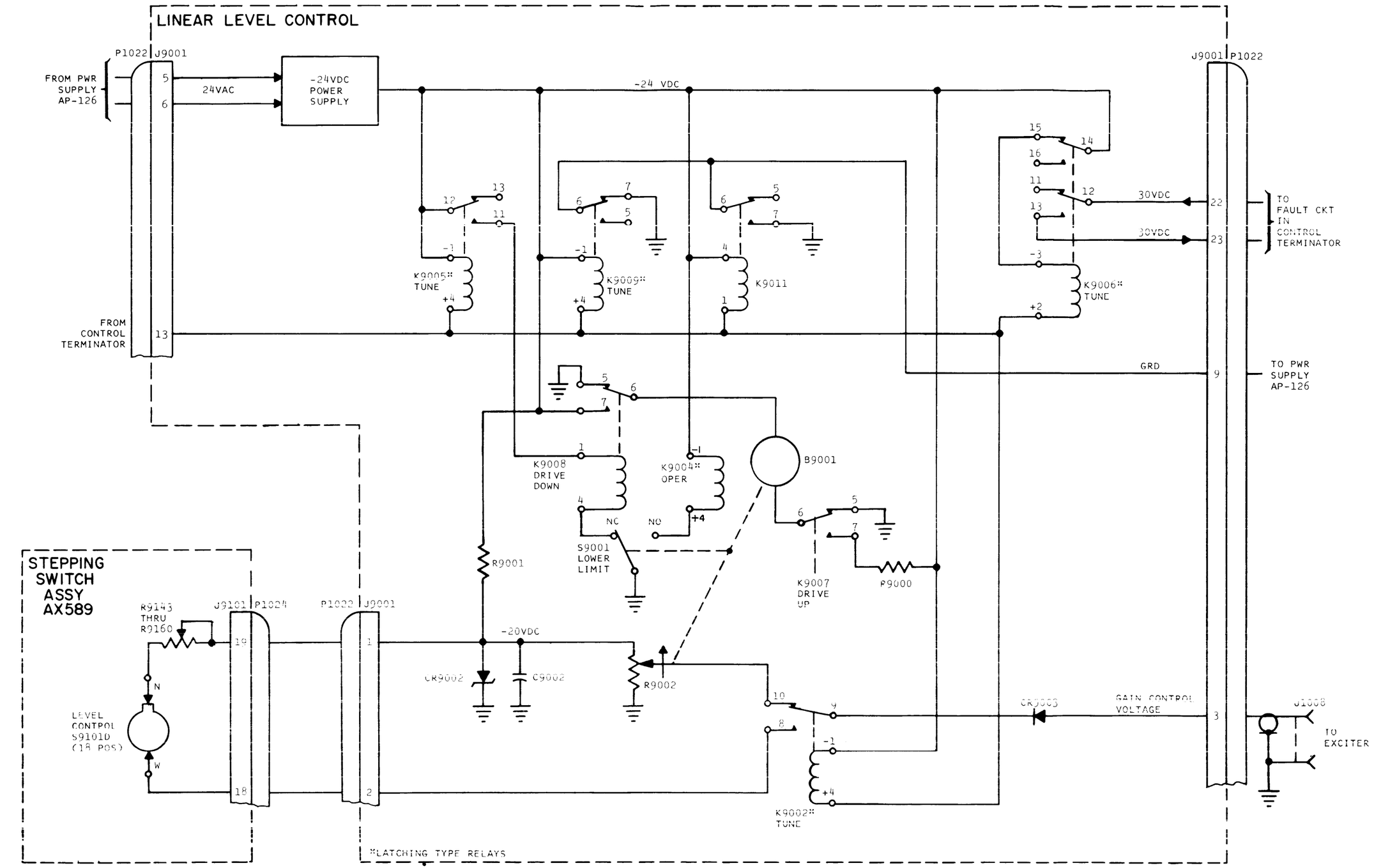


Figure 2-17. LLC During Pre-Position

When relay K9005 energizes, the closed contacts of the relay pass 24-volts to relay K9008, energizing the relay. With relay K9008 energized, -24-volts is fed through its contacts to power motor B9001 so that the motor rotates the control arm of potentiometer R9002 towards the high end of the -20-volt potential. The motor will continue to rotate until it reaches a preset position and trips microswitch S9001 at the lower limit of the switch. When the microswitch is tripped, the normally closed and open contacts of the switch open and close, respectively. With the normally closed contacts open, the coil of relay K9008 de-energizes, cutting off the drive potential to the motor, and the motor stops. When the normally open contacts of the microswitch close, latching relay K9004 is energized, locking the relay in the operate position.

Relay K9009, when energized, removes the ground path for energizing servos off relay K2001 in Power Supply AP-126. This relay controls the application of phase 3 power to the servo amplifiers and motors in the IPA and PA sections. When de-energized, the relay permits the IPA and PA servo amplifiers and motors to tune the transmitter to the carrier frequency. During the period of transmitter tuning, relay K9006 connects a 30-volt d-c path for the fault circuit in the Control Terminator. Should the transmitter fail to tune within the specified time, a fault indicator lights on the Remote Control Panel. In this case, a RESET pushbutton on the Remote Control Panel may be depressed, supplying via the Control Terminator, a control voltage that momentarily activates relay K9011. Under these conditions, the relay contacts of K9011 provide a momentary ground to the servos off relay K2001 in Power Supply AP-126, which momentarily energizes the relay.

This action momentarily removes phase 3 power from the IPA and PA servo amplifiers and motors. With the momentary interruption of phase 3 power from the servo amplifiers, the IPA and PA stages are returned to the pre-position mode of operation and the tuning and loading process is repeated.

c. LLC DURING POWER DRIVE-UP.

(1) General. - Prior to driving the transmitter up to its lower power limit (normally preset at 5 kw on front panel PA OUTPUT meter M1006), the PA load and tune amplifiers have completed their coarse tuning operation. At the start of fine sense tuning, the PA load servo amplifier sends a servos off command signal to a time delay relay in the LLC. After six seconds, the relay energizes and conditions relays in the LLC to drive the motor, causing it to rotate the control arm of potentiometer R9002 in a raise power direction.

(2) Functional Analysis (See Figure 2-17). - At the start of the fine sense tuning, a relay in the PA LOAD servo amplifier is operated to supply 28-volts to the heater element in the time delay relay K9010. After six-seconds, the thermal contacts of K9010 close, connecting 24-volts to lock latching relays K9009 and K9005 in the servos off and operate positions, respectively. With relay K9009 energized, one set of contacts opens the 24-volt path to the heater element of relay K9010. The second set of contacts connects a ground path, enabling servos off relay K2001 in Power Supply AP-126. When energized, the servos off relay cuts off phase-3 power to the servo amplifiers and motors in the IPA and PA sections of the transmitter.

With relay K9005 energized, two actions occur: one, resistor R9006 is parallel connected with the IPA grid bias resistor in power supply AP-126. During the transmitting period, this serves to set the bias level of the IPA tube for a linear signal response. Two, a 24-volt path is completed to energize latching relays K9002 and K9001 in the operate and drive-up positions, respectively.

The action of relay K9001 causes relay K9007 to energize. Whenever relay K9007 is energized, d-c power is applied to the motor, causing it to rotate the control arm of potentiometer R9002 in the raise power direction. With ALDC switch S1018 in its ON position, the rectified aldc voltage,(which is a negative voltage, proportional to r-f signal peaks), is algebraically added to the potential taken off the control arm of R9002. The resultant output voltage is then coupled through J1008 to control the gain of the exciter, which in turn controls the output power levels of the IPA and PA stages of the transmitter.

d. LLC DURING LOWER POWER LIMIT.

(1) GENERAL. - There are two controls used on PA OUTPUT meter M1006 to maintain the lower and upper power limits of the transmitter. For 10 kw (PEP) operation, these controls may be preset at 5 kw and 6 kw. When either of these two limits is reached, the output of a photo-electric cell is interrupted, conditioning relays in the LLC, which in turn control the operation of drive motor B9001. The discussion to follow is limited to the aspects of LLC during lower power limit operation. Refer to paragraph e for LLC upper power limit operation.

(2) FUNCTIONAL ANALYSIS (See Figure 2-18). - Prior to LLC lower power limit operation, drive-up relay K9007 is energized through a series of interlocking relay contacts (refer to paragraph c). The closed contacts of relay K9007 feeds power to the drive motor, causing it to rotate the wiper-arm of potentiometer R9002 in the raise power direction. At the same time, a corresponding increase in power is indicated by front panel PA OUTPUT meter M1006.

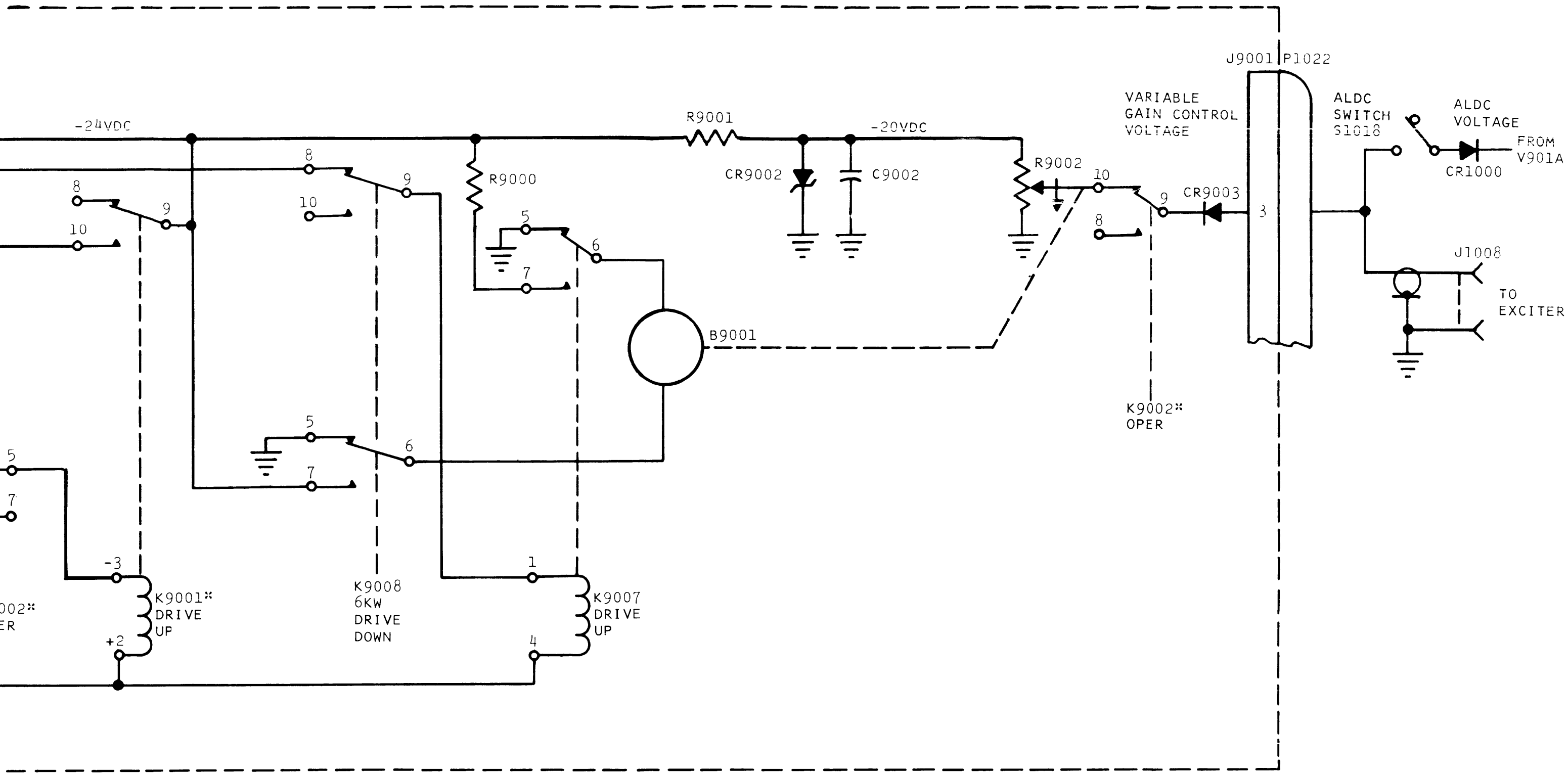
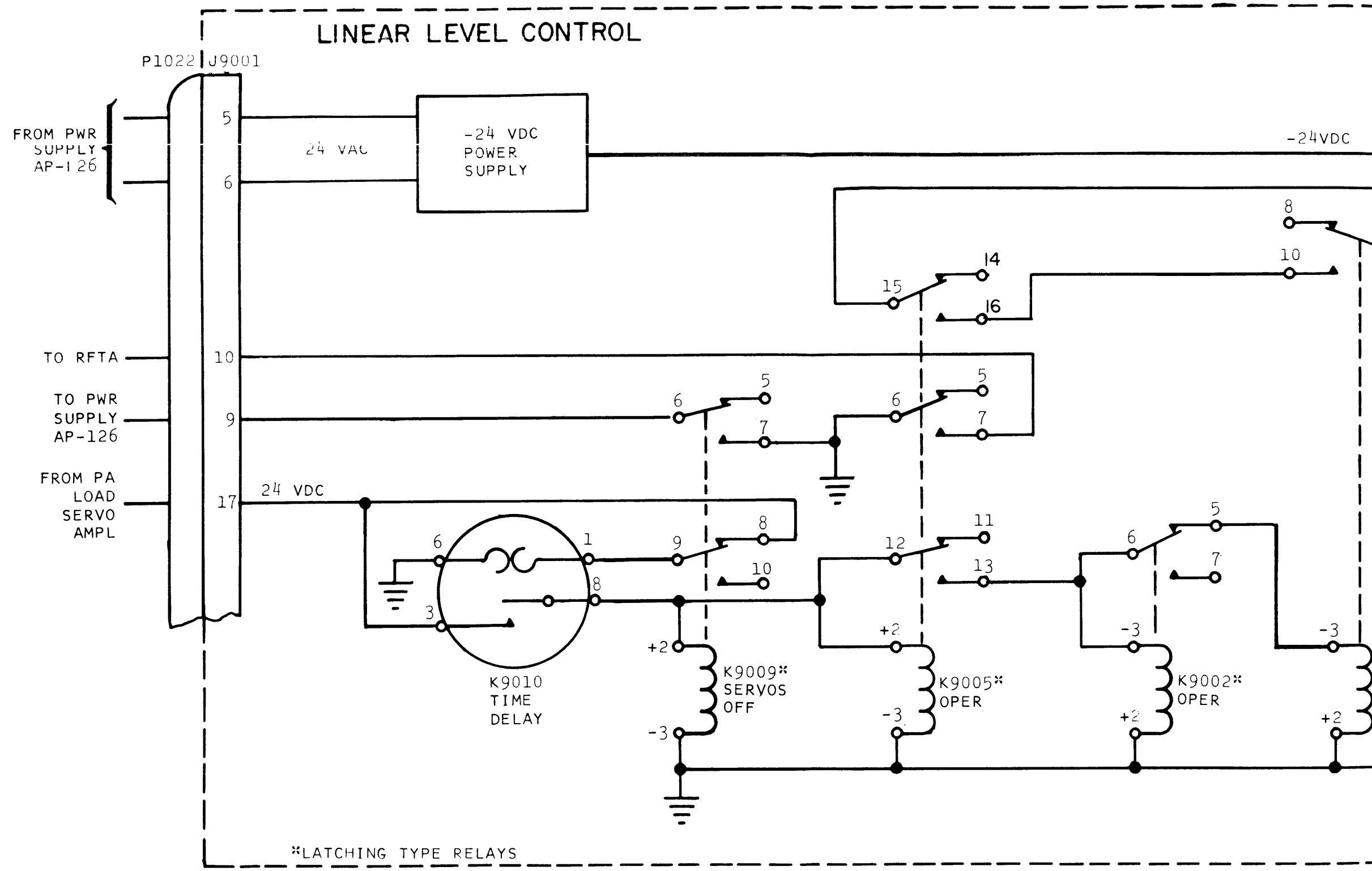


Figure 2-18. LLC During Power Drive-up.



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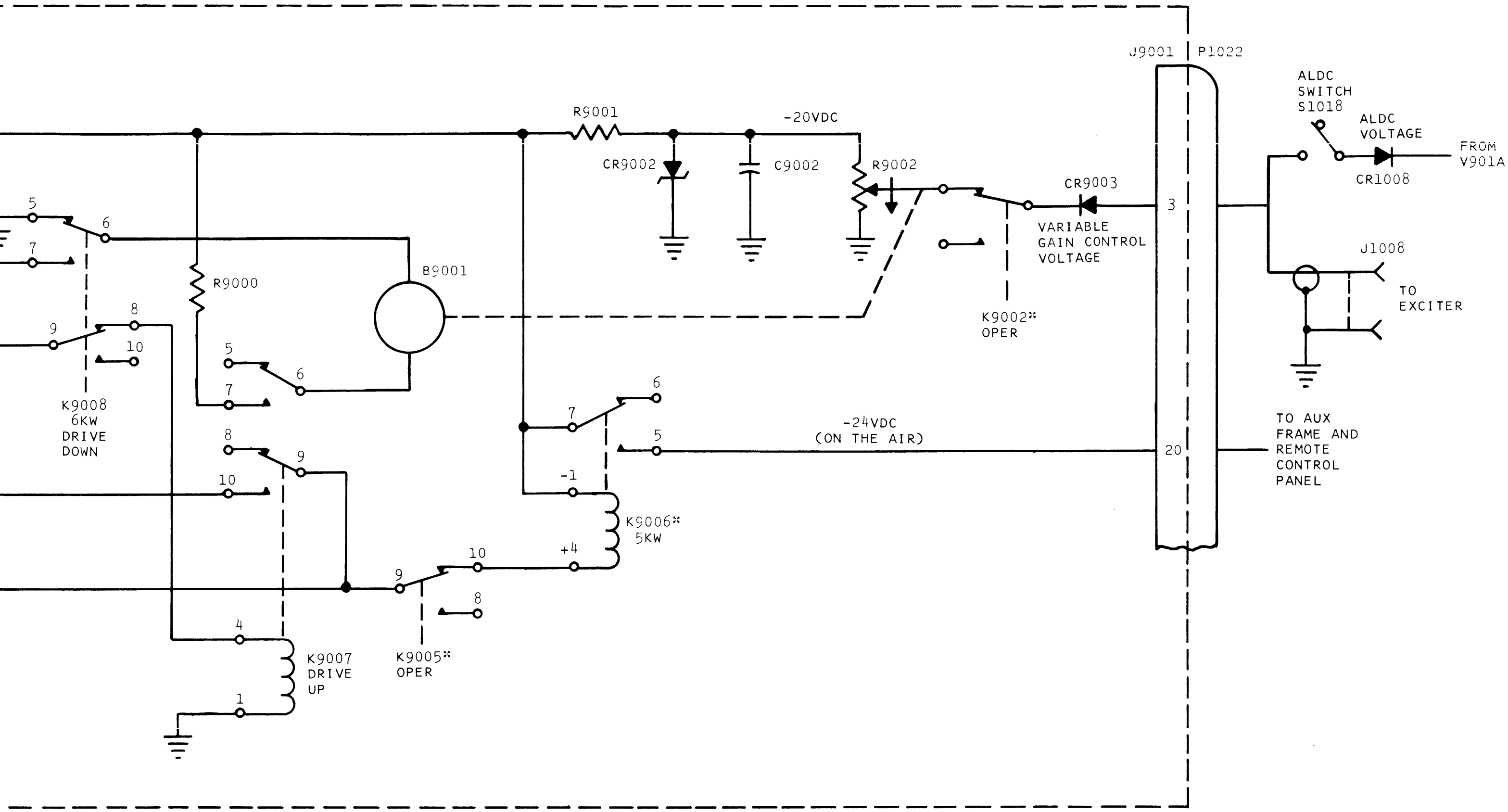
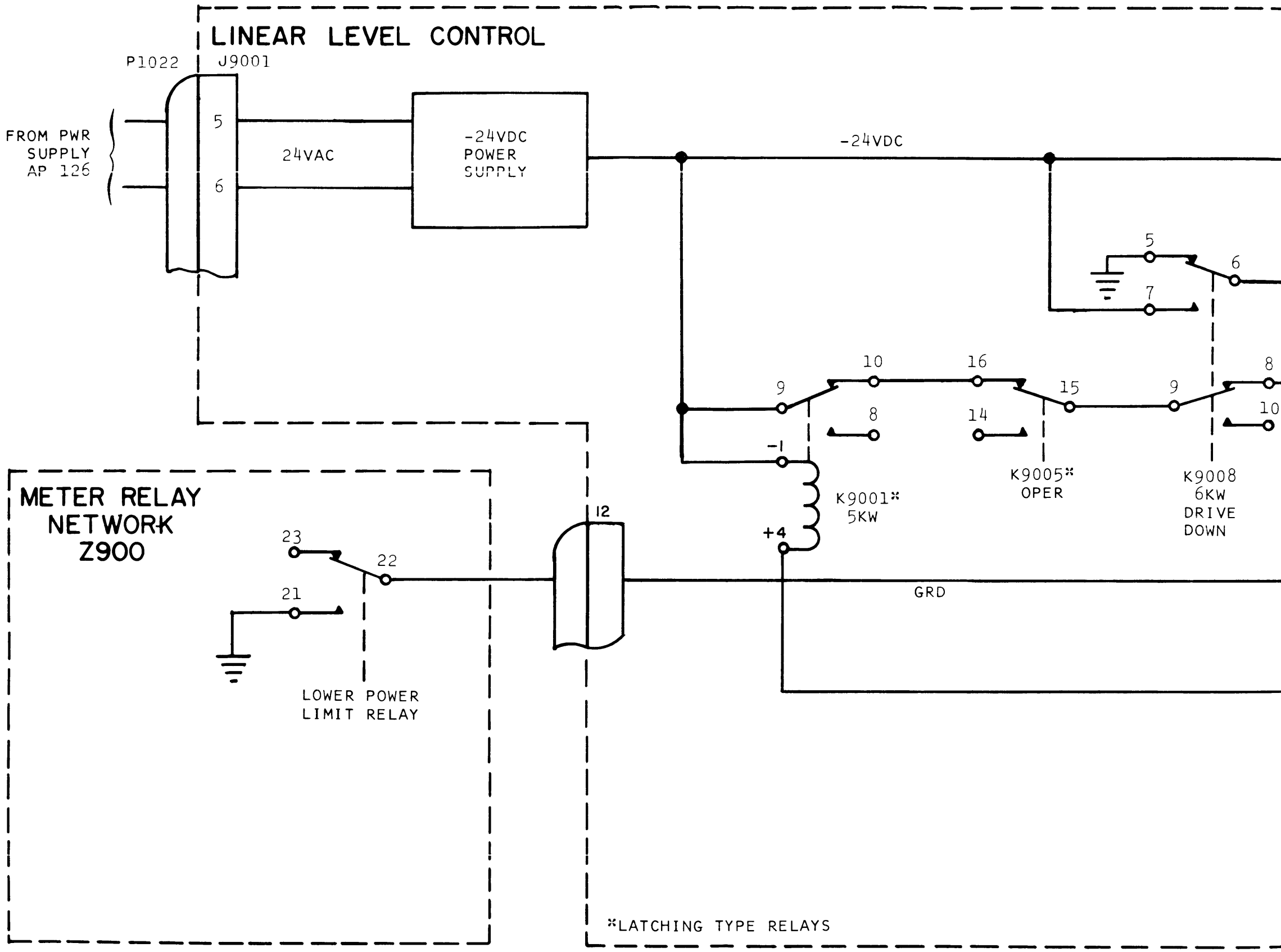


Figure 2-19. LLC During Lower Power Limit



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Relay K9007 will remain energized, and the motor will rotate in the raise power direction, until the lower power limit of the transmitter is reached. When the lower power limit is reached, the moving pointer and the preset position of the lower power limit pointer on PA OUTPUT meter M1006 are in correspondance. With both pointers in correspondance, a photo-electric circuit in meter M1006 is interrupted, thereby energizing a relay in Meter Relay Network Z900. With the relay energized, its contacts provide a ground path enabling relays K9001 and K9006 to latch in the 5KW position. With both relays energized, the following occurs: A -24-volt "on-the-air signal" is routed through the closed contacts of relay K9006 to the Remote Control Panel and auxiliary frame, and drive-up relay K9007 is deenergized by the open contacts of relay K9001. With relay K9007 disabled, the -24-volt drive potential to the motor is cut off and the motor stops.

e. LLC DURING UPPER POWER LIMIT.

(1) General. - There are three conditions which may cause the motor in the LLC to drive in a lower power direction. These are as follows: one, the upper power limit of the transmitter is reached due to excessive high drive peaks which may develop during multiple signal transmission; two, an overload condition exists in the diode overload circuitry of Relay Panel AR-176, and three, the transmitter fails to reach its lower power limit due to an operational failure. These three conditions will be separately described in the order given.

(2) Functional Analysis (See Figure 2-19). - The amplitude of the signal voltage developed by the 10-kw power amplifier is measured by PA OUTPUT meter M1006. Assuming that an overload condition exists due to excessive high levels of signal transmission, the resultant output from the power amplifier drives the moving pointer on meter M1006 towards its upper power limit. When the upper power limit is reached, the moving pointer and the upper power limit pointer on the meter are in correspondance. When both pointers are in correspondance, the output of a photo-electric circuit is interrupted and a relay in Meter Relay Network Z900 is energized. A ground path is then enabled, conditioning relay K9004 to latch in the drive-down position, which in-turn conditions 6KW drive-down relay K9008 to energize. Relay K9008 when energized, provides power to drive motor B9001 in the lower power direction. The motor will continue to operate in the drive-down direction until the lower power limit is reached. At this point, the photo-electric circuit controlling the lower power limit is interrupted, this time causing a relay in Meter Relay Network Z900 to deenergize. With the relay disabled, relay K9004 is conditioned

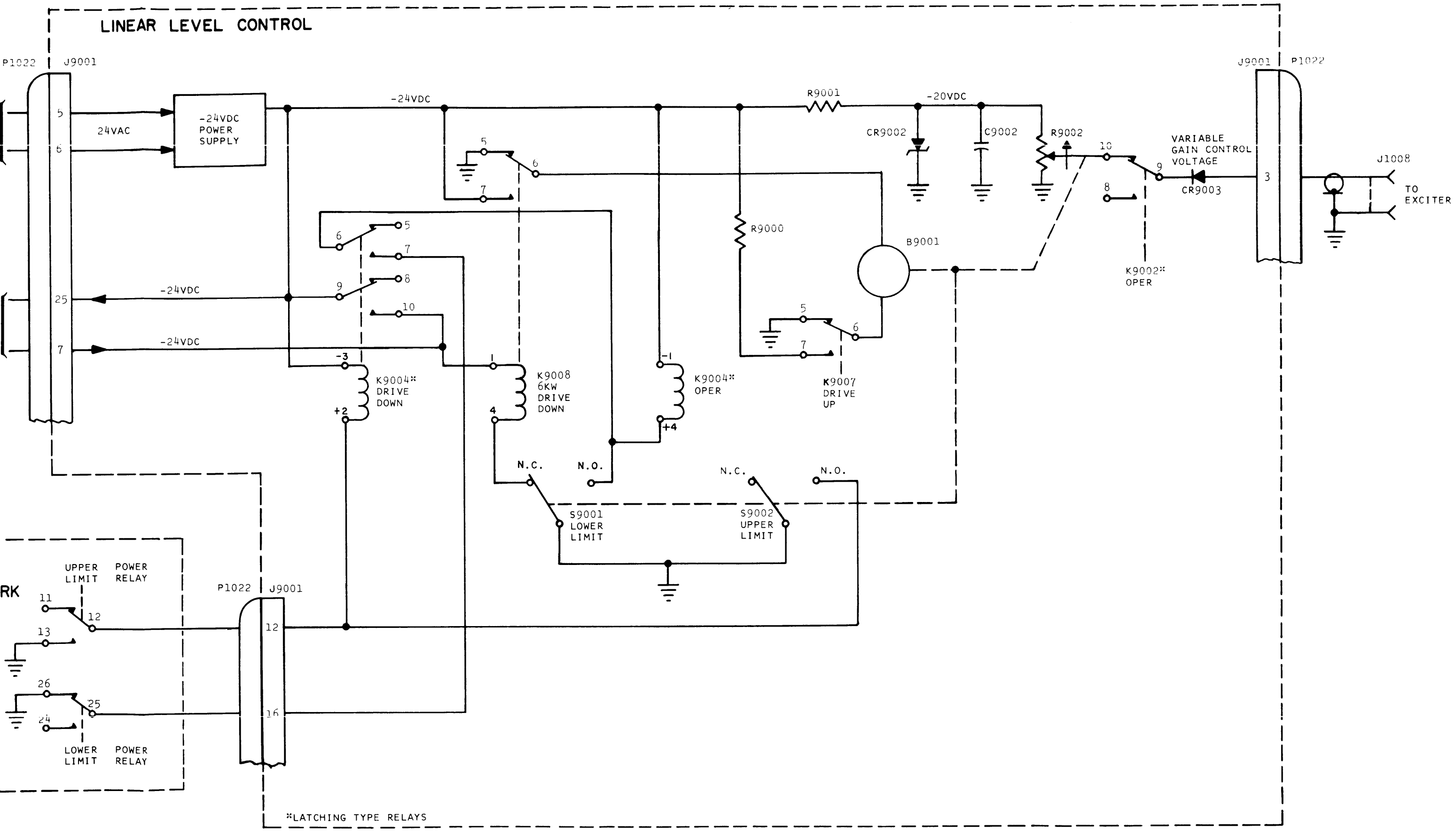
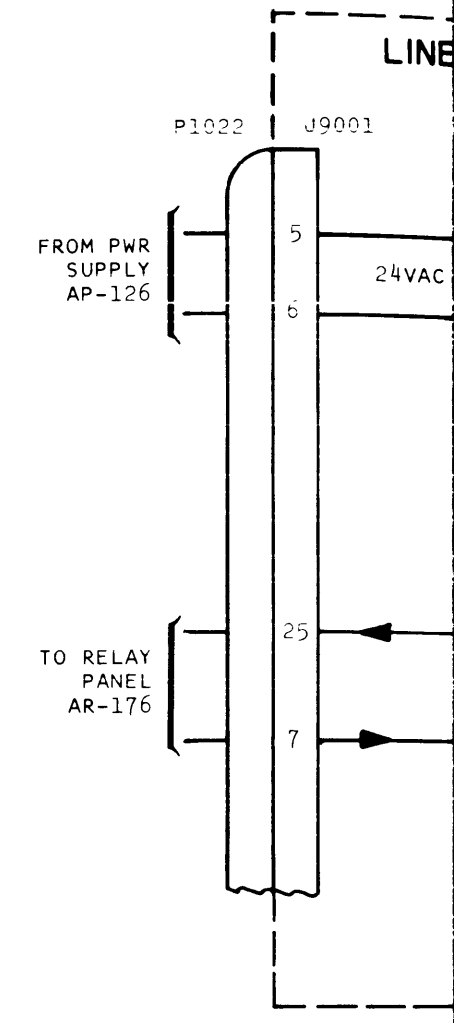
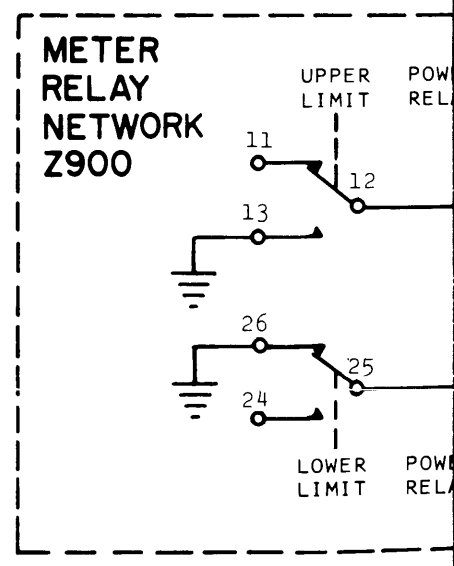


Figure 2-20 LLC During Upper Power Limit





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to latch in the operate position causing relay K9008 to de-energize. Whenever K9008 is deenergized the drive potential to the motor is removed and the motor stops.

Current flow in the screen voltage regulator of the main power supply is sampled by the overload coil of diode protect relay K704. When the current in the screen voltage regulator exceeds its normal operating limit, relay K704 switches to its overload state. In this state, relay K704 connects -24 volts to relay K9008, energizing the relay. With relay K9008 energized, motor B9001 will rotate in the lower power direction until the current is sufficiently lowered to deenergize relay K704. At this time, the contacts of relay K704 open,disabling the energizing path for relay K9008 and the motor stops.

Under normal conditions, the relays in the LLC are operated to drive the motor in the raise power direction until the lower power limit of the transmitter is reached. Should an operational failure occur during the power drive-up period, the motor will continue to rotate until it reaches a preset position and trips microswitch S9002 at its upper limit. When the contacts of the microswitch close, a ground path is then enabled, conditioning relay K9004 to latch in the drive-down position. As previously described, when relay K9004 is operated in the drive-down position, relay K9008 is activated, causing the motor to rotate in the drive down direction. At the same time relay K9008 acts to disable drive-up relay K9007 (see figure 2-18).

When the motor rotates in the lower power direction, away from the upper limit position microswitch S9002 reverts to its non-tripped position. At this point, a relay in the Meter

Relay Network provides a continuous ground through the contacts of K9004, to latch relay K9004 in its operate position. With relay K9004 in the operate position, the motor drive control switches from relay K9008 to relay K9007, which correspondingly switches the direction of motor rotation. From this point the motor will rotate until the upper limit switch is again engaged and the functions of relays K9004, K9007, and K9008 are repeated.

2-13. 2ND AMPL SERVO AMPLIFIER (AZ-105).

a. GENERAL. - The AZ-105 supplies control voltage to the second r-f amplifier tuning motor. This control voltage is in turn dependent on one of two servo-amplifier input signals: a pre-position feedback signal, or a sense signal. The servo amplifier has three modes of operation: pre-position, search, and operate. Each of these modes are discussed in sequence; refer to figure 6-2.

b. PRE-POSITION. - A pre-position feedback signal enters the AZ-105 at pin 5 of jack J402, and is routed to pin 12 of plug-in module Z400. Module Z400 also receives a pre-position reference signal (-0.5 vdc) at pin 25. The pre-position feedback signal is a voltage between 0 and +20 vdc. The feedback and reference signals are algebraically added and the resultant is modulated with 60 cps a-c (supplied at pins 21 and 22 of J400). This a-c modulated signal is amplified, and routed to contact 3 of relay K400 via pin 11 of J400.

When the pre-position feedback signal is appreciably removed from +0.5 vdc, relay K400 is deenergized, and the a-c modulated signal from pin 11 of Z500 is routed to pin 10 of Z501. This a-c modulated signal is amplified in Z401, and routed to the second amplifier tuning motor via pins 14 and 16 of J402. When the feedback signal approaches a level of +0.5 vdc (the algebraic sum of the feedback and reference signals is small), tuning motor control voltage diminishes, and relay K400 is energized. With K400 energized, the signal path from pin 11 of Z400 to pin 10 of Z401 is broken; also, +28 vdc is applied to the coil of relay K402 and to SEARCH lamp DS401.

c. SEARCH. - A sense signal enters the AZ-105 at pin 1 of jack J402; this sense signal is a current between 0 and +200 ua. A voltage divider comprising resistors R412 and R413, and resistor R411 form a -200 ua current source; this is the sense reference signal. The sense input and sense reference signals are algebraically added, and the sum is applied to transformer T401 via resistor R407 and chopper G400. The a-c signal from the secondary of T401 (dependent in amplitude on the sense-input signal) is applied to plug-in module Z401 at pins 1 and 9 of Z401. The signal at pins 1 and 9 of Z401 is amplified, and routed to contact 6 of relay K401 via pin 3 of J401. When K401 is energized (pre-positioning is completed), the signal from pin 3 of J401 is routed via resistor R408 to pin 10 of Z401; this signal is amplified and routed to the tuning motor.

d. OPERATE. - When the sense-input signal approaches +200 ua (the algebraic sum of the sense-input and sense-reference signals is small), control voltage for the tuning motor diminishes; also, relay K401 is energized. Operation of K401 lights OPERATE lamp DS400, and removes supply voltage from the heater of relay K404. Relay K400, and pin 8 of Z400, however, are returned to the +28 vdc supply via diode CR405 and the external limit switch (connected between pins 30 and 31 of J402). When the sense-input signal reaches +200 ua (indicating that the second r-f amplifier is properly tuned), a 28-volt shut-off signal is applied to pin 13 of J402. This shut-off signal energizes relay K403. Operation of K403 grounds out the sense-input signal, and removes supply voltage from the tuning motor (normally supplied via pin 15 of J402).

e. LIMIT SWITCH OPERATION. - If the external limit switch (connected between pins 30 and 31 of J402) opens during the search or operate sequence of operation, relay K400 is deenergized. With K400 deenergized, K402 is also deenergized, 28 volts is removed from pin 7 of Z400, and the servo amplifier begins operating in pre-position mode. Note that the signal from pin 11 of Z400 is again routed to pin 10 of Z401. The unit will continue to operate in pre-position mode until the pre-position feedback signal reaches +0.5 vdc, and the search sequence begins.

2-14. IPA AND PA TUNE SERVO AMPLIFIERS (AZ-106, AZ-109).

a. GENERAL.- Servo amplifiers AZ-106 and AZ-109 are similiar in operation; therefore, the following discussion, directed primarily at the AZ-106, applies to both units.

The AZ-106 supplies a control voltage to the IPA tuning motor. This control voltage is, in turn, dependent on various servo-amplifier input signals: pre-position feedback and reference signals, an internally generated search signal, an r-f trigger input, a coarse-tune sense signal, and a fine-tune sense signal. The servo amplifier has three modes of operation: pre-position, search, and operate. Each of these modes is discussed in sequence; refer to figure 6-3.

b. PRE-POSITION. - A pre-position feedback signal enters the AZ-106 at pin 5 of jack J302 and is routed to pin 12 of plug-in module Z300; a pre-position reference signal enters the AZ-106 at pin 6 of J202 and is routed to pin 25 of Z300. The pre-position feedback signal is a d-c analogue (between 0 and -20 vdc) of the tuning capacitor setting. The pre-position reference signal is set at a point between 0 and +20 vdc in accordance with the desired tuning capacitor setting. The feedback and reference signals are algebraically added and the resultant is modulated with 60 cps a-c (supplied at pins 21 and 22 of J300). This a-c modulated signal is amplified, and routed via pin 11 of J300, contacts 3 and 4 of relay K301, and pin 10 of J301 to module Z301. The a-c modulated signal is further amplified in Z301, and routed to the external tuning motor via pins 14 and 16 of J302.

When the associated tuning capacitor approaches the correct pre-position setting, the algebraic sum of the feedback and reference signals diminishes,

and control voltage for the tuning motor diminishes. When the tuning capacitor reaches its correct setting, the algebraic sum of the feedback and reference signals is zero (the feedback and reference signals are equal and opposite in polarity), and control voltage is removed from the tuning motor.

c. SEARCH. - Application of an RFPO trigger at pin 3 of J302 causes relay K301 to energize. The RFPO trigger indicates that the previous amplifier stage is tuned. With K301 energized, power is applied to pin 7 of Z300, and to SEARCH lamp DS301; also the signal path between pin 11 of Z300 to pin 10 of Z301 is broken, and Z300 receives a 60 cps signal from terminal 11 of transformer T300 via contacts 12 and 11 of K303 and resistor R301. This 60 cps signal is amplified in Z300, and then routed to the associated tuning motor.

A coarse-tuning sense signal enters the AZ-106 at pin 21 of J302; this signal is routed to module Z301 via contacts 8 and 9 of K303, chopper G300, and transformer T302. Chopper G300 and transformer T302 converts the d-c input signal to a-c. This a-c signal is amplified in Z301, and routed to pin 1 of Z300 via contacts 6 and 5 of K303. When the coarse-tuning sense signal approaches 0 vdc (indicating that coarse tuning is completed), relay K303 is energized. With K303 energized, +28 vdc is applied to OPERATE lamp DS300, and to pin 14 of Z300.

d. OPERATE. - A fine-tuning sense signal enters the AZ-106 at pin 1 of J302, and is routed to Z301 via contacts 9 and 10 of K303, chopper G300, and transformer T302. This d-c sense signal is converted to a-c in the same manner as the coarse-tuning sense signal was. The resultant a-c signal is amplified, and routed from pin 3 of Z300 through contacts 6 and 7 of K303, contacts 12 and 11 of K302, and resistor R308 to pin 10 of Z301. This a-c signal

is further amplified in Z301 and then applied to the associated tuning motor. When the fine-tuning sense signal approaches 0 vdc (indicating that fine tuning is accomplished), control voltage for the tuning motor diminishes, and relay K302 operates. Operation of K302 places resistor R307 (higher in value than R308) in the signal path between pins 3 and 10 of Z301. Servo amplifier gain is therefore lowered, and system oscillation (hunting) prevented.

e. LIMIT SWITCH OPERATION. - Activation of one of the tuning capacitor limit switches energizes a relay in the load servo amplifier. This relay removes supply voltage from pin 8 of Z300 and relay K301 With relay K301 de-energized, the AZ-106 starts operating in pre-position mode. The pre-position, search, and operate sequences will then be repeated.

2-15. IPA AND PA LOAD SERVO AMPLIFIERS (AZ-107, AZ-108).

a. GENERAL. - The AZ-107 and AZ-108 are similar in operation; therefore, the following discussion directed primarily at the AZ-107, applies to both units.

The AZ-107 supplies control voltage to the IPA stage load-capacitor motor. This control voltage is, in turn, dependent on several servo amplifier inputs: pre-position feedback and reference signals, a turn-on signal (supplied by the associated TUNE servo amplifier), and a sense signal. The AZ-107 has three modes of operation: pre-position, search, and operate. Each of these modes are discussed in sequence; refer to figure 6-4.

b. PRE-POSITION. - A pre-position feedback signal enters the AZ-107 at pin 5 of jack J502, and is routed to pin 12 of plug-in module Z500; a pre-position reference enters at pin 6 of J502, and is routed to pin 25 of Z500. The pre-position feedback is a d-c analogue (between 0 and -20 vdc) of the associated load capacitor setting. The pre-position reference signal is preset at a level

between 0 and +20 vdc corresponding to the desired load capacitor pre-position setting. The feedback and reference signals are algebraically added in Z500; the resultant is then modulated with a 60 cps a-c signal (supplied at pins 21 and 22 of Z500). This a-c modulated signal is routed to module Z501 via contacts 5 and 6 of relay K502. The a-c modulated signal is amplified in Z501, and routed to the associated load capacitor motor via pins 14 and 16 of J502. When the associated load capacitor approaches its correct pre-position setting, the algebraic sum of the feedback and reference signals becomes small, and the motor control voltage diminishes.

c. SEARCH. - A sense signal enters the AZ-107 at pin 1 of J502, and is routed to Z501 via chopper G500 and transformer T501. The chopper and transformer convert the d-c sense signal to a-c. This a-c signal is amplified in Z500, and then routed to contact 7 of relay K502. When coarse tuning of the stage is completed, 28 vdc is applied to relay K502 via pin 32 of J502. Operation of K502 completes the signal path between pins 3 and 10 of Z501. The associated load capacitor now receives control voltage that is derived from the sense input signal. Relay K501 is energized when an appreciable amount of control voltage is being applied to the load capacitor motor.

d. OPERATE. - When the sense input signal approaches 0 vdc, motor control voltage diminishes, and relay K502 de-energizes. With K502 de-energized, 28 vdc is applied to OPERATE lamp DS500, and to relay K504. Operation of K504 un-grounds the fine-tune sense signal path for the associated tune servo amplifier (this path includes pins 23 and 24 of J502, and resistor R508).

e. LIMIT SWITCH OPERATION. - The limit switches for the stage tune and load capacitors are connected between pins 30 and 31 of J502. If one of

these switches closes, relay K500 is energized. Operation of relay K500 removes supply voltage from K502 and relay K301 in the associated tune servo amplifier. De-energizing these two relays (K502 and K301) places the respective servo amplifiers in pre-position mode.

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 troubleshooting chart, table 3-3. The combined data of tables 3-1 through 3-3 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 procedures 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 which systematically checks equipment performance in terms of actual operating procedures. Perform each step in the order given.

TABLE 3-1. PRELIMINARY INSPECTION PROCEDURE

WHAT TO INSPECT	DEFECTS TO LOOK FOR	REMEDY
All electrical connections at rear of main frame.	Open connections, dirt, frayed cables.	Tighten, replace or clean as necessary.
Antenna connection at top of main frame.	Loose connection, dirt, frayed cable.	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, bluges, 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	Apply power to auxiliary frame; tune exciter for operation in the 2- to 32-mc range.	Normal exciter output (250 mw) is present at jack J3001.	Refer to auxiliary frame equipment manual.
	NOTE At conclusion of step 1, set exciter output at minimum.		
2	Set main frame controls as follows: PA SCREEN (137) OFF TUNE-OPERATE (136) OPERATE HIGH VOLTAGE (138) OFF ALDC (134) OFF INTERLOCK (132) NORMAL SERVOS ON (118) OFF (DOWN)		
3	Set TIME DELAY control (149) to 5 minutes, then set MAIN POWER circuit breaker (129) to ON.	Main frame blower motor B800 operates. TUNE lamp (108) lights. PA BIAS lamp (145) lights. After a few seconds, it goes off.	Open MAIN BLOWER fuse on relay panel or defective blower unit. Open resistor R1007. Defective circuit in Power Supply AP-126.

TABLE 3-2. EQUIPMENT PERFORMANCE CHECK (CONT)

STEP	OPERATION	NORMAL INDICATION	PROBABLE CAUSE OF ABNORMAL INDICATION
3 (cont)		PA BIAS meter (2) reads 300 volts.	Incorrect setting of PA BIAS ADJ control (154).
		FILAMENT PRIMARY meter (101) reads 230 volts ac.	Incorrect setting of FIL ADJ switch (133).
		All tubes in high voltage rectifier light (filaments).	Defective rectifier tube.
		After 5 minutes, INTERLOCK INDICATOR lamp (131) lights.	Open interlock circuit.
4	Set MULTIMETER switch (125) to 1ST AMPL Ip.	MULTIMETER (115) reads 30 microamperes.	Incorrect setting of 1ST AMPL BIAS ADJ control on Power Supply AP-126. Defective r-f amplifier V201 in the RF Amplifier RFTA. Defective voltage regulator in Power Supply AP-126.
5	Set MULTIMETER switch to 2ND AMPL Ip.	MULTIMETER (115) reads 20 microamperes.	Incorrect setting of DRIVE BIAS ADJUST control on Power Supply AP-126. Defective r-f amplifier V202 in RF Amplifier RFTA.
6	Set MULTIMETER switch (125) to 2ND AMPL Ep. Turn up r-f drive slightly; then tune TUNE control (126) for peak on MULTIMETER (115).	A peak is obtained.	Defective r-f amplifier V202 in RF Amplifier RFTA.

TABLE 3-2. EQUIPMENT PERFORMANCE CHECK (CONT)

STEP	OPERATION	NORMAL INDICATION	PROBABLE CAUSE OF ABNORMAL INDICATION
7	Set MULTIMETER switch (125) to position IPA Ep.	MULTIMETER (115) 20 to 30 microamperes.	Defective r-f amplifier V202 in RFTA. Incorrect setting of IPA FINAL BIAS ADJ control on Power Supply AP-126.
	NOTE At conclusion of step 7, return r-f drive to minimum.		
8	Depress OVERLOAD RESET pushbutton (130); then set HIGH VOLTAGE circuit breaker (138) to ON.	PLATE ON lamp (109) lights.	Defective contactor K3001 in auxiliary frame.
		After 20 seconds, PA PLATE CURRENT meter (103) indicates 1.6 to 2 amperes.	Defective contactor K3000, defective timer M3003, defective transformer T800, defective 10-kw high voltage rectifier.
		IPA PLATE CURRENT meter (116) indicates approximately 300 to 450 ma.	IPA BIAS potentiometer R2002 misadjusted, defective tube V203.
9	Increase drive slightly, then adjust TUNE control (126) for dip on IPA PLATE CURRENT meter (116).	A dip is obtained.	Defective component in IPA tuned circuit.
	NOTE At conclusion of step 9, return r-f drive to minimum.		
10	Set PA SCREEN switch (137) to ON.	PA SCREEN CURRENT meter (102) indicates 10 to 35 ma.	Defective relay K703 or K705 in relay panel.
		PA PLATE CURRENT meter (103) indicates 1.6 to 2 amperes.	PA BIAS ADJ potentiometer R703 misadjusted; defective tube V900.

TABLE 3-2. EQUIPMENT PERFORMANCE CHECK (CONT).

STEP	OPERATION	NORMAL INDICATION	PROBABLE CAUSE OF ABNORMAL INDICATION
11	Turn up r-f drive slightly until some increase is noted on PA PLATE CURRENT meter (103), then tune TUNE control (126) for dip on PA PLATE CURRENT meter (103).	A dip is obtained.	Defect in 10-kw power amplifier tuned circuit.
12	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. TROUBLESHOOTING

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
1	MAIN POWER circuit breaker (129) trips continually.	Short circuit in a-c input circuit.	Disconnect P1000 from J700 and P1010 from J2002. If circuit breaker still trips, check for overload in a-c 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 RFTA and AP-126 for shorts. If the circuit breaker remains on, check for a short in the relay panel.
2	With MAIN POWER circuit breaker (129) set to ON and HIGH VOLTAGE circuit breaker (138) set to OFF, all lamps on main frame are off and FILAMENT TIME meter (148) does not record elapsed time.	A-c 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 (148) on relay panel records elapsed time.	Fluorescent lamp circuit in main frame is defective.	Check lamps I1005 and I1006 and associated starters and ballasts.
4	MAIN BLOWER fuse on relay panel opens continuously.	Blower motor B800 is defective.	Check for short circuit in blower motor B800 and association wiring.
5	Blower motor in main frame does not operate, but FILAMENT TIME meter (148) on relay panel records elapsed time.	Blower motor B800 is defective.	Check for open circuit in blower motor B800 and associated wiring.

TABLE 3-3. TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
6	REAR FAN fuse on relay panel open continually.	Blower motor B3000 or B3001 is defective.	Check for short circuit in B3001/B3000 and associated wiring.
7	TIMER fuse on relay panel opens continually.	TIME DELAY meter M701 is defective.	Check for short circuit in TIME DELAY meter and associated wiring.
8	PA FIL fuse on relay panel open continually.	Filament transformer T801 is defective.	Check for short circuit in 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.
9	FILAMENT TIME meter (148) does not record elapsed time but FILAMENT PRIMARY meter (101) indicates 230 volts (red line).	FILAMENT TIME meter M700 is defective.	Check M700 and associated wiring.
10	TIME DELAY meter (149) does not operate but FILAMENT TIME meter (148) records elapsed time.	TIME DELAY meter M701 is defective.	Check M701 and associated wiring.
11	On Power Supply AP-126, BIAS fuse, BLOWER fuse, FILAMENTS fuse, or LOW VOLTAGE fuse opens continually.	Power Supply AP-216 is defective	Refer to table 3-4.
		RF Amplifier RFTA is defective.	Refer to table 3-4.

TABLE 3-3. TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
12	Blower motor B201 in RFTA does not operate.	B201 is defective.	Check B201 and associated wiring.
13	PA BIAS lamp (145) remains on after MAIN POWER circuit breaker (129) is turned on.	Bias rectifier circuit in AP-126 is defective.	Check PA BIAS relay K700,
14	An incorrect indication is obtained of FILAMENT PRIMARY meter (101) and filaments of V600 through V605 do not glow, but FILAMENT TIME meter (148) records elapsed time.	FIL ADJ switch (133) is defective.	Check S1002 and associated wiring.
		Transformer T801 is defective.	Check transformer T801.
15	On high voltage rectifier, and HV FILAMENT fuse opens continually.	High voltage rectifier is defective.	Check the associated rectifier tube, transformer, and wiring.
16	One of the tube filaments in the high voltage rectifier does not glow.	High voltage rectifier is defective.	Check the tube and associated fuse and transformer.
17	With INTERLOCK siwtch (132) set to NORMAL, INTERLOCK INDICATOR lamp (131) does not light although the time delay provided by TIME DELAY meter (149) 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 BANDSW 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:

TABLE 3-3. TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES	
17 (cont)			Interlock Switch Position	Check Interlock Switch (figure 2-4)
			IPA BAND SW	
			IPA AIR SW	S203 (operates from blower B201 and S204 and S205 RFTA)
			EXTERNAL	Jumper between terminals 4 and 6, TB3000.
			REAR DOOR	S1006
			PA AIR SW	S800 (operates from main blower B800)
			PA DECK	S1007
			PA BAND SW	S901 (operates from S900)
			RIGHT SIDE	S1008
			HV DECK	If DRAWER INTERLOCK lamp is lit, check RFTA drawer switch

TABLE 3-3. TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
17 (cont)			Interlock Switch Position — Check Interlock Switch (figure 2-4) S1990. If lamp is off, check hv deck interlock switch S1010. RELAY DECK — S1011 TIMER — Switch on TIME DELAY meter M701.
18	HIGH VOLTAGE circuit breaker (138) trips continually.	An interlock switch is open.	Refer to item 17 above.
		Contactor K3000 or K3001, or timer M3003 is defective.	Check for a short circuit in K3000, K3001, or M3003.
19	With HIGH VOLTAGE circuit breaker (138) set to ON, the PLATE ON lamp (109) 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 a-c voltage between terminals 29 and 30 of E702. If no voltage, relay K704 did not detect an overload. If 230 volts a-c 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.

TABLE 3-3. TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
19 (cont)		AC power input circuit is defective.	Check contactors K3000 and K3001, and timer M3003.
20	PA PLATE OVLD lamp (146) lights.	Relay panel is misaligned or defective.	Adjust PA PLATE OVLD ADJ control R705. Check relay K701, potentiometer R705, and R704.
		Power amplifier is defective.	Check 10-kw PA V900.
21	PA SCREEN OVLD lamp (147) 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 (151) 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.
		RFTA is defective.	Check V203 and check for short in screen circuit of V203.
23	IPA PLATE OVLD lamp (152) 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.
		RFTA is defective.	Check amplifier V203.

TABLE 3-3. TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
24	PLATE ON lamp (109) is on, but high voltage rectifier tubes do not glow purple.	Main power supply is defective.	Check transformer T800 circuits in main power supply.
25	PLATE ON lamp (109) is on, but PLATE TIME meter (150) does not record elapsed time.	Meter is defective.	Check meter M702.
26	Improper reading is obtained on PA SCREEN CURRENT meter (102).	10-kw PA defective.	Check screen current of PA V900.
		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 (137) is defective.	Check switch S1005.
27	PA SCREEN CURRENT meter (102) indicates 1200 volts when TUNE-OPERATE switch (136) is in the TUNE position. The TUNE lamp (108) is on.	Relay K705 is defective.	Check relay K705.
28	Correct readings are obtained on PA PLATE CURRENT meter (103) and PA OUTPUT meter (105), but reading on PA RF meter (104) is abnormal.	Meter rectifier circuit is defective.	Check the meter rectifier circuit associated with the PA PLATE RF meter.
29	With ALDC switch (134) set to ON, output power of transmitter does not decrease as ALDC control is rotated clockwise.	ALDC circuit associated with 10-kw PA is defective.	Check ALDC rectifier circuit elements.
		ALDC switch (134) or (166) is defective.	Check ALDC switch, control and associated wiring.

TABLE 3-3. TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
30	With SWR switch (135) depressed and transmitter connected into unbalanced antenna, no indication appears on PA OUTPUT meter (105).	Reflected power output circuit element (CR904, C1042, L1006, C1043, or S1017) is defective.	Check circuit elements in reflected power output channel of DC400.

NOTE

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

3-3. 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. RF AMPLIFIER RFTA AND POWER SUPPLY AP-126.

When system troubleshooting (tables 3-2 and 3-3) indicates that a trouble exists in the RFTA or its associated AP-126, use tables 3-4, 3-5, and 3-6 to isolate the trouble to a specific stage or part in these units. Unless specified otherwise, make all checks with the RFTA and AP-126 installed and connected in the main frame. When trouble has been isolated to a stage, use the overall schematic diagram in section 6 to locate the defective part. Parts location is shown in figures 3-1 and 3-2.

3-5. 10-KW POWER AMPLIFIER AX-580.

Troubleshooting procedures for the power amplifier are included in tables 3-2 and 3-3. Use the overall schematic diagram in Section 6 to circuit trace the power amplifier.

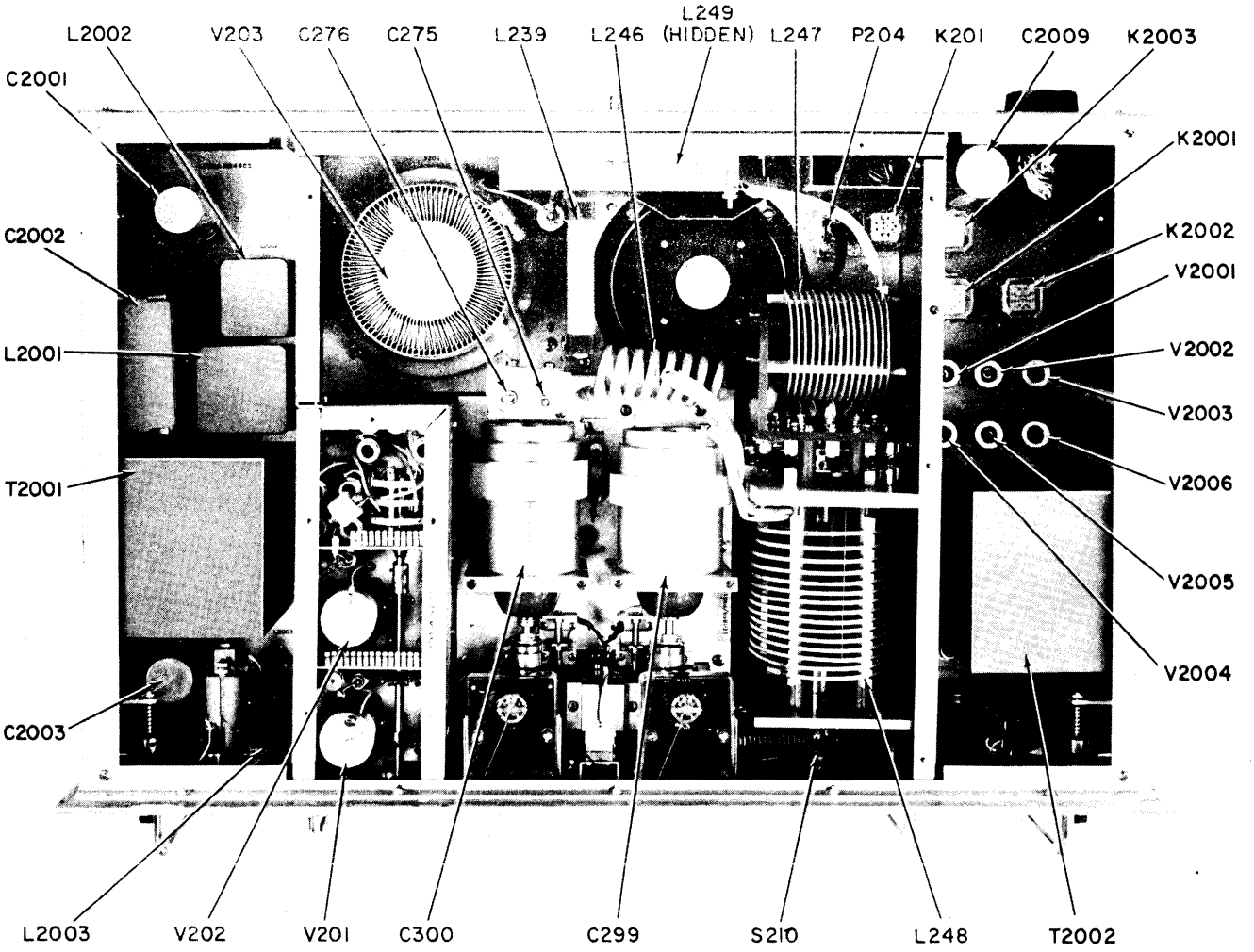

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Figure 3-1. RFTA and AP-126, Top View

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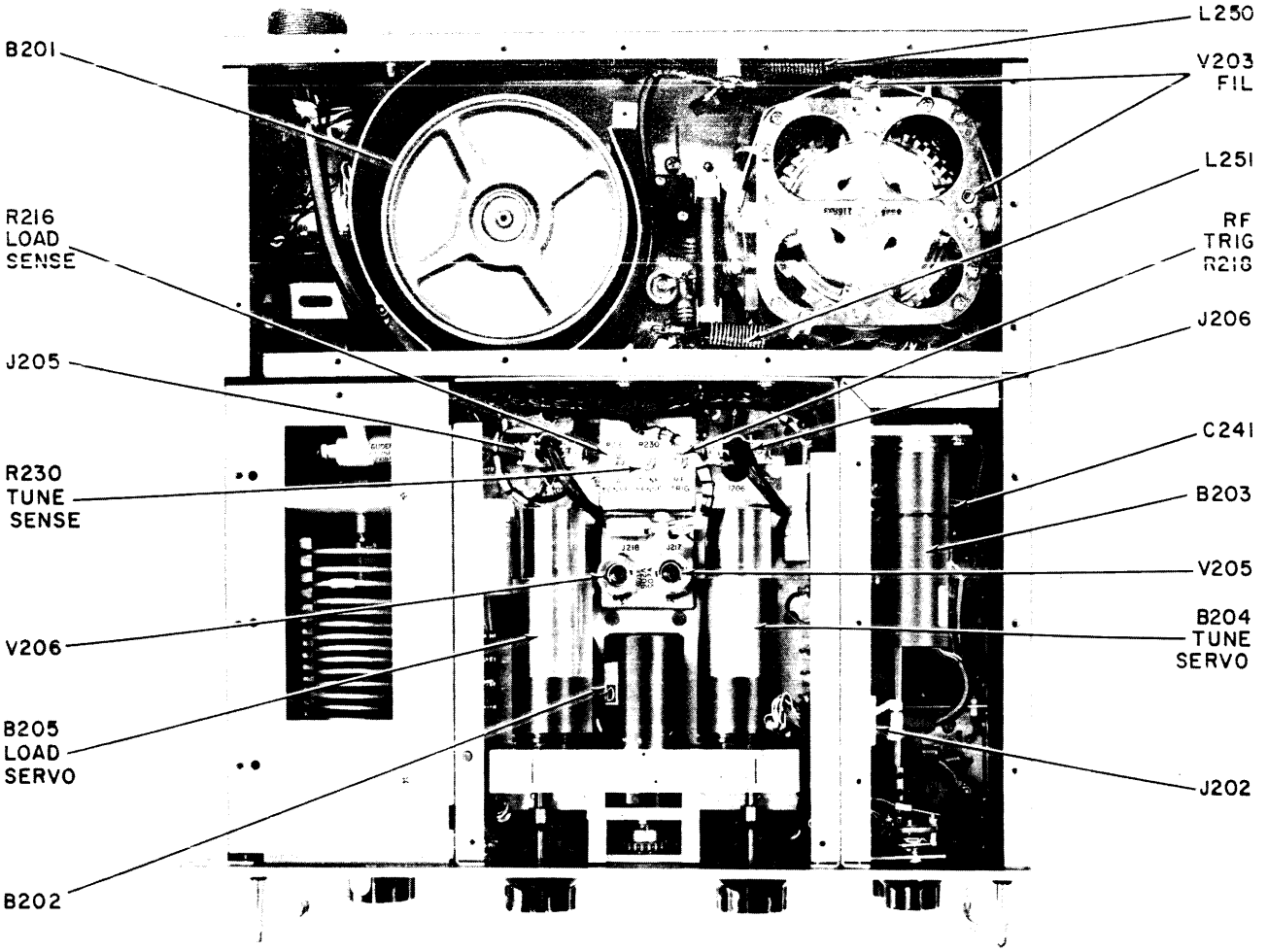

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Figure 3-2. RFTA, Bottom View

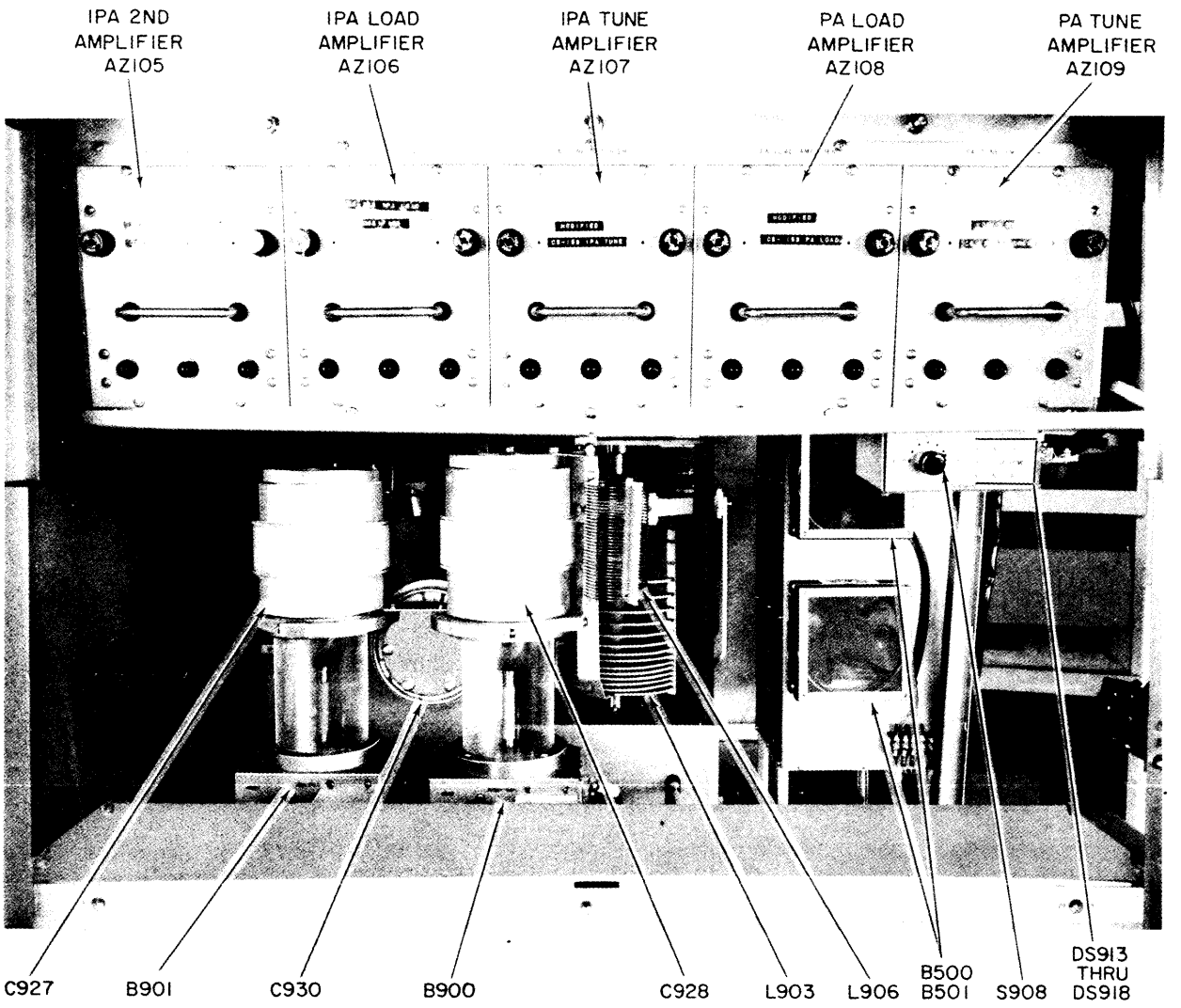

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Figure 3-3. 10-kw PA, Front View

TABLE 3-4. TROUBLESHOOTING, RFTA AND AP-126

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
1	Filaments of the r-f amplifiers do not glow in RFTA.	Defective transformer T2002.	Check transformer T2002.
		FILAMENTS fuse F2002 open.	Check fuse F2003.
		Defective relay K2003.	Check relay K2003.
2	The PA BIAS and BIAS indicator lamps light. (145 and 124, respectively)	Rectifier CR2002 defective.	Check rectifier CR2002.
		BIAS fuse F2002 open.	Check fuse F2002.
		Filter circuit defective.	Check inductor L2002, capacitor C2003, and resistor R2014.
		Transformer T2001 defective.	Check transformer T2001
		Regulator circuits defective.	Check regulators V2004 through V2006.
		Short in -420-volt circuit.	Check for short.
3	With MULTIMETER switch (125) set to 1ST AMPL Ip, a subnormal indication is observed on the MULTIMETER (115). Indication on IPA PLATE CURRENT meter (116) is excessive.	Bias rectifier circuit defective.	Refer to item 2.
		Shorted or leaky bypass capacitors.	Check capacitors C202, C203, and C204.
		Defective amplifier.	Check amplifier V201.
4	With MULTIMETER switch (125) set to 2ND AMPL Ip, a subnormal indication is observed on the MULTIMETER (115). Indication on IPA PLATE CURRENT meter (116) is excessive.	Bias rectifier circuit defective.	Refer to item 2.
		Defective voltage divider.	Check resistors R2007, and R2009 and potentiometer R2008.

TABLE 3-4. TROUBLESHOOTING, RFTA AND AP-126 (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
4 (cont)		Shorted or leaky bypass capacitors.	Check capacitors C223, C224, and C225.
		Defective amplifier.	Check amplifier V202.
5	With MULTIMETER switch (125) set to 2ND AMPL Ep, an incorrect indication is observed on MULTIMETER (115). Indication on IPA PLATE CURRENT meter (116) is abnormal.	Short in V202 plate circuit.	Check for short circuit.
		Defective amplifier tube.	Check V202.
6	With MULTIMETER switch (125) set to IPA Ep, an incorrect indication is observed on MULTIMETER (115). Indication on IPA PLATE CURRENT meter (116) is abnormal.	Short in V203 plate circuit.	Check for short circuit.
		Defective amplifier tube.	Check V203.
7	Screen fuse opens continually.	Short in screen voltage regulator circuit.	Check for short circuit.
8	BLOWER fuse opens continually.	Shorted blower motor.	Check blower motor B201.
		Shorted or leaky capacitor C296.	Check capacitor C296.
9	FILAMENTS fuse opens continually.	Shorted transformer T2002.	Check transformer T2002.
		Shorted bypass capacitor.	Check bypass capacitors C2007 and C2008.
		Short in RF Amplifier RFTA filament circuits.	Check for short circuit.

TABLE 3-4. TROUBLESHOOTING, RFTA AND AP-126 (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
10	LOW VOLTAGE fuse opens continually.	Shorted transformer T2001 or T2002.	Check transformer T2001 and T2002.
		Defective rectifier.	Check rectifiers CR2001 and CR2002.
11	With MULTIMETER switch (125) set to 2ND AMPL Ip, incorrect indications are observed on MULTIMETER (115) when operating at any frequency.	Motor B202 defective.	Check motor B202.
		R-f amplifier stage defective.	Check tube V202 by substitution.
		Relay K201 defective.	Check relay K201.
		Meter filter circuit defective.	Check meter filter circuit elements.
		Capacitor C241 misaligned.	Realign unit.
12	With MULTIMETER switch (125) set to 2ND AMPL Ip, incorrect indications are observed on MULTIMETER (115) when operating within one frequency band.	Switch S202 or S209 defective.	Check continuity of switch S202 or S209.
		Tuned circuit defective.	Check tuned circuit associated with non-operative frequency band.
		Variable inductor associated with inoperative frequency band misaligned.	Realign inductor associated with inoperative band.
13	With MULTIMETER switch (125) set to IPA Ep, incorrect indications are observed on MULTIMETER when operating any frequency.	Intermediate power amplifier stage defective.	Check tube V203. Make voltage and resistance checks.
		Motor B204 or B205 defective.	Check motor B204 or B205.

TABLE 3-4. TROUBLESHOOTING, RFTA AND AP-126 (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
13 (cont)		Meter filter circuit defective.	Check filter components associated with MULTIMETER switch position.
		Switch S209 defective.	Check continuity of switch S209.
14	Blower motor B201 does not operate but all tube filaments light.	Blower motor defective.	Check blower motor.
		Fuse F2004 open.	Check fuse F2004.
		Capacitor C296 defective.	Check capacitor C296.
15	DRAWER INTERLOCK indicator lamp (131) does not light when RFTA is extended from the rack.	Defective indicator lamp.	Check indicator lamp I2001 by substitution.
		Defective switch S1009.	Check continuity of switch S1009.
		Defective resistor R2017.	Check resistor R2017.

Table 3-5. Voltage and Resistance Data, AP-126

PIN	VOL/ RES	V2001 OB2	V2002 OA2	V2003 OB2	V2004 OA2	V2005 OB2	V2006 OA2
1	VOL	360 VDC	260 VDC	N. C.	-260 VDC	-150 VDC	0
	RES	60 K	55 K	N. C.	75 K	30 K	0
2	VOL	260 VDC	105 VDC	0	N. C.	N. C.	N. C.
	RES	55 K	INFINITE	0	N. C.	N. C.	N. C.
3	VOL	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.
	RES	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.
4	VOL	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.
	RES	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.
5	VOL	360 VDC	260 VDC	105 VDC	N. C.	N. C.	N. C.
	RES	60 K	55 K	INFINITE	N. C.	N. C.	N. C.
6	VOL	N. C.	N. C.	-55 VDC	N. C.	N. C.	N. C.
	RES	N. C.	N. C.	INFINITE	N. C.	N. C.	N. C.
7	VOL	N. C.	N. C.	N. C.	-400 VDC	-260 VDC	-150 VDC
	RES	N. C.	N. C.	N. C.	70 K	75 K	30 K

Voltage readings should be taken with no signal or gain control voltage applied. Resistance readings should be taken with unit completely disconnected from the transmitter.

Table 3-5. Voltage and Resistance Data, AP-126

PIN	VOL/ RES	V201 8121	V202 8121	V203 5CX3000A	V205 12AL5	V206 12AL5
1	VOL RES	0 0	0 0	FIL 5.4 VAC 650 ohm	0 1 K	0 INFINITE
2	VOL RES	1.4 VAC 50 K	-22 VDC 60 K	GRID-170 VDC 55 K	0 7 ohm	0 INFINITE
3	VOL RES	-12 VDC 12 K	N. C. N. C.	SCRN 800 VDC INFINITE	0 0	0 0
4	VOL RES	0 0	0 0	SUPP 0 0	12 VAC 0	12 VAC 0
5	VOL RES	0 0	0 0	PLATE 3.4KV INFINITE	0 INFINITE	0 INFINITE
6	VOL RES	12 VAC 0	12 VAC 0		N. C. N. C.	N. C. N. C.
7	VOL RES	1.2 VAC 50 K	-22 VDC 60 K		0 100 K	0 INFINITE
8	VOL RES	1.4 VAC 12 K	N. C. N. C.			
9	VOL RES	0 0	0 0			
10	VOL RES	260 VDC 50 K	-22 VDC 60 K			
11	VOL RES	N. C. N. C.	-22 VDC 12 K			

Voltage readings should be taken with no signal or gain control voltage applied. Resistance readings should be taken with unit completely disconnected from the transmitter.

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.

Locations of components and sub-assemblies in the 10-kw PA are shown in figures 3-3, 3-4, and 3-5. When one of the harmonic filters (AF-104 or AF-105) is suspected of malfunction, refer to figures 3-6 and 3-7; faulty components in these units (such as burned switch contents, exploded capacitors) are usually detectable by visual inspection.

3-6. MAIN POWER SUPPLY.

Troubleshooting procedure for the main power supply are included in tables 3-2 and 3-3. For further aid, refer to simplified schematic diagram, figure 2-3 and to Section 5 of this manual; component locations are shown in figures 3-8 and 3-9.

3-7. AUTOMATIC BAND SWITCHING.

Failure of the automatic band switching circuits may be caused by a malfunction on the auxiliary frame, in Power Supply AP-126, in the master stepping switch assembly, or in the LLC assembly. Set up transmitter for remote-controlled operation as outlined in the equipment operator's manual. If none of the band switches go to their proper positions, check master stepping switch S9101; if S9101 does not ro-

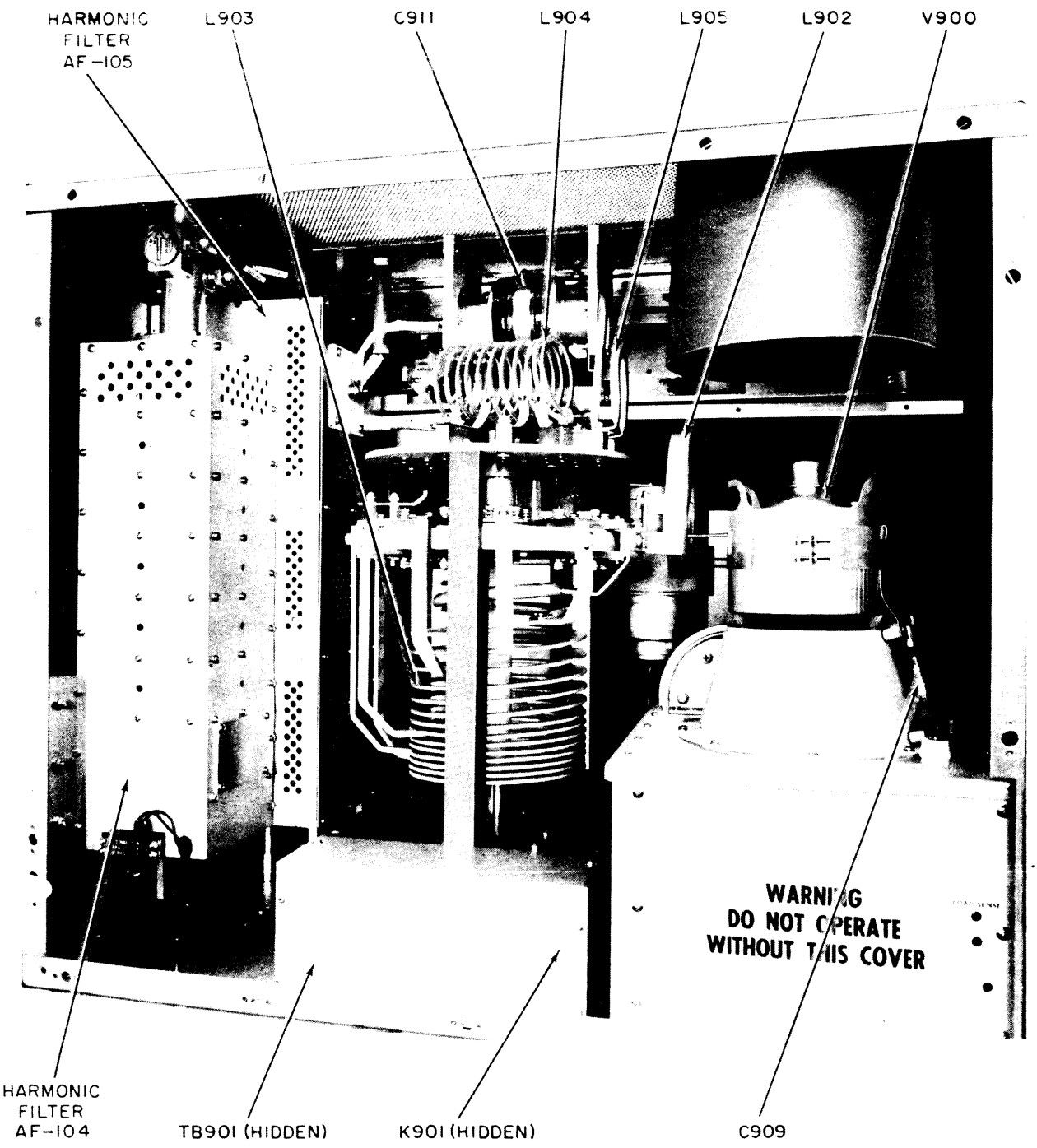

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Figure 3-4. 10-kw PA, Rear View

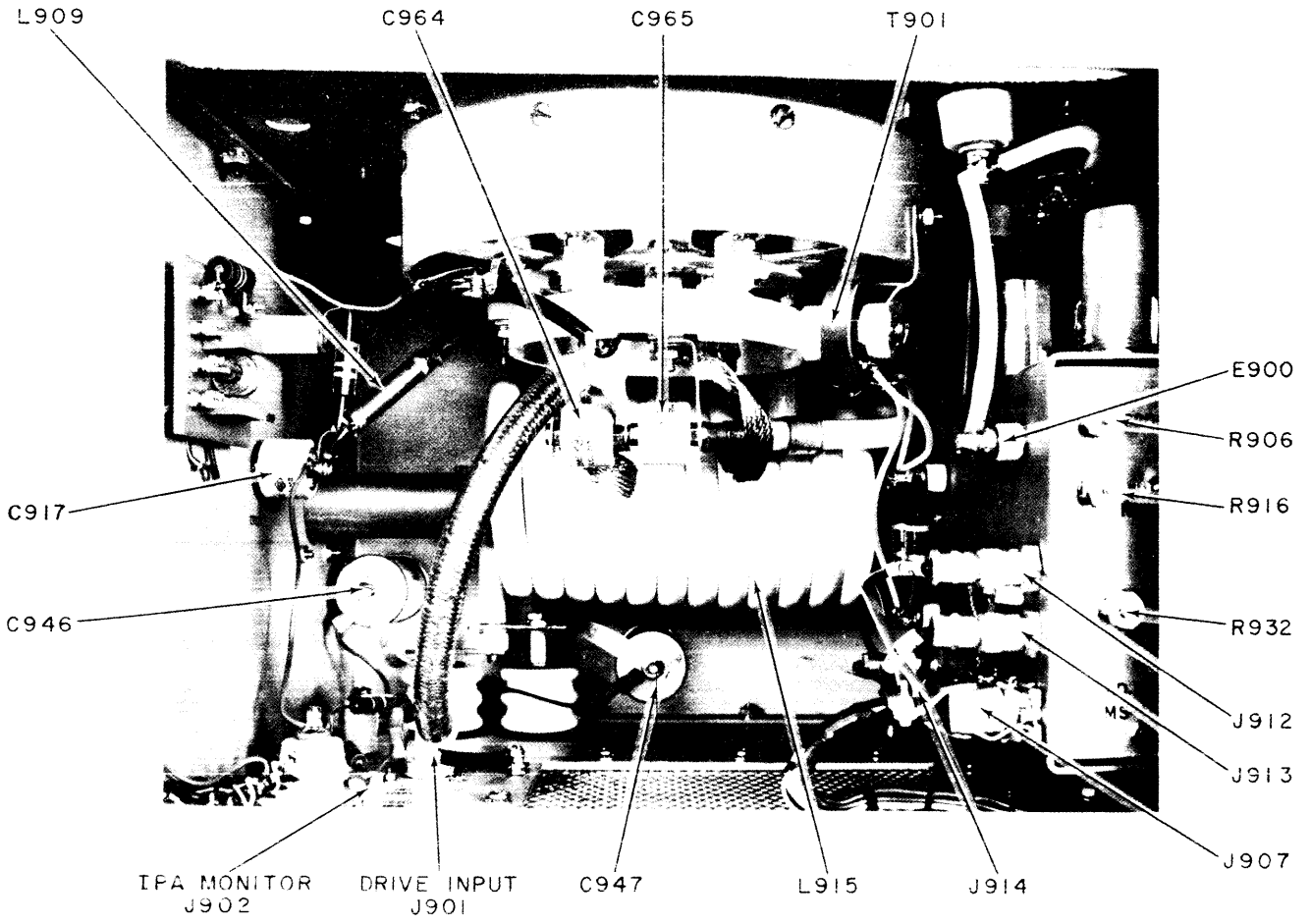

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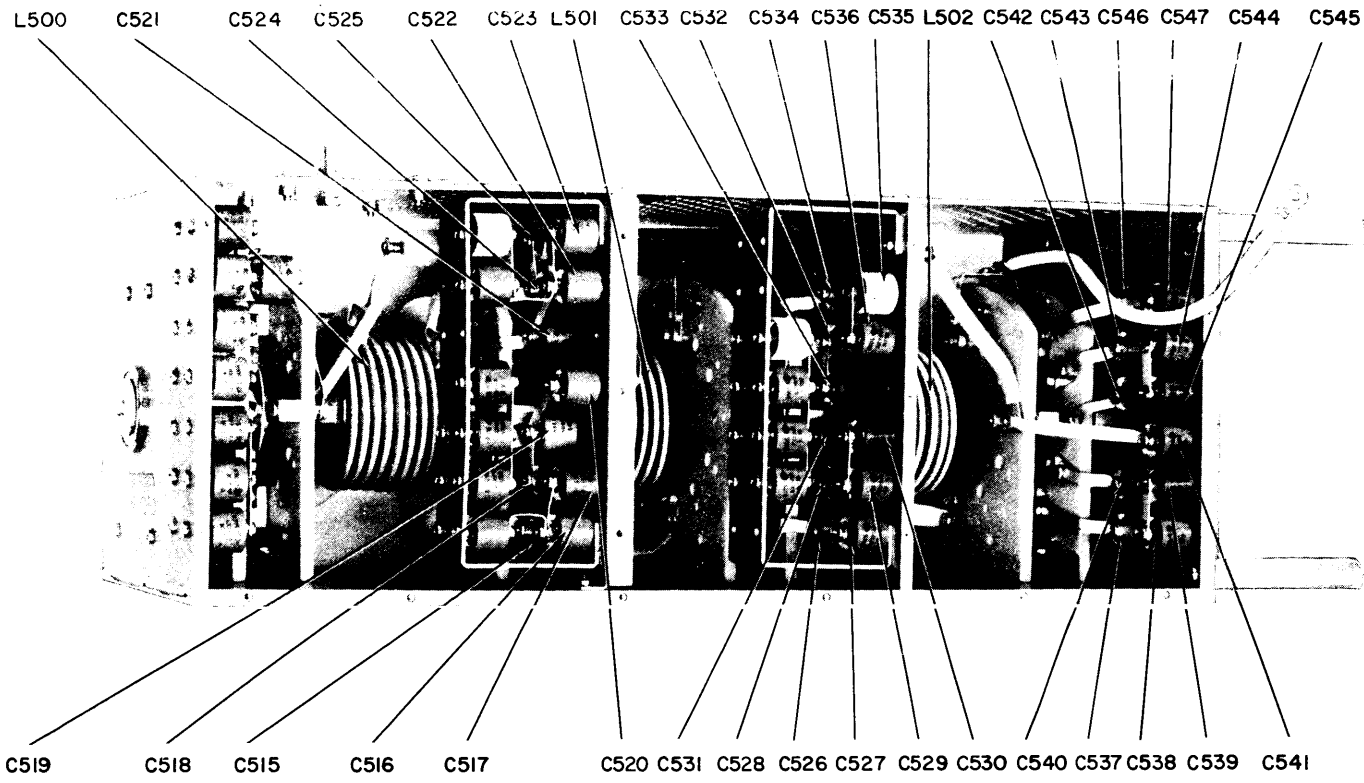
Figure 3-5. 10-kw PA Tube Chassis



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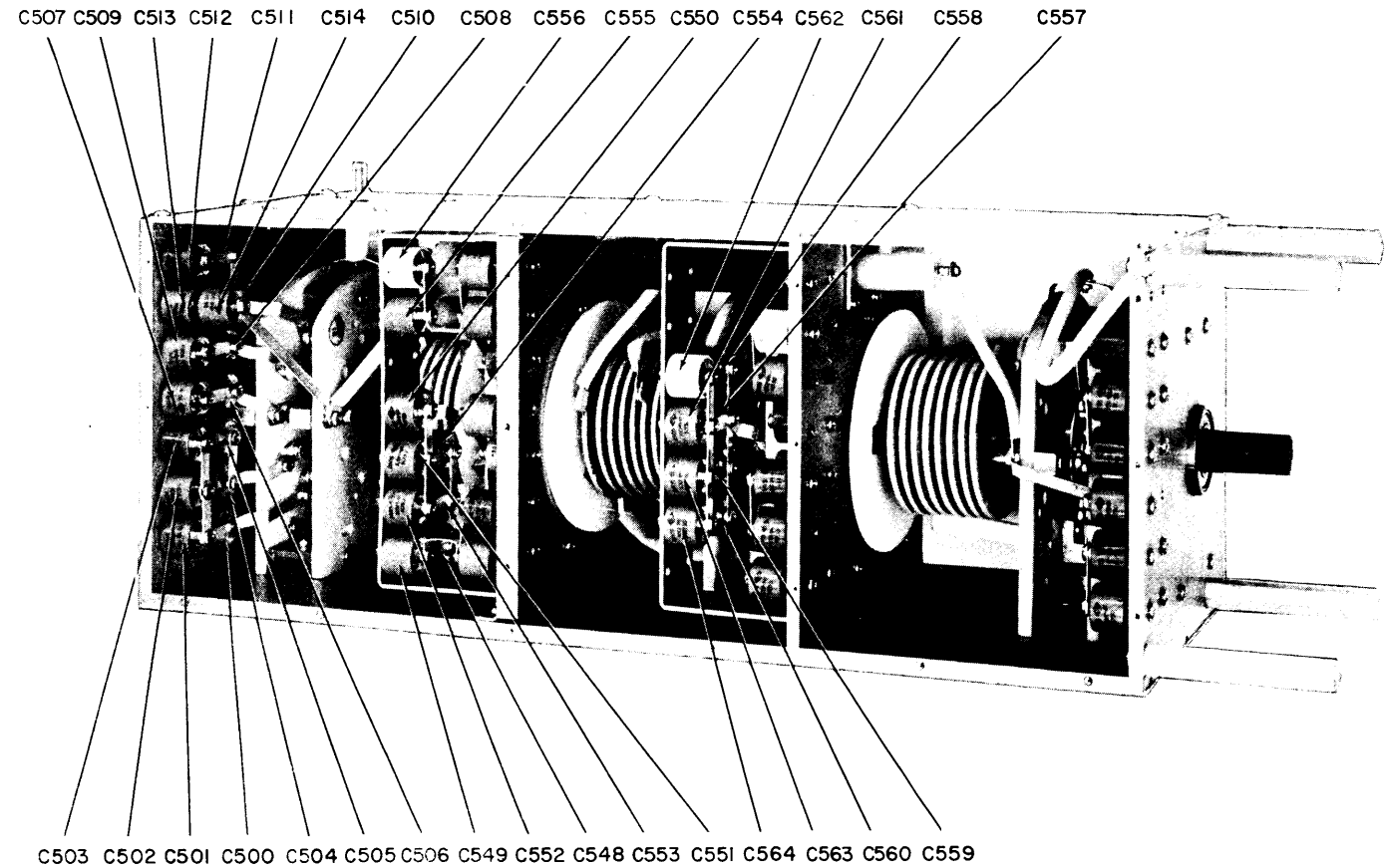

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Figure 3-6. Harmonic Filter, AF-105

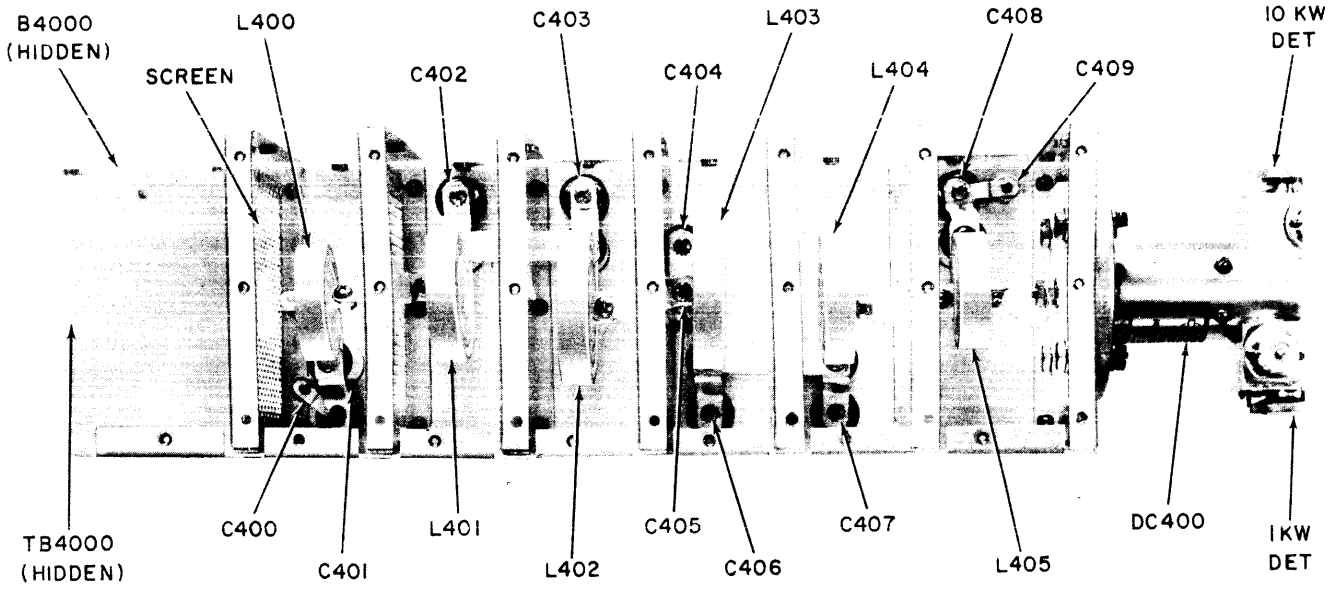

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Figure 3-7. Harmonic Filter AF-104.

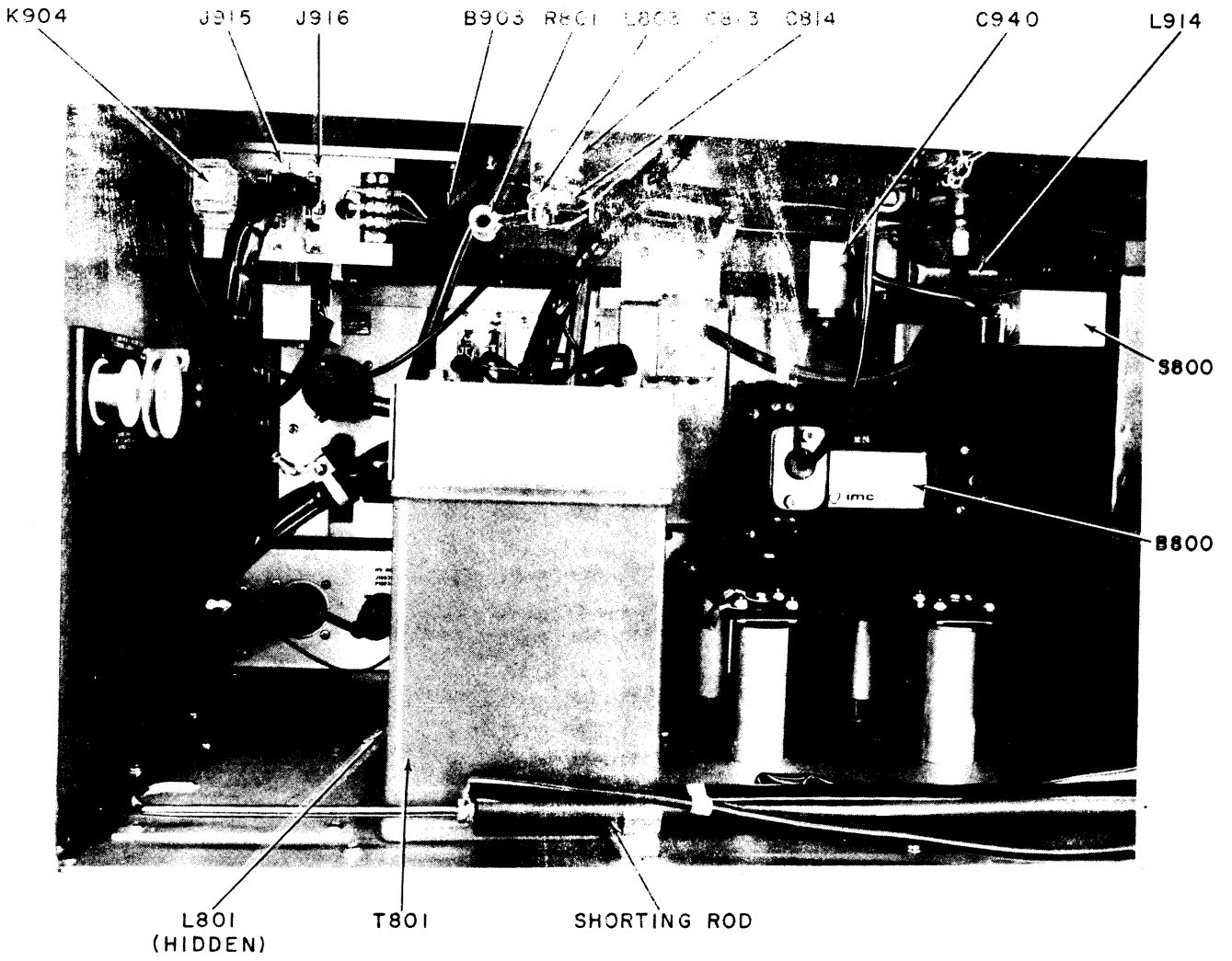

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Figure 3-8. Main Power Supply, Upper Compartment

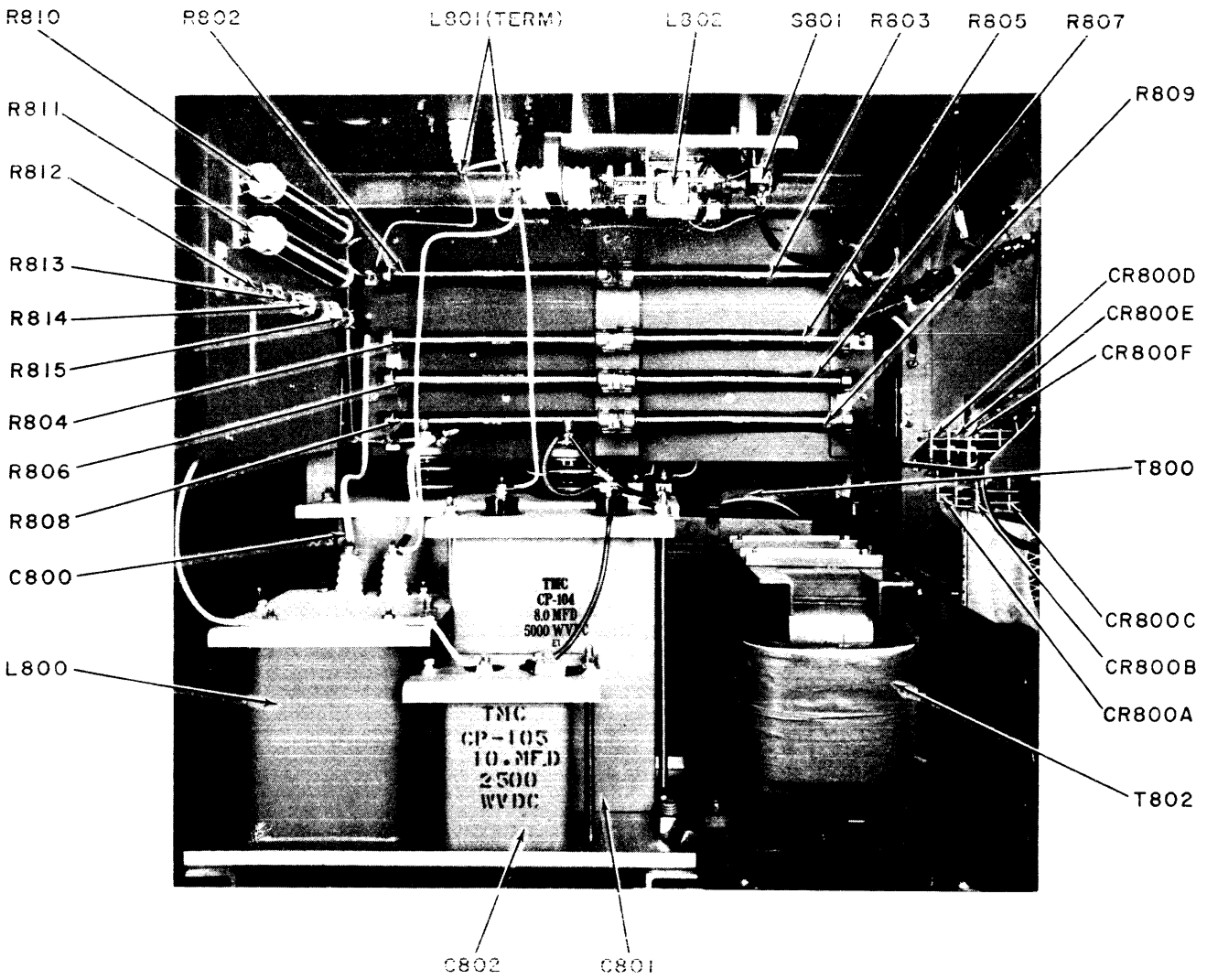

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Figure 3-9. Main Power Supply, Lower Compartment

tate when the exciter frequency is changed, check rectifier CR9101 and transformer T2002. The master stepping switch assembly is mounted behind the 10-kw PA control panel, on the right side; refer to figure 3-10 and the main schematic diagram in Section 6 to troubleshoot the master stepping switch. Refer to equipment manual for the auxiliary frame if control signals are not being applied to the master stepping switch. If the IPA and PA band switches do not operate, but the band switch in harmonic filter AF-105 does operate, check relay K2001 and the LLC assembly. The LLC assembly is mounted behind the 10-kw PA control panel, in the center; refer to figure 3-11 to locate components on the LLC assembly. The LLC requires an "iniate tune command" signal from the auxiliary frame; if this signal is not being received refer to auxiliary frame equipment manual for further troubleshooting aid.

Each band switch (IPA, PA, and harmonic filter) has its own drive motor and control relay. If one of the band switches does not operate, but the other two do, the trouble most likely lies in the associated relay or motor. These components are:

Band Switch	Drive Motor	Control Relay	Location Reference
IPA	B202	K201	Figure 3-2 Figure 3-1
PA	B902	K901	Figure 3-4
Harmonic Filter	B903	K904	Figure 3-8

3-8. AUTOMATIC TUNING AND LOADING.

Proper automatic tuning and loading is dependent upon the reception (from the auxiliary frame) of an "initiate tune command" signal, correct amplifier stage gain, sense circuits, and servo amplifiers.

If the automatic band switching circuits are operative, it may be assumed that the correct control signals are being received from the auxiliary frame. As components age, readjustment of the level controls in the master stepping switch assembly and of the sense circuits may be required. The sense circuits for the IPA stage are on the under side of the RFTA (see figure 3-2); the sense circuits for the 10-kw PA are located under the 10-kw PA tube chassis (see figure 3-12). The sense-circuit signals may be monitored at Adapter Panel AX-570 in the auxiliary frame; correct signal levels are given in the alignment procedures (see Section 4).

The five servo amplifier assemblies used for tuning and loading the transmitter are located in the upper front portion of the 10-kw PA compartment (see figure 3-3). Before troubleshooting these units, ascertain that the associated sense circuits are operating properly (see section 1). Each of the servo amplifiers has identical +20 vdc, -20 vdc, and +28 vdc power supply circuits (see figures 6-2 through 6-4); these voltages should be checked as the first troubleshooting step. Other malfunctions would usually be evidenced by irregularities in the sequential relay operation; refer to paragraphs 2-13 through 2-15.

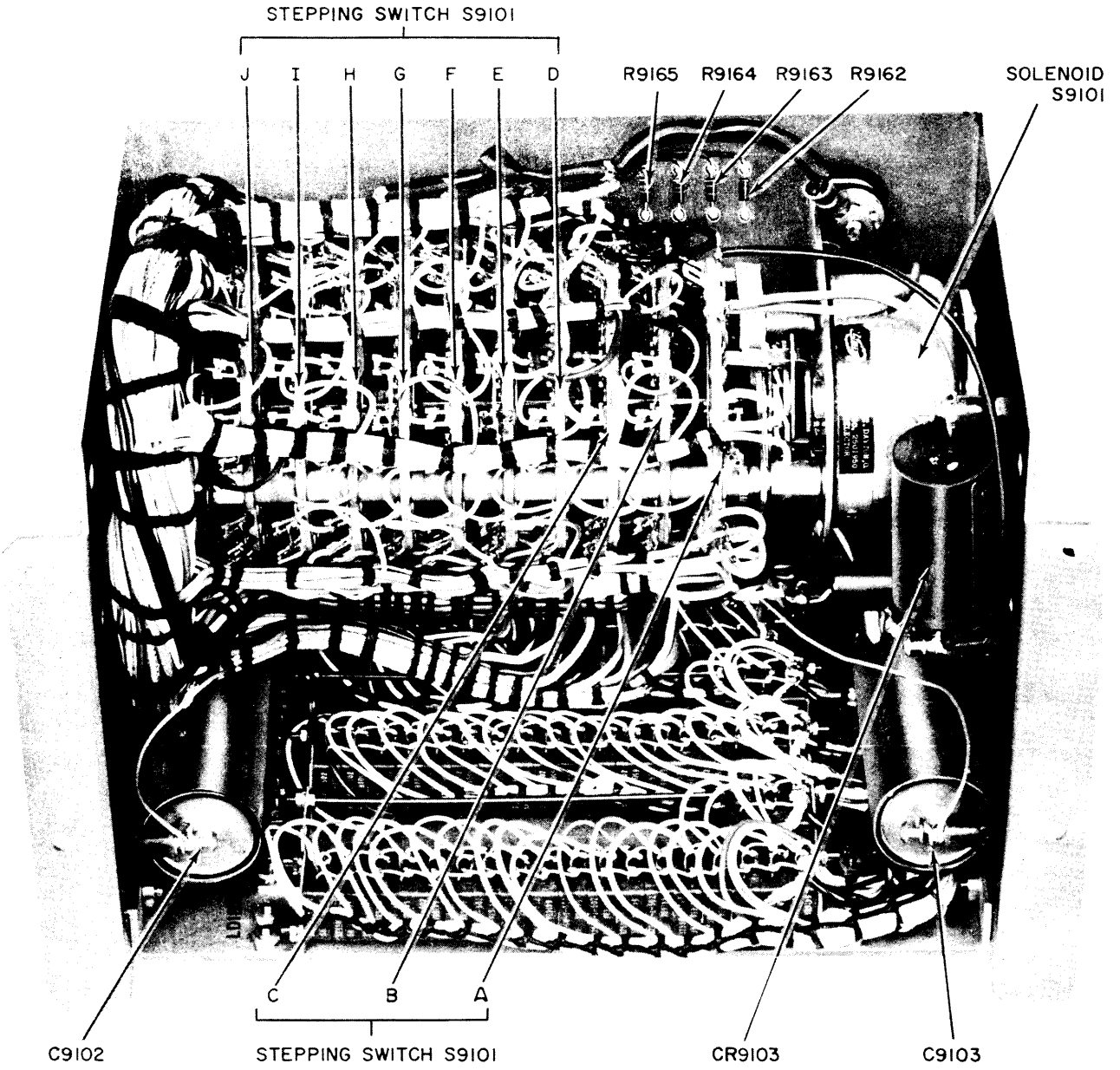

Figure 3-10. Master Stepping Switch Assembly, Bottom View

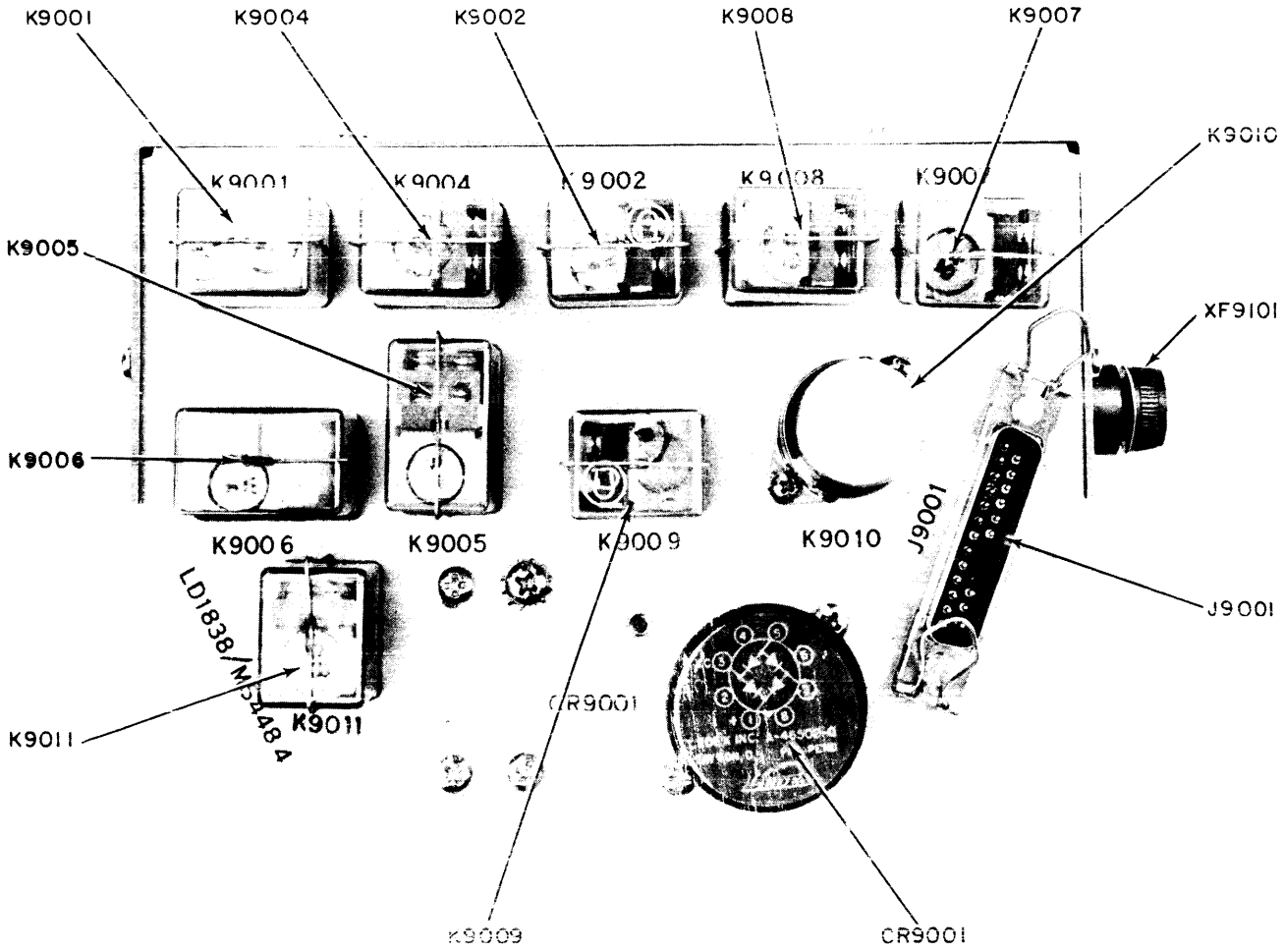

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Figure 3-11. LLC Assembly
(Sheet 1 of 2)

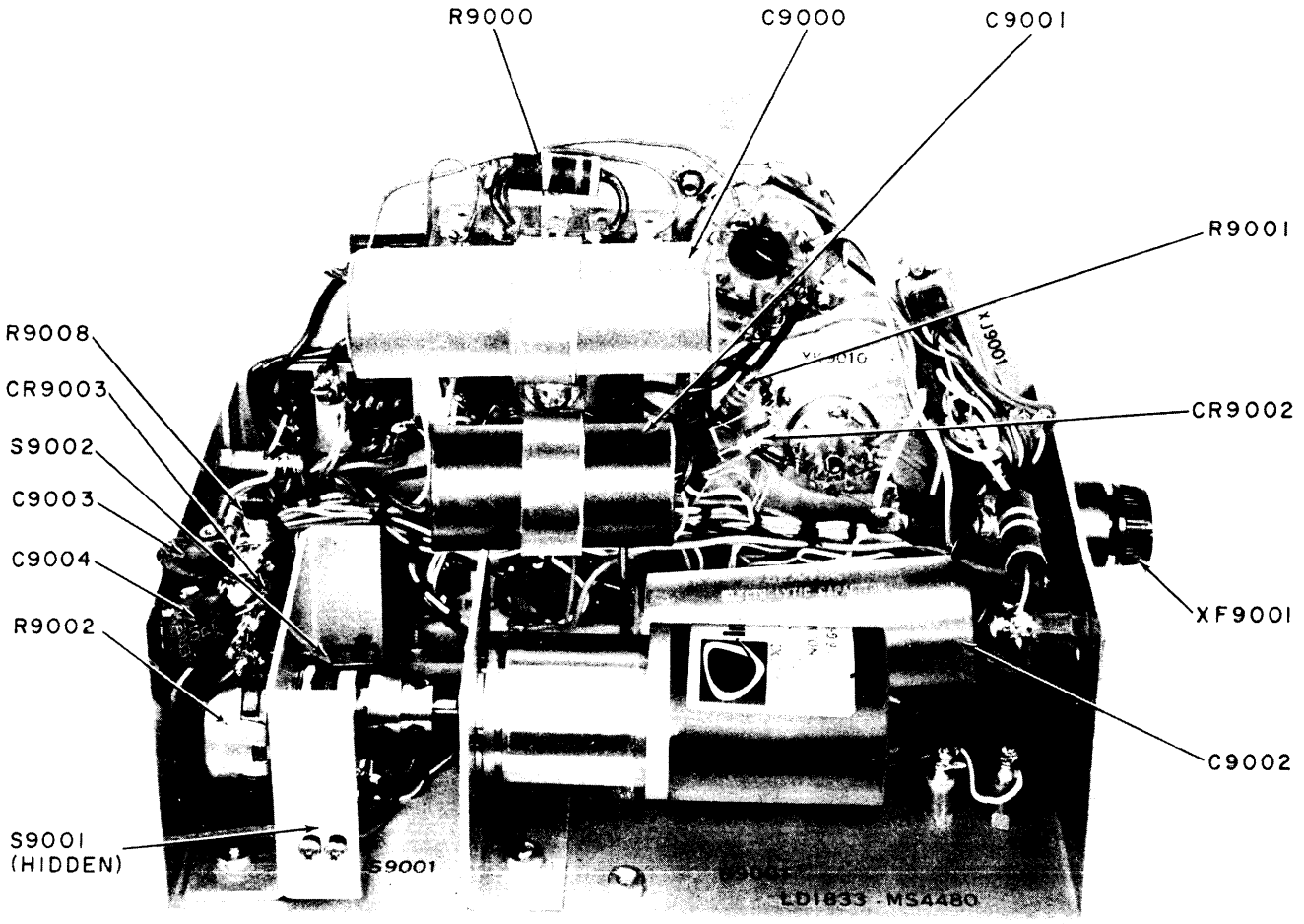

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Figure 3-11. LLC Assembly
(Sheet 2 of 2)

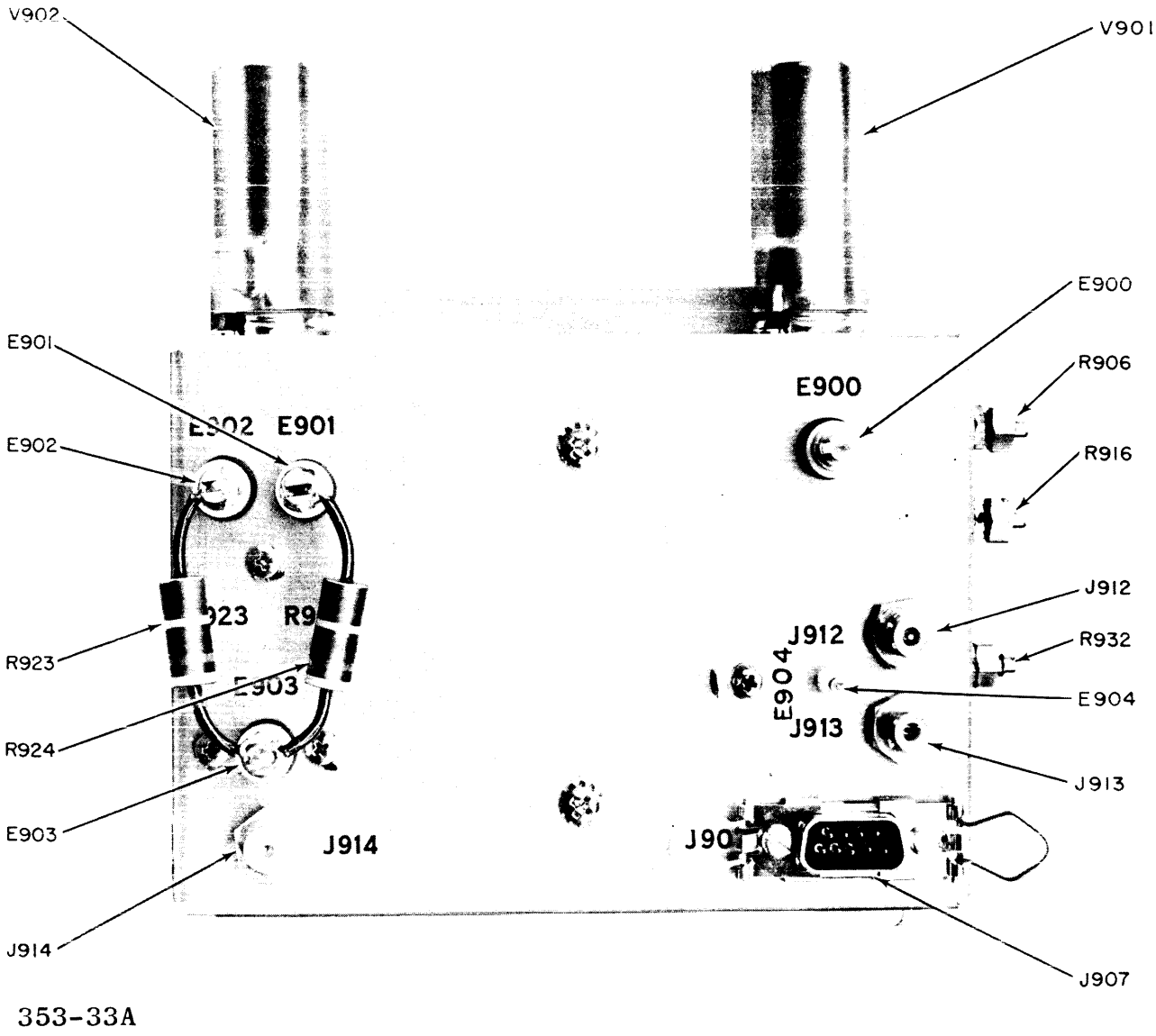


Figure 3-12. PA Sense Chassis
(Sheet 1 of 2)

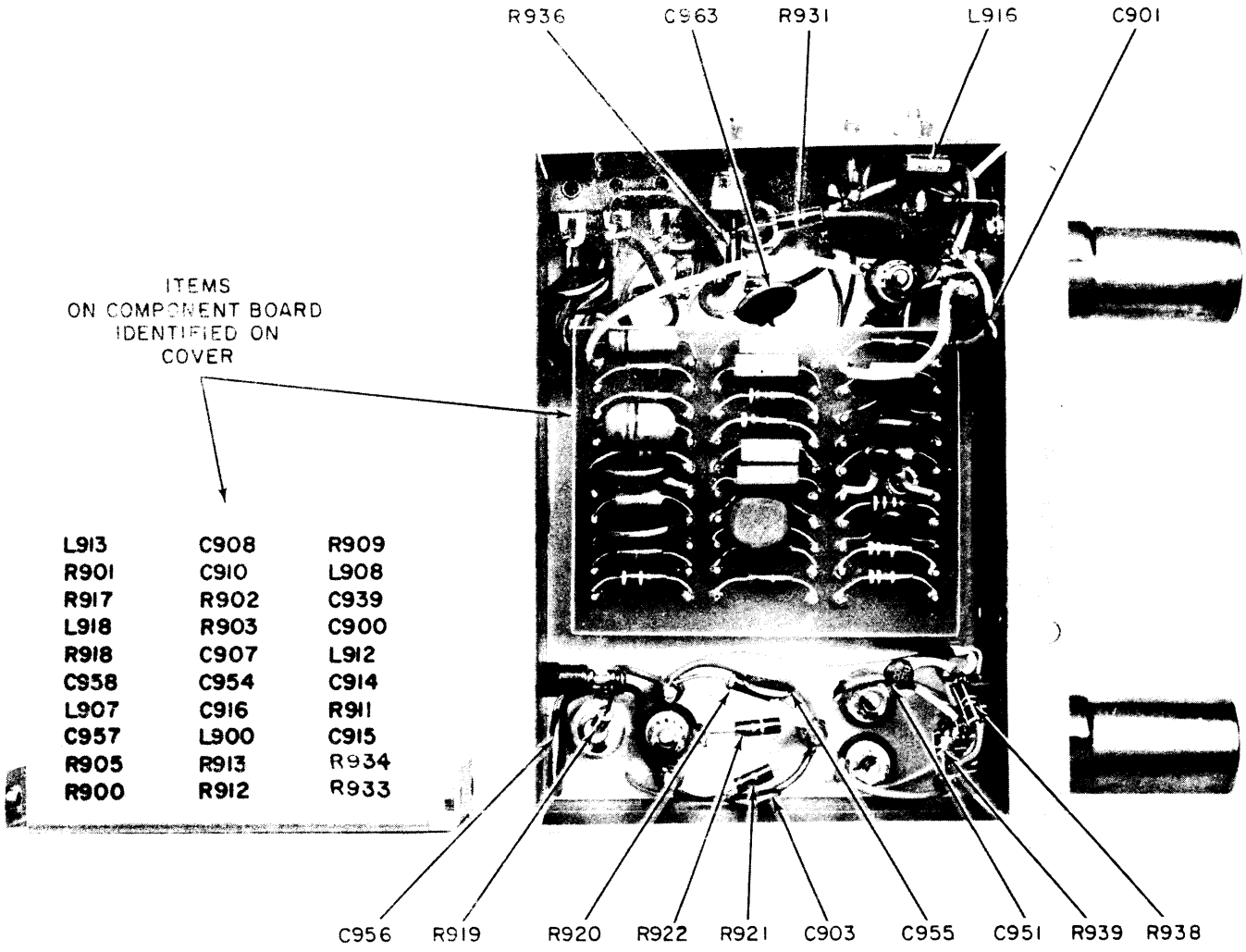


Figure 3-12. PA Sense Chassis
(Sheet 2 of 2)

3-9. SWR OVERLOAD CIRCUIT.

The SWR overload circuit may be checked as follows. Mechanically rotate reflected power diode CR401 (located above harmonic filter AF-104, see figure 3-4) until the arrow is pointing upward. Connect an r-f ammeter in the coaxial output line, or connect an r-f voltmeter across the output line. With the SWR OVLD switch on Standing Wave Control Unit SWCU set at 2:1, an SWR overload should occur with 540 watts power output (3.28A r-f or 164V r-f). With the SWR OVLD switch set at 3:1, an overload should occur with 1250 watts output (5A r-f or 250V r-f).

If the SWR overload circuit does not operate under the conditions described above, check CR401, reflected power signal circuitry in the auxiliary frame, and check the SWCU. Further troubleshooting data may be found in Technical Manual for Standing Wave Control Unit, Model SWCU.

SECTION 4

MAINTENANCE

4-1. 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, vacuum tubes with poor emission, 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 electrical quantities measurable with built-in meters and compare observations with established standards for irregularities. Observe indicator lights and rectifier tubes for abnormal color and signs of internal flashing.

b. DAILY DURING AN "OFF THE AIR" PERIOD. - Visually and manually inspect all parts in the 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. Note deposits of dust and dirt. Inspect condition of relay contacts. Check operation of all door interlocks.

c. MONTHLY DURING "OFF THE AIR" PERIODS. - Recondition rotary and switch contacts as necessary. Use crocus cloth and trichlorethylene or ethylenedichloride 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.

WARNING

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

CAUTION

When using trichlorethylene, avoid contact with painted surfaces, due to its paint removing effects. Do not use solvents to clean master stepping switch S9101.

4-2. BIAS ADJUSTMENTS.

a. Extend Power Supply AP-126 from the transmitter cabinet on its slides; manually close interlock switch S1009.

b. Set the MAIN POWER circuit breaker at ON; leave exciter de-energized.

c. Set MULTIMETER switch S201 at 1ST AMPL Ip; adjust potentiometer R2005 (on top side of AP-126 chassis) until MULTIMETER M201 indicates 30 microamperes.

d. Set MULTIMETER switch on 2ND AMPL Ip; adjust potentiometer R2008 until MULTIMETER indicates 20 microamperes.

e. Push AP-126 back into transmitter cabinet.

f. Set TUNE/OPERATE switch at OPERATE; set HIGH VOLTAGE circuit breaker at ON.

g. Adjust IPA BIAS ADJ potentiometer R2002 (on front of AP-126) until IPA PLATE CURRENT meter M202 indicates 80 to 90 milli-amperes.

h. Set PA SCREEN switch at ON; adjust PA BIAS ADJ potentiometer R703 (on fromt left side of main relay panel) until PA PLATE CURRENT meter M1002 indicates 0.7 amperes.

i. Set HIGH VOLTAGE circuit breaker at OFF; the bias adjustments are completed.

4-3. OVERLOAD ADJUSTMENTS.

a. IPA PLATE OVERLOAD.

(1) Set IPA PLATE OVLD ADJ control R711 at its fully clockwise position.

(2) Tune exciter and IPA stage upon any frequency.

(3) Misadjust IPA TUNE control and set excitation so that IPA PLATE CURRENT meter M220 indicates 600 milliamperes.

(4) Rotate IPA PLATE OVLD ADJ control counterclockwise until overload relay K707 trips (IPA PLATE OVLD lamp lights).

(5) Set HIGH VOLTAGE circuit breaker at OFF, and depress RESET button.

b. IPA SCREEN OVERLOAD.

(1) De-energize transmitter, remove front cover from main relay panel, and manually close inter-lock switch S1011. Disconnect lead from terminal 35 of E703; connect a milliammeter (50- or 60-ma scale) between the disconnected lead and terminal 35.

(2) Rotate IPA SCREEN OVLD ADJ control R709 fully clockwise.

(3) Energize transmitter, and tune exciter and IPA stage up on any frequency. With proper loading, milliammeter should indicate approximately 15 ma.

(4) Unload IPA until milliammeter indicates 30 ma; rotate IPA SCREEN OVLD ADJ control counterclockwise until overload relay K706 trips (IPA SCREEN OVLD lamp lights).

(5) De-energize transmitter, restore relay panel wiring, and replace cover.

c. PA PLATE OVERLOAD.

(1) Rotate PA PLATE OVLD ADJ control R705 fully clockwise.

(2) Tune transmitter to full power output at any frequency.

(3) Misadjust PA TUNE control so that PA PLATE CURRENT meter M1002 indicates 2.2 amperes.

(4) Rotate PA PLATE OVLD ADJ control counterclockwise until overload relay K701 trips (PA PLATE OVLD lamp lights).

(5) Set HIGH VOLTAGE circuit breaker at OFF, and press RESET button.

d. PA SCREEN OVERLOAD.

(1) Rotate PA SCREEN OVLD ADJ control R707 fully clockwise.

(2) Tune transmitter to full power output at any frequency.

(3) Unload the 10-kw PA until PA SCREEN CURRENT meter M1001 indicates 80 ma.

(4) Rotate PA SCREEN OVLD ADJ control until overload relay K702 trips (PA SCREEN OVLD lamp lights).

4-4. ALIGNMENT OF TECHNIMATIC CIRCUITS.

a. LEVEL CONTROL ADJUSTMENTS.

(1) Set main frame controls as follows:

Control	Position
MAIN POWER circuit breaker	ON
HIGH VOLTAGE circuit breaker	OFF
PA SCREEN switch	OFF
TUNE/OPERATE switch	OPERATE
SERVOS switch	OFF (down)

(2) At the exciter, set LOCAL/REMOTE switch at REMOTE, press TUNE SYNC button on remote control panel, then set LOCAL/ REMOTE switch at LOCAL. Manually tune the exciter for full power output on carrier at 2.000-megacycles.

(3) At the RFTA, set MULTIMETER switch S201 at 2ND AMPL Ep; adjust 2ND AMPL TUNING control to obtain peak indication on MULTIMETER M202.

(4) Adjust #1 LEVEL CONTROL potentiometer R9143 (located on the master stepping switch assembly, see figure 4-1) to minimize MULTIMETER indication.

(5) Set HIGH VOLTAGE circuit breaker at ON. Adjust R9143 until IPA PLATE CURRENT meter indicates 220 ma.

(6) Set HIGH VOLTAGE circuit breaker at OFF.

NOTE

Each of the remaining 17 LEVEL CONTROL potentiometers (R9144 thru R9160) must be adjusted at the low frequency limit of the applicable band. These test frequencies are shown on the inside of the master stepping switch assembly access door.

b. IPA SENSE AND TRIGGER ADJUSTMENTS.

(1) At the exciter, set LOCAL/REMOTE switch at REMOTE; press TUNE SYNC button on the remote control panel, then set LOCAL/REMOTE switch at LOCAL. Manually tune exciter for full power output on carrier at 3.000 megacycles.

(2) Extend RFTA and AP-126 on the drawer slides; manually close interlock switch S1009. Connect a 50-ohm, 1000-watt dummy load to J214. Disconnect P1022 from J209, and connect a VTVM to J209. Select a low-voltage d-c scale on the VTVM (+1vdc).

(3) Set TUNE/OPERATE switch at OPERATE, and set HIGH VOLTAGE circuit breaker at ON. Adjust 2ND AMP TUNING control until IPA PLATE CURRENT meter indicates 220 ma.

(4) Adjust 2ND AMPL SENSE potentiometer R209 (see figure 3-1) until VTVM indicates +0.2vdc.

(5) Remove VTVM, and restore normal connection to J209.

(6) Open front door of 10-kw PA compartment, and rotate RFPO control (located on front panel if IPA TUNE servo amplifier) fully counterclockwise. Manually close interlock switch S1007.

(7) Set SERVOS switch at ON; 2ND AMP TUNING control should automatically rotate counterclockwise, and then rotate clockwise until IPA PLATE CURRENT meter M201 indicates 220 ma.

(8) After the 2ND AMP TUNING control has stopped rotating, adjust RFPO control until SEARCH lamp on IPA TUNE servo amplifier lights (IPA TUNE control should start clockwise rotation).

(9) Set SERVOS switch off (down position).

(10) Disconnect P1014 from J213, and connect the VTVM to J213.

(11) Adjust IPA TUNE and LOAD controls to obtain maximum stage efficiency; i.e., maximum r-f power into dummy load with minimum IPA tube plate current. IPA power output may be measured with an r-f ammeter in series with the dummy load, or by measuring the r-f voltage at E203.

(12) Adjust IPA LOAD SENSE potentiometer R216 until VTVM indicates 0vdc.

(13) Rotate IPA LOAD control counterclockwise, and adjust IPA TUNE control to maintain a dip on the IPA PLATE CURRENT meter. Repeat these procedures until the VTVM indicates -0.25vdc.

(14) Disconnect the VTVM from J213, and connect it to J211. Adjust R-F TRIGGER potentiometer R218 until the VTVM indicates -0.5vdc.

(15) Disconnect P1013 from J212, and restore the normal connection at J213. Connect the VTVM to J212.

(16) Set SERVOS switch at ON; allow automatic tuning and loading to proceed until the IPA LOAD control stops rotating. Set SERVOS switch off (down).

(17) Rotate IPA TUNE control counterclockwise to obtain maximum power output. Adjust IPA TUNE SENSE potentiometer R230 until VTVM indicates 0vdc.

(18) Disconnect test equipment, restore normal connections at the rear of the RFTA, and push drawer back into transmitter cabinet.

c. PA SENSE AND TRIGGER ADJUSTMENTS.

(1) Open 10-kw PA compartment, and remove PA TUNE servo amplifier; place servo amplifier on a convenient work service, and connect it to the transmitter with test cable A-4369.

(2) Connect transmitter output to a 50-ohm 5000-watt dummy load. Connect a VTVM to PA LOAD monitor jack CP3000 at Adaptor Panel AX-570 in the auxiliary frame. Select a low-voltage d-c scale on the VTVM (1 vdc).

(3) At the exciter, set LOCAL/REMOTE switch at REMOTE; press TUNE SYNC button on the remote control panel, and then set LOCAL/ REMOTE switch at LOCAL.

(4) Manually tune exciter and transmitter for maximum power output. Make sure that the 10-kw PA stage is operating at best efficiency; i.e., maximum power output is attained with minimum plate current.

(5) Adjust PA LOAD SENSE potentiometer R906 (located under PA tube chassis; see figures 3-4 and 3-5) until VTVM indicates 0vdc.

(6) Rotate PA LOAD control counterclockwise, and adjust PA TUNE control to maintain dip on PA PLATE CURRENT meter. Repeat this procedure until the VTVM indicates -0.25 vdc.

(7) Connect VTVM to test point 21 (R-F TRIGGER) of servo amplifier test cable. Adjust R-F TRIGGER potentiometer R932 until VTVM indicates -0.5 vdc.

(8) Set HIGH VOLTAGE circuit breaker at OFF. Plug PA TUNE servo amplifier into transmitter receptacle. Rotate RFPO potentiometer

R916 fully counterclockwise.

(9) Set HIGH VOLTAGE circuit breaker at ON. Set SERVOS switch at ON, and allow transmitter to tune automatically until the IPA stage tuning is completed. After IPA TUNE control stops rotating, turn R916 clockwise until SEARCH lamp on PA TUNE servo amplifier lights.

(10) Set HIGH VOLTAGE circuit breaker at OFF. Disconnect test equipment, and close 10-kw PA section doors and covers.

d. PRE-POSITION ADJUSTMENTS.

(1) Manually tune exciter and transmitter for full power output on carrier at 2.000 megacycles.

(2) Connect a VTVM to IPA LOAD monitor jack CP3002 on Adaptor Panel AX-570 in the auxiliary frame. Select a low-voltage d-c scale on the VTVM (1 vdc).

(3) Rotate IPA LOAD control counterclockwise, and adjust IPA TUNE control to maintain dip on IPA PLATE CURRENT meter. Repeat this procedure until the VTVM indicates -0.25 vdc. Note counter reading of IPA LOAD control dial.

(4) Return IPA TUNE and LOAD controls to their optimum operating positions. Connect VTVM to PA LOAD monitor jack CP3000 on Adaptor Panel AX-570.

(5) Rotate PA LOAD control counterclockwise, and adjust PA TUNE control to maintain dip on PA PLATE CURRENT meter. Repeat this procedure until the VTVM indicates -0.25 vdc. Note counter reading of PA LOAD control dial.

(6) Return PA TUNE and PA LOAD controls to their optimum operating positions. Note counter readings of IPA TUNE and PA TUNE controls.

(7) Set exciter output at minimum, and set SERVOS switch at ON.

(8) Adjust IPA TUNE pre-position potentiometer #1, R9140 (see figure 4-1), until the IPA TUNE control is set approximately 1 turn counterclockwise from its setting as noted in step (6).

(9) Adjust IPA LOAD pre-position potentiometer #1, R9101, until the IPA LOAD control is set at the position noted in step (3).

(10) Adjust PA TUNE pre-position potentiometer #1, R9119, until the PA TUNE control is set approximately 1 turn counterclockwise from its setting noted in step (6).

(11) Adjust PA LOAD pre-position potentiometer #1, R9122, until the PA LOAD control is set at the position noted in step (5).

(12) Set exciter output at maximum; transmitter should tune automatically.

NOTE

Each of the remaining pre-position potentiometers is adjusted at the low-frequency limit of the applicable r-f band. Alignment frequencies are noted inside the master stepping switch assembly access door.

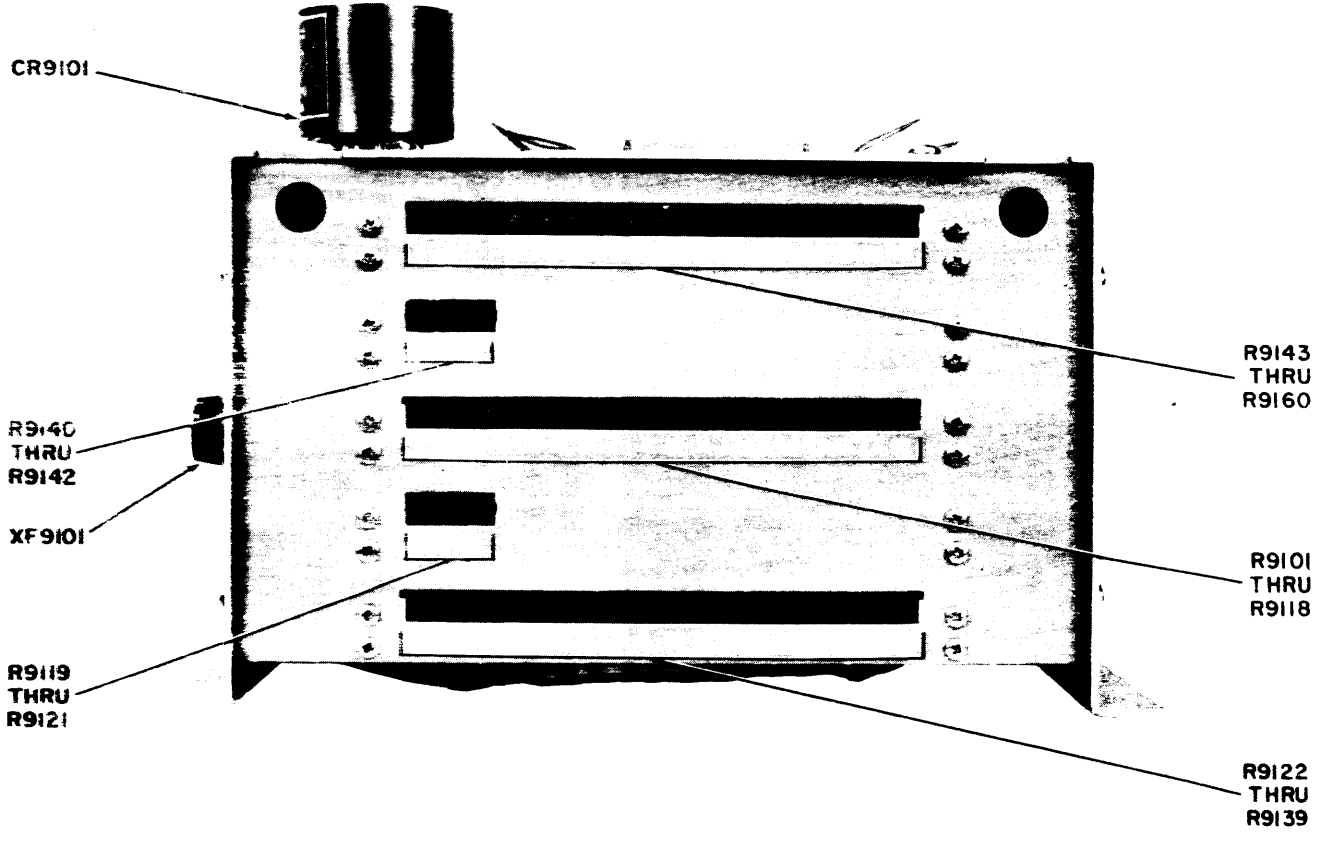


Figure 4-1. Master Stepping Switch Assembly, Front View

4-5. REPLACING BEARINGS ON MAIN FRAME BLOWER MOTOR (B800). (See figure 4-2.)

a. Remove six screws (91-18-19) and six washers (92-8), then remove inlet ring (67-729-1N-2).

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

c. 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).

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

e. Remove front end cap (3645B7-1).

f. 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.

g. 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.

h. 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.

i. 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).

j. 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).

k. 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.

l. Attach inlet ring (67-720-1N-2) to blower housing using four screws (91-18-18) and six washers (92-8).

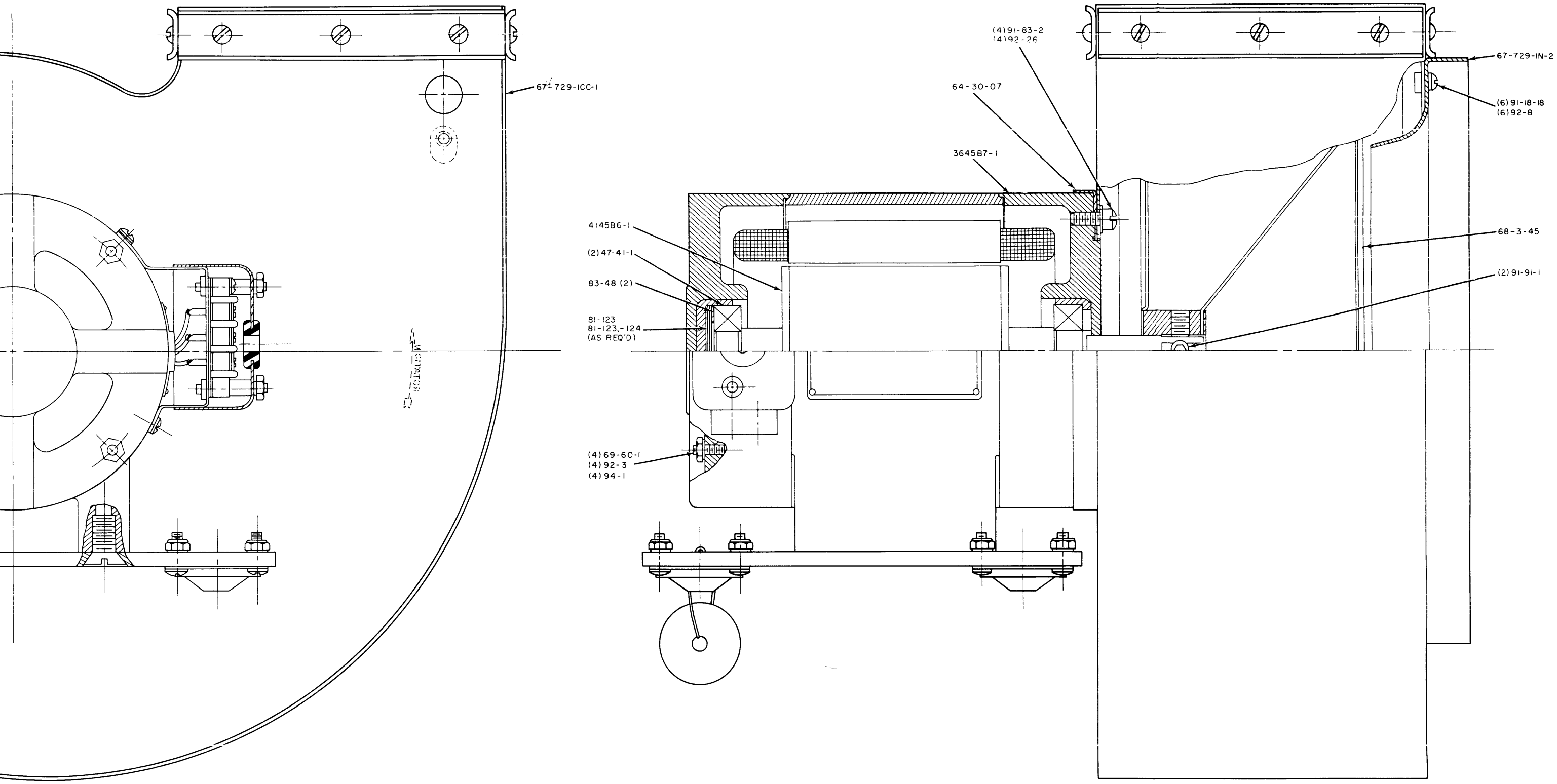
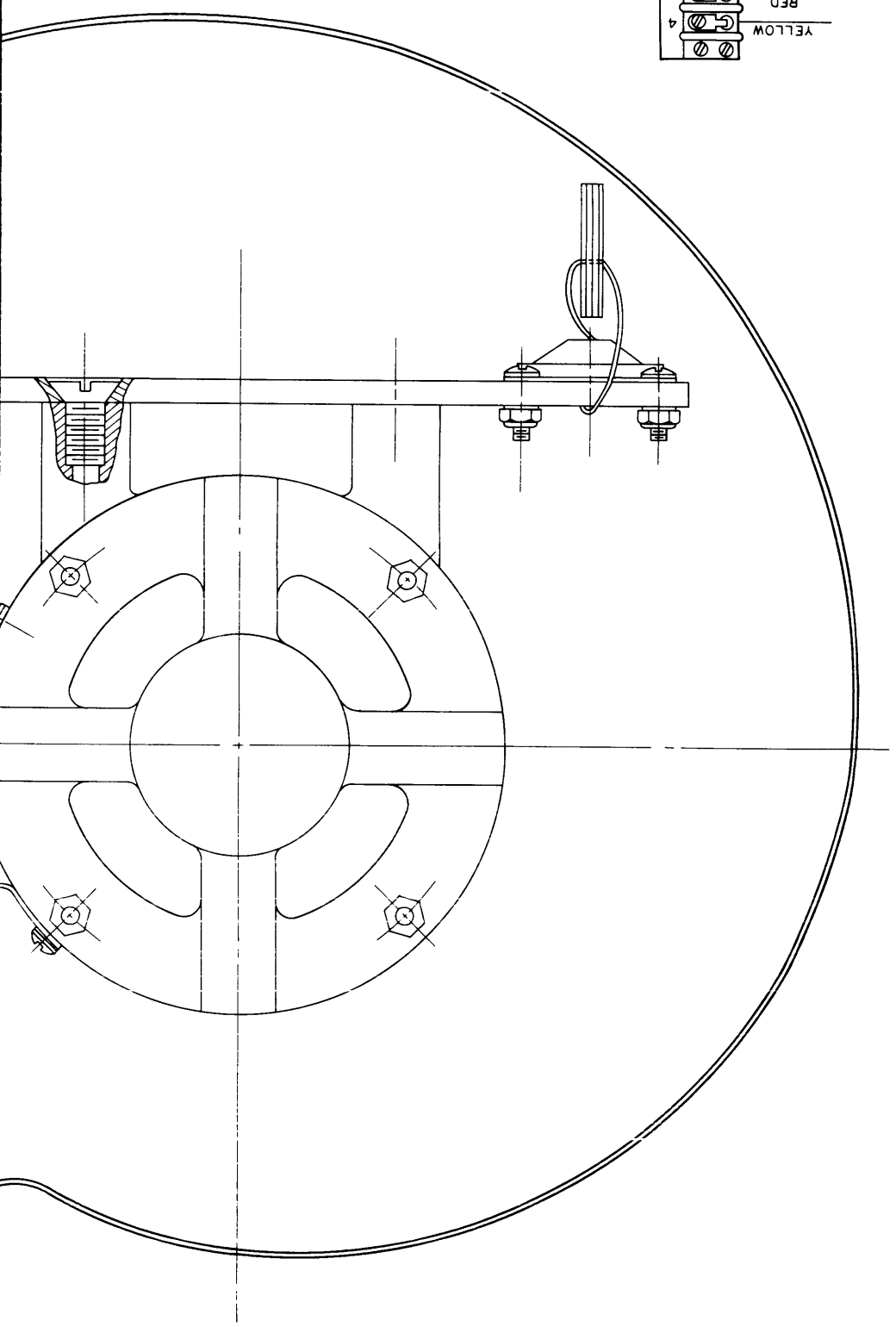
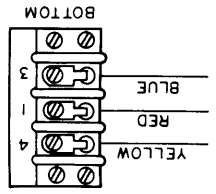


Figure 4-2. Main Blower Motor



VIEW AA



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. Generic name.
b. Reference designation.
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

PARTS LIST

for

RF AMPLIFIER, RFTA-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B201	FAN, CENTRIFUGAL: 230 volts, 50/60 cps, single phase; 2800/3200 RPM; ccw rotation; black anodize case.	BL126
B202	MOTOR, TUBEAXIAL, FAN: 220 V, ±10%; 50/60 cps, single phase; 8/10 RPM at 0.06 amps; ambient temperature range 0°C to +71°C; ccw rotation; black anodize case.	MO125
B203	MOTOR, TUBEAXIAL, FAN: motor voltage fixed phase 115 V, control phase 40 V; current rating fixed phase 0.063 amp, control phase 0.182 amp; power input fixed phase 6.0 watts, control phase 6.4 watts; 50/60 cps; black oxide case.	MO127
B204	MOTOR, TUBEAXIAL, FAN: motor voltage fixed phase 220 V, ±10%, control phase 36 V; current rating fixed phase 0.067 amp, control phase 0.330 amp; max. power output 3 watts; 50/60 cps; stainless steel case.	MO126
B205	Same as B204.	
C201	CAPACITOR, FIXED, MICA DIELECTRIC: 1,000 uuf, ±2%; 500 WVDC; char. E.	CM15E102G03YY
C202	CAPACITOR, FIXED, MICA DIELECTRIC: 1,500 uuf, ±10%; 300 WVDC; button type.	CB21PB152K
C203	Same as C202.	
C204	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2,000 uuf, ±20%; 500 WVDC.	CK70AW202M
C205	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C206	Same as C205.	
C207	Same as C205.	
C208	Same as C202.	
C209	Same as C202.	
C210	Same as C204.	
C211	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 100 WVDC.	CC100-28
C212	Same as C211.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C213	Same as C211.	
C214	Same as C204.	
C215	Same as C202.	
C216	Same as C204.	
C217	Same as C205.	
C218	CAPACITOR, FIXED, MICA DIELECTRIC: 1,500 uuf, ±2%; 500 WVDC.	CM100-10
C219	CAPACITOR, FIXED, CERAMIC, HIGH VOLTAGE: 1,000 uuf, ±20%; 500 WVDC.	CC108-4P1000M
C220	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1,000 uuf, ±20%; 5,000 WVDC; 6-32 tapped studs each end; 13/16" dia. x 7/8" long o/a.	CC109-38
C221	Same as C219.	
C222	CAPACITOR, FIXED, MICA DIELECTRIC: 2,400 uuf, ±2%; 500 WVDC1 char. D.	CM30D242G03
C223	Same as C202.	
C224	Same as C202.	
C225	Same as C204.	
C226	Same as C220.	
C227	Same as C202.	
C228	Same as C202.	
C229	Same as C204.	
C230 thru C232	Same as C211.	
C233 thru C236	Same as C205.	
C237	Same as C211.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C238	Same as C211.	
C239	CAPACITOR, FIXED, MICA DIELECTRIC: 27 uuf, ±10%; 500 WVDC; char. C.	CM15C270K03
C240	Same as C205.	
C241	CAPACITOR, VARIABLE, AIR DIELECTRIC: 12-270 uf; 1 section; ceramic stater insulation.	CB171
C242	CAPACITOR, FIXED, MICA DIELECTRIC: 82 uuf, ±5%; 500 WVDC; char. C.	CM15C820J03
C243	Same as C242.	
C244	CAPACITOR, FIXED, MICA DIELECTRIC: 91 uuf, ±2%; 500 WVDC; char. C.	CM15C910G03
C245	CAPACITOR, FIXED, MICA DIELECTRIC: 39 uuf, ±5%; 500 WVDC; char. C.	CM15C390J03
C246	CAPACITOR, FIXED, MICA DIELECTRIC: 10,000 uuf, ±1%; 300 WVDC; char. F.	CM35F103F03
C247	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1,000 uuf, ±10%; 500 WVDC.	CC100-9
C248	Same as C246.	
C249	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 300 WVDC.	CC100-37
C250	Same as C247.	
C251	Same as C247.	
C252	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 3 uuf, ±10%; 5,000 WVDC.	CC109-1
C253	CAPACITOR, FIXED, RF	CX109-2
C254	CAPACITOR, FIXED, MICA DIELECTRIC: 27 uuf. ±5%; 500 WVDC; char. B.	CM15E270J03
C255	Same as C211.	
C256	Same as C211.	
C257	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1,000 pf, ±5%; 500 WVDC.	CC113-1-102J

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C258	Same as C220.	
C259	Same as C202.	
C260	Same as C204.	
C261 thru C268	Same as C246.	
C269	Same as C220.	
C270	Same as C220.	
C271	Same as C219.	
C272	Same as C204.	
C273	Same as C220.	
C274	Same as C220.	
C275	CAPACITOR, FIXED, PLASTIC DIELECTRIC: 500 pf, ±10%; 8,000 VDC; glass-ceramic body.	CX102K501P
C276	Same as C275.	
C277	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5,000 uuf, GMV; 500 WVDC.	CC100-15
C278	Same as C205.	
C279	Same as C277.	
C280	Same as C205.	
C281	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 20,000 uuf, +80% -20%; 500 WVDC.	CC100-24
C282 thru C286	Same as C205.	
C287	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 uuf, ±20%; 5,000 WVDC; 6-32 tapped studs each end; 13/16" dia. x 7/8" long o/a.	CC109-36
C288	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10 uuf, ±10%; 5,000 WVDC; 6-32 tapped studs each end; 13/16" dia. x 7/8" long o/a.	CC109-8

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C289	Same as C205.	
C290	Same as C205.	
C291	CAPACITOR, FIXED, METALIZED PLASTIC: 1 uf, ±5%; 400 WVAC; epoxy encapsulated case.	CN114-1RO-4J
C292	CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC: 0.5 uf, ±10%; 600 WVDC.	CP53B1EF504K
C293	Same as C205.	
C294	Same as C205.	
C295	Same as C211.	
C296	CAPACITOR, FIXED, PAPER DIELECTRIC: 4 uf, ±10% at 60 cps at 25°C, ±5°C; 370 WVAC at 60 cps; hermetically sealed seamless drawn steel, oval case.	CP113-1
C297	Same as C204.	
C298	Same as C275.	
C299	CAPACITOR, VARIABLE, VACUUM: capacitance range 20 to 2,000 uf; voltage rating 5 Kv; ceramic body.	CB172-2
C300	CAPACITOR, VARIABLE, VACUUM: capacitance range 15 to 1,500 uf; voltage rating 5 Kv; ceramic body.	CB172-1
C301	CAPACITOR, FIXED, METALIZED PAPER: 680,000 uuf, ±10%; 1,000 WVDC; plastic insulation sleeving; metal case.	CP106C684-10K
C302	Same as C301.	
C303	Same as C204.	
C304	Same as C211.	
C305	Same as C211.	
C306	Same as C205.	
C307	Same as C275.	
C308	Same as C288.	
C309	Same as C205.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C258	Same as C220.	
C259	Same as C202.	
C260	Same as C204.	
C261 thru C268	Same as C246.	
C269	Same as C220.	
C270	Same as C220.	
C271	Same as C219.	
C272	Same as C204.	
C273	Same as C220.	
C274	Same as C220.	
C275	CAPACITOR, FIXED, PLASTIC DIELECTRIC: 500 pf, ±10%; 8,000 VDC; glass-ceramic body.	CX102K501P
C276	Same as C275.	
C277	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5,000 uuf, GMV; 500 WVDC.	CC100-15
C278	Same as C205.	
C279	Same as C277.	
C280	Same as C205.	
C281	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 20,000 uuf, +80% -20%; 500 WVDC.	CC100-24
C282 thru C286	Same as C205.	
C287	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 uuf, ±20%; 5,000 WVDC; 6-32 tapped studs each end; 13/16" dia. x 7/8" long o/a.	CC109-36
C288	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10 uuf, ±10%; 5,000 WVDC; 6-32 tapped studs each end; 13/16" dia. x 7/8" long o/a.	CC109-8

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C289	Same as C205.	
C290	Same as C205.	
C291	CAPACITOR, FIXED, METALIZED PLASTIC: 1 uf, ±5%; 400 WVAC; epoxy encapsulated case.	CN114-1RO-4J
C292	CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC: 0.5 uf, ±10%; 600 WVDC.	CP53B1EF504K
C293	Same as C205.	
C294	Same as C205.	
C295	Same as C211.	
C296	CAPACITOR, FIXED, PAPER DIELECTRIC: 4 uf, ±10% at 60 cps at 25°C, ±5°C; 370 WVAC at 60 cps; hermetically sealed seamless drawn steel, oval case.	CP113-1
C297	Same as C204.	
C298	Same as C275.	
C299	CAPACITOR, VARIABLE, VACUUM: capacitance range 20 to 2,000 uf; voltage rating 5 Kv; ceramic body.	CB172-2
C300	CAPACITOR, VARIABLE, VACUUM: capacitance range 15 to 1,500 uf; voltage rating 5 Kv; ceramic body.	CB172-1
C301	CAPACITOR, FIXED, METALIZED PAPER: 680,000 uuf, ±10%; 1,000 WVDC; plastic insulation sleeving; metal case.	CP106C684-10K
C302	Same as C301.	
C303	Same as C204.	
C304	Same as C211.	
C305	Same as C211.	
C306	Same as C205.	
C307	Same as C275.	
C308	Same as C288.	
C309	Same as C205.	

RF AMPLIFIER, RFTA-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C310	Same as C202.	
C311 thru C315	Same as C205.	
C316	CAPACITOR, FIXED, PLASTIC DIELECTRIC: 1,000 pf, ±10%; 8,000 VDC; glass-ceramic body.	CX102K102P
CR201	NOT USED	
CR202	NOT USED	
CR203	SEMICONDUCTOR DEVICE, DIODE: silicon; max. peak inverse voltage 200 V; max. reverse current 0.10 ua at 25°C; max. temperature 175°C; JEDEC type DO-7 case.	1N3070
DS201	LAMP, GLOW: neon; 110/125 VAC/DC; nom. current rating 0.6 ma, 1/15 watt; midget flange base, T-2 bulb.	BI111-1
E201	NOT USED	
E202	NOT USED	
E203	INSULATOR, BOWL: ceramic feed-thru; round; 7/8" dia. x 1/2" long.	NS112-2
EV200 thru EV204	NOT USED	
EV205	SHIELD, ELECTRON TUBE: 7 pin miniature.	TS102U01
EV206	Same as EV205.	
J201	CONNECTOR, RECEPTACLE, ELECTRICAL: 15 female crimp pin removeable contacts, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ310-1
J202	Same as J201.	
J203	CONNECTOR, RECEPTACLE, ELECTRICAL: 5 number 20 male contacts, gold over silver plated, spring temper phosphor bronze; rated for 1,900 V RMS at sea level; sub-miniature type.	JJ242-1P
J204	CONNECTOR, RECEPTACLE, ELECTRICAL: w/hood; 9 female crimp pin removeable contacts, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ313-4H

RF AMPLIFIER, RFTA-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J205	Same as J204.	
J206	Same as J204.	
J207	CONNECTOR, RECEPTACLE, ELECTRICAL: 27 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ313-3
J208	CONNECTOR, RECEPTACLE, ELECTRICAL: RF; 1 round female contacts, straight type; series BNC to BNC.	UG625*/U
J209	Same as J208.	
J210	CONNECTOR, RECEPTACLE, ELECTRICAL: male.	MS3102A18-16P
J211 thru J213	Same as J208.	
J214	CONNECTOR, RECEPTACLE, ELECTRICAL: female; teflon insulated.	UG560*/U
J215	CONNECTOR, RECEPTACLE, ELECTRICAL: 25 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; polarized; cadmium plated steel.	JJ313-2
J216	CONNECTOR, RECEPTACLE, ELECTRICAL: male.	MS3102A28-11P
J217	NOT USED	
J218	CONNECTOR, RECEPTACLE, ELECTRICAL: 14 number 20 male contacts, gold over silver plated, spring tempor phosphor bronze; rated for 1,900 V RMS at sea level; sub-miniature type.	JJ242-5P
K201	RELAY, ARMATURE: DPDT; 24 VAC, 400 ohms; contacts rated for 10 amps resistive, 5 amps inductive at 115 VAC or 26 VDC; nom. coil power required 1 to 2 watts; 500 V RMS; plug-in type; clear plastic enclosed case.	RL168-2C10-24AC
L201	COIL, RADIO FREQUENCY: fixed; 220 uh, $\pm$5%; current rating 230 ma; molded case.	CL275-221
L202 thru L205	Same as L201.	
L206	COIL, RADIO FREQUENCY: fixed; 113 uh, $\pm$5%.	CL361

RF AMPLIFIER, RFTA-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L207	COIL, RADIO FREQUENCY: 128 uh; operating frequency 790 Kc; 5/16" dia. x 5/8" long o/a.	CL177
L208	Same as L207.	
L209	Same as L206.	
L210	Same as L207.	
L211	Same as L207.	
L212	COIL, RADIO FREQUENCY	AX602
L213	TRANSFORMER, RADIO FREQUENCY: fixed; 45 uh, ±10%.	TZ210
L214	COIL, RADIO FREQUENCY: fixed; 150 uh, ±5%; current rating 315 ma; molded case.	CL275-151
L215 thru L218	Same as L214.	
L219	Same as L201.	
L220	NOT USED	
L221	TRANSFORMER, RADIO FREQUENCY: fixed; operating frequency 2.5 mc; total coil indictance 43.2 uh, ±1.0 uh.	A4228-1
L222	TRANSFORMER, RADIO FREQUENCY: fixed; operating frequency 2.5 mc; total coil inductance 27.4 uh, ±0.5 uh.	A4228-2
L223	TRANSFORMER, RADIO FREQUENCY: fixed; operating frequency 2.5 mc; total coil inductance 10.0 uh, ±0.2 uh.	A4228-3
L224	TRANSFORMER, RADIO FREQUENCY: fixed; operating frequency 7.9 mc; total coil inductance 5.13 uh, ±0.1 uh.	A4228-4
L225	TRANSFORMER, RADIO FREQUENCY: fixed; operating frequency 7.9 mc; total coil inductance 1.30 uh, ±0.04 uh.	A4228-5
L226	TRANSFORMER, RADIO FREQUENCY: fixed; operating frequency 7.9 mc; total coil inductance 2.59 uh, ±0.05 uh.	A4228-6
L227	TRANSFORMER, RADIO FREQUENCY: fixed; operating frequency 7.9 mc; total coil inductance 1.28 uh, ±0.02 uh.	A4228-7

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L228	TRANSFORMER, RADIO FREQUENCY: fixed; operating frequency 25 mc; total coil inductance 1.05 uh, ±0.02 uh.	A4228-8
L229	TRANSFORMER, RADIO FREQUENCY: fixed; operating frequency 25 mc; total coil inductance 0.545 uh, ±0.01 uh.	A4228-9
L230	COIL, REDIO FREQUENCY: fixed; 3.3 uh, ±10%; current rating 1,030 ma; molded case.	CL275-3R3
L231	COIL, RADIO FREQUENCY: fixed; 680 uh, ±5%; current rating 160 ma; molded case.	CL275-681
L232	Same as L201.	
L233	COIL, RADIO FREQUENCY: 750 uh, ±10%; current rated at 75 to 100 ma; 16.0 ohms; molded bakelite form.	CL100-5
L234	COIL, RADIO FREQUENCY: fixed; 0.150 mh, ±10%; current rating 400 ma; molded case.	CL140-2
L235 thru L238	Same as L234.	
L239	COIL, RADIO FREQUENCY: fixed; 33 uh, ±10%; rated at 2.5 mc.	CL366
L240	COIL, RADIO FREQUENCY: 185 uh, ±15 uh; operating frequency 790 Kc; 3/8" dia. x 2" long o/a.	CL178
L241	Same as L240.	
L242	Same as L201.	
L243	Same as L214.	
L244	Same as L214.	
L245	COIL, RADIO FREQUENCY: fixed; 14 uh, ±10%; rated at 7.9 mc.	CL373
L246	COIL, RADIO FREQUENCY: fixed.	CL356
L247	COIL, RADIO FREQUENCY: L section.	CL357
L248	COIL, RADIO FREQUENCY: bandswitch.	CL358
L249	Same as L240.	

RF AMPLIFIER, RFTA-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L250	COIL, RADIO FREQUENCY: fixed; 11 uh, ±20%; 3-1/2" o/a length.	CL372-2
L251	COIL, RADIO FREQUENCY: fixed; 11 uh, ±20%; 3-1/8" o/a length.	CL372-1
L252	NOT USED	
L253 thru L255	Same as L214.	
M201	METER: full scale deflection 0 - 100 ua; 11,000 ohms, ±15%; dust proof molded lucite case.	MR191-3
M202	METER: full scale deflection 0 - 1.0 amp; 0.05 ohms, ±15%; dust proof molded lucite case.	MR191-4
P201	CONNECTOR, PLUG, ELECTRICAL: w/hood; 15 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; polarized; cadmium plated steel.	JJ313-1H
P202	CONNECTOR, PLUG, ELECTRICAL: 15 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; polarized; cadmium plated steel.	JJ313-1
P203	CONNECTOR, PLUG, ELECTRICAL: 5 female contacts rated at 7.5 amps, spring temper phosphor bronze, gold over silver plated; 1,900 V RMS at sea level; sub-miniature type.	PL225-1S
P204	CONNECTOR, PLUG, ELECTRICAL: w/hood; 9 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; polarized; cadmium plated steel.	JJ313-4H
P205	Same as P204.	
P206	Same as P204.	
P207	NOT USED	
P208	CONNECTOR, PLUG, ELECTRICAL: 14 female contacts rated at 7.5 amps; spring temper phosphor bronze, gold over silver plated; 1,900 V RMS at sea level; sub-miniature type.	PL225-5S
PS201	SUPPRESSOR, PARASITIC	AX561
PS202	SUPPRESSOR, PARASITIC	AX163

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
PS203	Same as PS201.	
PS204	SUPPRESSOR, PARASITIC	AX562
R201	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±5%; 2 watts.	RC42GF470J
R202	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±5%; 1/2 watt.	RC20GF103J
R203	RESISTOR, FIXED, WIREWOUND	RB53CER1800F
R204	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, ±5%; 1/2 watt.	RC20GF472J
R205	Same as R202.	
R206	Same as R203.	
R207	RESISTOR, FIXED, FILM: 500 ohms, ±2%; power rated at 10 watts DC at 40°C, 15 watts AC at 40°C; pyrex glass case.	RR135-2-501
R208	RESISTOR, FIXED, COMPOSITION: 1 megohm, ±5%; 1/2 watt.	RC20GF105J
R209	RESISTOR, VARIABLE, COMPOSITION: 100,000 ohms, ±10%; 1/2 watt; linear taper.	RV106UX8B104A
R210	RESISTOR, FIXED, FILM: 1,000 ohms, ±2%; power rated at 10 watts DC at 40°C, 15 watts AC at 40°C; pyrex glass case.	RR135-2-102
R211	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, ±5%; 1/2 watt.	RC20GF104J
R212	Same as R211.	
R213	Same as R207.	
R214	RESISTOR, FIXED, COMPOSITION: 1,200 ohms, ±5%; 1/2 watt.	RC20GF122J
R215	Same as R208.	
R216	Same as R209.	
R217	Same as R208.	
R218	Same as R209.	

RF AMPLIFIER, RFTA-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R219	Same as R208.	
R220	RESISTOR, FIXED, COMPOSITION: 10 ohms, ±5%; 1/2 watt.	RC20GF100J
R221	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, ±5%; 1/2 watt.	RC20GF222J
R222	RESISTOR, VARIABLE, COMPOSITION: 1,000 ohms, ±10%; 2 watts.	RV120-1
R223	RESISTOR, FIXED, COMPOSITION: 220,000 ohms, ±5%; 1/2 watt.	RC20GF224J
R224	RESISTOR, VARIABLE, COMPOSITION: precision; 1,000 ohms, ±3%.	RV117-2-102
R225	Same as R224.	
R226	Same as R221.	
R227	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, ±5%; 1/2 watt.	RC20GF333J
R228	Same as R211.	
R229	RESISTOR, FIXED, COMPOSITION: 150,000 ohms, ±5%; 1/2 watt.	RC20GF154J
R230	RESISTOR, VARIABLE, COMPOSITION: 5,000 ohms, ±10%; 1/2 watt; linear taper.	RV106UX8B502A
R231	RESISTOR, FIXED, COMPOSITION: 330 ohms, ±5%; 1/2 watt.	RC20GF331J
R232	Same as R231.	
R233	NOT USED	
R234	Same as R211.	
R235	Same as R208.	
R236	Same as R208.	
R237	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±5%; 2 watts.	RC42GF102J
R238	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, ±5%; 1/2 watt.	RC20GF682J

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R239	Same as R237.	
S201	SWITCH, ROTARY: 1 section, 4 positions, 60° angle of throw; non-shorting type contacts, silver plated brass; mycalex insulation.	SW281
S202A	SWITCH SECTION, ROTARY: 30° angle of throw; shorting type section; bakelite insulation.	WS134-1
S202B	SWITCH SECTION, ROTARY: 30° angle of throw; non-shorting type section; bakelite insulation.	WS134-2
S203	SWITCH, ROTARY: 1 section, 2 positions, 60° angle of throw; non-shorting type contacts, silver plated brass; mycalex insulation.	SW252
S204	SWITCH, INTERLOCK: SPST; operating voltage 250 VAC; current rating 5 amps.	SW219
S205	Same as S204.	
S206	SWITCH, SENSITIVE: SPST; current rating 5.0 amps at 125/250 VAC; plastic body.	SW353-1
S207	Same as S206.	
S208	Same as S206.	
S209A,B,C	SWITCH, ROTARY: 3 sections, 12 positions, 30° angle of throw; shorting type contacts; ceramic wafers.	SW367
S210A,B	BANDSWITCH ASSEMBLY	AS127
S211	Same as S206.	
S212	Same as S206.	
V201	TUBE, ELECTRON: tetrode; 11 pin.	8121
V202	Same as V201.	
V203	TUBE, ELECTRON: pentode.	5CX3000A
V204	NOT USED	
V205	TUBE, ELECTRON: duo-diode; 7 pin miniature.	12AL5
V206	Same as V205.	

PARTS LIST (CONT)

RF AMPLIFIER, RFTA-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XK201	SOCKET, ELECTRON TUBE: octal.	TS101P01
XV201	SOCKET, ELECTRON TUBE: 11 pin.	TS170
XV202	Same as XV201.	
XV203	SOCKET, ELECTRON TUBE: self-contained 1,800 uuf, ±20% capacitance between screen grid and suppressor grid terminals, 1,000 WVDC.	TS181
XV204	NOT USED	
XV205	SOCKET, ELECTRON TUBE: 7 pin miniature.	TS102P01
XV206	Same as XV205.	

PARTS LIST

for

HARMONIC FILTER, AF104

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B400	FAN, VENTILATING: 208/230 VAC, 50/60 cps, 1 phase; 14 watts; impedance protected; 100 CFM free delivery; black phenolic or die cast zinc with black finish venturi block; solder lug type terminals to accommodate plug and cord; 4-11/16" square x 1-1/2" deep.	BL106-6
C400	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 50 uf, ±10%; 7,500 WVDC.	CC109-21
C401	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10 uf, ±10%; 5,000 WVDC.	CC109-5
C402	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100 uuf, ±10%; 5,000 WVDC.	CC109-28
C403 thru C407	Same as C402.	
C408	Same as C400.	
C409	Same as C401.	
CR400	DETECTING ELEMENT, DIRECTIONAL COUPLER: frequency range 2-30 Mc; 10 Kw full scale; calibrated to be within ±5% at 5 Kw.	DD109-1
CR401	DETECTING ELEMENT, DIRECTIONAL COUPLER: frequency range 2-30 Mc; 1 Kw full scale; calibrated to be within ±5% at 500 watts.	DD109-2
DC400	COUPLER, DIRECTIONAL: 50 ohm impedance; forward power 10 Kw, frequency 2-30 Mc.	DC104
L400	COIL, RADIO FREQUENCY	CL381
L401	COIL, RADIO FREQUENCY	CL382
L402	COIL, RADIO FREQUENCY	CL383
L403	Same as L402.	
L404	Same as L401.	
L405	Same as L400.	
TB400	TERMINAL BOARD, BARRIER: 4 terminals; 6-32 thd. x 1/4" long binder head screws; phenolic black bakelite.	TM102-4

PARTS LIST

for

HARMONIC FILTER, SWITCHABLE, AF105

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B500	FAN, VENTILATING: 115 VAC, 50/60 cps, 1 phase; 14 watts; impedance protected; 100 CFM free delivery; black phenolic or die cast zinc with black finish venturi block; solder type terminals to accommodate plug and cord; 4-11/16" square x 1-1/2" deep.	BL106-2
B501	Same as B500.	
C500	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100 uuf, ±10%; 5,000 WVDC.	CC109-28
C501	Same as C500.	
C502	Same as C500.	
C503	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 50 uuf, ±10%; 7,500 WVDC.	CC109-19
C504	Same as C500.	
C505	Same as C500.	
C506	Same as C503.	
C507 thru C511	Same as C500.	
C512	Same as C503.	
C513	Same as C500.	
C514	Same as C500.	
C515	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 uuf, ±20%; 5,000 WVDC.	CC109-36
C516	Same as C500.	
C517	Same as C503.	
C518	Same as C500.	
C519	Same as C515.	
C520 thru C524	Same as C500.	

HARMONIC FILTER, SWITCHABLE, AF105

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C525	Same as C503.	
C526	Same as C515.	
C527 thru C529	Same as C500.	
C530	Same as C503.	
C531	Same as C515.	
C532	Same as C500.	
C533	Same as C503.	
C534	Same as C500.	
C535	Same as C503.	
C536 thru C538	Same as C500.	
C539	Same as C503.	
C540	Same as C500.	
C541	Same as C500.	
C542	Same as C503.	
C543	Same as C500.	
C544	Same as C500.	
C545	Same as C503.	
C546	Same as C500.	
C547	Same as C503.	
C548 thru C555	Same as C500.	
C556	Same as C503.	

HARMONIC FILTER, SWITCHABLE, AF105

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C557 thru C561	Same as C500.	
C562	Same as C503.	
C563	Same as C500.	
C564	Same as C500.	
L500	COIL, RADIO FREQUENCY	CL384
L501	COIL, RADIO FREQUENCY	CL386
L502	COIL, RADIO FREQUENCY	CL385
S500A	S500 A, SWITCH ASSEMBLY	A5372
S500B	S500 B, SWITCH ASSEMBLY	A5458
S500C	S500 C, E, G, SWITCH ASSEMBLY	A5374
S500D	S500 D, SWITCH ASSEMBLY	A5459
S500E	Same as S500C.	
S500F	S500 F, SWITCH ASSEMBLY	A5460
S500G	Same as S500C.	
TB500	TERMINAL BOARD, BARRIER: 4 terminals; 6-32 thd. x 1/4" long binder head screws; phenolic black bakelite.	TM102-4
W500	CABLE ASSEMBLY, ELECTRICAL: RF	CA1233

PARTS LIST

for

RELAY PANEL, AR176

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C700	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, ±2%; char. C.	CE63C500G
C701	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf, -10% +150% at 120 cps at 25°C; 100 WVDC; polarized; insulated tubular case.	CE105-20-100
E700	TERMINAL BOARD, BARRIER: 14 number 6-32 binder head machine screws; phenolic body.	TM100-14
E701	TERMINAL BOARD, BARRIER: 8 number 6-32 binder head machine screws; phenolic body.	TM100-8
E702	Same as E701.	
E703	Same as E701.	
E704	TERMINAL BOARD, BARRIER: 10 number 6-32 binder head machine screws; phenolic body.	TM100-10
E705	Same as E700.	
E706	CONNECTOR, FEED-THRU: 3/8" dia. x 1-1/8" long; ceramic body; 6-32 threads.	TE175
E707 thru E711	Same as E706.	
F700	FUSE, CARTRIDGE: 5 amps; time lag; 1-1/4" long x 1/4" dia.; slow blow.	FU102-5
F701 thru F703	Same as F700.	
F704	FUSE, CARTRIDGE: 1 amp; time lag; 1-1/4" long x 1/4" dia.; slow blow.	FU102-1
F705	Same as F700.	
I700	LAMP, GLOW: neon; double candlebra; 110 volts, 1/4 watt; T-4-1/2 clear bulb, bayonet base.	BI103-2
I701 thru I704	Same as I700.	
I705	NOT USED	

RELAY PANEL AR176

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
I706	Same as I700.	
J700	CONNECTOR, RECEPTACLE, ELECTRICAL: 35 male contacts.	MS3102A32-7P
J701	CONNECTOR, RECEPTACLE, ELECTRICAL: 3 male contacts.	MS3102A22-9P
K700	RELAY ASSEMBLY, P.A. Bias; consists of armature relay with cabling; coil - 11,000 ohms, ±10%, four form pile up; contacts - silver cadmium, rated at 10 amps 125 VAC resistive; operate 0.010 amp, non-operate 0.009 amp.	AR105
K701	RELAY ASSEMBLY, P.A. Plate Overload; consists of armature relay with cabling; contacts - silver cadmium, rated at 25 amps, 125 VAC resistive; latch relay - 11,000 ohms, ±10%; unlatch relay 0-93 ohms, ±10%; latch operate 220 V, 60 cps AC or less.	AR100
K702	RELAY ASSEMBLY, P.A. Screen Overload; consists of armature relay with cabling; contacts - silver cadmium, rated at 25 amps, 125 VAC resistive; latch relay - 1,100 ohms, ±10%; unlatch relay 1,500 ohms, ±10%; latch operate 220 V, 60 cps AC or less.	AR108
K703	RELAY ASSEMBLY, P.A. Screen ON-OFF; consists of armature relay with cabling; contacts - silver cadmium, rated at 25 amps; coil - 1,800 ohms, ±10%; operate 220 V, 50/60 cps.	AR102
K704	RELAY ASSEMBLY, Diode Protect; consists of armature relay with cabling; coil - nominal voltage 32 VDC, pull-in current 0.060 amps, resistance 350 ohms, ±10%, pull-in voltage 22 V, pull-in power 1.2 watts; 32 VDC relay 3 form C single pole, double pole contacts in positions #1, #2, #3, #4 rated at 25 amps at 125 VAC.	AR175
K705	RELAY ASSEMBLY, Tune-Operatel consists of armature relay with cabling; contacts - silver cadmium, rated at 25 amps; coil - 1,800 ohms, ±10%; operate 220 V, 50/60 cps.	AR103
K706	RELAY ASSEMBLY, IPA Screen Overload; consists of armature relay with cabling; coil - latch 1,100 ohms, ±10%; trip - 10,000 ohms, ±10%; 4 PDT; contacts - silver, rated at 25 amps non-inductive load; latch operate 220 V, 60 cps AC or less.	AR107

RELAY PANEL AR176

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
K707	RELAY ASSEMBLY, IPA Plate Overload; consists of armature relay with cabling; coil - latch relay - 1,100 ohms, ±10%; unlatch relay 43 ohms, ±10%; 4 PDT; contacts - silver cadmium, rated at 20 amps, 125 VAC resistive; latch operate 220 V, 60 cps or less.	AR101
K708	RELAY ASSEMBLY, IPA Bias; consists of armature relay with cabling; coil - 11,000 ohms, ±10%, four form pile up; contacts - silver cadmium, rated at 10 amps, 125 VAC resistive; operate 0.010 amp, non-operate 0.009 amp.	AR106
M700	METER: elapsed time; 240 volts, 60 cps; standard ASA/MIL 3-1/2" (MR-36) mounting.	MR125-2
M701	TIMER, INTERVAL: time delay; time cycle - 5 minutes; dial division - 5 seconds; contacts rated at 10 amps; 3" dia. panel mounting; bakelite case.	TI101-5
M702	Same as M700.	
R700	RESISTOR, FIXED, COMPOSITION: 15,000 ohms, ±10%; 2 watts.	RC42GF153K
R701	RESISTOR, FIXED, COMPOSITION: 300 ohms, ±10%; 2 watts.	RC42GF301K
R702	RESISTOR, FIXED, COMPOSITION: 220,000 ohms, ±5%; 2 watts.	RC42GF224J
R703	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms, ±10%; 2 watts.	RV4LAYSA503A
R704	RESISTOR, FIXED, WIREWOUND: 0.5 ohms, 5 watts.	RW107-54
R705	RESISTOR, VARIABLE, WIREWOUND: 1 ohm, 4 watts; linear taper.	RA107TXA1ROA
R706	RESISTOR, FIXED, WIREWOUND: 250 ohms; 141 ma DC; 5 watts.	RW107-23
R707	RESISTOR, VARIABLE, WIREWOUND: 500 ohms, ±10%; 25 watts.	RA75ASA501AK25
R708	Same as R706.	
R709	RESISTOR, VARIABLE, WIREWOUND: 2,500 ohms, ±10%; 25 watts; linear taper.	RA75AXC252AK25

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R710	RESISTOR, FIXED, WIREWOUND: 10 ohms; 1,000 ma DC; 10 watts.	RW109-4
R711	RESISTOR, VARIABLE, WIREWOUND: 15 ohms, ±10%; 25 watts; linear taper.	RA75AXA150AK25
R712	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, ±10%; 1 watt.	RC32GF392K
S700	SWITCH, TOGGLE: DPST; rated for 6 amps at 250 volts; bat type toggle.	ST22K
XF700	FUSEHOLDER, LAMP INDICATING: accommodates cartridge fuse 1-1/4" long x 1/4" dia.; 90 to 300 volts, 20 amps; neon lamp type with 220K ohm lamp resistor; clear transparent flat sided knob; black body.	FH104-3
XF701 thru XF705	Same as XF700.	
XI700	LIGHT, INDICATOR: with white frosted lens; 105/125 volts; bayonet base lamp type.	TS137-7FB4
XI701 thru XI704	Same as XI700.	
XI705	NOT USED	
XI706	Same as XI700.	

PARTS LIST

for

POWER SUPPLY COMPARTMENT, AP131

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B800	FAN, CENTRIFUGAL: 220 volts, 50/60 cps, 3 phase; 2,320 watts full load; 6.1 line amps; ccw rotation; 3,250 RPM nominal.	BL111
C800	CAPACITOR, FIXED, PAPER: 4 uf, ±10%; 10,000 WVDC; 16" high x 13-1/2" wide x 5-1/8" thk. o/a.	CP103
C801	CAPACITOR, FIXED, PAPER: 8 uf, ±10%; 5,000 WVDC; 16" high x 13-1/2" wide x 5-1/8" thk. o/a.	CP104
C802	CAPACITOR, FIXED, PAPER: 10 uf, ±10%; 2,500 WVDC; 6-7/8" high x 4-9/16" wide x 3-3/4" thk. o/a.	CP105
C803	CAPACITOR, FIXED, MICA DIELECTRIC: 1,000 uuf, ±10%; 500 WVDC; char. B.	CM30B102K
C804 thru C810	Same as C803.	
C811	NOT USED	
C812	NOT USED	
C813	CAPACITOR, FIXED, PLASTIC DIELECTRIC: 10,000 uuf, ±20%; 4,000 WVDC; 1-1/8" dia. x 2-7/8" long o/a.	CX102J103M
C814	Same as C813.	
C815	CAPACITOR, FIXED, PAPER DIELECTRIC: 250,000 uuf, ±10%; 3,000 WVDC; hermetically sealed metal case.	CP70E1FL254K
CR800A,B, C,D,E,F	SEMICONDUCTOR DEVICES: matched set of 6 Zener diodes. Non-replaceable item, part of TB800, TMC part number AX126.	
E800	NOT USED	
E801	BUSHING, FEED-THRU: steatite insulators, neoprene gland; hot tinned brass stud, 1/4-20 threads, 1-1/8" dia. x 3" long o/a.	AX150
E802	Same as E801.	
E803	NOT USED	
E804	NOT USED	
E805	TERMINAL BOARD, BARRIER: 4 terminals; 6-32 thd. x 1/4" long binder head screws; phenolic body.	TM102-4

POWER SUPPLY COMPARTMENT, AP131

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L800	REACTOR, FILTER: 2 hy at 1.6 amps; 10" high x 7-7/16" wide x 5-31/32" deep o/a.	TF200
L801	REACTOR, FILTER: 5 hy at 1 amp; 10" high x 7-7/16" wide x 5-31/32" deep o/a.	TF199
L802	SOLENOID, RELAY: w/plunger; 230 volts, 60 cps, 0.2 amp; continuous duty cycle.	SZ100
L803	COIL, RADIO FREQUENCY: fixed; 185 uhy.	CL178
L804	Same as L803.	
R800	NOT USED	
R801	RESISTOR, FIXED, WIREWOUND: 4 ohms, 25 watts.	RW111-47
R802	RESISTOR, FIXED, WIREWOUND: 5,000 ohms, 140 watts.	RW118F502
R803	RESISTOR, FIXED, WIREWOUND: 18,000 ohms, 140 watts.	RW118F183
R804 thru R809	Same as R803.	
R810	RESISTOR, FIXED, WIREWOUND: 4 megohms, ±5%; 4 watts.	RW122-1-405
R811	Same as R810.	
R812	RESISTOR, FIXED, WIREWOUND: 180 ohms, ±5%; 14 watts.	RW119G181
R813	Same as R812.	
R814	RESISTOR, FIXED, WIREWOUND: 600,000 ohms, ±5%; 6 watts.	RW122-3-604
R815	Same as R814.	
R816	NOT USED	
R817	NOT USED	
R818	RESISTOR, FIXED, WIREWOUND: 5,000 ohms, ±5%; 10 watts. Part of Semiconductor Device Set, TB800, TMC part number AX126.	RW109-32
R819	NOT USED	
R820	NOT USED	

POWER SUPPLY COMPARTMENT, AP131

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R821	RESISTOR, FIXED, WIREWOUND: 100,000 ohms, rated at 7 watts, current rating 8.5 ma; 20 watts. Part of Semiconductor Device Set, TB800, TMC part number AX126.	RW110-43
R822	RESISTOR, FIXED, COMPOSITION: 220 ohms, ±5%; 2 watts. Part of Semiconductor Device Set, TB800, TMC part number AX126.	RC42GF221J
R823	RESISTOR, FIXED, COMPOSITION: 100 ohms, ±5%; 2 watts. Part of Semiconductor Device Set, TB800, TMC part number AX126.	RC42GF101J
R824 thru R827	Same as R823. Part of Semiconductor Device Set, TB800, TMC part number AX126.	
S800	SWITCH: air	SW243-1
S801	SWITCH, PUSHBUTTON: momentary contact; SPST; 15 amps at 125, 250, 460 VAC, 1/2 watt at 125 VDC; 1/4 amp at 250 VDC.	SW169
T800	TRANSFORMER, POWER: 210, 220, 230, 250 V, 50/60 cps AC, 3 phase delta primary; 3,400 VAC each; 1.6 amps wye secondary.	TF203
T801	TRANSFORMER, FILAMENT: 230 volts with taps on primary; 8.5 volts, 7.5 amps, CT secondary.	TF197
T802	AUTOTRANSFORMER, POWER, STEP-DOWN: 3 phase.	TF326
TB800	SEMICONDUCTOR DEVICE SET: consisting of 6 matched Zener diodes, CR800A,B,C,D,E,F and resistors, R818, R821, R822, R823, R824, R825, R826, R827.	AX126

PARTS LIST

for

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B900	MOTOR, CONTROL: motor voltage fixed phase 220 V, ±10%; control phase 36 CT; current rating, fixed phase 0.099 amp, control phase 0.600 amp; power input, fixed phase 13.3 watts, control phase 14.0 watts; 50/60 cps; aluminum black anodized case.	MO128
B901	Same as B900.	
B902	MOTOR, CONTROL: power input 25 watts at 220 V, ±10%; 50/60 cps; current rating 0.14 amp; black anodized case.	MO129
B903	Same as B902.	
C900	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 300 WVDC.	CC100-37
C901	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1,000 uuf, GMV; 500 WVDC.	CC100-29
C902	Same as C901.	
C903	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 4,700 uuf, GMV; 500 WVDC.	CC100-14
C904	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100 uuf, ±10%; 5,000 WVDC.	CC109-29
C905	Same as C904.	
C906	CAPACITOR, FIXED, CERAMIC DIELECTRIC: feed-thru; 1,000 uuf, ±20%; 500 WVDC.	CK70AW102M
C907	CAPACITOR, FIXED, MICA DIELECTRIC: 20 uuf, ±5%; 500 WVDC; char. C.	CM15C200J03YY
C908	CAPACITOR, FIXED, VACUUM: 3 uuf, 17,000 volts peak; current rating 7 amps; 1-1/16" dia. x 3-1/4" long.	CO102-3
C910	CAPACITOR, FIXED, MICA DIELECTRIC: 50 uuf, ±5%; 500 WVDC; char. C.	CM15C500J03
C911	CAPACITOR, FIXED, VACUUM: 1,000 uuf; 15,000 WVDC.	CO101-1000-15C
C912	NOT USED	
C913	NOT USED	
C914	Same as C901.	

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C915	Same as C901.	
C916	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C917	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1,000 uuf, ±20%; 5,000 WVDC; 6-32 tapped studs each end; 13/16" dia. x 7/8" long o/a.	CC109-38
C918	Same as C904.	
C919	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 500 uuf, ±20%; 5,000 WVDC; 6-32 tapped studs each end; 13/16" dia. x 7/8" long o/a. Part of XV900.	CC109-36
C920 thru C926	Same as C919. Part of XV900.	
C927	CAPACITOR, VARIABLE, VACUUM	CB172-3
C928	CAPACITOR, VARIABLE, VACUUM	CB172-4
C929	NOT USED	
C930	CAPACITOR, FIXED, VACUUM: 2,000 uf, ±5%; current rating 125 amps RMS; voltage rating 10 Kv.	CO109-3
C931	CAPACITOR, FIXED, MICA DIELECTRIC: 1,000 uuf, ±10%; 500 WVDC; char. C.	CM20C102K
C932	Same as C931.	
C933	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 50 uuf, ±10%; 7,500 WVDC; 6-32 tapped studs each end; 13/16" dia. x 7/8" long o/a. Part of XV900.	CC109-19
C934 thru C936	Same as C933. Part of XV900.	
C937	CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC: 1.0 uf, ±10%; 1,000 WVDC; hermetically sealed tubular metal case.	CP106C105-10K
C938	Same as C937.	
C939	Same as C901.	

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C940	CAPACITOR, FIXED, PLASTIC DIELECTRIC: trylar; 1,000 uuf, ±10%; 14,000 WVDC.	CX102K102T
C941	CAPACITOR, FIXED, MICA DIELECTRIC: 5 uuf, ±10%; 300 WVDC; char. C.	CM15C050K03
C942	CAPACITOR, FIXED, MICA DIELECTRIC: 50 uuf, ±5%; 500 WVDC; char. B.	CM20B500J03
C943 thru C945	Same as C906.	
C946	CAPACITOR, FIXED, PLASTIC DIELECTRIC: trylar; 10,000 uuf, ±20%; 4,000 WVDC.	CX102J103M
C947	Same as C946.	
C948	Same as C906.	
C949	Same as C906.	
C950	NOT USED	
C951	Same as C901.	
C952	Same as C901.	
C953	Same as C904.	
C954	CAPACITOR, FIXED, MICA DIELECTRIC: 10 uuf, ±5%; 500 WVDC; char. C.	CM15C100J03
C955	Same as C903.	
C956	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 500 WVDC.	CC100-32
C957	Same as C900.	
C958	Same as C900.	
C959	Same as C909.	
C960	NOT USED	
C961	CAPACITOR, FIXED, ELECTROLYTIC: 500 uf, 50 WVDC; polarized; hermetically sealed aluminum case with clear vinyl plastic sleeve.	CE116-10VN

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C962	NOT USED	
C963	Same as C916.	
C964	Same as C917.	
C965	Same as C917.	
C966-1 thru C966-5	Same as C916.	
C967-1 thru C967-9	Same as C916.	
C967-11 thru C967-15	Same as C916.	
C968-1 thru C968-5	Same as C916.	
C969-1 thru C969-9	Same as C916.	
C969-11 thru C969-15	Same as C916.	
C970	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5,000 uuf, GMV; 500 WVDC.	CC100-15
C971	Same as C970.	
C972	Same as C970.	
C973	Same as C916.	
C974	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 100 WVDC.	CC100-28
C975 thru C982	Same as C974.	

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C983 thru C988	Same as C916.	
C989	Same as C940.	
DS900	LAMP, GLOW: neon; rated for 110/125 VAC/DC, nominal current rating 1.7 ma, 1/15 watt; T-2 lamp size; midget flange base.	BI111-2
DS901 thru DS903	Same as DS900.	
DS904	LAMP, GLOW: rated at 5.0 V at 0.06 amp for 60,000 hours, 6.3 V at 0.07 amp for 6,000 hours; clear high impact plastic white lens; silver plated wire leads.	BI116-1-5
DS905 thru DS918	Same as DS904.	
E900	TERMINAL, FEED-THRU	TE101-3
E901 thru E903	Same as E900.	
E904	TERMINAL LUG: grounding type.	TE149-120
E905	CONTACT ASSEMBLY: short.	AX129
E906 thru E913	Same as E905.	
E914	CONTACT ASSEMBLY: long.	AX128
E915 thru E919	Same as E914.	
E920	NOT USED	
E921	INSULATOR, FEED-THRU	NS118-5
E922	Same as E921.	
E923	STAND-OFF: insulated.	TE102-2

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
E924 thru E932	Same as E923.	
E933	INSULATOR: pillar type, round, white glazed steatite.	NS3W0206
E934	FEED-THRU: insulated.	AX152
E935	Same as E934.	
E936	Same as E934.	
E937	Same as E923.	
E938	Same as E923.	
J900	CONNECTOR, RECEPTACLE, ELECTRICAL: RF; 1 round female contactm straight type; series BNC to BNC.	UG625*/U
J901	CONNECTOR, RECEPTACLE, ELECTRICAL: female; teflon insulated.	UG560*/U
J902	Same as J901.	
J903	Non-replaceable item. Part of Directional Coupler Assembly, TMC part number DC104. (Refer to parts list of Harmonic Filter Assembly AF104)	
J904	CONNECTOR, RECEPTACLE, ELECTRICAL: 25 male crimp pin removeable contacts, rated at 5 amps, 500 V RMS; polarized; cadmium plated steel.	JJ313-2
J905	CONNECTOR, RECEPTACLE, ELECTRICAL: 25 female crimp pin removeable contacts, rated at 5 amps, 500 V RMS; connector shape polarization.	JJ310-2
J906	NOT USED	
J907	CONNECTOR, RECEPTACLE, ELECTRICAL: 9 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; polarized; cadmium plated steel.	JJ313-4
J908	CONNECTOR, RECEPTACLE, ELECTRICAL: w/hood; 9 female crimp pin removeable contacts, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ310-4H
J909	Same as J908.	

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J910	CONNECTOR, RECEPTACLE, ELECTRICAL: 15 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; polarized; cadmium plated steel.	JJ313-1
J911	Same as J910.	
J912	CONNECTOR, RECEPTACLE, ELECTRICAL: RF type; 1 round male contact, straight type; series BNC to BNC.	JJ211
J913	Same as J912.	
J914	Same as J912.	
J915	Same as J905.	
J916	Same as J904.	
J917	Same as J910.	
K900	NOT USED	
K901	RELAY, ARMATURE: SPST; nominal voltage 24 VAC; 4 contacts, rated for 25 amps at 125 VAC; silver cadmium plated.	RL165-H4
K902	RELAY, ARMATURE: DPDT; 700 ohms, ±10% DC resistance; operating voltage 24 VDC; current rating 35 ma, 700 mw at 25°C; 8 contacts rated for 5 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-1
K903	NOT USED	
K904	RELAY, ARMATURE: 3 PDT; 24 VAC; 400 ohms; contacts rated for 10 amps resistive, 5 amps inductive at 115 VAC or 26 VDC; nominal coil power required 1 to 2 watts; 500 V RMS; plug-in type; enclosed clear plastic case.	RL168-3C10-24AC
L900	COIL, RADIO FREQUENCY: fixed; 1,000 uh, ±5%; current rating 140 ma; molded case.	CL275-102
L901	CHOKE, RADIO FREQUENCY: fixed; 38 uhy, ±5%.	CL179
L902	COIL, RADIO FREQUENCY: fixed; 1/8" thk. cold rolled copper, silver plated.	CL354
L903A	COIL, RADIO FREQUENCY	CL370
L903B	COIL, RADIO FREQUENCY: fixed; PI section.	CL369

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L904	COIL, RADIO FREQUENCY: fixed; L section.	CL368
L905A	COIL, RADIO FREQUENCY	CL223
L905B	COIL, RADIO FREQUENCY	CL278
L906	COIL, RADIO FREQUENCY: fixed.	CL271
L907	COIL, RADIO FREQUENCY: fixed; 120 uh, ±5%; current rating 330 ma; molded case.	CL275-121
L908	COIL, RADIO FREQUENCY: fixed; 680 uh, ±5%; current rating 160 ma; molded case.	CL275-681
L909	COIL, RADIO FREQUENCY: fixed; 185 uhy, ±10 uhy.	CL178
L910	COIL, RADIO FREQUENCY: 750 uhy, ±20%; current rating 100 ma max.; 17 ohms approx. DC resistance.	CL100-5
L911	COIL, RADIO FREQUENCY: fixed; 0.3 mh inductance; 790 Kc test frequency.	CL154
L912	Same as L907.	
L913	COIL, RADIO FREQUENCY: fixed; 3.30 uh, ±10%; molded case.	CL240-3.3
L914	Same as L901.	
L915	COIL, RADIO FREQUENCY: 5 uhy each coil; inside coil completely insulated from outside coil; 3-1/4" o/d x 6-1/2" long.	CL160
L916	Same as L907.	
L917	Same as L907.	
L918	COIL, RADIO FREQUENCY: fixed; 0.680 mh, ±10%; current rating 200 ma; molded case.	CL140-9
L919	NOT USED	
L920	NOT USED	
L921	Same as L907.	
L922	Same as L907.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L923 thru L927	Same as L909.	
L928 thru L936	Same as L907.	
L937 thru L941	Same as L909.	
L942 thru L948	Same as L907.	
L949	COIL, RADIO FREQUENCY: fixed; 150 mh, ±10%; current rating 400 ma; molded case.	CL140-2
L950 thru L952	Same as L949.	
L953	RF CONNECTOR PROBE ASSEMBLY	AJ101
MP900	COUNTER, ROTARY: 3 figure.	CY107
P900 thru P902	NOT USED	
P903	CONNECTOR, PLUG, ELECTRICAL: right angle type. Part of W902.	PL192
P904	Same as P903. Part of W902.	
P905	CONNECTOR, PLUG, ELECTRICAL: w/hood; 25 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ313-2H
P906	NOT USED	
P907	CONNECTOR, PLUG, ELECTRICAL: w/hood; 9 female crimp pin removeable contacts, rated for 5 amps, 500 V RMS; polarized; cadmium plated steel.	JJ310-4H
P908	CONNECTOR, PLUG, ELECTRICAL: w/hood; 9 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ313-4H

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
P909	Same as J908.	
P910	NOT USED	
P911	NOT USED	
P912	Same as P905.	
R900	RESISTOR, FIXED, COMPOSITION: 470,000 ohms, ±5%; 1/2 watt.	RC20GF474J
R901	RESISTOR, FIXED, COMPOSITION: 10 ohms, ±5%; 1/2 watt.	RC20GF100J
R902	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±5%; 1/2 watt.	RC20GF471J
R903	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±5%; 1/2 watt.	RC20GF470J
R904	NOT USED	
R905	RESISTOR, FIXED, COMPOSITION: 220,000 ohms, ±5%; 1/2 watt.	RC20GF224J
R906	RESISTOR, VARIABLE, COMPOSITION: 1 megohm, ±10%; 1/2 watt; linear taper.	RV106UX8B105A
R907	RESISTOR, FIXED, COMPOSITION: 27,000 ohms, ±5%; 2 watts.	RC42GF273J
R908	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±5%; 1 watt.	RC32GF471J
R909	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, ±5%; 1/2 watt.	RC20GF222J
R910	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±5%; 1 watt.	RC32GF470J
R911	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±5%; 1/2 watt.	RC20GF473J
R912	RESISTOR, FIXED, COMPOSITION: 1 megohm, ±5%; 1/2 watt.	RC20GF105J
R913	Same as R912.	
R914	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, ±5%; 2 watts.	RC42GF104J
R915	Same as R914.	

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R916	RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms, ±10%; 1/2 watt; linear taper.	RV106UX8B103A
R917	Same as R909.	
R918	RESISTOR, FIXED, COMPOSITION: 15,000 ohms, ±5%; 1/2 watt.	RC20GF153J
R919	Same as R912.	
R920	RESISTOR, FIXED, FILM: 4,700 ohms, ±1%; 1/2 watt.	RN65D472F
R921	Same as R920.	
R922	Same as R909.	
R923	RESISTOR, FIXED, FILM: 47 ohms, ±1%; 2 watts.	RN80B470F
R924	Same as R923.	
R925	RESISTOR, VARIABLE, PRECISION: 1,000 ohms, ±3%; 500 WVDC.	RV118-2-102
R926	Same as R925.	
R927	RESISTOR, FIXED, COMPOSITION: 18 ohms, ±5%; 1/2 watt.	RC20GF180J
R928	RESISTOR, FIXED, COMPOSITION: 330 ohms, ±5%; 1/2 watt.	RC20GF331J
R929	NOT USED	
R930	NOT USED	
R931	Same as R905.	
R932	RESISTOR, VARIABLE, COMPOSITION: 100,000 ohms, ±10%; 1/2 watt; linear taper.	RV106UX8B104A
R933	Same as R928.	
R934	Same as R928.	
R935	Same as R927.	
R936	Same as R912.	
R937	Same as R912.	

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R938	Same as R900.	
R939	Same as R900.	
R940	Same as R912.	
S900A,B	BANDSWITCH ASSEMBLY	AS126
S901	NOT USED	
S902A,B	SWITCH, ROTARY: 2 sections, 12 positions, 30° angle of throw; shorting type contacts section 1, non-shorting type contacts section 2, silver alloy; bakelite wafer insulation.	SW392
S903	SWITCH, SENSITIVE: SPST: current rating 5.0 amps at 125/250 VAC; 7 amps resistive, 4 amps inductive at 28 VDC; plastic body.	SW353-1
S904 thru S906	Same as S903.	
S907A,B	Same as S902A,B.	
S908	SWITCH, ROTARY	SW412
T900	NETWORK, RELAY METER: input voltage 230 V, 50 - 500 cps; 6 solder lug type terminals; stud mounted.	NW131
T901	TRANSFORMER, RADIO FREQUENCY	TZ211
TB900	NOT USED	
TB901	TERMINAL BOARD, BARRIER: 3 terminals; 6-32 thd. x 1/4" long binder head screws; phenolic black bakelite.	TM102-3
TB902	Same as TB901.	
V900	TUBE, ELECTRON: power amplifier, ceramic tetrode.	4CX5000A
V901	TUBE, ELECTRON	5726
V902	Same as V901.	
W900	NOT USED	
W901	NOT USED	

POWER AMPLIFIER COMPARTMENT, AX580

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
W902	WIRING HARNESS, BRANCHED, ELECTRICAL: consists of connectors P903, P904.	CA1101
XDS900	LIGHT, INDICATOR: with red lens; accepts T-3-1/4 single contact, midget flange lamp.	TS154-1
XDS901	LIGHT, INDICATOR: with yellow lens; accepts T-3-1/4 single contact, midget flange lamp.	TS154-3
XDS902	Same as XDS900.	
XDS903	Same as XDS901.	
XK900	NOT USED	
XK901	NOT USED	
XK902	SOCKET, RELAY: w/retainer; 6 male type contacts.	TS171-1
XK903	NOT USED	
XK904	SOCKET, RELAY: 11 cadmium plated pin contacts, rated at 500 V RMS, 3 amps; phenolic body.	TS100-5
XV900	SOCKET, ELECTRON TUBE: consists of socket and capacitors C919 thru C926, C933 thru C936.	TS134
XV901	SOCKET, ELECTRON TUBE: 7 pin miniature.	TS102P01
XV902	Same as XV901.	
Z900	NETWORK, RELAY, METER: 28 contacts; low limit load 10 amps, 115 VAC resistive load, high limit load 10 amps, 15 VAC.	NW132

PARTS LIST

for

MAIN FRAME ASSEMBLY, AX613

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1000 thru C1002	NOT USED	
C1003	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1,000 uuf, ±20%; 5,000 WVDC.	CC109-38
C1004	NOT USED	
C1005	Same as C1003.	
C1006 thru C1010	NOT USED	
C1011	CAPACITOR, FIXED, MICA DIELECTRIC: 10,000 uuf, ±5%; 500 WVDC; char. C.	CM35C103J03
C1012 thru C1020	NOT USED	
C1021	Same as C1011.	
C1022	CAPACITOR, FIXED, ELECTROLYTIC: 25 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-25-50
C1023 thru C1028	Same as C1011.	
C1029	CAPACITOR, FIXED, MICA DIELECTRIC: 1,000 uuf, ±10%; 500 WVDC; char. B.	CM20B102K
C1030 thru C1039	Same as C1003.	
C1040	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C1041 thru C1043	Same as C1040.	
CB1000	CIRCUIT BREAKER: 230 VAC, 50 amps, 3 PST.	SW240-3
CB1001	NOT USED	

MAIN FRAME ASSEMBLY, AX613

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CB1002	CIRCUIT BREAKER: 230 VAC, 350 ma, 1 pole.	SW297
CP1000	ADAPTOR, CONNECTOR, ELECTRICAL: female, straight type, series BNC to BNC.	UG492*/U
CR1000	SEMICONDUCTOR DEVICE, DIODE: silicon; peak inverse voltage 230 V; average rectified forward current 30 ma at 25°C; max. power dissipation 200 mw at 25°C; max. operating temperature 200°C; 2 axial wire lead type terminals, hermetically sealed glass case.	1N463
E1000	CONTACT, ELECTRICAL: spring loaded; silver plated beryllium copper; 3/4" x 1-1/8" x 3/4" o/a.	AX154
E1001	CONTACT, ELECTRICAL: spring loaded; nickel plated beryllium copper; 2-1/4" x 1-1/4" x 1" o/a.	AX153
E1002 thru E1007	Same as E1001.	
E1008	INSULATOR, FEED-THRU	AX261
E1009	Same as E1008.	
E1010	Same as E1008.	
I1000 thru I1003	NOT USED	
I1004	LAMP, NEON: 105/125 volts, 1/25 watt; miniature bayonet base T-3-1/4 clear bulb.	BI100-51
I1005	LAMP, FLUORESCENT: standard cool white; 1/2" dia. x 11-1/4" long.	BI107
I1006	Same as I1005.	
J1000	CONNECTOR, RECEPTACLE, ELECTRICAL: female; AN pin type. Part of Wiring Harness, TMC part number CA825.	MS3102A20-29S
J1001	CONNECTOR, RECEPTACLE, ELECTRICAL: 35 female contacts. Part of Wiring Harness, TMC part number CA825.	MS3102A32-7S
J1002	CONNECTOR, RECEPTACLE, ELECTRICAL: 1 round female contact, straight type; series BNC to BNC. Part of Wiring Harness, TMC part number CA825.	JJ172

MAIN FRAME ASSEMBLY, AX613

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J1003	CONNECTOR, RECEPTACLE, ELECTRICAL: one socket type contact. Part of Power Cable, TMC part number CA466, symbol W1008.	MS3102A18-16S
J1004	CONNECTOR, RECEPTACLE, ELECTRICAL: female; teflon insulated.	UG560*/U
J1005	Same as J1002. Part of Wiring Harness, TMC part number CA825.	
J1006	Same as J1002. Part of RF Cable Assembly, TMC part number CA462.	
J1007	Same as J1002. Part of RF Cable Assembly, TMC part number CA462.	
J1008	Same as J1002. Part of Wiring Harness, TMC part number CA825.	
J1009	Same as J1002. Part of Wiring Harness, TMC part number CA825.	
J1010	CONNECTOR, RECEPTACLE, ELECTRICAL: female. Part of Wiring Harness, TMC part number CA825.	MS3102A24-28S
J1011	Same as J1002.	
J1012	Same as J1002.	
K1000	RELAY: contact arrangement 4C (4 PDT) 6 VAC, 50/60 cycles, 3 amps; 2 coil contacts, 12 relay contacts. Supplied with socket, TMC part number RL174-2.	RL174-1
L1000	COIL, RADIO FREQUENCY: nominal inductance 177 uh; 2 mc frequency.	CL155
L1001 thru L1004	Same as L1000.	
L1005	COIL, RADIO FREQUENCY: fixed; 2.5 mh, $\pm$10%; current carrying capacity 100 ma; molded case.	CL140-1
L1006	Same as L1005.	
L1007	COIL, RADIO FREQUENCY: fixed; 0.150 mh, $\pm$10%; current carrying capacity 400 ma; molded case.	CL140-2
L1008	Same as L1007.	

MAIN FRAME ASSEMBLY, AX613

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
M1000	VOLTMENTER: filament primary; 0-300 volts; red marker at 230 volts; 4-1/2" square case.	MR118
M1001	AMMETER: PA; screen current; 0-100 ma DC; 4-1/2" square case.	MR116
M1002	AMMETER: PA; plate current; 0-3 amps DC; 4-1/2" square case.	MR117
M1003	VOLTMENTER: PA; plate RF; 0-10 Kv RF scale; 200 ma DC movement; 4-1/2" square case.	MR120
M1004	NOT USED	
M1005	NOT USED	
M1006	METER, SWR, KILOWATTS	MR187
P1000	CONNECTOR, PLUG, ELECTRICAL: female socket type. Part of Wiring Harness, TMC part number CA825.	MS3106B32-7S
P1001	CONNECTOR, PLUG, ELECTRICAL: female socket type. Part of Wiring Harness, TMC part number CA825.	MS3106B22-9S
P1002	CONNECTOR, PLUG, ELECTRICAL: 1 male pin type contact, 500 V peak; silver plated brass enclosing shell, 50 ohms, bayonet polarization; BNC twist lock, crimp type. Part of RF Cable Assembly CA503-42.00.	PL244-1
P1003	CONNECTOR, PLUG, ELECTRICAL: 1 male pin type contact. Part of Power Cable, TMC part number CA460, symbol W1003.	MS3106B18-16P
P1004	CONNECTOR, PLUG, ELECTRICAL: coaxial; HN type; 50 ohms, 5,000 volts peak. Part of RF Cable Assembly, TMC part number CA480-105-15.25.	PL222
P1005	Same as P1002. Part of RF Cable Assembly, TMC part number CA503-42.00.	
P1006	CONNECTOR, PLUG, ELECTRICAL: 1 female socket type contact. Part of Power Cable, TMC part number CA460, symbol W1003.	MS3106B18-16S
P1007	Same as P1002. Part of RF Cable Assembly, TMC part number CA462.	
P1008	Same as P1002. Part of RF Cable Assembly, TMC part number CA462.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
P1009	Same as P1004. Part of RF Cable Assembly, TMC part number CA480-105-15.25.	
P1010	Same as P1000. Part of Power Cable Assembly, TMC part number CA431.	
P1011	CONNECTOR, PLUG, ELECTRICAL: male pin type. Part of Power Cable Assembly, TMC part number CA431.	MS3106B32-7P
P1012 thru P1016	Same as P1002.	
P1017	CONNECTOR, PLUG, ELECTRICAL: 37 female crimp pin removeable contacts, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ310-5
P1018 thru P1021	Same as P1017.	
P1022	Same as P1002.	
P1023	Same as P1005.	
P1024 thru P1029	Same as P1002.	
P1030	CONNECTOR, PLUG, ELECTRICAL: 1 female type contact, teflon dielectric, rated for 48 ohms, 500 V RMS; miniature bayonet locking type.	PL204
P1031	Same as P1030.	
P1032	Same as P1030.	
P1033	Same as P1002.	
P1034	Same as P1011.	
P1035	Same as P1002.	
P1036	Same as P1009.	
P1037	CONNECTOR, PLUG, ELECTRICAL: 1 male contact, series UHF.	UG88*/U
P1038	CONNECTOR, PLUG, ELECTRICAL: male.	PL259A-TEF

PARTS LIST (CONT)

MAIN FRAME ASSEMBLY, AX613

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R1000	RESISTOR, FIXED, WIREWOUND: 100 ohms, 55 watts.	RW115-101-55
R1001	Same as R1000.	
R1002	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms, ±10%; 2 watts.	RV4NAYSD503A
R1003	RESISTOR, FIXED, COMPOSITION: 390,000 ohms, ±5%; 1/2 watt.	RC20GF394J
R1004	RESISTOR, FIXED, WIREWOUND: 2 ohms, ±1%.	RB100E2R00F
R1005	RESISTOR, FIXED, COMPOSITION: 220,000 ohms, ±5%; 1 watt.	RC32GF224J
R1006	RESISTOR, FIXED, COMPOSITION: 220,000 ohms, ±5%; 1/2 watt.	RC20GF224J
R1007 thru R1009	Same as R1006.	
R1010	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms, ±10%; 2 watts; consists of switch, symbol S1018.	RV4CTSD503A
S1000	SWITCH, PUSHBUTTON: SPST; momentary contact; rated for 1 amp, 250 V or 3 amps, 125 V; solder lug type terminals.	SW168SPST2NOBR
S1001	SWITCH, ROTARY: 1 section, 12 positions, 30° angle of throw.	SW250
S1002	SWITCH, ROTARY: tap, 180° total rotation, 7 taps, rated for 10 amps at 150 VAC.	SW167-7
S1003	NOT USED	
S1004	SWITCH, TOGGLE: DPDT; 6 amps, 125 VAC; 28° angle of throw; solder lug type terminals.	ST22N
S1005	SWITCH, TOGGLE: SPST; 6 amps, 125 VAC; 28° angle of throw; solder lug type terminals.	ST12A
S1006	SWITCH, INTERLOCK: push to operate; total travel approx. 0.312"; 15 amps, 120/250 VAC; 2 amps resistive at 250 VDC.	SW230

MAIN FRAME ASSEMBLY, AX613

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
S1007 thru S1011	Same as S1006.	
S1012	STARTER, FLUORESCENT LAMP: 8 watts; 13/16" dia. x 1-1/2" long.	P0170
S1013	Same as S1012.	
S1014	NOT USED	
S1015	SWITCH, MICRO: push type; 1/2 amp, 125 VDC or 1/4 amp, 250 VDC; solder type terminal lugs.	SW189
S1016	Same as S1015.	
S1017	SWITCH, TOGGLE: DPDT; momentary contact; rated for 3 amps, 250 VAC or 6 amps, 125 VAC; 2 position ON/ON, normally closed.	ST105
S1018	Integral part of R1010.	
T1000	BALLAST, FLUORESCENT LAMP: 8 watts, 118 volts, 0.17 amp, 60 cps.	P0169
T1001	Same as T1000.	
TB1000	TERMINAL BOARD, FANNING: 12 terminals; angle type, left end feed.	TM105-12AL
TB1001	TERMINAL BOARD, BARRIER: 14 terminals; 6-32 thd. x 1/4" long binder head screws; phenolic black bakelite.	TM102-14
W1000	NOT USED	
W1001	CABLE ASSEMBLY, POWER, ELECTRICAL: consists of 35" length of MWC wire, rubber covered; 2 connectors P1010, P1011.	CA431
W1002	CABLE ASSEMBLY, RADIO FREQUENCY: consists of 42" length of RF cable; 2 connectors P1002, P1005.	CA503-42.00
W1003	CABLE ASSEMBLY, POWER, ELECTRICAL: consists of 39-1/4" length high voltage cable; 2 connectors P1003, P1006.	CA460

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
W1004	CABLE ASSEMBLY, RADIO FREQUENCY: consists of 15-1/4" length of RF cable, RG165?u; 2 connectors P1004, P1009.	CA480-105-15.25
W1005	NOT USED	
W1006	CABLE ASSEMBLY, RADIO FREQUENCY: consists of 2 RF cables, RG174/U, one 39" and one 42", rubber jacket covering both cables; 1 connector J1006.	CA462
W1007	Same as W1006. Consists of J1007.	
W1008	CABLE ASSEMBLY, POWER, ELECTRICAL: consists of 10-1/2" length of number 14 AWG type cable; 1 connector J1003 one end, terminal lug other end.	CA466
W1009	WIRING HARNESS, BRANCHED, ELECTRICAL	CA825
XI1000 thru XI1003	NOT USED	
XI1004	LIGHT, INDICATOR: with clear lens for miniature bayonet base T-3-1/4 bulb.	TS106-2
XI1005A,B	SOCKET, FLUORESCENT LAMP: 75 watts, 250 volts.	TS141
XI1006A,B	Same as XI1005A,B.	
XS1000 thru XS1011	NOT USED	
XS1012	SOCKET, STARTER, FLUORESCENT: 60 watts, 250 volts.	TS140
XS1013	Same as XS1012.	

PARTS LIST

for

RFTA POWER SUPPLY, AP126

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C2001	CAPACITOR, FIXED, ELECTROLYTIC: triple section; 20 uf each section; 450 WVDC; polarized; tubular case.	CE108-1
C2002	CAPACITOR, FIXED, PAPER DIELECTRIC: 10 uf, ±10%; char. F; metal case.	CP70B1FG106K
C2003	Same as C2001.	
C2004	CAPACITOR, FIXED, MICA DIELECTRIC: 10,000 uuf, ±1%; 300 WVDC.	CM35F103F03
C2005 thru C2008	Same as C2004.	
C2009	CAPACITOR, FIXED, ELECTROLYTIC: 4 uf, ±10%; 600 WVDC; cylindrical case.	CP41B1FF405K
CR2001	RECTIFIER, SEMICONDUCTOR DEVICE	DD129
CR2002	RECTIFIER, SEMICONDUCTOR DEVICE: 3 phase; average current 1.5 amps at 75°C; non-recurrent surge 10 amps at 75°C; peak reverse voltage 2 Kv.	DD124
DS2001	Non-replaceable item. Part of XF2001.	
DS2002	Non-replaceable item. Part of XF2002.	
DS2003	Non-replaceable item. Part of XF2003.	
DS2004	Non-replaceable item. Part of XF2004.	
DS2005	Non-replaceable item. Part of XF2005.	
F2001	FUSE, CARTRIDGE: 1/2 amp.	FU104R50
F2002	FUSE, CARTRIDGE: 1/4 amp; time lag; 1-1/4" long x 1/4" dia; slow blow.	FU102-.250
F2003	FUSE, CARTRIDGE: 5 amps; time lag; 1-1/4" long x 1/4" dia; slow blow.	FU102-5
F2004	FUSE, CARTRIDGE: 3 amps; time lag; 1-1/4" long x 1/4" dia; slow blow.	FU102-3
F2005	FUSE, CARTRIDGE: 2 amps; time lag; 1-1/4" long x 1/4" dia; slow blow.	FU102-2

RFTA POWER SUPPLY, AP126

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
I2001	LAMP, GLOW: neon; 105/125 volts, 1/25 watt; miniature bayonet base T-3-1/4 bulb.	BI100-51
J2001	NOT USED	
J2002	CONNECTOR, RECEPTACLE, ELECTRICAL: 35 male pin type contacts.	MS3102A32-7P
K2001	RELAY, ARMATURE: DPDT; 24 VDC, 400 ohms; contacts rated for 10 amps resistive, 2 amps inductive at 115 VAC or 26 VDC; nominal coil power required 1 to 2 watts; 500 V RMS; plug-in type; enclosed clear plastic case.	RL168-2C10-24DC
K2002	RELAY, ARMATURE: DPDT; 220 VAC, 5,000 ohms; contacts rated for 10 amps resistive, 2 amps inductive at 115 VAC or 26 VDC; nominal coil power required 2 to 3 volt-amps; 500 V RMS; plug-in type; enclosed clear plastic case.	RL168-2C10-220AC
K2003	Same as K2002.	
L2001	REACTOR: 5 hy; max. DC current 250 ma; nom. DC resistance 90 ohms; 450 WVDC at 120 cps or 30 WVDC at 400 cps; hermetically sealed rectangular steel case.	TF5025
L2002	REACTOR: 2 hy; current rating 200 ma DC; approx. DC resistance 100 ohms; 900 WVDC; ceramic solder terminals; hermetically sealed steel case.	TF5023
L2003	REACTOR: 2 hy.	TF5024
P2001	CONNECTOR, RECEPTACLE, ELECTRICAL: 22 female contacts.	MS3108B28-11S
R2000	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, ±5%; 2 watts.	RC42GF104J
R2001	RESISTOR, FIXED, COMPOSITION: 56,000 ohms, ±5%; 2 watts.	RC42GF563J
R2002	RESISTOR, VARIABLE, COMPOSITION: 25,000 ohms, ±10%; 2 watts.	RV4LAYSA253A
R2003	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, ±5%; 2 watts.	RC42GF333J
R2004	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, ±5%; 2 watts.	RC42GF392J

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R2005	RESISTOR, VARIABLE, COMPOSITION: 5,000 ohms, ±10%; 2 watts.	RV4LAYSA502A
R2006	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±5%; 2 watts.	RC42GF473J
R2007	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±5%; 2 watts.	RC42GF103J
R2008	Same as R2002.	
R2009	Same as R2003.	
R2010	RESISTOR, FIXED, WIREWOUND: 1,500 ohms; current rating 81 ma; 10 watts.	RW109-26
R2011	RESISTOR, FIXED, COMPOSITION: 470,000 ohms, ±5%; 2 watts.	RC42GF474J
R2012	Same as R2011.	
R2013	RESISTOR, FIXED, WIREWOUND: 1,000 ohms; current rating 100 ma; 10 watts.	RW109-24
R2014	Same as R2011.	
R2015	RESISTOR, FIXED, WIREWOUND: 50 ohms; current rating 450 ma; 10 watts.	RW109-7
R2016	Same as R2015.	
R2017	RESISTOR, FIXED, COMPOSITION: 220,000 ohms, ±5%; 1/2 watt.	RC20GF224J
R2018	Same as R2015.	
R2019	Non-replaceable item. Part of XF2004.	
R2020	Non-replaceable item. Part of XF2005.	
R2021	Non-replaceable item. Part of XF2003.	
R2022	Non-replaceable item. Part of XF2001.	
R2023	RESISTOR, FIXED, WIREWOUND: 25 ohms; current rating 630 ma; 10 watts.	RW109-6
R2024	Same as R2023.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R2025	Same as R2023.	
R2026	Non-replaceable item. Part of XF2002.	
R2027	Same as R2001.	
R2028	RESISTOR, FIXED, COMPOSITION: 82,000 ohms, ±5%; 2 watts.	RC42GF823J
S2001	SWITCH, TOGGLE: DPDT; 6 amps, 125 VAC; 28° angle of throw; solder lug type terminals.	ST22N
T2001	TRANSFORMER, POWER, STEP-UP: primary- 50/60 cps, 3 phase, parallel connected 220 VAC, series connected 440 VAC; secondary #1 - 634 VAC at 200 ma; netural - 365 VAC at 250 ma; secondary #2 - 346 VAC at 50 ma; solder lug type terminals; hermetically sealed in rectangular metal can.	TF313
T2002	TRANSFORMER, POWER, STEP-DOWN: primary- 50/60 cps, parallel connected 220 VAC, series connected 440 VAC; secondary #1 - 5 VAC at 45 amps, CT and 11 VAC at 45 amps CT; secondary #2 - 13.6 VAC at 3 amps; secondary #3 - 6.3 VAC at 1 amp; secondary #4 - 24 VAC at 3 amps; solder lug type terminals; hermetically sealed in rectangular steel can.	TF315
V2001	TUBE, ELECTRON: voltage regulator, 7 pin miniature.	OB2
V2002	TUBE, ELECTRON: voltage regulator, 7 pin miniature.	OA2
V2003	Same as V2001.	
V2004	Same as V2002.	
V2005	Same as V2001.	
V2006	Same as V2002.	
XC2001	SOCKET, ELECTRON TUBE: octal type.	TS101P01
XC2002	NOT USED	
XC2003	Same as XC2001.	
XF2001	FUSEHOLDER, LAMP INDICATING: consists of lamp, DS2001 and lamp resistor, R2022.	FH106

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XF2002	FUSEHOLDER, LAMP INDICATING: accommodates cartridge fuse 1-1/4" long x 1/4" dia.; 90 to 300 volts, 20 amps; neon lamp type with a 220K ohm lamp resistor; clear transparent flat sided knob; black body. Consists of DS2002, R2026.	FH104-3
XF2003	Same as XF2002. Consists of DS2003, R2021.	
XF2004	Same as XF2002. Consists of DS2004, R2019.	
XF2005	Same as XF2002. Consists of DS2005, R2020.	
XI2001	LIGHT, INDICATOR: with clear unfrosted lens, for miniature bayonet base T-3-1/4 bulb.	TS106-2
XK2001 thru XK2003	Same as XC2001.	
XV2001	SOCKET, ELECTRON TUBE: 7 pin miniature.	TS102P01
XV2002 thru XV2006	Same as XV2001.	

PARTS LIST

for

LINEAR LEVEL CONTROL

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B9001	MOTOR, CONTROL	MO130
C9000	CAPACITOR, FIXED, ELECTROLYTIC: 2,000 uf, 25 WVDC; polarized; hermetically selaed aluminim case with black vinyl sleeve.	CE116-5VN
C9001	CAPACITOR, FIXED, ELECTROLYTIC: 500 uf, 50 WVDC; polarized; hermetically sealed aluminum case with black vinyl sleeve.	CE116-10VN
C9002	Same as C9000.	
C9003	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C9004	Same as C9003.	
C9005	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 100 WVDC.	CC100-28
C9006	Same as C9005.	
CR9000	NOT USED	
CR9001	RECTIFIER, SEMICONDUCTOR DEVICE	DD122
CR9002	SEMICONDUCTOR DEVICE, DIODE: silicon; nom. reference voltage 20 V; max. dynamic impedance 22 ohms; Zener test current 13 ma; max. power dissipation 1.0 watts at 25°C; max. ambient temperature 175°C; A31 type case.	1N3027B
CR9003	SEMICONDUCTOR DEVICE, DIODE: silicon; peak inverse voltage 230 V; average rectified forward current 30 ma at 25°C; max. power dissipation 200 mw at 25°C; max. operating temperature 200°C; 2 axial wire lead type terminals; hermetically sealed glass case.	1N463
F9000	NOT USED	
F9001	FUSE, CARTRIDGE: 1 amp; time lag; 1-1/4" long x 1/4" dia.; slow blow.	FU102-1
J9000	NOT USED	
J9001	CONNECTOR, RECEPTACLE, ELECTRICAL: 25 male crimp pin removeable, contacts, rated for 5 amps, 500 V RMS; polarized; cadmium plated steel.	JJ313-2

LINEAR LEVEL CONTROL

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
K9000	NOT USED	
K9001	RELAY, ARMATURE: DPDT; 485 ohms ±10% DC resistance; operating voltage 24 VDC; current rating 49 ma, power rating 1,200 mw at 25°C; 10 contacts rated for 3 amps AC or 5 amps DC at 29 VDC or 115 VAC; clear high impact styrene dust cover case.	RL156-9
K9002	Same as K9001.	
K9003	NOT USED	
K9004	Same as K9001.	
K9005	RELAY, ARMATURE: 4 PDT; 485 ohms ±10% DC resistance; operating voltage 24 VDC; current rating 49 ma, power rating 1,200 mw at 25°C; 16 contacts rated for 0.5 amp AC or 1 amp DC at 29 VDC or 115 VAC; clear high impact styrene dust cover case.	RL156-10
K9006	Same as K9005.	
K9007	RELAY, ARMATURE: DPDT; 700 ohms ±10% DC resistance; operating voltage 24 VDC; current rating 35 ma, power rating 700 mw at 25°C; 8 contacts rated for 3 amps AC or 5 amps DC at 29 VDC or 115 VAC; clear high impact styrene dust cover case.	RL156-1
K9008	Same as K9007.	
K9009	Same as K9001.	
K9010	RELAY, THERMAL DELAY	RL166-26N05
K9011	Same as K9007.	
R9000	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±5%; 2 watts.	RC42GF470J
R9001	RESISTOR, FIXED, COMPOSITION: 560 ohms, ±5%; 1/2 watt.	RC20GF561J
R9002	RESISTOR, VARIABLE, COMPOSITION: 25,000 ohms, ±10%; 2 watts.	RV4NAYSD253A
R9003	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±5%; 1/2 watt.	RC20GF471J
R9004	NOT USED	

LINEAR LEVEL CONTROL

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R9005	NOT USED	
R9006	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, ±5%; 2 watts.	RC42GF104J
R9007	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±5%; 1/2 watt.	RC20GF103J
R9008	Same as R9006.	
S9000	NOT USED	
S9001	SWITCH, SENSITIVE: SPST; current rating 5.0 amps at 125/250 VAC; plastic body.	SW353-1
S9002	Same as S9001.	
XCR9000	NOT USED	
XCR9001	SOCKET, ELECTRON TUBE: octal.	TS101P01
XF9000	NOT USED	
XF9001	FUSEHOLDER: extractor post type; moveable end terminals; o/a dimensions 2-17/64" long x 11/16" dia.	FH100-1
XK9000	NOT USED	
XK9001	SOCKET, RELAY: w/retainer; 6 male beryllium copper gold plated contacts; black phenolic body.	TS171-1
XK9002	Same as XK9001.	
XK9003	NOT USED	
XK9004	Same as XK9001.	
XK9005	SOCKET, RELAY: w/retainer; 12 male beryllium copper gold plated contacts; black phenolic body.	TS171-3
XK9006	Same as XK9005.	
XK9007 thru XK9009	Same as XK9001.	
XK9010	SOCKET, ELECTRON TUBE: 9 pin miniature.	TS103P01
XK9011	Same as XK9001.	

PARTS LIST

for

MASTER STEPPING SWITCH ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C9101	CAPACITOR, FIXED, ELECTROLYTIC: 75 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-75-50
C9102	CAPACITOR, FIXED, ELECTROLYTIC: 500 uf, 50 WVDC; polarized; hermetically sealed aluminum case with black vinyl sleeve.	CE116-10VN
C9103	Same as C9102.	
CR9101	RECTIFIER, SEMICONDUCTOR DEVICE	DD122
CR9102	ABSORBER, OVERVOLTAGE: operating voltage range 28 to 33 volts; max. reverse voltage 10 VDC; green epoxy case.	DD111-1
CR9103	ABSORBER, OVERVOLTAGE	DD121
F9101	FUSE, CARTRIDGE: 1 amp; time lag; 1-1/4" long x 1/4" dia.; slow blow.	FU102-1
J9101	CONNECTOR, RECEPTACLE, ELECTRICAL: 27 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; connector shape polarization.	JJ313-3
J9102	CONNECTOR, RECEPTACLE, ELECTRICAL: 25 male crimp pin removeable contacts, rated for 5 amps, 500 V RMS; polarized; cadmium plated steel.	JJ313-2
R9101	RESISTOR, VARIABLE, COMPOSITION: 5,000 ohms.	RV119-1-502
R9102 thru R9142	Same as R9101.	
R9143	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms.	RV119-1-503
R9144 thru R9160	Same as R9143.	
R9161	NOT USED	
R9162	RESISTOR, FIXED, COMPOSITION: 330,000 ohms, ±5%; 1/2 watt.	RC20GF334J
R9163	RESISTOR, FIXED, COMPOSITION: 470,000 ohms, ±5%; 1/2 watt.	RC20GF474J

MASTER STEPPING SWITCH ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R9164	RESISTOR, FIXED, COMPOSITION: 220,000 ohms, ±5%; 1/2 watt.	RC20GF224J
R9165	RESISTOR, FIXED, COMPOSITION: 120,000 ohms, ±5%; 1/2 watt.	RC20GF124J
S9101A,B, C,D,E,F, G,H,I,J	SWITCH, ROTARY	SW390
XCR9101	SOCKET, ELECTRON TUBE: octal.	TS101P01
XF9101	FUSEHOLDER: extractor post type; moveable end terminals; o/a dimensions 2-17/64" long x 11/16" dia.	FH100-1

PARTS LIST

for

IPA SECOND AMPLIFIER, MODEL AZ105

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
C400	CAPACITOR: 75 mf, 50 volt, N.L.W.	Cornell Dubilier	
C401 thru C403	Same as C400.		
C404	CAPACITOR: 2,600 mf, 50 volt.	Sprague	36D262G050AB0B
C405	Same as C404.		
C406	CAPACITOR: 0.02 mf, 200 volt ceramic; tolerance Z, temperature X5V aug. 22 leads, style 875.	Erie	875-025-X5V0-203Z
C407 thru C415	Same as C406.		
C416	Same as C400.		
C417	Same as C400.		
C418 thru C422	Same as C406.		
C423	CAPACITOR: 0.02 mf, 200 volt (may vary from 0 to 0.1 mf*)	Aerovox	
C424 thru C428	Same as C406.		
C429	CAPACITOR: 5 mf, 100 volt.	Gudeman	F6B505J-10
C430	Same as C406.		
C431	Same as C406.		
C432	CAPACITOR: 6.8 mf, 35 volt.	Sprague	150D685X0035-B2
C433	Same as C432.		
C434	CAPACITOR: 3.3 mf, 35 volt.	Sprague	150D335X9035-B2
C435	Same as C434.		
CR400	SEMICONDUCTOR DEVICE, DIODE	Varo	1N4436

IPA SECOND AMPLIFIER, MODEL AZ105

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
CR401	SEMICONDUCTOR DEVICE, DIODE	Texas Instrument	1N645
CR402 thru CR405	Same as CR401.		
DS400	LAMP, INDICATING	General Electric	GE387
DS401	Same as DS400.		
DS402	Same as DS400.		
F400	FUSE, CARTRIDGE: 1 amp, 250 V.	Bussman	
F401	FUSE, CARTRIDGE: 1/2 amp, 250 V.	Bussman	
G400	CHOPPER	Control Technology Co., Inc.	3-6419
J400	CONNECTOR	Cannon	DB-25S
J401	CONNECTOR	Cannon	DA-15S
J402	CONNECTOR	Amphenol	17-70370
K400	RELAY: 8,000 ohm.	Sigma	22RJCC
K401	RELAY: 13.0 MADC.	Allied Control	TS-154-CC-CC
K402	Same as K401.		
K403	RELAY: 5.8 MADC.	Allied Control	TS-154-C-C
K404	THERMAL RELAY	C-V Controls	DT-7021
L400	CHOKE: 220 mh.	Nytronic	WEE 220 mh
L401 thru L403	Same as L400.		
R400	RESISTOR: 0.51 ohm, ±5%; 2 watts; B. W. H.	I.R.C.	
R401	RESISTOR: 470 ohms, ±5%; 1/4 watt.	Allen Bradley	
R402	RESISTOR: 270 ohms, ±5%; 1/2 watt.	Allen Bradley	

IPA SECOND AMPLIFIER, MODEL AZ105

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
*R403	RESISTOR: 68 ohms, ±5%; 1/4 watt.	Allen Bradley	
R404	RESISTOR: 1.5K ohms, ±5%; 1/4 watt.	Allen Bradley	
R405	RESISTOR: 2.7K ohms, ±5%; 1/2 watt.	Allen Bradley	
*R406	RESISTOR: 750 ohms, ±5%; 1/4 watt.	Allen Bradley	
R407	RESISTOR: 1 megohm, ±5%; 1/4 watt.	Allen Bradley	
R408	RESISTOR: 12K ohms, ±5%; 1/4 watt.	Allen Bradley	
R409	RESISTOR: 3.3K ohms, ±5%; 1/4 watt.	Allen Bradley	
R410	RESISTOR: 15K ohms, ±5%; 1/4 watt.	Allen Bradley	
R411	Same as R407.		
R412	RESISTOR: 22K, ohms, ±5%; 1/4 watt.	Allen Bradley	
*R413	RESISTOR: 680 ohms, ±5%; 1/4 watt.	Allen Bradley	
T400	TRANSFORMER	Control Technology Co., Inc.	4900B
T401	TRANSFORMER	Control Technology Co., Inc.	3-6427
TB400	TERMINAL BOARD	Control Technology Co., Inc.	3-6435
TB401	TERMINAL BOARD	Control Technology Co., Inc.	3-6439
TB402	Same as TB400.		
XDS400	LAMPHOLDER	Dialight Corporation	162-8430-932
XDS401	Same as XDS400.		
XDS402	LAMPHOLDER	Dialight Corporation	162-8430-931
XF400	FUSEHOLDER	Bussman	HKP
XF401	Same as XF400.		
XK400	SOCKET, RELAY	Cinch-Jones	TS-101-P01

* Factory selected upon test, nominal value given.

IPA SECOND AMPLIFIER, MODEL AZ105

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
XK401	SOCKET, RELAY	Allied Control	3055-8
XK402	Same as XK401.		
XK403	SOCKET, RELAY	Allied Control	3055-1
Z400	PLUG-IN MODULE	Control Technology Co., Inc.	166R
Z401	PLUG-IN MODULE	Control Technology Co., Inc.	166S

PARTS LIST

for

IPA AND PA LOAD AMPLIFIERS, MODELS AZ107, AZ108

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
C500	CAPACITOR: 75 mf, 50 volt, N.L.W.	Cornell Dubilier	
C501 thru C503	Same as C500.		
C504	CAPACITOR: 2,600 mf, 50 volt.	Sprague	36D262G050AB0B
C505	Same as C504.		
C506	CAPACITOR: 0.02 mf, 200 volt ceramic; tolerance Z, temperature X5V aug. 22 leads; style 875.	Erie	875-025-X5V0-203Z
C507 thru C515	Same as C506.		
C516	Same as C500.		
C517	Same as C500.		
C518 thru C522	Same as C506.		
C523	CAPACITOR: 0.02 mf, 200 volt (may vary from 0 to 0.1 mf*)	Aerovox	
C524 thru C528	Same as C506.		
C529	CAPACITOR: 24 mf, 100 volt.	Gudeman	F68B246J-10
C530	Same as C506.		
C531	Same as C506.		
C532	CAPACITOR: 6.8 mf, 35 volt.	Sprague	150D685X0035-B2
C533	Same as C532.		
C534	CAPACITOR: 3.3 mf, 35 volt.	Sprague	150D335X9035-B2
C535	Same as C534.		
CR500	SEMICONDUCTOR DEVICE, DIODE	Varo	1N4436

IPA AND PA LOAD AMPLIFIER, MODELS AZ107, AZ108

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
CR501	SEMICONDUCTOR DEVICE, DIODE	Texas Instrument	1N645
CR502 thru CR504	Same as CR501.		
DS500	LAMP, INDICATING	General Electric	GE387
DS501	Same as DS500.		
DS502	Same as DS500.		
F500	FUSE, CARTRIDGE: 3AG, 1 amp, 250 V.	Bussman	
F501	FUSE, CARTRIDGE: 3AG, ½ amp, 250 V.	Bussman	
G500	CHOPPER	Control Technology Co., Inc.	3-6419
J500	CONNECTOR	Cannon	DB-25S
J501	CONNECTOR	Cannon	DA-15S
J502	CONNECTOR	Amphenol	17-70370
K500	RELAY: 8,000 ohm	Sigma	22RJCC
K501	RELAY: 13.0 MADC	Allied Control	TS-154-CC-CC
K502	Same as K501.		
K503	THERMAL RELAY	G-V Controls	DT-7021
K504	RELAY: 5.8 MADC	Allied Control	TS-154-C-C
L500	CHOKE: 220 mh	Nytronic	WEE 220 mh
L501 thru L506	Same as L500.		
R500	RESISTOR: 0.51 ohms, ±5%; 2 watts; B. W. H.	I.R.C.	
R501	RESISTOR: 100 ohms, ±5%; 1 watt.	Allen Bradley	
*R502	RESISTOR: 680 ohms, ±5%; 1/2 watt.	Allen Bradley	
*R503	RESISTOR: 1K ohms, ±5%; 1/4 watt.	Allen Bradley	

* Factory selected upon test. Nominal value given.

IPA AND PA LOAD AMPLIFIER, MODLES AZ107, AZ108

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
R504	RESISTOR: 470 ohms, ±5%; 1/2 watt.	Allen Bradley	
*R505	RESISTOR: 47K ohms, ±5%; 1/4 watt. (Used with AZ107 only)	Allen Bradley	
*R505	RESISTOR: 10K ohms, ±5%; 1/4 watt. (Used with AZ108 only)	Allen Bradley	
*R506	RESISTOR: 750 ohms, ±5%; 1/4 watt.	Allen Bradley	
R507	RESISTOR: 820K ohms, ±5%; 1/4 watt.	Allen Bradley	
*R508	RESISTOR: 180K ohms, ±5%; 1/4 watt. (Used with AZ107 only)	Allen Bradley	
*R508	RESISTOR: 470K ohms, ±5%; 1/4 watt. (Used with AZ108 only)	Allen Bradley	
R509	RESISTOR: 100K ohms, ±5%; 1/4 watt.	Allen Bradley	
R510	RESISTOR: 1 megohm, ±5%; 1/4 watt.	Allen Bradley	
R511	RESISTOR: 1.5K ohms, ±5%; 1/4 watt.	Allen Bradley	
T500	TRANSFORMER	Control Technology Co., Inc.	4900B
T501	TRANSFORMER	Control Technology Co., Inc.	3-6427
TB500	TERMINAL BOARD	Control Technology Co., Inc.	3-6435
TB501	Same as TB500.		
TB502	TERMINAL BOARD	Control Technology Co., Inc.	3-6439
XDS500	LAMPHOLDER	Dialight Corporation	162-8430-932
XDS501	Same as XDS500.		
XDS502	LAMPHOLDER	Dialight Corporation	162-8430-931
XF500	FUSEHOLDER	Bussman	HKP
XF501	Same as XF500.		

* Factory selected upon test. Nominal value given.

PARTS LIST (CONT)

IPA AND PA AMPLIFIER, MODLES AZ107, AZ108

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
XK500	SOCKET, RELAY	Cinch-Jones	TS-101-P01
XK501	SOCKET, RELAY	Allied Control	3055-8
XK502	Same as XK501.		
XK503	Same as XK500.		
XK504	SOCKET, RELAY	Allied Control	3055-1
Z500	PLUG-IN MODULE (Used with AZ107 only)	Control Technology Co., Inc.	153M
Z500	PLUG-IN MODULE (Used with AZ108 only)	Control Technology Co., Inc.	158M
Z501	PLUG-IN MODULE (Used with AZ107 only)	Control Technology Co., Inc.	153S
Z501	PLUG-IN MODULE (Used with AZ108 only)	Control Technology Co., Inc.	158S

PARTS LIST

for

IPA AND PA TUNE AMPLIFIER, MODLES AZ106, AZ109

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
C300	CAPACITOR: 75 mf, 50 volt, N.L.W.	Cornell Dubilier	
C301 thru C303	Same as C300.		
C304	CAPACITOR: 2,600 mf, 50 volt.	Sprague	36D262G050AB0B
C305	Same as C304.		
C306	CAPACITOR: 0.02 mf, 200 volt ceramic; tolerance Z, temperature X5V aug. 22 leads; style 875.	Erie	875-025-X5V0-203Z
C307 thru C310	Same as C306.		
C311	CAPACITOR: 20 mf, 50 volt, N.L.W.	Cornell Dubilier	
C312 thru C322	Same as C306.		
C323	CAPACITOR: 0.02 mf, 200 volt (may vary from 0 to 0.1 mf*)	Aerovox	
C324 thru C328	Same as C306.		
C329	CAPACITOR: 24 mf, 100 volt.	Gudeman	F68B246J-10
C330	Same as C306.		
C331	Same as C306.		
C332	CAPACITOR: 6.8 mf, 35 volt.	Sprague	150D685X0035-B2
C333	Same as C332.		
C334	CAPACITOR: 3.3 mf, 35 volt.	Sprague	150D335X9035-B2
C335	Same as C334.		
CR300	SEMICONDUCTOR DEVICE, DIODE	Varo	1N4436
CR301	SEMICONDUCTOR DEVICE, DIODE	Texas Instrument	1N645

IPA AND PA TUNE AMPLIFIER, MODELS AZ106, AZ109

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
CR302 thru CR305	Same as CR301.		
DS300	LAMP, INDICATING	General Electric	GE387
DS301	Same as DS300.		
DS302	Same as DS300.		
F300	FUSE, CARTRIDGE: 3AG, 1 amp, 250 V.	Bussman	
F301	FUSE, CARTRIDGE: 3AG, ½ amp, 250 V.	Bussman	
G300	CHOPPER	Control Technology Co., Inc.	3-6419
J300	CONNECTOR	Cannon	DB-25S
J301	CONNECTOR	Cannon	DA-15S
J302	CONNECTOR	Amphenol	17-70370
K300	THERMAL RELAY	G-V Controls	DT-7021
K301	RELAY: 8,000 ohm.	Sigma	22RJCC
K302	RELAY: 13.0 MADC.	Allied Control	TS-154-CC-CC
K303	Same as K302.		
L300	CHOKE: 220 mh.	Nytronic	WEE 220 mh
L301 thru L306	Same as L300.		
R300	RESISTOR: 0.51 ohms, ±5%; 2 watts; B. W. H.	I.R.C.	
*R301	RESISTOR: 3.3 megohms, ±5%; ¼ watt.	Allen Bradley	
R302	RESISTOR: 470 ohms, ±5%; ¼ watt.	Allen Bradley	
*R303	RESISTOR: 1K ohms, ±5%; ¼ watt.	Allen Bradley	
*R304	Same as R303.		

* Factory selected upon test. Nominal value given.

IPA AND PA LOAD AMPLIFIER, MODLES AZ106, AZ109

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
R305	RESISTOR: 330 ohms, ±5%; ¼ watt.	Allen Bradley	
*R306	RESISTOR: 750 ohms, ±5%; ¼ watt.	Allen Bradley	
*R307	RESISTOR: 220K ohms, ±5%; ¼ watt.	Allen Bradley	
*R308	RESISTOR: 38K ohms, ±5%; ¼ watt.	Allen Bradley	
R309	RESISTOR: 1 megohm, ±5%; ¼ watt.	Allen Bradley	
R310	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms, ±10%; 1/2 watt; linear taper	Technical Materiel Corporation	RV106UX8B503A
T300	TRANSFORMER	Control Technology Co., Inc.	4900B
T301	TRANSFORMER	Control Technology Co., Inc.	3-6380
T302	TRANSFORMER	Control Technology Co., Inc.	3-6427
TB300	TERMINAL BOARD	Control Technology Co., Inc.	3-6435
TB301	Same as TB300.		
TB302	TERMINAL BOARD	Control Technology Co., Inc.	3-6439
XDS300	LAMPHOLDER	Dialight Corporation	162-8430-932
XDS301	Same as XDS300.		
XDS302	LAMPHOLDER	Dialight Corporation	162-8430-931
XF300	FUSEHOLDER	Bussman	HKP
XF301	Same as XF300.		
XK300	SOCKET, RELAY	Cinch-Jones	TS-101-P01
XK301	SOCKET, RELAY	Allied Control	3055-8
XK302	Same as XK301		

* Factory selected upon test. Nominal value given.

IPA AND PA TUNE AMPLIFIER, MODELS AZ106, AZ109

REF SYMBOL	DESCRIPTION	MANUFACTURER	MANUFACTURER PART NUMBER
XK303	Same as XK300.		
Z300	PLUG-IN MODULE (Used with AZ106 only)	Control Technology Co., Inc.	151R
Z300	PLUG-IN MODULE (Used with AZ109 only)	Control Technology Co., Inc.	159R
Z301	PLUG-IN MODULE (Used with AZ106 only)	Control Technology Co., Inc.	151S
Z301	PLUG-IN MODULE (Used with AZ109 only)	Control Technology Co., Inc.	159S

SECTION 6

SCHEMATIC DIAGRAMS

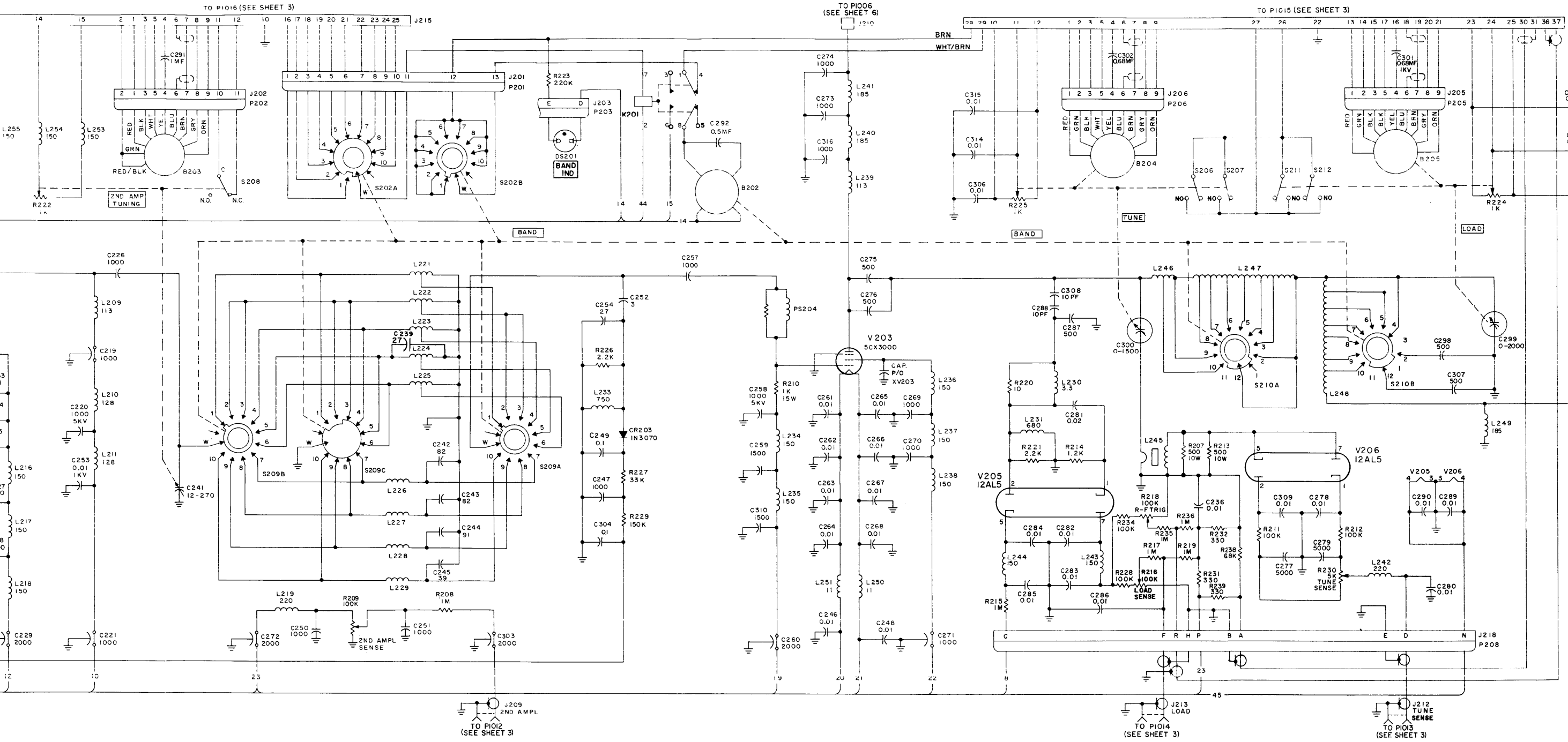


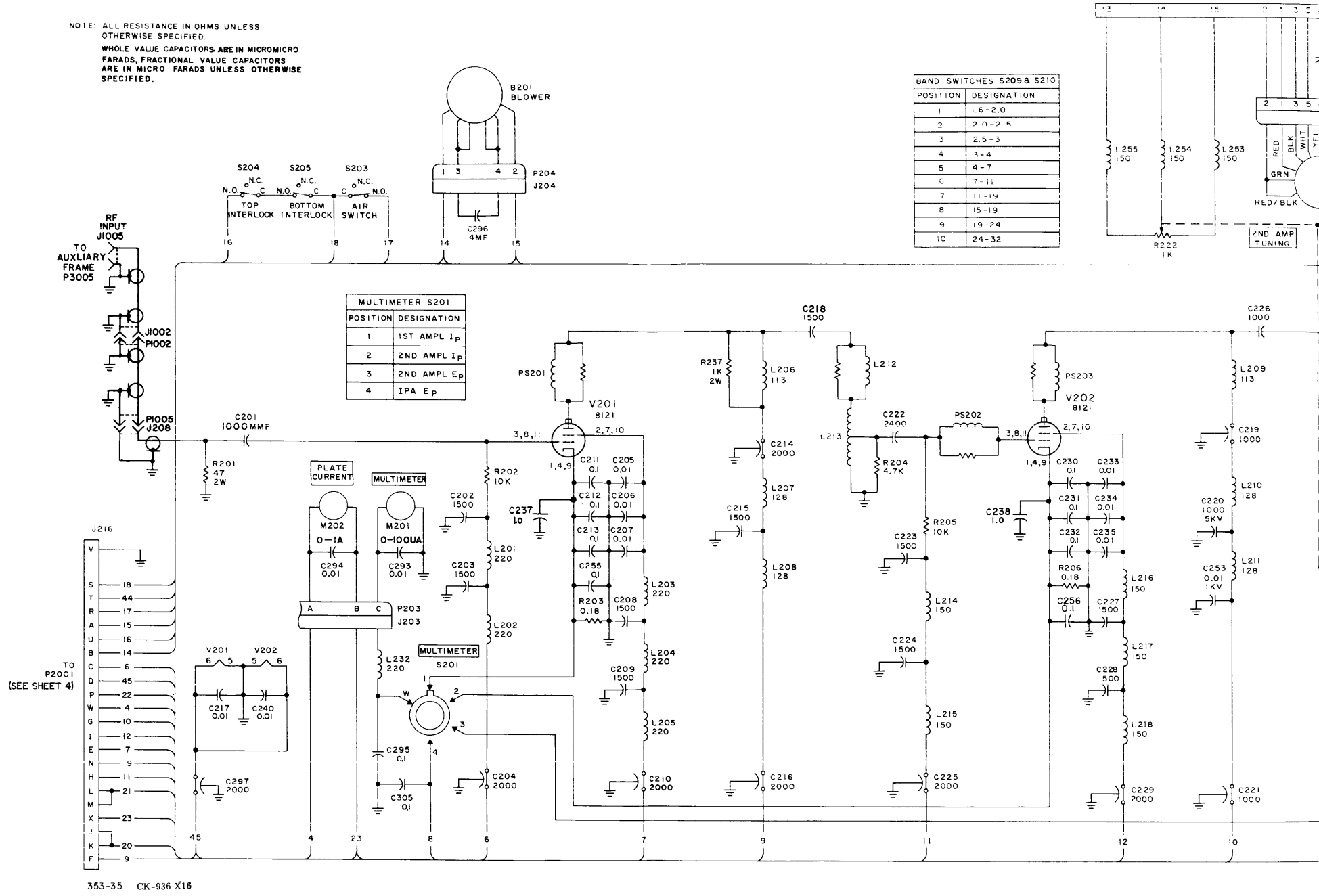
Figure 6-1. Schematic Diagram, TSTE-10K (sheet 1 of 6)

NOTE: ALL RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED

WHOLE VALUE CAPACITORS ARE IN MICROMICRO FARADS, FRACTIONAL VALUE CAPACITORS ARE IN MICRO FARADS UNLESS OTHERWISE SPECIFIED.

BAND SWITCHES S209 & S210	
POSITION	DESIGNATION
1	1.6-2.0
2	2.0-2.5
3	2.5-3
4	3-4
5	4-7
6	7-11
7	11-19
8	15-19
9	19-24
10	24-32

MULTIMETER S201	
POSITION	DESIGNATION
1	1ST AMPL I_p
2	2ND AMPL I_p
3	2ND AMPL E_p
4	IPA E_p



353-35 CK-936 X16

003660353

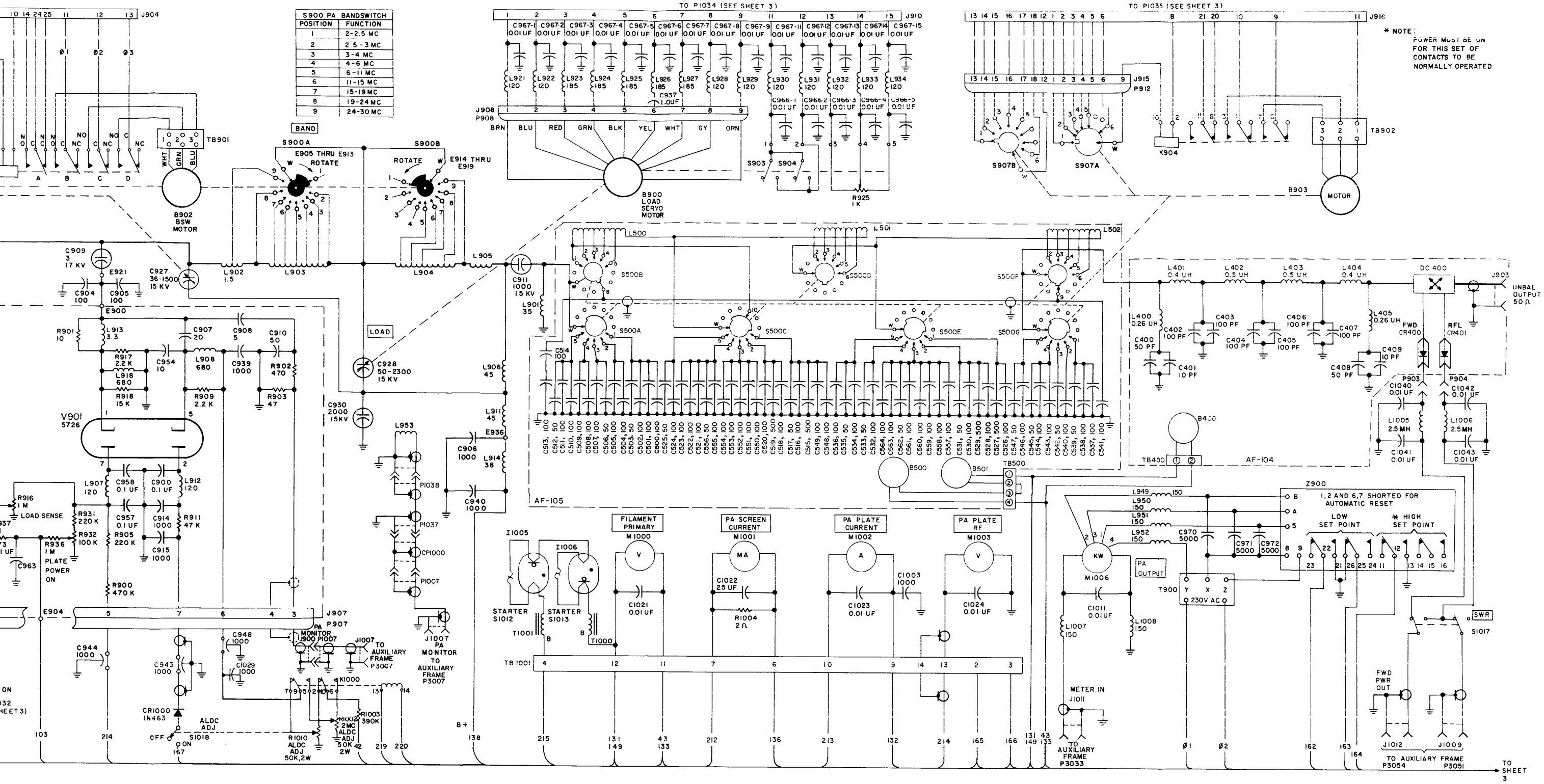
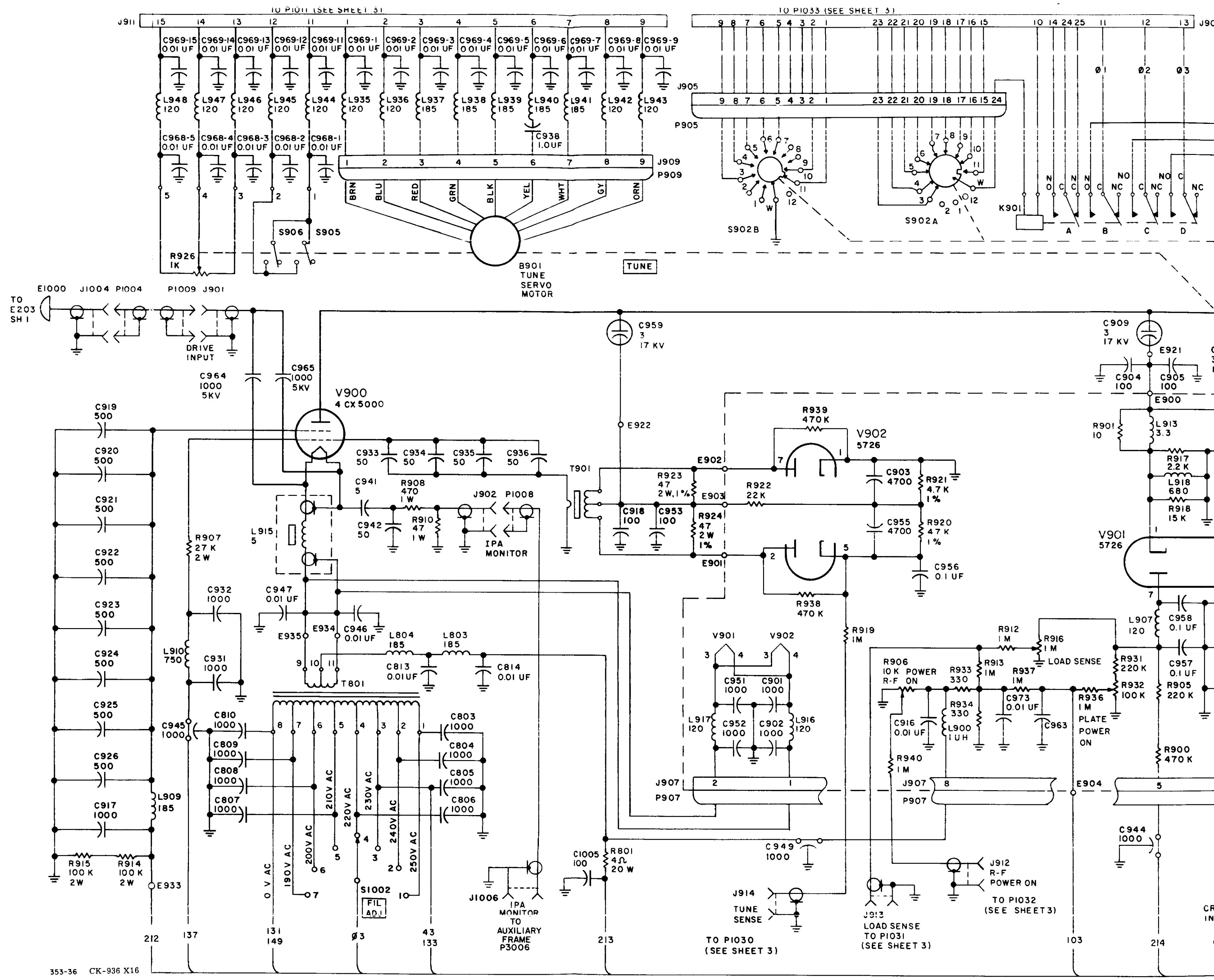


Figure 6-1. Schematic Diagram, TSTE-10K (sheet 2 of 6)


TO P1011 (SEE SHEET 3)
TO P1033 (SEE SHEET 3)
V900
4 CX5000
V901
5726
V902
5726
B901
TUNE
SERVO
MOTOR
TUNE
S902A
S902B
S905
S906
K901
T801
T901
DRIVE
INPUT
IPA
MONITOR
LOAD SENSE
PLATE
POWER
ON
R-F
POWER ON
TUNE
SENSE
TO P1030
(SEE SHEET 3)
TO P1032
(SEE SHEET 3)
LOAD SENSE
TO P1031
(SEE SHEET 3)
TO
AUXILIARY
FRAME
P3006
0 V AC
190V AC
200V AC
210V AC
220V AC
230V AC
240V AC
250V AC
S1002
FIL
ADJ
353-36 CK-936 X16

003660353

S908		LAMP
POSITION	DESIGNATION	
1	2-3	DS913
2	3-4	DS914
3	4-7	DS915
4	7-13	DS916
5	13-17	DS917
6	17-30	DS918
12	AUTO	

TO AUXILIARY FRAME CP3000 (SEE SHEET 2)

TO J914

TO AUXILIARY FRAME CP3001

P1030

P1028

E932

E927

J904 (SEE SHEET 2)

P1033

TO J916 (SEE SHEET 2)

P1035

DS904 2-2.5

P1024 J9102

P1023 J9101

P1024 J9102

P1024 J9102

P1036 J917

C974 0.1 DS905 2.5-3

C975 0.1 DS906 3-4

C976 0.1 DS907 4-6

C977 0.1 DS908 6-11

C978 0.1 DS909 11-15

C979 0.1 DS910 15-19

C980 0.1 DS911 19-24

C981 0.1 DS912 24-30 E938

C982 0.1

R927 18 2W E937

220

PA TUNE

R9119 THRU R9121 = 5K, 1W

S9101C PA BSW

S9101G

PA LOAD

R9122 THRU R9139 = 5K

C9103 500UF 50W VDC

S9101H

R9162 330K

R9163 470K

R9164 220K

R9165 120K

S9101I PA AMPL LOADING

S9101J HARMONIC FILTER BAND

S908

AUTO

C983 DS913

C984 DS914

C985 DS915

C986 DS916

C987 DS917

C988 DS918

R935 18

C983 THRU C988 = 0.01

S9101F

S9101D

S9101B IPA BSW

S9101E

S9101A CONTROL WAFER

CR9103

CR9102 IN538

C9101 75 UF 50 WV

CR9101

F9101 1A

IPA LOAD SERVO AMPLIFIER AZ 107

R9140 THRU R9142 = 5K 10W IPA TUNE

R9101 THRU R9118 = 5K 1W IPA LOAD

C9102 500MF 50WVDC

R9143 THRU R9160 = 50K 1W LEVEL CONTROL

J9101 P1023

J9102 P1024

J9101 P1024

J9102 P1024

J9101 P1023

J1010

TO AUXILIARY FRAME

E925 E930

E924 E929

P1013 TO J212 (SEE SHEET 1)

P1026 TO AUXILIARY FRAME CP3003

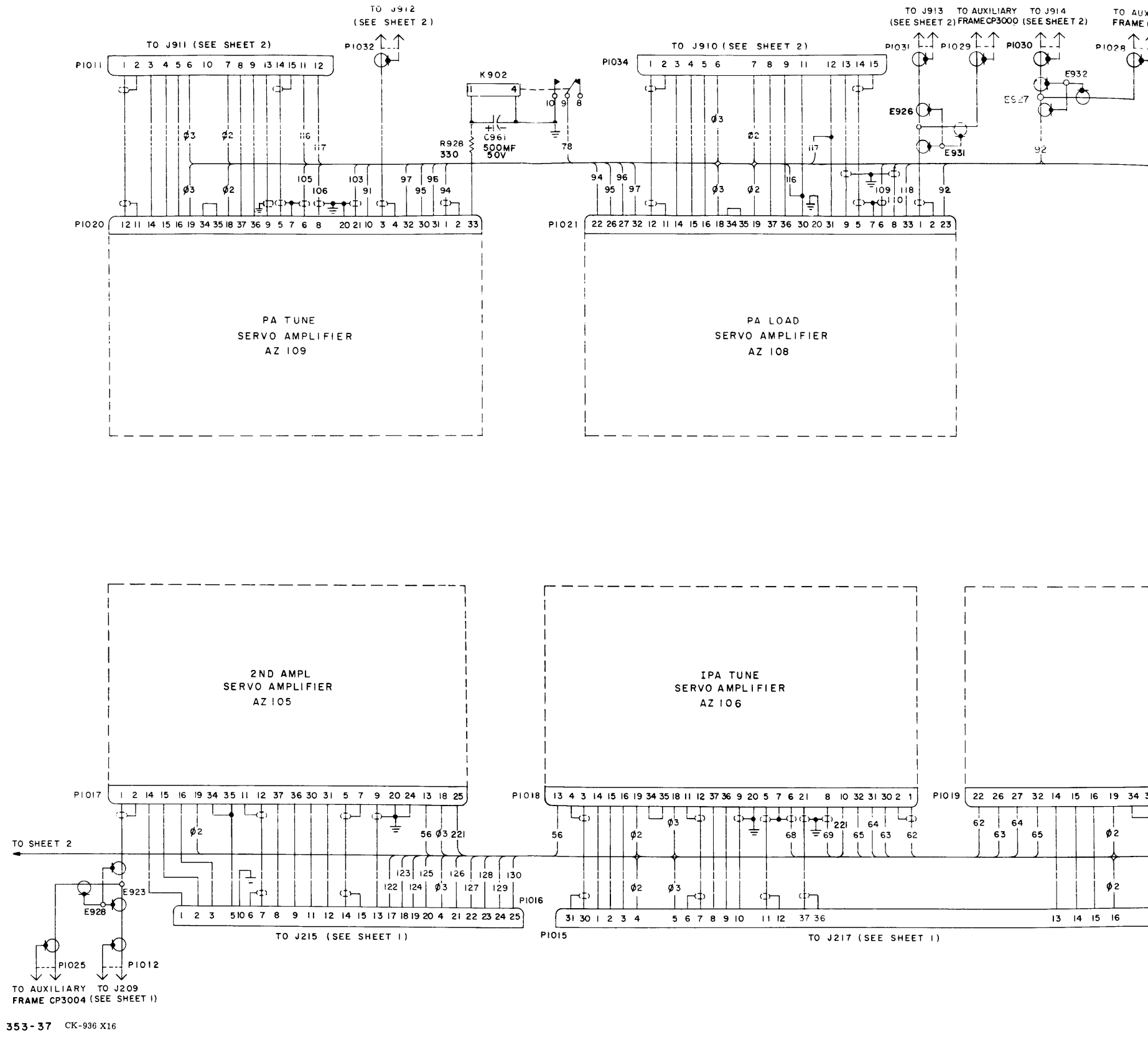
P1014 TO J213 (SEE SHEET 1)

P1027 TO AUXILIARY FRAME CP3002

J1008 ALDC TO AUXILIARY FRAME P3038

TO SHEET 4

Figure 6-1. Schematic Diagram, TSTE-10K (sheet 3 of 6)



353-37 CK-936 X16

003660353

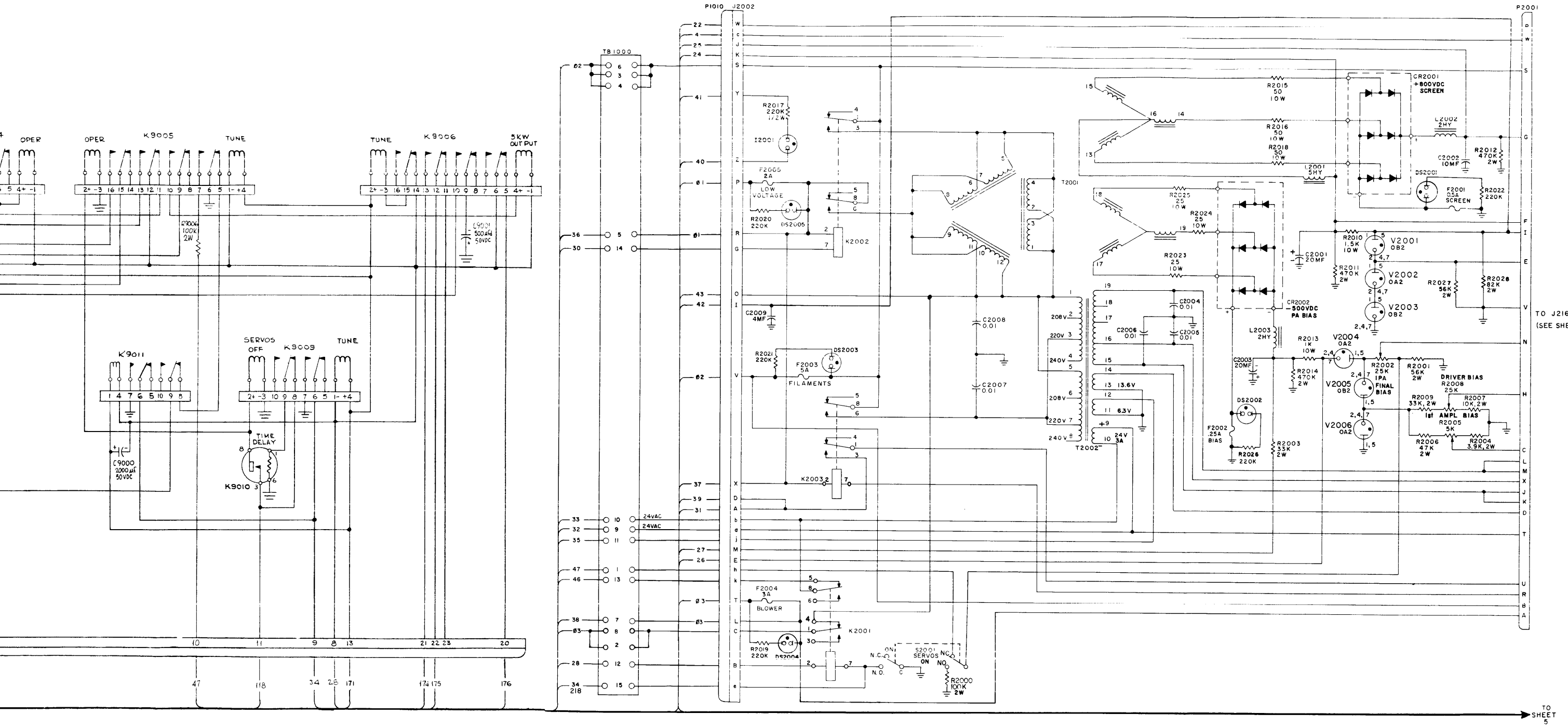
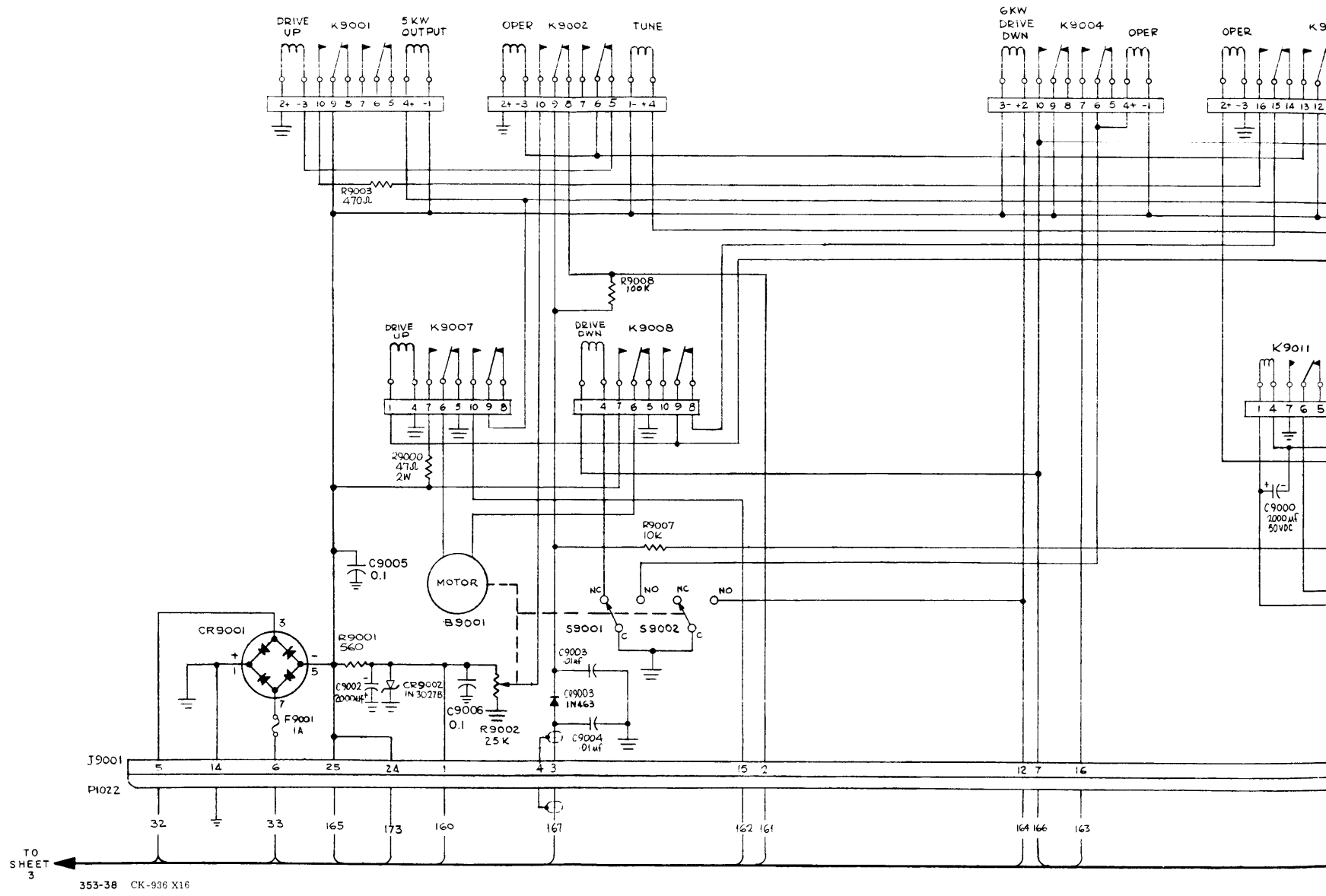


Figure 6-1. Schematic Diagram, TSTE-10K (sheet 4 of 6)


DRIVE UP
K9001
5 KW OUTPUT
OPER
K9002
TUNE
6KW DRIVE DWN
K9004
OPER
OPER
K9
R9003 470Ω
R9008 100K
DRIVE UP
K9007
DRIVE DWN
K9008
K9011
R9000 47Ω 2W
C9000 2000μf 50VDC
R9007 10K
C9005 0.1
MOTOR
B9001
NC
NO
NC
NO
CR9001
R9001 560
S9001
S9002
C9003 .01mf
C9002 2000μf
CR9002 IN3027B
C9003 IN463
C9006 0.1
R9002 2.5K
C9004 .01mf
F9001 1A
J9001
P1022
TO SHEET 3
353-38 CK-936 X16

003660353

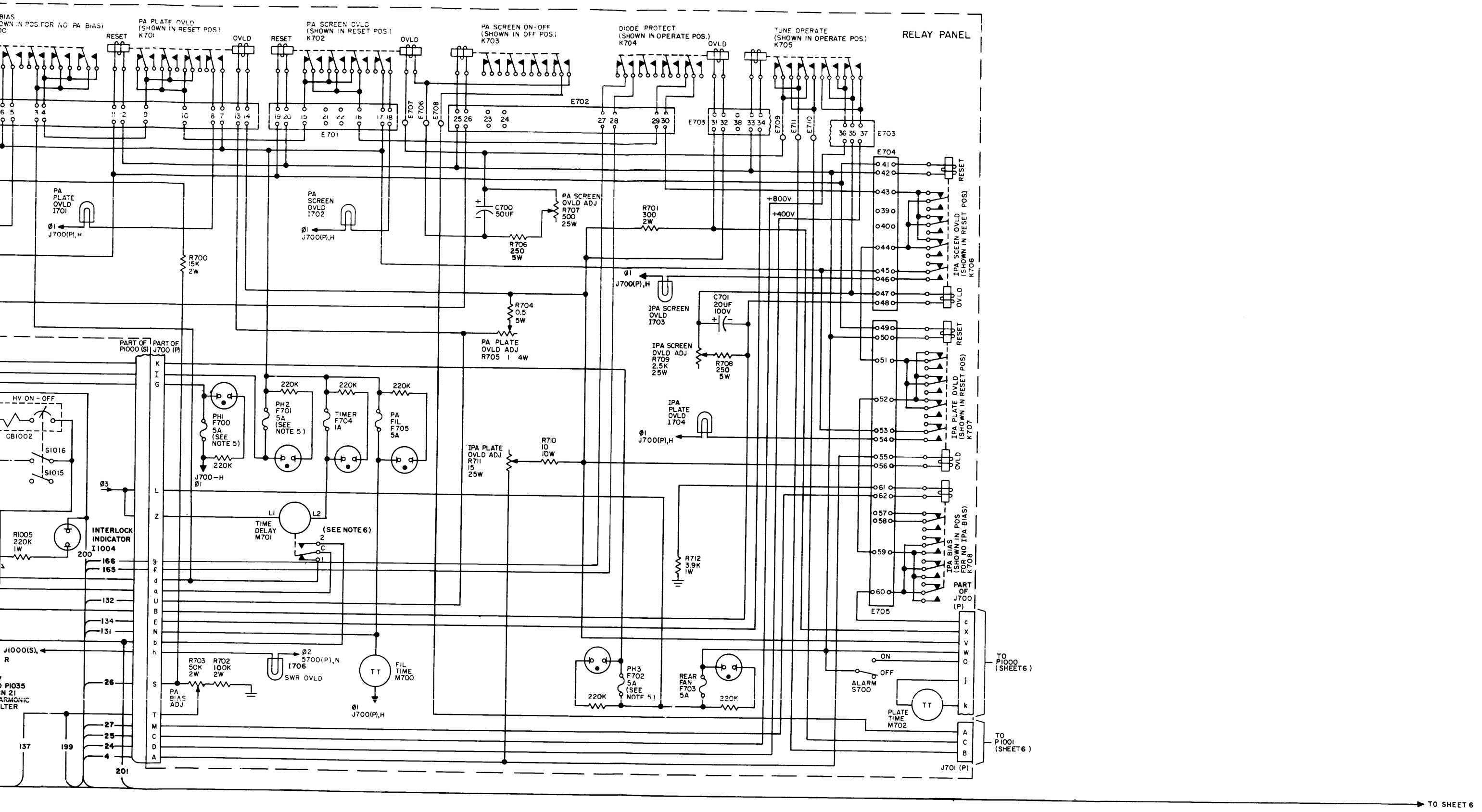
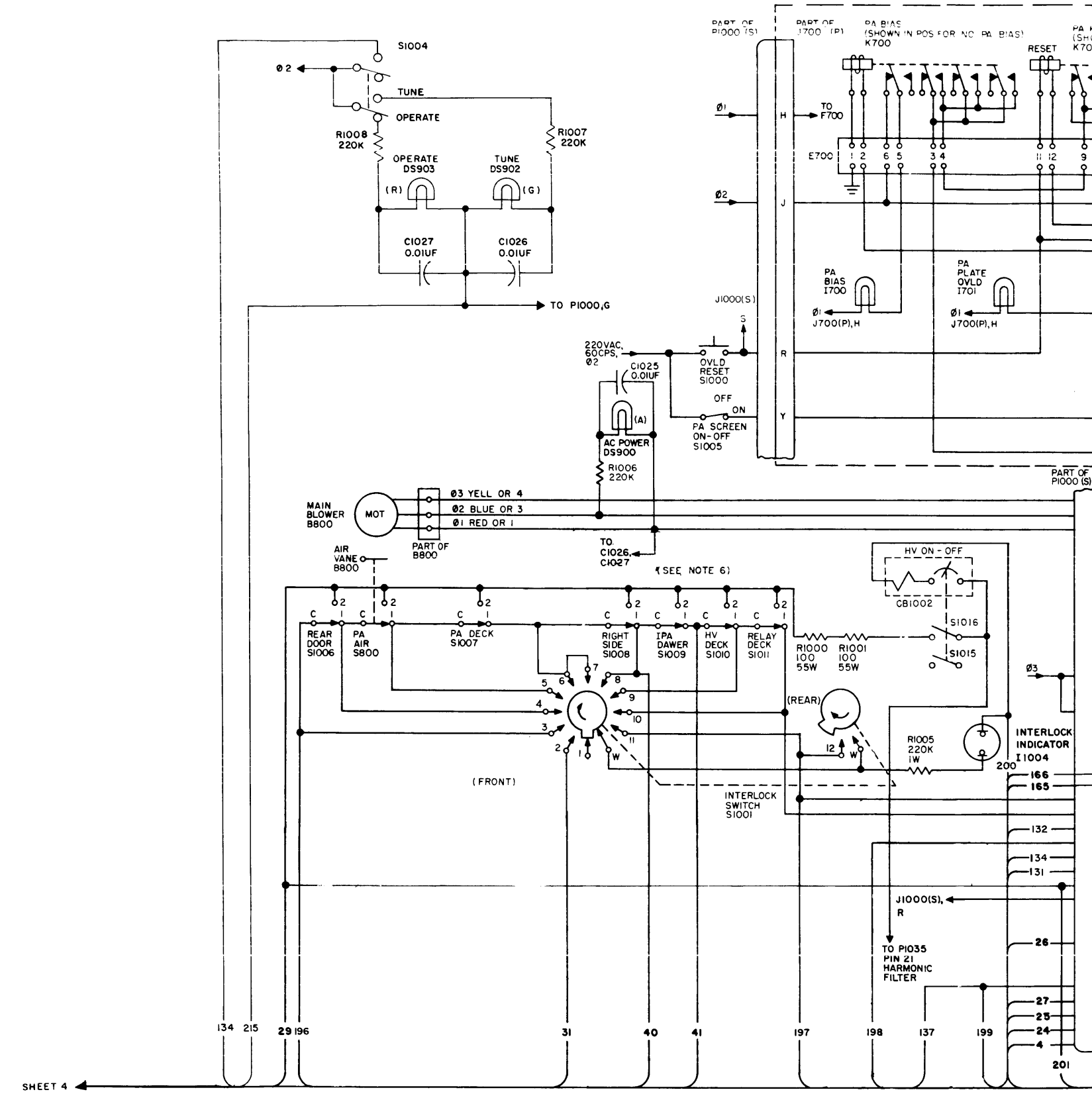
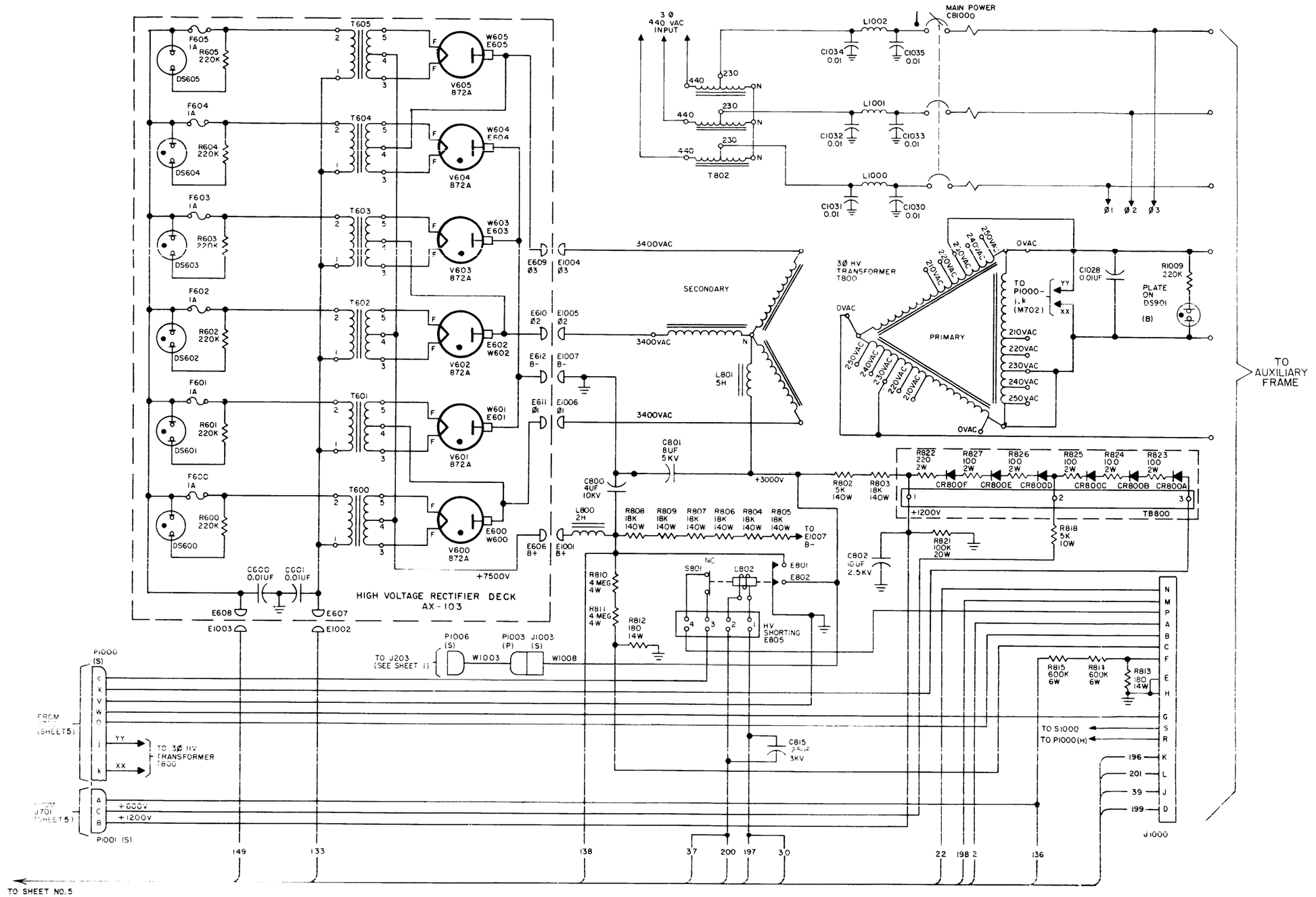


Figure 6-1. Schematic Diagram, TSTE-10K (sheet 5 of 6)



CK-936 X16

003660353



353-39 LR-930 X16

Figure 6-1. Schematic Diagram, TSTE-10K (sheet 6 of 6)

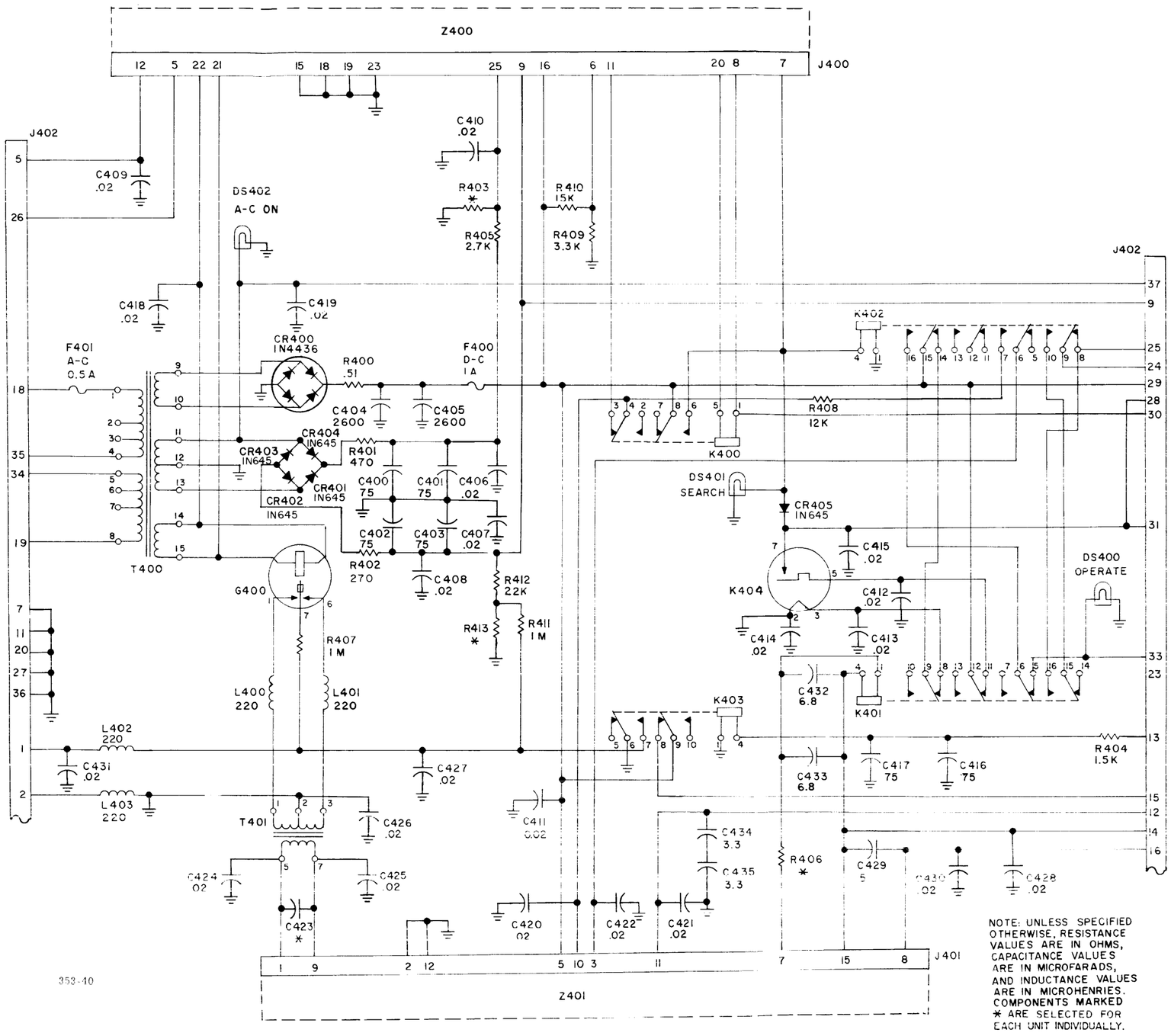


Figure 6-2. Schematic Diagram, AZ-105

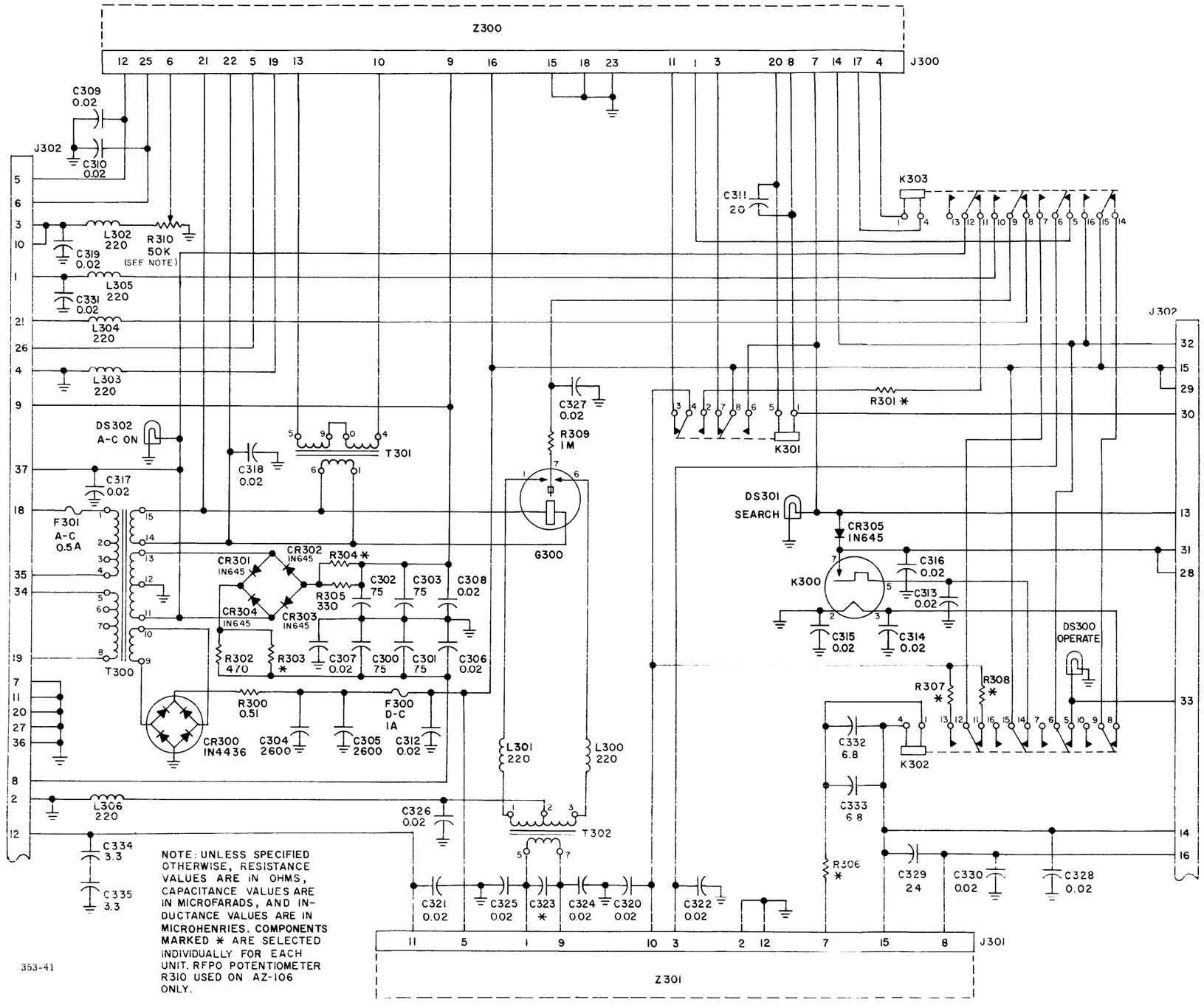


Figure 6-3. Schematic Diagram, AZ-106 and AZ-109

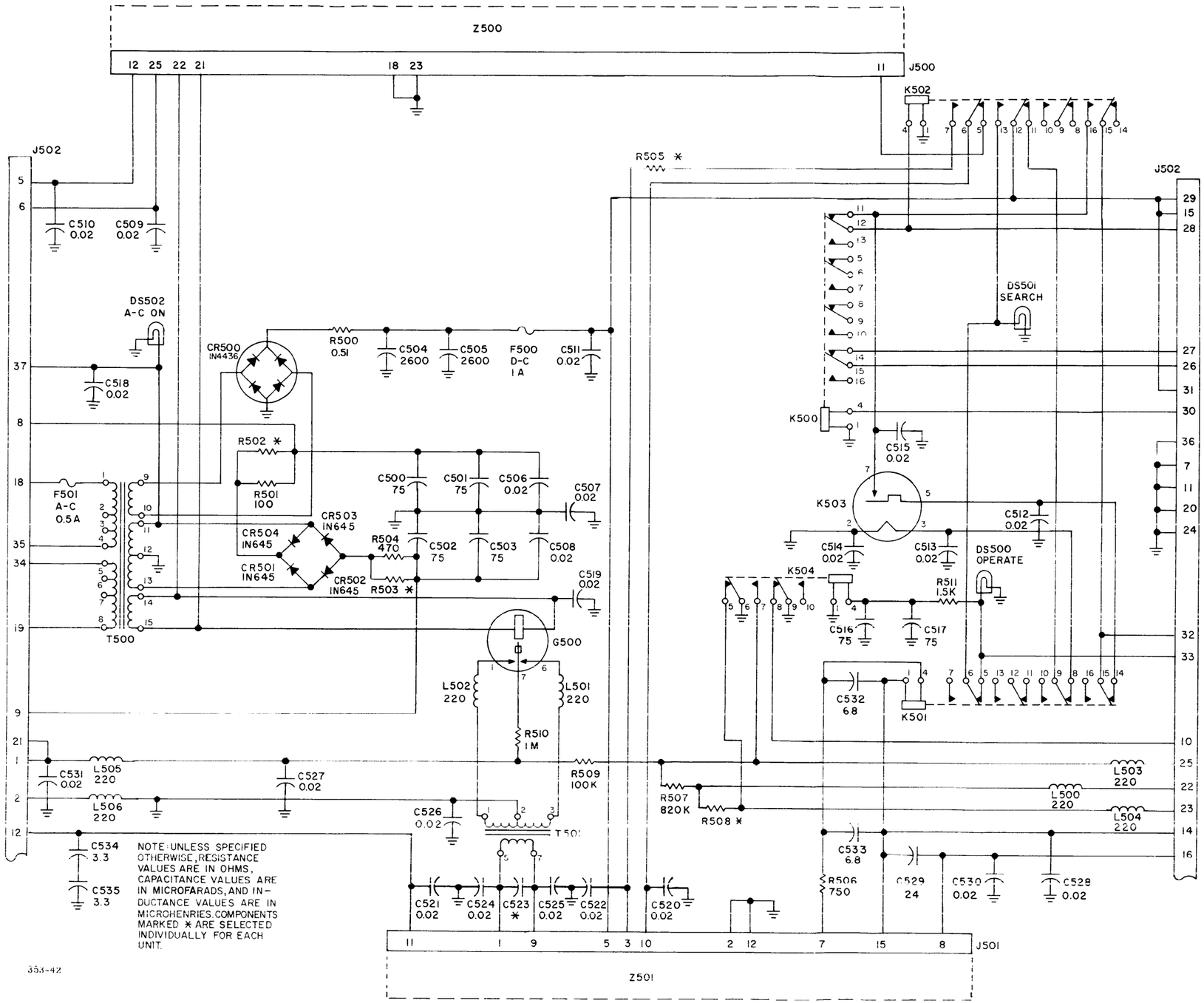


Figure 6-4. Schematic Diagram, AZ-107 and AZ-108