TECHNICAL MANUAL

for

BROADCAST TRANSMITTER

MODEL BCT-10K

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, CANADA

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IN 1021A

Issue Date: April 25, 1968

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.

TMC's obligation under this warranty is limited to the repair or replacement of defective parts with the exceptions noted above.

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

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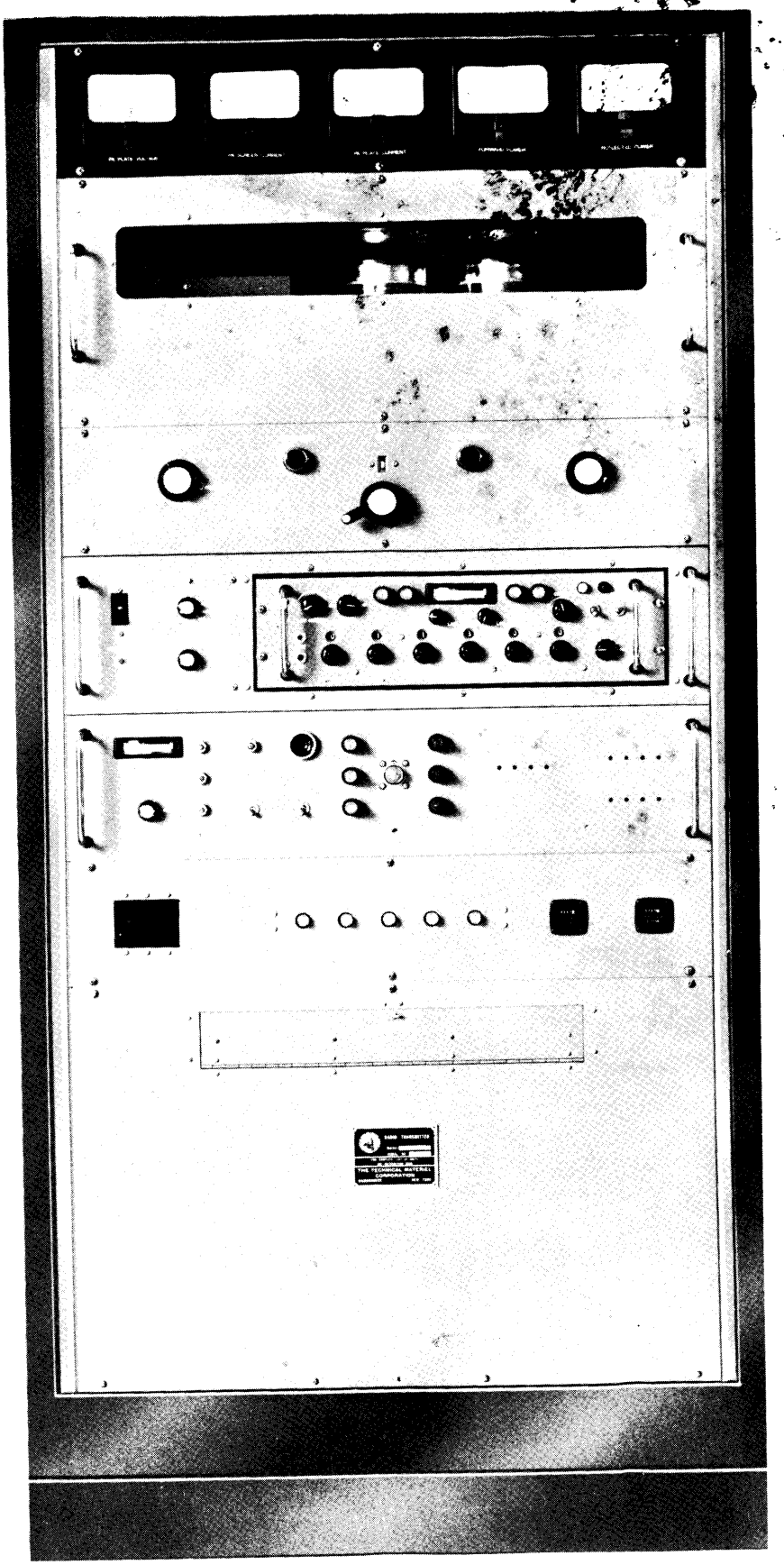

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Figure 1-1. Broadcast Transmitter 10K, Front View

SECTION 1
GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION.

The Broadcast Transmitter, Model BCT-10KA (figure 1-1) is a low frequency unit designed to operate in the broadcast band, providing rapid frequency selection with a minimum of time and effort. The transmitter is capable of 20,000 watts PEP (peak envelope power), or 10,000 watts average power through the frequency range of 450 to 2000 Kc.

The operating modes of the transmitter are:

1. AM (amplitude modulation).
2. SSB (single sideband) with suppressed or any degree of carrier.
3. FSK (frequency shift telegraphy).
4. FAX (facsimile).
5. CW (keyed carrier telegraphy).

1-2. PHYSICAL DESCRIPTION.

a. GENERAL. The BCT-10KA transmitter is a single rack configuration, divided into six individual sections. The rack is 65 inches high, 32 inches wide, and 35 inches deep, and weights 1274 pounds. The individual sections are the power supply with a spare fuse panel located on the front panel, a main power panel assembly, a driver drawer, an exciter drawer, a power amplifier section and a meter assembly panel. Two of the sections are slide out drawers, they are the driver drawer and the exciter drawer. The exciter drawer contains the exciter unit LFE which is a self contained unit. The power supply main power panel assembly, and part of the power amplifier sections internal components are accessible by the removal of the fastening screws holding the front panels to the main chassis.

The transmitter is equipped with interlocks and overload circuits throughout, to protect operating and maintenance personnel as well as the equipment. An added protective feature is an audible alarm which energizes when high voltage is lost.

All operating controls and meters are readily accessible on the front panel, with exhaust fan outlets, on top and rear. The antenna output is coupled to the flange on top of the transmitter. For maintenance and repair, removal of either side or rear skins will expose internal components. The transmitter has remote control capabilities in the following functions, HV off/on, Tune/Operate Overload Reset and Local/Remote.

1) METER PANEL ASSEMBLY

The meter panel located at the top of the transmitter, contains five meters. They monitor PA plate voltage, PA screen current, PA plate current, forward and reflected power.

2) POWER AMPLIFIER

The 10kw PA section contains the 10kw PA tube, its associated tuned circuits, and an exhaust fan. The front panel contains a plexiglass window, which is located on a separate section of front panel from the PA tuning and loading controls, and main power and high voltage indicators.

3) EXCITER DRAWER

The exciter drawer houses the exciter unit model LFE which is a modular type of unit that can be easily installed or removed from the transmitter. The exciter drawer also contains a 28vdc supply for a remote HV indicator lamp. The front panel of the exciter drawer contains, a high voltage circuit breaker, the interlock monitoring switch, the overload reset and ALDC adjust control. (Refer to LFE manual for information pertaining to the exciter unit.).

4) DRIVER DRAWER

The driver drawer contains four solid state power supplies, they are the IPA, Filament, Interlock and Bias supplies with two IPA stages, which provide driving power to the final power amplifier. The overload protect circuitry is located in this drawer with the overload adjust resistors and indicators on the front panel. The front panel also contains the IPA plate current meter, the meter function switch, an audible alarm and its on-off switch. The driver and PA bias adjust resistors can

be set from the front panel, with fuses for bias, low voltage, filament, blower, interlock and 24vdc regulated, located close by.

5) MAIN POWER PANEL

The main power panel contains the main power circuit breaker, fuses for main blower unit, PA filament and fan, a filament time and plate time meter and an exciter on-off switch.

On the underside of the main power panel is located the audio input jacks, terminal boards and IPA and PA monitor jacks. These jacks are accessible when the power supply front panel is removed.

6) POWER SUPPLY

The high Voltage Power Supply Section contains the line filters, a H.V. contactor which controls 3Ø primary power to the High Voltage Power Supply transformer, and the solid state High Voltage Rectifier. In the rear portion of the power supply section is the main PA blower unit providing forced air cooling.

1-3. TECHNICAL CHARACTERISTICS.

FREQUENCY RANGE:	450 to 2000 KHz.
MODES OF OPERATION:	CW, AM, AME, SSB, ISB and FSK.
POWER OUTPUT:	10,000 watt carrier power plus 5,000 watts audio in AM mode. 15 KW average power in the other modes.
OUTPUT IMEPDANCE:	50 ohms unbalanced. Designed to match any antenna with a VSWR of less than 2:1.
FREQUENCY STABILITY:	Synthesized control with a stability of at least 1 part in 10^8 per day.
TUNING SYSTEM:	Continous tuning across the band with all power tuning and bandswitching controls on the front panel.
VSWR PROTECTION:	Automatic protection against miss-match exceeding 2 to 1 is provided. A higher VSWR can be tolerated with reduced power output.
SIGNAL/DISTORTION RATIO:	In the SSB mode, distortion products are at least 35 db below either tone of a two tone test.

UNWANTED SIDEBAND REJECTION:	A signal at 500 Hz in the wanted sideband is down at least 60 db in the unwanted sideband.
SPURIOUS SIGNALS:	Spurious signals greater than 100 Hz removed from the carrier are at least 65 below carrier output.
NOISE LEVEL:	Noise level is at least 60 db down from either tone of a two tone test.
CARRIER INSERTION:	Carrier insertion continuously variable from full carrier to -55db.
HARMONIC SUPPRESSION:	Second harmonics are at least 50 db below the full carrier output.
AUDIO RESPONSE:	100 Hz to 10 KHz within ± 2 db. 100 Hz to 5 KHz from ± 1 db.
AUDIO INPUT:	600 ohm balanced or unbalanced. -20 dbm input to +10 dbm. -20 dbm input will provide full RF output.
FSK INPUT:	The unit will accept DC keying of 50 volts, 100 volts, 20 ma and 60 ma, either nuetral or polar.
CW INPUT:	Dry contact keying. Closure to ground provides full CW output.
HUM LEVEL:	At least 50 db below full PEP output.
HEAT DISSIPATION:	Approximately 20,000 watts.
ALDC:	Automatic load and drive control circuit maintains a relatively constant output level during high peaks of modulation or load changes. A front panel control allows adjustment of the level at which the ALDC takes effect, or switching off the ALDC as desired.
METERING:	Front panel meters provide indications of the operation of all critical circuits.
ENVIRONMENTAL CONDITIONS:	Designed to operate in any ambient temperature between 0° C and 55° C, and any value of humidity up to 95%.
STORAGE CONDITIONS:	Equipment will not be materially affected under storage of -30° C to +75° C and humidity of 0 to 95%.
ALTITUDE:	The transmitter is designed to provide full output at an altitude of 10,000 feet.

COOLING:	Air cooled.
SAFETY FEATURES:	Safety interlocks are provided in all high voltage areas. Whenever an interlock is actuated, high voltage is immediately grounded.
INSTALLATION DATA:	Weight: 1,274 pounds. Size: 65 inches High x 32 1/2 inches Wide x 35 inches Deep.
PRIMARY POWER:	208 three phase, 60 Hz. The primary of the transformer may be connected to either delta or "wye" input.
POWER REQUIREMENTS:	Under steady state conditions, with full output, transmitter requires approximately 35 KW.
LOOSE ITEMS:	Two Instruction Manuals are provided.
COMPONENTS & CONSTRUCTION:	All equipment manufactured in accordance with JAN/MIL specifications wherever practicable.

SECTION 2
INSTALLATION

2-1. EQUIPMENT INSPECTION.

The BCT-10K Transmitter has been assembled calibrated, and tested at the factory before shipment. Inspect all packages for possible damage during transit. Carefully unpack each crate as indicated by the packing list provided with transmitter shipment. Inspect all packing materials for parts that may have been shipped as loose items.

With respect to equipment damage for which the carrier is liable, the Technical Materiel Corporation will assist in describing methods of repair and the furnishing of replacement parts.

2-2. EQUIPMENT PACKAGING.

The equipment is shipped in boxes as shown by (figure 2-1, and 2-2). The box number and contents are stenciled on the outside of each box.

2-3. PRIMARY POWER.

The BCT-10K requires a three phase source voltage of 208vac at 50/60 cps.

2-4. PRIMARY POWER, AUDIO INPUT AND GROUND CONNECTIONS.

Refer to (figure 2-3 and 2-4) Primary power and external audio signal input cables as well as the station ground cable enter the transmitter through an access hole located in the bottom of the high voltage power supply compartment.

To connect the primary power, the audio signal input cables, and the ground to their respective lugs, and jacks, remove the front panel of the Power Supply compartment.

The primary power connections are located below line filter coils L1000, L1001, and L1002. The input cables are connected as follows. Phase 1 connects to L1000, phase 2 connects to L1001, and phase 3 connects to L1002.

The external audio input jacks are located on the bottom of the Main Power

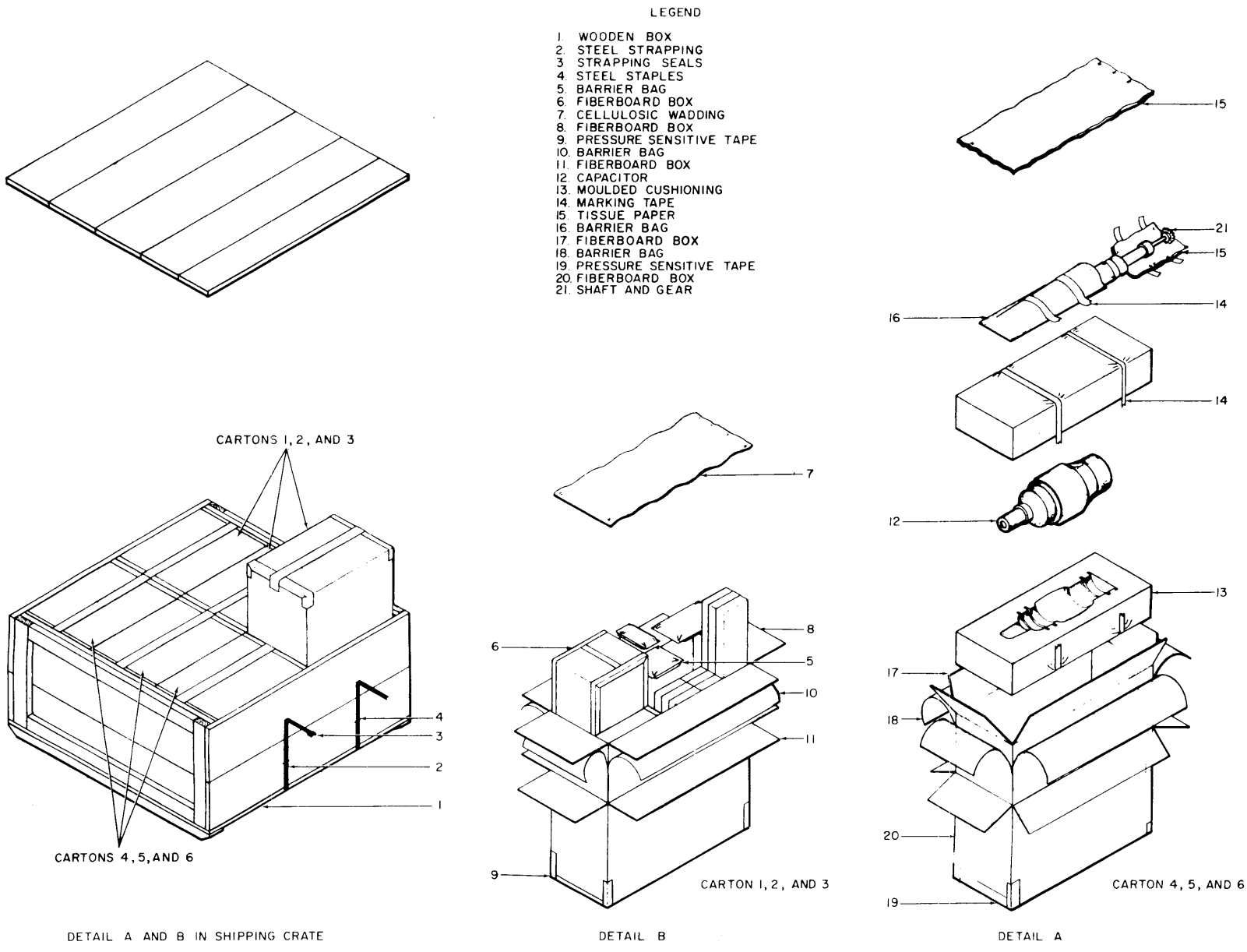

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Figure 2-1. Typical Equipment Packaging (sheet 1 of 2)

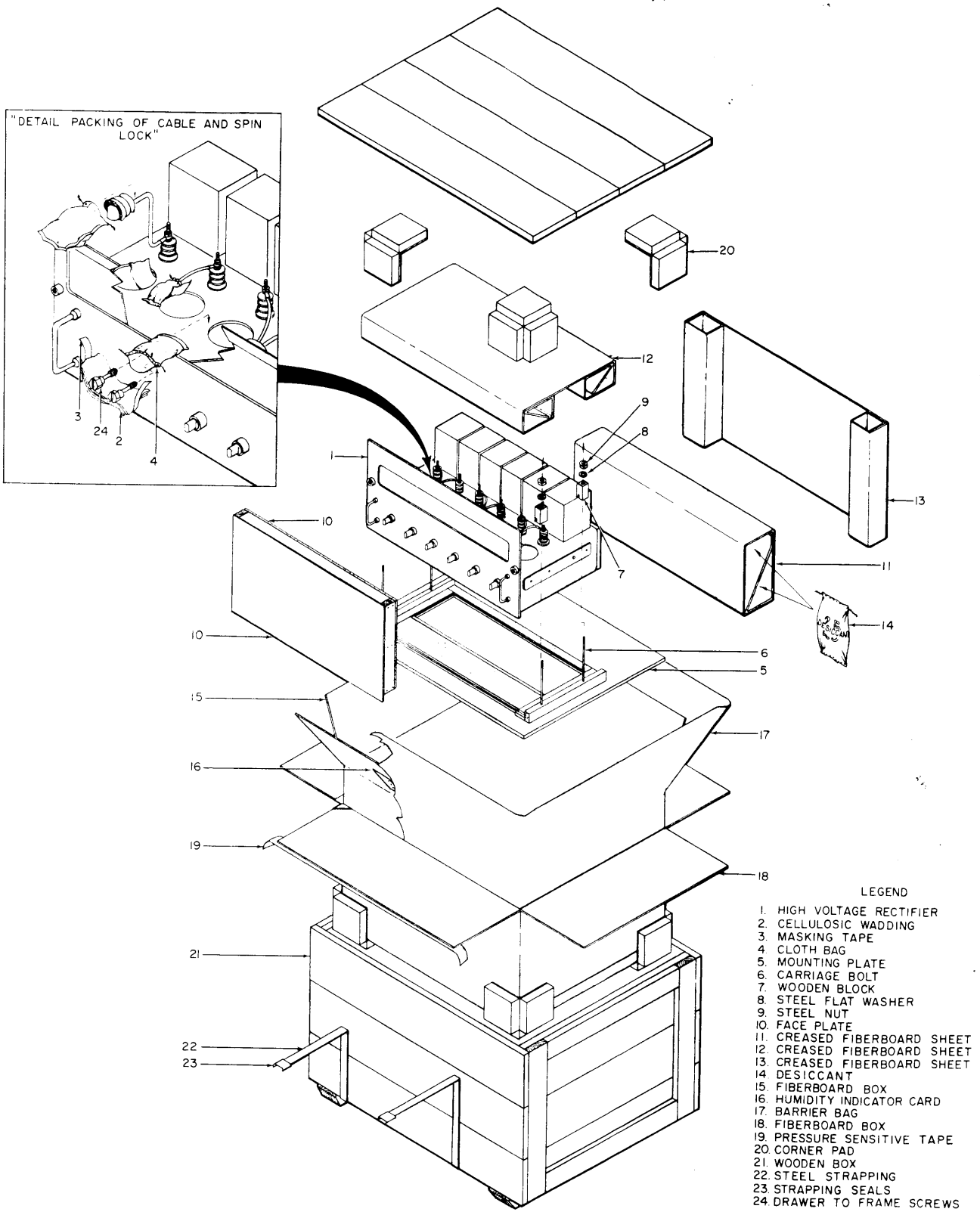

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Figure 2-2. Typical Equipment Packaging (sheet 2 of 2)

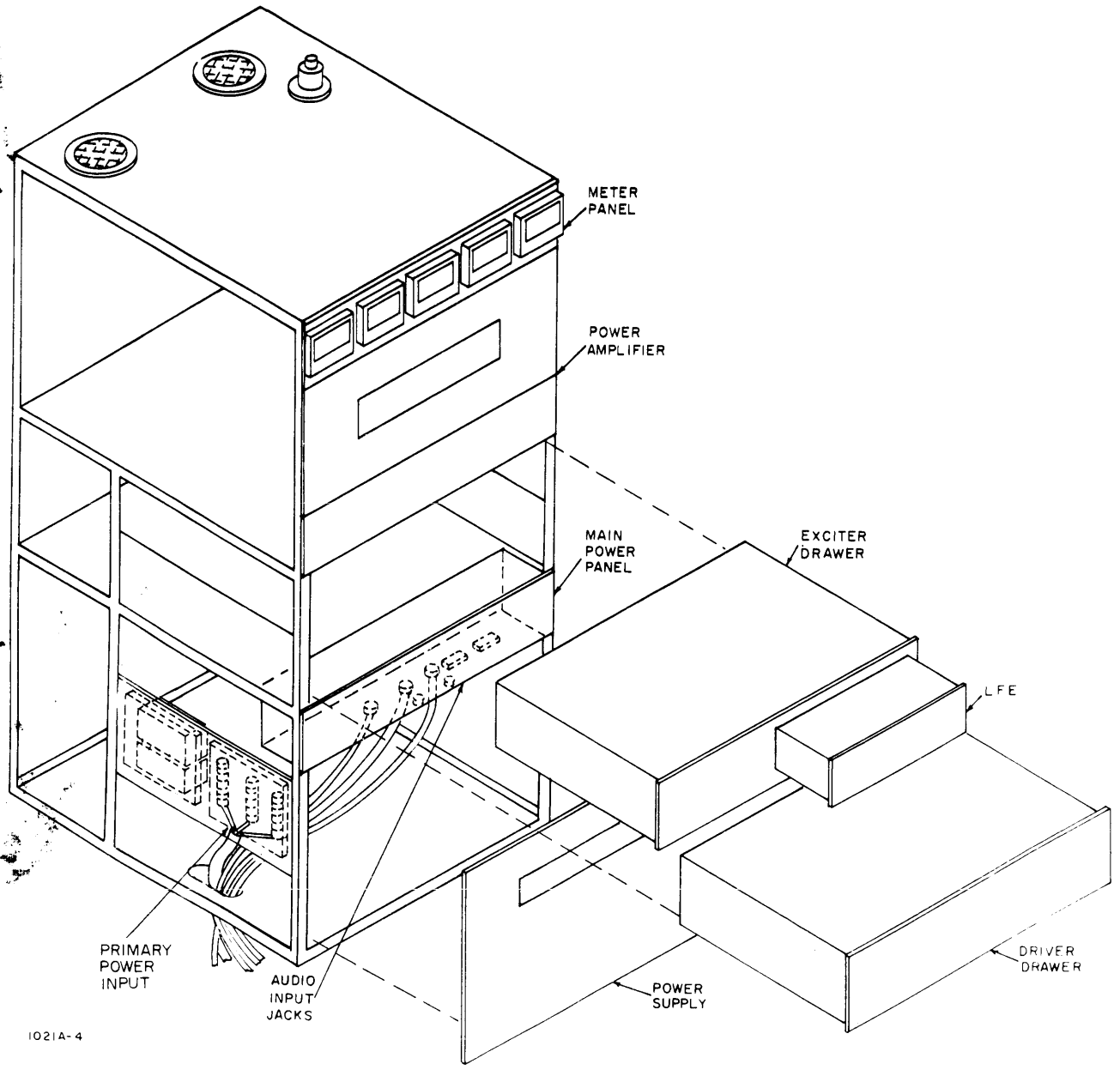

Figure 2-3. Installation Drawing

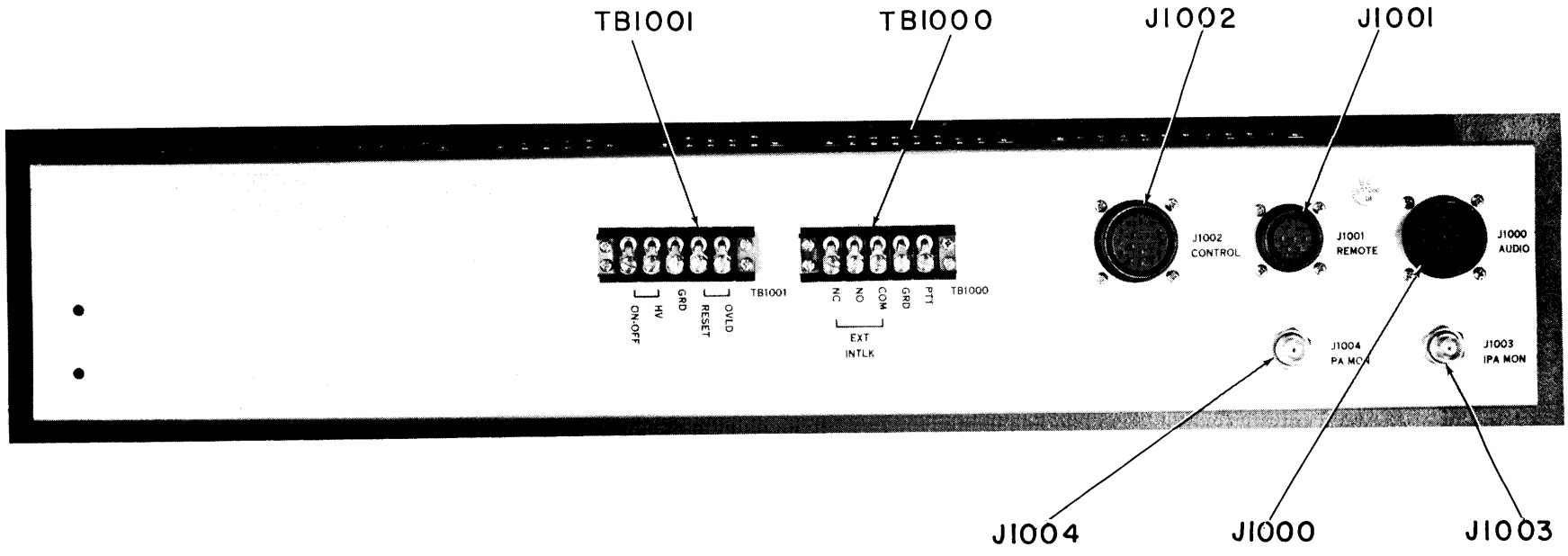

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Figure 2-4. Audio Input Panel

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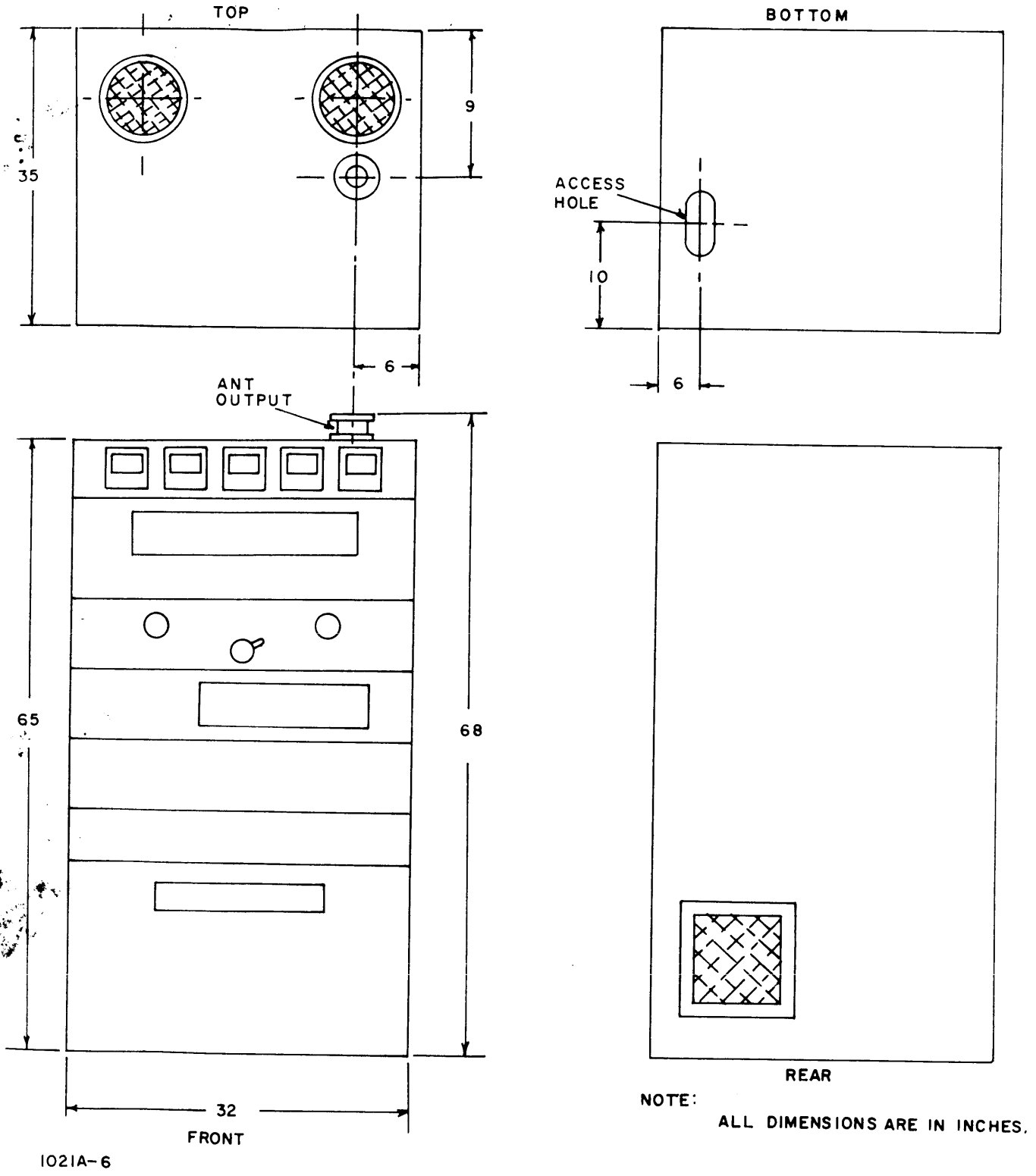

Figure 2-5. Outline Dimensional Drawing

Panel Assembly.

The station ground should be connected to the bolt, below the HV Contactor K800, which fastens the H.V. Contactor to the frame of the transmitter. After all the connections have been completed replace the power supply front panel.

CAUTION

Make sure the exciter unit LFE is correctly wired for 208vac operation. Refer to modular manual of exciter unit for input transformer wiring of exciter.

2-5. LOCATION OF TRANSMITTER.

Before attempting to install the BCT-10K ensure that adequate power is available at the selected site or location. Refer to dimensional outline drawing (figure 2-5) when choosing the operating location. The room (or van in which the BCT-10K is located) must have a ceiling height of at least 7 feet. Adequate ventilation must be provided. Operation of the transmitter in a poorly ventilated room will cause the surrounding temperature to become too high. Also a clearance of about 2 feet in the rear is needed for removal of rear skin for maintenance purposes.

2-6. PROCEDURE FOR SETTING BIAS LEVELS IN IPA (refer to figure 3-1).

1. Pull IPA drawer part way out.
2. Turn Driver bias, (36), IPA A bias (37) and IPA B bias (38) controls fully CCW.
3. Set HIGH VOLTAGE circuit breaker (11) to OFF.
4. Set MAIN POWER circuit breaker (62) at ON.
5. Turn METER FUNCTION switch (35) to Driver position.
6. Adjust Driver bias control (36) until a reading of 25 is read on meter.
7. Turn METER FUNCTION switch (35) to IPA A position.
8. Adjust IPA A bias control (37) until a reading of 25 is read on meter.
9. Turn METER FUNCTION switch (35) to IPA B bias.
10. Adjust IPA B bias (38) until a reading of 25 is read on meter.
11. Return METER FUNCTION switch to Driver position and go through meter switch positions again, to make certain second set of readings agree with first.

2-7. PRELIMINARY SETTINGS PRELIMINARY SETTINGS

1. High Voltage circuit breaker (11) to Off.
2. ALDC Adj (15) fully CCW.
3. EXCITER switch (63) to ON.
4. STANDBY switch (27) in STANDBY (for maximum stability the LFE requires a 24 hour warm up period.).
5. RF OUTPUT control (16) fully CCW.
6. ALARM switch (41) to OFF.

SECTION 3
OPERATOR'S SECTION

3-1. GENERAL.

The BCT-10K Transmitter is relatively easy to tune since there is a minimum of controls. The operator still should familarize himself thoroughly with the controls and operation of the transmitter before attempting to tune. Tuning instructions and Operating Controls and Indicators in Table 3-1 are provided in this Section to aid in operating the transmitter.

CAUTION

It is highly important to tune up a High power BCT-10K on a careful precise step by step basis. Furthermore to avoid damage to the transmitter it is important to operate it within rated loads. Operating the transmitter beyond its rated capacities is not recommended because it is hazardous to the equipment and may cause excessive distortion. It is good operating practice to allow the BCT-10K at least a 1/4 hour warm up period.

3-2. IPA PRELIMINARY CHECK (refer to figure 3-1).

NOTE

Before performing below check exciter unit must be in standby.

1. Place HIGH VOLTAGE circuit breaker (11) at ON.

2. Turn METER FUNCTION switch (35) to each IPA position, and read indication on IPA meter (34).

IPA meter should have the following readings:

a) Driver 25 = 100 ma plate current.

b) IPA A 25 = 100 ma plate current.

c) IPA B 25 = 100 ma plate current.

d) IPA TOTAl 25 = 200 ma plate current.

CAUTION

Before tuning transmitter make sure either a Dummy Load or an antenna is connected to the output.

3-3. OPERATING PROCEDURE.

AM OPERATION

1. Set MAIN POWER circuit breaker (62) at ON.

2. Set EXCITER switch (63) at ON.

3. Set POWER switch (27) at ON.

4. Set EXCITER switch (28) at ON when using either the USB or LSB 600 ohm line control (21) or (22).

Set EXCITER switch at PTT when using a mike in front panel MIKE jack (30).

5. Set MODE switch (33) at AM.

6. Select the desired operating frequency with the FREQUENCY SELECTION switch (32).

7. Turn METER switch (17) to the USB position.

8. Adjust the MIKE or LINE control (21) of sideband selected, to desired level as indicated by MONITOR (20)

9. Turn Meter switch (17) to the USB position.

10. Adjust the MIKE or LINE control (22) to desired level as indicated by MONITOR (20).

NOTE

DO NOT EXCEED RED REGION ON MONITOR (20). When mike input is used adjust level so as not to exceed red region with highest input from microphone.

11. Turn METER switch (17) to the RF POSITION and adjust RF output control (16) for the desired level of RF output indicated on monitor (20).

NOTE

Turn RF OUTPUT control (16) fully CCW before selecting different modes of operation.

CAUTION

Turn RF OUTPUT control (16) fully CCW before performing next steps of operation.

12. Check Interlock circuitry by turning interlock Monitor switch (14) in the following sequence PA AIR, IPA DRAWER, EXCITER DRAWER, REAR PANELS, EXTERNAL, FRONT PANELS, TIMER, BANDSWITCH HEAT OVERLOAD, and OFF.

When interlock circuit is functioning properly indicator (13) will light. When lamp does not light check for an open or inoperative interlock in the area indicated by switch (14).

13. Set PA BANDSWITCH (6) To desired frequency.

14. Preset LOAD control (10) in accordance with tuning chart.

15. Preset TUNE control (8) in accordance with tuning chart.

16. Set High Voltage circuit breaker (11) at ON.

17. Increase RF OUTPUT control (16) until PA PLATE CURRENT meter (3) reads 2 amperes.

18. Turn TUNE control (8) until forward power meter (4) gives resonance indication.

19. IF necessary correct LOAD control (10) setting.

20. Increase RF OUTPUT (16) to a 15 kw reading on forward power meter (4).

NOTE

Correct loading will give approximately 3 amperes of plate current at a 15-kw output.

21. Transmitter tuning is now complete reset RF OUTPUT control (16) to read 10-kw on FORWARD POWER meter.

22. Check reflected power reading by throwing on REFLECTED POWER monitor switch (40) (41). REFLECTED POWER meter should not exceed a 3:1 VSWR.

23. Set ALARM switch (41) to ON.

24. Keep ALDC control (15) fully CCW, until transmitter is completely tuned. When tuning is complete increase ALDC control until forward power meter (4) drops slightly ALDC is then functioning.

NOTE

In the event the transmitter shuts down due to an overload, PRESS OVLD RESET button (12) and retune transmitter.

3-4. OPERATING PROCEDURE.

SINGLE SIDEBAND WITH ANY DEGREE OF CARRIER

1. First four steps are the same as described in setting up for AM operation.
2. Select the desired sideband with Mode switch (33)
3. Select the desired operating frequency with the FREQUENCY SELECTION switch (32)
4. Turn METER switch (17) to the desired sideband.
5. Step five is the same as step 8 described in AM operation.
6. Turn METER switch (17) to the CARRIER position and adjust CARRIER control (29) to the desired level as indicated on MONITOR (20).
7. The following steps are the same as steps 11 thru 24 described in AM operation.

3-5. OPERATING PROCEDURE.

FACSIMILE

1. First three steps are the same as those described in AM operation.
2. Turn MODE switch (33) to FAX position.
3. Set FREQUENCY SELECTION switches (32) to the desired center frequencies.
4. The following steps are the same as steps 11 thru 24 described in AM operation.

3-6. OPERATING PROCEDURE.

FREQUENCY SHIFT KEYING

1. First three steps are the same as those described in AM operation.
2. Turn MODE switch (33) to FSK position
3. Set FREQUENCY SELECTIONS switches (32) to the desired center frequency.
4. Select appropriate FSK operation by setting switches S110 and S111.
5. Place SENSE switch S109 to the desired amount.
6. The following steps are the same as steps 11 thru 24 described in AM operation.

3-7. OPERATING PROCEDURE.

CARRIER WAVE

1. First three steps are the same as those described in AM operation.

2. Set MODE switch to the CW position.

3. The following steps are the same as those described in steps 11 thru 24 in AM operation.

TABLE 3-1. BCT-10K OPERATING CONTROLS AND INDICATORS

NUMBER DESIGNATION	PANEL DESIGNATION	FUNCTION
1	PA PLATE VOLTAGE meter	Indicates plate voltage (dc) of 10-kw power amplifier tube.
2	PA SCREEN CURRENT meter	Indicates screen current of 10-kw power amplifier tube.
3	PA PLATE CURRENT meter	Indicates plate current of 10-kw power amplifier tube.
4	FORWARD POWER meter	Indicates power output of transmitter.
5	REFLECTED POWER meter	Indicates VSWR of Transmitter.
6	PA BANDSWITCH mcs.	Sets frequency range of antenna tuning unit.
7	MAIN POWER lamp	When lit, indicates that primary power is being applied to transmitter.
8	TUNE CONTROL dial	Tunes output of 10-kw PA to desired frequency.
9	HIGH VOLTAGE lamp	When lit, indicates, that high voltage is on in the transmitter.
10	LOAD CONTROL switch	Varies output impedance of 10-kw PA.
11	HIGH VOLTAGE circuit breaker	Allows application of high voltage to IPA stage.
12	OVLD RESET SWITCH push-button	When depressed after an overload occurs, resets relay in IPA drawer
13	INTERLOCK INDICATOR lamp	Lights when a particular interlock circuit being monitored, is functioning properly.

TABLE 3-1. BCT-10K OPERATING CONTROLS AND INDICATORS (Cont)

NUMBER DESIGNATION	PANEL DESIGNATION	FUNCTION
14	INTERLOCK MONITOR switch	Allows monitoring of interlock circuits throughout transmitter.
15	ALDC ADJ - switch and control	Switch connect ALDC circuit in system, and sets ALDC voltage level.
16	RF OUTPUT control	Adjusts level of RF OUTPUT.
17	METER switch	7-position selector switch. Selects circuits in system to be measured.
18 & 19	SPARES	Spare line voltage fuses.
20	MONITOR meter	Monitors circuits selected by meter switch.
21	LSB MIKE/LINE gain control	Adjusts level of LSB input.
22	USB MIKE/LINE gain control	Adjusts level of USB input.
23 & 24	LINE Fuses	Protective fuses for line voltage input to unit.
25	STANDBY lamp	Indicator lamp lights when unit is in STANDBY condition.
26	POWER lamp	Indicator lamp for power ON condition.
27	ON/STANDBY switch	When set at ON applies operate 12 and 24 vdc to all modules and when set at STANDBY opens operate 12 and 24 vdc to modules.
28	EXCITER switch	Set switch at PTT when using the front panel microphone input. Set switch at ON when using USB or LSB line inputs.
29	Carrier control	Adjusts amount of carrier to be used.
30	MIKE jack	Accepts a 47,000 ohm impedance microphone.
31	KEY jack	Input for a dry contact keyer used for CW mode of operation.

TABLE 3-1. BCT-10K OPERATING CONTROLS AND INDICATORS (Cont)

NUMBER DESIGNATION	PANEL DESIGNATION	FUNCTION
32	1MHz, 100 KHz, 10KHz,	Selects the desired operating frequency in the 30-1999.99kc (kHz) frequency range. Each switch has a window displaying the numerical value of the frequency.
33	MODE switch	Selects the various mode capabilities of the unit.
34	IPA PLATE CURRENT meter	Indicates plate current of IPA stages.
35	METER FUNCTION switch	Selects IPA stage, plate current of which is indicated by IPA plate current meter.
36	IPA DRIVER control	Sets bias level of first IPA tube.
37	IPA A BIAS control	Sets bias level of first IPA "A" tube.
38	IPA B BIAS control	Sets bias level of second IPA "B" tube.
39	PA BIAS control	Sets bias level of 10-kw power amplifier.
40	REFLECTED POWER switch	In meter position directs VSWR to Reflected power meter.
41	ALARM switch	In on position closes circuit to audible alarm.
42	ALARM speaker	Speaker for alarm circuit, which sounds when high voltage fails in transmitter.
43	LV fuse	Protects low voltage power supply
44	FILAMENT fuse	Protects filament power supply
45	BLOWER fuse	Protects blower B301 in IPA.
46	Bias fuse	Protects bias rectifier circuit.
47	FILAMENT fuse	Protects filament rectifier circuit.
48	INTERLOCK fuse	Protects Interlock rectifier circuit.

TABLE 3-1. BCT-10K OPERATING CONTROLS AND INDICATORS (Cont)

NUMBER DESIGNATION	PANEL DESIGNATION	FUNCTION
49	24 VDC	Protects 24 vdc circuit.
50	PA bias control	Sets operating level of PA bias overload.
51	IPA VOLTAGE ADJ control	Sets operating level of IPA voltage overload.
52	PA BIAS OVLD ADJ control	Sets operating point of silicon controlled rectifier in PA bias overload circuit.
53	PA PLATE OVLD AJD control	Sets operating point of silicon controlled rectifier in PA plate overload circuit.
54	DRIVER PLATE OVLD lamp	When lit indicates that an overload has occurred in plate circuit to driver.
55	IPA PLATE OVLD lamp	When lit indicates that an overload has occurred in plate circuit to IPA.
55	IPA PLATE OVLD lamp	When lit, indicates that an overload has occurred in plate circuit of IPA.
57	IPA VOLTAGE OVLD lamp	When lit, indicates that an overload has occurred in PA screen circuit.
58	PA BIAS OVLD lamp	When lit, indicates that an overload has occurred in bias circuit of PA tube.
59	PA PLATE OVLD lamp	When lit, indicates that an overload has occurred in plate circuit of PA tube.
60	PA SCREEN OVLD lamp	When lit, indicates that an overload has occurred in screen circuit of PA tube.
61	SWR OVLD lamp	When lit indicates that an overload has occurred as a result of excessive VSWR.
62	MAIN POWER circuit breaker	In on position applies primary power to transmitter.
63	EXCITER on-off switch	Applies AC power to exciter unit LFE
64 & 65 & 66	PH1, PH2, PH3, fuses	Protect PA tube blower B800 in High voltage power supply compartment.

TABLE 3-1. BCT-10K OPERATING CONTROLS AND INDICATORS (Cont)

NUMBER DESIGNATION	PANEL DESIGNATION	FUNCTION
67	PA FILAMENT fuse	Protects PA filament circuit transformer.
68	FAN fuse	Protects fan B900 in PA compartment.
69	FILAMENT TIME meter	Indicates total operating time of filament circuit of 10-kw PA.
70	PLATE TIME meter	Indicates operating time of 10-kw plate circuit.

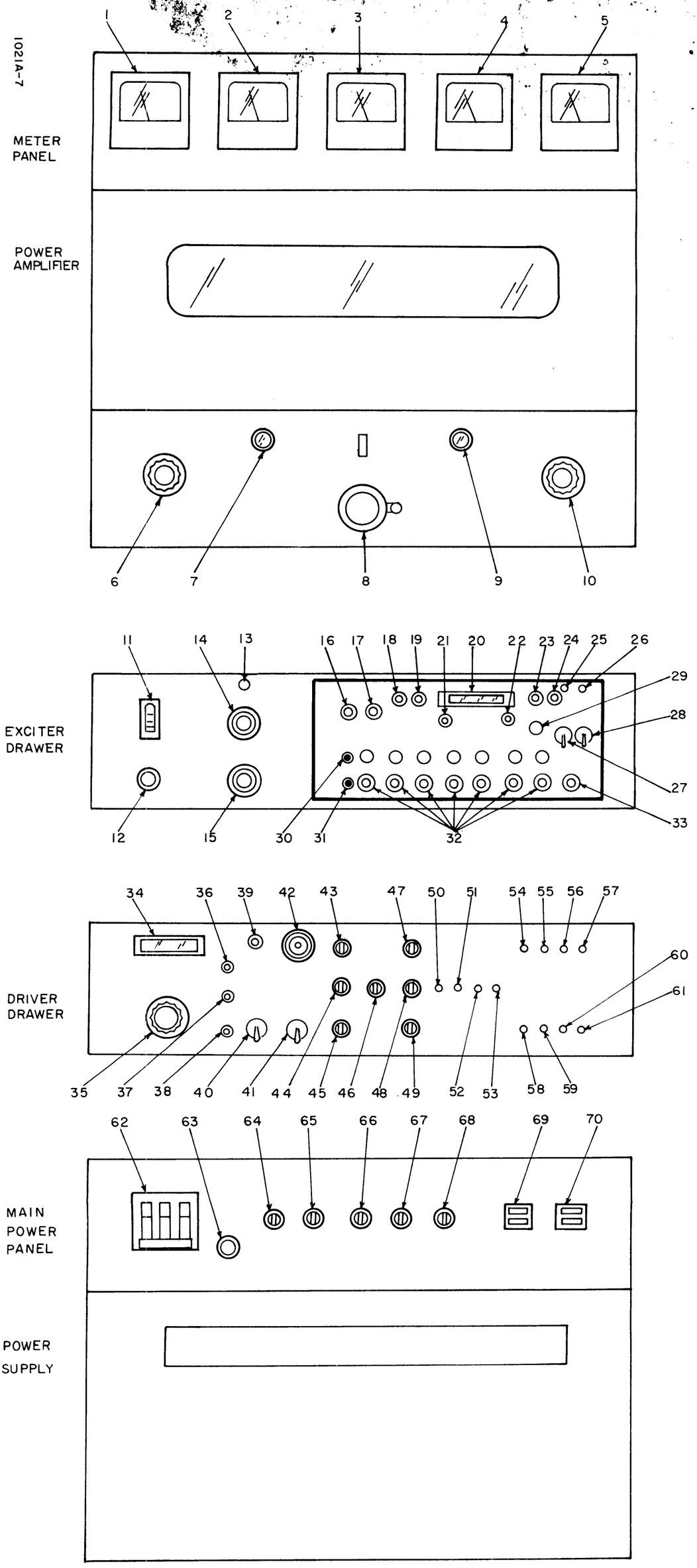

Figure 3-1. Controls and Indicators

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SECTION 4
PRINCIPLES OF OPERATION

4-1. GENERAL.

The BCT-10K Transmitter is a single rack configuration, comprised of six individual sections coupled together to form a 10-kw transmitter system.

The exciter unit LFE is a compact transistorized modular type unit, and may be used in other transmitter systems when applicable.

4-2. BLOCK DIAGRAM DESCRIPTION. (Refer to figure 4-1).

Audio signals enter the transmitter through the audio input jacks located in the main power panel. These audio jacks extend the audio into the exciter unit where the audio signals mix with the 450- to 2000-kc rf generated by the exciter unit (for detailed analysis of the exciter unit, refer to the exciter unit technical manual). The rf output of the exciter unit is then extended to the intermediate power amplifier stage.

The intermediate power amplifier consisting of two stages of amplification, accepts the r-f signal from the exciter unit, on the grid of the first IPA tube, the signal is then transformer coupled to the grids of the following two tubes which are operated in push pull with a final outpt rated at 160 volts.

The output of the IPA is coupled to the grid of the 10-kw linear power amplifier where it is raised to an r-f level of 20-kw PEP. The 10-kw output signal is then fed to a 50 ohm unbalanced antenna. 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 IPA drawer also houses four separate power supplies: the intermediate power amplifier, the plate supply which provides plate voltage for the three IPA stages, a bias supply which provides a regulated negative bias voltage for the IPA and final

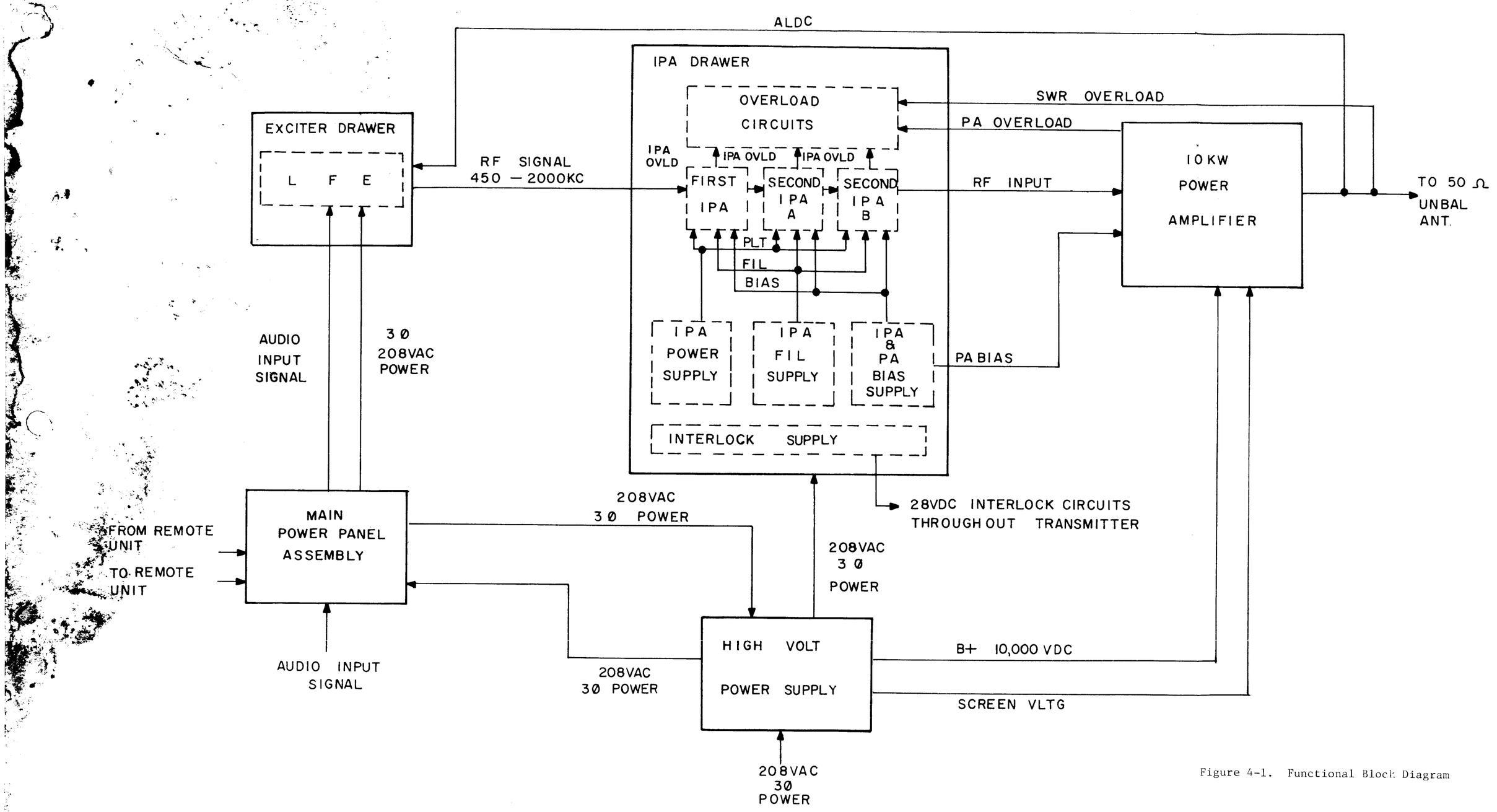

Figure 4-1. Functional Block Diagram

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PA stages, a filament supply which provides DC voltage for the three tube filaments in the IPA stages, and an interlock supply providing 28vdc to operate the interlock circuitry, with a regulated 24 vdc tapped off for the overload reset function.

The IPA drawer also contains the transistorized overload circuitry that opens the interlock circuitry cutting off high voltage to the transmitter. The protective circuits sample the IPA and PA plate and screen currents, and bias supply voltages. When any of these currents is excessive, or if a voltage is deficient, the overload relay operates and removes high voltage.

The High Voltage Power Supply provides the final PA with 10,000 volts DC plate voltage as well as a highly regulated screen voltage.

4-3. INTERMEDIATE POWER AMPLIFIER CIRCUIT ANALYSIS (refer to figure 7-2 Sh 1&2).

The intermediate power amplifier consists of two stages of amplification operating class AB1. The first stage V301 receives a minimum of 250mw on the grid, from the low frequency exciter unit LFE. The amplified signal is then transformer coupled through T303 to the grids of the second amplifier "A" stage V302, and "B" stage V303 operating in push pull. A 160 volt output through transformer T304 is coupled to the grid of the final Power Amplifier tube V900 by passing through IPA connector J304.

Both stages employ fixed bias type of operation, which is preset by first amplifier bias adjust resistor R329 and, second stage "A" and "B" amplifier bias adjust resistors R332 and R330.

The first IPA stage receives 1000vdc on its plate, and the second stage "A" and "B" amplifiers receive 2000 vdc on each plate.

A front panel switch S303 and its associated meter M301 measure the cathode current of each IPA tube.

4-4. IPA HIGH VOLTAGE POWER SUPPLY.

With reference to the interlock circuit analysis it can be seen that the IPA

High Voltage Power Supply will not operate until High Voltage Contactor K301 is activated. When K301 is activated a ground is placed on the coil of PLATES ON relay K306 energizing it and allowing phase 1 and 2 to pass through to the terminals of High Voltage Power Supply Transformer T302. The delta wye input transformer receives 208 vac on each leg and builds it up to 2000 volts output on the secondary wye section, before applying it to the solid state rectifier CR307. The IPA employs a full wave bridge rectifier consisting of a total of six rectifier cells. In this type of arrangement two half wave rectifiers are connected in series across each leg of the transformer. The rectified output of the power supply, passes through several filtering components before being applied to the plates of V302 and V303.

Transformer T302 also supplies 2000 vdc plate voltage for the first IPA stage and a regulated screen voltage for both stages of the IPA, by tapping the common point of all three legs of the secondary wye section T302.

The screen voltage is developed by voltage divider network R339, R340, R341, R343, and R342, and voltage regulated by two OA2 tubes V307 and V308, and an OB2 tube V309 before being applied to the screen of each tube.

4-5. BIAS SUPPLY, FILAMENT SUPPLY 28VDC SUPPLY (refer to figure 7-2 Sh 1&2).

The Bias supply, the IPA filament supply and the 28vdc interlock and overload circuit supply are all delta wye input transformer configurations. The 208VAC delta portion of the input transformer T301 receives three phase primary power and transfers it to the bias, filament and interlock supply wye sections producing 500 volts, 12vdc, and 28vdc, respectively. The rectifier portion of the three supplies are all full wave bridge circuits, using a total of six rectifier cells in each circuits. In this type of arrangement two half wave rectifiers are connected in series across each leg of the transformer.

The rectified output of the bias supply passes through choke input filter L304 dropping resistor R337 capacitor C318 and resistor R338 smoothing output ac ripple before it can reach the amplifier circuits. After filtering the rectified output

the voltage is regulated by three gas filled OA2 voltage regulator tubes before being applied to the voltage divider networks and bias adjust resistors in the IPA and PA tube circuits.

When PTT relay K303 is de-activated the PA tube V900 is cut-off. When relay K303 is energized a ground is applied to the bias circuit of V900 and it is able to operate.

The filament supply provides 12vdc to each IPA tube. The circuit is protected by a 4 amp fuse.

The 28vdc interlock and overload supply circuit provides 28vdc to interlock switches and relays.

The 28vdc internal supply circuit is protected by 2 amp fuse F309 the 24vdc has an additional 1 1/2 amp fuse F304 for protection.

4-6. 10KW PA and ANTENNA TUNING UNIT (Refer to figure 7-1).

GENERAL. - The 10-kw Power Amplifier tube V900 a 4CX35000 tetrode is operated class AB1 and amplifies the output of the two stage intermediate power amplifier. The output of V900 is 10,000 watts average power. The antenna tuning unit in the output circuit is designed for unbalanced operation.

a. CIRCUIT ANALYSIS - The r-f output of the third IPA is 160 volts applied to the grid of PA tube V900. Filament power at 10 volts, 300 amperes is supplied to the directly heated cathode of V900 from filament transformer T801. The center tap from T801 goes to PA PLATE CURRENT meter M902. By passing the r-f signal to ground through capacitors C805, C811, C810, and C808, places the cathode of V900 at r-f ground potential.

The -320 volt level of grid bias is controlled by final bias adjust potentiometer R311. The resistor can be adjusted from the front panel of the IPA Drawer.

The PA screen voltage is tapped off of High Voltage Power Supply Transformer T800 and is highly regulated by a series of six zener diodes and seven resistors. Meter M901 placed in the screen circuit monitors the PA SCREEN current.

The amplified signal from the plate of V900 passes through the output tuning network

consisting of tuning capacitors C909 and C910 with PA bandswitch S905 progressively shorting out sections of inductor L901. Load switch S906 progressively shorts out sections of output transformer T900. This network is designed to match the impedance of a 50 OHM UNBALANCED load to the impedance of the PA tube plate for maximum transfer of power.

The AUTOMATIC LOAD AND DRIVE CONTROL (ALDC) circuit Z900 samples the r-f voltage at the plate of V900, the r-f voltage is further reduced by capacitive voltage divider C913, C824,C825, C826, before being applied to the cathode of diode CR1. The ALDC ADJUST potentiometer R201 is coupled to front panel control ALDC ON-OFF switch S203. One side of R201 is returned to a positive voltage, the wiper of this control varies the bias on ALDC diode CR1. When the peak value of the r-f signal exceeds the bias on CR1, the diode conducts, developing a negative voltage, which is filtered and applied to ALDC switch S203. When ALDC is utilized this negative voltage is returned to a previous stage to control the signal amplitude.

The DIRECTIONAL COUPLER DC900 directs the r-f output signal to the antenna as well as directing the reflected power to the SWR overload circuitry, and the forward power to forward power meter M903. DC900 provides the means of measuring the output power on the Forward Power Meter of the transmitter, and the SWR of the transmission line on the Reflected Power Meter, M904. Forward Power from DC900 is rectified by diode CR900 and applied to M903. Reflected power from DC900 is rectified by diode CR901 and applied to SWR protective circuit or rectified power meter M904 depending on the position of switch S301. When switch S301 is in the meter position, input to the protective circuit is opened and meter M904 reads the SWR.

4-7. HIGH VOLTAGE POWER SUPPLY (refer to figure 7-1).

The High Voltage Power Supply provides the required plate voltage for the 10-kw power amplifier. The three phase primary ac input is connected to delta wye transformer T800. The transformer builds up the 208vac input to 4500 volts on each leg before it is applied to the full wave bridge circuit using a total of six rectifier

cells. In this arrangement, two half wave rectifiers are connected in series across each leg of the high voltage transformer, and has an extremely small percentage of ripple and a very low ratio of peak to average voltage.

The 10,000vdc output of the three phase full wave bridge rectifier is applied to a choke input type filter consisting of inductor L800 and capacitor C800, before being applied to the plate of power amplifier tube V900 it again passes through a series of filter components.

The high voltage level is measured by PA PLATE VOLTAGE meter M900.

4-8. THREE PHASE PRIMARY VOLTAGE CIRCUITS (refer to figure 4-2).

Three phase primary power enters the transmitter through the access hole in the bottom of the high voltage power supply compartment.

There is 208vac per leg, two legs Ø2 and Ø3 are tapped off for AC power to exciter unit LFE. When main power circuit breaker CB800 is closed main power indicator DS900 located on the front panel of the transmitter will light. At this time PA tube blower B800 in the high voltage power supply compartment and B900 in the PA compartment are energized, providing forced air cooling. The air pressure from B800 also forces the air vane of switch S801 to close, and allows phase 1 to flow to the driver drawer. High voltage contactor K800 and high voltage transformer T800 remains de-energized along with shorting relay K801.

Phase 1 and 2 is applied to blower motor B301 in the IPA compartment. The forced air from B301 then closes air vane S305 which allows phase 1 to flow to the coil of relay K305 activating the relay and enabling phase 1 and 2 to pass to transformer T301. With 3 phase power applied to the delta portion of T301, the Bias, Filament and Interlock Supplies are energized.

Phase 1 and 2 also energize Final Filament on relay K308 and Final Filament Interlock relay K302. With K308 in an energized state phase 3 is able to pass through its contacts and go to one side of the Timer M302, phase 1 is applied to the other side of the timer energizing it.

Phase 3 is also applied to one side of Filament Transformer T801.

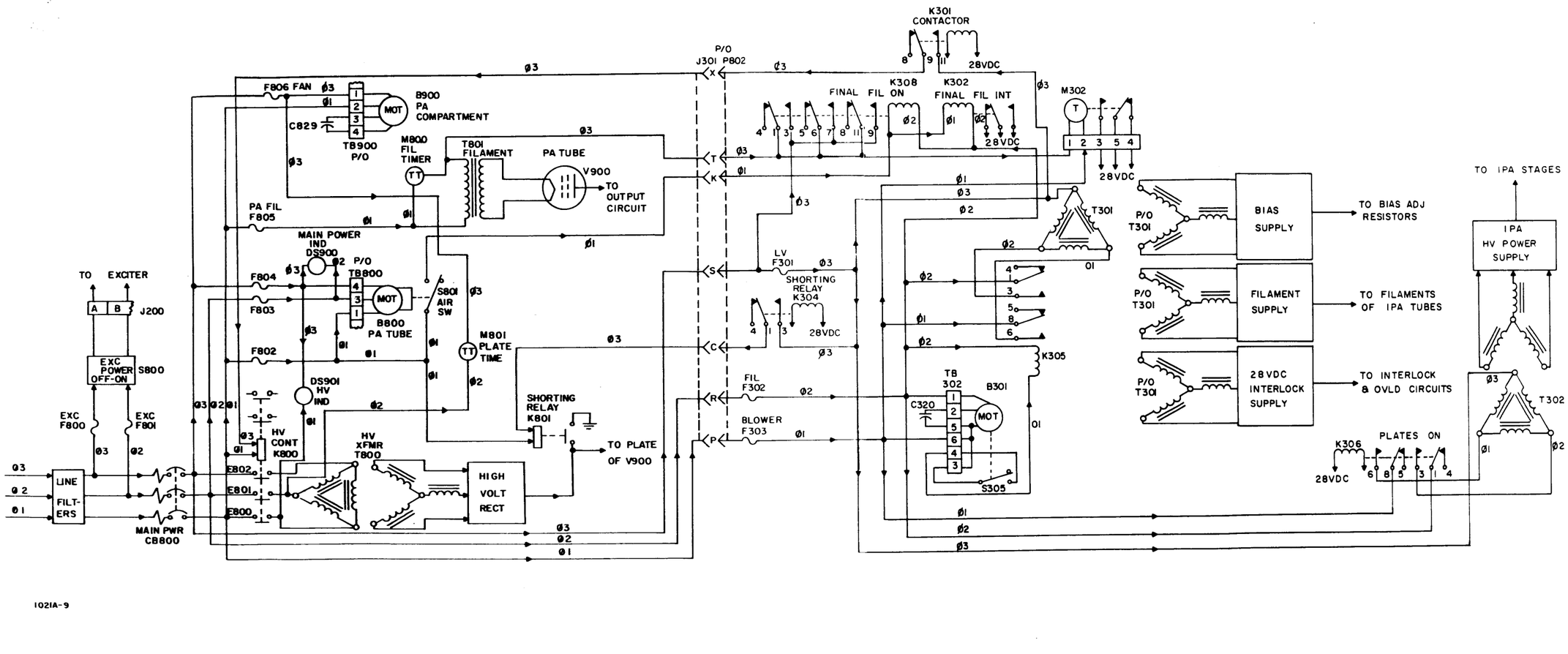

Figure 4-2. Simplified Schematic of AC Power Distribution

When plates On Relay K306 is energized by 28vdc phase 1 and 2 are able to pass through its contacts and flow to High Voltage Transformer T302. Phase 3 is applied directly to Transformer T302.

When High Voltage Contactor K301 is energized by 28vdc, plates ON relay becomes energized and phase 3 is allowed to flow back to one side of the coil of High Voltage Contactor K800, phase 1 is applied to the other side and the contactor becomes energized. With the application of primary power to the High Voltage Power Supply, High Voltage Indicator DS901, located on the front panel lights, and three phase power is able to flow to High Voltage Transformer T800 enabling the High Voltage rectifier to function.

4-9. OVERLOAD CIRCUITS (refer to figure 7-3).

The BCT-10K Transmitter is protected by eight solid state overload circuits. They are the power amplifier plate, bias, and screen, the IPA driver, IPA "A", and "B" and IPA voltage overload, and SWR overload circuits. The circuits are designed to shut off the Power Amplifier and Intermediate Power Amplifier High Voltage Power supplies should an overload condition exist in any of the prenamed areas.

All overload control circuits ultimately trigger overload relay 2K301. They are isolated by Diodes 2CR301, 2CR302, 2CR303, 3CR304, 2CR305, 2CR306, 2CR307, and 2CR308 which prevent the signal from an activated overload circuit from interacting with the other integrated overload circuits. With the contacts of relay 2K301 in the energized state, the 28vdc supply circuit to High Voltage contactor K301, is cut off deactivating it, this in turn de-energizes Plates On relay K306 that controls the IPA High Voltage Power Supply transformer T301. The 28vdc supply voltage to shorting relay K304 is also cut off, when overload relay 2K301 is energized. The phase 3 power to shorting relay K801 is cut-off and shorts out the the High Voltage Power Supply.

a. PA BIAS OVERLOAD - The PA Bias Overload adjust resistor 2R302 is connected to the PA Bias supply circuit of PA tube V900. The PA Bias voltage is from -320 to

-500vdc. Under normal conditions the value of resistor 2R304 is set by PA Bias overload resistor 2R302 for a 0- negative voltage. The 24 volt supply passes through 2R302, 2R303, and 2R304 to ground.

When an overload occurrs by a positive going voltage a .5to.7 volts is developed across the divider circuit causing SCRQ1, to trigger. With Q1 conducting front panel overload lamp 2I301 lights and transistor Q12 goes into conduction, activating overload relay 2K301.

b. PA PLATE OVERLOAD - The PA plate overload adjust resistor 2R308 set at a pre-determined level is connected to the cathode circuit of the PA tube to measure the plate current. If an excessive plate current should exist, the level of the plate overload adjust potentiometer is affected and produces a positive voltage high enough to exceed the forward breaker voltage of SCR Q2. When Q2 conducts, a plate overload condition is indicated by the front panel indicator lamp 2I302, and transistor Q12 conducts, activating overload relay 2K301, which opens the 28vdc supply line causing the High Voltage to be removed from the transmitter.

c. SCREEN OVERLOAD - The PA Screen overload adjust 2R312 is connected to the screen circuit of PA tube V900. During normal operation transistor Q4 conducts, creating a small voltage drop from collector to emitter. When the screen current rises excessively the voltage drop across overload adjust potentiometer 2R312, decreases. The base of Q4 sees this as a negative change and conducts less. At this point the collector to emitter voltage increases sufficiently to trigger SCR Q3. Front panel indicator lamp for screen overload, lights this time and transistor Q12 is activated causing overload relay 2K301 to energize and remove High Voltage from transmitter.

d. DRIVER, IPA "A", IPA "B" OVERLOAD CIRCUITS - Since all three overload circuits operate the same they will be discussed together. The Driver, IPA "A", and IPA "B" overload adjust resistors 2R315, 2R318, 2R321, set at a pre-determined level are connected to the cathode circuit of the first IPA amplifier stage, the 2nd IPA "A" and 2nd IPA "B" stages to measure the plate current. If an excessive plate

current should exist the level of the associated overload adjust potentiometer is affected, and produces a positive voltage high enough to exceed the forward breaker voltage of the SCR in the effected circuit either Q5, Q6 or Q7. When any one of the SCR's go into conduction, an overload condition is indicated by the front panel lamp either 2I304, 2I305, or 2I306, depending upon which stage of the IPA caused the overload. When the related SCR is conducting, transistor Q12 conducts energizing overload relay 2K301 which opens the 28vdc supply line, removing the high voltage from the transmitter.

e. IPA VOLTAGE OVERLOAD CIRCUIT - The IPA voltage overload adjust resistor 2R324 is connected to the voltage divider network which develops screen voltage for the IPA stages. During normal operation transistor Q9 conducts creating a small voltage drop from collector to emitter. When the screen current rises excessively the voltage drop across overload adjust potentiometer 2R324 decreases. The base of Q9 sees this as a negative change and conducts less. At this point the collector to emitter voltage increases sufficiently to trigger Q8. Front panel indicator 21307 the IPA overload indicator lights at this time and transistor Q12 is activated, causing overload relay 2K307 to energize and remove High Voltage from the transmitter.

f. SWR OVERLOAD - Transistor Q11 is connected in the SWR circuit to SWR relay K307. When the transmitter is operating normally Q11 is non-conducting and the 24vdc passes to ground. When an SWR greater than 3:1 is felt, SWR relay K307 energizes, and a +6 volts is applied to the base of transistor Q11 causing it to conduct and trigger SCR Q10, which lights front panel overload indicator 2I308 and also energize transistor Q12 which energizes overload relay 2K301 removing High Voltage from the transmitter.

4-10. OVERLOAD RESET AND ALARM CIRCUIT (refer to figure 7-4).

In the event of an overload High Voltage contactor K301 de-energizes and removes high voltage from the transmitter. If desired an audible alarm will go off by having

the alarm switch S302 in the closed position and allowing the 24vdc to complete the alarm circuit to ground through the contacts of the de-energized High Voltage Contactor.

The regulated 24vdc also flows through the overload reset switch S201, through the associated circuitry to the contacts of overload Delay relay K309. As described in the interlock circuit description relay K309 delays the 24vdc from reaching the overload circuits for just an instant until after the high voltage is applied to the transmitter. Relay K309 then energizes and the overload circuits receive the regulated 24vdc supply voltage.

When an overload occurs overload relay 2K301 will energize. To reset overload relay, depress overload reset button, this opens the 24vdc line to the coil of the overload relay and returns it to its normal deenergized position.

4-11. 28VDC AND INTERLOCK CIRCUITRY.

The BCT-10K Transmitter has a network of interlock switches and protective devices through out the unit to protect the operating and maintenance personnel as well as the equipment. The circuit is comprised of switches, relays and a timer designed to disable high voltage in the event an interlock is open. There is a total of 12 interlock switches. In order to locate an open or faulty interlock, switch S202 is provided on the front panel of the exciter drawer. Turning the switch through each of nine positions and observing when indicator lamp DS200 lights will indicate the interlock circuit is functioning properly. In the event indicator lamp DS200 does not light, the position that switch S202 is then at will be the area of an open or faulty interlock.

The 28vdc interlock and overload circuitry is actuated by the application of 3Ø phase power to PA Tube Blower B800. Blower B800 applies air pressure to close the air vane on switch S801. Filament on relay K308 and Final Filament Interlock relay K302 in series with switch S801 are then energized by phase 1 and 2.

The delta wye configured 28vdc interlock supply transformer T301 is also energized by 3 phase primary power and the 28vdc interlock supply is able to function.

a. SERIES INTERLOCK CIRCUIT (Refer to figure 4-3).

When all interlock switches are closed the 28vdc supply voltage will take the following path. It will first pass through the closed contacts of Final Filament Interlock Relay K302. It then takes two paths, one path to contact 1 of switch S202, and another path through switch S304, to contact 2 of switch S202 and also through switch S200 to contact 3 of interlock switch S202. The 28vdc Interlock Voltage then goes out terminal b of jack J200 passing through the PA rear and PS rear interlock switches, through the External interlocks which are in parallel and passing to the Fuse and Window panel interlocks to the closed contacts of Timer M302. The 28vdc then takes two paths: one path will go through the coil of shorting relay K304 energizing it. The second path is through terminal h of Jack 301 to remote high voltage on-off switches which are in parallel, and then passes through PA Load and PA Band switch interlocks. It then continues through terminal 6 of TB900, going through Heat Overload switch S904. The 28vdc then flows out terminal 8 of TB900 to pin j of jack J301. After passing through jack J301 it takes two paths, one path goes to the coil of Overload Delay Relay K309, and its delay circuit capacitor C315 and Resistor R318. (After a momentary Delay K309 enables the 24 vdc supply voltage to flow to overload circuit board). The other path goes through pin 18 of jack J302 through the closed contacts of Overload Relay 2K301 in the de-energized condition passing out terminal y of jack J203 to the coil of High Voltage Contactor K301. When High Voltage circuit breaker CB200 is placed in the on position a ground is applied to the coil of the HV Contactor energizing it. When H.V. Contactor K301 is energized a ground is applied to the coil of Plates on Relay K306 energizing it.

Diode CR301 and CR302 prevent the series interlock circuit from feeding back to the shorting relay K304, when the H.V. Circuit Breaker CB200 is in an open position.

1. When the 28vdc is supplies to the interlock circuitry the interlock circuits can be monitored by switch S202.

2. By placing switch S202 in PA air switch position, switch S801 can be monitored. Since filament on relay is in series with PA switch S801 the activation of filament on relay indicates that S801 is closed. When final filament interlock relay K302 is energized it allows 28vdc to flow through switch S202 to indicator lamp DS200.

3. By placing switch S202 in the IPA drawer position the interlock switch 304 can be monitored. If interlock switch 304 is in the normally open position it allows 28 vdc to light the indicator lamp DS200. If the interlock switch S304 is in the normally closed position the HV Circuit Breaker CB200 will open and shut off the High Voltage.

4. By placing switch S202, to the exciter drawer position, switch S200 can be monitored. Indicator DS200 will light if S200 is in the normally open position. If the switch is in the normally closed position the interlock supply voltage will flow through HV circuit breaker CB200 opening up the switch and shutting off high voltage.

5. By placing switch S202 in rear panels position PA rear switches can be monitored. If the switches are in the normally open position they allow 28vdc to flow to indicator lamp DS200. In the normally closed position the switches will allow the 28vdc to open H.V. Circuit Breaker, CB200, and shut off the high voltage.

6. By placing switch S202 in the external position the external interlocks can be monitored.

7. By placing switch S202 in front panel position the fuse and window panel switches can be monitored. If the switches are in the normally open position indicator lamp DS200 will light. If the switches are in the normally closed position, the High Voltage Circuit Breaker CB200 will open and shut off the high voltage.

WARNING

To monitor the following positions, Bandswitch, Heat Overload, and Timer the following sequence must be adhered to or switch S202 will give a misleading

indication and could cause needless maintenance.

The positions should be monitored Timer, Bandswitch, and Heat Overload.

8. In the PA Bandswitch position the interlock supply voltage passes through the Timer contacts, and the High Voltage on-off positions before being applied to PA Band and PA Load switches. The PA Band and PA Load switches are then in the normally closed position and will light indicator DS200. If they should be in the normally open position the transmitter High Voltage Contactor will be deenergized and shut off the high voltage.

9. In the Heat Overload position the indicator lamp DS200 will light as long as the Heat Overload switch is in the normally closed position. If the switch is tripped to the normally open position by excessive heat, the High Voltage circuit CB200 will open and shut off the high voltage.

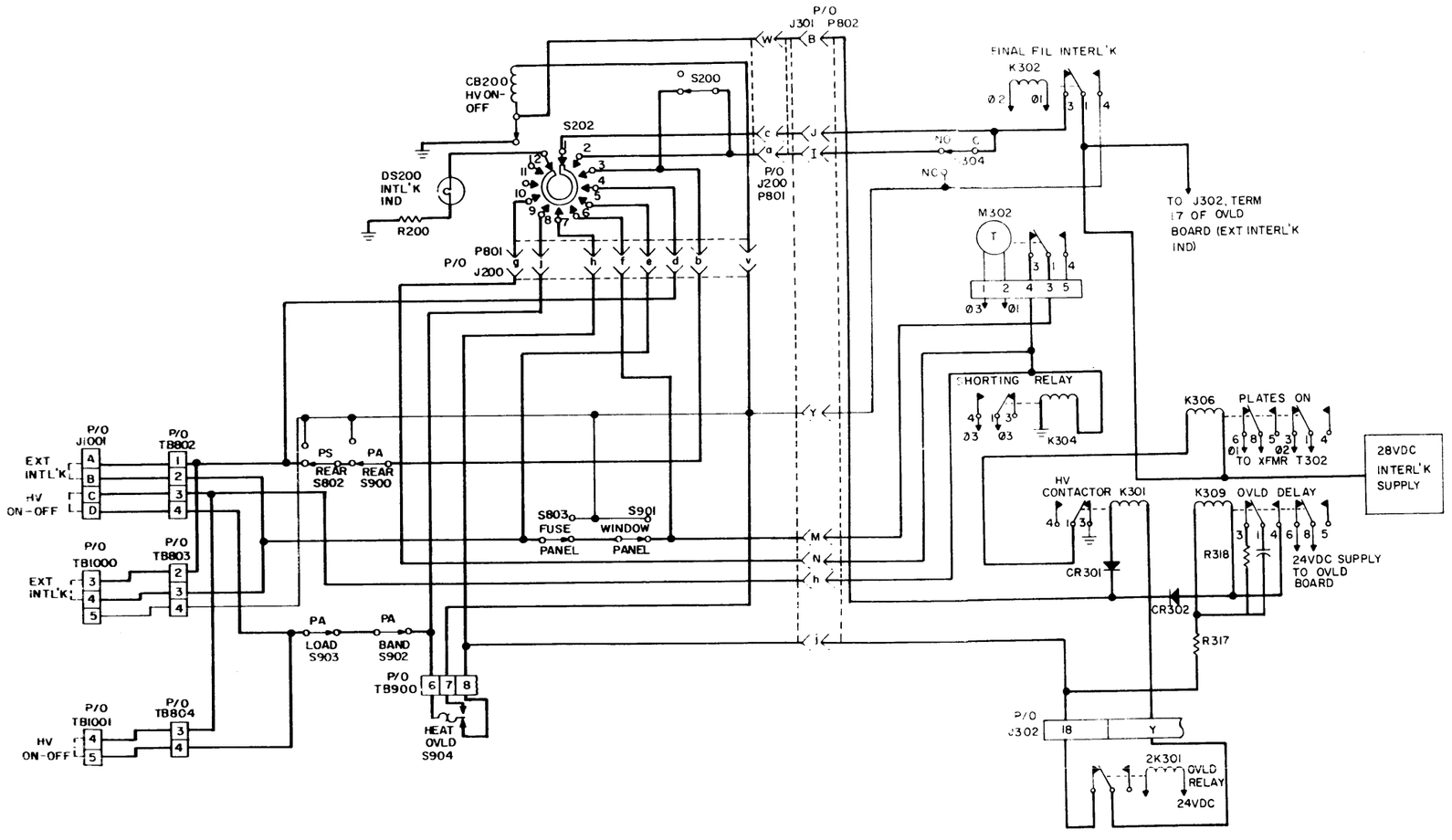

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Figure 4-3. Simplified Schematic of Interlock Circuits.

SECTION 5
MAINTENANCE

5-1. GENERAL.

Maintenance is divided into three categories: operator's maintenance, preventive maintenance, and corrective maintenance. The operator's maintenance, performed by the operator as he works with the equipment, is confined to visual inspection, cleaning, and fuse replacement.

This section also contains detailed troubleshooting techniques and reference data that should be used to quickly locate malfunctions in the transmitter. A preliminary inspection procedure, table 5-1 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 5-2, and a system troubleshooting chart, table 5-3. The combined data of tables 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 the trouble symptoms listed are produced by malfunctions 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.

5-2. PREVENTIVE MAINTENANCE.

Preventive maintenance is maintenance that detects and corrects trouble-producing conditions before they become serious enough to affect equipment operation. Common cuases of trouble 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. Observe indicator lights 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" PERIOD. - 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 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. Gear trains 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.

5-3. EQUIPMENT PERFORMANCE CHECK.

Table 5-2 is a procedure that systematically checks equipment performance in terms of operating procedures. Perform each step in the order given.

NOTE

Numbers in parentheses identify locations of operating controls and indicators. Refer to the operator's section for front panel location diagrams. Normal, proper, or correct meter indications are those given in the BCT-10K tuning chart.

TABLE 5-1. PRELIMINARY INSPECTION PROCEDURE

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

TABLE 5-2. EQUIPMENT PERFORMANCE CHECK

STEP	OPERATION	NORMAL INDICATION	PROBABLE CAUSE OF ABNORMAL INDICATION
1	Connect antenna or dummy load to transmitter, and check that all doors, covers and components are secured.		
2	Set all tuning controls on transmitter to positions specified in transmitter tuning chart.		
3	Set the following controls to there preliminary setting.		

TABLE 5-2. EQUIPMENT PERFORMANCE CHECK (CONT)

STEP	OPERATION	NORMAL INDICATION	PROBABLE CAUSE OF ABNORMAL INDICATION
3 cont.	1. H.V. circuit (11) to OFF. 2. EXCITER switch (63) to ON. 3. ALDC adj (15) fully CCW. 4. STANDBY switch (27) to standby. 5. RF OUTPUT control (16) fully CCW. 6. ALARM switch (41) to OFF.	STANDBY lamp on LFE (exciter unit) should light.	Open line fuse F800 or F801.
4	Set MAIN POWER circuit breaker (62) to ON.	MAIN POWER lamp (7) lights. PA Tube blower B800 operates. PA compartment B900 operates. FILAMENT TIME meter (69) operates. 1 PA BLOWER operates	Open line fuses to BLOWERS and main power lamp. Blower motors defective Filament on relay K302 or Air switch S801 defective.
5	Set all tuning controls on transmitter to positions specified in transmitter tuning chart TUNE up EXCITER UNIT accordingly to operators instructions in Section 3 of Manual, paragraph 3-3, steps 3-11.	EXCITER power lamp (26) lights	Check maintenance manual for LFE if unit fails to operate.

TABLE 5-2. EQUIPMENT PERFORMANCE CHECK (CONT)

STEP	OPERATION	NORMAL INDICATION	PROBABLE CAUSE OF ABNORMAL INDICATION
	NOTE Turn RF OUTPUT control fully counter clockwise before performing next steps of operation.		
6	Turn Interlock monitor switch (14) through each position.	Interlock Indicator lamp (13) lights.	Open Interlock switch.
7	Set High Voltage Circuit Breaker (11) ON.	High Voltage lamp (9) lights. PA PLATE TIME meter (79) operates. PA H.V. Power Supply is energized. 1PA H.V. Power Supply is energized. PA PLATE volt meter should read 9000 vdc.	Overload condition occurrs. Defective shorting relay K304. Defective H.V. contactor K800. Defective shorting relay K801. Defective Plates On relay K306.
8	Increase RF OUTPUT control (16) until 2 amperes is indicated on PLATE Current Meter (3).	PA PLATE current meter (3) should have 2 amperes indication.	Defective PA PLATE current. Low PA plate voltage. PA bias not functioning properly. Excessive screen current.
9	Turn TUNE control (8) until forward power meter indicates resonance	Resonance Indication by forward power meter.	Defect in power amplifier V900.

TABLE 5-2. EQUIPMENT PERFORMANCE CHECK (CONT)

STEP	OPERATION	NORMAL INDICATION	REMEDY
10	Increase RF OUTPUT (16) to a 15kw reading on forward power meter (4). Then reset RF OUTPUT control (16) to read 10kw on forward power meter.	Forward Power meter (4) should read 15kw.	Improper tuning or loading; or defect in P.A. circuit. Defective Direct-Coupler DC900.
11	Throw REFLECTED power switch (40) to REFLECTED power position.	REFLECTED POWER meter should not exceed a 3:1 VSWR.	Improper tuning or loading. Defective Directional Coupler DC900.
12	Increase ALDC control (15).	FORWARD POWER meter (4) drops slightly.	ALDC ADJ R201 Defective. ALDC circuit failure (Z900).

5-4. PROCEDURE FOR REPLACEMENT OF PA TUBE

WARNING

Extremely high voltages are present in the transmitter. Before replacing PA TUBE make sure the HIGH VOLTAGE and MAIN POWER circuit breakers are set at OFF. Use the shorting rod provided to discharge all capacitors to ground.

1) Remove rear skin of transmitter.

2) Remove one half of PA TUBE AIR DUCT by unfastening dzus fasteners and screws.

3) Remove metal band around PA tube by unfastening take up screw, and sliding off band from tube.

4) Turn WING nut in a clockwise direction to raise tube in its holder.

5) The PA tube weighs approximately 60 pounds, lift tube from its holder being careful not to injure personnel or other components on removal.

6) Carefully replace new tube in holder.

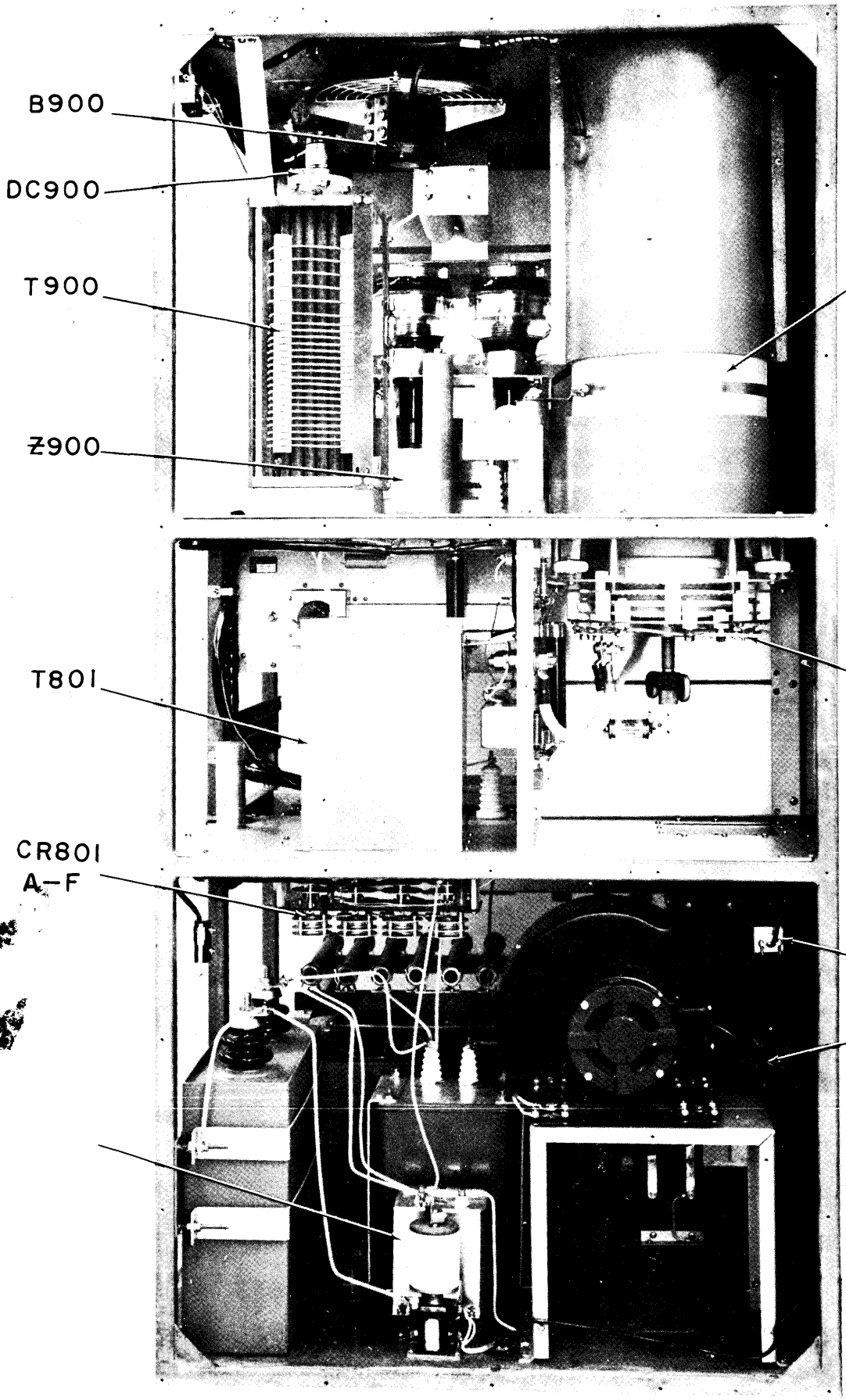

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Fig. 5-1. Overall Rear View Of BCT-10K

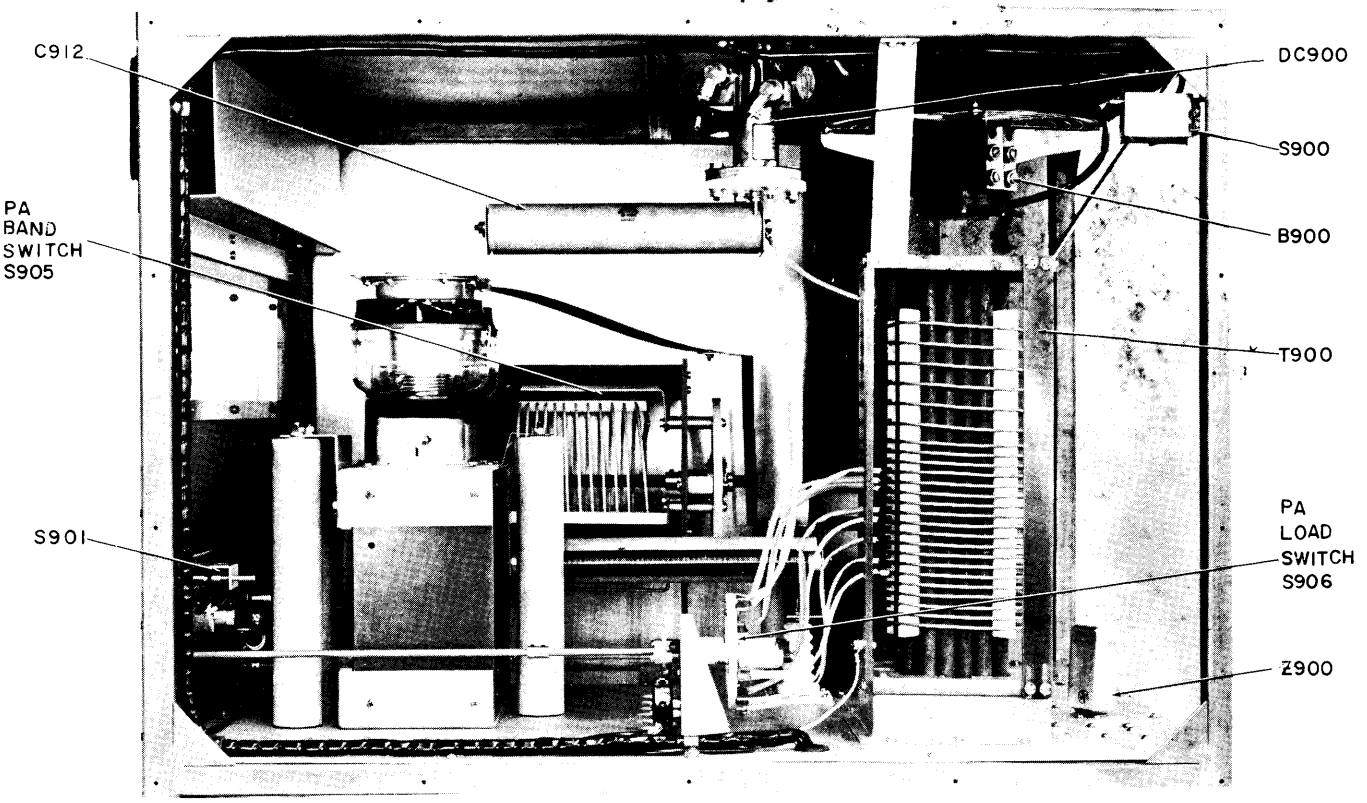

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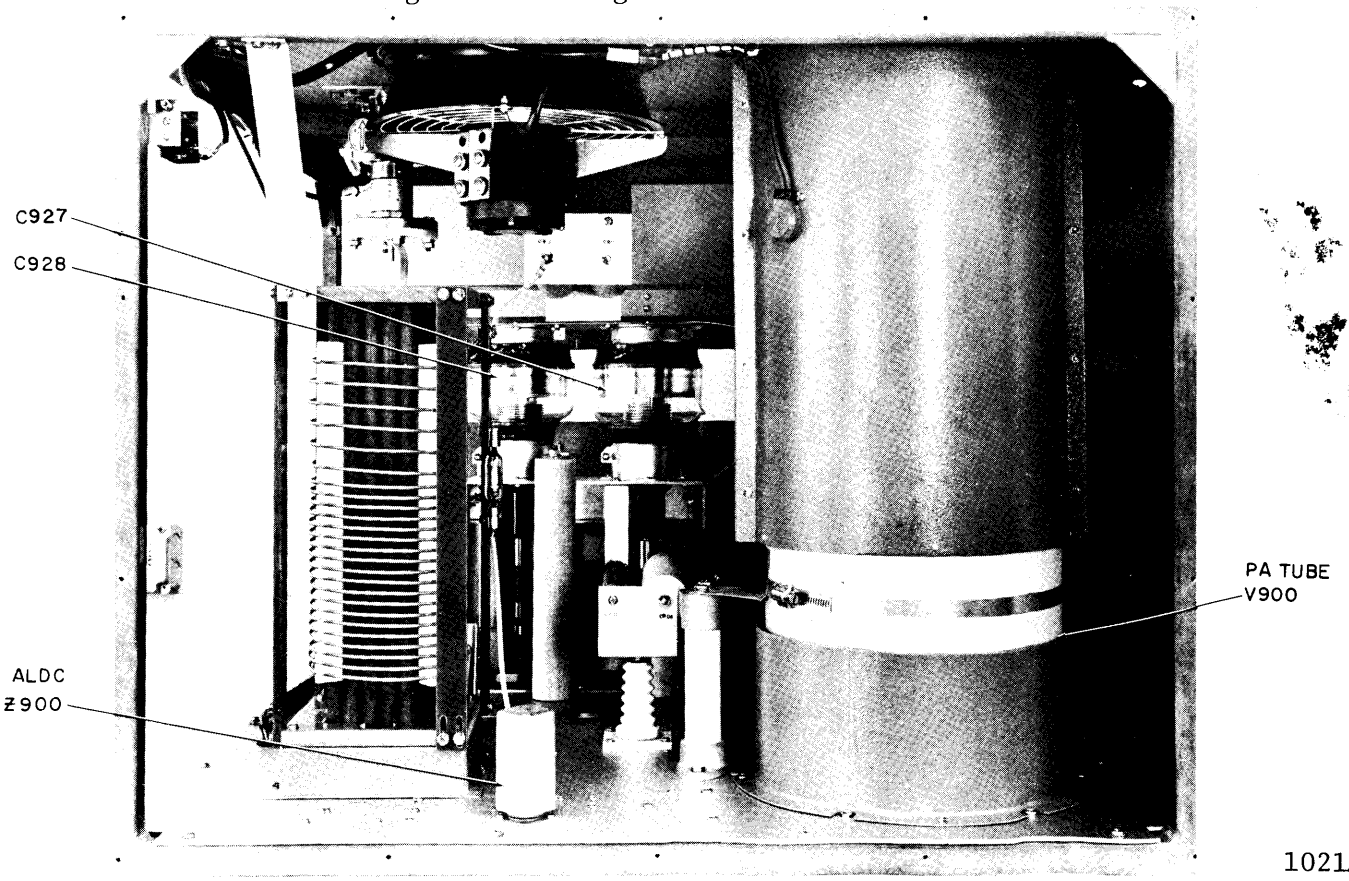
Figure 5-2. Right Side of PA Section



681.3-5

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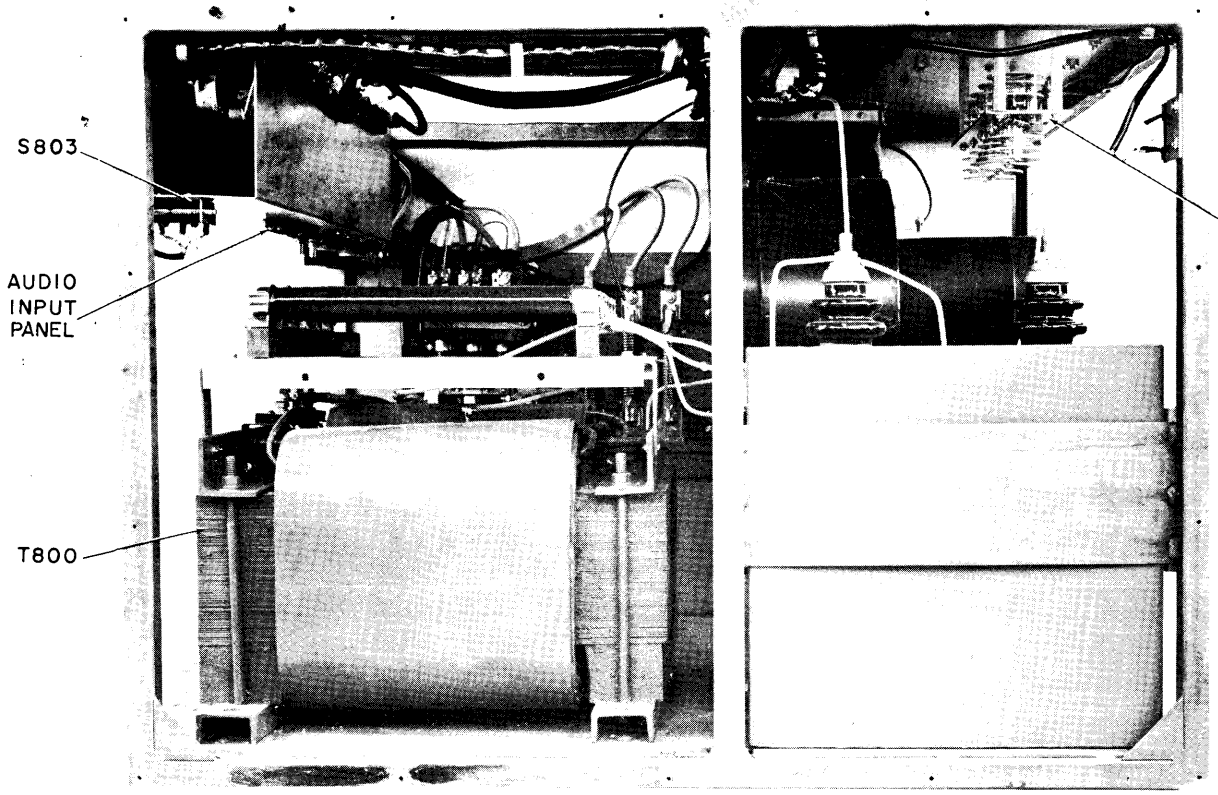
Figure 5-3. Rear View of PA Section



681.3-6

1021A-14

Figure 5-4. Right Side View of Power Supply Section

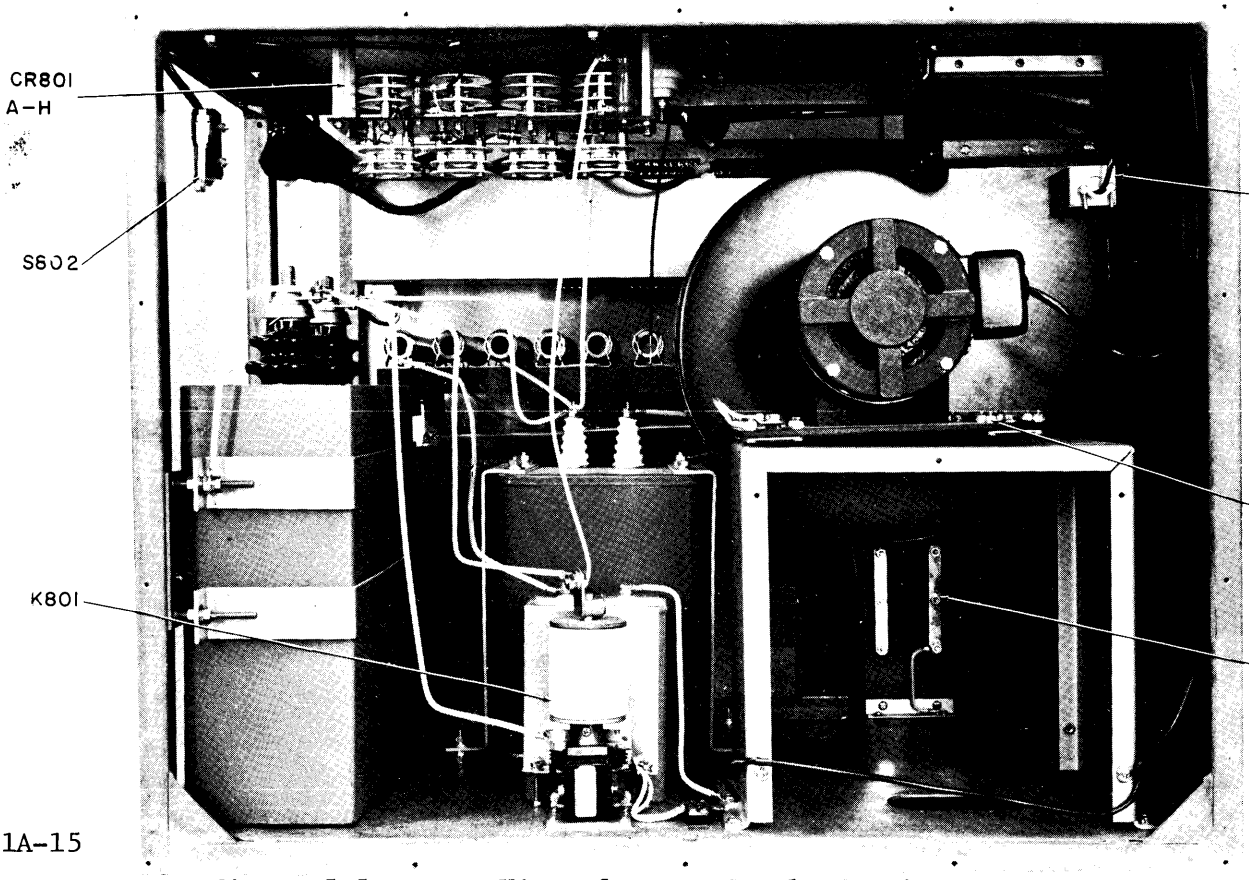


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Figure 5-5. Rear View of Power Supply Section.

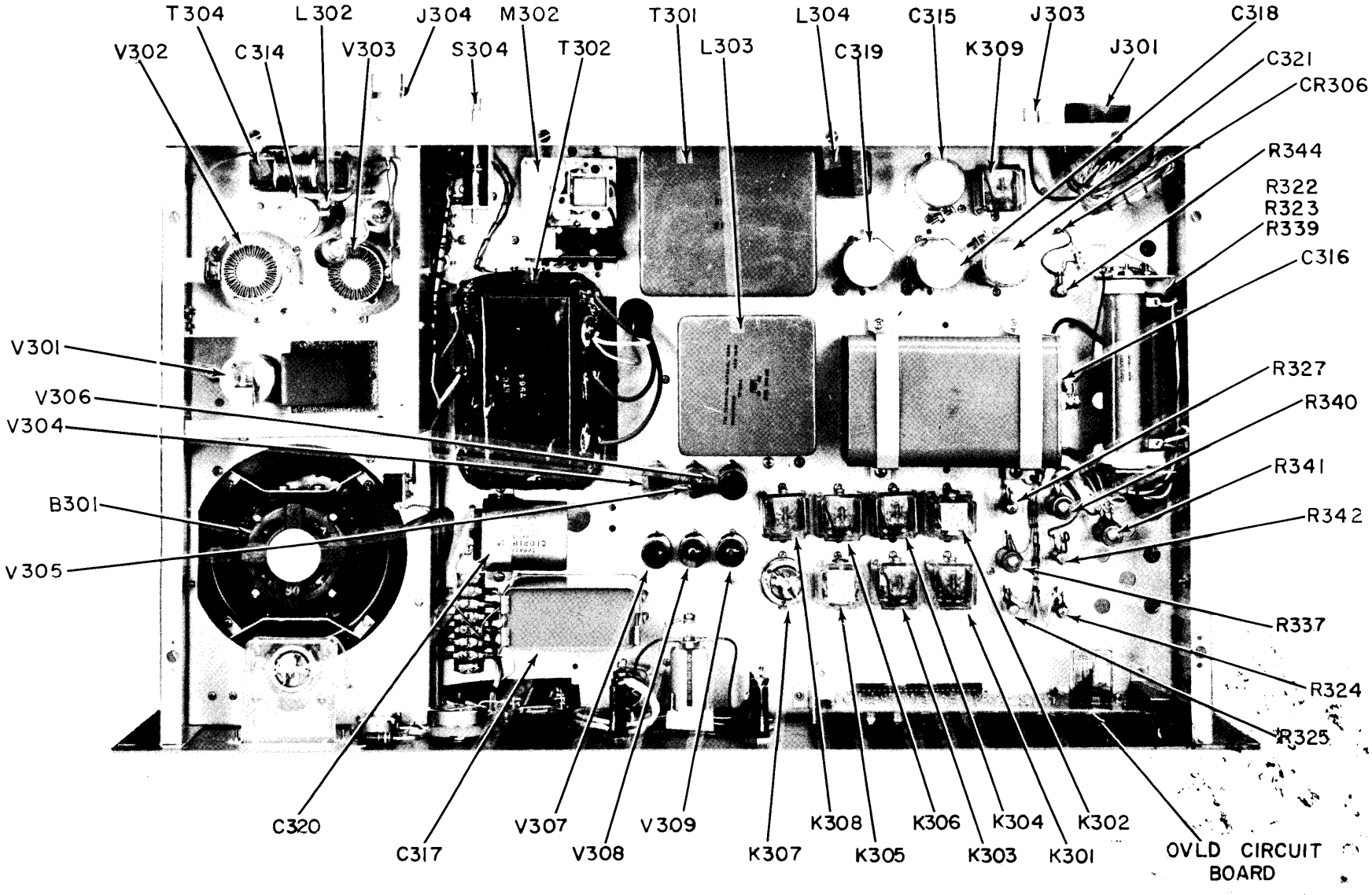

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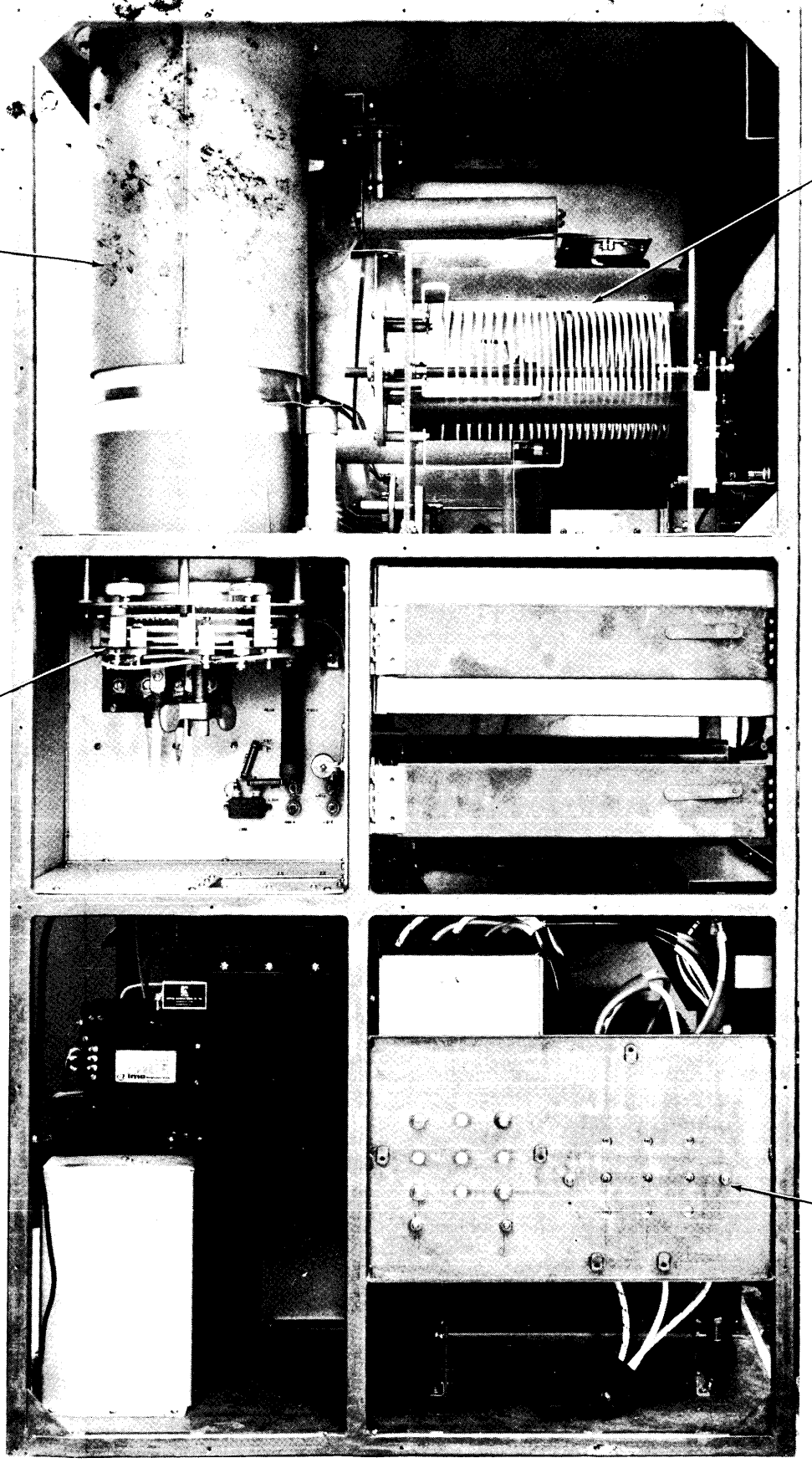
Figure 5-6. Top View of Driver Drawer

681.29-6



1021A-17

Figure 5-7. Overall Left Side View of BCT-10K

7) Slowly turn knurled head on bottom of tube holder until tube seats correctly.

8) Turn WING nut in a counter clockwise direction and lower tube into socket.

9) Replace other parts in the reverse order from when they were removed.

5-5. FRONT PANEL REMOVAL OF PA TUBE

The following procedure is presented to facilitate replacement of the Power Amplifier tube, when it is only accessible, by removal of the front panel of the transmitter, for example in a van, an airplane or any area where lack of space limits removal of sides or rear skins.

To replace PA tube proceed as follows:

WARNING

Extremely high voltages are present in the transmitter. Before replacing PA tube make sure the HIGH VOLTAGE and MAIN POWER circuit breakers are set at OFF. Use the shorting rod provided to discharge all capacitors to ground.

1) Remove EXCITER DRAWER (1) from transmitter.

2) Remove DRIVER DRAWER (2) from transmitter.

3) Remove WINDOW PANEL (3) from transmitter.

4) Turn BANDSWITCH knob (4) to 450-750 kilohertz position, then uncouple knob shaft from the BANDSWITCH shaft by removing the two set screws.

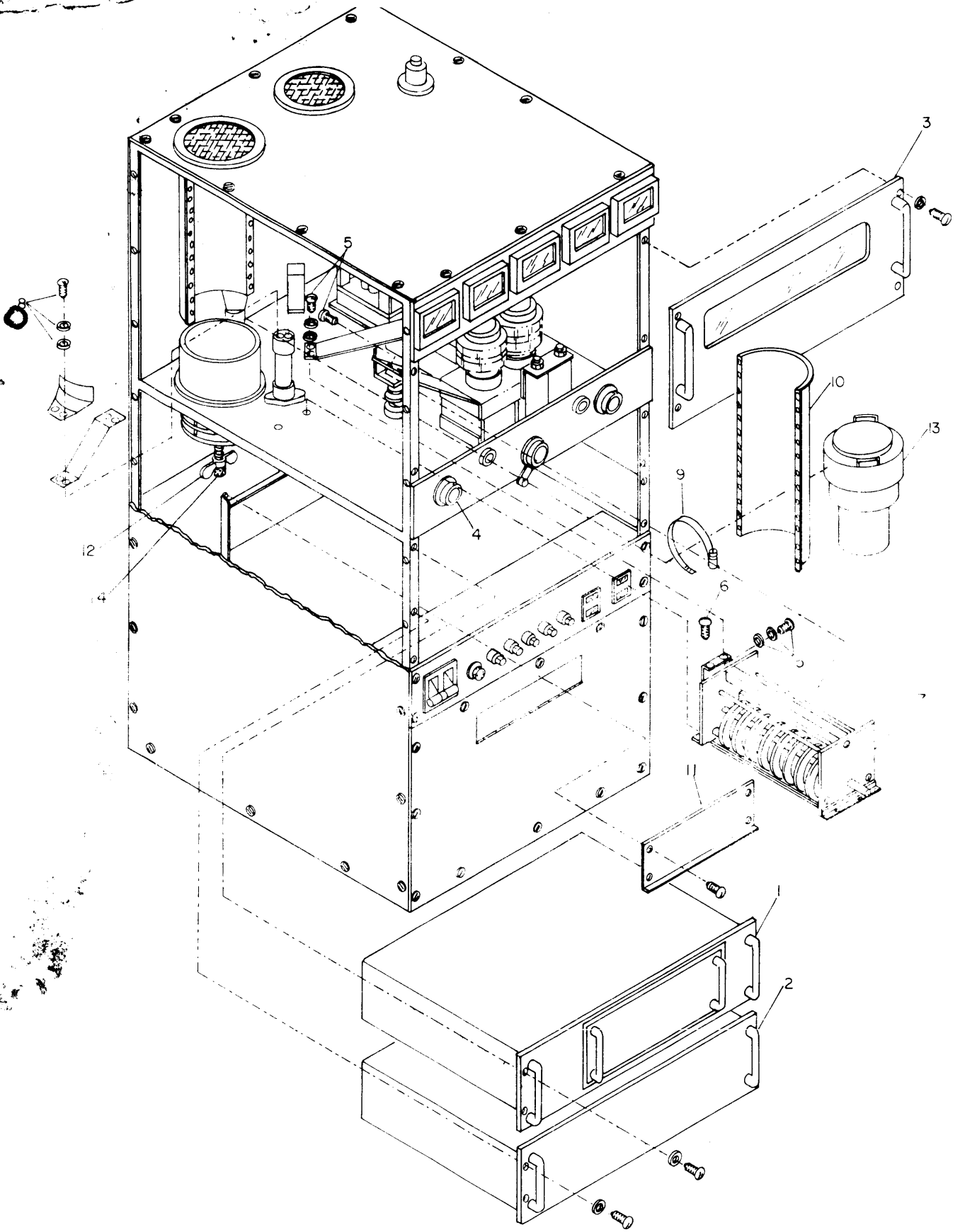
5) Unfasten screws, washers, and nuts (5) holding copper straps to BANDSWITCH, on right side and rear brackets.

6) Remove screws (6) holding BANDSWITCH BRACKETS to the bottom plate of PA section.

7) Remove BANDSWITCH (7) from PA section of transmitter.

8) Remove SCREWS and washers (8) holding copper strap to standoff.

9) Remove metal band (9) around PA tube by unfastening take up screw, and sliding off band from tube.



Figures 5-8. Front Panel Removal of PA Tube

10) Remove one half of PA Tube AIR DUCT (10) by unfastening dzus fasteners and screws.

11) Remove rear SHIELD (11) of EXCITER DRAWER compartment by unfastening screws holding SHIELD.

12) Turn WING NUT (12) in clockwise direction to raise tube in holder.

13) The PA Tube (13) weighs approximately 60 pounds lift tube from its holder being careful not to injure personnel, or other components on removal.

14) Carefully place new tube in holder.

15) Slowly turn knurled head (14) on bottom of tube holder until tube seats correctly.

16) Turn WING nut (12) in a counter-clockwise direction and lower tube into socket.

17) Replace other parts in the reverse order from when they were removed.

5-6. REPLACING BEARING ON PA FAN MOTOR B900 (See figure 5-9).

1) Loosen two setscrews (91-12-1) on fan hub and slide fan (68-25-7) from shaft.

2) Remove four bolts (9-10-17), four washers (92-5), and four nuts (94-2-1) from motor housing.

3) Remove front end cap (3102B101) and rotor assembly (4102B153-1) from motor housing.

4) Remove front end cap (3102B101 from rotor assembly (4102B153-1).

NOTE

If any shim washers should adhere to front bearing, be sure to put them back into end cap. All shim washers and loading spring (83-10) must be positioned in their original order for reassembly.

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

6) Press new bearing (47-3-31) on shaft by applying pressure to inner race only. DO NOTE APPLY PRESSURE TO OUTER RACE OF BEARING.

7) Replace rotor assembly (4102B153-1) in front end cap (3102B101), then place rotor assembly with front end cap in motor housing. Secure front end cap to motor housing using four screws (91-10-17), four washers (92-5), and four nuts (94-2-1).

8) Slide fan (68-25-7) on shaft. The two set-screws (91-12-1) should line up with flats on shaft to prevent raising a burr which would interfere with future disassembly. Tighten setscrews and stake with Glyptol.

5-7. REPLACING BEARING ON MAIN BLOWER MOTOR B800 (See figure 5-10).

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

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

3) Remove four screws (91-82-2) and four washers (92-26) holding blower housing (67-729-1CC-1) to motor with air retainer (64-30-7).

4) 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).

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

6) Remove rotor assembly (414B5-1) from motor.

NOTE

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

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

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

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

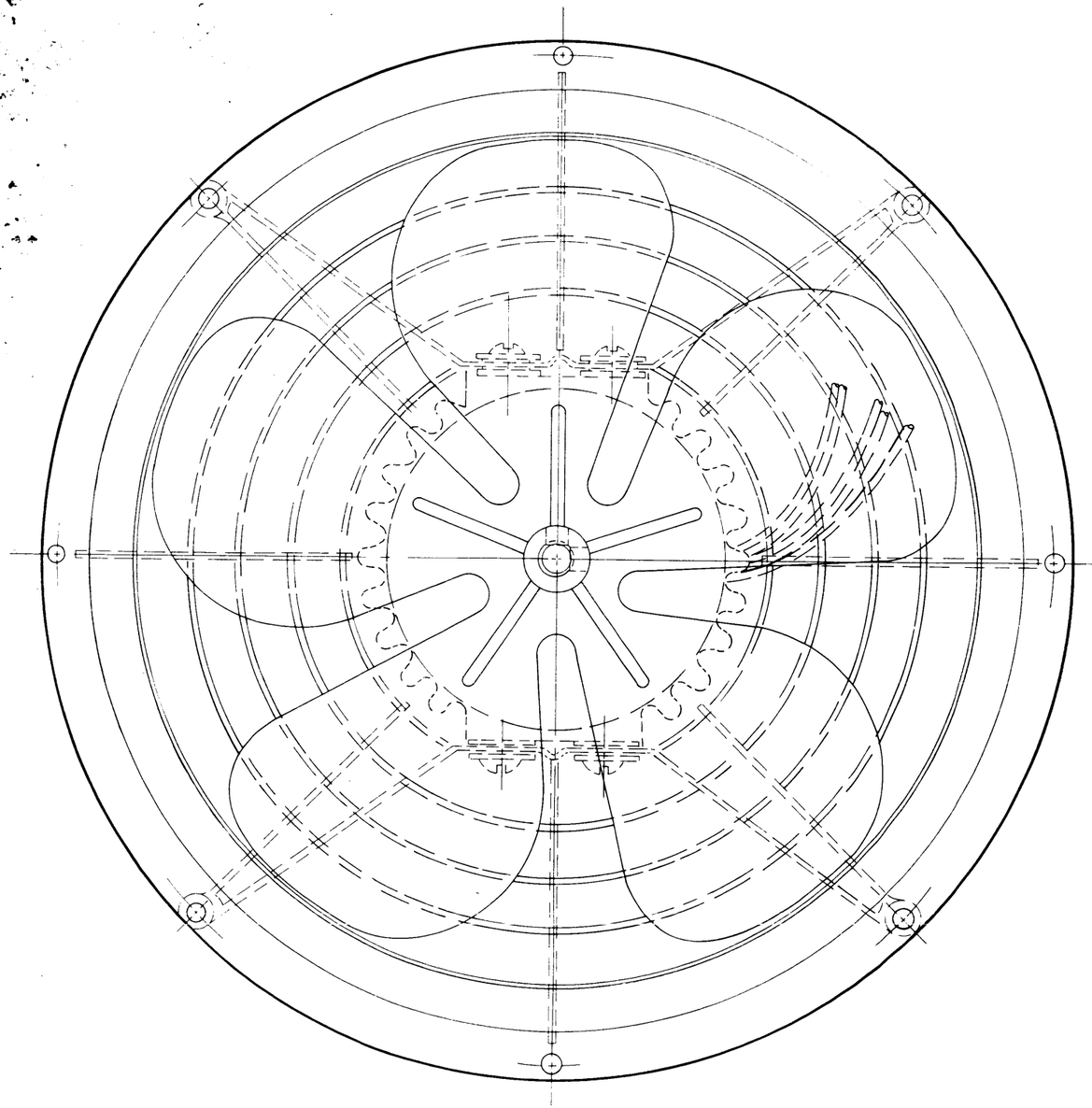
10) Replace air retainer (64-30-7) to front end cap and attach motor to blower housing (67-729-1CC-1) with four screws (91-83-2) and four washers (92-26).

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

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

5-8. IPA DRAWER BLOWER (B301)

The bearings in blower B301 are non replacable items. Only the motor, or blower housing may be replaced. See parts list for numbers.



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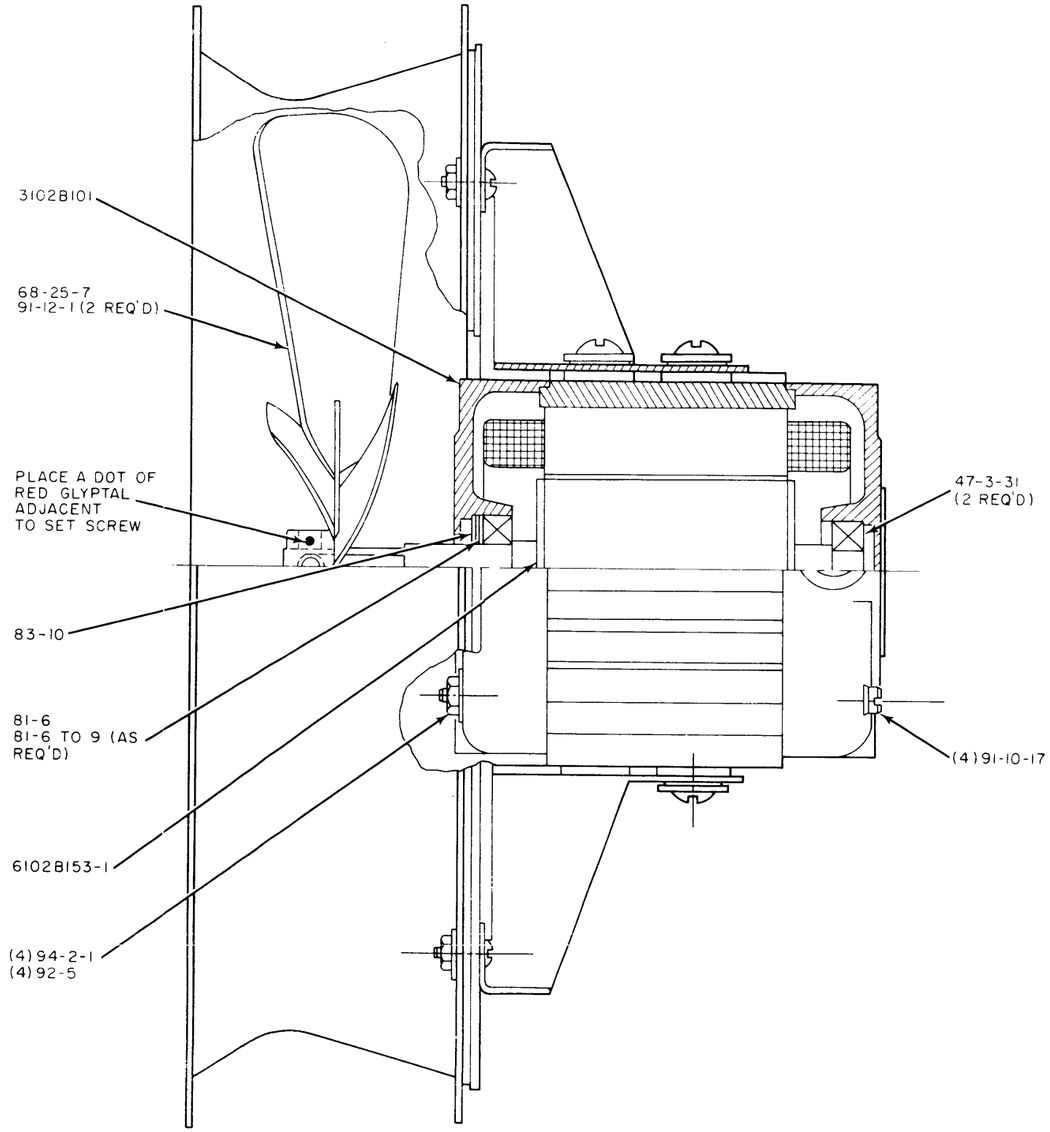

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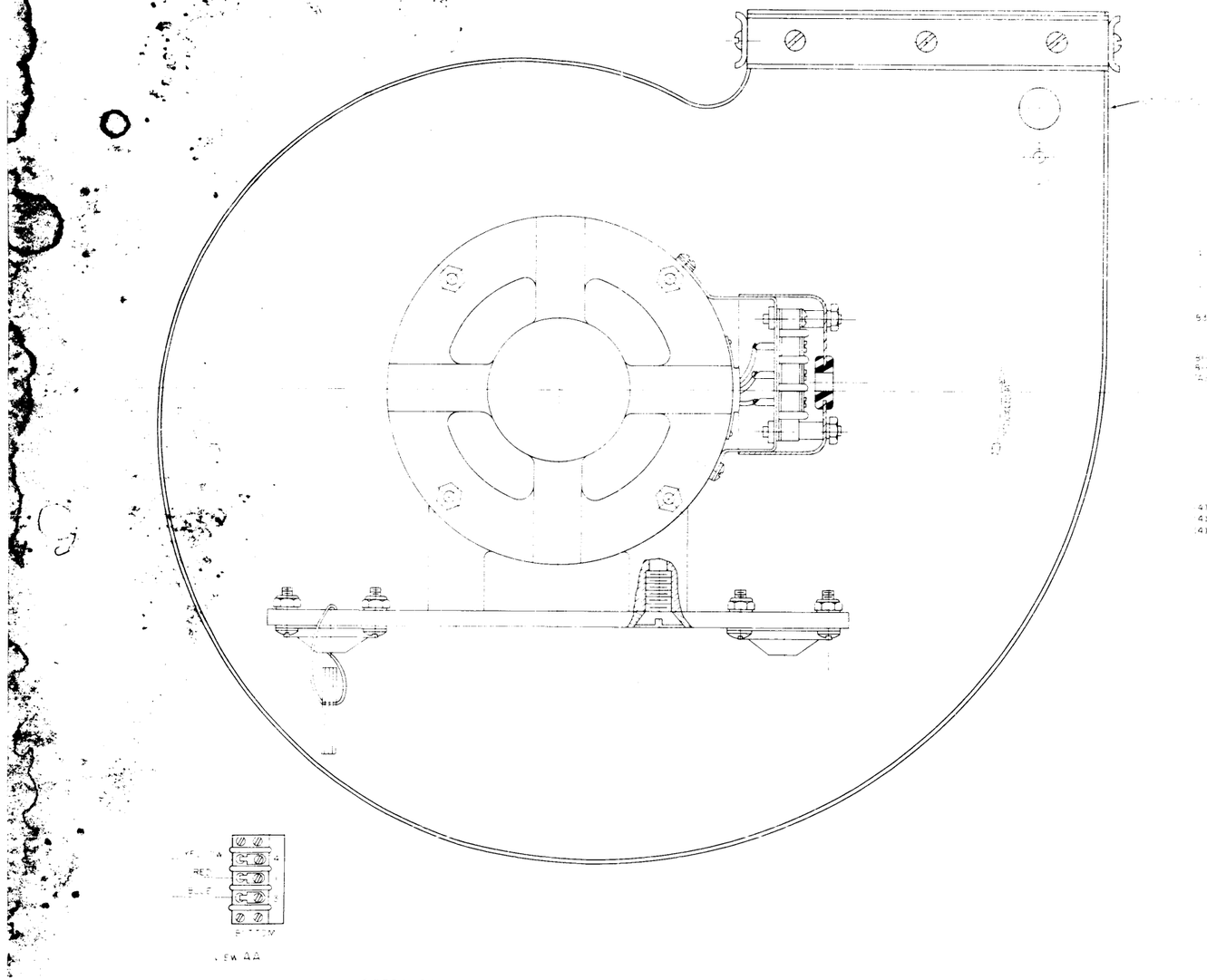
Figure 5-9. PA Fan Motor



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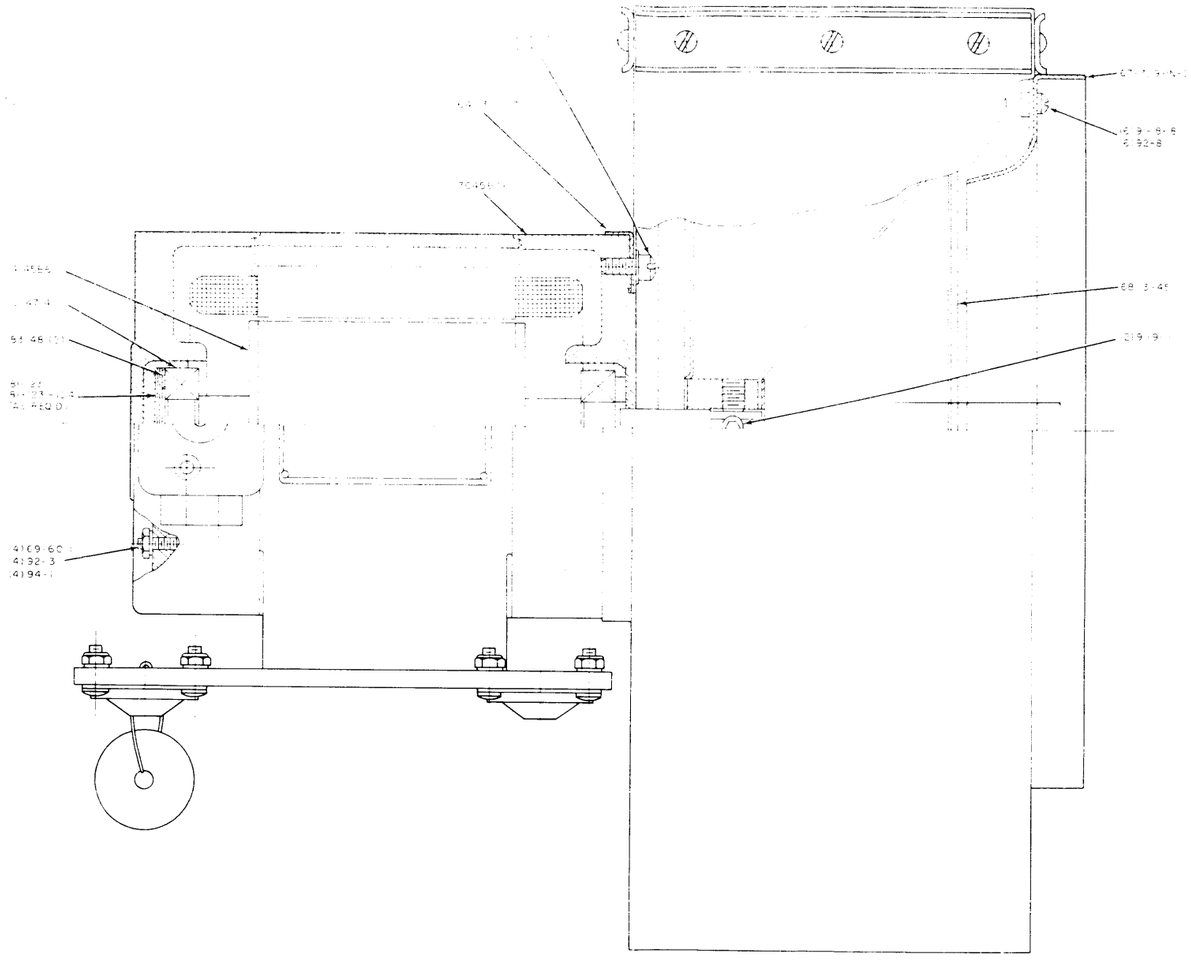

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Figure 5-10. Power Supply Blower

SECTION 6
PARTS LIST

6-1. INTRODUCTION

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

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

a. Reference symbol.

b. Description as indicated in parts list.

c. TMC part number.

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

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

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

BMA 209
PNL ASSY, CONTROL

REF SYMBOL	DESCRIPTION	PNC PART NUMBER
DS900	Lamp, Incandescent: 230V; 10 watts; screw base	BI-105-1
DS901	Same as DS900	
XDS900	Socket, Lamp: Frosted blue lens: screw type socket	TS136-4FS
XDS901	Socket, Lamp: Frosted red lens; screw type socket	TS136-1FS

P/0AX680

BMA 210
CAP. ASSY, TUNE

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C927	Capacitor, Variable Vacuum: 50-2000WFD, 10KV WVDC, Current Rating 45 Amps, Rms.	CB155
C928	Same as C927	

P/O AX680

SOCKET ASSY, TUBE
BMA 211

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C804	Capacitor, Fixed: Ceramic, 6800PF, +40%-20%, 3500WVDC	CC115-2-6800
C805	Same as C804	
C806	Same as C804	
C807	Same as C804	
XV900	Socket, Electron Tube	TS188

BMA 212
TUBE COMPARTMENT

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C802	Capacitor, Fixed: Film Dielectric 20UF; 2KWVDC	CP117-2
C803	Capacitor, Fixed: Ceramic 1000VVF ±20%, 5000WVDC 100,000 Meg Ohms	CC109-38
C808	Same as C809	
C809	Capacitor, Fixed: .01UF, ± 10%, 300 WVDC	CM35F103F03
C812	Same as C8Ø3	
C813	Same as C8Ø3	
C814	Same as C8Ø3	
C815	Same as C8Ø3	
C817	Capacitor, Fixed: Ceramic Feed-Thru 1000_F, +20%, 1000WVDC	CC108-4P1000M
C818	Capacitor, Fixed: Ceramic 5 PF- ±10%, 5000 WVDC	CC109-3
C819	Same as C8Ø3	
C830	Capacitor, Fixed: "TRYLAR", .01UF, ±10%, 8000 WVDC	CX102J103M
J800	Connector, Coatial: Femal Contact, BNC Type, Single Hole Mounted	UG625/U
L802	Coi, RF: Fixed, 185 UH	CL178
L803	Same as L802	
L804	Same as L802	
L805	Same as L802	
R807	RES, FXD, COMP Resistor, Fixed: Composition, 47 Ohms, ±5%, 1 Watt	RC32GF47ØJ
R808	Resistor, Fixed, Film, Non Inductive, Bonded Carbon 15KV Max Resistange Range 100 Ohms - 3,300 Ohms TOL ± 10%	RR134-152
R809	Same as R808	

AX681 POWER SUPPLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B800	BLOWER/FAN: 220v; 50/60 Hz, 3 phase; ccw; 3250 rpm; nom; 2320 with full load; 6.1 line amps.	BL111-60
C800	CAPACITOR, FIXED, PAPER; 4 uf ± 10%; 10,000 wvdc.	CP103
C801	CAPACITOR, FIXED, PAPER; 10 mf, ±10%; 2500 wvdc.	CP105
C810	CAPACITOR, FIXED, PAPER; 15 mf, ±10%; 50 wvdc.	CP116
C811	Same as C810.	
C820	CAPACITOR, FIXED, CERAMIC; 10,000 uuf, GMV; 500 wvdc.	CC100-16
C821	Same as C820.	
C822	Same as C820.	
C823	CAPACITOR, FIXED, ELECTROLYTIC; 50 ufd, ±2%;	CE63C500G
C827	CAPACITOR, FIXED, MICA; 5 uufd, ±20%; 500 wvdc.	CM15B050M03
C828	CAPACITOR, FIXED, MICA; 2000 mmf, ±2%; 500 wvdc.	CM30B202G03
C829	CAPACITOR, FIXED, PAPER; 4.0 uf, ±10%; 600 wvdc.	CP41B1FF405K
CR800A	RECTIFIER, SEMICONDUCTOR DEVICE; average rectified current 2.8 a; forward volt drop 18.0v; max. PVR 15,000v.	DD128-3
CR800B	Same as CR800A.	
CR800C	Same as CR800A.	
CR800D	Same as CR800A.	
CR800E	Same as CR800A.	
CR800F	Same as CR800A.	
CR801A	SEMICONDUCTOR DEVICE, DIODE (matched set); silicon, Zener type; 50w/1600 vdc, total ±5%.	VR100S/8-1600-5
CR801B	Same as CR801A.	
CR801C	Same as CR801A.	
CR801D	Same as CR801A.	
CR801E	Same as CR801A.	

AX681 POWER SUPPLY (cont)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CR801F	Same as CR801A.	
CR801G	Same as CR801A.	
CR801H	Same as CR801A.	
E803	INSULATOR, FEED THRU.	NS107
K800	RELAY, CONTACTOR; 3 phase; 220 vac; 60 Hz; 150 amp open.	RL138
K801	SWITCH, VACUUM SOLENOID; KV PK TEST 15 KV 60 Hz switch rating 100 amps.	RL179
L800	FILTER CHOKE: inductance 1.4 hy, dc current rating 2.5 a; dc resistance insulation test voltage 15 hy.	TF280
L801	COIL, DECOUPLING PLATE; 2.5 mHz.	CK426-1
L806	COIL, RF, FIXED; 185 uhy	CL178
L1001		
L1002	Same as L1001.	
R800	RESISTOR, FIXED, WIREWOUND; 50,000 ohms; 140 watts.	RW118F503
R801	Same as R800.	
R802	Same as R800.	
R803	Same as R800.	
R804	RESISTOR, FIXED, WIREWOUND; 1.0 ohms, ±0.5%; 14 watts.	RW119G1R0
R805	RESISTOR, FIXED, WIREWOUND; 35,000 ohms; 140 watts.	RW118F353
R806	RESISTOR, FIXED, WIREWOUND; 35,000 ohms; 140 watts.	RW118F183
R810	RESISTOR, FIXED, WIREWOUND; 1 ohm; current rating 5000 25 watts.	RW111-1
R813	RESISTOR, FIXED, COMPOSITION; 47 ohms, ±5%; 1 watt.	RC32GF470J
R818	RESISTOR, FIXED, WIREWOUND; 250 ohms, 141 ma dc; 5 watts.	RW107-23
R821	RESISTOR, FIXED, WIREWOUND; 20 watts; 10,000 ohms; 8.3 ma.	RW110-43

AX681 POWER SUPPLY (cont)
A

REF SYMBOL	DESCRIPTION	MC PART NUMBER
R822	RESISTOR, FIXED, COMPOSITION; 100 ohms, ±5%; 2 watts.	RC42GF101J
R823	Same as R822.	
R824	Same as R822.	
R825	Same as R822.	
R826	Same as R822.	
R827	Same as R822.	
R828	Same as R822.	
R829	RESISTOR, FIXED, COMPOSITION; 220 ohms, ±5%; 2 watts.	RC42GF221J
S802	SWITCH, MICRO; roller; spdt; 15 amp; 125 vac.	SW260
T800	TRANSFORMER, POWER, STEP UP; 208 vac, 60 cps, 15 kv 10 K vdc; 4 A from 30 fwb.	TF364
T801	TRANSFORMER, POWER, STEP DOWN; 208 vac, single phase, 60 Hz, 1000 vdc, 10 vac, 300 A center tap.	TF365
TB806	TERMINAL STRIP, BARRIER TYPE; plastic; 2 terminals.	TM102-2

PANEL ASSEMBLY METER

AX 682

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C900	CAPACITOR, FIXED: Ceramic; .1 UF +80% - 20%, 500 WVDC	CC100-32
C903	Same as C900	
C904	Same as C900	
C905	Same as C900	
M900	METER VOLT, DC: 0-20 Kilovolts	MR133
M901	METER, PA Screen Current 0-100 Milliamps, DC	MR116
M902	METER, Volt DC: 0-10 VDC	MR129
M903	METER, MOCRO, AMP: 0-100 Micro Amps	MR199
M904	METER, MICRO, AMP: 0-50 Microamps, 2000 ohms Resistance	MR200
R900	RESISTOR, FIXED: Composition 56 ohms $\pm$5%, 2 Watt	RC42GF560J

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B301	FAN CENTRIFUGAL: 230 V, 50/60 Hz, Single Phase: Rotation 2.800/ 3,200 RPM	BL126
C301	CAPACITOR, FIXED: Ceramic 100,000 PF ± 80%-20%, 500 WVDC	CC100-28
C302	CAPACITOR, FIXED, CERAMIC .1PF + 80%-20%, 500WVDC	CC100-32
C304	CAPACITOR, FIXED, ELECTROLYTIC: 200 PF, -10% + 150%	CE105-200-15
C305	Same as C302	
C306	CAPACITOR, FIXED, Mica-DIELECTRIC: 10,000 PF ±5% 1200 WVDC	CM50B103J03
C307	Same as C302	
C308	Same as C302	
C309	Same as C302	
C310	Same as C304	
C311	Same as C302	
C312	Same as C304	
C313	Same as C302	
C314	CAPACITOR, FIXED: PLASTIC .01 MF, ±5% 4000 WVDC	CX102J103M
C315	CAPACITOR, FIXED: 10PF, ±10% 2500 WVDC	CP105
C316	CAPACITOR, FIXED: 10PF, ±10% 2500 WVDC	CP105
C317	CAPACITOR FIXED: PAPER; 10.0 PF, ±10% 1000 WVDC	CP70B1FG10GK
C318	CAPCITOR, FIXED, ELECTROLYTIC: 850 PF, 450 WVDC	CE51C800R
C319	Same as C318	
C320	CAPACITOR, FIXED PAPER: 4 PF ± 10%, 350 WVDC	CP113-1
C321	Same as C315	
C322	CAPACITOR FIXED: Ceramic 2000 PF, ± 20% CHAR A	CK70AW202M
C323	Same as C322	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C324	Same as C322	
C325	Same as C322	
C326	Same as C322	
C327	Same as C322	
C328	Same as C322	
C329	Same as C322	
C330	Same as C322	
C331	Same as C302	
C332	Same as C302	
C333	Same as C302	
C334	Same as C302	
C336	Same as C302	
CR301	SEMI CONDUCTOR DEVICE: Diode Silicon	IN2984
CR303	RECTIFIER, SEMICONDUCTOR DEVICE: 3 Phase: Average Current 1.5 Amp, Non-	DD124
CR304	RECTIFIER, Low Voltage	DD141
CR305	Same as CR305	
CR306	SEMICONDUCTOR DEVICE: Diode	IN2986B
CR307	RECTIFIER, SEMICONDUCTOR DEVICE: 3 Phase Average Current 1.5 Amps at 75°C	DD129
DS301	BUZZER: AUDIBLE SIGNAL; Operating Voltage 6 to 28 VDC: 3 to 14 MA	BZ101-2
E301	Terminal Turret	TE102-2
E302	Same as E301	
E303	Same as E301	
E304	Same as E301	
E305	Same as E301	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
E306	Same as E301	
E307	Same as E301	
E308	Same as E301	
E309	Same as E301	
E310	Same as E301	
E311	TERMINAL, Slotted	TE101-3
E312	Same as E311	
E313	Same as E301	
F301	FUSE CARTRIDGE: 4 Amps, Time Lag	FU102-4
F302	Same as F301	
F303	Same as F301	
F304	FUSE, CARTRIDGE: 1 1/2 Amps Time Lag	FU102-1.5
F305	Fuse Cartridge: 1/4 Amps Time Lag: High Voltage	FU104R25
F306	Same as F301	
F307	FUSE, CARTRIDGE: 2 Amps Time Lag	FU102-2
J302	CONNECTOR, RECEPTACLE ELECTRICAL: 44 Female Contacts Rated For 5 Amps at 1,800 VRMS	JJ319-22DTE
J304	CONNECTOR, RECEPTACLE: Female Teflon Insulated	UG560*1U
K301	RELAY ARMATURE: 3 PDT 24 VDC, 400 Ohms Contacts Rated for Amps	RL168-3c10-24DC
K302	RELAY ARMATURE: DPDT 220 VAC, 5000 Ohms Contacts Rated for 10 Amps	RL/168-2c10-220AC
K303	RELAY ARMATURE: DPDT 24 VDC, 400 Ohms Contacts Rated for 10 Amps	RL168-2C10-24DC
K304	Same as K303	
K305	Same as K302	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
K306	Same as K303	
K307	RELAY, HI-SEN: Insulated forr 400 VDC or 300 VAC: 2700 Ohms Resistance	RL158
K308	RELAY, ARMATURE: 3 PDT: 220 VAC, 5000 ohms: Contacted Rated for 10 Amps	RF168-3c10-220AC
K309	Same as K303	
K301	Coil, Radio Frequency Fixed 1,000 PF, ± 5% 1,600 Ohms DC	CL275-102
L302	Coil, Radio Frequency	CL405-1
L303	REACTOR: 7hy at 350 MA: DC Resistance 55 Ohms	TF5013
L304	REACT R: 5hy at 25 MA DC Resistance 375 ohms	TF5028
L305	COIL RADIO FREQUENCY: Fixed, 50 ouh ± 5% 110 ohms DC Resistance: 75 MA Current Rating	CL226-5
L306	Same as L305	
L307	Same as L305	
L308	Same as L305	
L309	Same as L305	
M301	METER: Full Scale Deflection 0 To 100 UA; 11,000 ohms ± 15%	MR191-3
M302	TIME INTERVAL: Adjustable Range Setting 30 Sec. Minimum, 5 Min. Max. SPDT Current Rating 10 Amps at 60 Hz	TI105
R301	RESISTOR, FIXED: Composition 33 ohms ± 5% 1/2 Watt.	RC20GF330J
R302	Resistor, FIXED: Composition 330 Ohms, ± 5% 2 Watt	RC42GF331J
R303	Same as R302	
R304	Same as R302	
R305	Same as R302	
R306	Same as R302	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R307	Same as R302	
R308	Same as R302	
R309	Same as R302	
R310	RESISTOR FIXED COMPOSITION: 47 ohms ± 5% 1/2 Watt	RC20GF470J
R311	RESISTOR FIXED COMPOSITION: 10,000 ohms ± 5% 1/2 Watt	RC20GF103J
R312	RESISTOR FIXED COMPOSITION: 10 ohms ± 5% 1 Watt	RC32GF202J
R313	RESISTOR, FIXED COMPOSITION: 200 ohms ± 5% 1 Watt	RC32GF202J
R314	RESISTOR, FIXED COMPOSITION: 10 ohms ± 5% 2 Watt	RC42GF100J
R315	Same as R314	
R316	Same as R313	
R317	RESISTOR, FIXED COMPOSITION: 150 ohms ± 5% 2 Watt	RC42GF151J
R318	RESISTOR, FIXED COMPOSITION: 47 ohms ± 5% 2 Watt	RC42GF470J
R320	Same as R319	
R321	Same as R319	
R322	RESISTOR, FIXED: Wire Wound 8000 ohms, 50 Watts	RW105-48
R323	Same as R332	
R324	RESISTOR, FIXED: Wire Wound; 15000 ohms, 10 Watt	RW-109-36
R325	Same as R324	
R326	RESISTOR, VARIABLE: Wire Wound; 25,000 ohms ± 5% 4 Watts	RA30NASD253A
R327	RESISTOR, FIXED: Wire Wound; 2,500 ohms ± 5% 10 Watts	RW109-29
R328	RESISTOR, FIXED COMPOSITION: 3,900 ohms ± 5% 2 Watts	RC42GF392J
R329	RESISTOR, VARIABLE COMPOSITION: 25000 ohms, ±10% 2 Watts	RV4LAY5A253A
R330	RESISTOR, FIXED COMPOSITION: 33,000 ohms, ± 5% 2 Watt	RC42GF333J

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R331	Same as R330	
R332	Same as R329	
R333	Same as R328	
R334	Same as R328	
R335	Same as R329	
R336	Same as R330	
R337	RESISTOR, FIXED: Wire Wound; 1,500 ohms 5% 10 Watts	RW109-26
R338	RESISTOR, FIXED COMPOSITION: 470,000 ohms ± 5% 2 Watts	RC42GF474J
R339	RESISTOR, FIXED: Wire Wound 10,000 ohms, 50 Watts	RW105-29
R341	RESISTOR, FIXED: Wire Wound 5000 ohms ± 5% 20 Watts	RW110-30
R342	RESISTOR, FIXED: Wire Wound 300 ohm 10 Watt	RW109-32
R343	RESISTOR, FIXED COMPOSITION: 100,000 ohms 5% 2 Watts	RC42GF104J
R344	RESISTOR, FIXED COMPOSITION: 82,000 ohms ±5% 2 Watts	RC42GF823J
R345	RESISTOR, FIXED: Wire Wound 50 ohm 5 Watts	RW107-16
R346	RESISTOR, FIXED COMPOSITION: 39,000 ± 5% 1/2 Watt	RC20GF393J
R347	Same as R346	
R348	RESISTOR, FIXED COMPOSITION: 100 ohms ± 5% 1/2 Watt	RC20GF101J
S301	SWITCH, TOGGLE SPST: Nominal Current Rating 3 Amps at 250 VAC/DC or 6 Amps at 125 VAC/DC	ST103-5-62
S302	SWITCH, TOGGLE SPDT: Nominal Current Rating 1 Amp at 250 VAC/DC or 3 Amps at 125 VAC/DC	ST103-11-62
S303	SWITCH, ROTARY: 1 Sec, 4 positions: 60° Angle of Throw	SW464
S304	SWITCH, INTERLOCK: Push to Operation; Total Travel Approximate 0.312 in. 15 Amp, 120, 250 VAC	SW230
S305	SWITCH, ROTARY: SPDT 5 Amp 125 or 250 VAC	SW252

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
T301	TRANSFORMER, POWER, STEP-UP PRIMARY 208 VAC 30/60 Hz	TF366
T302	TRANSFORMER, PLATE, STEP-UP PRIMARY 208 VAC 3 Phase Secondary 200V, 3 Phase Material Tap; 1000V	TF371
T303	TRANSFORMER INTERSTAGE VALVE; Information not avail.	TR191
T304	TRANSFORMER, OUTPUT VALVE; Information not available	TR190
TB301	TERMINAL BOARD Assembly	A4705-4
TB302	TERMINAL BOARD-BARRIER; 6 Terminals	TM102-6
V301	ELECTRON TUBE TETRODE 11 Pin Contact	8121
V302	ELECTRON TUBE	4CX350A
V303	Same as V302	
V304	ELECTRON TUBE, 7 Pin Contact	0A2
V305	Same as V304	
V306	Same as V304	
V307	Same as V304	
V309	ELECTRON TUBE 7 Pin Contact	0B2
XC309	Same as XK302	
XC318	Same as XK302	
XC319	Same as XK302	
XF301	FUSE HOLDER; LAMP INDICATING 90 to 25V, 20 Amps	FH104-3
XF302	Same as XF301	
XF303	Same as XF301	
XF304	FUSE HOLDER: LAMP INDICATING 22 to 33V, 20 Amps	FH104-11
XF305	FUSE HOLDER: LAMP INDICATING 500 V, 30 Amps	FH106
XF306	Same as XF304	
XF307	Same as XF304	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XK302	Same as XK302	
XK304	Same as XK302	
XK305	Same as XK302	
XK306	Same as XK302	
XK307	SOCKET, ELECTRON TUBE: 9 Pin Contact	TS100-7
XK308	Same as XK301	
XV301	SOCKET, ELECTRON TUBE: 11 Pin Contact	TS170-1
XV302	SOCKET, ELECTRON TUBE: Air System, 9 Pin Contact Grounded Cathode, Includes 1100 PF, Silver Mica Capacitor C	TS132-2
XV303	Same as XV302	
XV304	SOCKET, ELECTRON TUBE	TS102P01
XV305	Same as XV304	
XV306	Same as XV304	
XV307	Same as XV304	
XV308	Same as XV304	
XV309	Same as XV304	

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OVERLOAD BOARD ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
2C301	Capacitor, Fixed, Ceramic Dielectric: 200,000 PF: +80% - 20%: 25 VDCW	CC100-33
2C302	Capacitor, Fixed, Ceramic Dielectric: 100,000 UUF, +80% -20%: 100 WVDC	CC100-28
2C303	Same as 2C302	
2C304	Same as 2C303	
2C305	Same as 2C302	
2C306	Same as 2C302	
2C307	Same as 2C302	
2C308	Same as 2C302	
2C309	Same as 2C302	
2C310	Same as 2C302	
2C311	Same as 2C302	
2C312	Same as 2C302	
2C313	Same as 2C302	
2C314	Same as 2C302	
2C315	Same as 2C302	
2C316	Same as 2C302	
2C317	Same as 2C301	
2C318	Same as 2C302	
2CR301	Semi-conductor, Germanium, Diode	IN270
2CR302	Same as 2CR301	
2CR303	Same as 2CR301	
2CR304	Same as 2CR301	
2CR305	Same as 2CR301	

P/O AX683

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
2CR306	Same as 2CR301	
2CR307	Same as 2CR301	
2CR308	Same as 2CR301	
2CR309	Same as 2CR301	
2CR310	Semi-conductor, Zener Diode	1N3022B
2DS301	Lamp, Incandescent: 5 to 6 Volts, 0.063 Amps: Bulb	BI-114-2
2DS302	Same as 2DS301	
2DS303	Same as 2DS301	
2DS304	Same as 2DS301	
2DS305	Same as 2DS301	
2DS306	Same as 2DS301	
2DS307	Same as 2DS301	
2DS308	Same as 2DS301	
3K301	Relay, Armature: 4PDT: 700 Ohms, ±10% DC. Resistance: Operations Voltage 24 VDC: Current Rating 35 MA	RL156-8
2Q301	Semi-conductor Diode, Silicon	2N1595
2Q302	Same as 2Q301	
2Q303	Same as 2Q301	
2Q304	Transistor: NPN, Silicon	2N697
2Q305	Same as 2Q301	
2Q306	Same as 2Q301	
2Q307	Same as 2Q301	
2Q308	Same as 2Q301	
2Q309	Transistor: Germanium	2N1308
2Q310	Same as 2Q301	

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REF SYMBOL	DESCRIPTION	TMC PART NUMBER
2Q311	Same as 2Q304	
2Q312	Same as 2Q304	
2R301	Resistor, Fixed Composition 1,000 Ohms, ±5% 1/2 Watt	RC20GF102J
2R302	Resistor Variable Composition: 5,000 Ohms ±10%	RV111U502A
2R303	Resistor, Fixed Composition 47,000 Ohms ±5%, 1/2 Watt	RC20GF473J
2R304	Same as 2R301	
2R305	Resistor, Fixed, Composition 1 Meg Ohm ±5%, 1/2 Watt	RC20GF105J
2R306	Same as 2R301	
2R307	Same as 2R301	
2R308	Resistor Variable Composition 100 Ohms	RV111U101A
2R309	Same as 2R301	
2R310	Same as 2R301	
2R311	Resistor, Fixed Composition 2,7000 Ohms ±5% 1/2 Watt	RC20GF272J
2R312	Resistor Variable Composition 1,000 Ohms ±10% 25 Watt	RV11U102A
2R314	Same as 2R301	
2R315	Same as 2R308	
2R316	Same as 2R301	
2R317	Same as 2R301	
2R318	Same as 2R308	
2R319	Same as 2R301	
2R320	Same as 2R301	
2R321	Same as 2R308	
2R322	Same as 2R301	
2R323	Same as 2R301	
2R324	Same as 2R302	

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REF SYMBOL	DESCRIPTION	TMC PART NUMBER
2R326	Same as 2R301	
2R329	Resistor, Fixed: Composition, 470,000 Ohms, ± 5% 1/2 Watt	
2R330	Resistor Fixed: Composition, 15,000 Ohms, ± 5% 1/2 Watt	RC20GF153J
XK301	Socket, Relay 12 Contacts	TS171-4

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CB200	Circuit Breaker, Single Pole 20 VAC, Current Rating 50 Max	SW418-1
C200	Capacitor, Fixed: Ceramic Feed Thru Type 2000VVF, ±20%, 500 WVDC	CK70AW202M
C201	Same as C200	
C202	Same as C200	
C203	Same as C200	
C204	Same as C200	
C205	Same as C200	
C206	Same as C200	
C207	Same as C200	
C208	Same as C200	
C209	Same as C200	
C210	Same as C200	
C211	Same as C200	
C213	Same as C200	
C215	Coil, F.F. Fixed, 10uh 75 MA	CL101-4
C216	Capacitor, Fixed, Ceramic .1 UF, +80% -20%, 500 WVDC	CC100-32
C218	Capacitor, Fixed, Mica: .01UF, ± 10%, 300 WVDC	CM35F103F03
C219	Same as C218	
C220	Same as C218	
C221	Same as C218	
C222	Same as C218	
C223	Same as C218	
C224	Same as C218	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C225	Same as C218	
C226	Same as C218	
C227	Same as C218	
C228	Same as C218	
C229	Same as C218	
C230	Same as C218	
C231	Capacitor, Fixed Electrolytic 200 UF; 50 WVDC, Polarized	CE116-8VN
C232	Same as C231	
CR200	Semiconductor Device, Diode Silicone	IN2484
CR201	Semi-Condcutor, Rectifier, Bridge Peak Reverse Volts 200, RMS Input Volts 140 DC Output Current 3 Amps	DD130-200-300
DS200	Lamp, Indicator, Voltage 6.0, 6.3, 0.06, 007 Amps	BI116-1-5
E200	Terminal, Feed-Thru Breakdown Voltage 60 RMS - 3200	TE114-2
E201	Same as 200	
E202	Same as 200	
F200	Fuse Cartridge Type 3/4 Amp: Time Delay	FU102-.750
J200	Connector, Receptacle Male	MS3102A28-218
J202	Jack Bulkhead; Series BNC	JJ172
K204	Relay, Mercury; Wetted Contact, 2 Amps Max. 500V	RL167-1
P200	Plug, Twist Lock; Female Polarized, 10 Amps, 250 Volts 15 Amps, 125 Volts	PL176
P202	Connector, Plug; Crimp Type	PL244-1
R200	Resistor, Fixed; Composition 470 Ohms $\pm$ 5%, 2 Watt	RC42GF471J
R201	Resistor, Variable Composition Total Resistance 50,000 Ohms, $\pm$ 10%	RV4NCYSD503A
R202	Resistance, Fixed Wire Wound 350 Ohms $\pm$ 5%, 5 Watts	RR114-10W

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R203	Same as R202	
R204	Resistor, Fixed Composition, 15000 Ohms ± 5% 2 Watt	RC42GF152J
R210	Resistor, Fixed Composition, 270 Ohms, ± 5% 1/2 Watt	RC20GF271J
R211	Resistor, Fixed Composition, 5600 Ohms, ± 5% 1/2 Watt	RC20GF562J
T200	Transformer Power Isolation Step down Primary Input 105, 115, 125, or 210, 230, 250V: 50/60 cps Single Phase	TF269
S200	Switch Interlock; Push 15 Amp 120/250 VAC:	SW230
S201	Switch, Push Button 250 MA, 30 Watt	SW 291-1
S202	Switch Rotary; 1 Section 12 positions 30° Angle of Throw	SW250
S203	Part of R201	
XF200	Fuse Holder Bayonet Base 22 to 33V Amber	FH104-11

AX 686 PANEL ASSEMBLY

MAIN - POWER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CB800	Circuit Breaker, 240, VAC	SW462
C1000	Capacitor, Fixed: MICA 01 UF, ±5%, 300 WVDC	CM35F103F03
C1001	Same as C1000	
C1002	Same as C1000	
C1003	Same as C1000	
C1004	Same as C1000	
C1005	Same as C1000	
C1006	Same as C1000	
C1007	Capacitor, Fixed: MICA: 1000 UUF, ±10%, 500 WVDC	CM30F102F03
C1008	Same as C1007	
C1009	Same as C1000	
C1010	Same as C1000	
C1011	Same as C1000	
C1012	Same as C1000	
C1013	Same as C1007	
C1014	Same as C1000	
C1015	Same as C1000	
C1016	Same as C1000	
C1017	Same as C1000	
C1018	Same as C1000	
C1019	Same as C1000	
C1020	Same as C1000	
C1021	Same as C1000	
C1022	Same as C1000	
C1023	Same as C1000	

AX 686 PANEL ASSEMBLY (cont)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1024	Same as C1000	
F800	Fuse Cartridge; Time Lag 1 Amp	FU102-1
F801	Same as F800	
F802	Fuse, Cartridge: Time Delay 5 Amps	FU102-5
F803	Same as F802	
F804	Same as F802	
F805	Fuse Cartridge Time Delay, 15 Amps	FU102-15
M800	Indicator Elapsed Time 220 VAC: 60 HZ	MR198-1
M801	Same as M800	
S800	Switch Rotary 1 Section 2 Positions, 30° Angle of Throw	SW255
S803	Switch Interlock: Push Type, 15 Amp 120/250 VAC	SW230
XF800	Fuse Holder, Bayonet Base 100/ 250V Neon Lamp	FH104-3
XF801	Same as XF800	
XF802	Same as XF800	
XF803	Same as XF800	
XF804	Same as XF800	
XF805	Same as XF800	
XF806	Same as XF800	

SECTION 7
SCHEMATIC DIAGRAMS

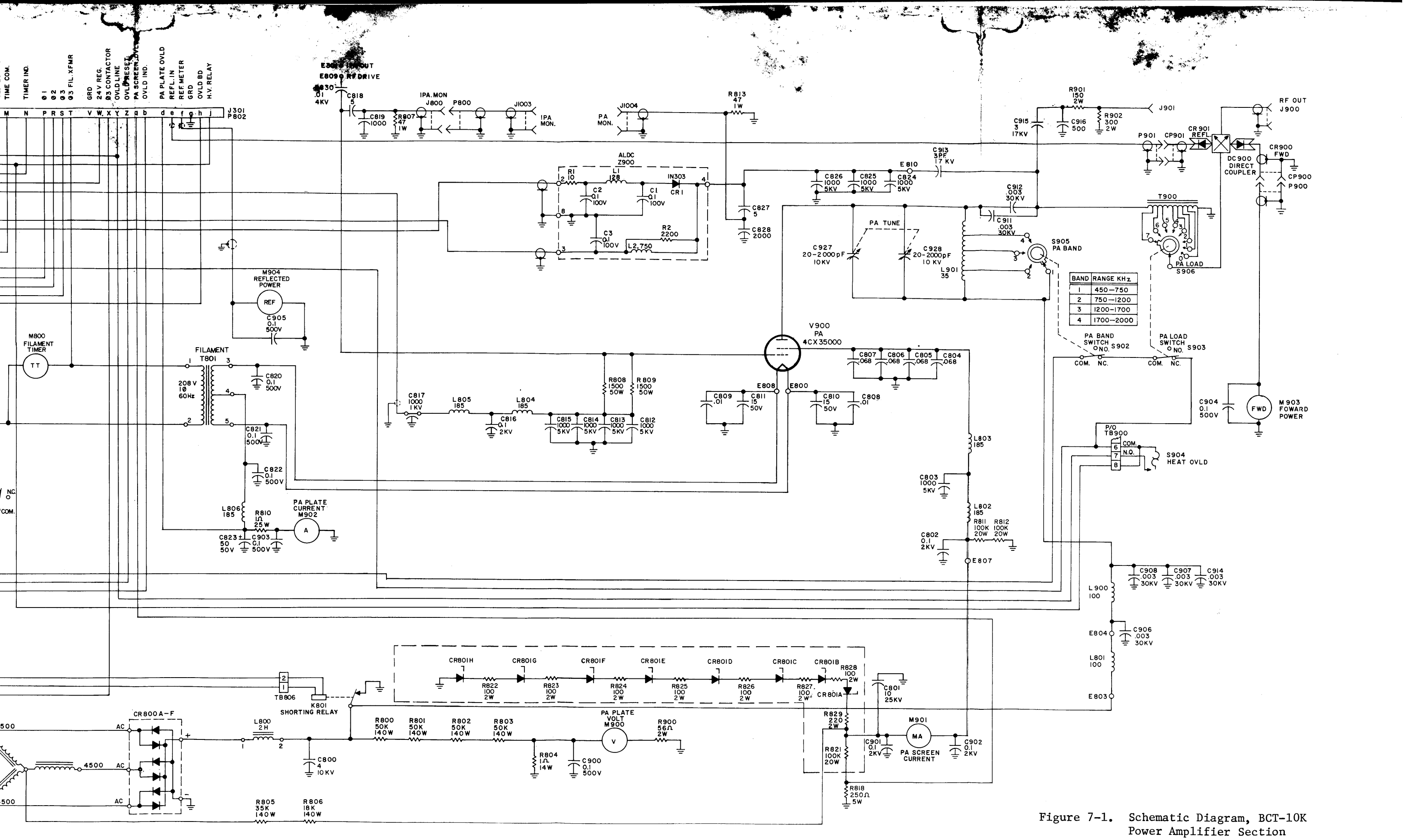
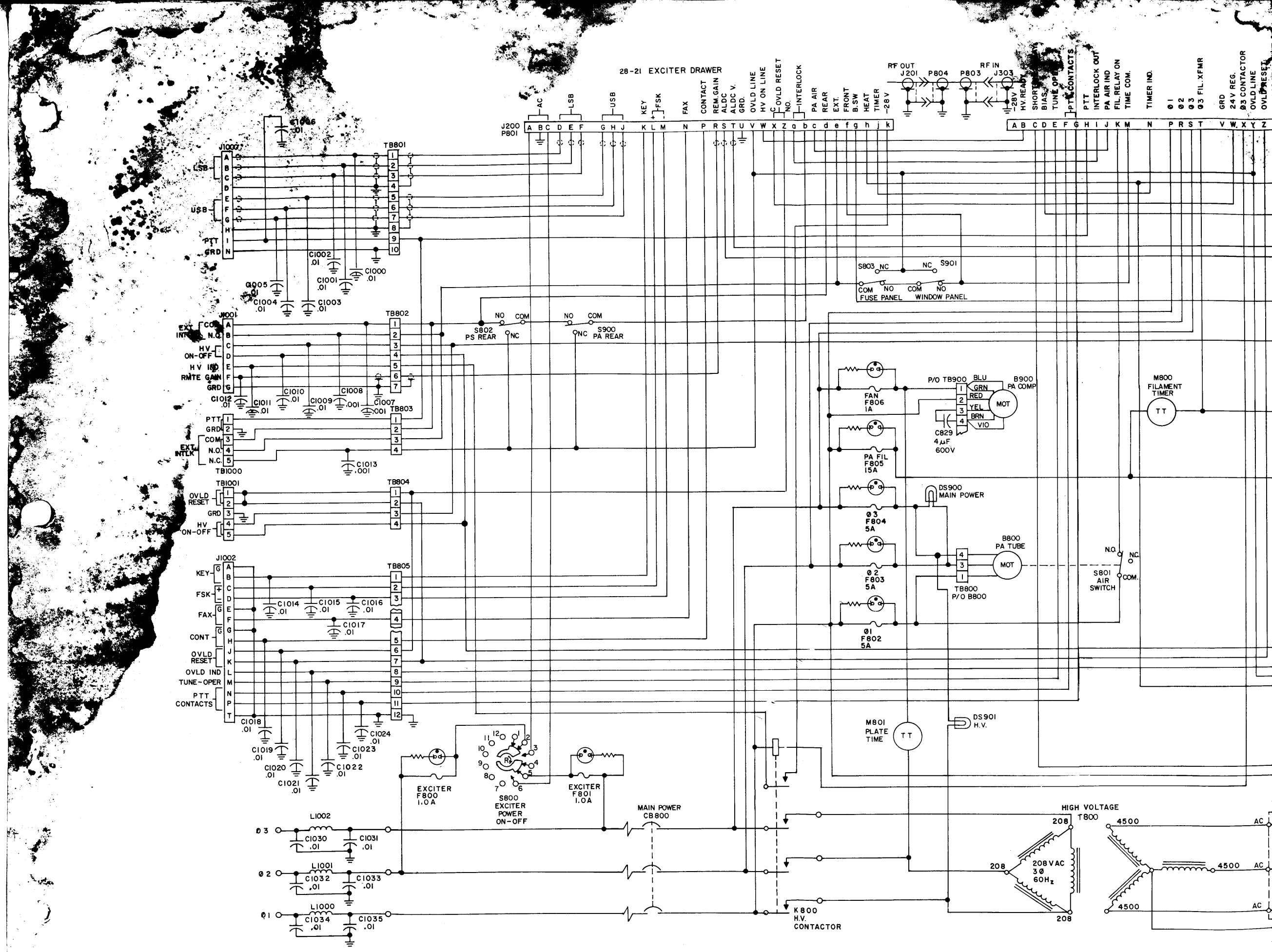


Figure 7-1. Schematic Diagram, BCT-10K Power Amplifier Section


28-21 EXCITER DRAWER
J200 P801
AC
LSB
USB
KEY
FSK
FAX
CONTACT
REM.GAIN ALDC
ALDC V.
GRD.
OVLD LINE
HV ON LINE
OVLD RESET NO.
INTERLOCK
PA AIR
REAR EXT.
FRONT B.SW
HEAT TIMER
-28V
RF OUT J201
P804
P803
RF IN J303
-28V
HV READY
SHORTS
BIAS
TUNE OPER
PTT CONTACTS
PTT
INTERLOCK OUT
PA AIR IND
FIL. RELAY ON
TIME COM.
TIMER IND.
Ø1
Ø2
Ø3
Ø3 FIL. XFMR
GRD
24V REG.
Ø3 CONTACTOR
OVLD LINE
OVLD RESET
J1000
LSB
USB
PTT
GRD
TB801
C1006 .01
C1002 .01
C1001 .01
C1000 .01
C1005 .01
C1004 .01
C1003 .01
J1001
EXT INTLK COM
N.O.
N.C.
HV ON-OFF
HV IND
RMTE GAIN
GRD
TB802
C1012 .01
C1011 .01
C1010 .01
C1009 .01
C1008 .001
C1007 .001
TB803
PTT
GRD
COM
N.O.
N.C.
EXT INTLK
C1013 .001
TB1000
TB1001
OVLD RESET
GRD
HV ON-OFF
TB804
J1002
KEY
FSK
FAX
CONT
OVLD RESET
OVLD IND
TUNE-OPER
PTT CONTACTS
TB805
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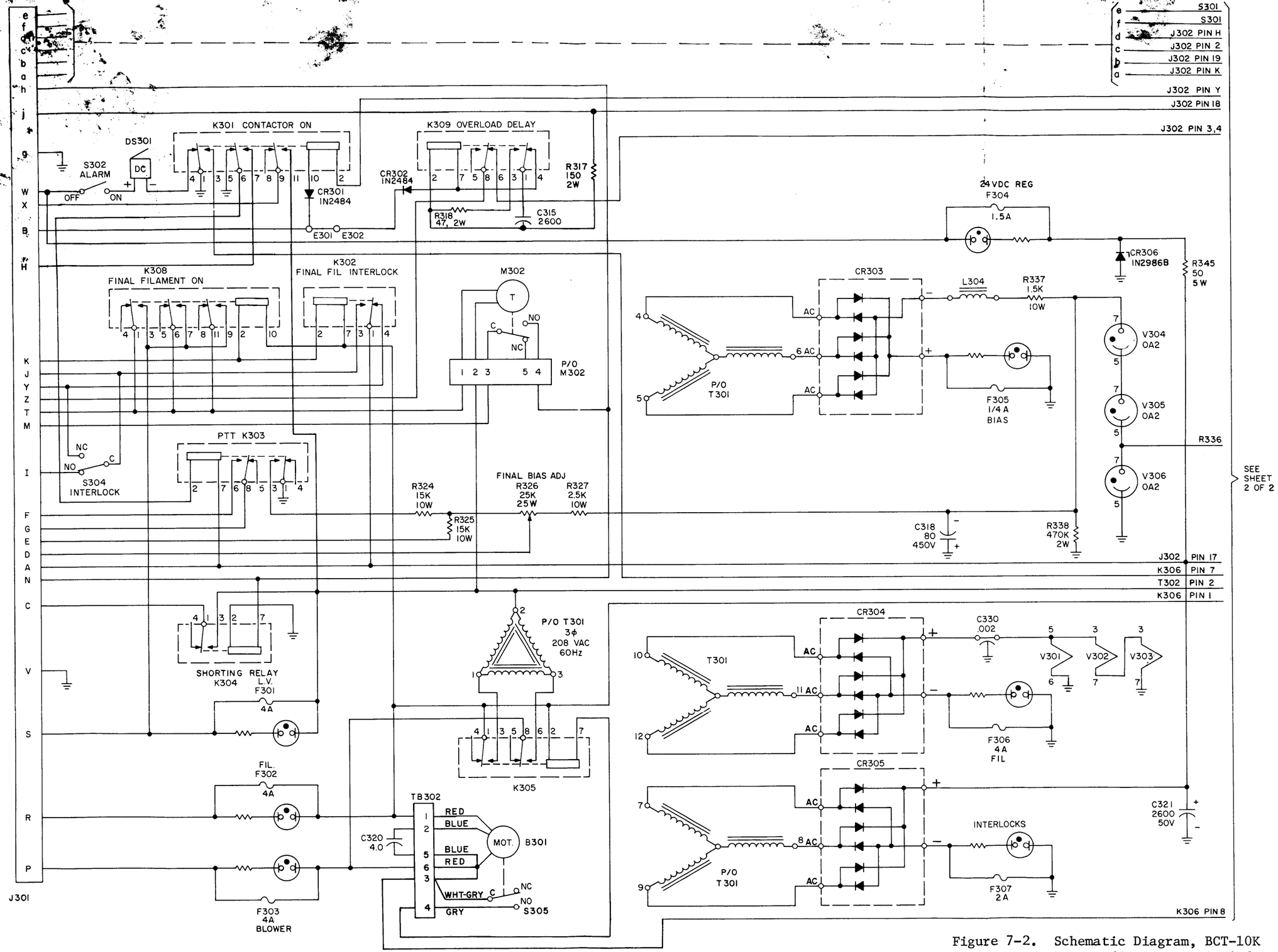
C1015 .01
C1016 .01
C1017 .01
C1018 .01
C1019 .01
C1020 .01
C1021 .01
C1022 .01
C1023 .01
C1024 .01
S802 PS REAR
S900 PA REAR
NO COM NC
S803 NC
NC S901
COM NO COM NO
FUSE PANEL
WINDOW PANEL
FAN F806 1A
P/O TB900
BLU
GRN
RED
YEL
BRN
VIO
B900 PA COMP
MOT
C829 4 µF 600V
PA FIL F805 15A
DS900 MAIN POWER
Ø3 F804 5A
B800 PA TUBE
Ø2 F803 5A
TB800 P/O B800
Ø1 F802 5A
N.O.
N.C.
S801 AIR SWITCH
COM.
M800 FILAMENT TIMER
TT
M801 PLATE TIME
DS901 H.V.
EXCITER F800 1.0A
S800 EXCITER POWER ON-OFF
EXCITER F801 1.0A
MAIN POWER CB800
K800 H.V. CONTACTOR
L1002
L1001
L1000
C1030 .01
C1031 .01
C1032 .01
C1033 .01
C1034 .01
C1035 .01
Ø3
Ø2
Ø1
HIGH VOLTAGE T800
208
208 VAC 3Ø 60Hz
4500
AC

CK 1428



CK1466

Figure 7-2. Schematic Diagram, BCT-10K Intermediate Power Amplifier (Sheet 1 of 2)

UNLESS OTHERWISE SPECIFIED:

1. ALL RESISTORS ARE IN OHMS.
2. ALL CAPACITORS ARE IN MICROFARADS.
3. ALL INDUCTANCE VALUES ARE IN MICROHENRIES

FUSE NOTES:

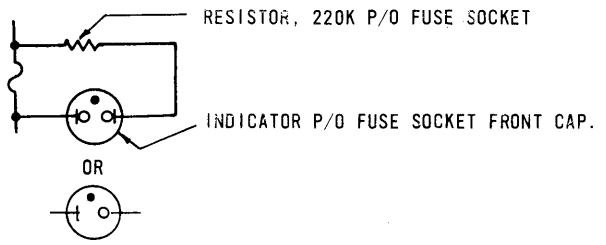


Figure 7-2. Schematic Diagram, BCT-10K Intermediate Power Amplifier (Sheet 2 of 2)

7-6/7-7

J302 PIN d — H
J302 PIN c — 2
J302 PIN b — 19
J302 PIN a — K
K301 PIN 2 — Y
J302 PIN j — 18
K309 PIN 6 — 3,4

J302 PIN f
J302 PIN e — METER
S301 — MON.
E313
C301 0.1
L301 102
L301 102
K307 SWR 3,8,11
J303 R.F. INPUT
R301 33
C302 0.1
R310 47
R348 100
R311 10K
E303
L305 50mH
E304
C331 0.1
C325 0.002
R330 33K 2W
1ST AMPL BIAS ADJ
R329 25K, 2W
R328 3.9K 2W
V305 PIN 5
FROM SHEET 1 OF 2

V301 8121
2,7,10
1,4,9
C304 200,15V
R312 10 1W
C332 0.1
C333 0.1
L306 50mH
E305
C305 0.1
R344 82K 2W
C327 0.002
C306 0.01
E311
C317 10
T303
C307 0.1
C308 0.1
R313 2K 1W
E306
C334 0.1
L307 50mH
E307
C309 0.1
C326 0.002
R331 33K 2W
R332 25K, 2W
2ND "A" BIAS ADJ

V302 4CX350
2,4,6,8
C310 200,15V
E308
R314 10 2W
L308 50mH
C328 0.002
C311 0.1
R333 3.9K 2W
R341 5K 20W
R339 10K 50W
R340 50K 20W
R342 300 10W
R343 100K 2W
C319 80 450V

V303 4CX350
C312 200,15V
R315 10 2W
R316 2K 1W
E309
L309 50mH
E310
C336 0.1
C313 0.1
R336 33K 2W
C329 0.002
2ND "B" BIAS ADJ
R335 25K 2W
R334 3.9K 2W

T304
J304
L302 185
E312
C314 .01 4KV

V307 0A2
V308 0A2
V309 0B2

J302 PIN 4
K301 PIN 3
T301 PIN 2
K305 PIN 2

M301
A
100uA

POS	FUNCTION
1	PI MA V100 X 2
2	PI MA V100 X 2.5
3	PI MA V100 X 2.5
4	TOTAL PI MA

R346 39K 1/2W
R320 39K 1/2W
S303
R321 39K 1/2W
R319 39K 1/2W
R347 39K, 1/2W
C323 0.002

K306 PLATES ON
2 7 6 8 5 3 1 4

T302
3φ 208 VAC 60Hz

CR307
AC
AC
AC
+
−
L303
C316 10
R322 80K 50W
R323 80K 50W

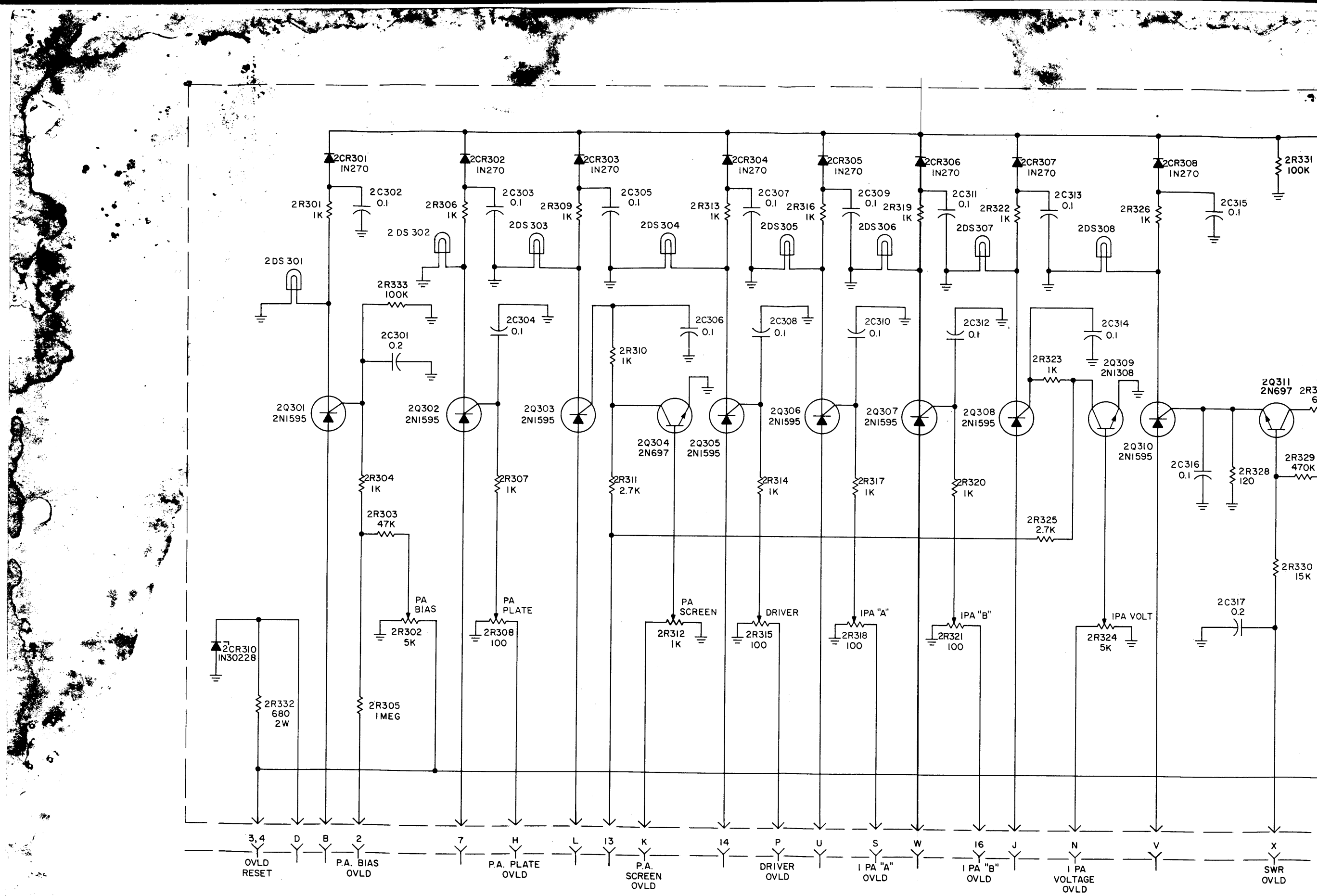
S305 COM

CK1466

Z30
PC415/A4651

2CR301 IN270
2CR302 IN270
2CR303 IN270
2CR304 IN270
2CR305 IN270
2CR306 IN270
2CR307 IN270
2CR308 IN270
2R331 100K
2C318 0.1
2R301 1K
2C302 0.1
2R306 1K
2C303 0.1
2R309 1K
2C305 0.1
2R313 1K
2C307 0.1
2R316 1K
2C309 0.1
2R319 1K
2C311 0.1
2R322 1K
2C313 0.1
2R326 1K
2C315 0.1
2 DS 302
2DS 303
2DS 304
2DS305
2DS 306
2DS307
2DS308
S 301
2R333 100K
2C304 0.1
2C306 0.1
2C308 0.1
2C310 0.1
2C312 0.1
2C314 0.1
2C301 0.2
2R310 1K
2R323 1K
2Q309 2N1308
2Q311 2N697
2R327 620
2Q312 2N697
2Q301 2N1595
2Q302 2N1595
2Q303 2N1595
2Q306 2N1595
2Q307 2N1595
2Q308 2N1595
2Q310 2N1595
2Q304 2N697
2Q305 2N1595
2C316 0.1
2R328 120
2R329 470K
2K301 OVERLOAD
1 4 16 15 14 10 9 8 13 12 11
2R304 1K
2R307 1K
2R311 2.7K
2R314 1K
2R317 1K
2R320 1K
2R325 2.7K
2R303 47K
2R330 15K
2CR309 IN270
PA BIAS
PA PLATE
PA SCREEN
DRIVER
IPA "A"
IPA "B"
IPA VOLT
2R302 5K
2R308 100
2R312 1K
2R315 100
2R318 100
2R321 100
2R324 5K
2C317 0.2
2R305 1MEG
2R334 1.8K
2R335 560
332
80
2W
D B 2 7 H L 13 K 14 P U S W 16 J N V X 21 1, A, Z 19 17 18 Y 22 20
P.A. BIAS OVLD
P.A. PLATE OVLD
P.A. SCREEN OVLD
DRIVER OVLD
I PA "A" OVLD
I PA "B" OVLD
I PA VOLTAGE OVLD
SWR OVLD
SWR RELAY
EXT. OVLD IND
28 VDC
J302

Figure 7-3. Schematic Diagram, BCT-10K Overload Circuit Board


2CR301 IN270
2CR302 IN270
2CR303 IN270
2CR304 IN270
2CR305 IN270
2CR306 IN270
2CR307 IN270
2CR308 IN270
2R331 100K
2R301 1K
2C302 0.1
2R306 1K
2C303 0.1
2R309 1K
2C305 0.1
2R313 1K
2C307 0.1
2R316 1K
2C309 0.1
2R319 1K
2C311 0.1
2R322 1K
2C313 0.1
2R326 1K
2C315 0.1
2DS 301
2 DS 302
2DS 303
2DS 304
2DS305
2DS306
2DS307
2DS308
2R333 100K
2C301 0.2
2C304 0.1
2C306 0.1
2C308 0.1
2C310 0.1
2C312 0.1
2C314 0.1
2R310 1K
2R323 1K
2Q309 2N1308
2Q311 2N697
2Q301 2N1595
2Q302 2N1595
2Q303 2N1595
2Q304 2N697
2Q305 2N1595
2Q306 2N1595
2Q307 2N1595
2Q308 2N1595
2Q310 2N1595
2C316 0.1
2R328 120
2R329 470K
2R304 1K
2R307 1K
2R311 2.7K
2R314 1K
2R317 1K
2R320 1K
2R325 2.7K
2R303 47K
2R330 15K
PA BIAS
2R302 5K
PA PLATE
2R308 100
PA SCREEN
2R312 1K
DRIVER
2R315 100
IPA "A"
2R318 100
IPA "B"
2R321 100
IPA VOLT
2R324 5K
2C317 0.2
2CR310 IN30228
2R332 680 2W
2R305 1MEG
3,4
D
B
2
7
H
L
13
K
14
P
U
S
W
16
J
N
V
X
OVLD RESET
P.A. BIAS OVLD
P.A. PLATE OVLD
P.A. SCREEN OVLD
DRIVER OVLD
I PA "A" OVLD
I PA "B" OVLD
I PA VOLTAGE OVLD
SWR OVLD

CK1467

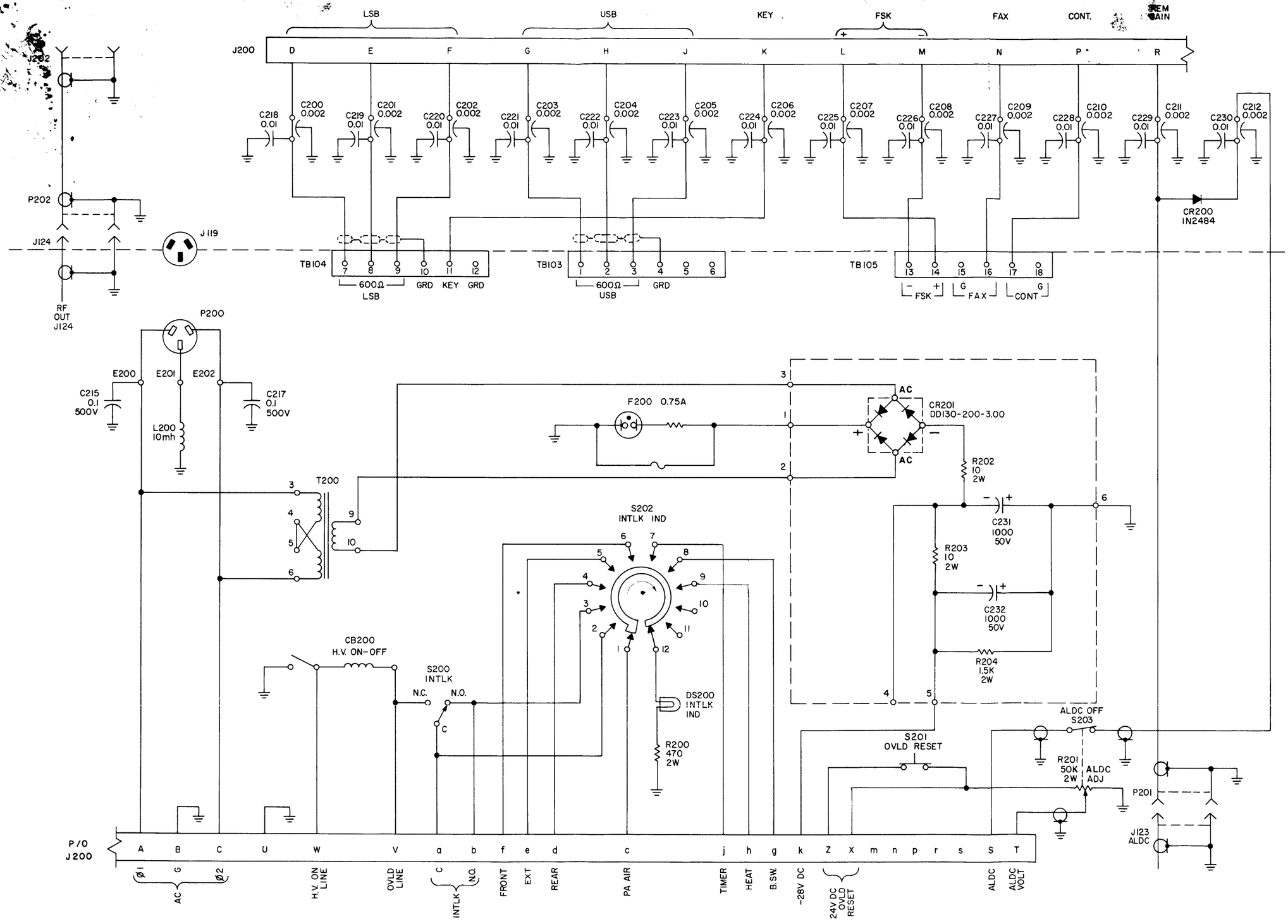


Figure 7-4. Schematic Diagram, BCT-10K Exciter Drawer