TECHNICAL MANUAL

for

LINEAR POWER AMPLIFIER

MODEL-PALA-10K

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, CANADA

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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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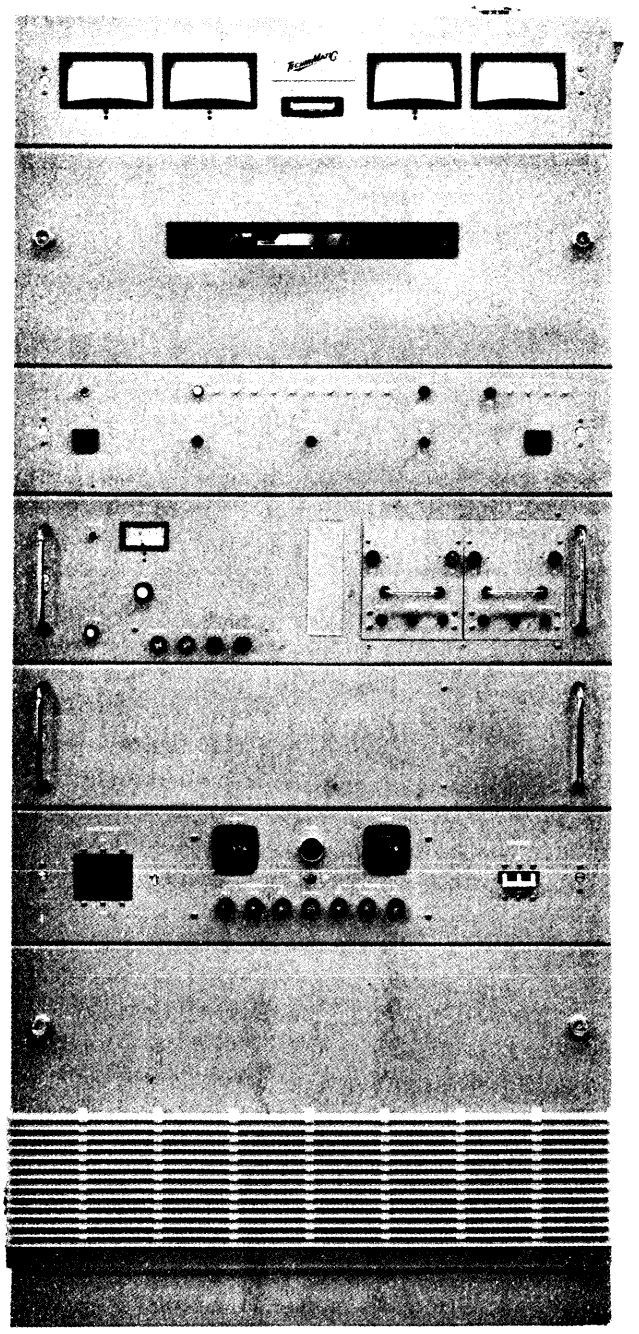

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Figure 1-1. PALA-10K Overall Front View

SECTION I
GENERAL INFORMATION

1-1. PURPOSE OF EQUIPMENT

The PALA-10K is a conservatively-rated high-powered automatic Linear Amplifier which delivers 10 Kilowatts peak envelope power (PEP) and average throughout the range of 2 MHz to 30 MHz. The PALA-10K will accept the output of any exciter providing 100 milliwatts drive. Additionally, the transmitter features circuitry to provide rapid tuning either locally or remotely as desired.

1-2. EQUIPMENT MAKE-UP

Table 1-1 lists the major components of the transmitter.

TABLE 1-1. MAJOR COMPONENTS

TMC DESIGNATION	ASSEMBLY NUMBER
Main Frame Sub-Assembly	AX-5086
Meter Panel	AX-5083
PA Section	AX-5084
IPA Drawer	AX-5080
Exciter Drawer	AX-5102
Main Power Panel	AX-5081
Main Power Supply	AP-148
Harmonic Filter	AF-109

1-3. DESCRIPTION OF EQUIPMENT

a. GENERAL. As shown in figure 1-1, the Transmitter consists of a single frame, housing all the components of the transmitter. Primary power connections are made through the access hole on the base assembly. External exciter Transmitter control connections are made to the Exciter Remote Assembly. Transmitter RF power is routed through a directional coupler mounted in the opening located on the top of the transmitter. The transmitter frame houses an exciter drawer, a two-stage broad band linear amplifier, an intermediate power amplifier, 10KW Power Amplifier, and associated power supplies and control circuits. The RF components are distributed through the upper portion of the frame. Heavy power supply components are bolted to the base channels of the frame.

(1) Main Meter Panel. The main meter panel contains five meters. The meters monitor PA PLATE current, PA SCREEN current, LOAD SENSE, REFLECTED power, and PA OUTPUT power. The PA OUTPUT meter is calibrated in Kilowatts (average power).

(2) Power Amplifier. The power amplifier section is mounted below the main meter panel. It contains the Power Amplifier tube (8794) especially designed for sideband work. The output circuit is a modified Parallel L circuit designed to match an unbalanced antenna of 50 ohms with a VSWR to 3:1. Additionally, the automatic tuning and loading components are located in the PA compartment.

(3) IPA Drawer. The IPA is slide mounted directly below the main control panel and serves as the intermediate power amplifier between an associated exciter and power amplifier. The IPA drawer contains two fully broad-banded RF amplifiers and a final amplifier which provides approximately 500 watts drive to the PA section. The final IPA tube is air-cooled by a self-contained blower within the drawer. Bandswitching is accomplished via the bandswitch control on the main control panel. Transmitter bias supply and 24 VDC supply are located in the IPA drawer.

Servo amplifier plug-in units (IPA & PA TUNE) are also located in the IPA drawer. These units, when controlled by the sense circuits of the IPA and PA, automatically tune and load the IPA and PA sections of the transmitter.

(4) Exciter Drawer. The exciter drawer contains transmitter control board PC-526 and transmitter relays K2001 "SERVO OFF", K2002 "MANUAL", K2003 "SERVO OFF", K2004 "HIGH VOLTAGE ON/OFF", and K2005 "BIAS ON" relay which control circuits of the transmitter.

Normally, the exciter drawer houses an exciter (Model MMX( ) 2 or Model SME-6), however, when the transmitter is to be driven from an external source, the exciter drawer is fitted with a blank panel.

(5) Main Power Panel. The main power panel mounted directly below the exciter controls the application of primary power, filament and screen voltages to the IPA and PA sections of the transmitter. Other front panel controls include a High Voltage aural alarm with its ON/OFF switch, Plate and Filament time meters, which monitor the time voltage has been applied to both the plate and filaments of the Power Amplifier tube, and exciter ON/OFF switch, which applies AC power to the exciter when exciter is mounted in exciter drawer.

(6) Main Power Supply. The main power supply is mounted on the bottom of the transmitter frame. The power supply contains a High Voltage transformer and associated circuitry to provide plate and screen voltages to the RF Amplifiers within the transmitter.

(7) Harmonic Filter. The harmonic filter is an automatically switched filter network which decreases the harmonic content of the PA signal. The filter is mounted in the front of the PA section directly behind the PA window. There are six (6) filter sections covering the frequency range of the transmitter.

1-4. TECHNICAL SPECIFICATIONS

FREQUENCY RANGE:	2 to 30 MHz standard; 1.6 to 30 MHz optionally.
OPERATING MODES:	SSB, ISB, CW, AM, FSK and FAX (with the appropriate Exciter). Four channel ISB with SBG-4 or TMX adapter.
POWER OUTPUT:	10,000 watts 2 tone PEP with signal to distortion 35 db. 10K AV.
OUTPUT IMPEDANCE:	50 ohms unbalanced with VSWR to 3:1, EIA flange for 1-5/8" coax.
STABILITY AND FREQUENCY CONTROL:	Depending on exciter used.
TUNING:	Automatic or manual. Automatic has manual override.
RF INPUT:	Provides full PEP OUTPUT with 100 milliwatt RF input.
REMOTE OPERATION:	Facilities for remote operation including mode, frequency, power level and readback available.
SPURIOUS SIGNALS:	At least 60 db below full PEP output.
HARMONIC SUPPRESSION:	Second harmonic at least 50 db down from PEP output. Third harmonic at least 65 db down from PEP output.
HARMONIC FILTERS:	Available fixed for all frequencies above 30 Mc or bandswitched for lower frequencies. Resultant harmonics conform to latest requirements.
AUDIO INPUT:	Depends on exciter used.
METERING:	Meters with special illuminated overload protection.
NOISE:	Power supply ripple 55 db down from full PEP output. Other 70 db down--special "white noise" protection.
COOLING:	Filtered forced air cooling semi-pressurized cabinet.
ENVIRONMENTAL:	Designed to operate in any ambient temperature between the limits of 0 and 50°C for any value of humidity to 90%.
SPECIAL FEATURES:	Adjustable power output levels with overload and bias protection, and alarm. Controlled and adjustable ALDC. Safety interlocks at all high voltage points.
PRIMARY POWER:	210, 220, 230, 240, 250 volts, 50/60 Hz, 3 phase, Delta or Wye.
POWER REQUIREMENTS:	Maximum 27,000 watts. All solid state power supply.
SIZE:	33-1/2" w. x 38-3/4"d. x 68-3/4" h. standard.
INSTALLED WEIGHT:	Approximately 1300 pounds.
SHIPPING WEIGHT:	Approximately 1660 pounds.
SIZE OF LARGEST SHIPPING CONTAINER:	43" w. x 49" l. x 81" h.
COMPONENTS AND CONSTRUCTION:	Manufactured in accordance with JAN/MIL wherever practicable.

SECTION II
INSTALLATION

2-1. EQUIPMENT INSPECTION

The PALA-10K transmitter hereafter referred to as Transmitter, was 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 the Transmitter shipment. Inspect all packing materials for parts that may have been shipped as loose items.

2-2. EQUIPMENT PACKAGING

The equipment is shipped in boxes as shown by figure 2-5 (typical equipment packaging). The box number and contents are stenciled on the outside of each box.

2-3. PRIMARY POWER REQUIREMENTS

The Transmitter requires a three phase source voltage of 230 vac, 50/60 cps. The maximum power requirement is 27,000 watts.

2-4. PRIMARY AC INPUT CONNECTIONS

Refer to figure 2-1. Primary power cables and station ground cables enter the Transmitter through an access hole located in the bottom of the high voltage power supply compartment. To connect the primary power and ground to their respective lugs, proceed as follows:

CAUTION

Insure PRIMARY THREE PHASE AC IS OFF AND TAGGED before making connections to Transmitter.

a. Loosen Panel locks on High Voltage Power Supply cover, and temporarily remove cover. (Place cover in safe place to avoid damaging or scratches.)

b. Loosen and remove lock washers and nuts on Primary AC input board. (Do not discard.)

c. Connect primary three phase AC cables to AC input board and secure with hardware removed in paragraph 2.

d. Measure the DC resistance to ground of each AC input terminal to insure that no short circuits or low resistance to ground have occurred.

e. Remove test instrument from Transmitter and replace high voltage power supply cover.

WARNING

Insure that all personnel are clear from Transmitter before proceeding to step f.

f. Apply primary AC voltage to transmitter and place MAIN POWER breaker to ON position. The main blower should operate.

g. Place MAIN POWER breaker OFF, check rotation of Main blower as follows: In the rear of transmitter between the Power Amplifier tube and PA Bandswitch, the main blower hub and air fins can be seen, when the blower is rotating in the right direction, the hub and air fin will be rotating counterclockwise as viewed from the rear of Transmitter PA deck.

Note

If blower rotation is incorrect, place MAIN POWER breaker OFF. INSURE PRIMARY AC IS OFF and reverse any two AC input phases leads. Blower rotation should be correct.

2-5. HIGH VOLTAGE TRANSFORMER INSTALLATION (PRIMARY AC POWER MUST BE OFF)

CAUTION

The High Voltage Transformer is extremely heavy, use fork-lift or some lifting device when attempting installation.

a. Remove Transformer from crate, position Transformer in such a manner that when installed in the bottom of frame, the front or primary Terminals of Transformer will be facing the front of Transmitter. (Transformer must enter Transmitter from the rear of Power Supply Section).

b. Move all leads aside that may be in the path of the Transformer prior to actual installation.

c. Refer to figure 5-12 and position Transformer in frame accordingly. Connect Transformer leads in the following manner: Refer to figure 2-2 and connect CA-682 to Transformer primary terminals. Each of the three primary sections will have three heavy insulated black leads that must be connected between terminal "0" and the corresponding primary AC input voltage tap (210, 220, 230, 240 and 250).

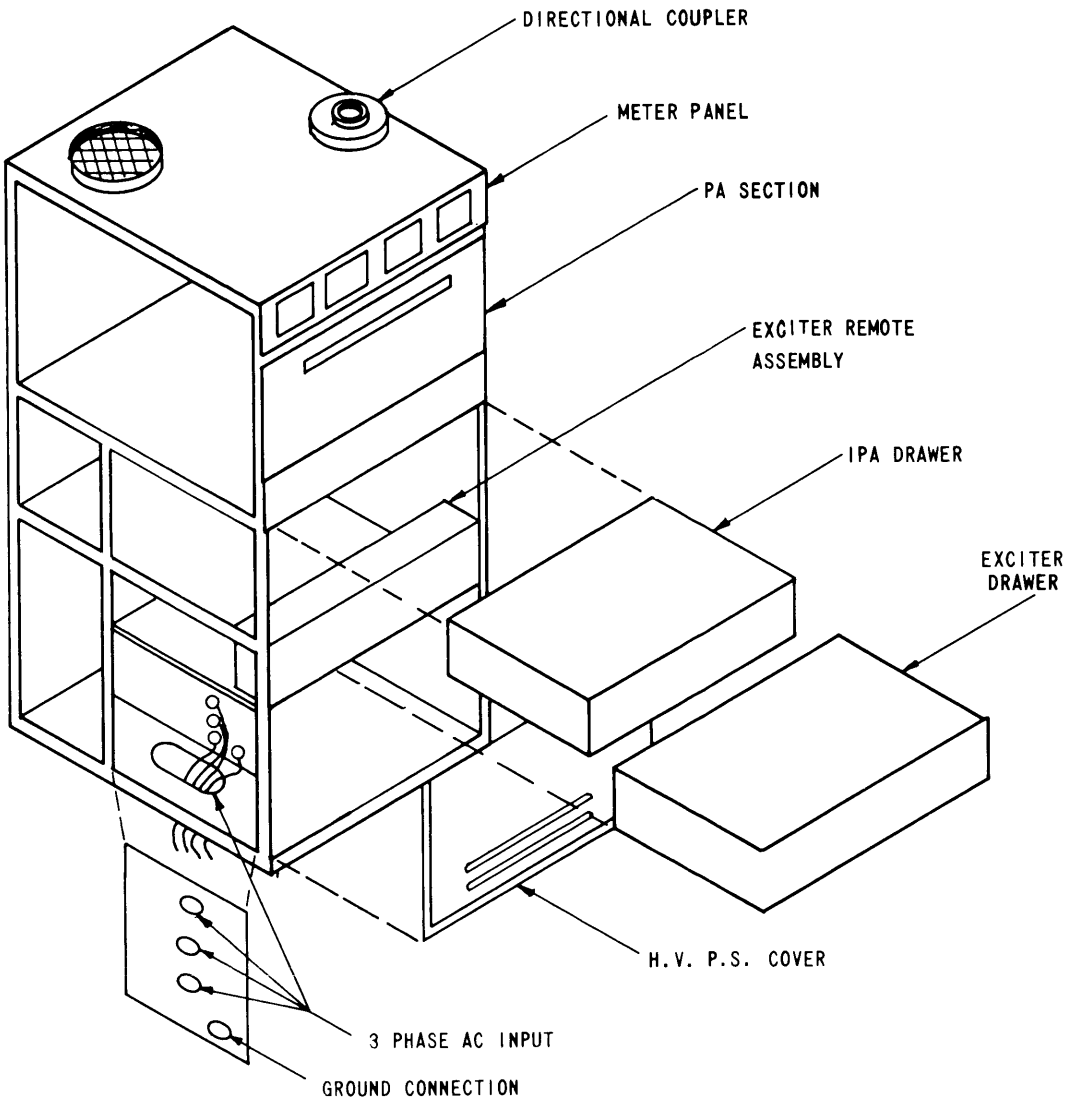


Figure 2-1. Typical PALA-10K Installation

Additionally, there are small insulated leads that must be connected to the primary sections. (Refer to figure 2-2). Connect:

Violet lead to 220v terminal of section 1 primary
Gray-white to 220v terminal of section 2 primary
Gray lead to 240v terminal of section 2 primary
White lead to 220v terminal of section 3 primary

2-6. TRANSFORMER SECONDARY CONNECTIONS

The secondary terminals of T801 are located in the rear of transmitter, connect secondary leads in following manner. (Refer to figure 5-14 Transmitter Overall Rear View.)

CONNECT FROM	CONNECT TO
Top rectifier	right 3400v terminal on T801
Middle rectifier (CR802 & CR803)	middle 3400v terminal on T801
Bottom rectifier (CR804 & CR805)	left 3400v terminal on T801

Connect heavy teflon insulated lead from "N" terminal to L801.

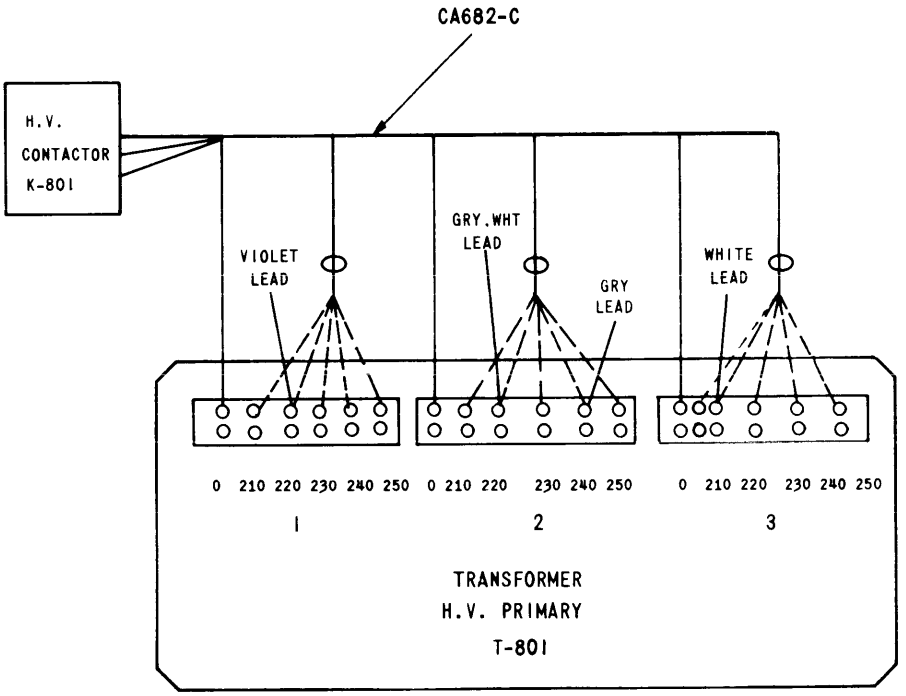


Figure 2-2. Transformer H.V. Primary Connections

2-7. HIGH VOLTAGE CHECK

Once transformer has been installed and wired according to paragraphs 2-5 and 2-6, it is recommended that a high voltage check be performed. To do this, carefully read the instructions below and proceed with extreme caution.

WARNING

WHEN MEASURING AC VOLTAGE, USE EXTREME CAUTION. DO NOT TOUCH METER OR LEADS WHEN VOLTAGE IS ON. AFTER MEASURING VOLTAGE, PLACE MAIN BREAKER OFF BEFORE MOVING METER LEADS.

a. Insure Primary AC BREAKER is OFF and TAGGED.

b. Place MAIN POWER breaker and SCREENS breakers to OFF position.

c. Place an AC Voltmeter across two of the three phase AC input line to measure the Primary AC Voltage.

d. Connect transformer primary leads to the appropriate transformer tap that corresponds to the primary AC input Voltage measured in paragraph c.

e. Clear personnel from transmitter and apply primary AC to transmitter.

f. Place MAIN POWER breaker and SCREEN breakers to the ON position.

g. Wait approximately 10 to 15 minutes for all IPA tube filaments to warm up.

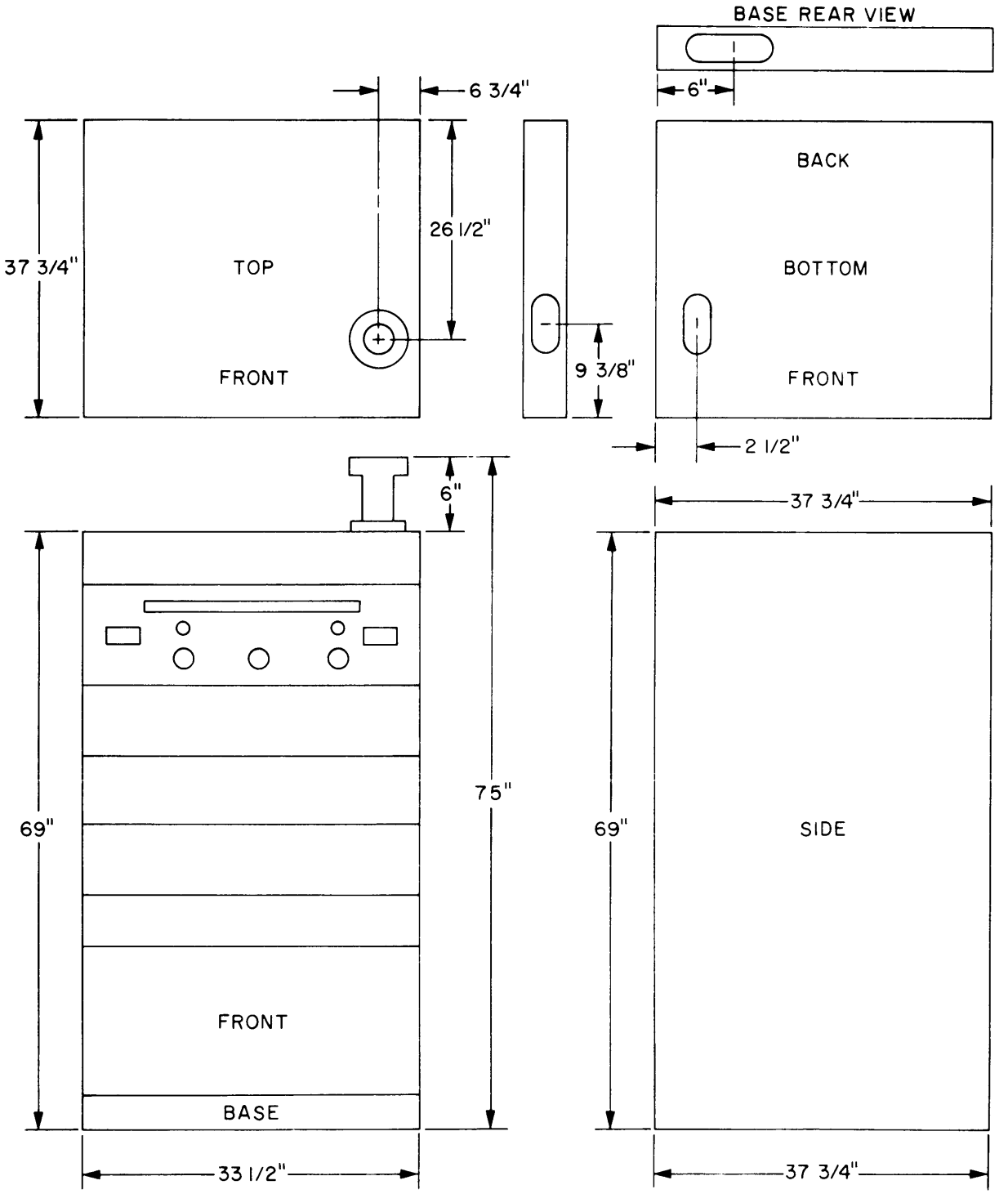


Figure 2-3. Outline Dimensional Drawing

h. Press HIGH VOLTAGE Switch to apply high voltage to Transmitter. HIGH VOLTAGE indicator should light.

i. Press HIGH VOLTAGE switch to OFF (HIGH VOLTAGE indicator must go out). Place MAIN POWER breaker to OFF position. Short out all HIGH VOLTAGE points to ground with HIGH VOLTAGE Shorting Stick provided.

2-8. POWER AMPLIFIER TUBE INSTALLATION (V701)

CAUTION

Finger contacts located inside mounting socket for tube V-701 must not be bent. Check contacts carefully before attempting to install tube in socket.

a. Observe finger contacts inside the tube socket.

b. Carefully lift tube V-701 (contained in crate) up into air duct in top of frame (raise lower portion of air duct) until base of tube clears socket.

c. Carefully lower tube straight down into socket until slight resistance is encountered. Make sure tube is centered in socket.

d. In one motion while firmly grasping tube, rotate tube about a quarter of a turn and push tube firmly down into socket. A slight amount of effort may be required to seat tube. Caution should be observed in seating tube so as not to damage finger contacts in socket. Check tube seating, it must be all the way down and centered in tube socket.

e. Tighten retaining strap hardware, so that tube is held securely in place.

2-9. PA FILAMENT VOLTAGE CHECK. (Refer to figure 5-14.)

a. Once POWER AMPLIFIER TUBE has been installed in tube socket, perform the following filament voltage check:

1. Place AC voltmeter leads across the secondary winding of T804 for the purpose of measuring the filament voltage.

2. Place meter in such a manner that it can easily be seen a safe distance from transmitter.

3. Insure that personnel are clear from transmitter and place Primary Power Breaker and MAIN BREAKER to the ON positions. (HIGH VOLTAGE AND SCREEN BREAKERS MUST BE OFF.)

4. Measure the filament voltage; it should be between 5.7 to 6.0 VAC.

5. If measured voltage is not within specified limits, place MAIN POWER BREAKER OFF.

6. Relocate the connection on terminal No. 2 of T804 to a terminal (3, 4, 5, 6, 7) that will provide a secondary output of 5.7 to 6 VAC.

CAUTION

DO NOT REMOVE THE LEAD ON TERMINAL NO. 1. (For a schematic diagram reference refer to CK1643, sheet 5.)

7. After the correct value has been obtained, place MAIN BREAKER to OFF position and remove test meter and leads.

2-10. LOW VOLTAGE TRANSFORMER T803 CONNECTIONS. (Refer to figure 5-12 for location of transformer.)

The Low Voltage Transformer T803 is a three-phase transformer with multi-tapped primary windings. Once the primary AC voltage has been measured, the measured value should coincide with the appropriate tap on the Low Voltage transformer T803. Example: Primary AC voltage value 230VAC, the connections should then be on the 230V taps on T803. DO NOT REMOVE THE CONNECTION MARKED "0".

a. To change T803 primary taps proceed as follows:

1. Place MAIN POWER BREAKER to OFF position.

2. On each of the primary windings of T803, relocate the connection to coincide with the measured Primary AC voltage value. DO NOT CHANGE THE CONNECTION ON THE TERMINAL MARKED "0".

3. Secure hardware on Transformer connection.

2-11. EXTERNAL TRANSMITTER CONNECTIONS

Audio intelligence, key lines, etc., into the transmitter through J3001. Refer to CK-1643 sheet 4 for information concerning connections.

Intelligence connector plug MS-3106-B32-7P is supplied as a loose item. Secure connector plug from loose item box and make connections as per CK-1643 (J-3001).

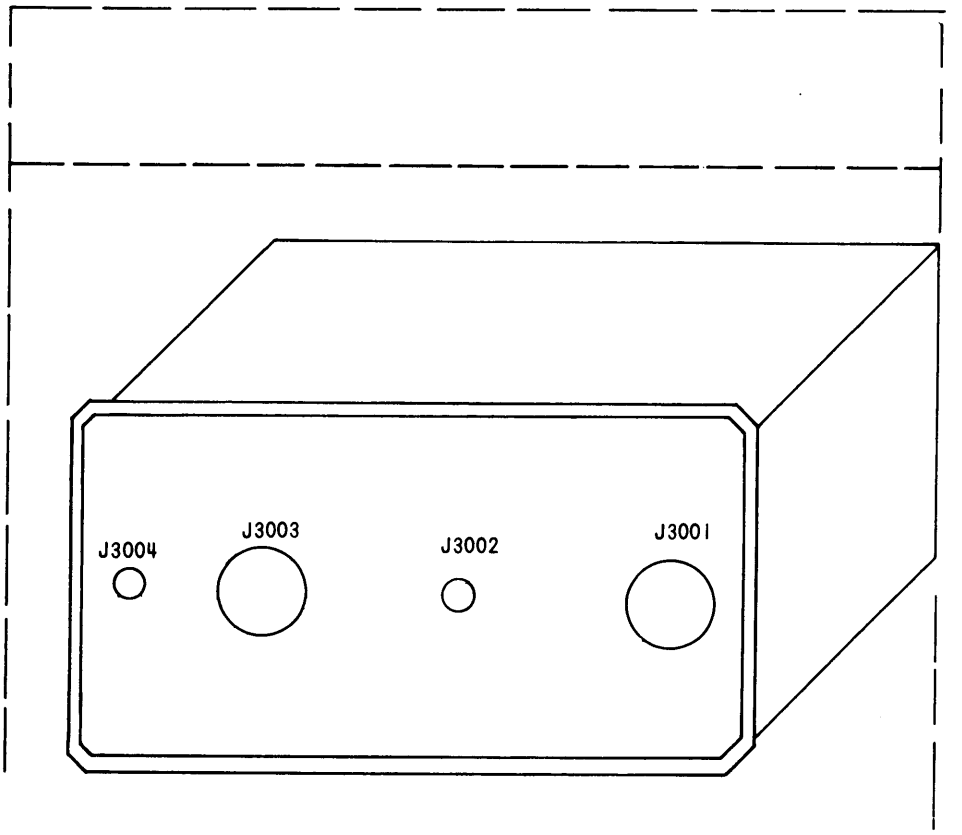


Figure 2-4. Exciter Remote Assembly (As Viewed From Rear of Transmitter)

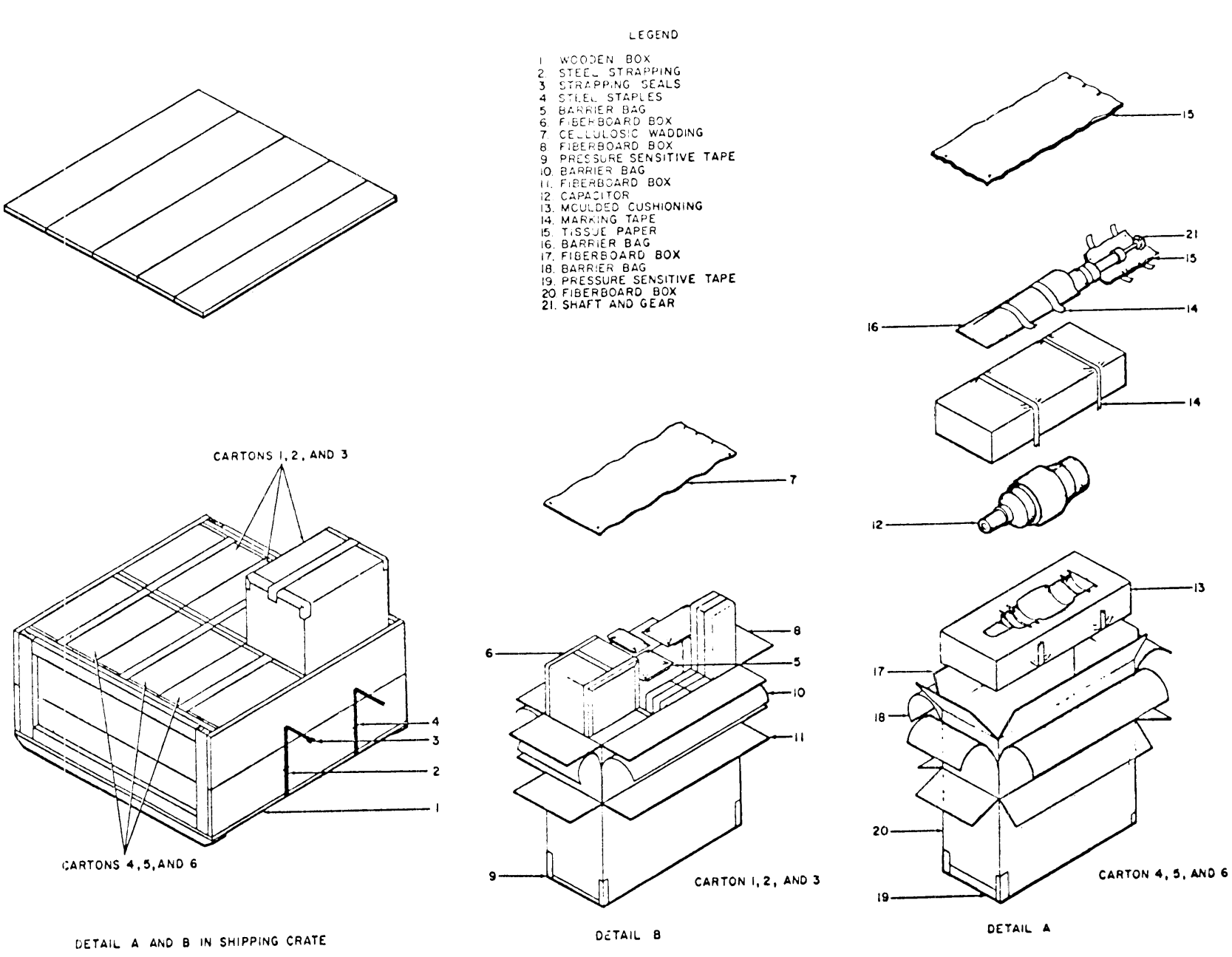


Figure 2-5. Typical Equipment Packaging

SECTION III
OPERATOR'S SECTION

3-1. SCOPE

This section gives detailed operating instructions for the PALA-10K transmitter in the MANUAL and AUTOMATIC MODES of operation.

3-2. GENERAL

The operator should become thoroughly familiar with the location and function of each control of the transmitter. Bear in mind that, although an extensive interlock and overload system is designed into the transmitter, a single incorrect control setting might still overload certain components, inviting early failure and consequently transmitter "downtime", not to mention improper and illegal emission.

A definite operating sequence (as outlined by operating instructions) should be strictly followed; the operator should establish a procedural pattern, thus ensuring consistent operation.

Before applying power to the transmitter, check that antenna or dummy load connections are properly made.

3-3. CONSIDERATIONS IN TUNING TRANSMITTER

a. GENERAL. Before transmitter is tuned for any specified mode of operation, it should be initially tuned and loaded on a carrier frequency.

This procedure should be followed even if suppressed carrier operation is desired. After the transmitter is tuned to carrier frequency, either or both sidebands are generated by applying the proper modulating signals required by the particular mode of operation. The carrier level may then be reinserted or by-passed, as desired.

b. CARRIER FREQUENCY VERSUS ASSIGNED FREQUENCY. A brief description of "carrier" versus "assigned" frequency is presented at this point since these may be significantly different when operating in certain modes and will affect the choice of frequency to be selected in the exciter. "Carrier" frequency may be defined as that position in the RF spectrum reserved for the "carrier" whether the carrier is present or not. The "assigned" frequency is a reference frequency designed to identify or reserve a given portion of the RF spectrum. Most government agencies define the "assigned" frequency as the "center of a frequency band assigned to a station". The "assigned" frequency and the "carrier" frequency may or may not be the same. In practice, the assigned frequency is frequently suffixed by the carrier frequency in parenthesis for clarification.

Example 1 - For an upper sideband transmission, with the carrier completely suppressed and with a total RF bandpass extending from 300 cps above Fc to 3KC, the assigned frequency is 1650 cycles above the non-existent carrier frequency.

Example 2 - For an independent sideband (ISB) Transmission, with audio intelligence covering 350-7500 cycles per sideband, with or without carrier suppression, the assigned frequency and the carrier frequency are one and the same both occupy the center of the transmitted spectrum.

c. PEAK ENVELOPE POWER VERSUS AVERAGE POWER INDICATION. A common misapprehension continues to exist over the ratio between average and PEP in high power transmitters, particularly when multichannel (Multitone) transmissions are used. Bear in mind that the PEAK ENVELOPE POWER (PEP) during modulation can be many times that of the Average Power indicated on the PA OUTPUT METER. Thus the transmitter AVERAGE POWER must be reduced sufficiently to avoid a serious PEAK overload to the transmitter, with consequent "flat topping" and possible damage.

When the PALA-10K is used with TMC exciters models MMX( ) 2 or SME( ) 6, the PEAK to AVERAGE ratio's are factory adjusted; maintained with internal circuits peculiar to TMC exciters. However, the PALA-10K (less exciter) features four (4) adjustable pre-set average power levels which can be adjusted to any power from approximately 1.5KW to 10 kilowatts. Refer to section 5 for pre-set power level adjustment procedure should it be desired to change power levels.

d. TRANSMITTER CARRIER TUNING PROCEDURE. The operational procedure presented on the following pages will be in two parts, "MANUAL TUNING" wherein all operating controls are adjusted by the operator and "AUTOMATIC TUNING," that is accomplished once the transmitter has been satisfied with all signal and voltage inputs required for AUTOMATIC TUNING.

Control and Indicator chart Table 3-1 has been prepared in conjunction with Control and Indicators Location Drawing (figure 3-1) to assist in the location and function of operating controls during tuning and operating of the transmitter.

Note

The PALA-10K transmitter in the AUTOMATIC mode of operation, unless properly interfaced with the appropriate exciter cannot perform the automatic bandswitching function. Thus, prior to starting the AUTOMATIC TUNING cycle bandswitching must be performed manually as indicated in the AUTOMATIC TUNING PROCEDURE.

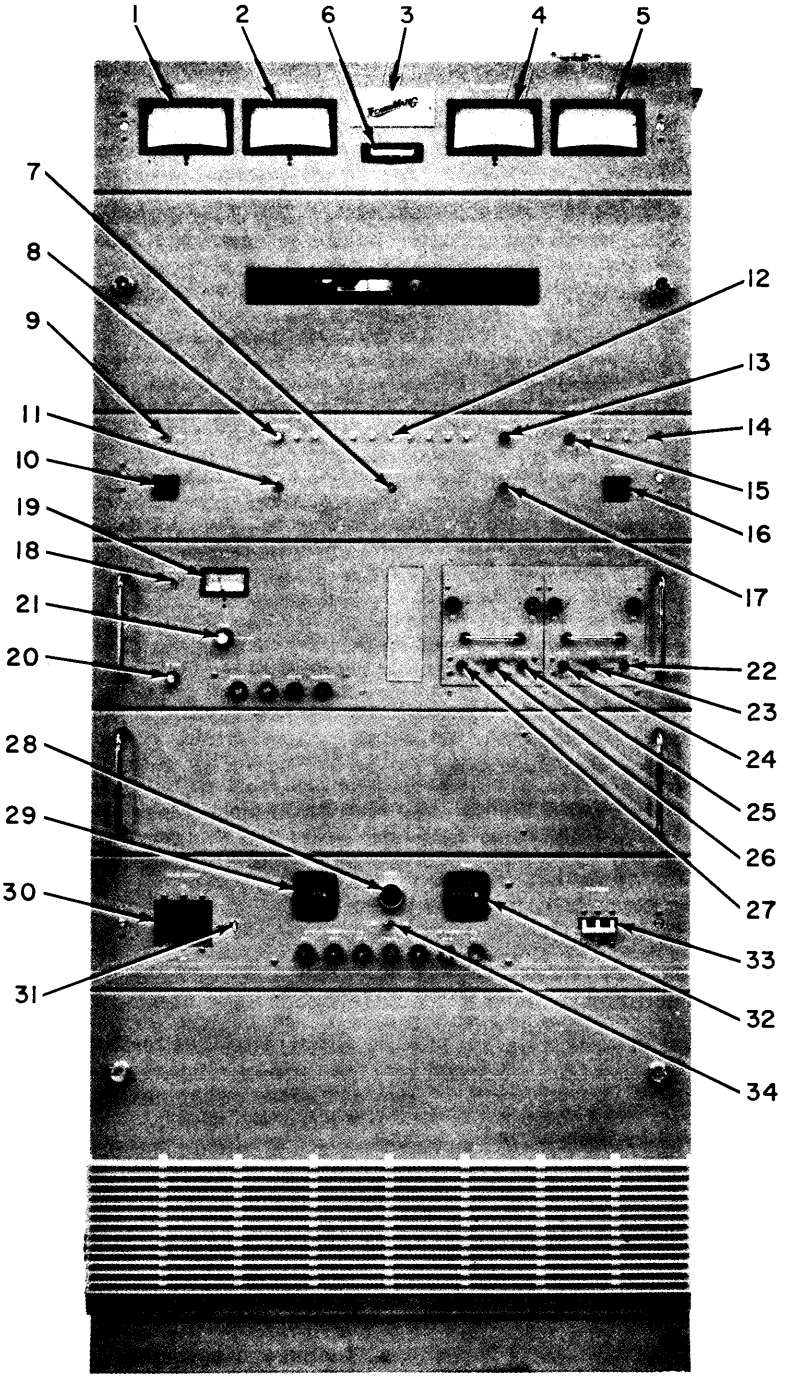


Figure 3-1. Controls and Indicators Location

3-4. MANUAL TUNING PROCEDURE (CARRIER ONLY)

STEP	OPERATION	NORMAL INDICATIONS
1	Place MAIN POWER breaker (30) to the ON position.	Main blower and IPA blower must operate. Technimatic light (3) and Band Indicator (12) must illuminate.
2	Place SCREENS breaker (33) to ON position.	INTERLOCK lamp (8) will light (provided that all safety interlocks are closed and the time delay cycle has been completed).
3	Place MANUAL/AUTO Switch (9) to MANUAL position.	No indications at this time, however, all auto tuned circuits are disabled for manual operation.
4	Place ALARM ON/OFF Switch (34) to OFF position.	Should alarm switch have been in the ON position with High Voltage removed, the audiable High Voltage alarm would be on this switch turns High Voltage alarm off.
5	Set RF drive from associated exciter to minimum.	No Indications.

Note

The transmitter is equipped with protective overload circuitry incorporated in meters on the transmitter. Should an overload occur in either the PA PLATE CURRENT, PA SCREEN CURRENT, IPA PLATE CURRENT or at the transmitter output in the form of excessive VSWR, the corresponding meter face will illuminate to indicate an overload has occurred in that circuit of the transmitter. Additionally each of the aforementioned meters have an overload indicator which can be adjusted to trip at a value set by the operator.

6 Adjust the OVERLOAD INDICATOR (adjustment screw located directly below the meter face on each meter) on each meter for values listed:

PA PLATE CURRENT	3 1/2 A.
PA SCREEN CURRENT	80 MA.
IPA PLATE CURRENT	800 MA.
REFLECTED POWER	as desired

7 Select BANDSWITCH Position by holding BANDSWITCH CONTROL (7) first to left until BAND INDICATOR lights, then holding BANDSWITCH CONTROL to the right until the next BAND INDICATOR lights.

BAND INDICATOR (12) will illuminate to indicate PA frequency band selected.

Note

The transmitter features four (4) pre-set AVERAGE OUTPUT POWER levels which are adjustable and selected at the front of the transmitter. Before applying excitation to the transmitter one (1) of the four (4) pre-set power levels should be selected.

N te

If POWER LEVELS are specified contracturally or at end-users request, the calibration of pre-set power levels are performed at the factory. However, when pre-set power levels are not known prior to shipment they are all set at the same level (AVERAGE POWER 10 KW).

(To calibrate the four power levels to values refer to the maintenance section "Pre-Set Power Level Adjustments" paragraph 5-7).

STEP	OPERATION	NORMAL INDICATIONS
8	Remove Bias Control cover on IPA to expose Bias adjustment controls, adjust PA BIAS, DRIVER BIAS; BBL BIAS for maximum bias.	PA Bias control adjusted to MAX clockwise position. DRIVER BIAS control adjusted to MAX clockwise position. BBL BIAS control adjusted to MAX clockwise position.
9	Press HIGH VOLTAGE Switch (10) to light indicator (It may be necessary to press HIGH VOLTAGE Switch twice).	HIGH VOLTAGE Switch will illuminate RED when High Voltage is ON.
10	Adjust PA BIAS control for an indication of .75 amps on the PA PLATE CURRENT Meter (2).	PA PLATE CURRENT meter indicates quiescent current of .75 amperes.

Note

The Driver Bias adjust is very critical, as it will effect the transmitter TUNE LEVEL during automatic tuning.

11	Adjust DRIVER BIAS control for an indication of 150 MA on PLATE METER (19).	PLATE Meter (19) indicates quiescent current of 150 ma.
12	Press 2nd AMP BUTTON (18) hold in and adjust BBL BIAS control for indication of 200 MA on PLATE METER (19) when 2nd AMP BUTTON (18) is pressed.	PLATE Meter will indicate 200 MA when 2nd AMP BUTTON is pressed.
13	Rotate RF GAIN Control (20) to Maximum counter-clockwise position. Apply the desired operating frequency unmodulated at an RF level of 100 Milliwatts to the RF input of the transmitter.	

Note

During initial manual tuning of transmitter RF OUTPUT POWER will be increased or decreased with the RF GAIN CONTROL (20).

14	Adjust RF GAIN CONTROL (20) clockwise slightly to cause an increase in IPA PLATE current indication on PLATE Meter (19) not to exceed 250 MA.	PLATE Meter (19) will indicate increase in meter reading not to exceed 250 MA.
15	Adjust TUNING control (21) for a noticeable increase in PA PLATE Current indication on PA PLATE Current Meter (2).	The rotation of IPA TUNE control will cause IPA output to be applied to PA indicating resonance. At this point the PA PLATE Current meter (2) will indicate an increase from quiescent.

CAUTION

During Tuning of Power Amplifier do not exceed a PA PLATE Current reading of two (2) amperes. Should an overload occur High Voltage Indicator will go out. To Re-Set HIGH VOLTAGE, decrease RF drive and press to light HIGH VOLTAGE Indicator. (HIGH VOLTAGE Switch must be pressed twice to energize High Voltage.)

STEP	OPERATION	NORMAL INDICATIONS
16	Operate the PA TUNE Control (11) (Press control down or up) as necessary to cause a noticeable resonant dip in PA PLATE Current Meter (2) indicator.	PA PLATE Current Meter will indicate resonant dip and OUTPUT METER will indicate power output.
17	Operate PA LOAD Control (17) (Press control + or -) as necessary to produce a maximum reading on PA OUTPUT Meter (5).	PA OUTPUT METER will indicate a further increase in Power Output during loading process.
18	Operate the PA LOAD control (17). (Press control up or down as necessary to cause LOAD SENSE meter to indicate at or near zero reading.	PA OUTPUT METER (5) will indicate highest value when transmitter is properly loaded into antenna or load.

Note

Proper Tuning can also be accomplished by observing LOAD SENSE Meter (6) for a zero to 100 Reading at a level of 1KW.

19	Readjust IPA TUNE Control (21) for further increase in PA OUTPUT METER indication.	PA OUTPUT METER may indicate a slight increase in meter reading.
20	Rotate RF GAIN Control (20) clockwise to increase PA Output Power Level to desired or pre-set power level.	PA OUTPUT METER indicates desired output level.
21	Rotate RF GAIN CONTROL (20) counter-clockwise and press HIGH VOLTAGE Switch to OFF.	PA OUTPUT Meter will indicate zero and HIGH VOLTAGE lamp will go out indicating the removal of High Voltage.

Note

The above outlined procedure has presented a logical sequence for manually tuning the PALA-10KW on a selected CARRIER frequency at the desired or rated AVERAGE POWER OUTPUT LEVEL. Modulating techniques will depend upon the exciter that is used. Refer to paragraph 3-6 for POWER OUTPUT indications under multitone multichannel transmissions, before the re-application of excitation to the transmitter.

3-5. AUTOMATIC TUNING PROCEDURE (CARRIER ONLY)

STEP	OPERATION	NORMAL INDICATIONS
1	Place MAIN POWER breaker (30) to the ON position.	Main blower and IPA blower must operate. Technimatic light, BAND INDICATOR and Power LEVEL indicator must light.
2	Place SCREENS breaker (33) to ON position.	INTERLOCK lamp (8) will light (provided that all safety interlocks are closed and the time delay cycle has been completed).
3	Place ALARM ON/OFF switch to OFF position (34).	If ALARM switch is in the ON position with High Voltage removed, the audiable HIGH VOLTAGE ALARM would be ON; this switch turns HIGH VOLTAGE alarm OFF.

STEP	OPERATION	NORMAL INDICATIONS
4	Place MANUAL/AUTO switch to MANUAL (9).	Auto-tuned circuitry is disabled and manual controls enabled.
5	Select the appropriate BANDSWITCH position by first holding BAND-SWITCH control (7) to the LEFT until BAND INDICATOR lights then holding BANDSWITCH control to the RIGHT until next BAND INDICATOR lamp lights. (Bandswitching is accomplished by lateral movement of bandswitch control.)	BAND INDICATOR lamp (12) will illuminate to indicate PA frequency band selected.
6	Select the desired OUTPUT POWER level with POWER ADJUST switch (15). When power adjust switch is in the "UP" position one of the four pre-set power levels is selected.	The POWER LEVEL indicator lamp (14) will light to indicate the power level selected. (The levels as explained earlier are each fully adjustable and set by the operator). Refer to section 5 for power level Adjustment Procedure.
7	Insure that "RF DRIVE" from exciter is at minimum output and PRESS HIGH VOLTAGE switch indicator (10).	HIGH VOLTAGE switch INDICATOR will light. The following meter indications will be noted: PA PLATE CURRENT = .75 AMPERES IPA PLATE CURRENT = 150 MA 2ND AMP PLATE CURRENT = 200 MA 2ND AMP plate current will be indicated on IPA PLATE meter only when 2nd AMP (18) button is depressed.

Note

The values listed in Step 7 are quiescent values; should any meter indication be abnormal, refer to Steps 8 through 12 in the MANUAL TUNING PROCEDURE.

8	Press HIGH VOLTAGE switch indicator button to OFF position (10).	HIGH VOLTAGE indicator (RED) will go out.
9	Place MANUAL/AUTO switch in the AUTO position (9). Apply an unmodulated signal at a level of 100 milliwatts to the RF input of transmitter.	Transmitter AUTO-TUNED circuitry is enabled and manual tuning controls are disabled.
10	Press HIGH VOLTAGE button to light INDICATOR (10), and press TUNE button (16).	HIGH VOLTAGE will be applied to transmitter and AUTOMATIC tuning will take place. At the completion of the auto-tuned cycle READY INDICATOR (10) will light, indicating transmitter "CARRIER" tuning completed at a POWER OUTPUT LEVEL selected by operator.
11	Reduce RF output of exciter to MINIMUM.	

Note

The transmitter auto-tuning should be completed in approximately 10 seconds; however, incorrect control settings can cause excessive tuning time resulting in a FAULT INDICATION to the transmitter. Should this FAULT INDICATOR come on, check for correct band indication and excitation level before depressing TUNE BUTTON AGAIN. If FAULT INDICATION is REPEATED, refer to section 5 for AUTO-TUNING adjustment procedures (paragraphs 5-10 and 5-11).

CAUTION

The aforementioned procedure outlines "CARRIER" AUTOMATIC TUNING. However, once the exciter has been adjusted for the desired type of intelligence and emission mode, the reapplication of the RF drive from the exciter must be carefully adjusted to avoid exceeding the PEP rating of the transmitter. Refer to figure 3-2, which illustrates the relationship between peak and average power in graphic form under multitone conditions.

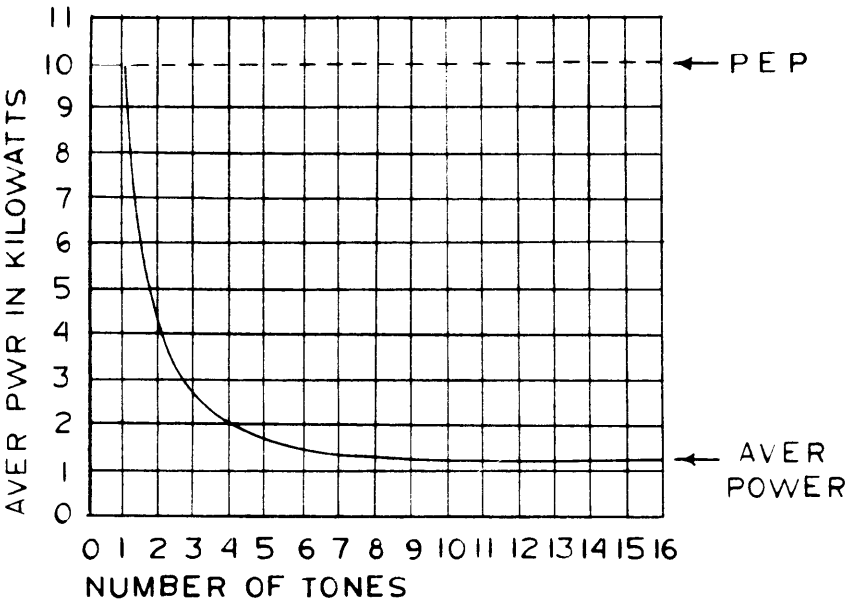


Figure 3-2. Ratio Average Power and PEP as a Function of Tones

3-6. AVERAGE POWER OUTPUT INDICATIONS

When two tones of equal amplitudes are applied to a SSB system, the ratio of PEP to Average Power is 2:1. This relationship is valid for two tones only. Thus it is apparent that when the PALA output meter indicates 5KW with two tones of equal amplitude applied to the transmitter, PEAK ENVELOPE POWER will be 10KW under that condition only.

Note

PA OUTPUT METER INDICATES AVERAGE POWER ONLY. AS AN OPTION, TMC OFFERS A "PEAK ENVELOPE POWER METER" WHICH INDICATES "PEP" AND "AVERAGE POWER".

In Multichannel, multi-tone transmission modes where more than two tones are used, a definite relationship exists between the AVERAGE power as read on the OUTPUT METER and PEAK ENVELOPE POWER developed. A chart in graphic form (figure 3-2) indicates the ratio of P average to PEP as a function of tones, for reference in determining peak to average power ratios.

Consider, for a moment a transmitter rating 10KW PEP, 5 KW average with two tones applied.

With two tones applied, PEP is 2 X P average. If with 16 tones applied, and the system operated at 5KW average, the transmitter must be capable of handling a peak envelope power of 25 KILOWATTS. (This would result in a serious PEP overload.)

Thus it can be seen that average power reduction and/or a method of keeping PEP at a constant level during high modulation peaks is necessary. The TMC series of high powered transmitters are featured with circuits (ALDC) that perform a function of limiting high modulation peaks, when used with an appropriate exciter. To adjust the ALDC controls refer to Section 5 "ALDC ADJUSTMENT PROCEDURE".

TABLE 3-1. CONTROLS AND INDICATORS

ITEM NO. (FIG. 3-1)	PANEL DESIGNATION	FUNCTION
1	PA SCREEN CURRENT Meter	Indicates PA SCREEN CURRENT of 10KW amplifier and PA Screen overload. (Meter illuminates to indicate overload.)
2	PA PLATE CURRENT Meter	Indicates PA PLATE CURRENT of 10 KW amplifier and PA Plate overload. (Meter illuminates to indicate overload.)
3	TECHNIMATIC light	When lit indicates primary power is applied to transmitter and MAIN POWER breaker is ON.
4	REFLECTED POWER Meter	Indicates REFLECTED power on upper meter scale and SWR on lower meter scale.
5	PA OUTPUT Meter	Indicates AVERAGE PA OUTPUT POWER.
6	LOAD SENSE Meter	Monitors samples of PA PLATE CURRENT and PA PLATE RF VOLTAGE. (At 1KW output level, when PA Plate current and PA Plate RF are equal the load sense meter will indicate at or near zero center scale reading.)
7	BANDSWITCH Control	Operates PA BANDSWITCH in manual operation only. Lateral movement of control to the left or right will cause the PA bandswitch to rotate to next position.
8	INTERLOCK Indicator Lamp	When lit indicates all interlocks closed and interlock circuit complete.
9	MANUAL/AUTO Switch	Determines transmitter operation either MANUAL or AUTOMATIC. When switch is in auto, with the appropriate exciter, bandswitching, tuning and loading are accomplished automatically. When in manual, bandswitching, tuning, and loading must be performed manually.
10	HIGH VOLTAGE ON/OFF	When pressed to ON position HIGH VOLTAGE is applied to PA and IPA plate circuits and switch indicator lights. When depressed to OFF position High Voltage is removed and switch indicator goes out.
11	PA TUNE CONTROL	Operates PA TUNE capacitor when MANUAL/AUTO switch is on MANUAL position only.
12	PA BAND Indicators	When lit indicates PA Bandswitch position, from 2MHz to 30MHz divided into 10 separate positions: 2-2.3, 2.3-2-6, 2.6-3, 3-4, 4-5, 5-8, 8-12, 12-16, 16-24, and 24-30. There is one lamp for each position.
13	FAULT Indicator	When lit indicates transmitter auto-tuning not completed within 30 seconds.
14	POWER Level Indicators	When lit indicates one of the four pre-set power levels selected by the operator.

TABLE 3-1. CONTROLS AND INDICATORS (cont.)

ITEM NO. (FIG. 3-1)	PANEL DESIGNATION	FUNCTION
15	POWER ADJUST Switch	Dual function switch, when depressed down pre-set output level, can be calibrated prior to actual RF Output of transmitter. When placed in the UP position, one of the four pre-set power levels is selected. (Each time switch is placed in UP position, one power level is selected).
16	TUNE/READY Switch	When MANUAL/AUTO Switch is in AUTO position, the TUNE Switch when depressed will start the Auto-tuning cycle. Once auto-tuning is completed and Pre-set power output level reached READY indicator will light.
17	PA LOAD Control	Operates PA loading capacitor when MANUAL/AUTO Switch is in manual only.
18	2ND AMP METER Button	When depressed IPA PLATE CURRENT METER indicates 2nd IPA PLATE CURRENT.
19	IPA PLATE CURRENT Meter	Indicates 2nd and 3rd IPA PLATE CURRENTS. (Meter illuminates to indicate overload.)
20	RF GAIN Control	Adjust transmitter power output during MANUAL and AUTO Operation. However, when in manual, control must be adjusted manually. In automatic operation control is adjusted automatically.
21	IPA TUNE Control	Tunes IPA Section to resonance during manual and auto operation. In manual operation tune control is manually adjusted. During auto-tune cycle tune control is adjusted automatically.
22	PA TUNE SERVO OPERATE lamp	When lit indicates auto-tuning of Power Amplifier completed.
23	PA TUNE SERVO SEARCH lamp	When lit indicates voltage applied to PA Tuning Section to initiate automatic tuning of PA.
24	PA TUNE SERVO AC lamp	When lit indicates AC applied to PA TUNE SERVO Amplifier.
25	IPA SERVO OPERATE lamp	When lit indicates IPA tuning cycle complete.
26	IPA SERVO SEARCH lamp	When lit indicates Voltage applied to IPA Tuning Section to initiate automatic tuning of IPA Section.
27	IPA SERVO AC lamp	When lit indicates AC applied to servo-amplifier chassis. (After completion of servo tuning the AC will automatically be removed and all lamps on servo amplifiers will go out.)
28	ALARM	Audible alarm to indicate failure of High Voltage.
29	FILAMENT TIME Meter	Registers the time (in hours and minutes) Voltage has been applied to the PA filaments.
30	MAIN POWER Breaker	When placed in ON position applies Primary power to Transmitter.

TABLE 3-1. CONTROLS AND INDICATORS (cont.)

ITEM NO. (FIG. 3-1)	PANEL DESIGNATION	FUNCTION
31	EXCITER ON/OFF	In the ON position supplies AC POWER to exciter. (Used only when exciter is installed in exciter drawer.)
32	PLATE TIME Meter	Registers total time DC PLATE VOLTAGE applied to PA Plate Circuit.
33	SCREENS Breaker	In ON position provides screen Voltage to PA tube.
34	ALARM ON/OFF Switch	When placed in ON position activates High Voltage ALARM when high voltage is off.

SECTION IV
PRINCIPLES OF OPERATION

4-1. GENERAL.

With an rf input of at least 100 MW, the PALA-10K transmitter provides fully automatic, or manual continuous tuning over the frequency range of 2 to 30 MHz.

The IPA drawer contains three RF linear amplifier stages. The first two stages of amplification in the IPA section are broad band tuned and the IPA stage is a tuned Parallel L circuit. The PA is an air cooled stage with a tuned Parallel L circuit, providing an output impedance of 50 ohms.

Servo tuning of the transmitter is accomplished at approximately 1 KW with final output determined by one of four adjustable Power Level controls. The output is maintained at the adjusted Power level by ALDC feedback to the Exciter. Front panel meters provide required overload settings as well as meter indications.

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

Figure 4-1 shows the path of rf input from the Exciter, through the amplifier stages, the output meter circuits, and finally to the transmitting antenna. Basic servo tuning control signals are also shown to illustrate the servo functions during tuneup. The Tuning Sequence is as follows:

When an RF input of 100 MW from the Exciter is applied to the motor driven RF Gain Control and the 100 MW rectifying circuit. The application of high voltage causes a cathode voltage input to the Drive Up Comparator Assembly via Tune complete Relay contacts and 28V from the PA Tune Servo to the IPA Servo via contacts on the HV ON/OFF relay.

The application of 100 MW and 28V from the PA Tune Servo causes the IPA Servo Amplifier to go into the "Search" mode. The IPA Servo supplies control voltage to the IPA Servo motor coupled to the IPA Tuning Capacitor, causing it to start turning.

Simultaneously, the Drive Up Comparator Assembly has been comparing the IPA cathode input to an adjustable Tune Level voltage. The adjustment of the Tune Level control determines the level of rf drive that the transmitter will servo tune.

RF drive, at the desired tune level is applied to broad band linear amplifier V1301, an 8233 tube. V1301 a class A amplifier provides amplification of approximately 5 before application to the 2nd broad band linear amplifier, V1302 a 4CX350A tube. V1302 operates as a class A amplifier providing amplification of approximately 8. The amplified signal is then applied to V1401. The V1401 tube is an 8576 operating as a class AB_1 intermediate power amplifier, providing approximately 500 watts of drive power to the input of the Final Amplifier.

With the application of amplified rf input on the grid of V1401, the rotating IPA Tuning Capacitor will develope rf at the plate when approaching resonance. A rectified sample of the plate rf, called the IPA Plate Trigger is routed to the IPA Servo through the IPA Plate Trigger Potentiometer. The IPA Plate Trigger Potentiometer determines the required level of plate rf necessary to stop the IPA Tuning Capacitor from searching. The application of the plate trigger to the IPA Servo completes the "Search" mode and initiates the "Servo" mode.

The IPA Servo Amplifier will remain in the "Servo" mode until a dc correction voltage from the IPA phase detector approaches zero. The IPA phase detector compares the phase relationship between the grid and plate of V1401 to determine when the plate circuit is properly tuned to resonance. When the correction voltage approaches zero, the Operate lamp on the IPA Servo Amplifier lights, placing the IPA Servo Amplifier in the Operate mode.

The dc voltage that turns the Operate lamp on, is also sent to the PA Tune Servo to place it into its "Search" mode. The Search mode provides the necessary motor control voltage to B_1 which is coupled to the PA Tuning Capacitor to start the capacitor searching for resonance. The amplified signal from V1401, has been routed to the grid of V701 the PA tube, a class AB_1 amplifier providing 10 KW output.

As the PA Tuning Capacitor approaches resonance, the PA plate rf sample developed is routed through the PA Plate Trigger Adjust to the PA Tune Servo. The plate trigger places the PA Tune Servo into the "Servo" mode. When the dc correction voltage from the PA phase detector approaches zero, the "Servo" mode ends and the Operate lamp lights.

The Operate lamp on the PA Tune Servo routes a "Load Search ON" voltage to K2, closing its normally open contacts. Until this time in the servo tuning sequence, the Load Comparator Assembly has received only a PA cathode input which has kept the load capacitor at a minimum capacity. This has kept the transmitter unloaded during PA SEARCH to assure that sufficient rf plate trigger is always present.

The closure of K2 contacts provides a path for a sample of the PA plate rf to enter the Load Comparator Assy. through the Load Sense Adjust. The Load Sense potentiometer is adjusted so that the Load Sense Meter reads zero (±100) when loading is correct at approx. 1 KW. When the Load Sense meter reads zero (±100), motor control diminishes, stopping the Load capacitor.

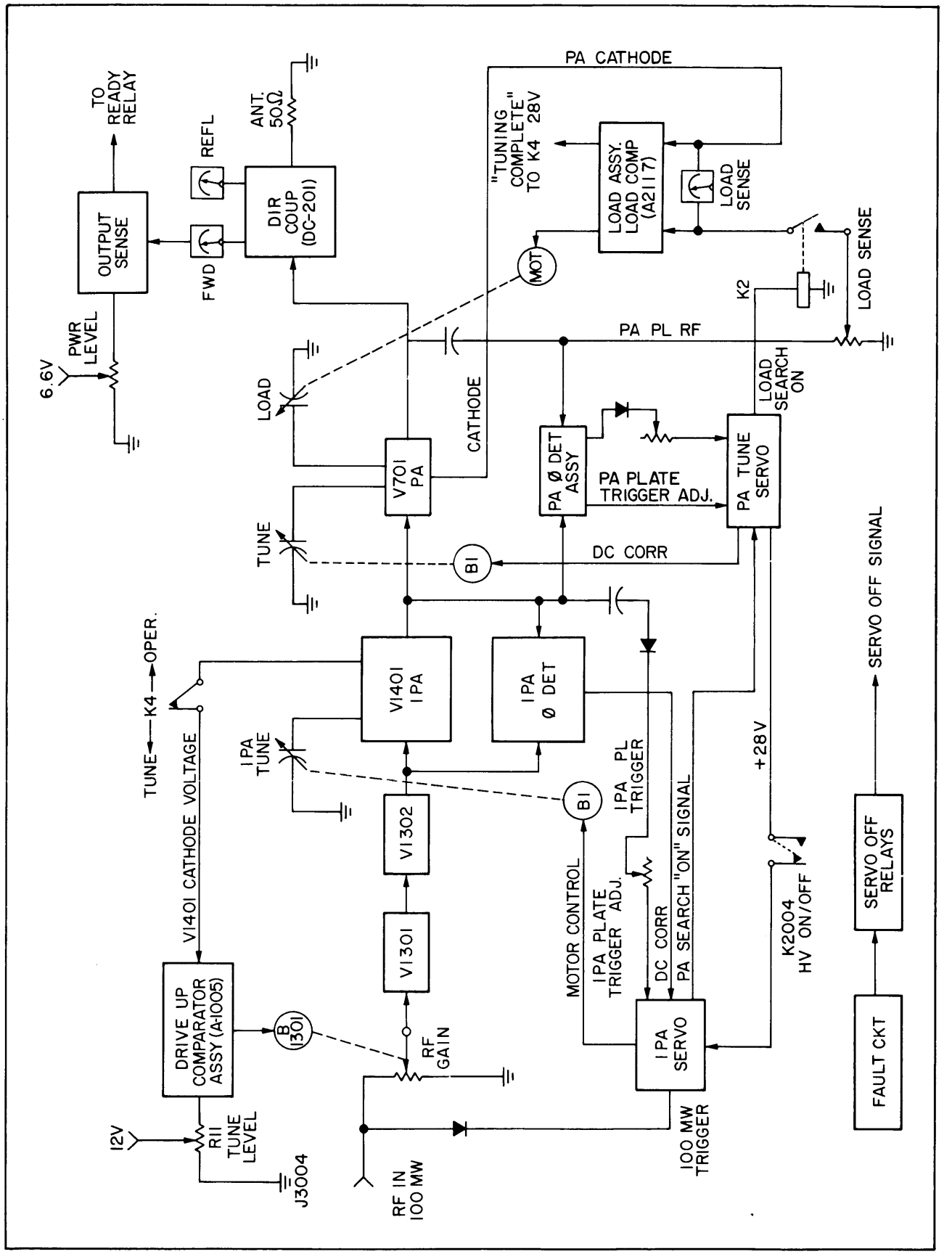


Figure 4-1. Block Diagram PALA-10K

When the Load Comparator is satisfied, a 28V Tuning Complete signal leaves the Load Assy. to energize K4 the Tuning Complete relay into the "Operate" condition. A set of contacts on K4 removes the IPA cathode input to the Drive-Up Comparator Assy. The unbalanced Drive-Up Comparator causes RF Gain motor to start driving the RF Gain Control "Up". As more rf drive is being applied, the Output Sense circuit compares one of the selected Power Level voltages to the input from the Output meter. When the two inputs to the Output Sense Circuit are equal, a ground is sent to K5, the Ready 1 relay to latch it into the "Output" condition. The "Output" condition of K5 removes the operating voltage to the Drive-Up Comparator Assy. and switches it to the Ready lamp. When the Ready lamp lights, the transmitter is ready to accept intelligence input from the Exciter.

The adjustable Fault circuit provides an energizing ground to the Servo OFF relays which shuts off the servos and biases the transmitter near cutoff should the transmitter fail to tune within approximately 30 seconds.

4-3. AC POWER DISTRIBUTION (Refer to Figure 4-2) and CK-1643 Sheet 5.

GENERAL.

Three-phase power is supplied to three input terminals located at the bottom left side of the transmitter. Safety and protective interlocks are employed throughout the transmitter to prevent application of high voltage until specific requirements are met, thus preventing injury to personnel and damage to the transmitter.

BLOCK DIAGRAM ANALYSIS.

Phases 1 and 2 at the input terminals are routed through the Exciter ON/OFF switch S3000 to Supply AC input to the exciter. (Used on HFT-10K series.) AC input to the exciter is therefore present at all times, independent of the position of the Main Power breaker, CB3001.

Closure of the Main Power Breaker provides 3 phase input to the PA Blower B801 and phases 1 and 3 to the IPA Blower B1401. The air switches for the PA and IPA blowers are normally closed when the blowers are not operating. When the blowers commence operating their respective air switches open, preventing a closure of phase 1 to the Filament ON relay, K802. Should one of the blowers fail to operate, the contact closure of the air switch energizes the Filament ON relay, opening its normally closed contacts, switching off the AC to the primaries of the filament transformers.

With the blowers operating properly, AC input power is applied to the PA filament transformer T804 and the Low Voltage filament transformer T803. The Filament Elapse meter M3001, records filament time on the PA tube. The contacts of the Filament Timer prevent a closure of the series interlock chain until the 3 minute time delay of the Timer has expired. The PA filament transformer supplies 6.0 VAC to the PA filament. The Low Voltage Filament and Control transformer supplies 3 phase AC to the IPA filament rectifier CR-805, and the +24V rectifier, CR1103. The output of the IPA filament rectifier provides 6.3VDC Filament Voltage to the IPA tubes.

The series interlock chain carries 24VDC up to the Filament Timer interlock, whereupon closure will route the 24VDC to the Bias ON relay, K2005. Contacts (1) and (3) of the Bias ON relay route phase 1 to the Deadman coil, A801 removing the shorting ground to the HV power supply. The Deadman relay also routes the 24VDC interlock voltage to one side of the HV ON/OFF relay, K2004.

AC input voltage to the Tune and Load Assemblies consists of a constant phase 2 application and a switched phase 1 when operating in the manual or auto mode.

When the Auto/Manual switch is in the Manual position, phase 1 is supplied to the Tuning and Loading assemblies via the Manual Tune and Load Switches and Man Servo Relay. The Low Voltage Filament and Control transformer also supplies 20 VAC to the Tune Control for application to the Control windings of the Tune motor.

4-4. DC POWER DISTRIBUTION (Refer to Figure 4-3) and Schematic Diagram CK-1643 Sheet 5.

a. PLATE VOLTAGE.

Application of 3 phase power input to T801 High Voltage Transformer provides plate voltage for the IPA tube and the PA tube. The PA plate voltage of 7500 VDC is derived from a full wave bridge rectifier circuit, CR802A thru F, then filtered by L801 and C801 before application to the PA plate. Resistors R803 through R808 are bleeders for the supply. One half of the value of the PA plate voltage (3750VDC) is available at the neutral tap of T801 secondary. This is the plate voltage for the IPA tube and is filtered by L802 and C802 before application to the IPA plate.

Full wave bridge rectifier circuit CR804 provides 2000 VDC the plate voltage for the 2nd IPA tube. The DC return for this power supply is through the Screens circuit breaker contacts (C) and (D) which will open in the event of excessive current drain.

The voltage divider R809 and R810 provides 400 VDC plate voltage for the 1st IPA tube, which is derived from the neutral of the transformer.

b. SCREEN VOLTAGE.

Closure of the Screens circuit breaker CB3002 provides 2 of the 3 phase input to the screen transformer, T802. The output of the full wave bridge rectifier CR803 is 2000 VDC and regulated by 200V zener diodes, CR801A thru CR801H. The top of the zener stack provides 1600 VDC for the PA screen. At the junction of CR801D and CR801E is

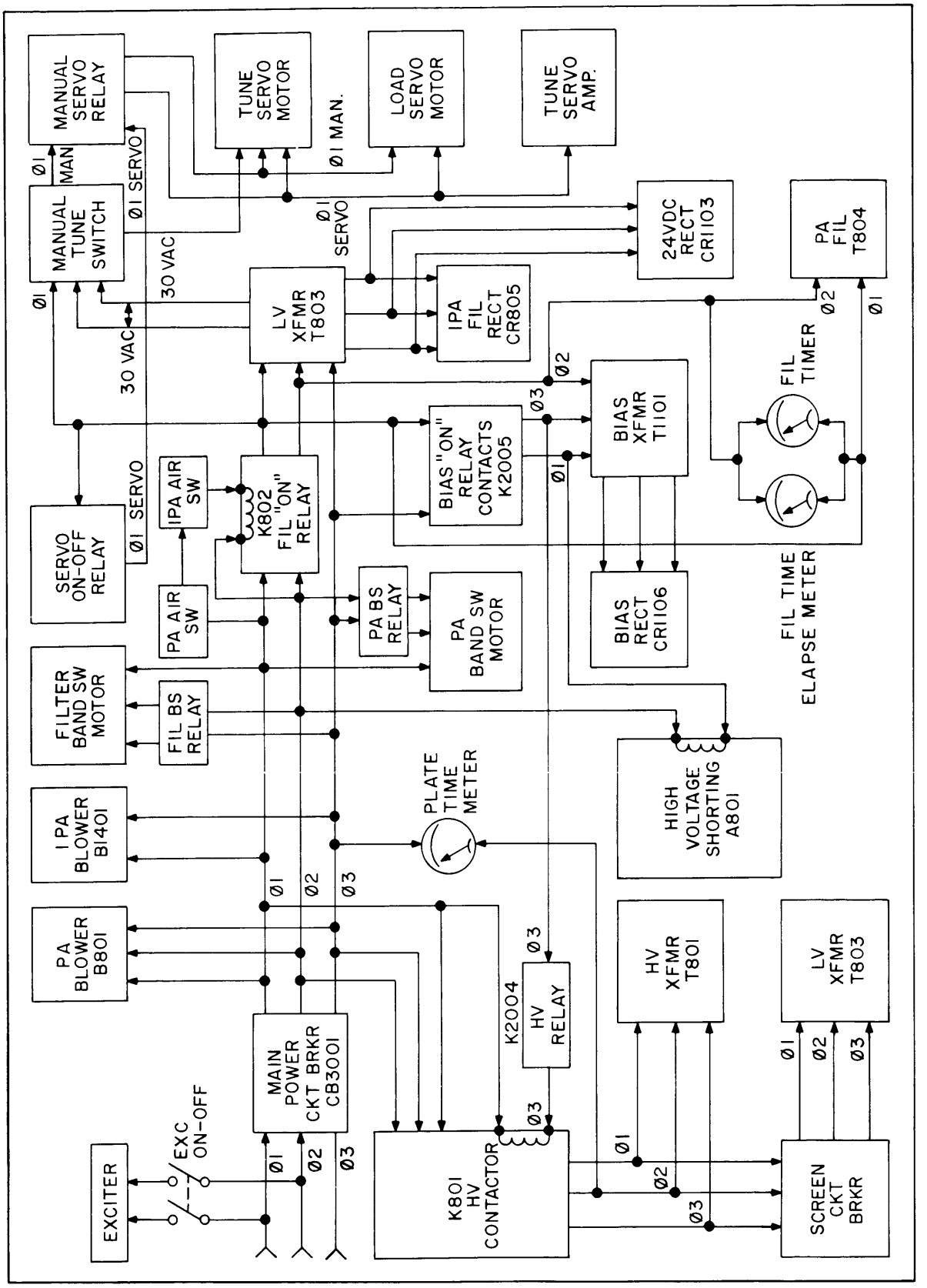


Figure 4-2. PALA-10K Simplified Diagram AC Power Distribution

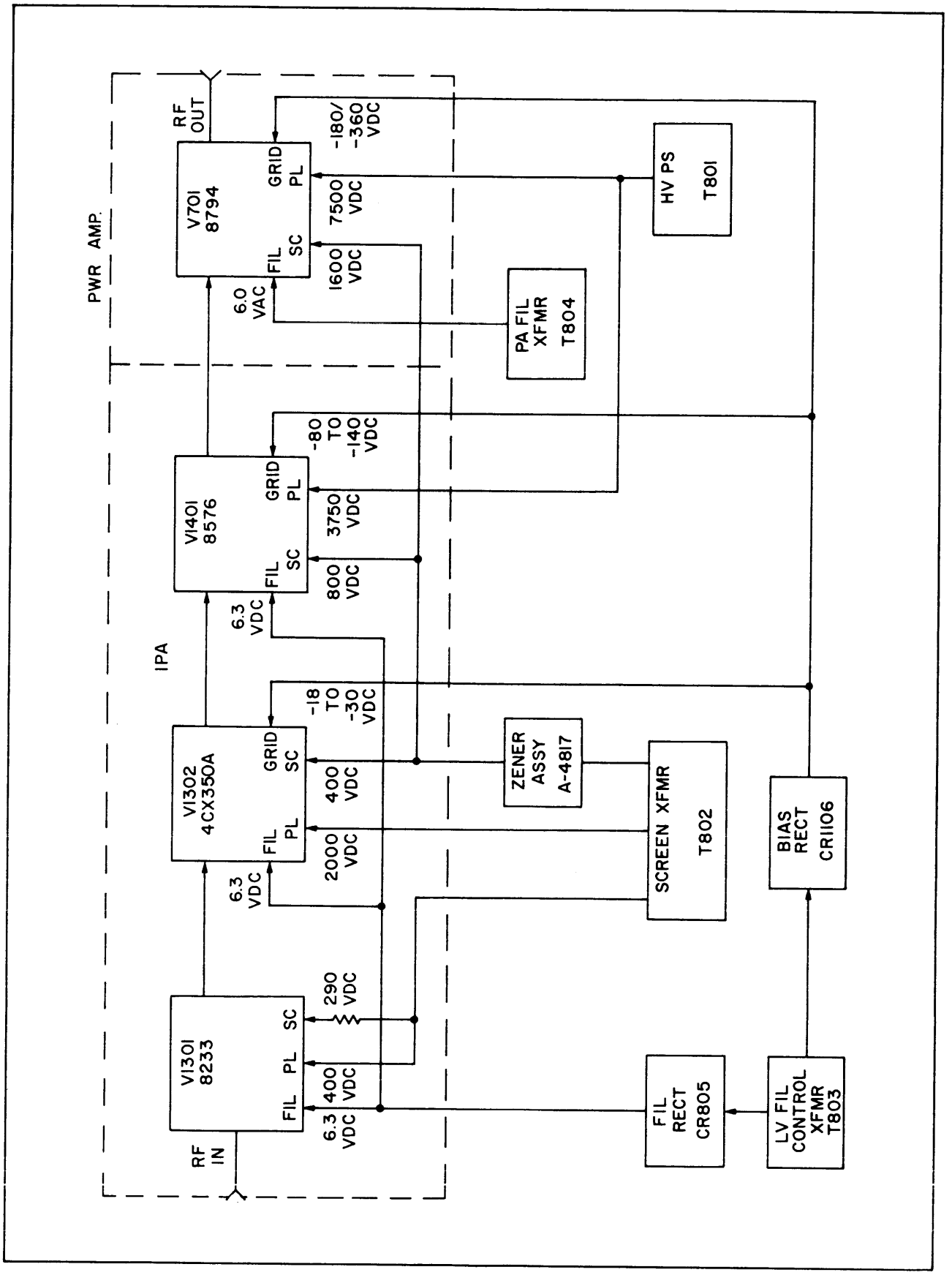


Figure 4-3. PALA-10K Operating Potentials

800 VDC for IPA screen and 400 VDC at the junction of CR801F and CR801G for the screen of V1302. The DC return for this supply is through the screen overload circuitry on PC 529 to protect against excessive current drain should an overload occur. Screen voltage of 290 VDC for the first IPA V1301, is derived from R1307 connected to its plate voltage of 400 VDC.

c. BIAS VOLTAGE. (Refer to CK-1680, Sheet 3, IPA Drawer Schematic Diagram.)

When the Bias ON relay K2005 energizes, two of three phase input in applied to the bias transformer T1101, in the IPA drawer. The secondary output of the Transformer is applied to full wave bridge rectifier CR1106. The output of CR1106 (approx. -400 VDC) is filtered by L1101 and C1104 before application to the zener diode regulators. The dc return for the Bias supply is through F1002 to protect the circuit against overloads.

Regulated bias voltages are tapped from the zeners CR1107, CR1108, CR1109 for application to the three bias potentiometers. The ground necessary for voltage drop across the bias potentiometers is supplied by contacts (1) and (3) of energized Bias relay, K1101. The bandswitch interlock circuit prevents 24V from reaching the PTT relay during band changes to keep the amplifier stages at maximum bias, or close to cut-off.

The top of the zener stack provides -360 VDC to the PA Bias potentiometer before application to the grid of the PA tube. The PA Bias potentiometer is adjusted to provide approximately 750 MA of idle current as indicated on the PA Plate Current meter. The junction of CR1107 and CR1108 provides -240 to the Driver Bias Adjust potentiometer. The Driver potentiometer is adjusted to provide approximately 150 MA of idle current on the IPA Plate Current meter when the 2nd Amp button is in its normal position. The junction of CR1108 and CR1109 provides -120V to the BBL bias potentiometer before application to the 2nd IPA grid. The BBL bias potentiometer is adjusted to provide approximately 200 MA of idle current as observed on the IPA Plate Current meter when the 2nd AMP button is depressed.

d. 24V SUPPLY.

The secondary of Low Voltage Filament and Control Transformer T-803 provides 30 VAC input to CR1103 in the IPA drawer. The output of the full wave bridge rectifier, CR1103 is filtered by C1101 and C1102 before being regulated at +24 VDC by zener diode CR1104. This regulated 24V is used as Control Voltage for the transmitter. The DC return of the 24V supply is through F1003 to protect agains overloads.

4-5. PROTECTIVE OVERLOADS AND INTERLOCKS. (Refer to Figure 4-4.)

GENERAL.

The interlock and overload circuitry of the transmitter provides protection for the equipment and operating personnel. An open interlock or overload condition will de-energize K2004, the H.V. ON/OFF relay.

SIMPLIFIED CIRCUIT ANALYSIS.

The regulated 24V interlock voltage is routed through the mechanically closed interlocks to the filament timer interlock. When the time delay of the Filament Timer has expired, the 24V energizes the Bias ON relay which in turn energizes the Deadman relay. Contacts on the Deadman relay route the 24V to one side of the H.V. ON/OFF relay through the normally closed contacts of the Heat Overload and external interlocks. The HV ON/OFF relay is energized when the HV ON/OFF switch is depressed, providing a path thru the normally closed contacts of the Main Overload relay and thru the Remote HV ON/OFF provision to ground. The HV ON/OFF relay provides, phase 3 to K801, the HV Contactor Coil. When K801 energizes a ground is provided for the remote and local HV lights. The normally closed contacts open removing the ground on the Alarm ON/OFF switch, disabling the HV alarm when HV is on and Alarm switch in in ON position. An indication on the IPA Plate Current meter, PA Plate Current meter, PA Screen Current meter, or Reflected Power meter, that hits the red overload pointer, provides a contact closure on the associated meter sensing circuit. The contact closure supplies a gating pulse to trigger an overload SCR, providing a path for the 24V to the overload lamp on the meter, and 24V to the Main Overload relay causing it to energize, opening the ground path to the HV ON/OFF relay. To restore high voltage, the HV ON/OFF switch is depressed so that its contacts open, removing the 24V supply to the Meter Contact coils. The open contacts no longer provide a gating pulse to the specific overload SCR opening the voltage path to the overload and removing the 24V to the Main Overload relay. The Main Overload relay de-energizes, keeping its contacts to the overload position. Depressing the HV ON/OFF switch again will place its contacts in the closed position, restoring HV, and resetting the overload relay.

Should any of the interlocks open when the HV is on, the 24V supply to the HV ON/OFF relay is diverted to a line connecting all the normally closed contacts of the interlocks to the input of the Main Overload relay. An open interlock therefore places the transmitter in an overload condition, preventing the potentially dangerous application of high voltage when the open interlock is closed.

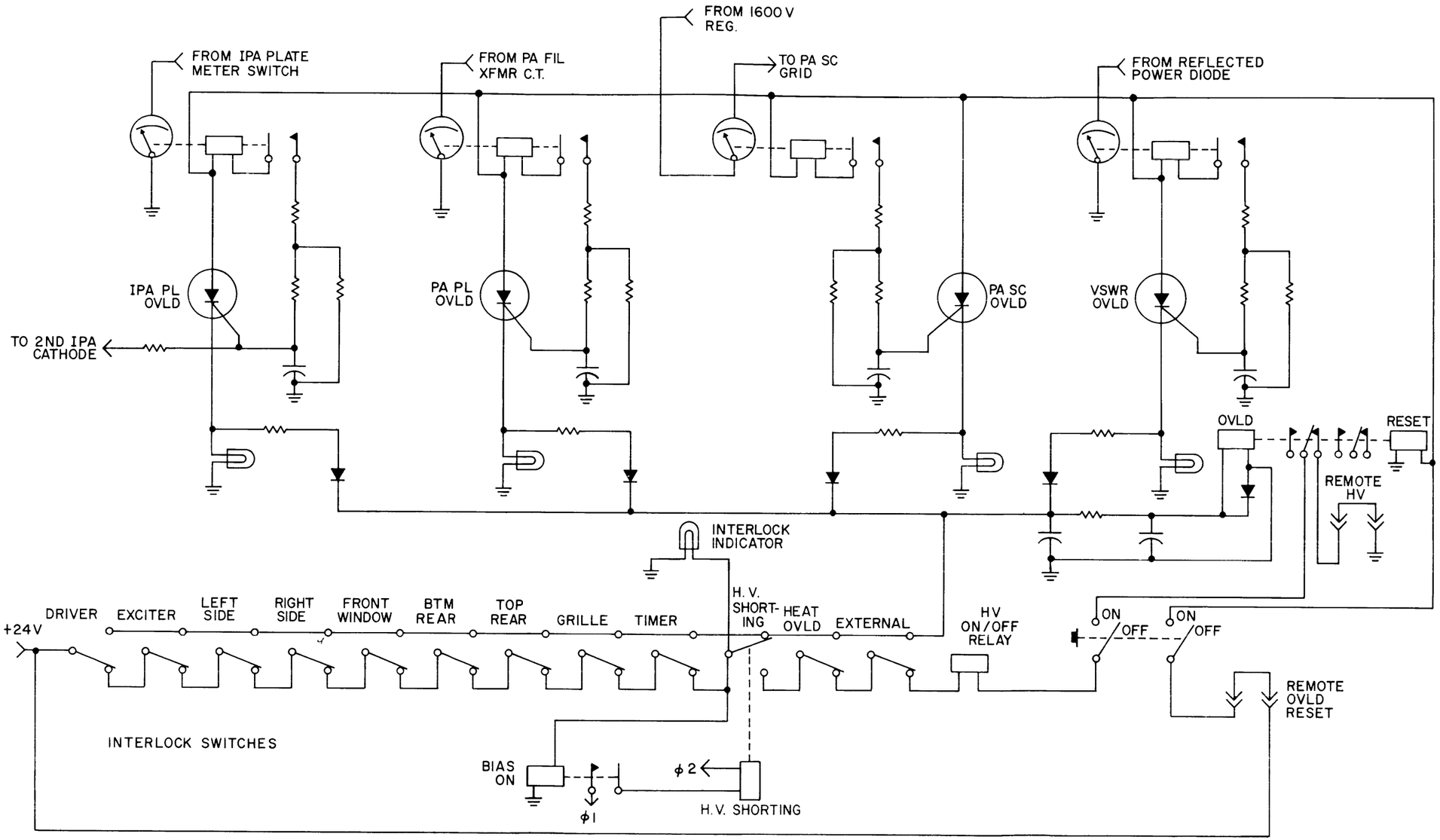


Figure 4-4. Simplified Interlock and HV Overload Circuits

4-6. AUTOMATED TUNING SEQUENCE. (Refer to Figure 4-1.)

GENERAL.

The automated tuning cycle of the transmitter is accomplished in less than 10 seconds with a "Carrier ON" ground supplied by the transmitter to the Exciter. The carrier level of 100 MW initiates the IPA Servo Amplifier into the "Search" mode whereupon the presence of IPA plate rf stops the servo controlled IPA Tuning Capacitor and places the IPA Servo Amplifier into the "Servo" mode. The Servo Amplifier will remain in the Servo mode until the dc correction voltage being fed back to the Servo Amplifier approaches zero which will initiate the "Operate" mode, illuminating the Operate lamp. The Operate Lamp voltage on the IPA Servo signals the PA Tune Servo to commence searching. RF voltage appearing at the plate of the PA tube stops the "Search" mode and places the PA tune Servo into the "Servo", then "Operate" mode when the dc correction voltage approaches zero. When the PA Tune Capacitor has completed tuning, the Load Ass'y. latches the Servo Tuning Complete relay into the Operate position. The Servo Tuning Complete relay shuts off the servo amplifiers and transfers output control to one of the selected Power Level controls connected to the Output meter. The RF Gain Control Motor will drive up, until the selected output is attained. At the selected output, a ground supplied by the sensing circuit on the Output meter will place Ready 1 and Ready 2 relays into the "Output" position. Ready 1 and Ready 2 relays illuminate the Ready lamp, ungrounds the ALDC and PTT circuits and removes the Exciter. The Exciter then automatically switches its output to the intelligence supplied.

A "Fault" circuit incorporated into the transmitter will automatically bias the transmitter near cut-off and shut off the servo amplifiers if tuning is not complete within 30 seconds.

4-7. SCHEMATIC ANALYSIS, AUTOMATED TUNING SEQUENCE. (Refer to Figure 4-1 and CK-1642 Tuning Control Board.)

a. INITIAL REQUIREMENTS FOR AUTO TUNING.

The initial requirements to commence the automated tuning sequence are; the Auto/Manual switch placed in the Auto position, an rf carrier input from the Exciter of 100 MW and the application of high voltage with the HV ON/OFF switch. Depressing the Tune button starts the sequence by providing a ground at pin (M) of PC 526, the Tuning Control Ass'y. The ground seen at pin (M) places the following relays in the Tune position; K4 the Servo Tuning Complete relay, K5 and K3 the Ready 1 and Ready 2 relays, for one half second K1 the Servo Recycle relay and the Servo OFF relays.

The application of high voltage provides approximately 150 ma of idle current in the IPA tube, V1401. The voltage thus derived from the IPA cathode is routed through now closed contacts (14) and (15) of the Servo Tuning Complete relay and normally closed contacts of K2, the Remote Meter relay to pin (1) of AZ117, the Drive-up Comparator Ass'y.

b. 100 MW TRIGGER.

The 100 MW rf input at J3004 is applied to the RF Gain control R1301 and the 100 MW rectifier circuit. The positive voltage output from the rectifier circuit is applied to pin (12) of A-1007 through the 100 MW Trigger control and out pin (11). The 100 MW Trigger control adjusts the rectified 100 MW for approximately +.5 VDC before it is applied to pin (6) of the IPA Servo Amplifier. Application of the 100 MW Trigger at pin (6) causes K1, the Search relay in the IPA Servo Amplifier to energize. A set of contacts on K1 cause a closure at pins (23) and (25) of A-1003 the IPA Servo Amplifier.

c. TUNE LEVEL. (Refer to IPA Schematic Diagram CK1680.)

Zener diode CR1105 in the IPA drawer provides a regulated 12V thru pin (14) of A-1007 to the Tune Level Control. The Tune Level Control, adjusts this voltage called Tune Level voltage to approximately 5 VDC, then routes it out pin (13) of A1007, through the closure provided by K1 at pins (23) and (25) of the IPA Servo, normally closed contacts of the Remote Meter relay to pin (2) of the Drive Up Ass'y.

There are 2 inputs at present to A1005, the Drive Up Assembly; a sample of the IPA cathode voltage on pin (1) and a Tune Level voltage on pin (2). If the cathode voltage on pin (1) is less than the Tune Level or Command signal voltage on pin (2), Q1 will be forward biased causing K1 the drive Up relay to energize. If the voltage on pin (1) is greater than the voltage on pin (2), K2 the drive Down relay will energize.

Assume that K1 has energized. Phase 3, present on pin (N) of J1001 is routed through the closure at pins (19) and (10) provided by K1 and the Upper Limit switch S1301 to the green, or drive up winding of the RF Drive motor B1301. Phase 1 from pin (Q) of J1001 is applied to pin (9) of A-1005 and out pin (6) thru the closed contacts of K1 to the red, or fixed phase winding of the Drive Motor. The Drive Motor will drive up until the Tune Level voltage and the cathode voltage are equal (IPA cathode voltage increases as more drive is being applied to the IPA stages) the conduction of Q1 will decrease, releasing K1 from an energized state. If cathode voltage is not present at pin (1) of A-1005 the RF Drive motor will continue to drive up until the Upper Limit microswitch is opened by the actuating arm on the RF Gain Control shaft, removing the drive Up phase to the motor. If the Tune Level voltage is not present, K2 will be energized causing the RF Drive Motor to drive down until the actuating arm on the opposite side of the RF Gain control shaft opens the Lower Limit switch, removing the drive Down phase to the motor. If H.V. is applied with 100 MW rf input not present, open contacts (23) and (25) on A-1003 the IPA Servo

Amplifier prevent the Tune Level Voltage from arriving at the Drive-Up Comparator, thereby providing automatic drive Down.

d. IPA SEARCH. (Refer to IPA Schematic Diagram CK1680.)

Placing the Auto/Manual switch in the Auto position removes 24V from pin (e) of J2001, de-energizing K6 the Manual relay on PC 526, the Tuning Control Ass'y and the Manual relay in the Exciter drawer.

Phase 1 available at pin (h) of J2001 through the Filament ON relay is routed to pin (19) of the PA Tune Servo and pin (F) of A-10 and the IPA Capacitor Ass'y. Pin (F) is connected to one side of the fixed phase winding of the IPA Capacitor Motor. Phase 2, tapped from the primary of the PA filament transformer is applied to pin (18) of the PA Tune Servo. Pins (18) and (19) on A-1004 therefore apply 230 VAC to the input transformer of the PA Tune Servo. The center tap of this input transformer is available at pins (34) and (35) for application to pin (J) of the IPA Capacitor Ass'y, the other side of the fixed phase winding on the IPA Capacitor motor. With the high voltage ON and the Auto/Manual switch in the Auto position, +28V is present at pin (29) of the PA Tune Servo. The 28V is routed through the now closed contacts of the HV ON/OFF relay for application to pin (29) of the IPA Servo Amplifier. This voltage is used to energize the Search relay (with application of 100 MW input at pin 6) in the IPA Servo Amplifier and applies approximately 20 VAC control voltage to pins (14), (15), and (16) at J6. The control voltage available at J6 is then routed to A1001, pins (H), (K), and (L) the control voltage windings of B1 in the IPA Capacitor Ass'y. The application of the control voltage to the IPA Capacitor Motor, disturbs the phase relationship between the fixed phase winding and the control voltage winding, starting the motor. The IPA Tuning Capacitor, coupled to the motor starts to search for resonance. The generator winding produces a feedback voltage to the IPA Servo Amplifier to maintain the motor speed constant.

e. IPA OPERATE. (Refer to Figure 4-5 and CK-1680.)

As resonance is approached, a positive dc sample of the rf voltage at the plate of V1401, the IPA tube, is routed to pin (3) of the IPA Servo Amplifier, through the IPA Trigger potentiometer. The IPA Trigger potentiometer determines the amount of plate trigger required (approximately .5V) to stop the Servo Amplifier from searching and places it into the Servo Mode.

Since C1, the IPA Tuning Capacitor provides continuous tuning it is possible that resonance may occur at two settings of the capacitor, 180° apart. To insure that the capacitor will tune on only one half of it rotation, thus assuring proper sensing voltage polarity, microswitch S-1 in the IPA Tuning Ass'y will produce a closure between pins (4) and (2) on XA1001, as the capacitor rotates from minimum to maximum capacity. The 24V on pin (4) is thus routed to pin (8) of the IPA Servo Amplifier to latch K5 in a position that will short the IPA Plate Trigger input at pin (3). When C1 rotates from maximum to minimum capacity, which is the desired portion of the tuning rotation, S-2 causes a contact closure between pins (4) and (1) of XA1001 on the IPA Tuning ASSY. The 24V on pin (4) is now routed to pin (9) of the IPA Servo Amplifier latching the opposite coil of K5, removing the short on the Plate Trigger at pin (3). Therefore, the function of S-2 is to progressively latch one side of K5, shorting the Plate Trigger when the capacitor is searching from minimum to maximum capacity, then latching the other side of K5 to remove the short, from maximum to minimum capacity.

The IPA Plate Trigger voltage causes the IPA Servo Amplifier to stop searching and places it into the Servo mode, switching motor control from a fixed voltage within the Servo Amplifier to a DC correction voltage from the IPA Phase Detector. The IPA Servo Amplifier will remain in the "Servo" mode until the dc correction voltage from the IPA phase detector diminishes to zero, at which time the operate lamp will illuminate. The phase detector compares the phase relationship between the rf voltage at the plate and the induced voltage from the toroidal at the input to the tube. When the phase relationship is other than 90° apart, a negative or positive correction voltage is developed and sent to pin (1) of the IPA Servo Amplifier to correct the control voltage to the IPA Motor, bringing it to rest at resonance. For frequency bands 4 through 9 a portion of the dc correction voltage is shunted to ground through S-2C to decrease sensitivity of the phase detector at the higher frequencies. When the correction voltage is zero the IPA Tuning motor stops, indicating that the IPA stage is tuned properly.

f. PA TUNE SEARCH. (Refer to PA Tune Schematic Diagram CK-1627.)

The Operate lamp on the IPA Servo serves as the signal for the PA Tune Servo to commence searching for resonance.

When the Operate lamp on the IPA Servo lights, 28V present on pin (17) of A1003 is applied to pin (3) of the PA Tune Servo. The RFPO adjustment on the front panel of the PA Tune Servo determines the amount of RFPO voltage required to place the PA Tune Servo into the Search mode. The RFPO voltage energizes K2 in the PA Tune Servo which routes 28V to the Search lamp and pin (2) of the Load Ass'y. The voltage at pin (2) passes through the normally closed contacts (5) and (6) of K1 to pin (5), of the Load Ass'y Comparator board. The function of this board is similar to the Drive-Up Comparator board described in section 4c. At the start of the tuning sequence the Load Ass'y Comparator board receives only one input, a sample of the PA cathode voltage at pin (1). With only the cathode voltage present, K2 the Down relay in the Load Ass'y Comparator board is energized causing the Load Capacitor to withdraw from any previous position to minimim capacity. At minimum capacity the Load motor is shut off by the action of the lower limit switch opening. A sample of

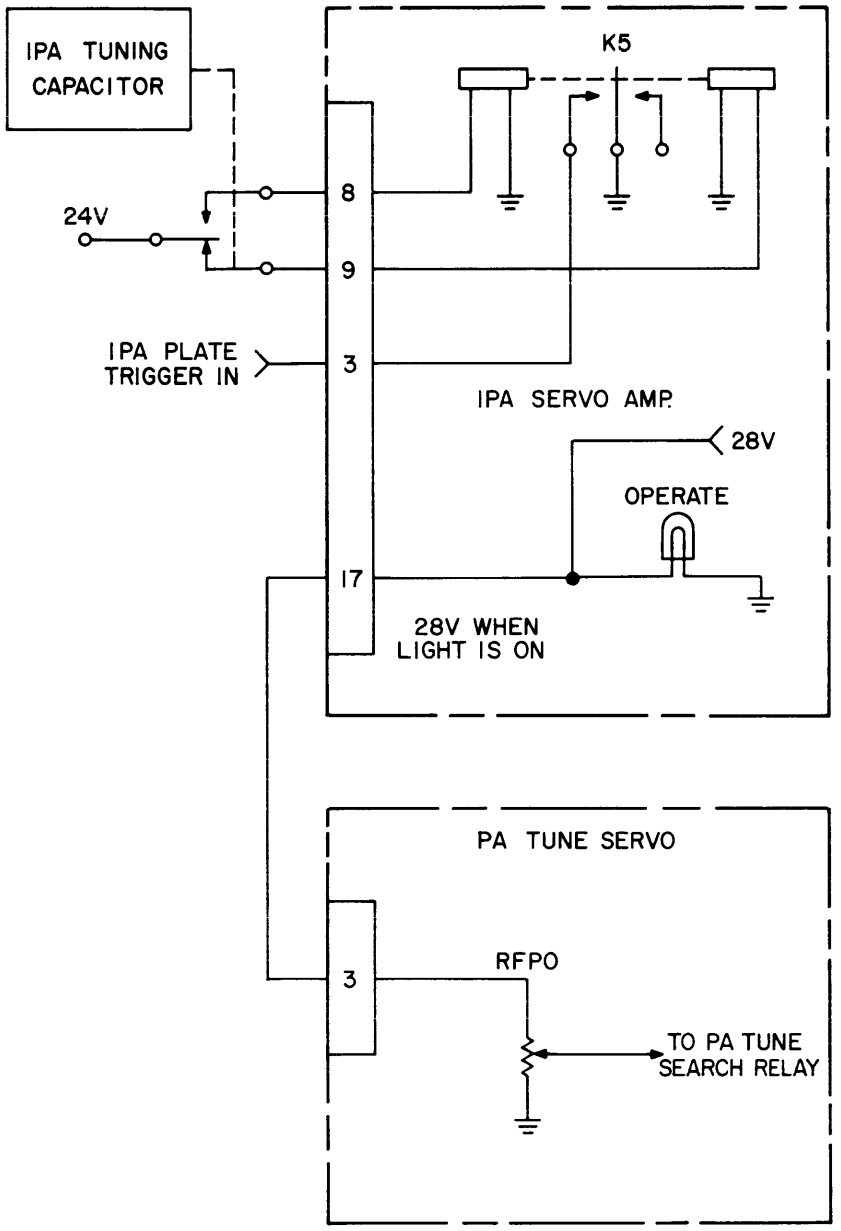


Figure 4-5. IPA Plate Trigger Shorting and RFPO Input to PA Tune Servo

the PA rf voltage is delayed to pin (2) of the Load Comparator until the PA Tune Servo goes into the Operate mode at which time 28V energizes K2, closing its normally open contacts, completing the path from pin (E) of the Load Assembly to pin (1) of the Load Comparator. The Load compacitor is kept at minimum capacity during PA Tuning to assure the presence of sufficient rf trigger at all times.

Phase 1 and 2 are present on the fixed voltage winding of the PA Tune Motor whenever the Auto/Manual switch is placed in the Auto position. Control voltage to the control winding of the PA Tune motor is supplied by pins (14), (15) and (16) of the PA Tune Servo. The PA Tune motor will commence searching in the direction that K2 the Tune Servo Rotation relay was last latched in. If K2 had last latched in the "Servo CW" position contacts (9) and (10) close, which are connected to pins (21) and (19) respectively. The closure seen at pins (21) and (19) will vary the control voltage at pins (14) (15) and (16) so that the PA Tune motor will start searching in a CW manner until it hits the Upper Limit switch or finds an rf trigger to stop it. Should the PA Tune motor travel to the Upper Limit switch the closure of these contacts will switch 24V to the "Servo CCW" coil of K2 reversing the direction of the PA Tune motor. The generator winding of the PA Tune motor provides feedback voltage to the PA Tune Servo at Pins (36), (37), (11) and (12) to maintain the motor speed constant.

As resonance is approached a sample of the PA plate rf leaves pin (E) of the PA Sense Ass'y and enters A1007 in the IPA at pin (E18) for application to the PA Plate Trigger potentiometer. The PA Plate Trigger determines the required level of plate rf necessary to stop the PA Tune Capacitor from searching. The PA Plate Trigger leaves A1007 at pin (E-17) and enters the PA Tune Servo at pin (21).

With application of the plate trigger the Search mode ends and the "Servo" mode commences, with motor control being switched from a fixed voltage within the Servo Amplifier to a dc correction Voltage from the PA Phase Detector. The PA Tune Servo will remain in the Servo mode until the DC correction voltage from the PA phase detector circuit diminishes to zero, at which time the Operate lamp will light indicating the completion of tuning.

The correction voltage leaves the PA Sense Ass'y at pin (L) and enters the PA Tune Servo at pin (1). The correction voltage at pin (1) provides the necessary change in control voltage at pins (14), (15) and (16) to bring the PA Tune motor to resonance.

g. LOAD CAPACITOR OPERATION. (Refer to PA Load Capacitor Schematic Diagram CK-1628.)

When the PA Tune Servo goes into Operate, a +28V "Load Servo ON" signal leaves pin (32) of the PA Tune Servo and enters pin (3), of J1002 on the Load Ass'y. The "Load Servo ON" signal energizes K2, completing the path for the PA rf sample from pin (E) of J1008 to pin (1) of the Load Comparator board. The rf sample available at pin (E) of the PA Sense Ass'y is also fed to the Load Sense potentiometer. The Load Sense potentiometer is adjusted so that loading is correct when the Output meter reads 1 KW. The Load Sense meter which sits across the two inputs to the Load Comparator board is therefore adjusted to read zero ±100 at 1 KW. When the Load Sense meter reads to the left of zero center, the Load Capacitor will travel upwards, increasing the loading capacity. When the meter reads to the right the Load Capacitor will travel down, decreasing the loading capacity.

h. TUNING COMPLETE AND OUTPUT LEVEL. (Refer to Figure 4-6 and Tuning Control CK-1642.)

When the Load capacitor completes tuning, +28V is routed through the normally closed contacts of de-energized K1 and K2 the load Up and Down relays to pin (16) of the Load Ass'y. Comparator board. This +28V, called the Tuning Complete signal leaves pin (L) of the Load Ass'y and enters pin (7) of the Tuning Control Assembly. The Tuning Complete signal energizes K4, the Servo Tuning Complete relay through CR3 which provides a one half second time delay before K4 will latch into the Operate condition. Contacts (14) and (15) of K4 open, removing the IPA cathode input to pin (1) of the Drive-Up Comparator board. Pins (23) and (25) connected to K1 in the IPA Servo open, removing the variable Tune Level Voltage to pin (2) of the Drive-Up Comparator. Pins (23) and (24), connected to K1 in the IPA Servo resume their normally closed position removing from ground a fixed +12V to pin (2) of the Drive-Up comparator. The RF Gain Motor starts to drive up. Drive up will continue until the Power Output meter reaches a level as determined by one of the selected four Power Level potentiometers. At the preset output level, the sensing circuit in the NW 161 will present a ground at pin (4) for application to pin (F) of the Tuning Control Assembly. The ground is passed through contacts (6) and (7) of K4 the Servo Tuning Complete relay to pin (3) of the Ready 1 relay, K5. K5 will latch into the Output condition and in turn release Ready 2 relay, K3 from the Tune condition. With Ready 1 latched in the Output position the following functions are performed;

1- Contacts (5) and (6) open, removing the "Carrier ON" ground to the Exciter.

2- Contacts (15) and (16) close, providing 24V to the Ready lamp and removing 24V to the FAULT circuit.

With Ready 2 released from the Tune condition the following functions are performed;

1- Contacts (9) and (10) open, removing the ground provided by the Auto/Manual switch to the PTT circuit.

2- Contacts (6) and (7) open, removing the ground on the ALDC line, therefore making ALDC operative only after the transmitter has completed tuning.

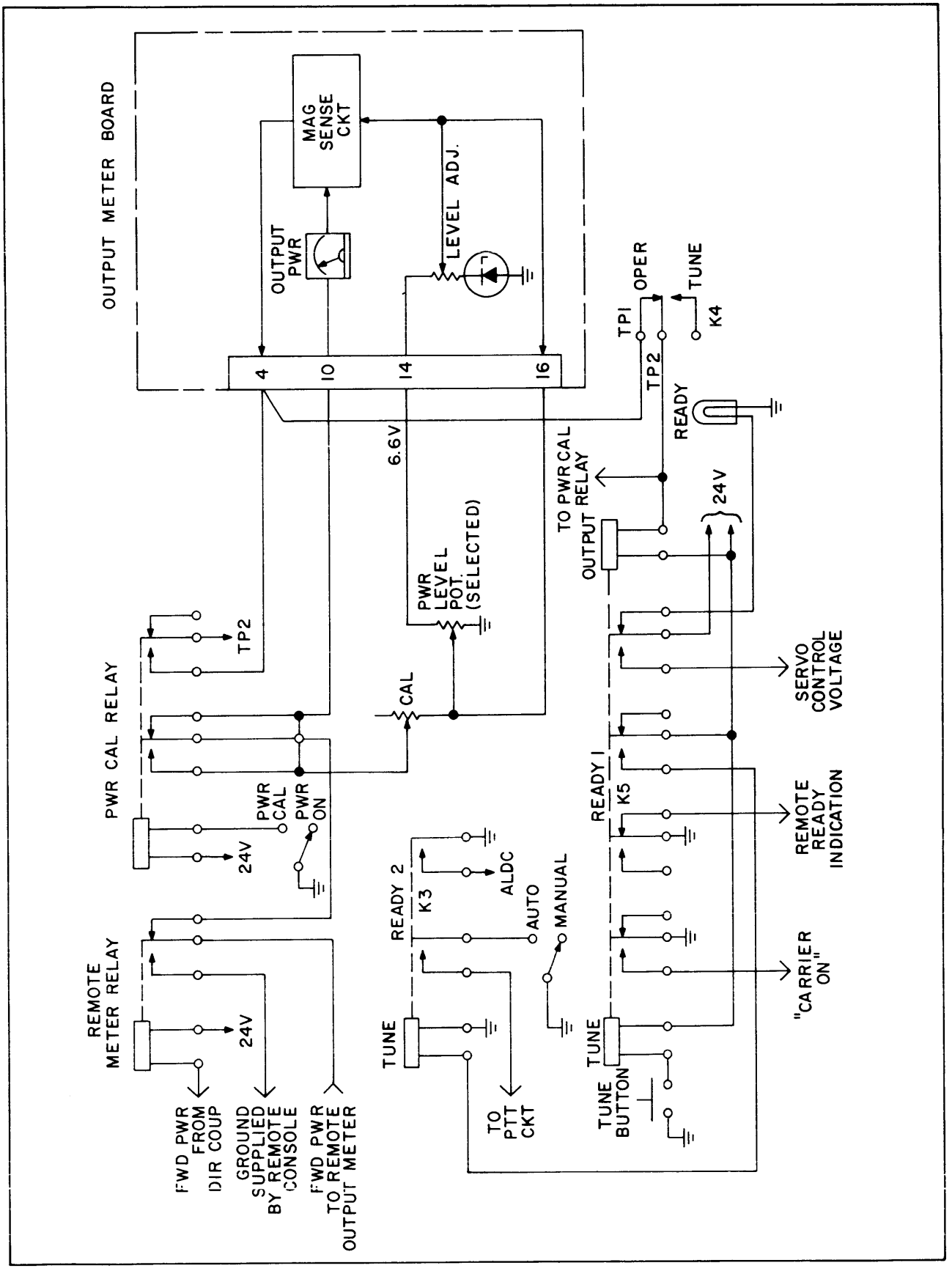


Figure 4-6. Functional Diagram of Power Level Circuit and Output Control When Ready

The removal of the "Carrier ON" ground is the signal to the Exciter to automatically switch to the desired intelligence for transmission.

i. FAULT. (Refer to Schematic Diagram CK-1642, Tuning Control Board.)

Should the transmitter fail to completely tune approximately 30 seconds the time adjustable Fault circuit will automatically light the local and remote Fault indicators and remove AC power to the Servo Amplifiers.

The RC time constant of R4, the Delay Adjust and C2 in the Tuning Control Ass'y determine the delay desired to energize K7, the Fault relay. When K7 is energized the ground provided through contacts (6) and (7) energize the Servo OFF relays removing AC power to the Servo Amplifiers, thus shutting them off. To recycle the tuning sequence after a Fault has been obtained requires the depression of the Tune button. The Tune button momentarily energizes K1 the Servo Recycle relay removing the 24V path from pin (6) to the Fault relay. With the supply voltage removed, the Fault lamp extinguishes and the tuning sequence starts again.

4-8. ALDC.

The ALDC circuit provides a feedback voltage to the Exciter to prevent excessive rf output from the transmitter. Selection of Power levels 1, 2, 3 or 4 will select the corresponding ALDC threshold potentiometer for that particular Power Level selection.

The Power Level Ledex motor, switches S-1A thru S-1G to select the appropriate ALDC potentiometer. A filtered 24V is routed through the selected potentiometer and applied to pin (A) of the PA Sense Ass'y. This voltage is used to back bias, the ALDC rectifier. The threshold adjusted ALDC voltage leaves the PA Sense Ass'y at pin (C) and is routed to pin (n) of J2002 of the Exciter drawer for application to the ALDC input of the Exciter. The ALDC threshold adjustment is normally adjusted on carrier so that increases in rf will not exceed the Power Level reading.

4-9. AUTOMATIC POWER LEVEL. (Refer to Figure 4-6.)

The transmitter is capable of selecting any of four preset Power Output Levels as determined by output requirements of the using station. The Output Meter board sensing circuit compares the forward power input from the Output Meter with a preset voltage from the selected Power Level potentiometer. When the two voltages are equal the sensing circuit presents a ground to the Ready 1 relay to latch it into the Output position.

The forward power input from the Output Directional Coupler is routed the normally closed contacts of the Remote Meter relay. The application of a ground to the Remote Meter relay from a remote control console would divert the forward power voltage to a remote meter. After passing through the remote meter provision the forward power is routed through normally closed contacts of the Power-Cal relay to pin (E10) of the Output Meter board. The forward power voltage is then applied to the output sensing circuit through the Power Output meter. A supply of 6.6V available from pin (E14) of the Output Meter board is applied to the four Power Level potentiometers. Selection of the desired Power Level potentiometer is performed by momentarily pressing the Power Adjust switch to the Power position (Up) until the desired Power Level Indicator illuminates. The Power position of S-1C, provides a ground to 24V Ledex Motor which moves the Pwr. Advance switch. The preset voltage of the selected Power Level pot is also applied to the output sensing circuit. When the two inputs to the output sensing circuit are equal, a ground from pin (4) of the Output Meter board energizes Ready 1 relay through the now closed contacts of the Servo Tuning complete relay.

Calibration of the Power Level circuit is performed by substituting the forward power input at pin (10) of the Meter board with a calibrated voltage. Placing the Power Adjust switch in the Adj. position (Down), energizes the Pwr. Cal relay and applies the calibrated voltage to the Power Output meter and the output sensing circuit. The Pwr. Adjust position provides a convenient means for the operator to determine the Power Level setting as the Power Output meter, directly reads the value of KW power that the Ready lamp will light at. The Level Adjust, on the Output Meter board is adjusted to provide a lower limit reference and the Cal potentiometer (R6) adjusts the upper limit reference. With the Level Cal. potentiometers calibrated, any power level between 1.5KW and 10KW may be obtained by depressing the Power Cal. switch and adjusting any of the Power Level potentiometers to the desired level as indicated by the Output meter.

4-10. BANDSWITCH CONTROL. (Refer to Figure 4-7.)

GENERAL.

Bandswitching within the transmitter may be performed locally with the PA Bandswitch Control or automatically by frequency selection on the Exciter when the Auto/Manual switch is in the Auto position. A remote bandswitching provision is also available.

DETAILED CIRCUIT ANALYSIS.

Bandswitching is accomplished by providing a ground to the PA Bandswitch Control Switch wafer in the Manual mode, or the PA Bandswitch Servo Control notch homing wafer in the Auto mode. The ground thus provided will then be routed to the PA Bandswitch relay which supplies AC voltage to the PA Bandswitch Motor.

a. MANUAL CONTROL.

Placing the Auto/Manual switch, S5002 into the Manual position provides 24VDC to KC the manual relay; the normal open contact closes on K6 providing

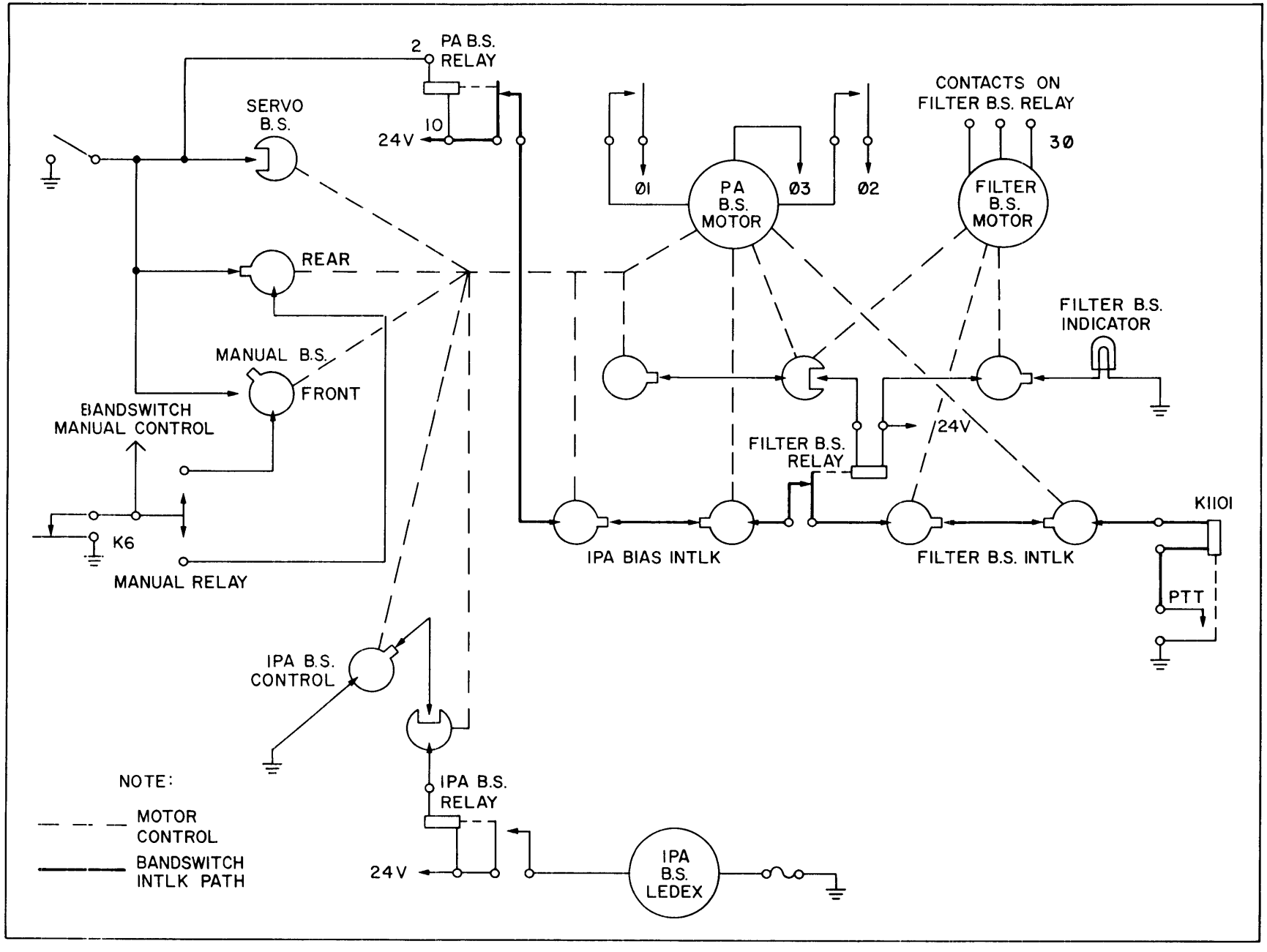


Figure 4-7. Bandswitch Control for Typical Band

a ground to pin (X) of the Tuning Control Ass'y. Pin (X) is connected to the common arm of the Bandswitch control switch, S5004. The two poles of this switch are connected to pins (i) and (j) of J1. When the neutral arm is moved to the right, the ground picked up at pin (i) is routed through PA Bandswitch Manual Control rear wafer to pin (2) of the PA Bandswitch relay K1, Pin 10 of the PA Bandswitch relay has a fixed +24V input. The PA Bandswitch relay energizes, routing phase 1 and 2 from pins (A) and (B) of A704J2 to the PA Bandswitch Motor. With phase 3 already present on the motor from pin (C) of A704J2, the motor moves the switches coupled to it, one position. The PA Bandswitch Manual Control, rear wafer having moved one position in a counterclockwise direction, has moved into an open position (2.3-2.6) therefore removing the ground to the PA Bandswitch relay. To move the PA Bandswitch Motor further, the ground on the common arm must now be supplied to pin (j), or the arm must be moved to the left. Moving the neutral arm to the left will now supply a ground to the PA Bandswitch relay through the PA Bandswitch Control, front wafer moving the PA Bandswitch motor one more position. Therefore, the PA Bandswitch Manual control lever must be moved to the left and right to move the PA Bandswitch in a stepping manner.

The PA Bandswitch Indicator wafer receives 24V to its wiper from pin (N). With the control switches as shown schematically in band 1, the 24V will be routed through the wafer to pin (M) which is connected to the 2-2.3 PA band indicator light.

With the PA Bandswitch at rest in the 2-2.3 MHz band the 24V that supplies pin (10) of the PA Bandswitch relay is routed thru normally closed contacts (11) and (8) to pin (R) of A204J2. This voltage may be considered IPA and Filter bandswitch interlock voltage. It is routed thru the IPA Bandswitch interlock wafers, the normally closed contacts of the Filter Bandswitch relay, the Filter Bandswitch interlock wafers and finally to one side of the PTT relay K1101. It can be seen that unless all bandswitch relays and interlock wafers are in the same position at rest, the PTT relay will not be energized resulting in the transmitter being placed close to cut-off.

A ground provided at pin (B) A104J1 is routed thru the IPA Bandswitch control, front wafers to the notch homing control wafer on the IPA bandswitch. When a ground is seen at pin (2) of K1, 28V present at pin (22) of J1 will energize K1, routing 28V to K3, the IPA Bandswitch Ledex Motor. The IPA Bandswitch Ledex Motor will rotate until the notch breaks the ground connection to K1.

A ground provided at pin (T) J2 is routed thru the Filter Bandswitch control, front wafer to the notch homing wafer in the filter. The Filter Bandswitch relay will be energized until the notch on the wafer opens the ground path to pin (2) of the relay. Phases 1 and 2 are routed thru contacts (6) and (7) and (9) and (11) to the Filter Bandswitch relay to the Filter Bandswitch Motor while phase 3 is a constant input. The 24V from pin (P) that supplies the Filter Bandswitch relay also provides voltage for Filter Bandswitch indication.

b. AUTO CONTROL.

Placing the Auto/Manual switch in the auto position removes the ground supplied to the neutral arm of the Bandswitch Manual Control. The ground necessary to energize the PA Bandswitch relay must then be supplied. The PA Bandswitch Servo Control notch homing wafer from the Exciter or a Remote Control Console. A ground thus obtained will keep the PA Bandswitch relay in an energized state until the notch removes the ground. All other functions of bandswitching are similar to Manual bandswitching as described in paragraph 4-10a.

4-11. HARMONIC FILTER. (Refer to Figure 4-8.)

The output from the PA tuning circuit is applied to Harmonic Filter, AF109 to provide at least -80db harmonic rejection at the transmitter output. The Harmonic Filter is a low pass filter supplying the necessary harmonic suppression (with minimum insertion loss) in six automatically switched bands. The switched filter bands cover the PA Bandswitch frequency selection, rejecting all frequencies beyond the upper limit of each band.

4-12. IPA SERVO AMPLIFIER, AZ-119. (Refer to Figures 4-9 and 4-10.)

The IPA Servo Amplifier, AZ-119 supplies control voltage to the IPA Capacitor Motor. The Servo Amplifier has three modes of operation; "Search," "Servo" and "Operate". Each of these modes are discussed in sequence.

a. SEARCH MODE.

A 100 mw trigger signal received at pin 6 of A-1003 the rear connector of the Servo Amplifier is routed to pin 1 of the relay driver, connector DB-255. A 28 VDC signal from the PA Tune Servo is also routed to the IPA Servo Amplifier through pin 29 of A-1003 and is applied to pins 1 and 6 of relay K1. The presence of the 100 mw dc voltage on pin 1 of the relay driver module produces a ground on pin 4. The ground is applied to pin 4 of K1, causing it to energize. Contacts 12 and 13 of K1, hold the relay in the energized position (through ground). Contacts 6 and 7 of K1., route the 28 vdc to the Search lamp causing it to illuminate. Contacts 9 and 10 of K1 provide a contact closure at pins 23 and 25 of J6 for the Tune Level voltage. The 28 vdc from pin 29 of A-1003 is also applied to a 100 K dropping resistor before being directed to contacts 15 and 16 of K1. The motor speed is controlled by the resistor in series with the 100 K resistor. This resistor is grounded at one end through pin 7 of J6. From contact 15 of K1, the voltage is directed to contacts 14 and 15 of de-energized relay K2 and routed to pin 1 of the Servo Amplifier connector DA15S. The 28 vdc is also routed to pin 8 of relay driver connector DB-255 to enable the K2 driver circuit. The application of 1/4 volt plate trigger from pin 3 of A-1003 to pin 10 of DB 25S enables a

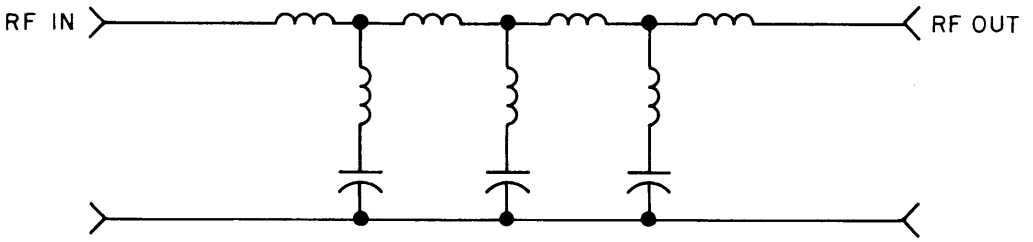


Figure 4-8. Equivalent Circuit of Harmonic Filter, AF109

a ground to be seen at pin 7, allowing K2 relay to energize. Contacts 12 and 13 of K2 hold the relay energized (through ground).

b. SERVO MODE.

When relay K2 is energized, the motor is switched from a fixed control voltage from within the Servo Amplifier to the dc correction voltage developed by the sensing circuit.

Contacts 15 and 16 of energized relay K2 enable the sensing circuit signal from pin 1 of A1003 routed to pin 1 of connector DA15S. When the sensing circuit signal diminishes to zero, the ground is removed from pin 16 of the relay amplifier connector DB25S, which de-energizes relay K3. The 28 vdc is then able to be routed through contacts 6 and 7 of K2, to contacts 11 and 12 of K3 to the Operate lamp, enabling it to light.

c. OPERATE MODE.

As the sensing circuit signal diminishes to zero, the AC voltage from pin 8 and 15 of connector DA15S also deminishes to zero, causing the servo motor to stop.

Relay K4 is energized by a 28 vdc "servo disabling" signal arriving at pin 13 from the PA Tune Servo. Contacts 12 and 13 of K4 disable the dc correction voltage to the Servo Amplifier module.

The condition of relay K5 is controlled by a lever on the IPA Capacitor shaft, activating one of two microswitches. During the undesired portion of the IPA Tuning Capacitor rotation, contacts 6 and 7 of K5 ground the IPA plate trigger input at pin 3. (Refer to Figure 4-5 and paragraph 4-7e).

The PA Tune Servo supplies 52 VRMS to pins 18 and 19 of A1003, where it is then routed to the bridge rectifier circuit and the AC ON lamp.

4-13. PA TUNE SERVO AZ-118. (Refer to Figures 4-9 and 4-11.)

The PA Tune Servo Amplifier, AZ-118 supplies control voltage to the PA Tuning capacitor Motor. The Servo Amplifier has three modes of operation; "Search", "Servo", and "Operate". Each of the modes are discussed in sequence.

a. SEARCH MODE.

The Operate lamp on the IPA Servo Amplifier supplies 28 vdc to the RFPO (RF Power ON) input on the pin 3 of the rear connector J7. The RFPO adjustment on the front panel of the PA Tune Servo determines the amount of RFPO voltage required to place the PA Tune Servo into the Search mode.

The application of the RFPO input on pin 6 of Servo Amplifier connector DB25S, causes the ground felt at pin 20 to energize relay K2. With K2 energized, 28 vdc is applied to pin 7 of module 159BR and to the Search lamp, causing it to illuminate. The signal path between pin 11 of module 159BR and pin 10 of 159BSA is broken by contacts 3 and 4 of K2 opening. Module 159BSA now receives a 60 cps signal from terminal 11 of transformer T1 via; contacts 11 and 12 of K1, a resistor, terminals 2 and 4 of K2 to pin 10 of module 159BSA. This 60 cps signal is amplified in 159BSA and then routed to the associated tuning motor.

b. SERVO MODE.

A rectified sample of the PA plate rf enters the PA Tune Servo at pin 21 of J7 and is routed to pin 1 of module 159BSA via contacts 8 and 9 of K1. The 159BSA module amplifies the rectified signal and routes it out pin 3, through contacts 5 and 6 of K1 to pin 1 of module 159BR. The presence of the amplified plate trigger signal at pin 1 of module 159BR causes a ground to be felt on pin 4, energizing K1. Contacts 15 and 16 on K1 close, routing 28 vdc to the Operate lamp.

c. OPERATE MODE.

Motor control to the PA Tuning Capacitor Motor is now switched to the dc correction voltage arriving at pin 1 of J6 from the PA Phase Detector circuit. The dc correction voltage at pin 1 of J6 is routed through now closed contacts 9 and 10 of K1 to pin 1 of module 159BSA. The dc correction voltage on pin 1 of 159BSA is amplified and leaves the module at pin 3, returning to pin 10 via the now closed contacts 6 and 7 of K1 and the gain adjusting resistor on TB1.

When the dc correction voltage reaches zero, the motor from pins 8 and 15 of module 159BSA also diminishes to zero, causing the motor to stop.

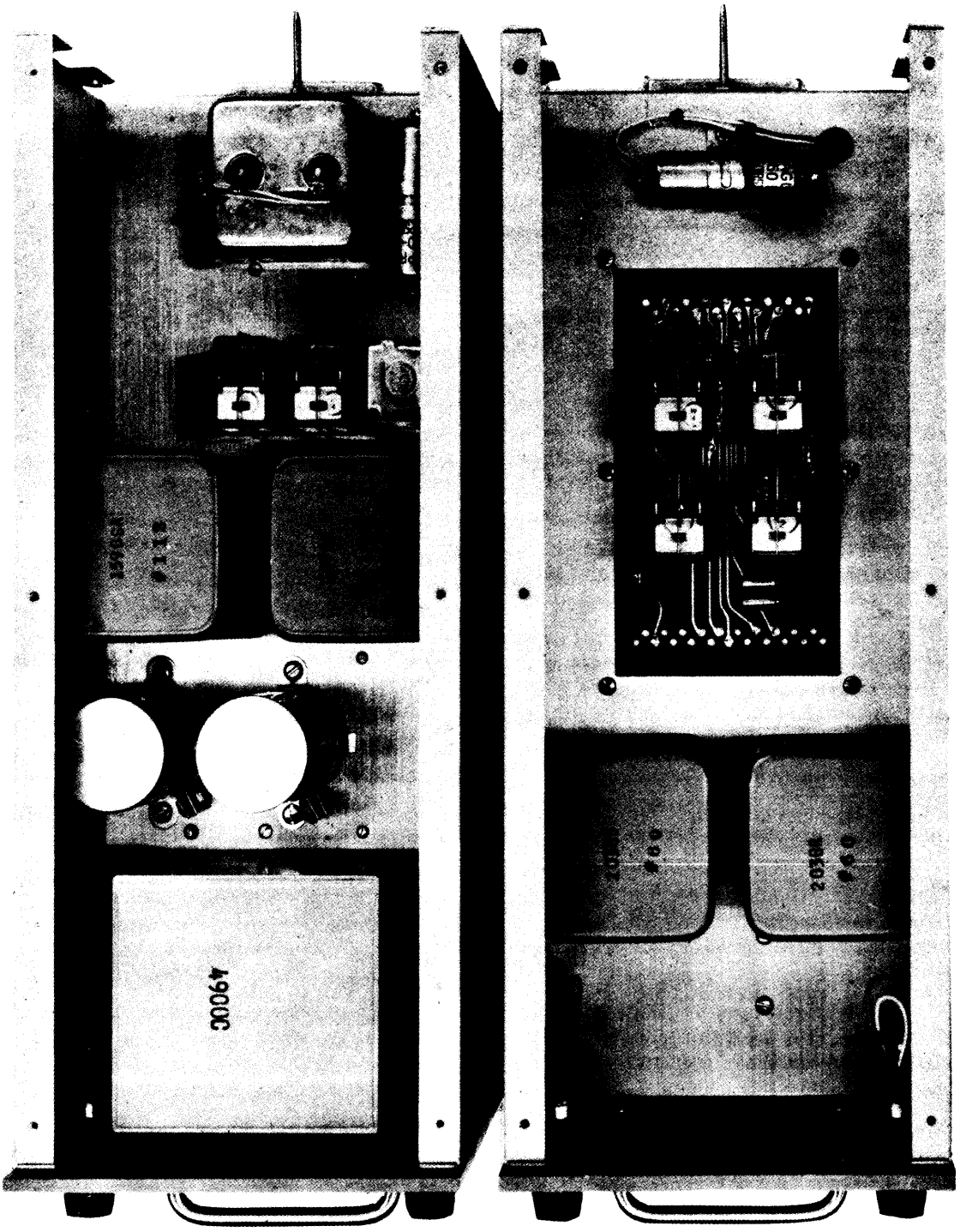
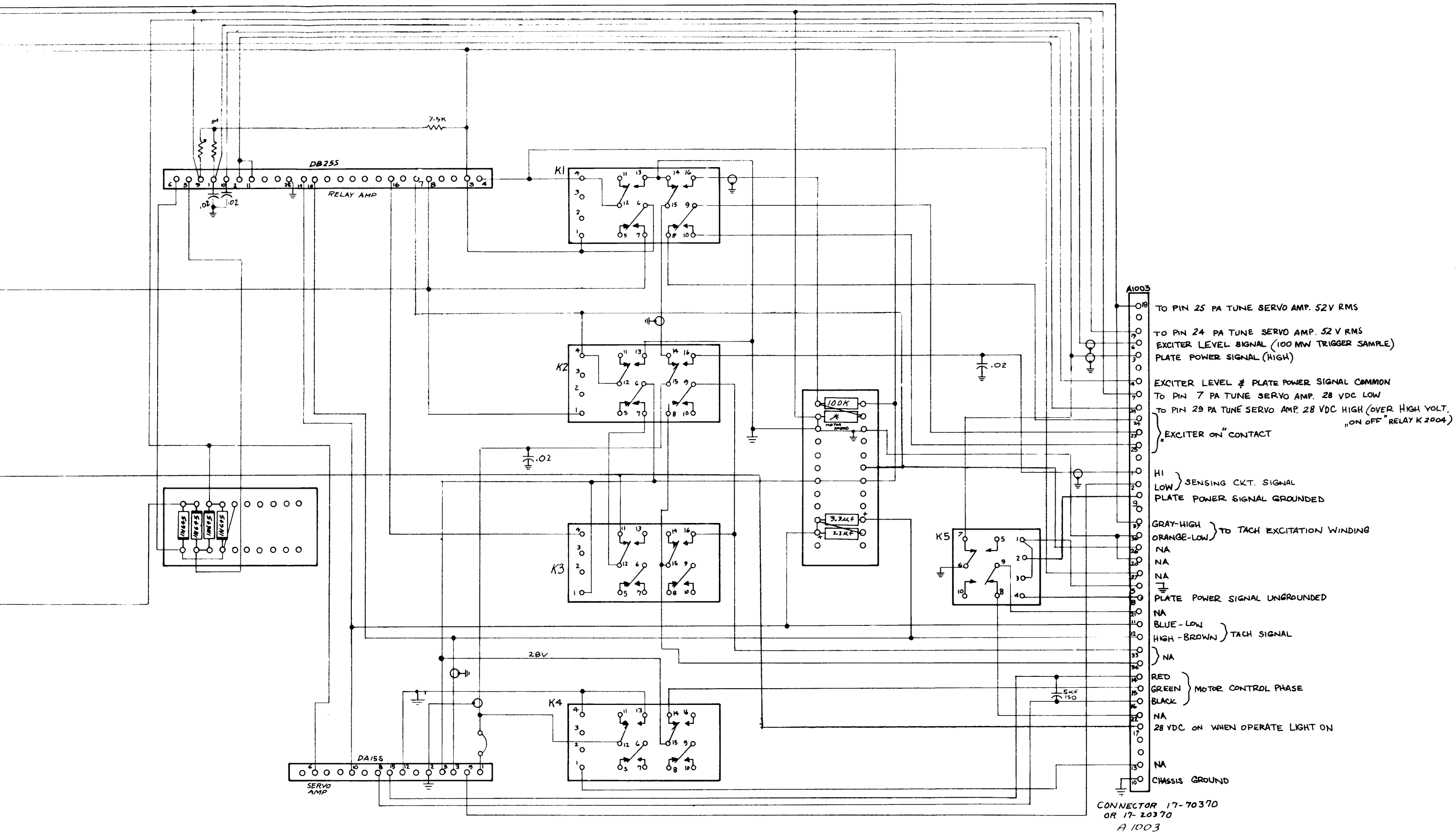
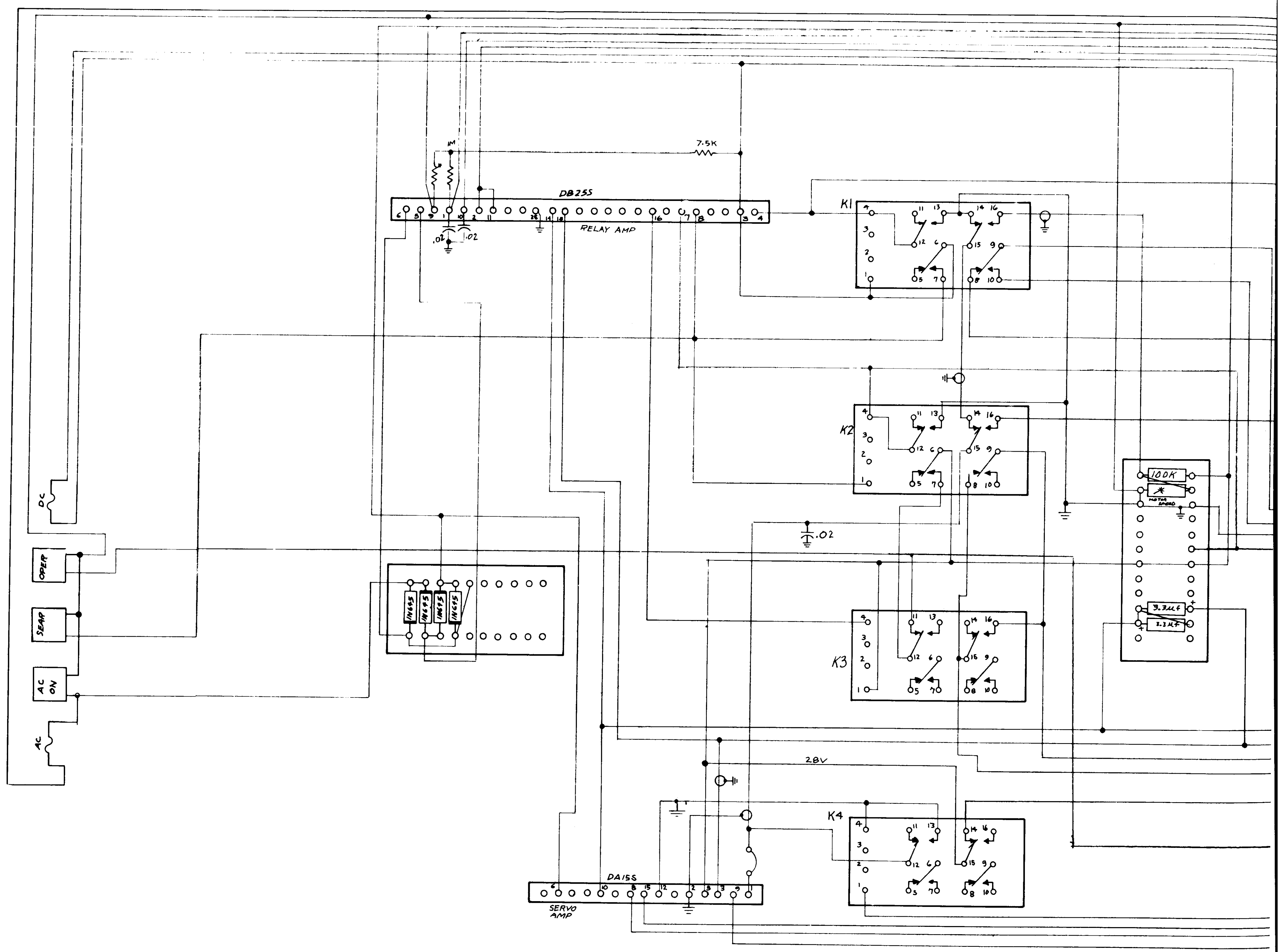


Figure 4-9. Top View, PA Tune Servo Amplifier and IPA Servo Amplifier



CK1681

Figure 4-10. IPA Servo Amplifier, AZ119



DB25S
RELAY AMP
7.5K
1M
.02
.02
K1
K2
K3
K4
.02
100K
MOTOR SPEED
3.3μf
3.3μf
IN645
IN645
IN645
IN645
28V
DA15S
SERVO AMP
DC
OPER
SEAR
AC ON
AC

011691035

MODULE DB 25-5
159B-R

RFPO ADJ 50K

K2 (8000Ω)

K3

K1

TB-1

TB-2

MODULE 159BSA

DA15S

MMT21FB

IN4436

IN1645

TB1

A1004

50/60~ POWER SUPPLY
NA
NA
PRE-POSITION CKT COMMON
LOW / HIGH 26V 60~ TACH EXCITATION
NA
FEEDBACK POT SIGNAL
PRE-POSITION SIGNAL
HI / LO RF POWER ON
SEARCH DIRECTION MOMENTARY SWITCH NC LIMIT SWITCH
LOAD SERVO ON SIGNAL (+28VDC)
CONNECT TOGETHER FOR 220V OPERATION 18 TO 34; 19 TO 35 FOR 110V OPERATION
NA
52V RMS FOR IPA SERVO
CHANGE JUMPER FOR 50/60 CPS
IPA AMP. OFF SIGNAL (+28V)
NA.
CHASSIS GROUND
GREEN / RED / BLACK MOTOR CONTROL PHASE
HI / LO TACHOMETER SIGNAL
PLATE POWER TRIGGER
HI / LO SENSING CIRCUIT SIGNAL

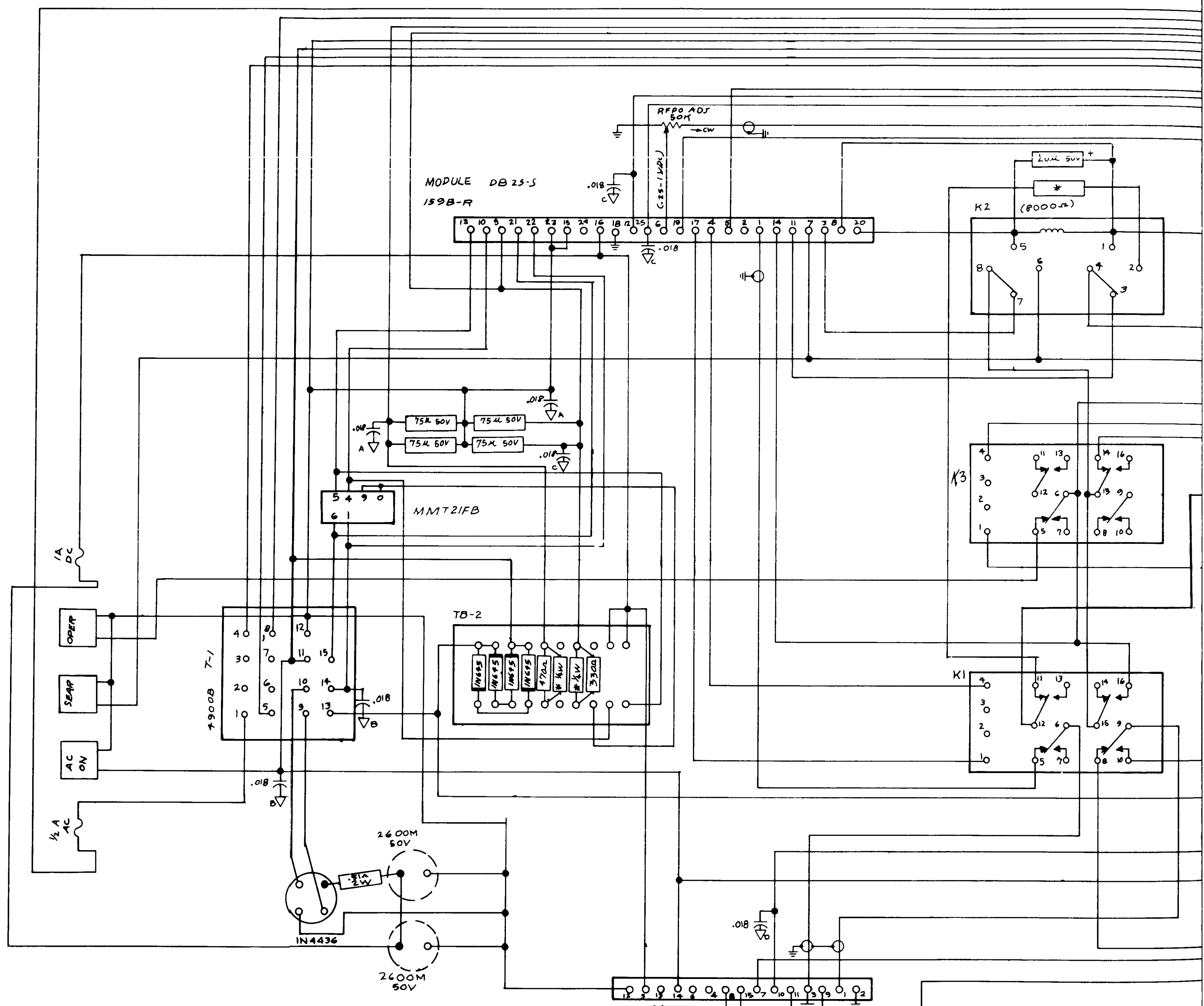
= SELECTED BY TEST
S ARE V4W UNLESS SPECIFIED
CITORS ARE CERAMIC BY PASS.
T LOCATED ON FRONT PANEL

□ DENOTES TB 3 (1 THRU 10)

CONNECTOR 17-70370 OR 17-20370 A 1004

CK1682

Figure 4-11. PA Tune Servo Amplifier, AZ118



* VALUE SELECTED BY TEST
RESITORS ARE ¼W UNLESS SPECIFIED
.018 CAPACITORS ARE CERAMIC BY PASS.
RFPO POT LOCATED ON FRONT PANEL

011691

SECTION V
MAINTENANCE

5-1. INTRODUCTION

The PALA-10K transmitter has been designed for long term trouble free operation. When it becomes necessary to perform alignment and/or adjustments to the equipment, it is recommended that technicians perform the necessary operations outlined under FIELD MAINTENANCE.

A. The following maintenance aids are provided for troubleshooting, alignment and replacement of parts.

1. System block diagram (section 4 Figure 4-1)

2. Fuse Location Drawing (Figure 5-8)

3. Fuse Functions (Table 5-3)

4. System overload and bias setting procedure

5. Alignment procedure

6. Maintenance Programs (for troubleshooting)

5-2. LIST OF TEST EQUIPMENT REQUIRED

Signal Generator	Hewlett Packard Model-606A or equivalent
VTVM	Hewlett Packard Model-410B or equivalent
Multimeter	Simpson Model-260 or equivalent

5-3. OPERATORS MAINTENANCE PROCEDURE

a. Refer to operational checkout procedures for manual or automatic depending on desired mode of operation (Paragraph 3-4 or 3-5).

b. Operator's troubleshooting chart (Table 5-1).

5-4. PREVENTIVE MAINTENANCE

In order to prevent equipment failure due to dust, dirt or other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to.

At periodic intervals, the equipment should be pulled out on its slides for internal cleaning and inspection. The wiring and all components should be inspected for dirt, dust, corrosion, grease or other harmful conditions. Remove dust with a soft brush or vacuum cleaner. Remove dirt or grease with any suitable cleaning solvent. Use of carbon tetrachloride should be avoided due to its highly toxic effects. Trichlorethylene or methyl chloroform may be used, providing the necessary precautions are observed.

WARNING

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

CAUTION

When using trichlorethylene, avoid contact with painted surfaces, due to its paint removing effects.

5-5. TROUBLESHOOTING

The first step in troubleshooting the automated system is as follows:

a. Observations. Observe the operation of transmitter and determine whether the indications are normal or abnormal. (Refer to operator's section both manual and automatic tuning.)

b. Fuse Checks. Should a malfunction occur a visual check of fuses on the system must be performed. (All fuses are indicating type except for the servo amplifiers.) (Refer to Figure 5-8 for fuse location.)

c. Voltage checks. At this time voltage checks are not necessary until localization of the malfunction has taken place.

d. Localization of malfunction. Perform the operational check-out procedure outlined in paragraph 3-4 or 3-5. Use of this procedure will help localize the particular fault at hand.

Troubleshooting charts have been specially prepared to assist you in localization of a malfunction should one occur. The manner in which the table has been written gives a logical sequential order for localizing malfunctions.

e. Field maintenance. Procedures presented on the following pages give instructions for qualified personnel to maintain, align, and/or troubleshoot the PALA-10K Transmitter.

WARNING

When it becomes necessary to measure transmitter voltages, use extreme caution, hazardous voltage potentials are present although Main Power breaker may be OFF. It is recommended that the following precaution be strictly adhered to ! !

1. CHECK TO ASCERTAIN MAIN PRIMARY POWER IS OFF OR REMOVED FROM TRANSMITTER.

2. SHORT OUT ALL H.V. POINTS WITH SHORTING STICK PROVIDED.

3. ATTACH TEST METER TO POINT OF TEST DESIRED, RE-APPLY VOLTAGE TO TRANSMITTER.

4. WHEN MEASURING HIGH VOLTAGE POTENTIALS DO NOT TOUCH TEST METER OR LEADS ONCE VOLTAGE HAS BEEN APPLIED.

5. ESTABLISH TEST CONDITIONS AND OBSERVE READING ON TEST METER.

6. REMOVE PRIMARY POWER, SHORT OUT ALL HIGH VOLTAGE POINTS; REMOVE TEST METER.

TABLE 5-1. OPERATOR'S TROUBLESHOOTING CHART

NO.	MALFUNCTION	PROBABLE CAUSE OF MALFUNCTION
1	IPA Blower will not operate.	REPLACE DEFECTIVE IPA BLOWER FUSE (2 AMPS).
2	Interlock Indicator will not light.	
3	RF GAIN control will not drive-up with required input present.	REPLACE DEFECTIVE BIAS FUSE (1/10 AMP).
4	PA PLATE CURRENT excessive IPA PLATE CURRENT excessive overloads continues to trip.	
5	PA TUNE Control will not operate manually.	REPLACE DEFECTIVE 24 VDC FUSE (8 AMPS).
6	PA LOAD Control will not operate manually or automatically.	
7	BANDSWITCH Control will not operate manually or automatically.	
8	RF GAIN control will not operate automatically.	
9	IPA Bandswitch will not change frequency bands.	REPLACE DEFECTIVE IPA BANDSWITCH FUSE (5 AMPS).
10	AC Lamp on IPA Servo Amplifier will not light when AUTO-MANUAL switch is in AUTO position.	REPLACE DEFECTIVE AC FUSE ON IPA SERVO AMPLIFIER. (0.25 AMP).
11	Search lamp on IPA Servo Amplifier will not light in the AUTO mode of operation.	REPLACE DEFECTIVE DC FUSE ON IPA SERVO AMPLIFIER (0.5 AMP).

TABLE 5-1. OPERATOR'S TROUBLESHOOTING CHART (cont.)

NO.	MALFUNCTION	PROBABLE CAUSE OF MALFUNCTION
12	AC Lamp on PA Tune Servo Amplifier will not light when AUTO-MANUAL Switch is in AUTO position.	REPLACE DEFECTIVE AC FUSE ON PA TUNE SERVO AMPLIFIER (1.0 AMP)..
13	Search Lamp on PA Tune Servo Amplifier will not light when AUTO-MANUAL Switch is in AUTO position.	REPLACE DEFECTIVE DC FUSE ON PA TUNE SERVO AMPLIFIER (1.5 AMP).
14	Main Blower will not operate.	REPLACE Ø1 BLOWER OR - (3 AMPS) FUSE Ø2 BLOWER OR - (3 AMPS) FUSE Ø3 BLOWER OR - (3 AMPS) FUSE
15	Interlock lamp will not light.	
16	High Voltage Indicator will not light when switch has been pressed.	
17	PA Screen Meter indicates NO reading with High Voltage on.	REPLACE Ø1 LOW VOLTAGE (2.5 AMPS) FUSE Ø2 LOW VOLTAGE - (2.5 AMPS) FUSE Ø3 LOW VOLTAGE - (2.5 AMPS) FUSE
18	PA and IPA Plate Meters indicate NO reading with High Voltage ON.	
19	Transmitter Output Power suddenly drops to ZERO.	
20	PA Tune Control inoperative.	REPLACE PA FIL FUSE (5 AMPS)
21	PA Load Control inoperative.	
22	Filament Time Meter inoperative.	
23	High Voltage indicator will not Light when High Voltage switch is pressed.	
24	Interlock lamp will not light.	

5-6. ALDC ADJUSTMENT PROCEDURE (Refer to Figure 5-5 for control location)

PURPOSE:

The ALDC adjustments outlined are for the purpose of maintaining a constant PEAK POWER reference during modulating emission modes. The transmitter provides a NEGATIVE D.C. Voltage which is adjustable and proportional to the transmitter output. This voltage is made available at the transmitter ALDC output jack to interface with an appropriate exciter.

The exciter accepts this voltage to control the RF drive. Thus, a PEAK to AVERAGE relationship is established in the exciter as a result of an ALDC control Voltage.

a. Slide Technimatic Light cover "up" to expose the four ALDC adjustment potentiometers.

b. Set MANUAL/AUTO switch to MANUAL, operate POWER ADJUST switch to select position #1. (Press ADJ switch "UP" to select position.)

c. Tune and Load transmitter to any carrier frequency between 2 MHz and 30 MHz.

d. Adjust RF GAIN control for a PA OUTPUT indication of 7 KW.

e. Adjust R8 (located on PC-533 behind the Technimatic Light Cover), until the Power OUTPUT indication commences to decrease.

f. Continue to adjust R-8 for a PA OUTPUT indication of 5 KW.

g. Increase RF GAIN, (to check ALDC capture) PA OUTPUT should remain constant.

h. Reduce RF drive to minimum, operate POWER ADJUST switch to select power level #2. (Press ADJ switch "UP" to select position.)

i. Repeat step d.

j. Adjust R9 (located on PC-533 behind Technimatic Light cover) until power OUTPUT indication commences to decrease.

k. Continue to adjust R-9 for PA OUTPUT indication of 5 KW.

l. Increase RF GAIN, (to check ALDC capture) PA OUTPUT indication should remain constant.

m. Reduce RF drive to minimum, operate POWER ADJUST switch to select power level #3. (Press ADJ switch "UP" to select position.)

n. Repeat step d.

o. Adjust R-10 (located on PC-533 behind Technimatic Lamp cover) until POWER OUTPUT indication commences to decrease.

p. Continue to adjust R-10 for a PA OUTPUT indication of 5 KW.

q. Increase RF drive, (to check ALDC capture). PA OUTPUT indication should remain constant.

r. Reduce RF drive to minimum, operate POWER ADJUST switch to select position #4. (Press ADJ switch "UP" to select position.)

s. Repeat step d.

t. Adjust R-11 (located on PC-533 behind Technimatic Lamp Cover) until PA OUTPUT indication commences to decrease.

u. Continue to adjust R-11 for a PA OUTPUT indication of 5 KW.

v. Increase RF drive, (to check ALDC capture) PA OUTPUT indication should remain constant.

w. Reduce RF drive to minimum and replace Technimatic Lamp Cover. This completes ALDC adjustment procedure.

The ALDC adjustments may be set for values LOWER than specified in the procedure if desired.

Note

Should the ALDC capture voltage be insufficient, resulting in an INCREASE in PA OUTPUT when RF drive is increased, further adjustment of that ALDC potentiometer may be necessary to hold the PA OUTPUT constant.

5-7. PRE-SET AVERAGE POWER LEVEL ADJUSTMENT PROCEDURE (Refer to Figure 5-5)

PURPOSE:

The transmitter features 4- pre-set average power levels which are selectable, and adjustable from the front of the transmitter. These power levels once calibrated can be selected manually or remotely depending on system requirements.

The following outlines procedural steps for adjusting and/or calibrating the four power levels.

A. INITIAL LOWER LIMIT REFERENCE ADJUSTMENT

1. Energize transmitter (Place MAIN POWER breaker and SCREEN breakers to ON position, H. V. must be OFF).

2. Loosen EXCITER DRAWER PANEL LOCKS and extend EXCITER DRAWER out on its slides. Remove top cover and defeat EXCITER DRAWER interlock (Pull interlock shaft slightly until interlock switch closes.)

3. Remove PC-526, (located on front right side of exciter drawer chassis) insert extender card re-insert PC-526 into extender card.

4. Place a jumper from TP-1 to TP-2 (on rear side of PC-526).

5. Temporarily remove front PA Window loosen METER PANEL LOCKS and carefully lower meter panel on its hinges to expose the rear side.

6. Place AUTO/MANUAL switch to AUTO position, temporarily remove the connector from Terminal #16 on OUTPUT Meter board (NW-161).

7. Adjust Level potentiometer (located on rear of OUTPUT METER (NW-161) until READY indicator lights. Press TUNE button and readjust level control in opposite direction slightly until READY indicator goes out.

8. Remove jumper from TP-1 and TP-2, remove extender card, replace PC-526 into its respective jack, replace top cover, close and lock EXCITER DRAWER into position. (Replace lug on ten 16.)

9. Replace connectors back on Terminal #16 and place METER PANEL in its original position and lock in place. Replace Front PA Window to original position and secure with hardware removed in step 5. This completes the initial adjustment to establish the lower limit reference.

B. UPPER LIMIT REFERENCE ADJUSTMENT (Refer to Figure 5-5)

1. Operate POWER ADJ. switch to select position #1. (Press switch "UP" to select position.)

2. Slide Technimatic Light Cover-up to expose power level adjustment potentiometers R-1, R-2, R-3, and R-4 (located on PC-533 behind Technimatic Lamp Cover).

3. Holding POWER ADJ. switch in the ADJ position (down), adjust R-1 for a full scale indication on the PA OUTPUT meter.

4. Adjust R-7 (MTR-CAL) with POWER ADJ. switch in the ADJ position (down), until the READY indicator lights. (Back off R-7 slightly.)

5. Press TUNE button, READY indicator should light when OUTPUT meter indicates FULL SCALE deflection.

Note

Should READY indicator NOT come on when TUNE button is pressed, repeat step #4. This completes the UPPER LIMIT REFERENCE ADJUSTMENT.

C. POWER SELECT ADJUSTMENTS. (Refer to Figure 5-5 for location of controls)

Once the upper and lower reference limits have been calibrated, any power level from approximately 1.5 KW to rated output may be calibrated by holding POWER ADJ switch in ADJ. (down) position, and adjusting the following for the desired amount of PA OUTPUT POWER:

R-1 adjusted for Power Level position #1
R-2 adjusted for Power Level position #2
R-3 adjusted for Power Level position #3
R-4 adjusted for Power Level position #4

5-8. POWER LIMITING ADJUSTMENT

After completion of paragraphs 5-7A through 5-7C, a final power limiting check and/or adjustment should be performed in the following manner.

1. Select a power level as per para 5-7C.

2. Remove lead connected to ALDC jack, and servo Tune transmitter to any carrier frequency between 2-30 MHz.

Note

When automatic tuning is completed the transmitter's output should be the desired output set-up in para 5-7C. However, in the event of overshoot, (output higher than desired) adjust Power Limiting controls as follows:

3. Observe PA output indication on OUTPUT meter, press switch down to the "ADJ." position and observe the Output indication.

4. Release Power Switch and compare readings (actual output indication vs calibrated Output indication).

5. When comparing the two readings, if the actual output indication is higher than the calibrated output proceed as follows:

a. Press TUNE button to initiate a recycle and adjust POWER LIMIT control to a point that the READY lamp will not light when transmitter tuning is completed.

b. Hold the POWER ADJUST switch down and simultaneously adjust the POWER LIMIT control until meter indicates calibrated value and READY lamp lights.

6. The choice of POWER LIMITING controls to be adjusted is dependent on the POWER POSITION selected, adjust:

R-12 for POWER POSITION #1
R-13 for POWER POSITION #2
R-14 for POWER POSITION #3
R-15 for POWER POSITION #4

Note

Repeat step 5 as often as necessary to obtain optimum results. After the POWER LIMITING adjustment has been made, press the TUNE button to initiate a return cycle and check output as in step 4. The meter indication for both actual and calibrated output should be approximately the same. After completion of POWER LIMIT adjustments replace ALDC lead removed in step 2.

5-9. TRANSMITTER BIAS ADJUSTMENT PROCEDURE

The bias adjustment outlined below are to obtain quiescent plate current values. Before bias adjustments can be made, the "Bias Control Cover" must be removed to expose the bias adjustment controls. Refer to Figure 5-1 for location of bias controls.

Note

Quiescent plate current values indicated in the procedure are normal operating values, however should abnormal condition exist refer to Figure 5-2. (Simplified Bias Control diagram.)

1. Set bias controls to maximum clockwise position. (Bias voltage will be a max value)

2. Place MAIN POWER breaker to ON position.

3. Place SCREEN breakers to ON, AUTO/MANUAL switch to MANUAL.

Insure that dummy load or antenna is connected to transmitter output and RF drive is at minimum.

4. Press HIGH VOLTAGE button to light indicator subsequently applying HIGH VOLTAGE.

5. Observe PA PLATE CURRENT meter and adjust PA BIAS control for an indication of .75 amperes as read on PA PLATE CURRENT meter.

6. Observe PLATE METER on IPA drawer and adjust DRIVER BIAS control for an indication of 150 MA as read on PLATE meter.

REF SYM	TUBE TYPE	TUBE FUNCTION	STATIC PLATE CURRENT ADJ TO	MAX AVAILABLE BIAS VOLTAGE
V1301	8233	BROADBAND LINEAR AMP.	SEE NOTE 2	SEE NOTE 2
V1302	4CX350	2ND IPA	200 MA	-30 VDC
V1401	8576	3RD IPA	150 MA	-80 VDC
V701	8794	PA	0.75A	-360 VDC

NOTE:

1. MAX BIAS VOLTAGE WILL BE PRESENT IF:
   A. BANDSWITCH NOT IN PROPER POSITION.
   B. PTT RELAY NOT ENERGIZED.
   C. BIAS CONTROLS ARE AT MAX CLOCKWISE.
2. V1301 HAS FIXED BIAS VOLTAGE.
3. WHEN MAX BIAS VOLTAGE IS PRESENT AT V1302, V1401, V701, THE STATIC PLATE CURRENT IS REDUCED TO ZERO WHICH PLACES THE AMPLIFIERS AT OR NEAR CUTOFF.

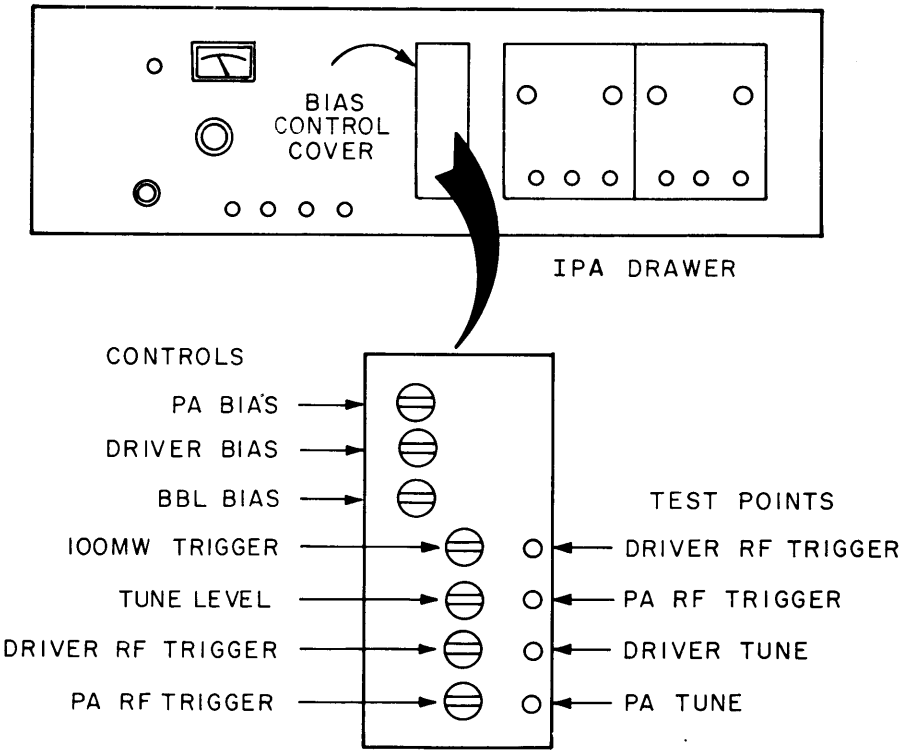
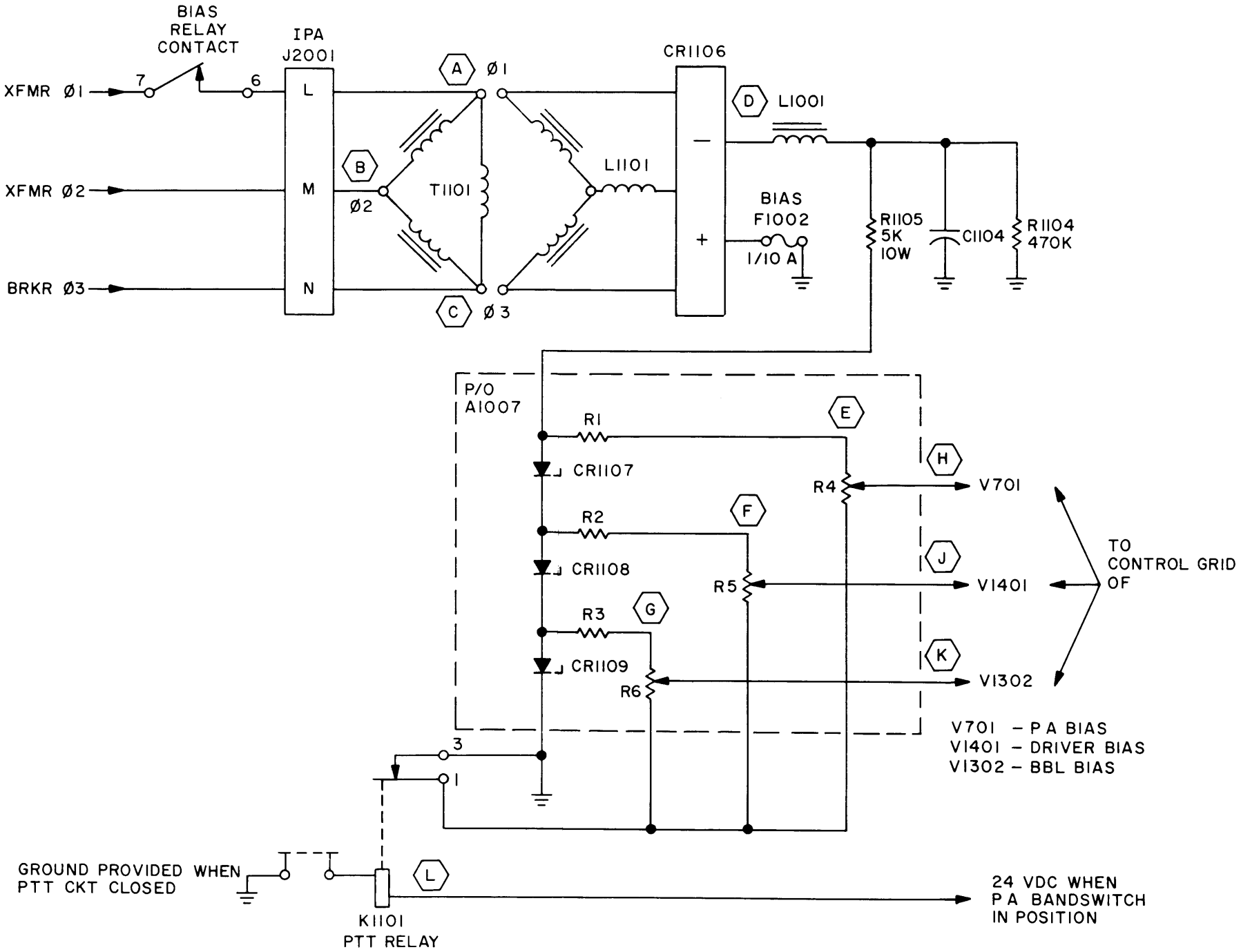


Figure 5-1. Bias Controls Location



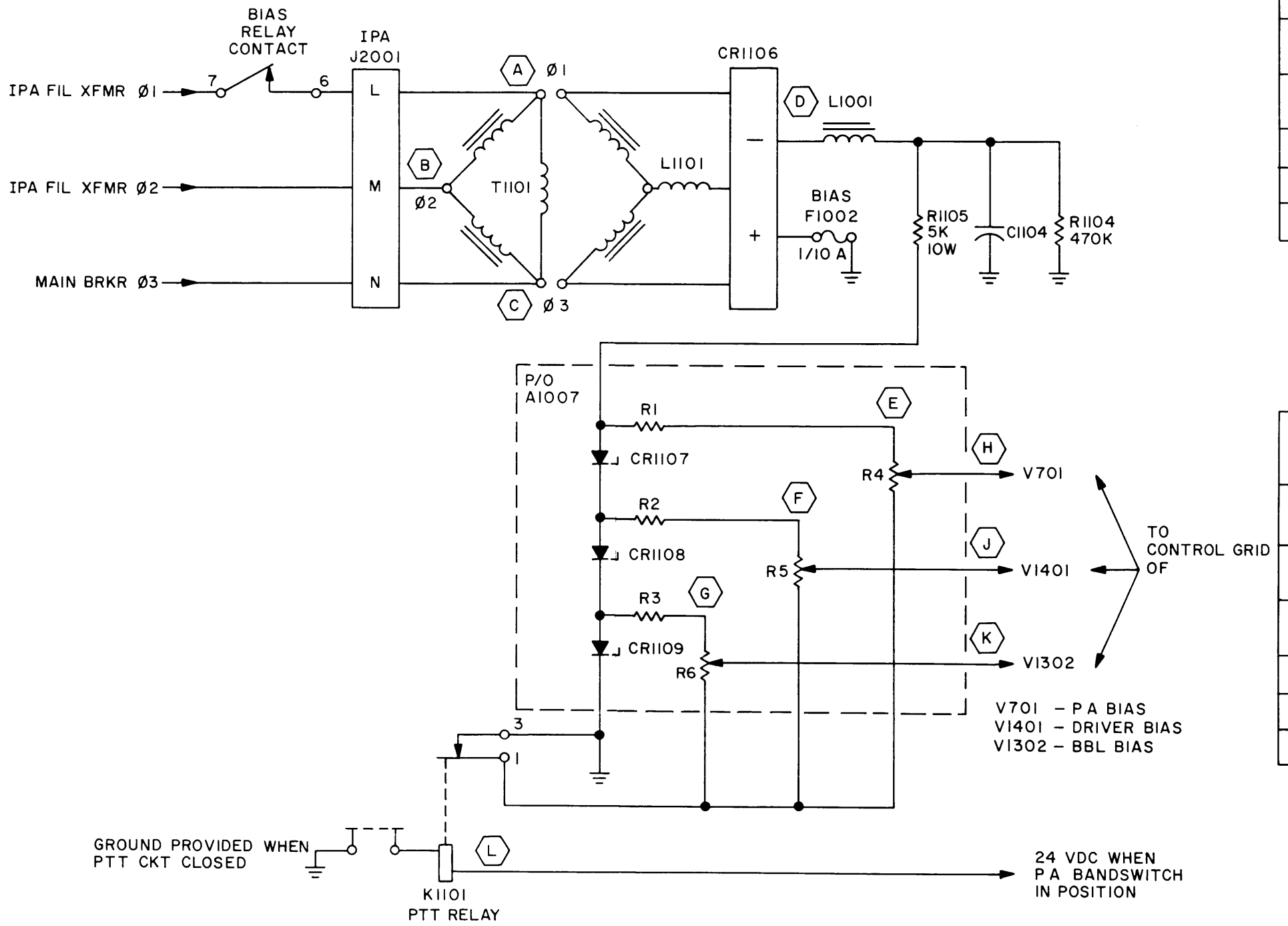
BIAS SUPPLY VOLTAGE (PTT RELAY CLOSED)

POINT OF TEST	VOLTAGE	REFERENCE DESIGNATION	POINT OF TEST	VOLTAGE	REFERENCE DESIGNATION
A	230 VAC Ø1	T1101	G	-120 VDC	R6
B	230 VAC Ø2	T1101	H	-210 VDC	V701
C	230 VAC Ø3	T1101	J	-80 VDC	V1401
D	-420 VDC	L1101	K	-22 VDC	V1302
E	-360 VDC	R4	L	24 VDC	K1161
F	-240 VDC	R5			

BIAS SUPPLY VOLTAGE (PTT RELAY OPEN)

POINT OF TEST	VOLTAGE	REFERENCE DESIGNATION	POINT OF TEST	VOLTAGE	REFERENCE DESIGNATION
A	230 VAC Ø1	T1101	G	-120 VDC	R6
B	230 VAC Ø2	T1101	H	-360 VDC	V701
C	230 VAC Ø3	T1101	J	-240 VDC	V-1401
D	-420 VDC	L-1101	K	-120 VDC	V1302
E	-360 VDC	R4	L	0 VDC	K1101
F	-240 VDC	R5			

Figure 5-2. Simplified Bias Control Circuit



BIAS SUPPL

POINT OF TEST	VOLTAGE	REFER DESIGN
A	230 VAC Ø1	T11
B	230 VAC Ø2	T11
C	230 VAC Ø3	T11
D	-420 VDC	L11
E	-360 VDC	R4
F	-240 VDC	R5

BIAS SUPP

POINT OF TEST	VOLTAGE	REFER DESIGN
A	230 VAC Ø1	T11
B	230 VAC Ø2	T11
C	230 VAC Ø3	T11
D	-420 VDC	L-1
E	-360 VDC	R4
F	-240 VDC	R5

Figure 5-

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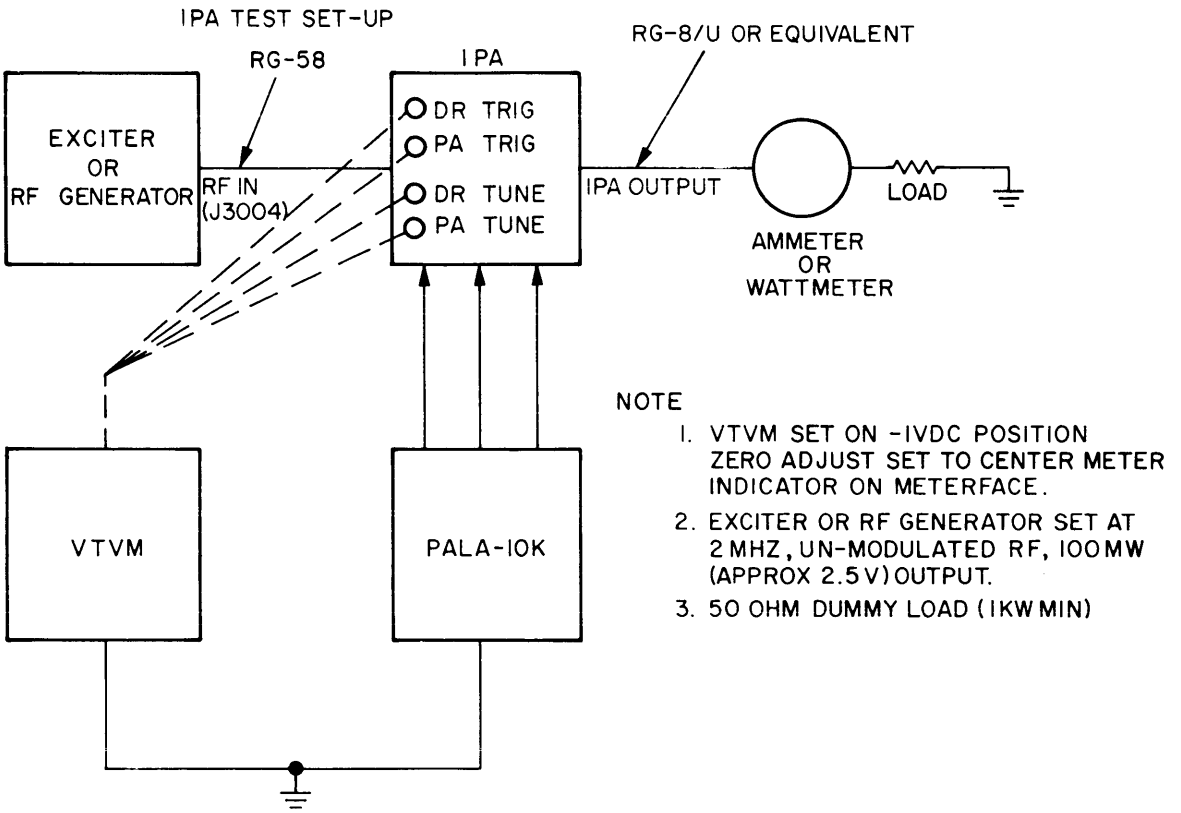


Figure 5-3. IPA Alignment Test Set-Up

7. Press 2ND AMP button, note PLATE meter indication and adjust (2ND AMP button depressed) BBL bias control for an indication of 200 MA as read on the PLATE meter.

8. Press HIGH VOLTAGE button to OFF and replace BIAS CONTROL COVER.

5-10. AUTO TUNING ADJUSTMENT PROCEDURE (IPA SECTION)

INTRODUCTION

The following paragraphs give information for adjusting controls that enable transmitter auto tuning. Bear in mind that, the controls mentioned throughout have previously been set at the factory and therefore need only to be adjusted if abnormalities or parts replacement have taken place.

The transmitter auto-tuning is sequential, extremely rapid, and interdependent on preceding functions that supply control voltages to enable auto tuning. The requirements for auto tuning are 100 milliwatt input, AUTO/MANUAL switch on AUTO, High Voltage ON and TUNE BUTTON pressed.

Note

All adjustments in the foregoing procedure(s) enables the transmitters auto tuning circuitry to function normally. Before making any adjustments observe transmitter indicators (meters, lamps, control knobs breakers, etc.) and refer to paragraphs 3-4 and/or 3-5 for normal transmitter indications. If a transmitter control or indicator does not appear to function normally check all switches and breakers, determine if breakers and switches are in correct position for AUTO-TUNING. Refer to List of Adjustments and determine which control(s) need adjusting.

LIST OF ADJUSTMENTS

ABNORMAL OBSERVATION	PROBABLE CAUSE
IPA Servo Amplifier SEARCH lamp does not light	Check 100 milliwatt trigger adjustment (Paragraph 5-10A)
IPA Servo Amplifier OPERATE lamp does not light	Check Driver RF Trigger adjustment (Paragraph 5-10C)
PA Plate Current increases from quiescent value to a value outside of 1.1 - 1.2 AMPS.	Check Tune Level adjustment (Paragraph 5-10B)
PA Servo Amplifier SEARCH lamp does not light	Check R. F. P. O. adjustment (Paragraph 5-11A)

LIST OF ADJUSTMENTS (cont.)

ABNORMAL OBSERVATION	PROBABLE CAUSE
PA Servo Amplifier OPERATE lamp does not light	Check PA RF Trigger adjustment (Paragraph 5-11B)
Load Sense Meter does not indicate at or near zero (after PA operate lamp lights)	Check Load Sense adjustment (Paragraph 5-11C)

A. 100-MILLIWATT TRIGGER ADJUSTMENT

The 100-MILLIWATT TRIGGER adjustment determines the amount of voltage required to energize the search relay within the IPA Servo Amplifier, thus placing the IPA Servo Amplifier in the SEARCH mode. Before attempting to make an adjustment proceed as follows:

1. Insure that transmitter is properly terminated into a 50 ohm dummy load or antenna.

2. Place MAIN POWER and SCREEN breakers to ON position. Place AUTO/MANUAL switch to MANUAL and operate BANDSWITCH control to select a frequency band that coincides with the assigned operating frequency.

3. Place MANUAL/AUTO switch to AUTO position. Insure that RF input is unmodulated and at a 100 milliwatt level. Press H. V. switch to light indicator subsequently applying High Voltage and PRESS TUNE button.

4. AC lamps on both Servo Ampliers must light, SEARCH lamp on IPA Servo Amplifier must light indicating IPA SERVO AMPLIFIER in search mode with 100 milliwatt input.

5. If the green SEARCH lamp does not light. Remove Bias control cover (Refer to figure 5-4 for control location) and adjust 100 MILLIWATT TRIGGER control until SEARCH lamp on IPA Servo Amplifier lights. When GREEN SEARCH lamp lights the IPA TUNING control must rotate automatically tuning the IPA to resonance. When adjusting the 100 milliwatt trigger control be sure that it is adjusted to a point that will make the SEARCH lamp light and no further. If the lamp does not light refer to TABLE 5-5 for troubleshooting information.

B. TUNE LEVEL ADJUSTMENT

The TUNE LEVEL control determines the transmitter output level during initial automatic tuning cycle. When the tune level control is adjusted the voltage present on the control is routed to the DRIVE-UP COMPARATOR board providing one input, the second input to comparator is a sample of the IPA cathode voltage. The DRIVE-UP COMPARATOR compares the levels of the two input voltages, and

when either the IPA CATHODE or TUNE LEVEL voltage is unequal the comparator will control the RF drive motor which is mechanically coupled to the RF GAIN control to increase or decrease the RF drive as necessary to equalize the input voltage level, therefore the amount of tune level voltage will determine the tune up level or inhibit auto-tuning if incorrectly adjusted:

When IPA Cathode voltage less than Tune Level voltage, Transmitter Drives-up
When IPA Cathode voltage greater than Tune Level voltage, Transmitter Drives-down
When Tune Level Voltage incorrectly adjusted too high, Transmitter Tuning level high
When Tune Level voltage incorrectly adjusted too low, Transmitter Drives down
When IPA Cathode voltage missing, Transmitter Drives up to limit switch
When Tune Level voltage missing, Transmitter Drives-down
When 100 milliwatt trigger voltage missing, Transmitter Drives-down

Before attempting to make a Tune Level adjustment proceed as follows:

1. Insure that Transmitter is properly terminated into a 50-ohm dummy load or antenna.

2. Place MAIN POWER breaker and SCREEN breakers to their ON positions.

3. Place AUTO/MANUAL switch to MANUAL (RF Drive must be at minimum).

4. Press High Voltage switch to light indicator subsequently applying High Voltage.

5. Check quiescent current values as indicated on the PA Plate, IPA Plate and 2nd Amp meters. If necessary adjust for the following values:

PA PLATE CURRENT	.75 AMPS
IPA PLATE CURRENT	150 MA
2ND AMP PLATE CURRENT	200 MA

6. Place AUTO/MANUAL switch to AUTO and adjust exciter for 100 milliwatt output.

7. Press TUNE button.

8. Observe the following transmitter actions and/or indicators.

a. AC lamps on IPA and PA Servo Amplifiers light.

b. SEARCH lamp on IPA Servo Amplifier lights.

c. IPA Plate current increases from quiescent value.

d. PA Plate current increases from quiescent value to 1.1 amps ± .1 amp depending on frequency.

e. OPERATE lamp on IPA Servo amplifier lights.

f. SEARCH lamp on PA TUNE servo amplifier lights.

g. Operate lamp on PA TUNE servo amplifier lights, Transmitter output power increases to pre-set power level and READY lamp lights.

9. The TUNE LEVEL control must be adjusted only if after the IPA Servo amplifier Operate lamp lights, and PA Plate current meter indicates less than 1.1 amps or more than 1.2 amps.

10. To adjust TUNE LEVEL Control, observe PA Plate current indication, if more or less than 1.1 to 1.2 amps, press TUNE button to recycle Transmitter and adjust TUNE LEVEL control counterclockwise (counterclockwise to increase PA Plate current) or clockwise (clockwise to decrease PA Plate current) to obtain a PA Plate current value of 1.1 amps after the IPA Servo Amp OPERATE lamp lights.

Note

After each adjustment of the TUNE LEVEL control the TUNE button must be pressed to initiate a retune cycle. The adjustment should be repeated as often as necessary to obtain the proper PA Plate current level of 1.1-1.2 amps after the Operate lamp lights.

C. DRIVER RF TRIGGER ADJUSTMENT

The Driver (IPA RF Trigger control when adjusted determines the amount of voltage required to stop the IPA tuning capacitor from Searching thereby ending the SEARCH mode and beginning the SERVO and OPERATE mode. Initially as the IPA Tuning capacitor approaches resonance and/or zero driver tune sense voltage, the IPA Servo Amplifier OPERATE lamp lights indicating IPA resonance and SEARCH and SERVO mode completed. During the auto tuned cycle of the transmitter of the IPA tuning capacitor continues to rotate (search mode) the IPA Servo Amplifier's Operate lamp fails to light, the IPA RF TRIGGER voltage may be insufficient to stop the IPA tuning capacitor. To adjust the DRIVER RF trigger control proceed as follows:

a. Set transmitter controls for MANUAL operation.

b. Adjust R.F.P.O. control (located on PA TUNE Servo amplifier) MAX counterclockwise.

c. Place Test VTVM in Driver TUNE sense Test pack (connect and set meter as per figure 5-3).

d. Manually adjust RF Gain control clockwise slightly to apply drive to transmitter and adjust IPA Tuning control observing PA Plate current meter and Test VTVM. Plate current must be between 1.1 - 1.2 amps, test VTVM should indicate zero at IPA resonance.

e. Once zero indication has been observed place Test Meter in Driver RF Trigger Test jack. The Driver RF Trigger Voltage should be .5 VDC.

Note

If Driver Trigger Voltage is not at .5 VDC adjust Driver Trigger control until Test meter indicates .5 VDC (+1/2 volt DC).

Place MANUAL/AUTO switch to AUTO. Press TUNE button and observe the following:

IPA SEARCH lamp should light
IPA TUNING control should rotate seeking resonance and stop.
IPA Servo Amplifier's OPERATE lamp should light indicating search mode ends servo and operate modes begin.

5-11. AUTO TUNING ADJUSTMENT PROCEDURE (PA SECTION)

A. R.F.P.O. (R.F. Power ON) ADJUSTMENT

Note

The necessary voltage and signals required to enable PA AUTO-TUNING is via the IPA AUTO tuning circuitry therefore IPA AUTO TUNING alignment must be performed prior to PA AUTO-TUNING ADJUSTMENT.

The R.F.P.O. adjustment determines the amount of voltage required to place the PA Tune Servo Amplifier into the SEARCH mode. The voltage that places the IPA Servo Amplifier in the Operate mode is routed to the PA Servo Amplifier to place it in the Search mode. To adjust the R.F.P.O. control and/or initiate the PA Tune Search mode proceed as follows:

Set transmitter controls for AUTO mode of operation
Energize transmitter and Press TUNE button.
When IPA Servo Operate lamp lights and PA Plate current meter indicates 1.1 lamps adjust R.F.P.O. control to a point that will make the PA TUNE Servo SEARCH lamp light.

B. PA PLATE RF TRIGGER ADJUSTMENT

The PA Plate Trigger control when adjusted determines the level of voltage necessary to stop the PA Tune capacitor from searching. When PA Tune capacitor completes the search mode the Operate lamp lights indicating completion of the servo mode and beginning of the Operate mode. Therefore the PA Plate Trigger control should be adjusted to stop the PA tune capacitor at the point of resonance. Before adjusting the PA Plate Trigger control, set transmitter controls for AUTO operation, energize transmitter and press TUNE button to initiate the auto-tune cycle.

The IPA Servo Amplifier's SEARCH and OPERATE lamps should light and sequentially PA Tune Servo Amplifier's SEARCH and OPERATE lamps should light.

However if the PA Tune Servo Amplifier OPERATE lamp fails to light, it indicates that PA resonance has not been reached and/or the PA RF Trigger voltage is insufficient to stop the Tune capacitor at a point of resonance.

To adjust the PA RF Trigger control proceed as follows:

1. Place MANUAL/AUTO switch in Manual position.

2. Press PA LOAD control down to set PA Loading capacitor at minimum.

3. Energize transmitter (H.V. & Screen Breakers ON).

4. Operate IPA TUNE and PA TUNE controls to resonate PA to desired operating frequency (Refer to Paragraph 3-4 for manual tuning procedure).

5. Adjust PA Output to a level of 1 KW as indicated on the OUTPUT meter.

6. Connect Test VTVM (meter controls must be set as per figure 5-3) to PA TUNE test point on monitor PA TUNE sense voltage. When the PA is at resonance the PA TUNE sense voltage should be approximately zero.

Note

If the PA TUNE sense voltage is not at zero readjust the PA TUNE control to obtain a zero voltage indication on the test VTVM.

7. Place test VTVM in PA RF Trigger test point and adjust PA RF Trigger control until the test VTVM indicates minus .5 VDC.

C. LOAD SENSE ADJUSTMENT

The LOAD SENSE control is used to adjust the LOAD SENSE meter to indicate a zero reading when loading is correct at a 1 kilowatt output level. When the transmitter is in the AUTO mode of operation the PA LOAD capacitor immediately rotates to minimum capacitance when High Voltage is ON and PA Plate Current is present. This condition is normal and is indicated by the LOAD SENSE meter reading to the RIGHT of center scale. During transmitter loading the LOAD capacitor travels toward maximum capacitance and the LOAD SENSE meter indicator follows and indicates at or near zero when loading is correct.

A condition of NO loading will be noted by the following:

(A) LOAD SENSE meter reads to LEFT of center scale after PA operate lamp lights.

(B) LOAD SENSE meter reads to RIGHT of center after PA Operate lamp lights.

(C) READY lamp does not light due to NO loading (insufficient PA OUTPUT).

(D) Excessive PA Plate Current and insufficient PA OUTPUT.

(E) Servo Amplifier lamps do not go out and fault lamp lights after 30 seconds.

Should it become necessary to adjust the LOAD SENSE control proceed in the following manner:

(1) Energize transmitter (MAIN POWER, SCREEN BREAKERS to ON).

(2) Place MANUAL/AUTO switch to MANUAL.

(3) Operate PA TUNE and PA LOAD control to produce the maximum PA OUTPUT with the least amount of PA Plate Current.

(4) Increase RF DRIVE until PA OUTPUT meter indicates rated output. (Readjust TUNE and LOAD controls if PA SCREEN current is excessive at rated OUTPUT.)

(5) Reduce PA OUTPUT to a level of 1 KW as indicated on PA OUTPUT meter.

(6) Slide Technimatic Cover "UP" to expose LOAD SENSE adjustment control. (Refer to figure 5-5 for control location.) Adjust LOAD SENSE control until LOAD SENSE meter indicates ZERO (center scale).

(7) Place MANUAL/AUTO switch in AUTO and press TUNE button.

Transmitter indicators lamps and meter indicator should indicate in the following sequence:

IPA and PA Servo Amplifier AC lamps light
IPA Quiescent current 200 ma as read on IPA Plate Current meter
PA Quiescent current .75 amps as read on PA Plate Current meter
IPA SEARCH lamp followed by IPA OPERATE lamp lights
PA Plate Current indicator increases to between 1.1 and 1.2 amperes
Simultaneously PA Servo Amplifier's SEARCH lamp followed by PA Servo Amplifier's OPERATE lamp lights
LOAD SENSE meter indicator swings toward center as loading takes place
All Servo Amplifier Indicator lamps (AC, search, operate) go out
Transmitter output meter reads appox. 1 KW
Transmitter output indication increases from 1 KW to rated output and READY lamp lights.

5-12. FAULT INDICATION ADJUSTMENT PROCEDURE

INTRODUCTION:

The transmitter is designed to servo tune to rated or desired output in less than ten seconds. The fault circuit featured in the transmitter, senses the transmitter tuning time and will remove voltages to the servo amplifiers, RF drive motor and bias the transmitter at or near cutoff if the transmitter has not completed the tuning cycle within the duration of time affixed by the following adjustment.

1. Extend EXCITER drawer out on its slides, remove top cover and defeat exciter drawer interlock. (Pull interlock shaft out slightly until interlock switch closes.)

2. Remove PC526 (located in exciter drawer) and insert extender card in PC526 jack. Re-insert PC526 into extender card.

3. Remove the RF input from J3004 (or insure that RF drive at minimum). Place MANUAL-AUTO switch to AUTO.

4. Place MAIN POWER and SCREEN breakers to their ON positions.

5. Press HIGH VOLTAGE switch to light indicator.

6. Press TUNE switch. After approximately 30 seconds the FAULT indicator should light and all servo amplifier lamps should go out.

7. If the FAULT lamp does not light within 30 seconds, adjust R4 on PC526 until FAULT indicator lights 30 seconds after TUNE button is pressed. (Repeat the adjustment as often as necessary to obtain optimum results.)

8. Press HIGH VOLTAGE switch to OFF, (H.V. indicator OUT) remove extender card and replace PC526 into its respective jack.

9. Affix top cover to EXCITER drawer and slide drawer back to its original position. This completes the FAULT indicator Adjustment procedure.

5-13. OVERLOAD CIRCUIT TEST

PURPOSE: (Refer to Figure 5-6 for Control Location)

The Overload Circuitry functions to protect the transmitter against excessive currents and VSWR. The simplicity of overload adjustments and indications of overloaded conditions affords ease of overload recognition. To set the overloads perform the following:

A. Energize transmitter (MAIN POWER BREAKER ON, SCREEN BREAKERS ON).

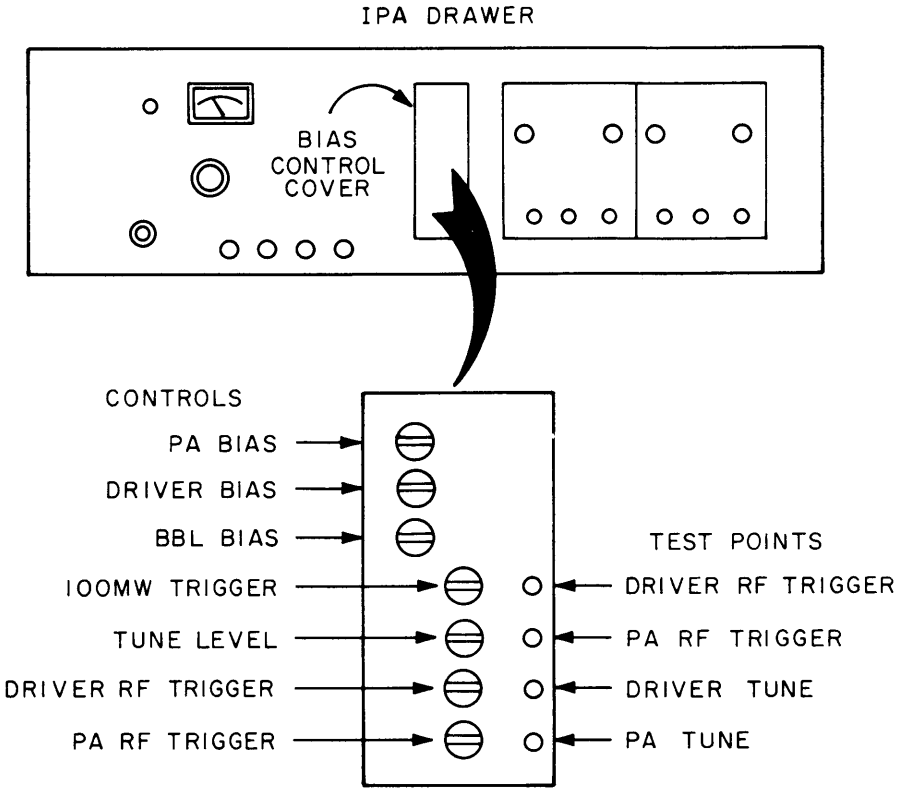


Figure 5-4. Automatic Tuning Adjustment Controls

B. MANUAL-AUTO switch to MANUAL, HIGH VOLTAGE switch ON. (Press H.V. switch to light indicator.)

C. Apply RF Source (11 MHz) to RF INPUT of transmitter.

D. Manually tune transmitter for rated output.

E. Reduce RF drive to min.

Note

To reset an overload the High Voltage switch must be pressed twice (press to reset overload, press to apply High Voltage). If a malfunction occurs and overload circuitry does not function normally, refer to paragraph 5-18 for troubleshooting information.

5-14. PA PLATE OVERLOAD ADJUSTMENT

1. Adjust Overload indicator (adjustment screw located directly below meter-face) for 2 amperes as indicated on PA PLATE current meter.

2. Increase drive, until PLATE CURRENT meter indicates 2 AMPERES. Observe the following:

A. When meter indicator reaches the value of overload indicator setting, the High Voltage will trip OFF.

B. PLATE CURRENT meter Face will illuminate indicating overload in Plate current.

C. Meter indicator will remain at the overload value to indicate value which caused overloaded condition.

3. Reduce RF drive to minimum and press HIGH VOLTAGE button to reset HIGH VOLTAGE. (H.V. switch may have to be pressed twice.)

4. To further check operation of plate overload, increase RF drive again noting that HIGH VOLTAGE tripped as in STEP 2. Set overload indicator for an indication of 3 1/2 amps as read on the PLATE CURRENT meter.

5-15. PA SCREEN OVERLOAD ADJUSTMENT

1. Repeat paragraph 5-13A thru D and proceed to Step 2.

2. Reduce RF drive, set PA SCREEN overload indicator to 30 milliamps as indicated on the PA SCREEN current meter.

3. Increase RF drive and operate PA TUNE and PA LOAD controls to draw SCREEN current. (Under-load Transmitter).

4. Further increase the RF drive until meter indicator reaches value set on overload indicator.

5. Observe the following:

A. High Voltage should trip OFF (indicated by H.V. indicator OFF).

B. PA SCREEN meter face will illuminate and meter indicator will remain at the overloaded value.

C. PA PLATE current and IPA plate current meters will indicate zero.

6. To further check operation of PA Screen Overload, reduce RF drive, Press H.V. button to light indicator, increase drive until overload trips at overload indicator value.

7. Reset overload indicator to 80 MA.

5-16. SWR OVERLOAD ADJUSTMENT

1. Repeat paragraphs 5-13A thru D and proceed to step 2.

2. Press H.V. button to REMOVE HIGH VOLTAGE. (High Voltage Indicator must be OUT.)

3. Rotate 5 KW reflected power diode element (located in directional coupler DC-104) 180° (ARROW on diode element should be in direction of RF output from transmitter to antenna after it has been rotated 180°.)

4. Press H.V. button to apply HIGH VOLTAGE. Set Reflected power overload indicator to 2.0:1 as indicated on the bottom scale on REFLECTED power meter.

5. Increase RF drive until REFLECTED power indicator reaches overload indicator value and observe the following:

A. H.V. will trip OFF, H.V. indicator will go out.

B. REFLECTED power meter will illuminate.

C. REFLECTED power indicator will remain at the overloaded value to further indicate overload.

D. PA and IPA plate current meters will indicate ZERO.

E. To further check operation of SWR overload, Reduce RF drive, Press H.V. button to ON, increase RF drive again until overload trips H.V. OFF.

F. Restore 5 KW (Reflected power) diode element to original position (arrow on diode element facing direct opposite of 20 KW forward power diode).

G. Set SWR overload indicator to desired value.

5-17. IPA PLATE CURRENT OVERLOAD ADJUSTMENT

1. Insure RF drive is at minimum setting.

2. Energize transmitter, (MAIN POWER-ON, SCREEN BREAKERS ON, H.V. switch pressed to ON, and MANUAL/AUTO switch in MANUAL position).

3. Set IPA PLATE overload indicator to 300 ma as read on IPA PLATE meter.

4. Remove bias control cover and adjust DRIVER BIAS control counter-clockwise noting PLATE meter indication. When PLATE current meter indicates 300 ma (value of IPA PLATE overload setting).

Observe the following indications:

A. H.V. will trip to OFF (H.V. indicator OFF).

B. IPA PLATE meter will illuminate.

C. IPA PLATE meter indicator will remain at overloaded value.

D. PA PLATE current meter will indicate ZERO.

E. Adjust DRIVER BIAS control maximum clockwise and press HIGH VOLTAGE switch twice to apply HIGH VOLTAGE.

F. Readjust DRIVER BIAS control counterclockwise to restore original state Plate Current value of 150 MA as read on the IPA Plate Current meter.

G. Reset overload indicator to indicate 800 MA as read on the IPA PLATE meter.

5-18. TROUBLESHOOTING TRANSMITTER OVERLOAD CIRCUITRY

The overload is designed to remove High Voltage in the event of excessive current conditions. Paragraphs 5-13 thru 5-17 provides information for checking and setting overloads. However, if the overload circuitry does not function in accordance with paragraphs 5-13 thru 5-17 troubleshoot the circuitry in the following manner:

(a) Temporarily remove PA window.

(b) Loosen METER PANEL locks and lower METER PANEL on its hinges to expose rear side.

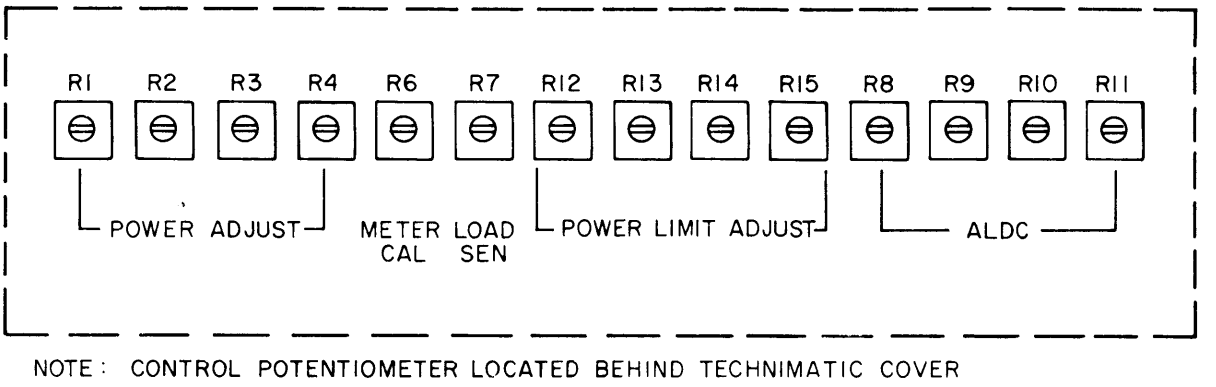


Figure 5-5. Transmitter Output Control Board, PC 533

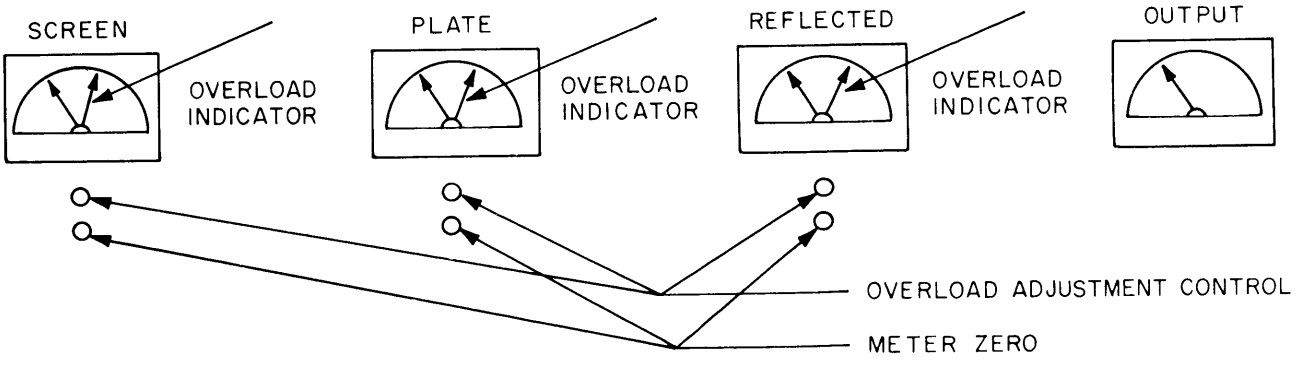


Figure 5-6. Overload Adjustment Controls

(c) Place MAIN POWER breaker and SCREEN breaker (dual section) to ON position. Single section of SCREEN breaker MUST BE IN OFF POSITION.

Adjust Overload pointer counterclockwise to make contact with meter pointer, overload lamps (3) should light.

Note

If overload lamp on associated meter board does not light temporarily place a jumper across switch controls on meter board. (Refer to Assembly Drawing on associated schematic diagram for parts location.) If overload lamps do not light with jumper check Q. and/or the presence of 24V on the associated board inputs. The voltage that lights the overload lamp also energizes the overload relay.

(d) Observe OVERLOAD relay K1, (located on A4802) when the overload lamps light on any meter board. K-1 should energize to an overload condition. If K1 does not energize check E-8 on A4802 for the presence of 24V. (refer to Assembly Drawing for parts location).

Not

When an overload condition exists the associated meter overload lamp should light, however should more than one set of overload lamps light check isolation diode CR-1 on each overload board.

(e) When overload relay K-1 is latched in the overload condition it must be reset to enable a High Voltage ON condition. Remove temporary jumper or adjust overload pointer clockwise and press H.V. button.

Observe overload relay K-1 it should latch into the reset position and associated overlamps should go out. If overload relay K-1 does not reset check for the presence of 24V on E-11 of A-4802.

Reference:	ASSEMBLY NO.	SCHEMATIC DIAGRAM
PA PLATE OVERLOAD BOARD	A-4800	CK-1643-sh-3
PA SCREEN OVERLOAD BOARD	A-4800	CK-1643-sh-3
REFLECTED POWER & MAIN OVERLOAD BOARD	A-4802	CK-1643-sh-1
IPA PLATE OVERLOAD BOARD	A-4801	CK-1680-sh-3

TABLE 5-2. INTERLOCK LOCATION

MODULAR UNIT	ITEM NO. REF. FIG. (5-7)	DESIGNATION	FUNCTION
PA SECTION	1	PA Window	When PA window opened, interlock circuit opens removing H.V. Interlock lamp goes out.
	2	PA Rear Cover	Interlock opens when rear cover removed; H.V. relay opens removing H.V.; Interlock lamp goes out.
	3	Rear P.S. Cover	Interlock opens when P.S. cover removed. H.V. relay opens removing H.V. Interlock lamp goes out.
IPA DRAWER	4	IPA Drawer	Interlock opens when IPA drawer not properly closed. H.V. relay opens removing H.V. Interlock lamp goes out.
	5	IPA Top Cover (located on top of chassis)	Interlock opens when top cover removed; H.V. relay opens removing H.V. Interlock lamp goes out.
	6	IPA Bottom Cover (located on bottom chassis directly above bottom cover)	Interlock opens when bottom cover removed. Filaments and 24V circuits open removing H.V. All front panels indicators go out.

TABLE 5-2. INTERLOCK LOCATION (cont.)

MODULAR UNIT	ITEM NO. REF. FIG. (5-7)	DESIGNATION	FUNCTION
EXCITER DRAWER	7	Exciter Drawer	Interlock opens when exciter drawer extended from frame. H.V. relay de-energizes removing H.V. Interlock lamp goes out.
MAIN POWER PANEL	8	Left Side	Interlock opens when left side shield is removed. H.V. relay de-energizes removing H.V. and interlock lamp goes out.
	9	Right Side	Interlock opens when right side shield is removed. H.V. relay de-energizes removing H.V. and interlock lamp goes out.
HIGH VOLTAGE POWER SUPPLY	10	H.V. Power supply	Interlock opens when H.V. power supply cover is removed. H.V. relay de-energizes removing H.V. and interlock lamp goes out.

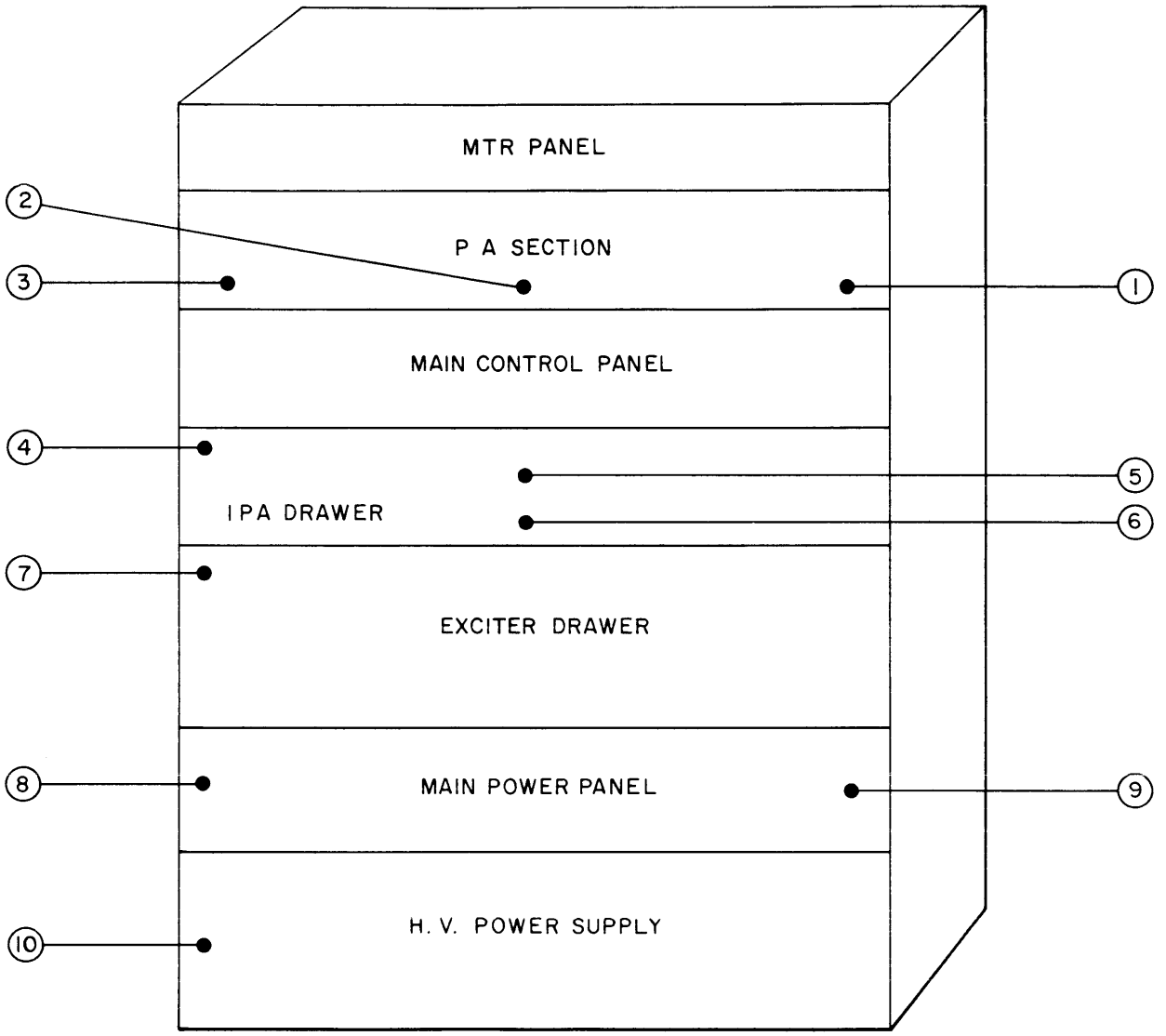


Figure 5-7. Interlock Locations

TABLE 5-3. FUSE FUNCTIONS

ITEM #	PANEL DESIGNATION	FUNCTION
1	BLOWER	Protective fuse for IPA blower. Lights to indicate fuse defective. (2 AMPS)
2	BIAS	Protective fuse for bias circuit. Lights to indicate fuse defective. (1/10 AMP)
3	24 VDC	Protective fuse for 24 VDC supply. Lights to indicate fuse defective. (8 AMP)
4	BANDSWITCH	Protective fuse for PA, IPA, and Filter Bandswitches. (5 AMP)
5	IPA SERVO AC	Protective fuse for IPA Servo Amplifier AC input transformer. (1/2 AMP)
6	IPA SERVO DC	Protective fuse for IPA Servo Amplifier B+ voltages. (1/4 AMP)
7	PA TUNE SERVO AC	Protective fuse for PA Tune Servo Amplifier AC input transformer. (1/2 AMP)
8	PA TUNE SERVO DC	Protective fuse for PA Tune Servo Amplifier B+ voltages. (1/4 AMP)
9	Ø1 BLOWER	Protective fuse for PA Blower Lights to indicate defective fuse. (3 AMP)
10	Ø2 BLOWER	SAME AS ITEM #9.
11	Ø3 BLOWER	SAME AS ITEM #9.
12	Ø1 LOW VOLTAGE	Protective fuse for PA, IPA and BBL screen circuits. Lights to indicate defective fuse. (2.5 AMP)
13	Ø2 LOW VOLTAGE	SAME AS ITEM #12.
14	Ø3 LOW VOLTAGE	SAME AS ITEM #13.
15	PA FIL	Protective fuse for PA Filaments. Lights to indicate defective fuse. (5 AMP)
16	POWER LEDEX (INTERIOR FUSE LOCATED BEHIND TECHNIMATIC LAMP)	Protective fuse for Ledex Motor. Lights to indicate defective fuse. (2 AMP)
17	PRIMARY AC (INTERIOR FUSE LOCATED ON PA LOAD ASSEMBLY)	Protective fuse for PA Load Servo Motor. Lights to indicate defective fuse. (2/10 AMP)
18	DC (INTERIOR FUSE LOCATED ON PA LOAD ASSEMBLY).	Protective fuse for 24 VDC circuit within the PA Load Assembly. Lights to indicate defective fuse. (1/16 AMP)

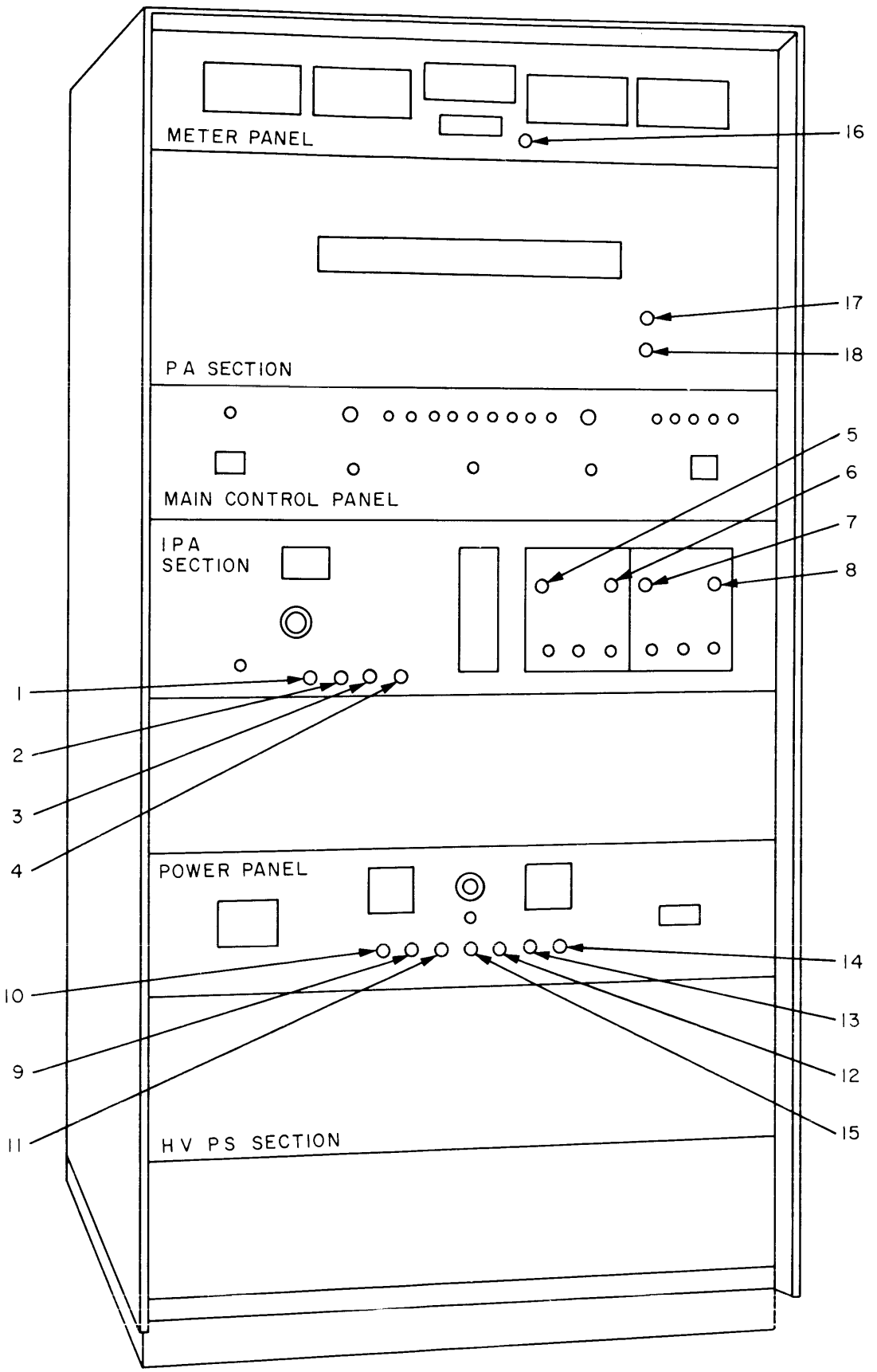


Figure 5-8. Fuse Locations

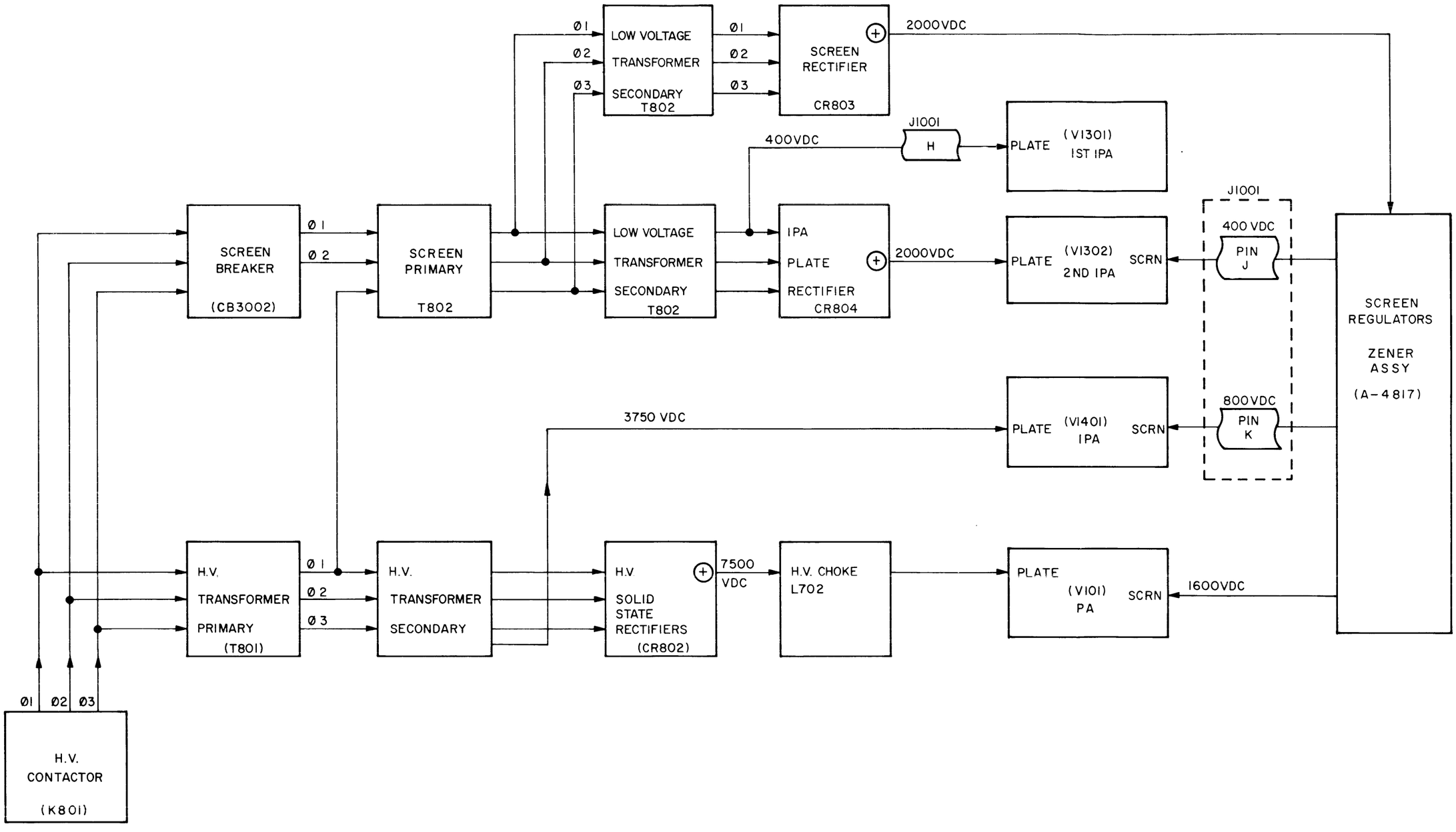


Figure 5-9. Simplified Diagram Plate & Screen Circuits V1301, V1302, V1401, V701

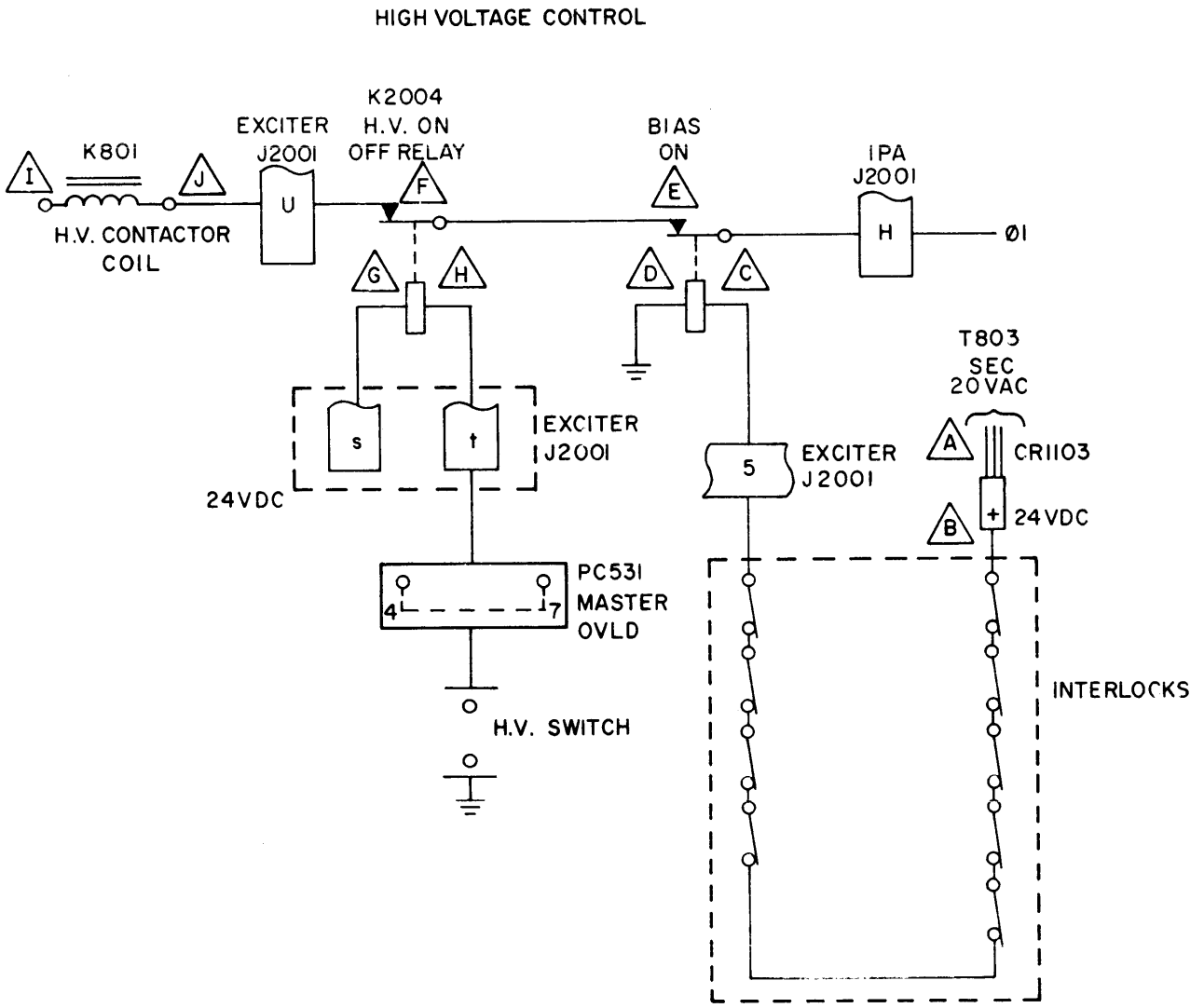


Figure 5-10. High Voltage Control

TABLE 5-4. HIGH VOLTAGE CONTROL VOLTAGE CHART (REF. FIGURE 5-10)

POINT OF TEST	MEASURED VALUES	REFERENCE SYMBOL
A	20 VAC	T803
B TO GROUND	+24 VDC	CR-1103
C TO GROUND	+24 VDC	K 2005 PIN 2
D	GROUND ALWAYS	K 2005 PIN 10
E TO GROUND	115 VAC (Ø1)	K 2005 PIN 1
F TO GROUND	115 VAC (Ø1)	K 2004 PIN 1
G TO GROUND	+24 VDC	K 2004 PIN 2
H	GROUND (H.V. BUTTON PRESSED)	K 2004 PIN 10
I TO GROUND	115 VAC Ø	K801
J TO GROUND	115 VAC Ø	K801
I TO J	230 VAC	K801

TEST EQUIPMENT:

Simpson 260 multimeter
or equivalent

TEST CONDITIONS:

1 - Main power breaker on

2 - Screens breaker on

3 - Interlock circuit complete

OBJECT:

To energize High Voltage contactor.

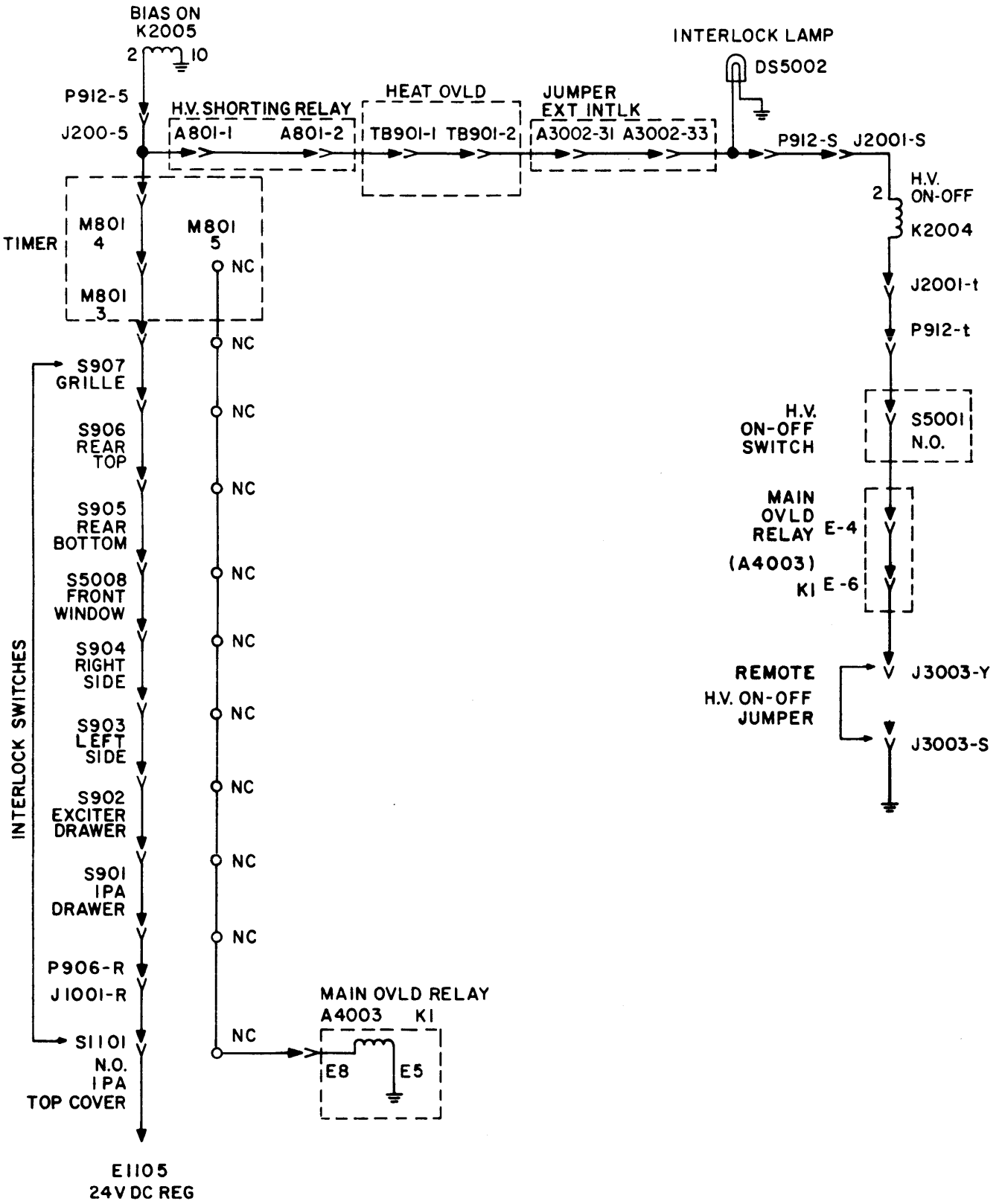


Figure 5-11. Simplified Interlock Circuit Diagram

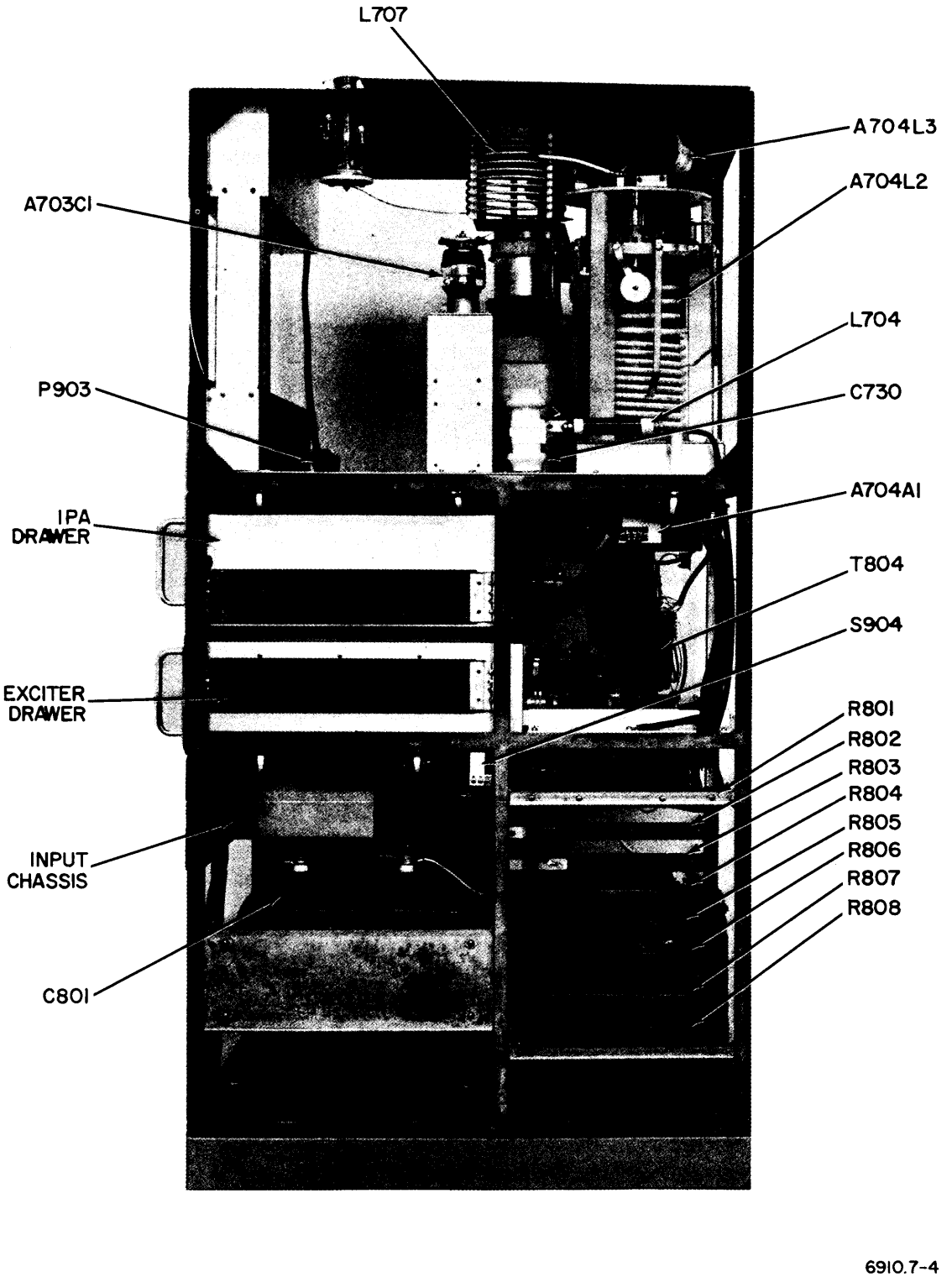


Figure 5-12. Overall Transmitter Rightside View

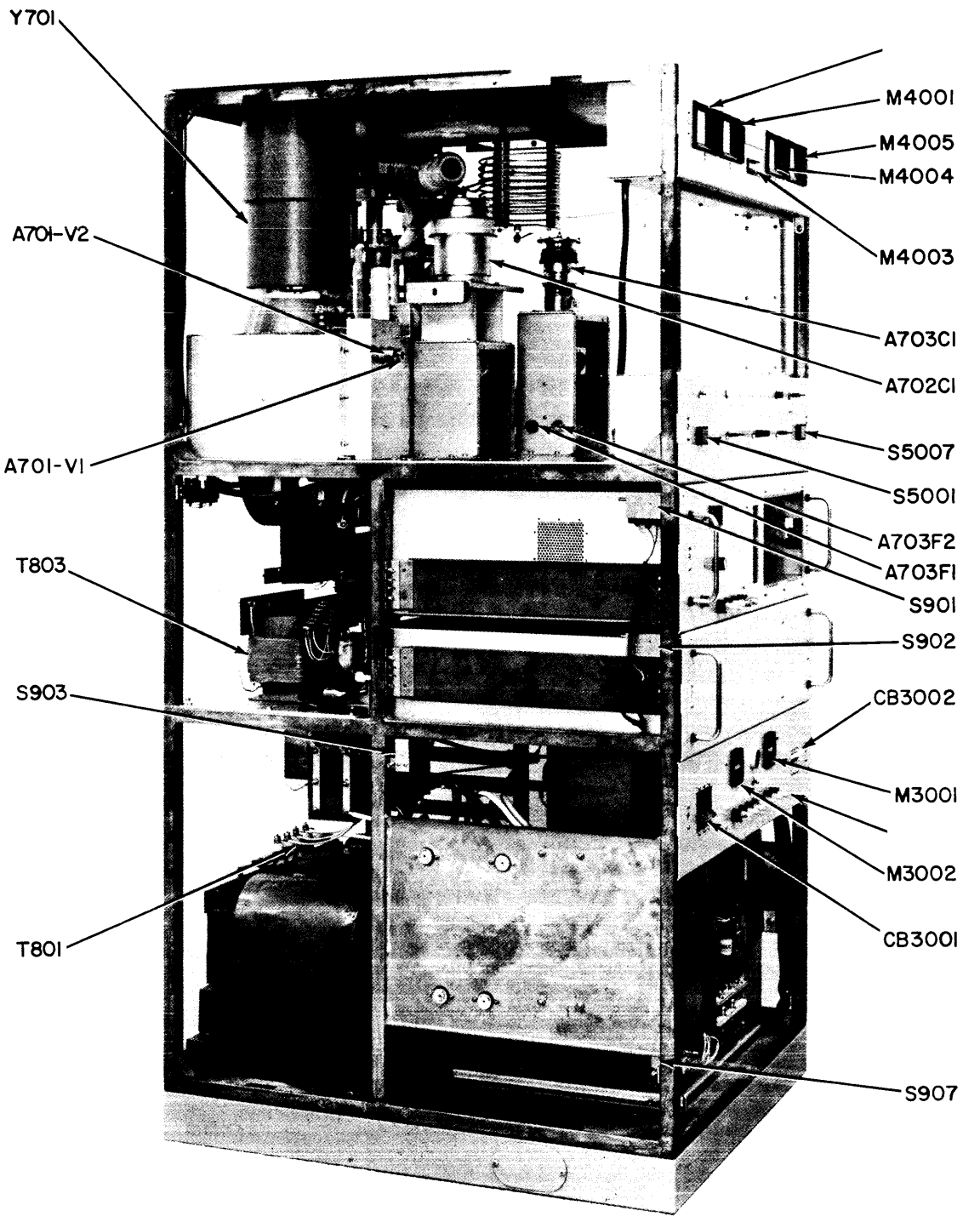


Figure 5-13. Transmitter Overall Left View

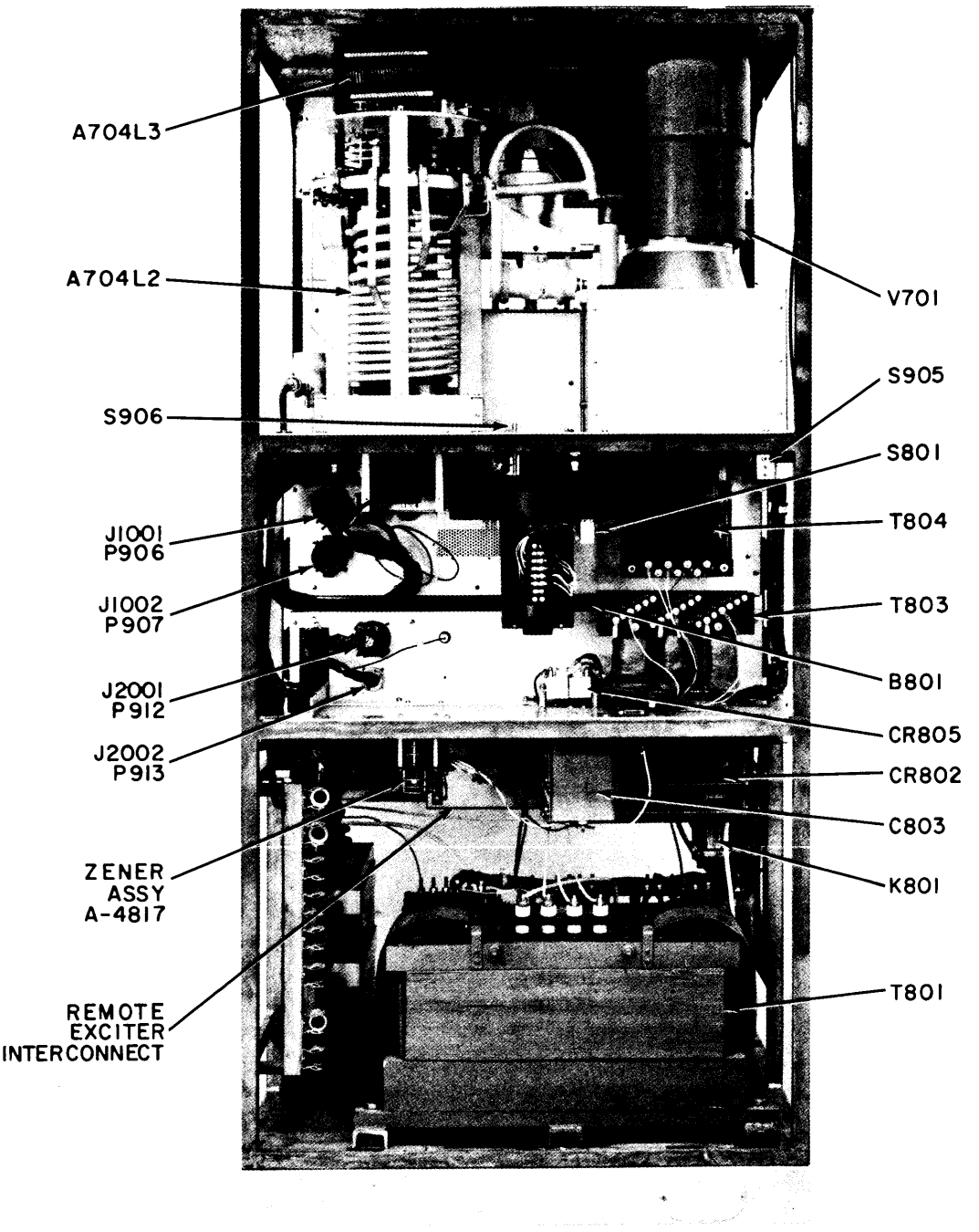


Figure 5-14. Transmitter Overall Rear View

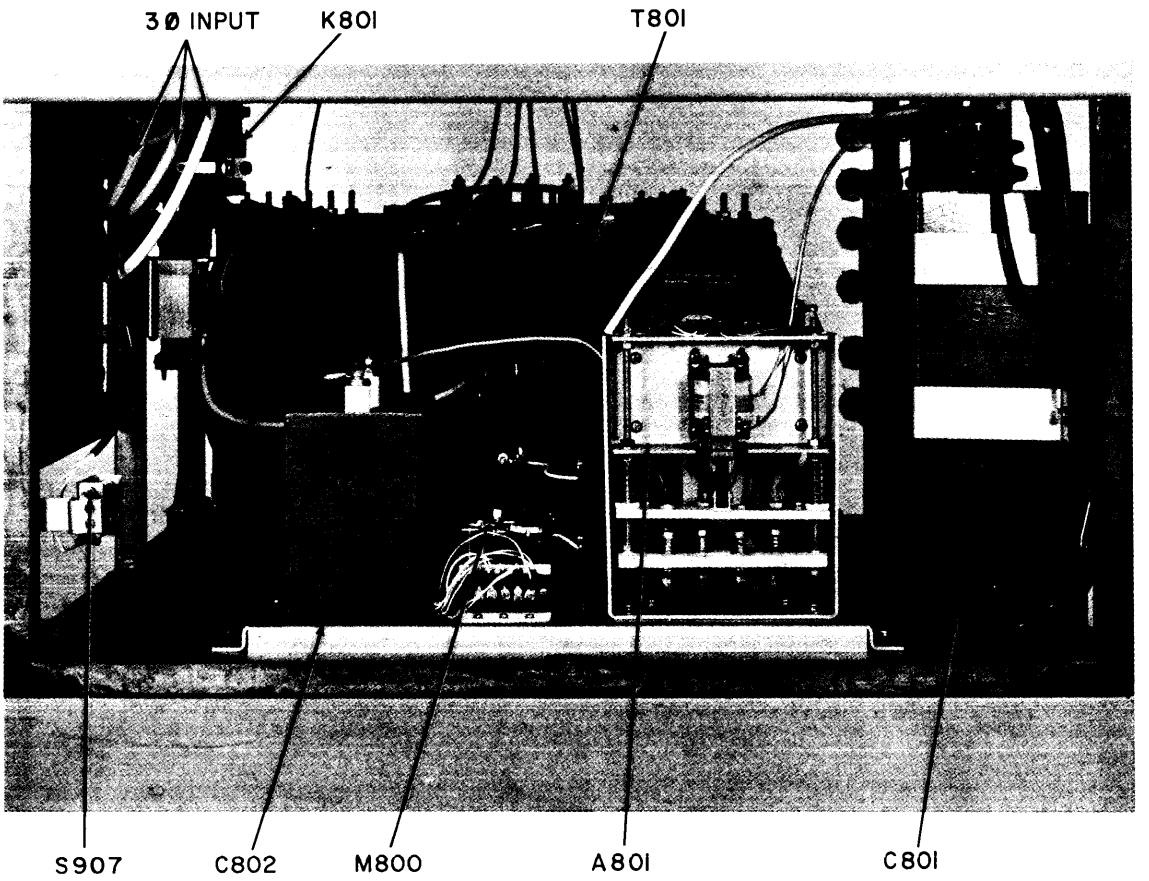


Figure 5-15. High Voltage Power Supply Section

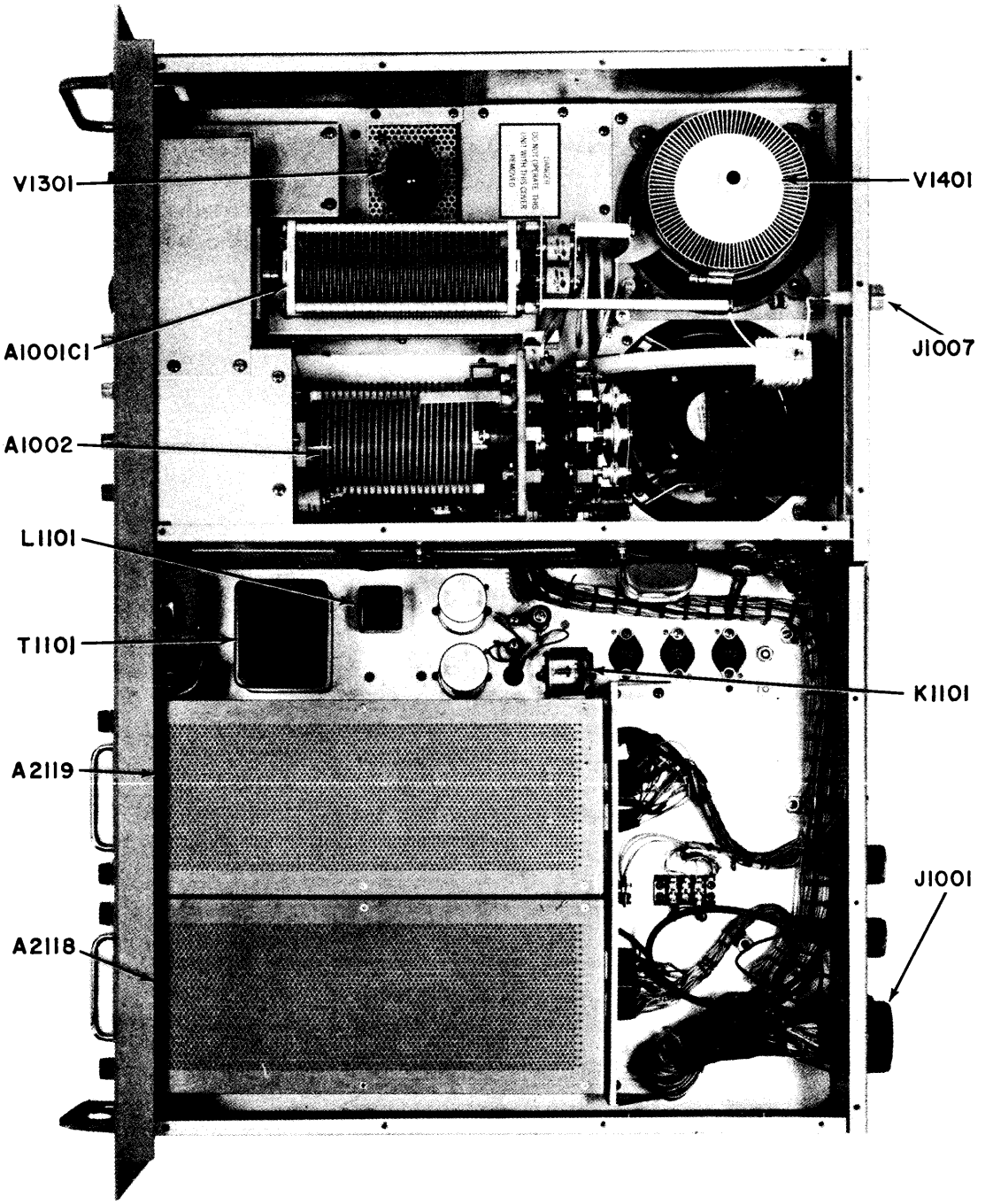


Figure 5-16. IPA Drawer Top View

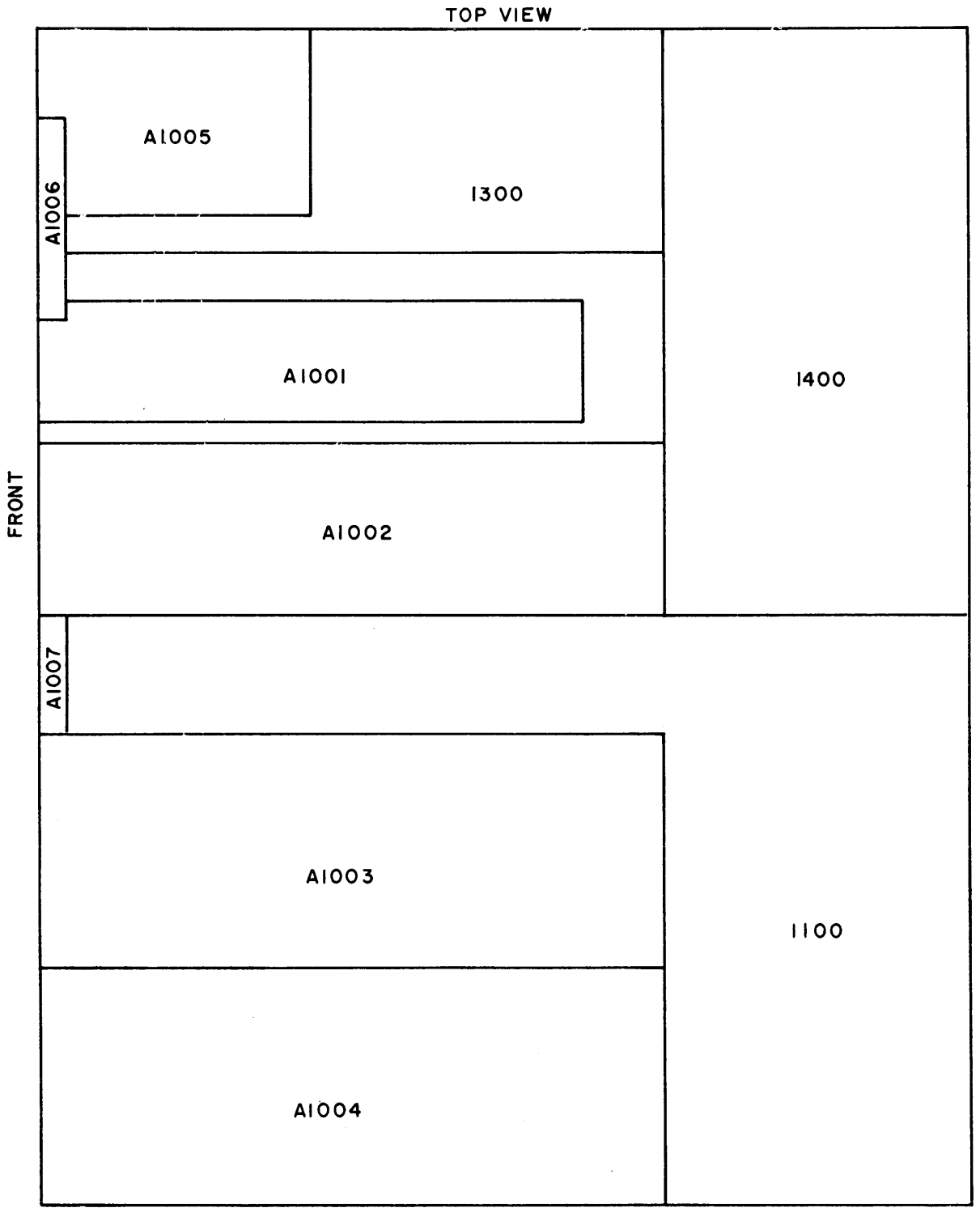


Figure 5-17. IPA Drawer AX-5080 Symbol Series Location Top View

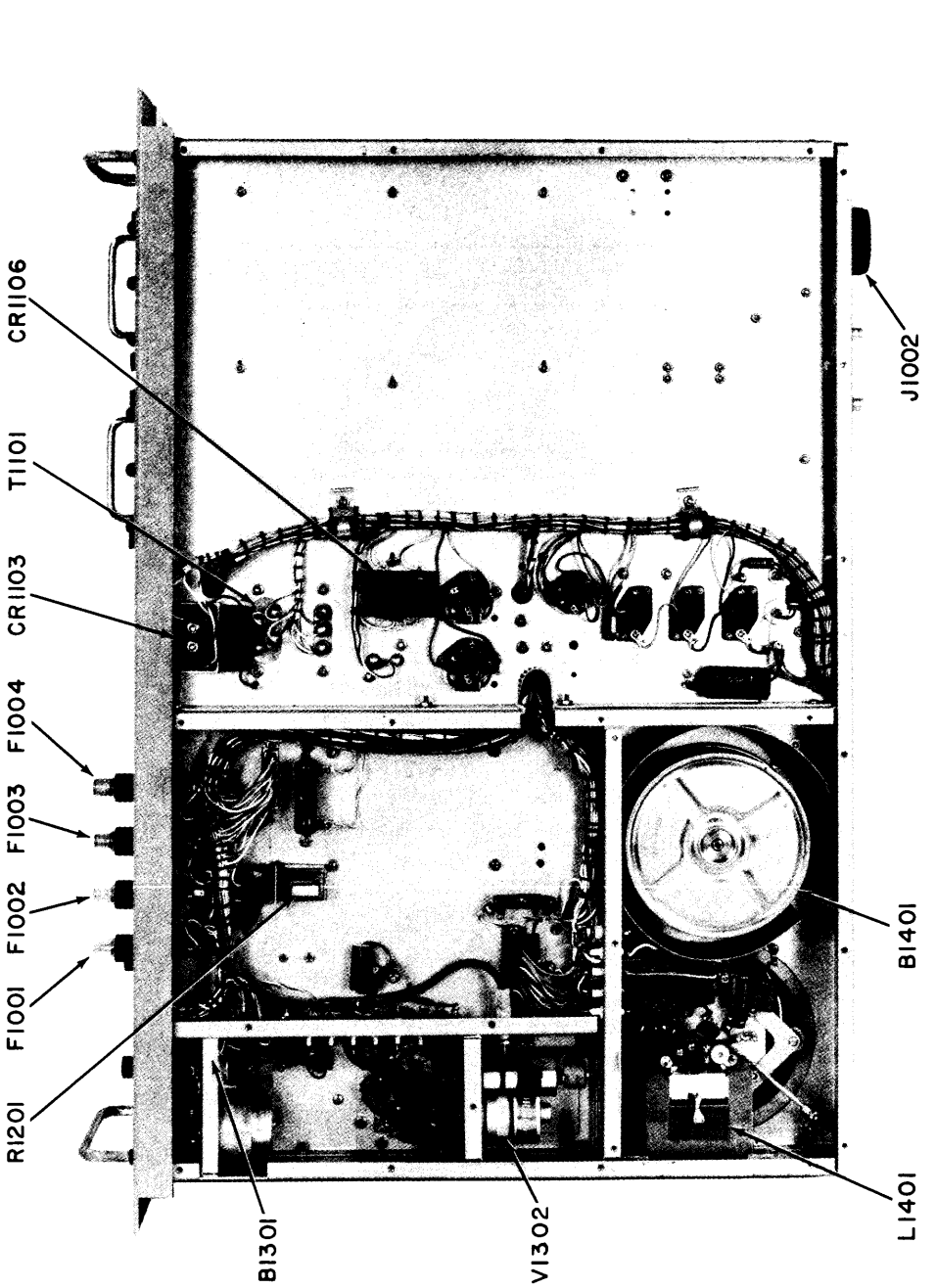


Figure 5-18. IPA Drawer Bottom View

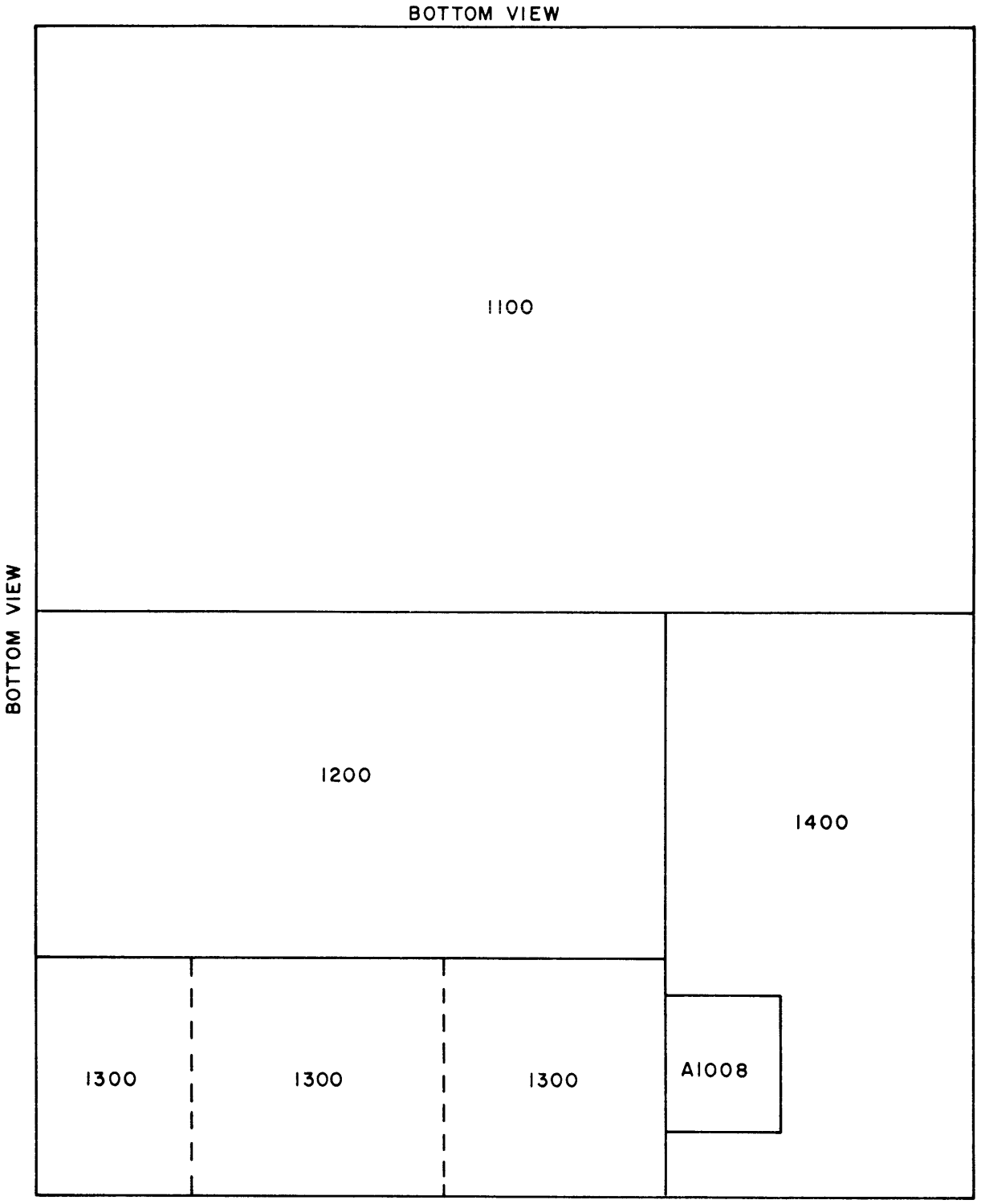


Figure 5-19. IPA Drawer AX-5080 Symbol Series Location Bottom View

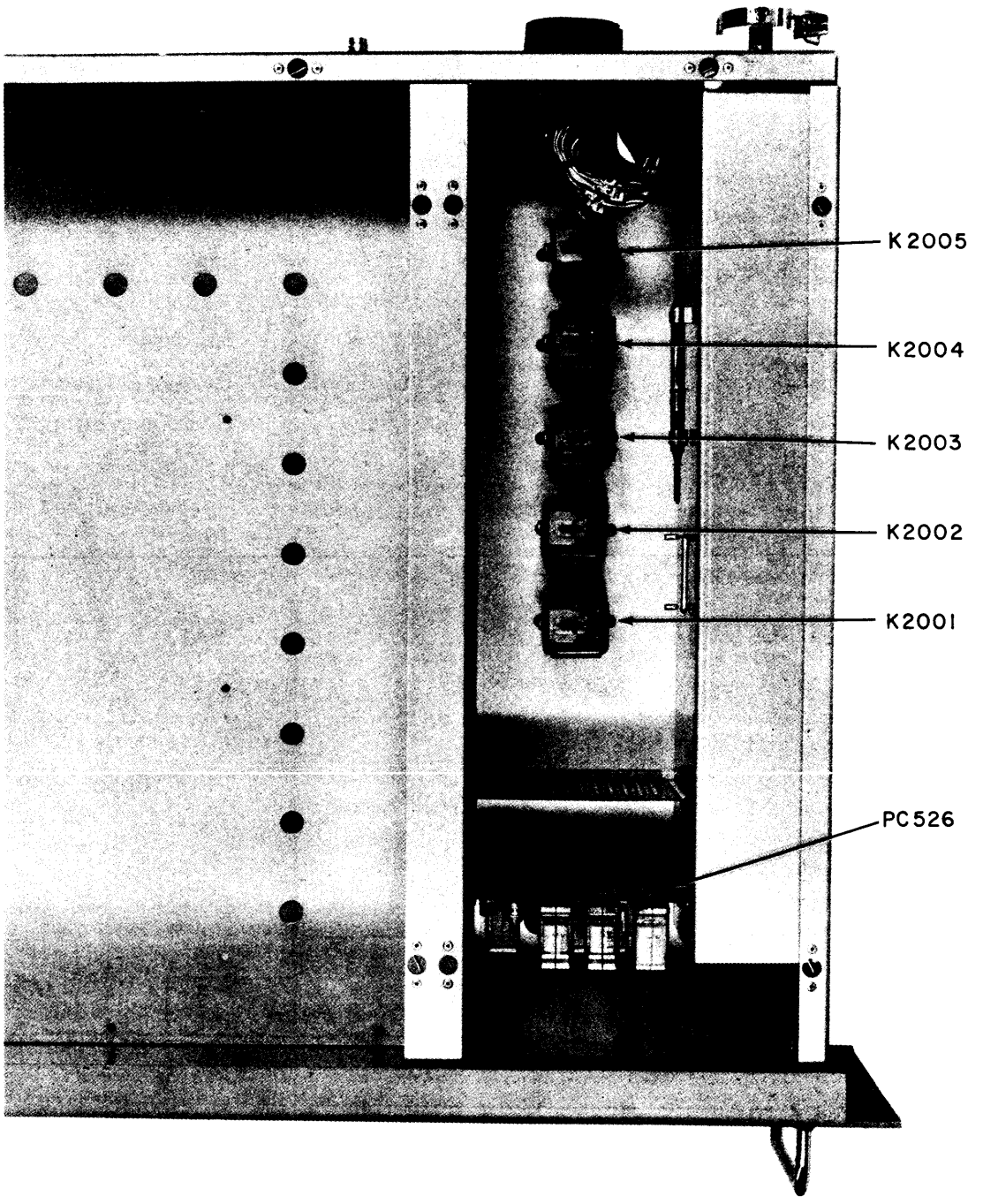


Figure 5-20. Exciter Drawer Top View

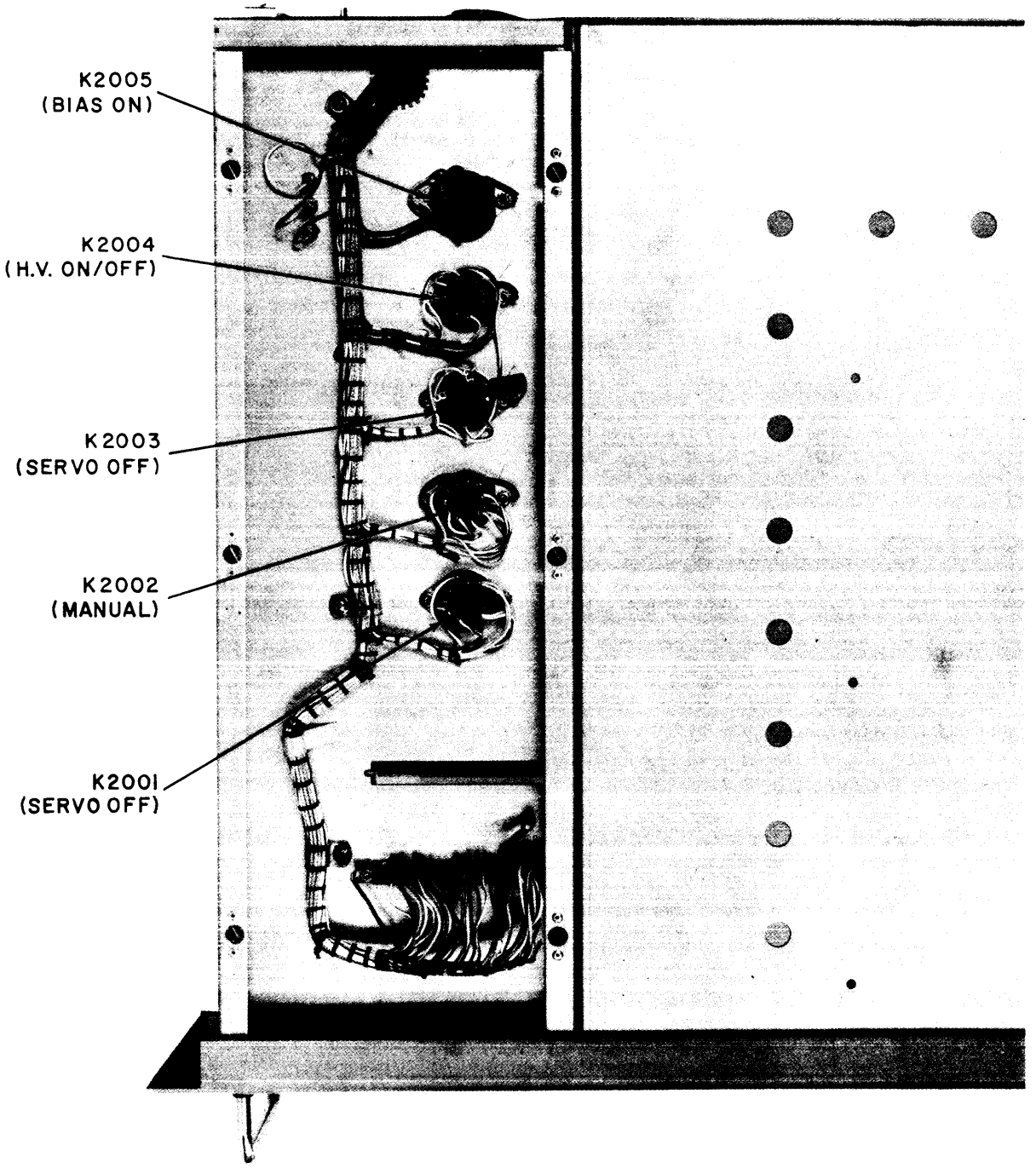


Figure 5-21. P/O Exciter Drawer Bottom View

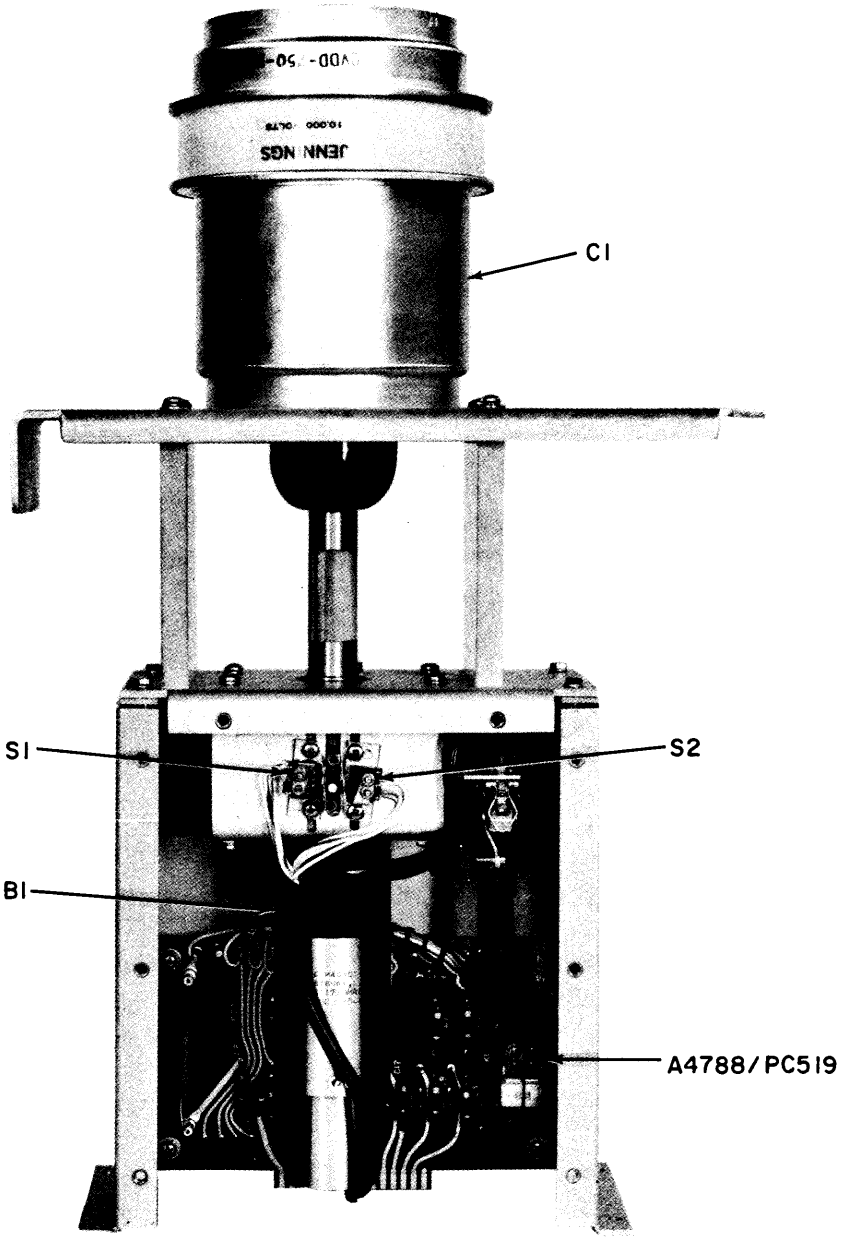


Figure 5-22. PA Tuning Assembly

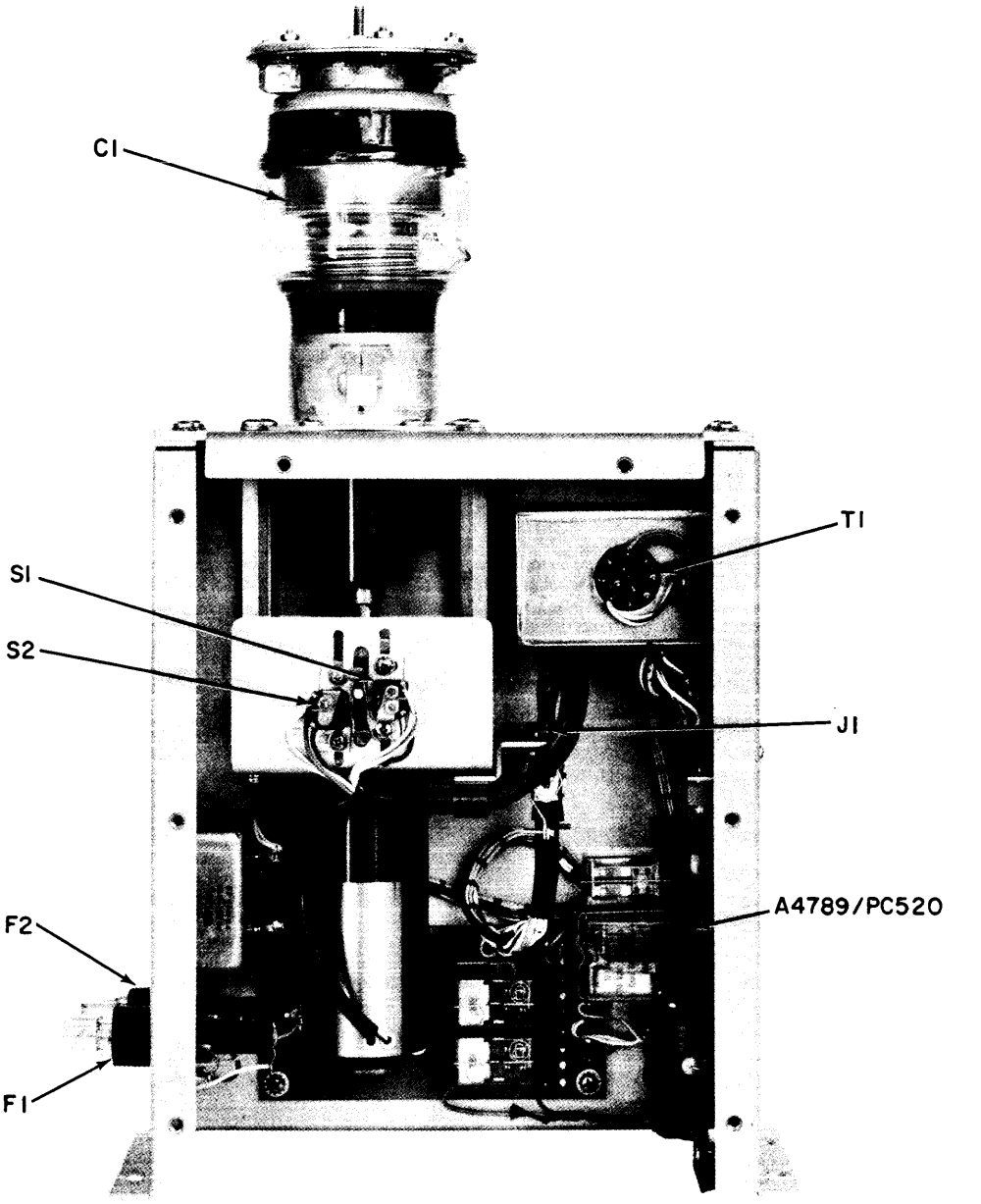


Figure 5-23. PA Load Assembly

TABLE 5-5. TROUBLESHOOTING CHARTS

The Maintenance programs listed are for the purpose of assisting in troubleshooting and maintenance of the transmitter.

These charts or programs do not list all possible difficulties, however, they can be used as a starting point to isolate a particular malfunction. To use the charts follow these instructions.

1. Determine the nature of the trouble.

2. Find the programs which describes it most completely (refer to program list).

3. Follow the arrow from that block to the first suggested fault. INVESTIGATE.

4. If no trouble is found, follow the arrow to the next fault suggested. INVESTIGATE.

5. If trouble is only partially corrected, find the block which most nearly describes the remaining trouble. INVESTIGATE.

6. Proceed as in Line 3 above.

MAINTENANCE PROGRAM LIST

Maintenance Program "A" Auto Tuning Troubleshooting.

Maintenance Program "B" IPA Servo Amp Search lamp does not light.

Maintenance Program "C" IPA & PA Servo Amplifier AC lamps do not light.

Maintenance Program "D" PA Tune Search lamp does not light.

Maintenance Program "E" PA Tune Servo Operate lamp does not light.

Maintenance Program "F" Auto Tuning.

Maintenance Program "G" IPA Plate Meter reading abnormal.

Maintenance Program "H" 2nd AMP Plate meter reading abnormal.

Maintenance Program "I" No H. V.

Maintenance Program "J".

A. Main Blower Does Not Operate.

B. Bandswitch & Interlock lamps out.

C. Power Select lamp out.

Maintenance Program "K" Interlock lamp does not light.

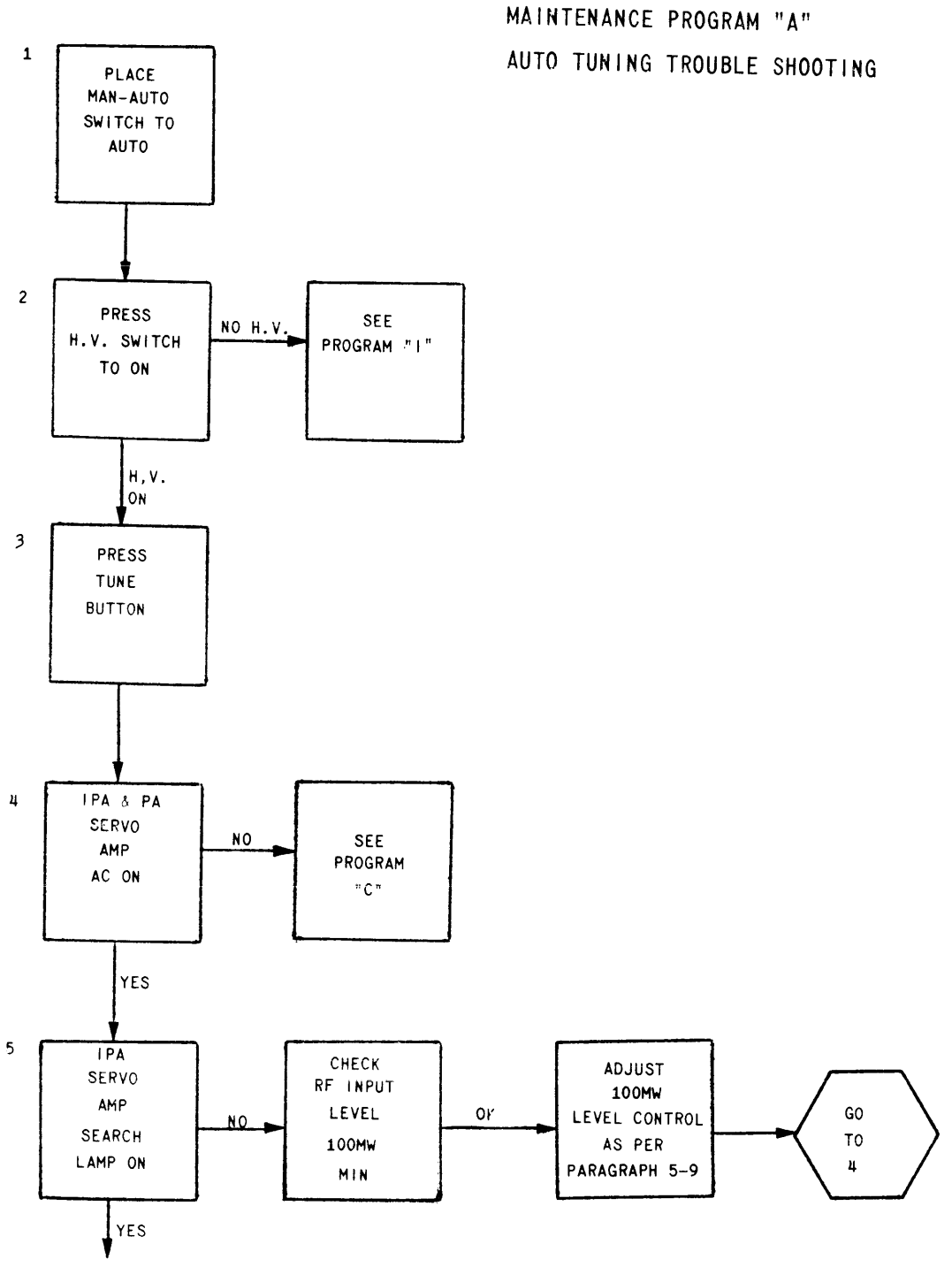


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "A"

AUTO TUNING TROUBLE SHOOTING

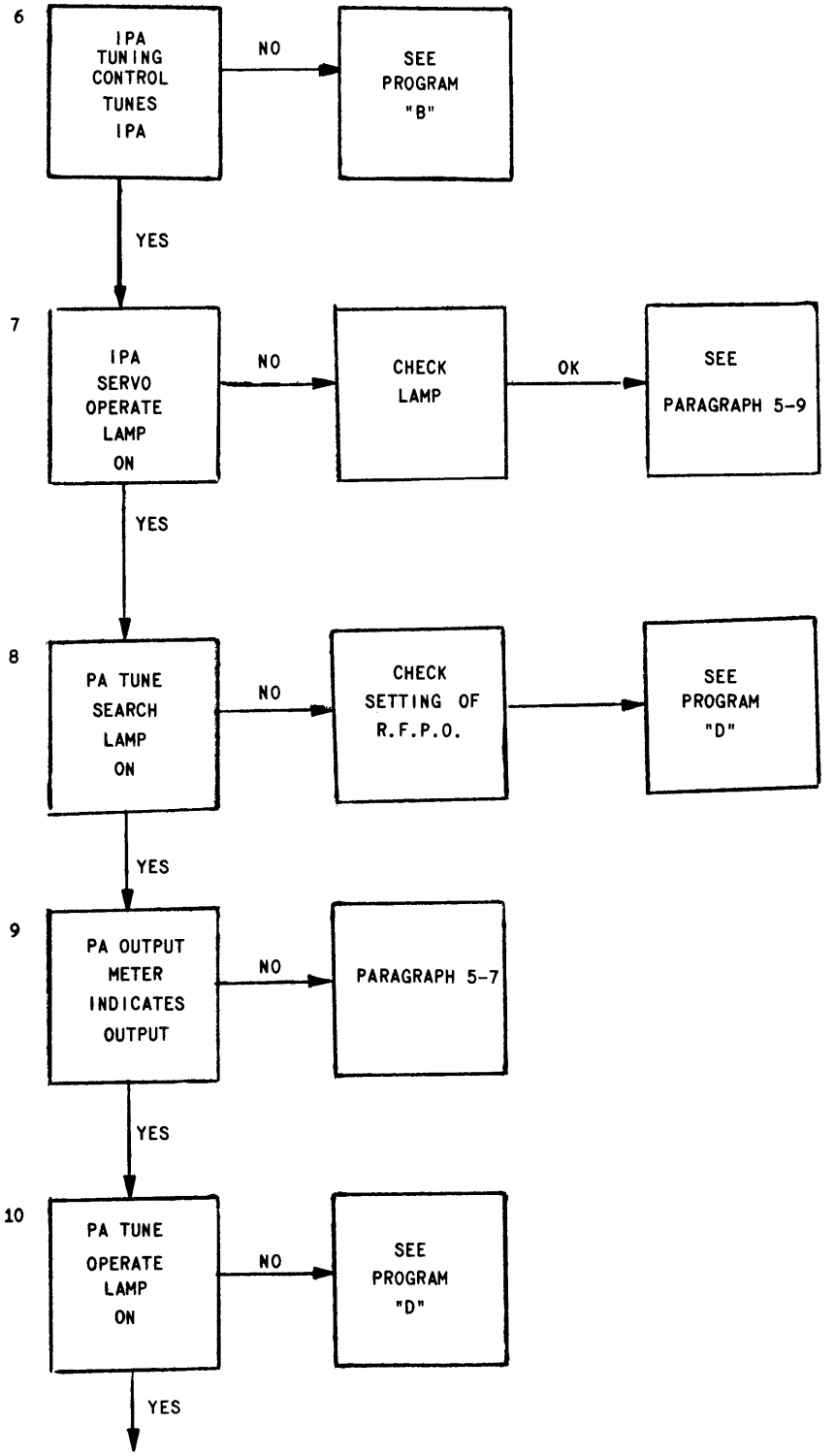


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "A"
AUTO TUNING TROUBLE SHOOTING

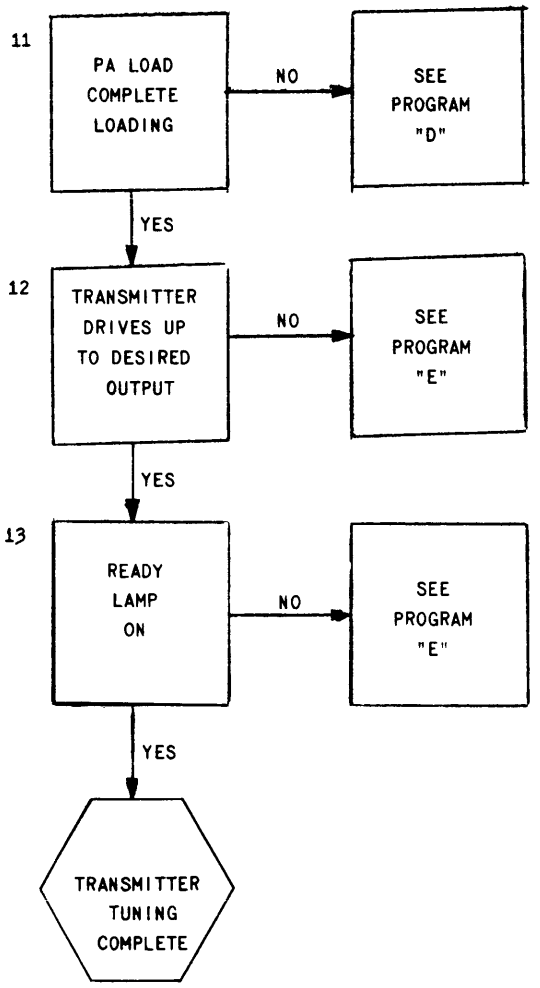


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "B"

PROBLEM: IPA SERVO AMP SEARCH LAMP DOES NOT LIGHT.
(AC AND DC FUSES OK)

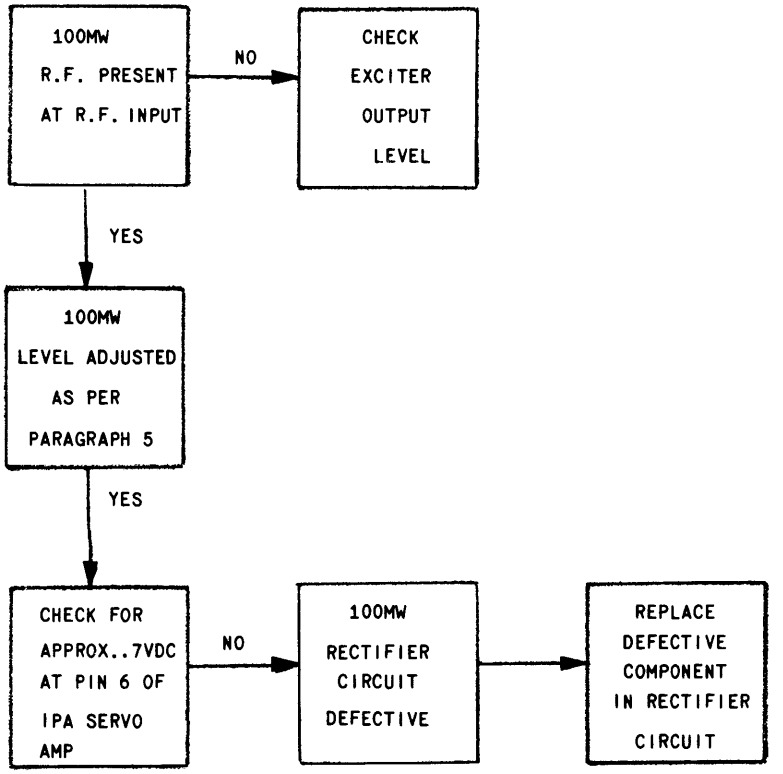


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "C"

PROBLEM: IPA & PA TUNE SERVO AMPLIFIER AC LAMP DOES NOT LIGHT.
(AC & DC FUSES ARE OK)

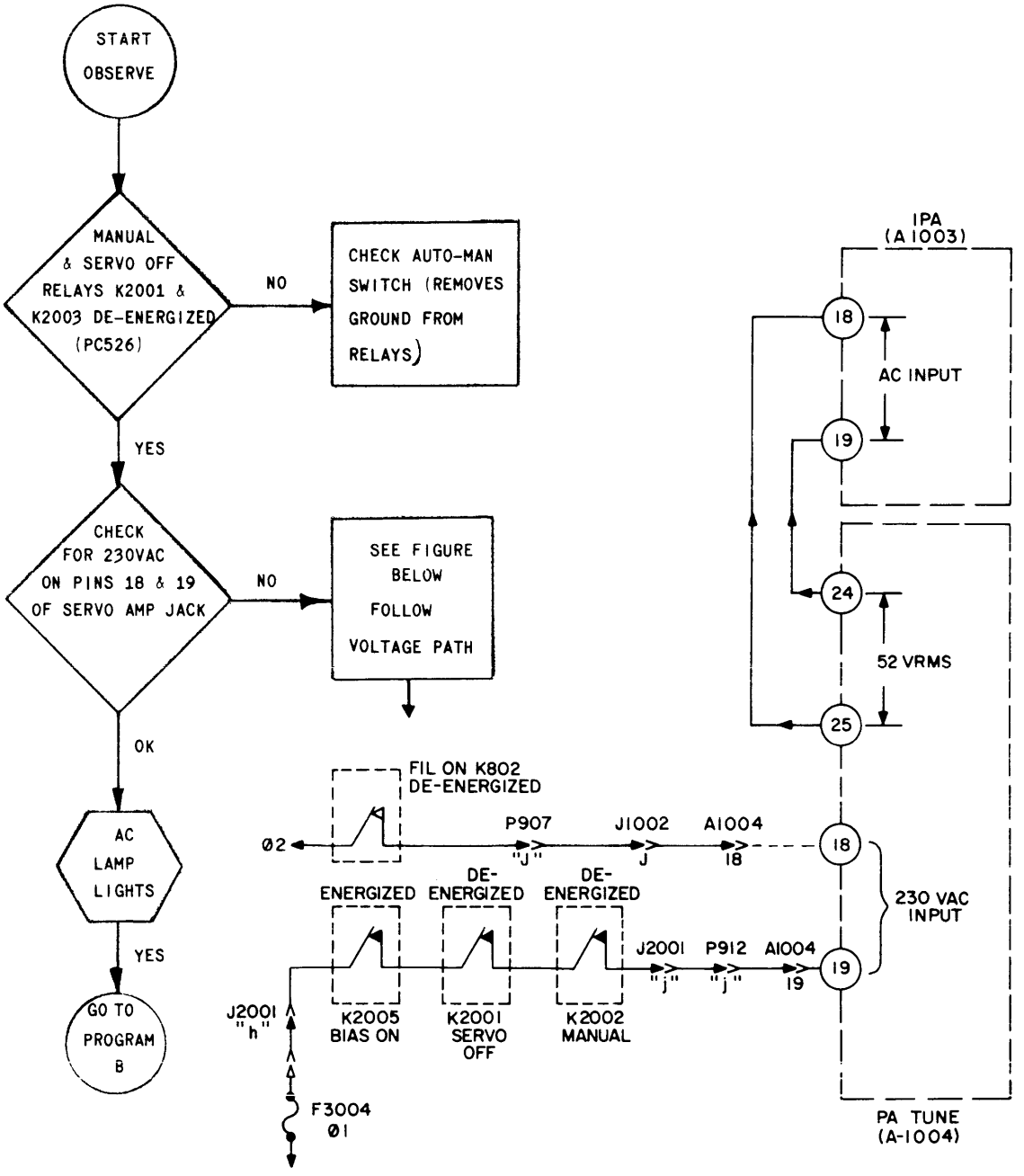


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "D"

PROBLEM: PA TUNE SERVO AMPLIFIER SEARCH LAMP DOES NOT LIGHT
(AC AND DC FUSES OK)

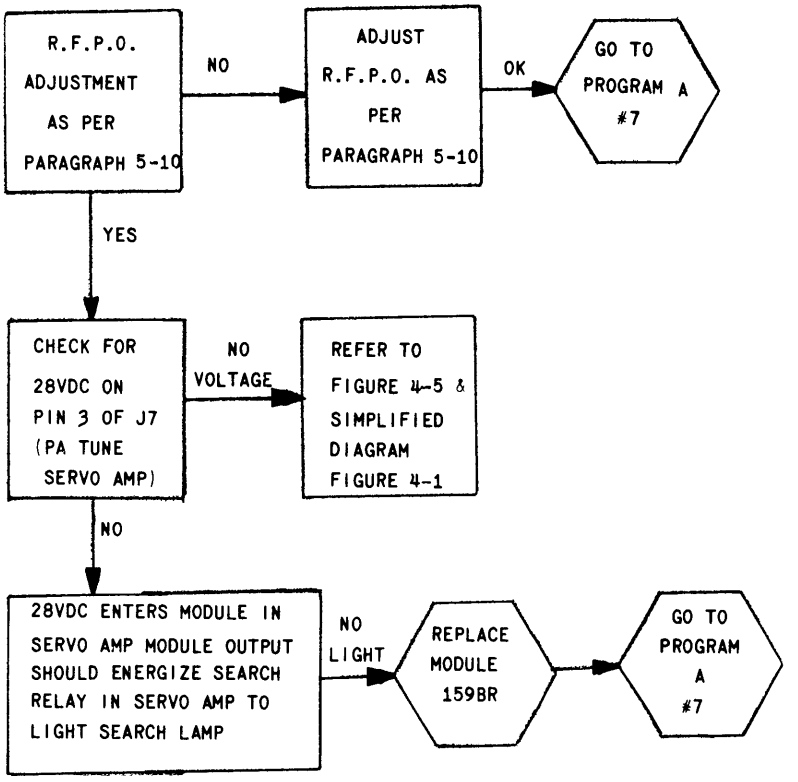


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "E"

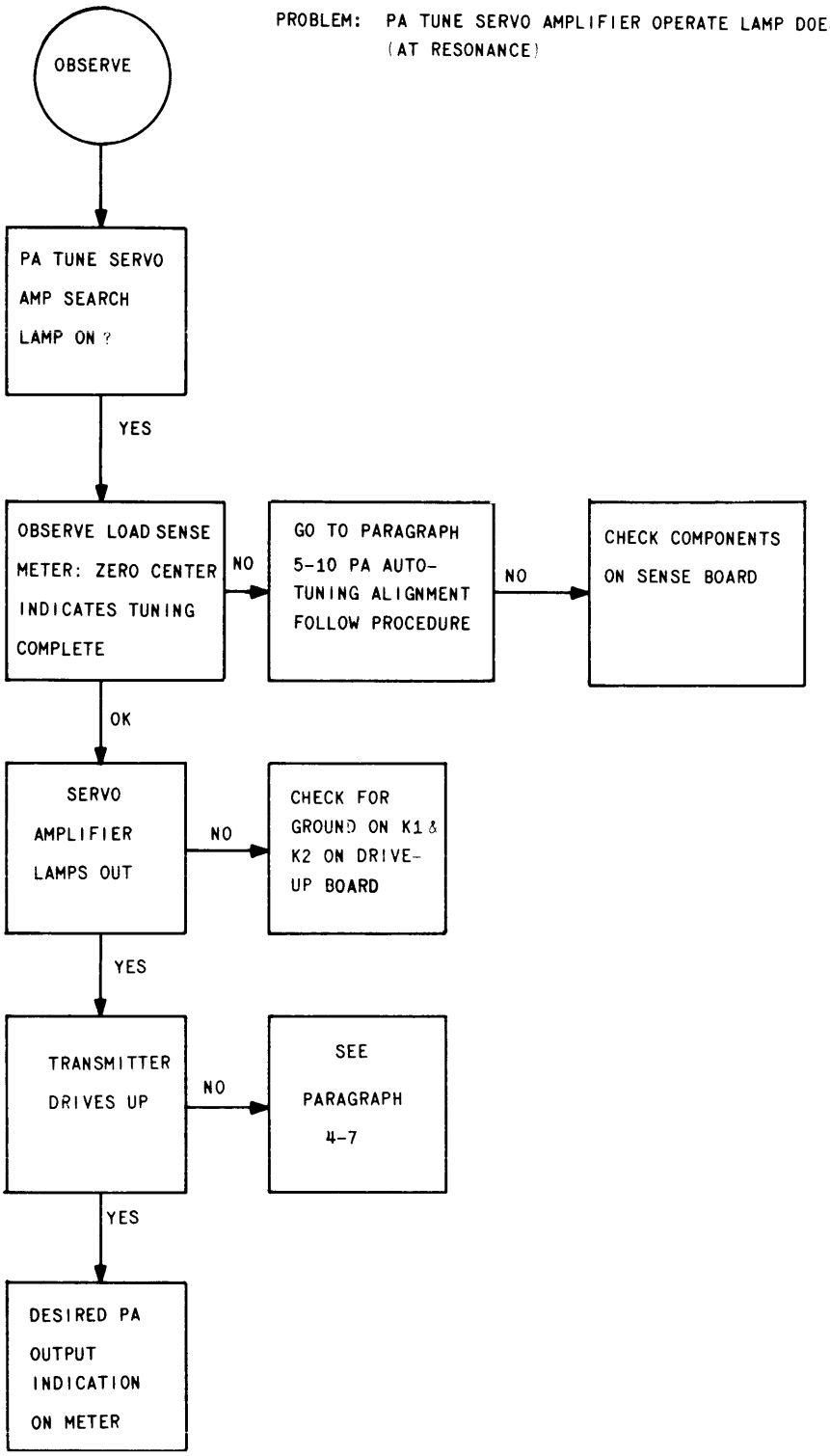


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "F"

PROBLEM: TRANSMITTER WILL NOT TUNE AUTOMATICALLY

NOTE: PLACE MANUAL-AUTO SWITCH TO MANUAL AND PROCEED TO 1

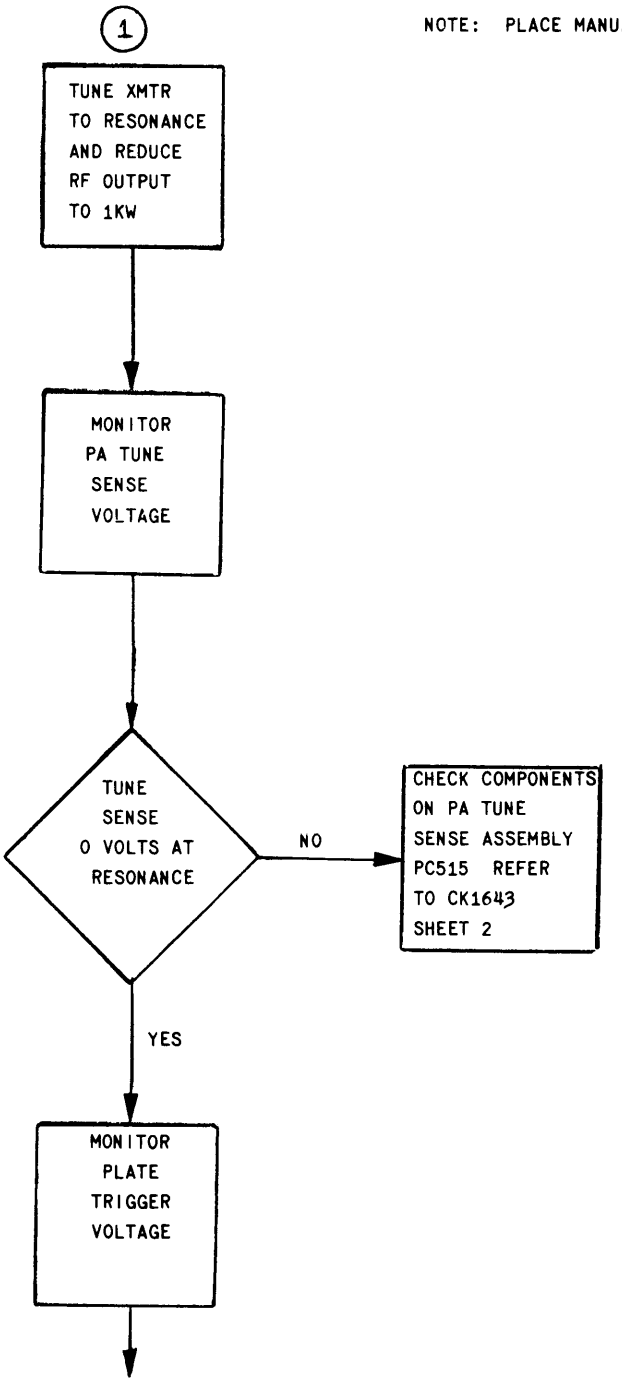


TABLE 5-5. TROUBLESHOOTING CHART

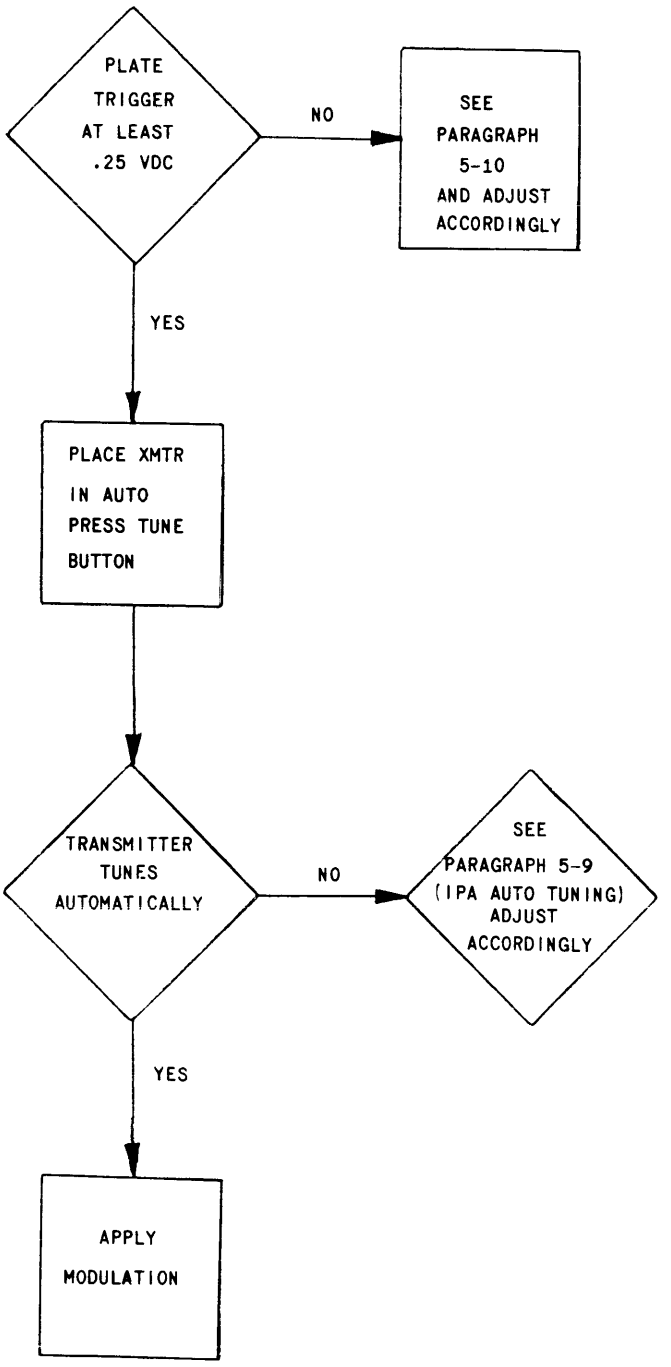


TABLE 5-5. TROUBLESHOOTING CHART

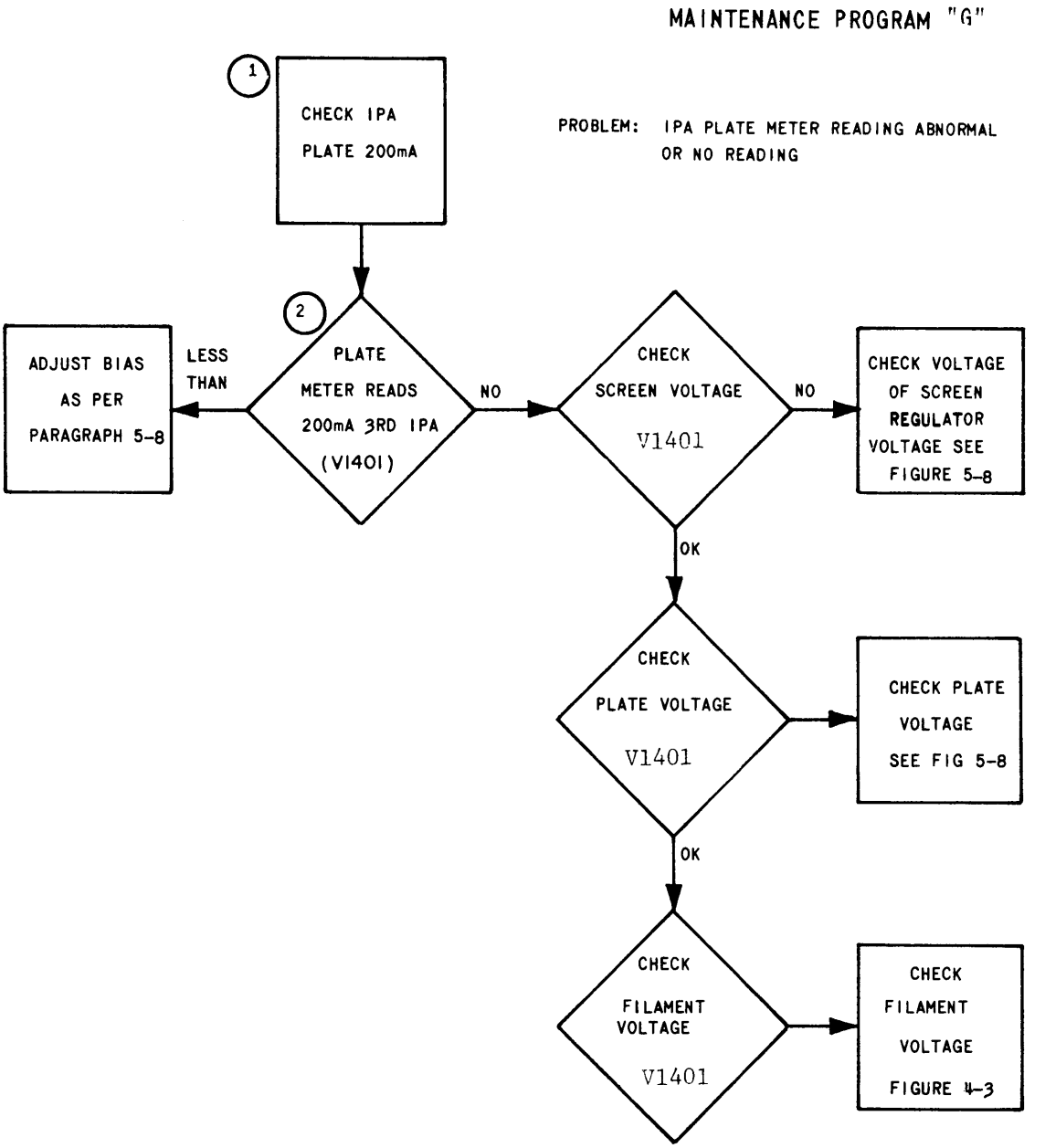
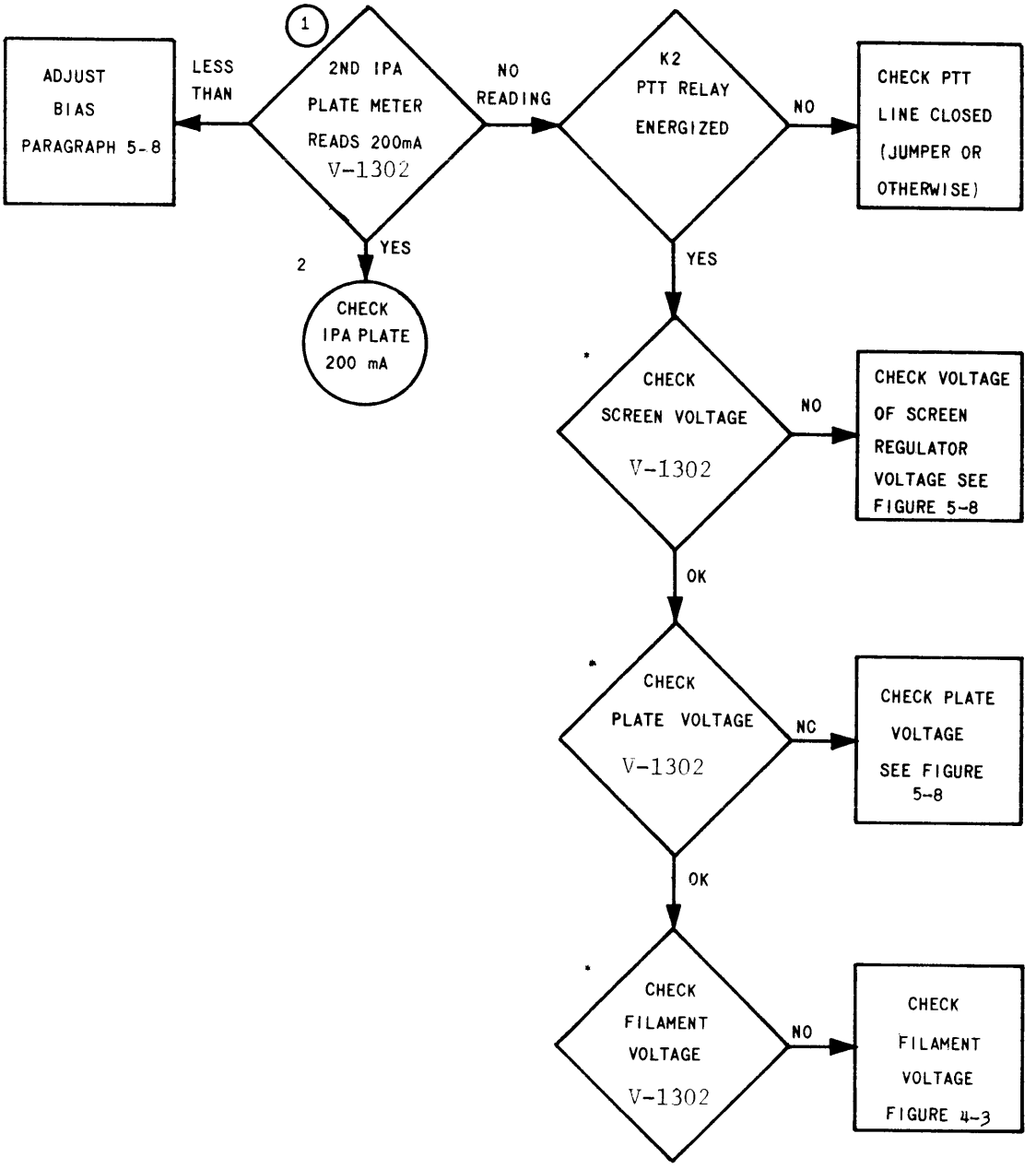


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "H"

PROBLEM: 2ND IPA READING ABNORMAL OR NO READING



* USE CAUTION WHEN MEASURING VOLTAGES

TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "1"

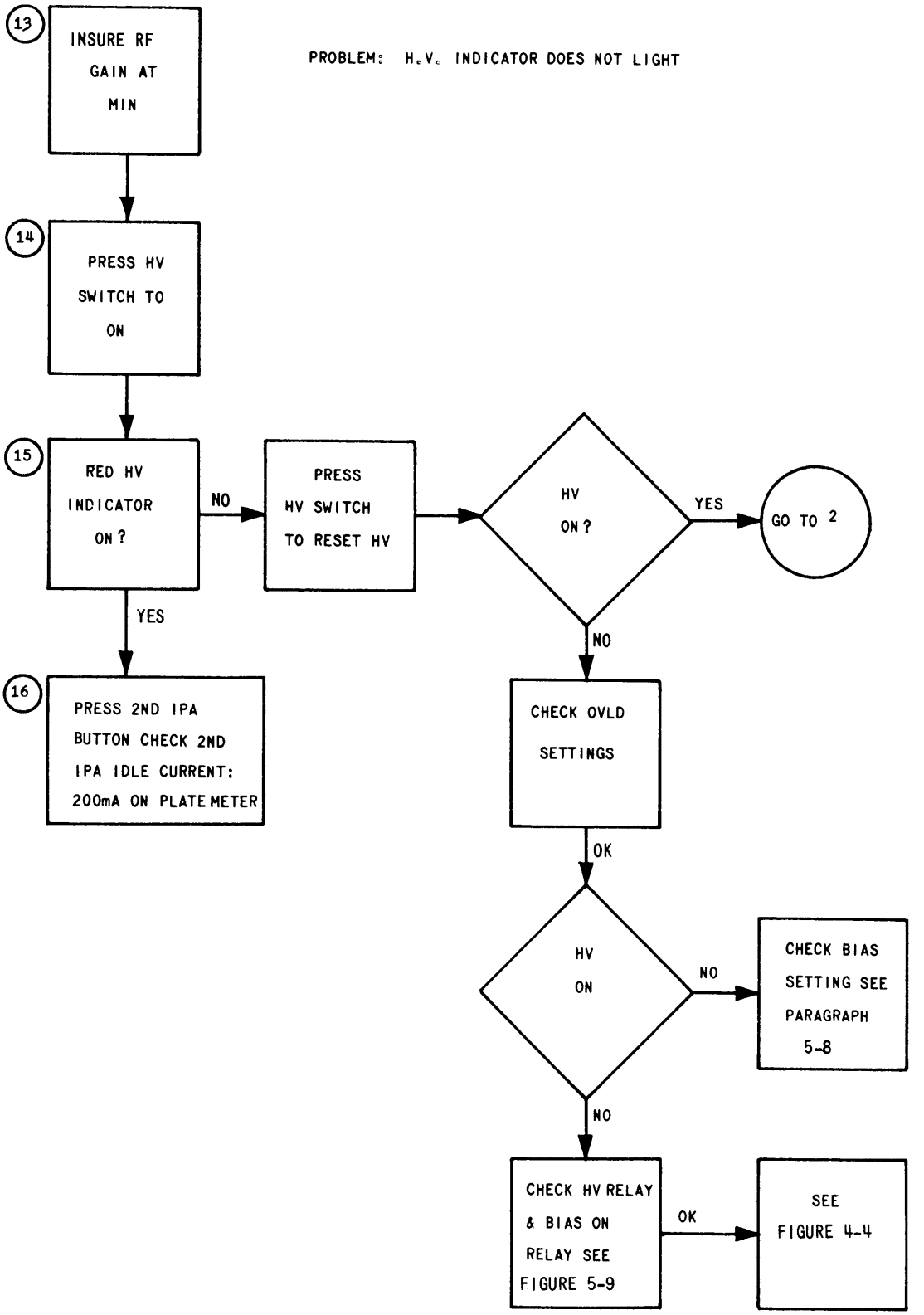


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "J"

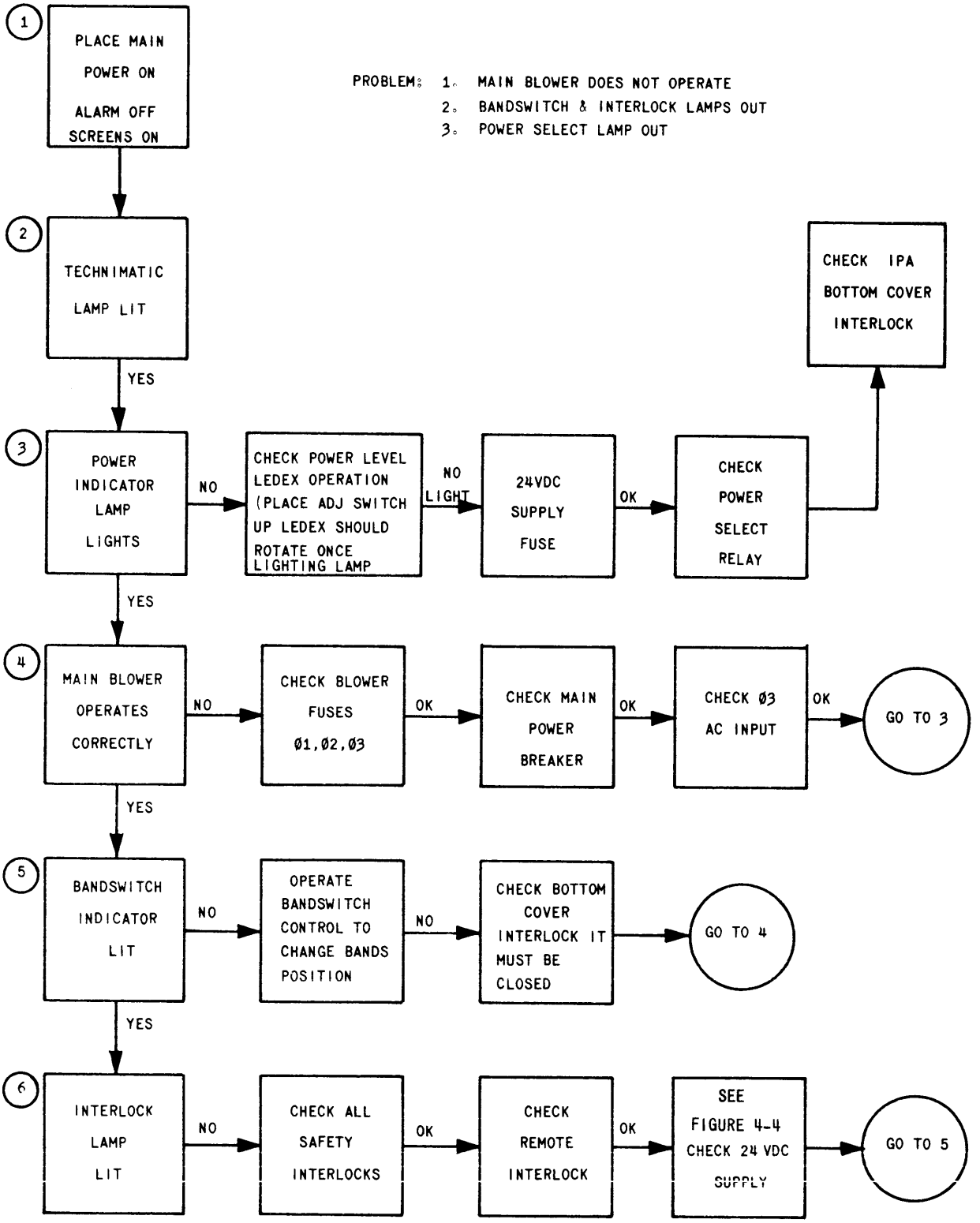


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "J"

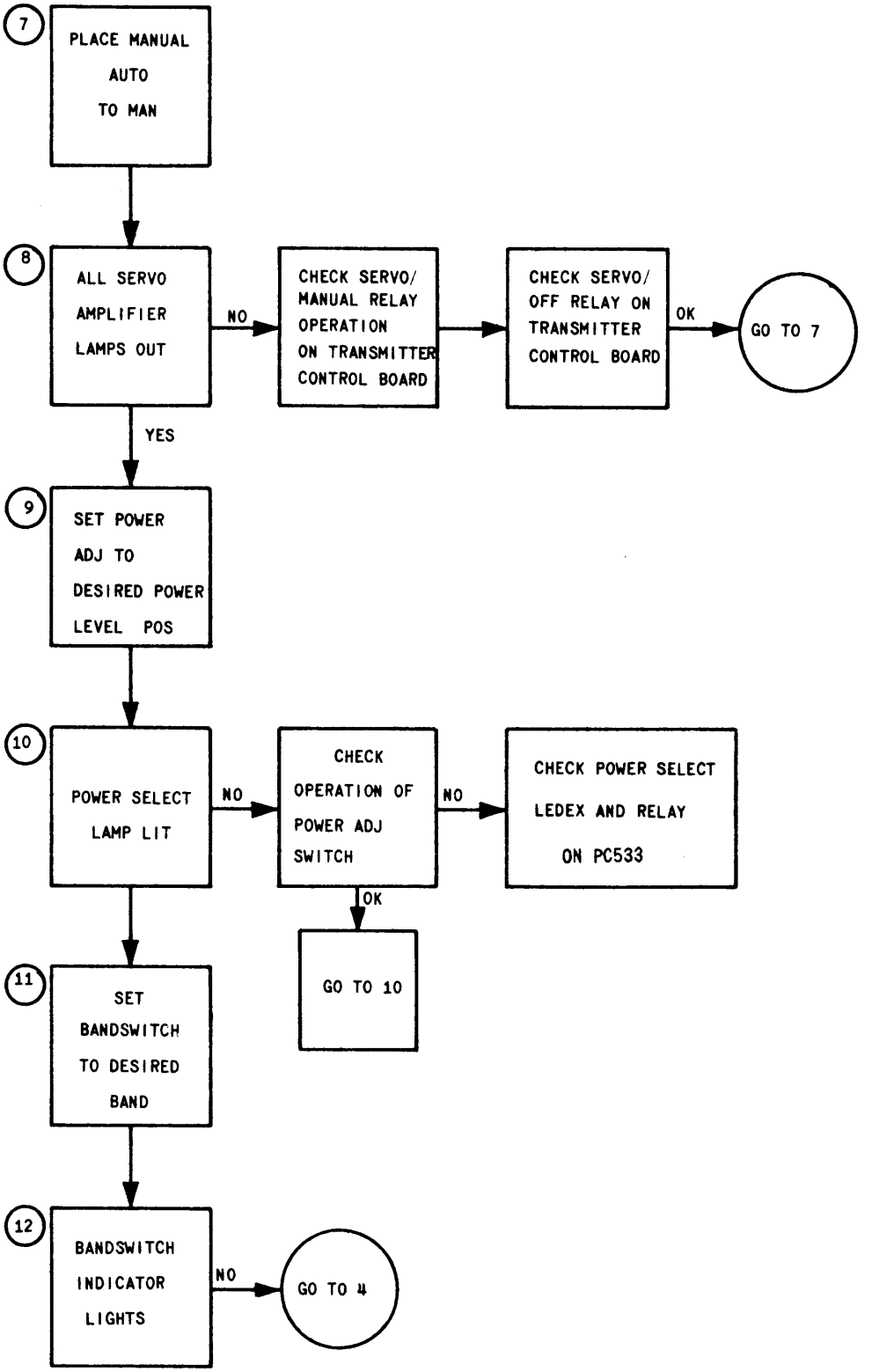


TABLE 5-5. TROUBLESHOOTING CHART

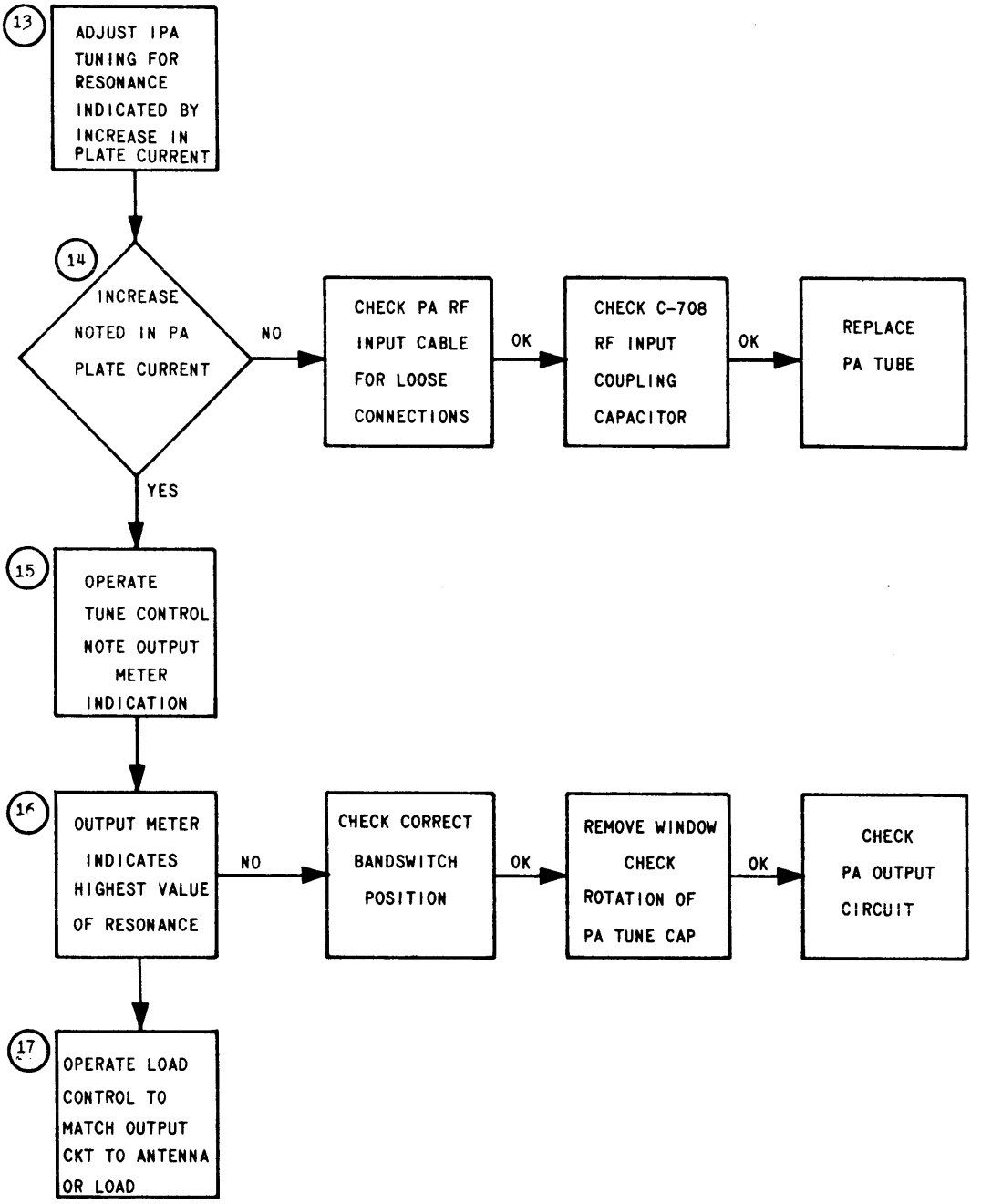


TABLE 5-5. TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "J"

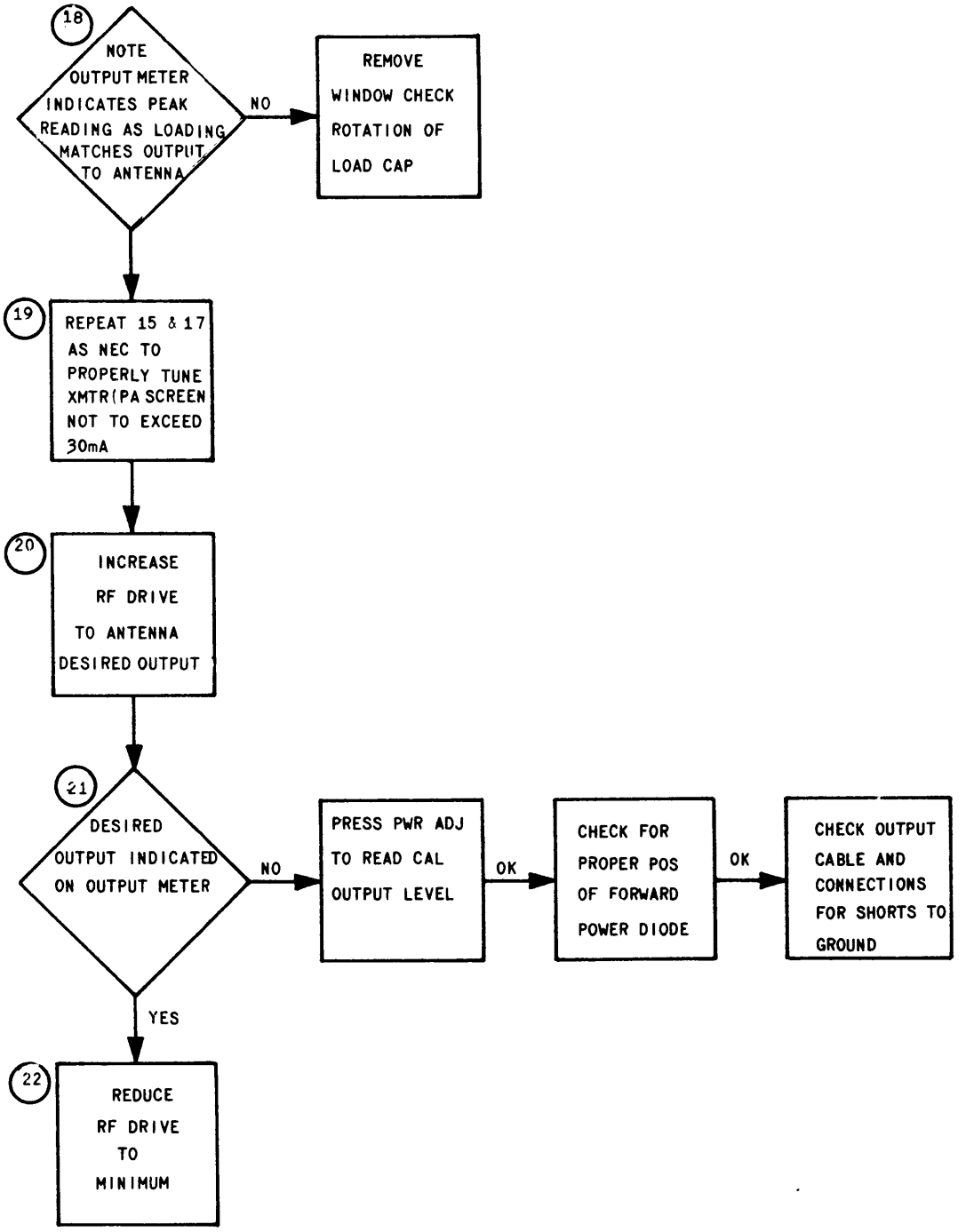


TABLE 5-5. TROUBLESHOOTING CHART

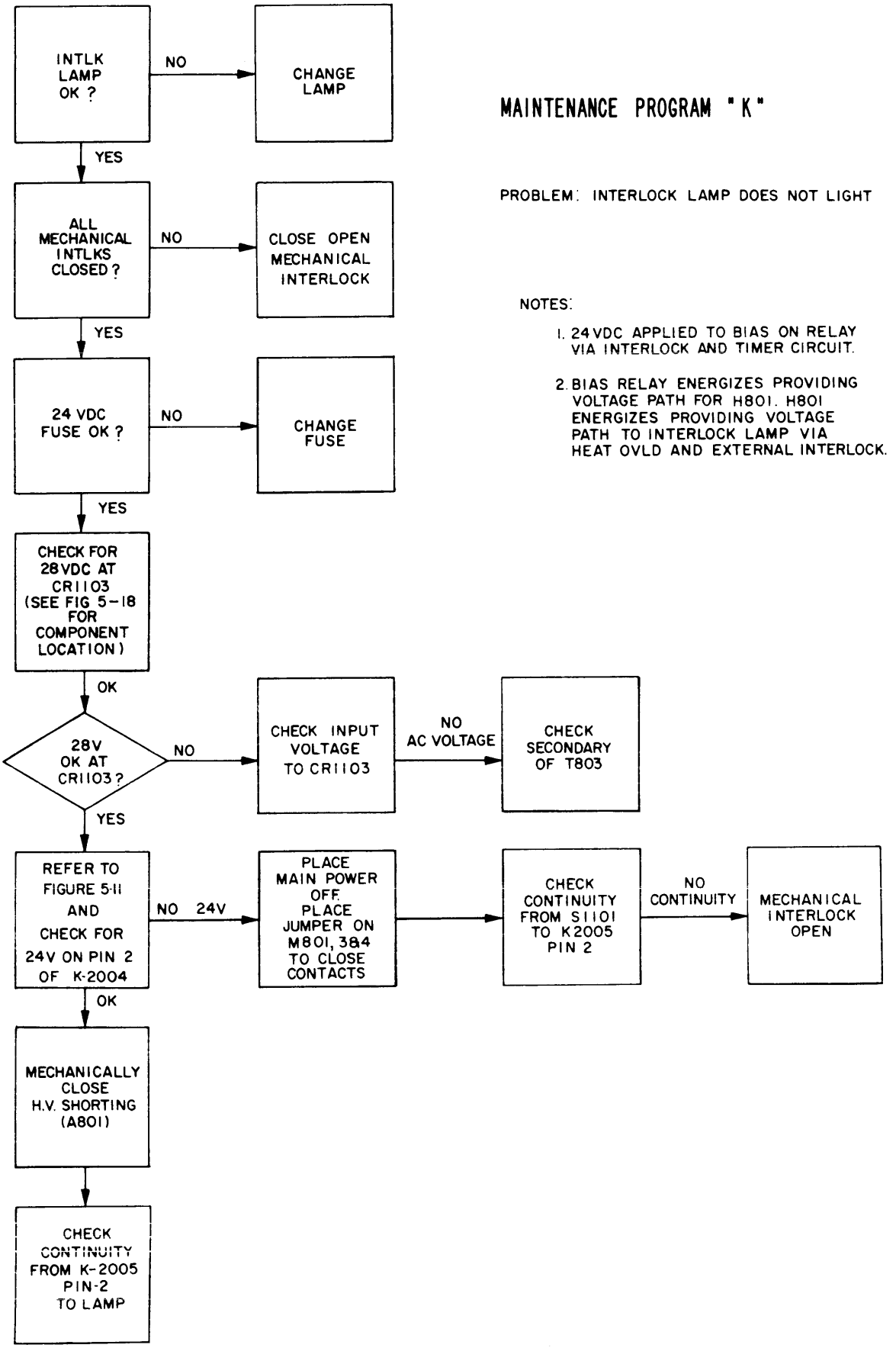
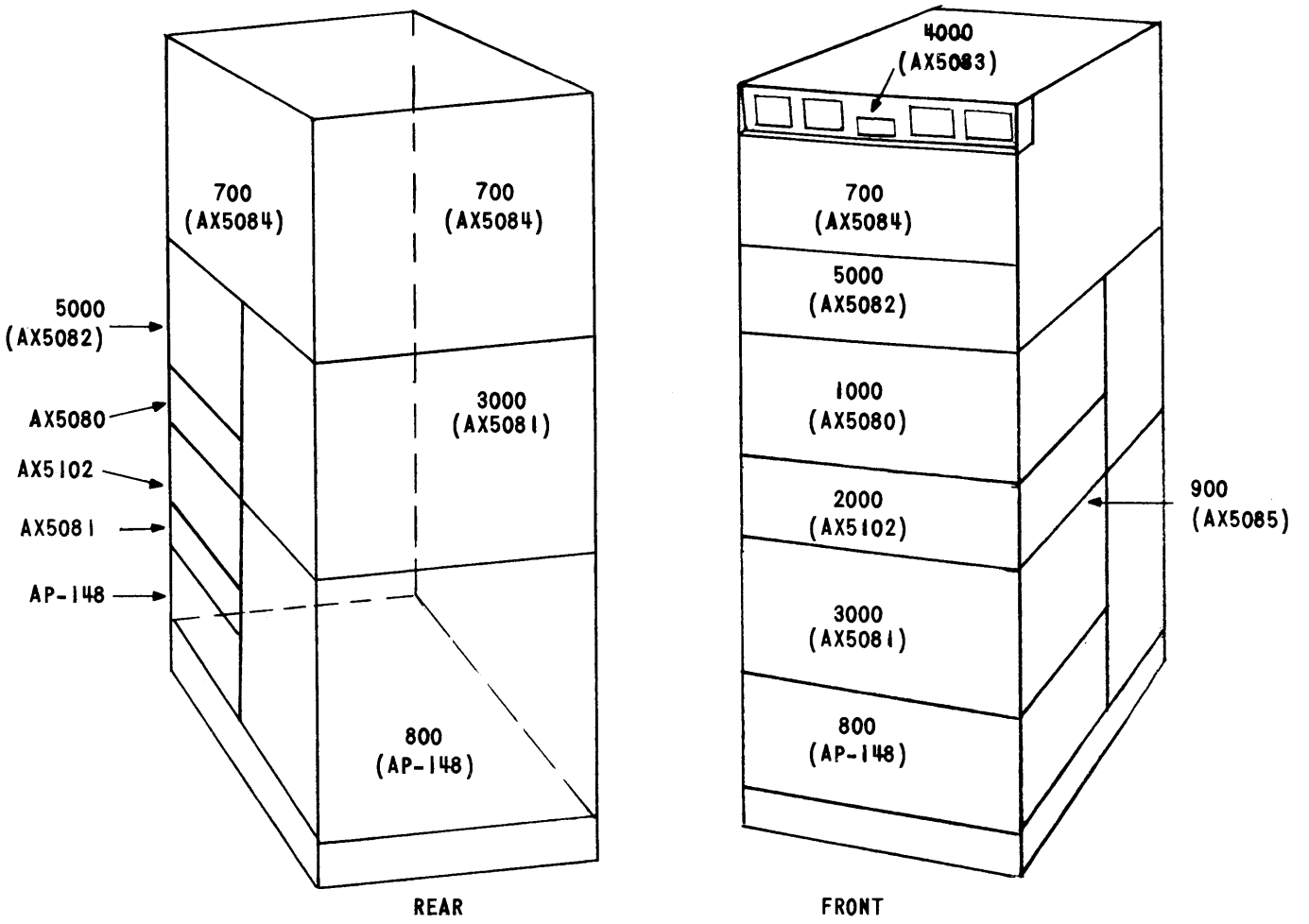


TABLE 5-5. TROUBLESHOOTING CHART



ASSEMBLY NO.	NAME	SYMBOL SERIES
AX5084	PA SECTION	700
AP-148	PWR SUPPLY	800
AX5085	MAIN FRAME SUB ASSY	900
AX5080	IPA DRAWER	1000
AX5102	EXCITER DRAWER	2000
AX5101	INPUT CHASSIS	3000
AX5083	METER PANEL	4000
AX5082	MAIN CONTROL PANEL	5000

FIG 6-1 ASSEMBLY LOCATION DRAWING

SECTION VI
PARTS LIST

6-1. INTRODUCTION.

Reference designations have been assigned to identify all electrical parts of the equipment. These designations are used for marking the equipment (adjacent to the part they identify) and are included on drawings, diagrams and the parts list. The letters of a reference designation indicate the kind of part (generic group), such as resistor, capacitor, transistor, etc. The number differentiates between parts of the same generic group. Sockets associated with a particular plug-in device, such as transistor or fuse, are identified by a reference designation which includes the reference designation of the plug-in device. For example, the socket for relay K2001 is designated XK2001. The assemblies and/or sub-assemblies that are a part of a major assembly are suffixed with an asterisk; parts list breakdown for these assemblies are located in the rear of the parts section. For example, in parts list for Power Amplifier, the Reference Symbol A701 shows a TMC part number A4783*, the parts list breakdown for A4783 is located in the rear of parts list section. Refer to figure 6-1 for location of assemblies and symbol series on transmitter. To expedite delivery when ordering replacement parts, specify the TMC part number and the model number of the equipment. See example below.

To order C1 of A4789, order as follows:

A4789 C1, TMC Part No. CC100-16.

Title	Page
2 MHz to 30 MHz Power Amplifier (Symbol Series 700)	6-2
Main Power Supply (Symbol Series 800)	6-5
Main Frame Sub-Assembly (Symbol Series 900)	6-8
IPA Drawer (Symbol Series 1000)	6-9
Exciter Drawer (Symbol Series 2000)	6-15
Input Chassis (Symbol Series 3000)	6-16
Main Meter Panel (Symbol Series 4000)	6-18
Main Control Panel (Symbol Series 5000)	6-19

2-30 MHz POWER AMPLIFIER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A701	BD ASSY, PA SEN	A-4783*
A702	CAP. ASSY, TUNE	BMA 381*
A702A1	BD ASSY, PC	A-4788*
A702C1	CAP., VAR. VAC	CB 176
A702S1	SW, SENS-W/ACTR	SW-353-3
A702S2	SAME AS A702S1.	
A702W1	WRG, HARN, BRCHD	CA 1517
A702W1P1	CONN, PL, ML	JJ 313-2H
A703	CAP., ASSY LOAD	BMA 380
A703A1	BD ASSY, PC	A-4789*
A703A2	NETWORK	AZ 117
A703C1	CAP., VAR. VAC	CB 147
A703C2	CAP., FXD, MTLZ	CP121-25M150T
A703F1	FUSE, CTG	FU102-2
A703F2	FUSE, CTG	FU102-.062
A703S1	SW, SENS-W/ACTR	SW 353-3
A703S2	SAME AS A703S1.	
A703T1	XFMR, PWR, SD	TF 0245
A703W1	WRG HARN, BRCHD	CA 1518
A703W1P1	CONN, PL, FML	JJ 310-1H
A703W1XA1	CONN, RECP, FML	JJ 293-15DFE
A703XF1	FUSEHOLDER	FH104-3
A703XF2	FUSEHOLDER	FH104-11
A704	BANDSW ASSY	AS 145
A705	REMOTE PWR ASSY	AX 5095
A706	FIL ASSY, HARM	AF 109
A707	ASSY ALDC CKT	A-4822*
C701	CAP., FXD, CER	CC 109-38
C702	SAME AS C701.	
C703	SAME AS C701.	
C704	CAP., FXD, CER	CC 109-36
C705	SAME AS C704.	
C706	SAME AS C704.	
C707	SAME AS C704.	
C708	SAME AS C704.	
C709	CAP., FXD, CER	CC 109-31
C711	CAP., FXD, CER	CK 70AW102M
C712	SAME AS C711.	
C713	CAP., FXD, CER	CC 115-2-6800
C714	SAME AS C713.	
C715	SAME AS C713.	
C716	CAP., FXD, CER	CC 109-19
C717	SAME AS C716.	
C718	SAME AS C716.	
C719	SAME AS C716.	
C720	CAP., FXD, CER	CC 109-28
C721	SAME AS C720.	

2-30 MHz POWER AMPLIFIER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C722	CAP., FXD, CER	CC 109-6
C723	CAP., FXD, CER	CC 109-6
C724	SAME AS C723.	
C725	SAME AS C723.	
C726	SAME AS C723.	
C727	SAME AS C723.	
C728	CAP., FXD, CER	CC109-28
C729	SAME AS C728.	
C730	CAP., FXD, CER	CC 120-202B25
C731	SAME AS C730.	
C732	SAME AS C730.	
C733	CAP., FXD, CER	CC 100-28
C734	SAME AS C733.	
C735	SAME AS C733.	
C736	SAME AS C733.	
C739	CAP., FXD, CER	CC 120-202B25
C740	CAP., FXD, CER	CC 109-24
CR701	DET, ELEM	DD 119-10
CR702	DET, ELEM	DD 119-9
DC701	COUP, DIR	DC 104-3
E701	INS. BOWL	NS 112-2
E702	INS. STANDOFF	NS 3W0208
E703	CONT, ELECT, HV	AX 152
E704	SAME AS E703.	
E708	INS. FD-THRU	TEO 101-3
E709	SAME AS E708.	
E710	SAME AS E708.	
E711	SAME AS E708.	
E712	INS. STANDOFF	NS 3W0320
E714	TERM., STUD-INS	TEO 102-2
E715	SAME AS E714.	
E716	SAME AS E714.	
E717	SAME AS E714.	
J701	CONN, RECP - HN	UG 560
J704	CONN, RECP, ML	MS 3102A24-28P
L701	COIL, RF, FXD	CL 178
L702	COIL, RF, FXD	CL 100-5
L703	COIL, FIL	CL 444
L704	COIL, RF, FXD	CL 166
L705	COIL, RF, FXD	CL 166
L706	COIL, RF	CL 442
L707	COIL, ASSY, OUT	CL 443

2-30 MHz POWER AMPLIFIER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L708	COIL, RF, FXD	CL 240-120
L709	SAME AS L708.	
L711	COIL, RF, FXD	CL 178
P701	CONN, PL, RF	PL 254
P702	SAME AS P701.	
R701	RES, FXD, COMP	RC42GF273J
S701	SW, THERMO	SS 107
T701	XFMR, RF	TZ 229
V701	TUBE, ELECT	8794
W701	CBL, RF, COUP	CA 1566
W702	CBL, ASSY, JUMPER	CA0409-144-2.00
W703	SAME AS W701.	
W704	SAME AS W701.	
W705	CBL, ASSY JUMPER	CA0409-144-3.00
XA707	SOC, EL TUBE	TS101-PQ1
XV701	SOC, EL TUBE	89-088

MAIN VOLTAGE POWER SUPPLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A801	SHRTG REL ASSY	AX5096*
B801	FAN, CENT., 3 PH	BL 132
C801	CAP., FXD, P	CP103
C802	CAP., FXD, PLST	CX113-2
C803	CAP., FXD, P	CP105
C804	SAME AS C803	
C805	CAP., FXD, CER	CC109-38
C806	CAP., FXD, CER	CC109-38
C807	CAP., FXD, CER	CC109-38
CR803	RECT, SCOND, DEV	DD129
CR804	SAME AS CR803.	
CR805	RECT, SCOND DEV	DD147
CR806	SCOND, DEV, DIO	IN3022B
CR801 A	SCOND DEV, DIO	IN2846B
CR801 B	SAME AS CR801A.	
CR801 C	SAME AS CR801A.	
CR801 D	SAME AS CR801A.	
CR801 E	SAME AS CR801A.	
CR801 F	SAME AS CR801A.	
CR801 G	SAME AS CR801A.	
CR801 H	SAME AS CR801A.	
CR802 A	RECT, SCOND DEV	DD128-3
CR802 B	RECT, SCOND DEV	DD128-3
CR802 C	RECT, SCOND DEV	DD128-3
CR802 D	SAME AS CR802C.	
CR802 E	SAME AS CR802C.	
CR802 F	SAME AS CR802C.	
CR807 A	SCOND DEV, DIO	IN2846B
CR807 B	SAME AS CR807A.	
E801	TERM., LUG	TEO 149-144
E802	SAME AS E801.	
E803	SAME AS E801.	
E804	SAME AS E801.	
E805	BOLT, MACH	SCHH2520BN24
E806	SAME AS E805.	
E807	SAME AS E805.	
E808	SAME AS E805.	
E809	CONTACT KIT SINGLE	PO-183
E810	SAME AS E809.	
E811	SAME AS E809.	

MAIN POWER SUPPLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
E812	TERM., STUD- INS	TEO 102-2
E813	SAME AS E812.	
E816	NOT USED.	
E817	CONTACT	AX154
K801	REL, SOL. -3P	RL130-3
K802	REL, ARM.	RL184-1
L801	REACTOR - 2H	TF5035
L802	REACTOR - 5H	TF5034
L803	REACTOR - 7H	TF5013
L804	COIL, RF, FXD	CL178
M801	TIMER, INTERVAL	TI-105-1
P801	CONN, PL, HN	PL 253-1
R801	RES, FXD, WW	RW118F502
R802	SAME AS R801.	
R803	RES, FXD, WW	RW118F5R0
R804	RES, FXD, WW	RW118F183
R805 thru R808	SAME AS R804.	
R809	RES, FXD, WW	RW105-29
R810	NOT USED.	
R811	RES, FXD, WW	RW110-7
R812	SAME AS R811.	
R813	RES, FXD, WW	RW110-3
R814	RES, FXD, COMP	RC42GF331J
R815	RES, FXD, COMP	RC42GF102J
R816	RES, FXD, COMP	RC42GF331J
R817	NOT USED.	
R818	NOT USED.	
R819	RES, FXD, COMP	RC42GF101J
R820	SAME AS R819.	
R821	RES, FXD, WW	RW110-43
R822	RES, FXD, COMP	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	SAME AS R822.	

MAIN POWER SUPPLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R830	NOT USED.	
R831	NOT USED.	
R832	RES, FXD, WW	RW110-7
R833 thru R838	RES, FXD, WW	RW-109-7
S801	SW, SENS	SW252
T801	XFMR, PWR, S. U.	TF203
T802	XFMR, PWR, S. U.	TF386
T803	XFMR, PWR, S. D.	TF384
T804	XFMR, PWR, S. D.	TF383
W801	WRG HARN, BRCHD	CA0682
W802	CBL ASSY, RF	CA582-3
W803	CBL, PWR INPUT	CA1561
W804	CBL, PWR	CA1562
W805	CBL, IPA FILA.	CA1563
W806	CBL, SCREEN INP.	CA1564
W807	CBL, SCREEN INP.	CA1564
W808	CBL, AIR SW	CA1565
W809	LEAD, ELEC	CA0412-2-9.00
W810	LEAD, ELEC	CA0412-2-11.00
W811	LEAD, ELEC	CA0412-2-14.00
W812	LEAD, ELEC	CA0409-105-32.00
W813	LEAD, ELEC	CA0409-231-17.00
W814	LEAD, ELEC	CA412-89-24.00
W815	LEAD, ELEC	CA412-86-6.00
W816	LEAD, ELEC	CA0412-51-3500
W817	LEAD, ELEC	CA0409-107-24.00
W818	LEAD, ELEC	CA0412-11-11.50
W819	LEAD, ELEC	CA0412-2-16.00
W820	LEAD, ELEC	CA0412-2-18.00
W821	LEAD, ELEC	CA412-87-4.00
W822	LEAD, ELEC	CA0412-30-6.00
W823	LEAD, ELEC	CA0412-30-8.00
W824	LEAD, ELEC	CA412-88-3.00
W825	LEAD, ELEC	CA0409-232-9.00
W826	LEAD, ELEC	CA0412-76-4.00
W827	LEAD, ELEC	CA412-35-11.00
W828	LEAD, ELEC	CA0412-36-6.00
W829	LEAD, ELEC	CA409-28-6.00
W830	LEAD, ELEC	CA409-28-6.00
W831	LEAD, ELEC	CA412-69-3.00
XK802	SOCKET, REL	TS196-1

MAIN FRAME SUB-ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
S901	SW PUSH-PULL	SW230
S902 thru S907	SAME AS S901.	
TB901	TERM., BD, BARR	TM102-4
W901	WRG HARN, BRCHD	CA1509

IPA DRAWER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A1001	CAP, ASSY, TUNE	BMA 397
A1002	BD, SW, ASSY	AS 146*
A1003	MOD., IPA	AZ 119
A1004	MOD., TUNE	AZ 118
A1005	BD, ASSY, PC	AZ 117
A1006	BD, ASSY, PC	A 4801*
A1007	BD, ASSY, PC	A 4793*
A1008	BD, ASSY, PC	A 4807*
A1001A1	BD, ASSY, PC	A 4790*
A1001B1	MOT	MO 127
A1001C1	CAP., VAR	CB 175
A1001C2	CAP., FXD, CER	CC109-36
A1001C3	SAME AS A1001C2.	
A1001C4	SAME AS A1001C2.	
A1001C5	SAME AS A1001C2.	
A1001S1	SW	SW 353-2
A1001S2	SAME AS A1001S1.	
A1001W1	CABLE, S. P.	CA 1521
B1301	MOT	MO 136
B1401	BLO, CENT	BL 126
C1001	CAP., FXD, CER	CC100-6
C1101	CAP., FXD, ELECT.	CE 116-10VN
C1102	SAME AS C1101.	
C1103	CAP., FXD, CER	CC100-28
C1104	CAP., FXD, ELECT.	CE51C800R
C1105	SAME AS C1104.	
C1106	CAP., FXD, PAPER	CP113-1
C1107	CAP., FXD, CER	CC100-37
C1108	SAME AS C1107.	
C1109	SAME AS C1107.	
C1110	SAME AS C1107.	
C1111	SAME AS C1107.	
C1112	SAME AS C1107.	
C1201	CAP., FXD, ELECT.	CE 116-15VN
C1202	CAP., FXD	CN 114-1R0-4J
C1203	CAP., FXD, CER	CK 70AW202M
C1204	SAME AS C1203.	
C1205	SAME AS C1203.	
C1206	SAME AS C1203.	
C1207	SAME AS C1203.	
C1208	CAP., FXD, ELECT.	CK 70AW102M

IPA DRAWER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1209	CAP., FXD, ELECT.	CE 105-25-25
C1210	CAP., FXD	CK70AW202M
C1211	SAME AS C1210.	
C1212	SAME AS C1210.	
C1213	CAP., FXD, CER	CC108-4P1000M
C1214	CAP., FXD	CK 70AW202M
C1215	SAME AS C1214.	
C1216	CAP., FXD, CER	CC108-4P1000M
C1301	CAP., FXD, CER	CC100-16
C1302	SAME AS C1301.	
C1303	CAP., FXD, CER	CC100-35
C1304	CAP., FXD, CER	CC100-44
C1305	SAME AS C1304.	
C1306	CAP., FXD, CER	CC100-32
C1307	CAP., FXD, CER	CC100-32
C1308	CAP., FXD, CER	CC100-31
C1309	CAP., FXD	CM111E220J5S
C1310	CAP., FXD	CM112F222F3S
C1311	CAP., FXD, CER	CC100-37
C1312	CAP., FXD, CER	CC100-44
C1313	CAP., FXD, CER	CC100-37
C1314	SAME AS C1313.	
C1315	CAP., FXD, CER	CC100-32
C1316	CAP., FXD, CER	CC100-32
C1317	CAP., FXD	CM50B222G03
C1318	CAP., FXD, CER	CC109-38
C1319	CAP., FXD, CER	CC100-28
C1320	SAME AS C1319.	
C1321	SAME AS C1319.	
C1401	CAP., FXD	CM15B301G03
C1402	CAP., FXD, CER	CC100-37
C1403	SAME AS C1402.	
C1404	CAP., FXD	CM112F562J5S
C1405	CAP., FXD, MICA	CM35F103F03
C1406	SAME AS C1405.	
C1407	SAME AS C1405.	
C1408	SAME AS C1405.	
C1409	CAP., FXD, CER	CC100-32
C1410	CAP., FXD	CC100-36
C1411	SAME AS C1410.	
C1412	SAME AS C1410.	
C1413	SAME AS C1410.	
C1414	CAP., FXD	CC100-38
C1415	CAP., FXD, CER	CC108-4P1000M

IPA DRAWER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1416	SAME AS C1415.	
C1417	SAME AS C1415.	
C1418	SAME AS C1415.	
C1419	SAME AS C1415.	
C1420	SAME AS C1415.	
C1421	SAME AS C1415.	
CR1101	SCOND, DEV, DIO	IN 547
CR1102	SAME AS CR1101.	
CR1103	RECT., SCOND DEV	DD 146
CR1104	SCOND DEV, DIO	IN 3321B
CR1105	SCOND DEV, DIO	IN 2976B
CR1106	RECT, SCOND DEV	DD 124
CR1107	SCOND DEV, DIO	IN 2841R
CR1108	SAME AS CR1107.	
CR1109	SAME AS CR1107.	
CR1201	SCOND DEV, DIO	IN 547
CR1202	SAME AS CR1201.	
CR1303	SCOND DEV, DIO	IN 34A
E1001	BUTTON, CONT.	PM 1332
E1101	TERM, STUD-INS	TEO 102-2
E1102	SAME AS E1101.	
E1103	SAME AS E1101.	
E1004	SAME AS E1101.	
E1005	SAME AS E1101.	
E1006	SAME AS E1101.	
E1201	TERM, STUD-INS	TEO 102-2
E1202	TERM, STUD-INS	TEO 102-2
E1203	TERM, STUD-INS	TEO 101-3
E1204	TERM, STUD-INS	TEO 101-3
E1205	TERM, STUD-INS	TEO 102-2
E1206	SAME AS E1205.	
E1207	SAME AS E1205.	
E1301	TERM	TEO 169-1
E1302	SAME AS E1301.	
E1303	SAME AS E1301.	
E1304	SAME AS E1301.	
E1305	TERM, STUD-INS	TEO 102-2
E1306	SAME AS E1305.	
E1307	SAME AS E1305.	
E1308	SAME AS E1305.	
E1309	SAME AS E1305.	
E1310	TERM, STUD-INS	TEO 102-2
E1311	TERM, STUD-INS	TEO 102-2
E1312	TERM, STUD-INS	TEO 102-2
E1313	SAME AS E1312.	

IPA DRAWER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
E1314	SAME AS E1312.	
E1315	SAME AS E1312.	
E1401	INS STANDOFF RND	NS3W0108
F1001	FUSE, CTG	FU 102-2
F1002	FUSE, CTG	FU 102-.1
F1003	FUSE, CTG	FU 102-8
F1004	FUSE, CTG	FU 102-5
J1005	ADAPT, CONN, RF	UG 492 */U
J1006	SAME AS J1005.	
J1007	CONN, RF	UG 560 */U
K1101	REL, ARM 3PDT	RL 168-3C1024DC
K1201	REL, ARM	RL 156-1
K1401	REL, ARM	RL 185-1
L1001	XFMR	TR 192
L1101	CHOKE	TF5028
L1301	COIL, RF, FXD	CL 101-2
L1302	SAME AS L1302.	
L1303	CL	
L1304	COIL, RF, FXD	CL 140-2
L1305	SAME AS L1304.	
L1306	SAME AS L1304.	
L1307	CL	
L1308	COIL, RF, FXD	CL 178
L1401	CL	
L1402	COIL, RF, FXD, 35UH	CL 292
L1403	COIL, RF, FXD	CL 140-6
L1404	SAME AS L1403.	
L1405	COIL, RF, FXD	CL 138
M1001	MTR	MR 216
R1101	RES, FXD, WW 10W	RW 109-2
R1102	RES, FXD, COMP	RC 42GF181J
R1103	RES, FXD, COMP	RC 20GF272J
R1104	RES, FXD, COMP	RC 42GF474J
R1105	RES, FXD, WW 10W	RW 109-26
R1106	RES, FXD, WW 10W	RW 109-14
R1107	RES, FXD, WW 10W	RW 109-9
R1108	RES, FXD, COMP	RC 42GF474J
R1109	RES, FXD, COMP	RC 20GF102J
R1201	RES, FXD, WW 5W	RW 107-28
R1202	RES, FXD, COMP	RR-114-5W
R1203	SAME AS R1202.	

IPA DRAWER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R1204	RES, FXD, WW 25W	RW111-5
R1205	RES, FXD, COMP	RC42GF100J
R1206	RES, FXD, COMP	RC42GF391J
R1207	RES, FXD, WW 20W	RW 110-1
R1301	RES, VAR	RV4NAYSK500A
R1302	RES, FXD, COMP	RC20GF471J
R1303	RES, FXD, COMP	RC20GF222J
R1304	RES, FXD, COMP	RC20GF103J
R1305	RES, FXD, COMP	RC20GF102J
R1306	RES, FXD, COMP	RC42GF101J
R1307	RES, FXD, COMP	RC42GF223J
R1308	RES, FXD, COMP	RC20GF333J
R1309	RES, FXD, COMP	RC42GF331J
R1310	RES, FXD, COMP	RC42GF472J
R1401	RES, FXD, COMP	RR116-1400W
R1402	RES, FXD, COMP	RR114-300W
R1403	RES, FXD, COMP 10W	RR116-1400W
S1001	SW, PUSH, DPDT	SW521
S1101	SW	SW219
S1201	SW	SW219
S1301	SW	SW353-2
S1302	SAME AS S1301.	
S1401	SW	SW252
T1101	XFMR, PWR	TF375
TB1101	TERM, BD, BARR	TM102-3
TB1102	TERM, BD, BARR	TM102-6
V1301	TUBE, ELECT	8233
V1302	TUBE, ELECT	4CX350A
XC1104	SOC, EL TUBE	TS100-3
XC1105	SAME AS XC1104.	
XCR1107	SOC, SCOND, DEV	TS166-1
XCR1108	SAME AS XCR1107.	
XCR1109	SAME AS XCR1107.	
XF1001	FUSE HOLDER	FH 104-3
XF1002	FUSE HOLDER	FH 104-3

IPA DRAWER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XF1003	FUSE HOLDER	FH 104-11
XF1004	SAME AS XF1003.	
XK1201	SOC, REL	TS 171-1
XV1301	SOC, TUBE, ELECT.	TS 198
XV1302	SOC, TUBE, ELECT.	SK660
Z1301	SUPP, PARA	A 1546-2
Z1302	SUPP, PARA	A 1546-4
Z1401	SUPP, PARA	A 1546-3

EXCITER DRAWER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C2012	CAP., FXD, ELECT	CE116-10VN
CR2001	SCOND DEV, DIO	IN 547
E2001	TERM., STUD-INS	TEO 102-2
E2002	SAME AS E2001.	
E2003	SAME AS E2001.	
E2007	SAME AS E2001.	
E2010	SAME AS E2001.	
J2001	CONN, RECP, ML	MS3102A32-414P
K2001	REL, GEN, PUR	RL168-3C-10-24D
K2002	SAME AS K2001.	
K2003	REL, GEN, PUR	RL168-2C-10-24D
K2004	REL, GEN, PUR	RL168-3C-10-24D
K2005	SAME AS K2004.	
R2001	RES, FXD, COMP	RC42GF101J
R2002	RES, FXD, COMP	RC20GF221J
W2001	WRG HARN, BRCHD	CA 1507
XA2001	CONN, RECP, FML	JJ319-22DFE
XA2002	SAME AS XA2001.	
XK2001	SOC, EL TUBE	TS 100-6
XK2002	SAME AS XK2001.	
XK2003	SOC, EL TUBE	TS 101-P01
XK2004	SOC, EL TUBE	TS 100-6
XK2005	SAME AS XK2004.	

INPUT CHASSIS ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A3001	BS ASSY, INPUT	A-4809*
A3002	SAME AS A3001.	
J3001	CONN, RECP, FML	MS3102A32-7S
J3002	CONN, RECP, ML	MS3102A24-28P
J3003	CONN, RECP, ML	MS3102A32-7P
W3001	WRG HARN, BRCHD	CA1520

POWER PANEL MAIN

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CB3001	CKT BKR- 3PST	SW448
CB3002C	CKT BKR- SPST	SW525
CB3002A,B	CKT BKR - DPST	SW527
DS3001	GEN, AUDIO SIG	BZ101-2
F3001	FUSE, CTG	FU-102-3
F3002	SAME AS F3001.	
F3003	SAME AS F3001.	
F3004	FUSE, CTG	FU102-5
F3005	FUSE, CTG	FU102-2.5
F3006	SAME AS F3005.	
F3007	SAME AS F3005.	
F3008	FUSE, CTG	FU102-1
M3001	IND, ELAP TIME	MR-198
M3002	SAME AS M3001.	
R3001	RES, FXD, WW	RW107-5
S3001	SW, TOGGLE - SPST	ST103-5-62
S3002	SW, TOGGLE - DPDT	ST103-24-62
W3002	CABLE ASSY JUMPER	CA-409-64-2.00
XF3001	FUSEHOLDER, IND	FH104-3
XF3002 thru XF3008	SAME AS XF3001.	

METER PANEL ASSEMBLY

AX 5083

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A4001	BD ASY, PC	A-4800*
A4002	SAME AS A4001.	
A4003	BD ASY, PC	A-4802*
A4004	NETWORK	NW161
C4001	CAP., FXD, CER	CC100-28
C4002	SAME AS C4001.	
C4003 thru C4005	SAME AS C4001.	
E4001	TERM., BD - LUG	TM 117-1
M4001	AMMETER	MR 215-2
M4002	AMMETER	MR 215-1
M4003	AMMETER	MR 191-15
M4004	AMMETER	MR 214
M4005	AMMETER	MR 213
R4001	RES, FXD, COMP	RC20GF682J

CONTROL PANEL MAIN

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
S5001	SW PUSH-SPST	SW522-1
S5002	SW, TOGGLE-DPDT	ST103-24-62
S5003	SW, LEVER	SW523-3
S5004	SW, LEVER	SW523-1
S5005	SW, LEVER	SW523-3
S5006	SW, LEVER	SW523-2
S5007	SW PUSH-SPST	SW522-2
S5008	SW, PUSH-PULL	SW230
XDS2	LIGHT, IND	TS153-13
XDS3	LIGHT, IND	TS153-8

HARMONIC FILTER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B1	GEAR MOTOR	MO129
C1	CAP., FXD, CER	CC100-16
C2 thru C23	SAME AS C1.	
C24	CAP., FXD, CER	CC109-28
C25 thru C30	SAME AS C24.	
C31	CAP., FXD, CER	CC109-19
C32	SAME AS C24.	
C33	CAP., FXD, CER	CC109-13
C34	SAME AS C31.	
C35	SAME AS C33.	
C36	SAME AS C31.	
C37	SAME AS C31.	
C38	CAP., FXD, CER	CC109-24
C39 thru C41	SAME AS C24.	
C42	SAME AS C33.	
C44	SAME AS C31.	
C45	SAME AS C31.	
C46	SAME AS C33.	
C47	CAP., FXD, CER	CC109-31
C48	SAME AS C38.	
C49	SAME AS C38.	
C50 thru C52	SAME AS C24.	
C53	SAME AS C33.	
C54	SAME AS C24.	
C55 thru C57	SAME AS C31.	
C58	SAME AS C38.	
C59	SAME AS C47.	
C60	SAME AS C38.	
C61	SAME AS C38.	
C62	CAP., FXD, CER	CC109-5
C63	CAP., FXD, CER	CC116-6
C64	CAP., FXD, ELEC	CE116-12V
C65	SAME AS C33.	
C66	SAME AS C38.	
C67	SAME AS C33.	
C68	SAME AS C31.	

HARMONIC FILTER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C69	SAME AS C38.	
C70	SAME AS C24.	
C71	SAME AS C33.	
C72	SAME AS C24.	
C74	SAME AS C24.	
DS1-6	LAMP	BI110-7
J2	CONN.	MS3102A24-28P
J3	RECEPTACLE, BNC	UG 625/U
K1	RELAY	RL168-3C10-24DC
R1	RES., FXD, COMP	RC42GF471J
R2	RES., FXD, COMP	RC42GF473J
S1	SW, ROTARY	SW524
S3	SW, ROLLER LEVER	SW260
XDS1	SOCKET, INC. LAMP	TS153-5
XDS2 thru XDS6	SAME AS XDS1.	
XK1	SOCKET, 11 PIN	TS100-5

PA BANDSWITCH ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A1	SW ASSY, CONTROL	AX 5103*
B1	MOT	MC 129
C1	CAP., FXD, CER	CC119-151-15K
C2	CAP., FXD, CER	CC119-351-12K
E1	CONTACT, ASSY	A-1701
E2	SAME AS E1.	
E3 thru E8	SAME AS E1.	
E9	CONTACT, ASSY	AX 573
E10	SAME AS E9.	
E11	WIPER, CONT	PM1176
E12	CONTACT, ASSY	A-1700-2
E13	CONTACT, SHORT	MS5613
E14a	CONTACT, SWITCH	MS1601-4
E14b	CONTACT, SWITCH	MS1601-5
E15	ROTOR, CONT	PM1430
E16a	SAME AS E14a.	
E16b	CONTACT, SWITCH	MS1601-5
E17	CONTACT, ASSY	A-1701-2
E18 thru E21	SAME AS E17.	
E22	CONTACT, ASSY	A-1700-2
E23	SAME AS E17.	
L1	COIL, RF, HI FRE	CL441
L2	COIL, MN TANK	CL445
L3	COIL, ASSY	CL440
SIA, B	MN TANK SW ASSY	BMA409
SIC, D	OUTPUT SW ASSY	BMA411

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, CER	CC109-38
C2 thru C6	SAME AS C1.	
C7	CAP., FXD, CER	CC109-19
C8	CAP., FXD, CER	CC116-10
C9	CAP., FXD, CER	CC116-9
C10	CAP., FXD, CER	CC116-8
CR1	SCOND DEV, DIO	IN547
E1	TERM, STUD, INS	TE0102-2
E2	SAME AS E1.	
E3	CONT, LEAF, SPRG	PM1210-4
E4 thru E13	SAME AS E3.	
E14	CONT, LEAF, SPRG	PM1210-4
E15 thru E20	SAME AS E14.	
E21	CONT, LEAF, SPRG	PM1210-5
E22	CONT, LEAF, SPRG	PM1210-4
E23	SAME AS E22.	
K1	REL, ARM, DPDT	RL168-2C10-24DC
L1	COIL, RF, HI FREQ	CL447
L2	COIL, MN TANK	CL446
L3	COIL	CL292
L4	COIL, IND	CL448
R1	RES, FXD, COMP	RC20GF102J
R2	RES, FXD, COMP	RC20GF222J
R3	RES, FXD, COMP	RC20GF562J
R4	RES, FXD, COMP	RC20GF203J
S2	SW, LEDEX	SW429
W1	CBL ASY, S.P.	CA1522
XK1	SOC, TUBE, ELEC	TS100-3

REMOTE POWER ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A1	BD ASSY, PC	A-4805 *
F1	FUSE, CTG	FU102-2
S1	SW, ROT, LEDEX	171582-001
W1	CBL, ASSY	CA1567
XF1	FUSEHOLDER	FH104-11

HIGH VOLTAGE SHORTING ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
E1	CONT, COMP	SC165-5
E2 thru E4	SAME AS E1	
E5	CONT, ELECT.	SC165-7
E6 thru E8	SAME AS E5.	
L1	SOL., ELECT.	SZ100-60
S1	SW, SENS-SPDT	SW260
TB1	TERM., BD, BARR	TM102-5

SW ASSEMBLY CONTROL

AX 5103

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CR1	SCOND, DEV, DIO	IN914
CR2	SAME AS CR1.	
J1	CONN, RECP, FML	JJ200-9
J2	CONN, RECP, ML	JJ200-10
K1	REL, ARM	RL168-3C10-24D
R1	RES, FXD, COMP	RC20GF102J
R2	SAME AS R1.	
R3	RES, FXD, COMP	RC20GF152J
R4	SAME AS R3.	
S1	SW, ROTARY	SW526
TB1	TERM., BD- BARR	TM 100-3
W1	WRG HARN, BRCHD	CA 1494
XK1	SOC, REL	TS100-06

PA SENSE BOARD ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, MICA	CM111C050J5S
C2	CAP., FXD, MICA	CM111C180J5S
C3	CAP., FXD, MICA	CC100-28
C4	SAME AS C3.	
C5 thru C15	SAME AS C3.	
C16	CAP., FXD, MICA	CC100-28
C17 thru C20	SAME AS C16.	
C21	CAP., FXD, MICA	CM111C180J5S
C22	CAP., FXD, MICA	CM111C100J5S
E1	TERM., STUD	TEO 127-2
E2	SAME AS E2.	
E3	SAME AS E2.	
E4	SAME AS E2.	
L1	COIL, FXD, MOLDED	CL240-120
L2	SAME AS L1.	
L3	CHOKE, RF	CL105-2
L4	SAME AS L3.	
R1	RES, FXD, WW	RR114-50W
R2	SAME AS R1.	
R3	RES, FXD, COMP	RC20GF222F
R4	RES, FXD, COMP	RC20GF123J
R5	RES, FXD, COMP	RC20GF103J
R6	RES, FXD, COMP	RC20GF473J
R7	RES, FXD, COMP	RC20GF474J
R8	RES, FXD, COMP	RC20GF123J
R9	RES, FXD, PREC	RN15X4701G
R10	SAME AS R9.	
R11	RES, FXD, COMP	RC20GF223J
R12	RES, FXD, COMP	RC20GF474J
R13	RES, FXD, COMP	RC20GF123J
R14	RES, FXD, COMP	RC20GF223J
R15	RES, FXD, COMP	RC20GF471J
R16	RES, FXD, COMP	RC20GF103J
R17	RES, FXD, COMP	RC20GF473J
V1	EL TUBE	5726
V2	SAME AS V1	
XV1	SOC, EL TUBE	TS102P01
XV2	SAME AS XV1.	

PA TUNE

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, CER	CC100-16
C2 thru C18	SAME AS C1.	
C19	CAP., FXD, CER	CC100-16
C20 thru C21	SAME AS C19.	
C22	CAP., FXD, MTLZ	CN114-1R0-4J
E1	TERM., STUD	TEO 127-3
E2 thru E12	SAME AS E1.	
E13	TERM., STUD	TEO 127-3
E14 thru E19	SAME AS E13.	
K1	REL, ARM. -4PDT	RL 156-8
L1	COIL, RF, FXD	CL240-120
L2 thru L8	SAME AS L1.	
L9	COIL, RF, FXD	CL240-120
L10 thru L14	SAME AS L9.	
XK1	SOC, REL W/RET	TS171-4

PA LOAD CAPACITOR BOARD

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, CER	CC100-16
C2	SAME AS C1.	
C3	SAME AS C1	
C4	CAP., FXD, MTLZ	CN114-1R0-4J
C5	CAP., FXD, ELECT.	CE105-75-50
C6	CAP., FXD, CER	CC100-16
C7 thru C15	SAME AS C6.	
C16	CAP., FXD, CER	CC100-16
C17	CAP., FXD, CER	CC100-16
C18	CAP., FXD, ELECT.	CE105-75-50
CR1	SCOND, DEV, DIO	IN3029
CR2	RECT., SCOND. DEV	DD130-100-15
CR3	SCOND, DEV, DIO	IN3070
K1	REL, ARM. -4PDT	RL156-8
K2	REL, ARM. -4PDT	RL156-1
L1	COIL, RF, FXD	CL240-120
L2	SAME AS L1.	
L3	SAME AS L1.	
L4	COIL, RF, FXD	CL240-120
R1	RES, FXD, COMP	RC32GF181J
XK1	SOC, REL - W/RET	TS171-4
XK2	SOC, REL - W/RET	TS171-5

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, CER	CC100-16
C2 thru C13	SAME AS C1.	
E1	TERM., STUD	TEO 127-3
E2 thru E12	SAME AS E1.	

A-4791

PA BAND INDICATOR

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, CER	CC100-28
C2 thru C10	SAME AS C1	
E1	TERM., STUD	TEO 127-2
E2 thru E7	SAME AS E1.	
E8	TERM., STUD	TEO 127-2
E9 thru E10	SAME AS E8.	
R1	RES, FXD, COMP	RC42GF311J

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R1	RES, FXD, COMP	RC42GF472J
R2	RES, FXD, COMP	RC42GF123J
R3	RES, FXD, COMP	RC42GF822J
R4	RES, VAR-COMP	RV4NAYSA103AY
R5	SAME AS R4.	
R6	SAME AS R4.	
R7	RES, FXD, COMP	RC42GF223J
R8	RES, FXD, COMP	RC42GF822J
R9	RES, FXD, COMP	RC42GF182J
R10	RES, VAR-COMP	RV119-1-104B
R11	RES, VAR-COMP	RV119-1-102C
R12	RES, VAR-COMP	RV119-1-104B
R13	RES, VAR-COMP	RV119-1-503C
TP1	JACK, TIP	JJ219-18-9
TP2	SAME AS TP1.	
TP3	SAME AS TP1.	
TP4	SAME AS TP1.	

TUNING CONTROL BOARD

A-4796

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, ELECT	CE105-150-75
C2	CAP., FXD, ELECT	CE105-100-25
CR1	SCOND, DEV, DIO	IN2484
CR2	SAME AS CR1.	
CR3	NETWORK	NW179
K1	REL, ARM. - DPDT	RL 156-1
K2	REL, ARM. - DPDT	RL 156-9
K3	REL, ARM. - DPDT	RL 156-1
K4	REL, ARM. - 4PDT	RL 156-10
K5	SAME AS K4.	
K6	REL, ARM. - 4PDT	RL 156-8
K7	REL, ARM. - 4PDT	RL 156-15
Q1	TRANSISTOR	2N492A
R1	RES, FXD, COMP	RC20GF221J
R2	RES, FXD, COMP	RC32GF221J
R3	SAME AS R2.	
R4	RES, VAR - COMP	RV111V254A
TP1	TERM., STUD	TEO 127-2
TP2	SAME AS TP1.	
XK1	SOC, REL - W/RET	TS171-5
XK2	SAME AS XK1	
XK3	SOC, REL - W/RET	TS171-5
XK4	SOC, REL - W/RET	TS171-4
XK5	SAME AS XK4.	
XK6	SAME AS XK4.	
XK7	SAME AS XK4.	

PA SCREEN & PA PLATE METER BOARD

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD. ELECT	CE105-50-15
C2	CAP., FXD. CER	CC100-28
C3	SAME AS C3.	
CR1	SCOND, DEV. DIO	IN2484
DS1	LAMP, INCAND	BI101-1820
DS2	SAME AS DS1.	
DS3	SAME AS DS1.	
E1 thru	TERM., STUD	TEO 127-3
E5	SAME AS E1.	
Q1	TRANSISTOR	2N 1595
R1	RES, FXD, COMP	RC20GF121J
R2	RES, FXD, COMP	RC20GF122J
R3	RES, FXD, COMP	RC20GF102J
XDS1	LAMPHOLDER	TS107-4
XDS2	SAME AS XDS1.	
XDS3	SAME AS XDS1.	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, ELEC	CE105-50-15
C2	CAP., FXD, CER	CC100-16
C3	SAME AS C2.	
C4	SAME AS C2.	
CR1	SCOND DEV. DIO	IN2484
DS1	LAMP, INCAND	BI101-1820
DS2	SAME AS DS1.	
Q1	TRANSISTOR	2N1595
R1	RES., FXD, COMP	RC20GF122J
R2	RES., FXD, COMP	RC20GF121J
R3	RES., FXD, COMP	RC20GF102J
R4	RES., FXD, COMP	RC20GF332J
XDS1	LAMPHOLDER	TS107-4
XDS2	SAME AS XDS1.	

REFLECTED POWER METER CIRCUIT

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, ELECT.	CE105-50-15
C2	CAP., FXD, CER	CC100-28
C3 thru C12	SAME AS C2	
CR1	SCOND, DEV, DIO	IN2484
CR2	SCOND, DEV, DIO	IN2484
CR3	SCOND, DEV, DIO	IN270
CR4	SCOND, DEV, DIO	IN270
DS1	LAMPHOLDER	BI101-1820
DS2 thru DS3	SAME AS DS1.	
E1	TERM., STUD	TEO 127-3
E2 thru E12	SAME AS E1.	
E13	TERM., STUD	TEO 127-3
K1	SOC, ARM. - POT	RL156-9
Q1	TRANSISTOR	2N1595
R1	RES., FXD, COMP	RC20GF121J
R2	RES., FXD, COMP	RC20GF122J
R3	RES., FXD, COMP	RC20GF102J
XDS1	LAMPHOLDER	TS107-4
XDS2 thru XDS3	SAME AS XDS1.	
XK1	SOC, REL - W/RET	TS 171-5

REMOTE POWER ASSEMBLY BOARD
A-4805

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CR1	SCOND, DEV, DIO	IN914
CR2	SAME AS CR1.	
CR3	SAME AS CR1.	
CR4	SAME AS CR1.	
CR5	SCOND, DEV, DIO	IN538
CR6	SCOND, DEV, DIO	IN914
CR7	SAME AS CR1.	
CR8	SAME AS CR1.	
CR9	SCOND, DEV, DIO	IN3022B
DS1	LAMP, INCOND	BI101-1820
DS2	LAMP, INCOND	BI101-1820
E1	TERM, STUD	TEO 127-3
E2	SAME AS E1.	
E3	SAME AS E1.	
E4 thru E21	SAME AS E1.	
E22 thru E38	SAME AS E1.	
K1	REL, ARM. - 4PDT	RL 156-8
K2	REL, ARM. - 6PDT	RL 156-5
R1	RES. FXD, COMP	RV119-1-502C
R2 thru R4	SAME AS R1.	
R5	RES. FXD, COMP	RC20GF563J
R6	RES. FXD, COMP	RV119-1-503C
R7 thru R15	SAME AS R1.	
R16	RES. FXD, COMP	RC20GF102J
XDS1	LAMPHOLDER	TS107-2
XDS2	LAMPHOLDER	TS107-2
XK1	SOC, REL W/RET	TS171-8
XK2	SOC, REL W/RET	TS171-6

A-4806

POWER INDICATOR BOARD

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, CER	CC100-28
C2 thru C5	SAME AS C1.	
E1	TERM., STUD	TEO 127-2
E2 thru E5	SAME AS E1.	
R1	RES, FXD, COMP	RC42GF331F

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, CER	CC100-16
C2AB	CAP., FXD, CER	CC100-23
C3AB	SAME AS C2AB.	
CR1	SCOND DEV DIO	IN3070
CR2	SAME AS CR1.	
CR3	SAME AS CR1.	
L1	XFMR, FXD	TR 194
L2	COIL FXD, R.F.	CL140-6
R1	RES, FXD, COMP	RC20GF103J
R2	RES, FXD, COMP	RC42GF470J
R3	SAME AS R2.	
R4	RES, FXD, COMP	RC20GF102J
R5	SAME AS R4.	
R6	RES, FXD, COMP	RC20GF222J
R7	RES, FXD, COMP	RC20GF103J

INPUT CHASSIS BOARD

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, CER	CC100-42
C2 thru C18	SAME AS C1.	
C19	CAP., FXD, CER	CC100-42
C20 thru C30	SAME AS C19.	
E1	TERM., STUD	TEO 127-2
E2 thru E5	SAME AS E1.	
E6	TERM., STUD	TEO 127-2
E7 thru E23	SAME AS E6.	
E24	TERM., STUD	TEO 127-2
E25 thru E41	SAME AS E24.	
E42	TERM., STUD	TEO 127-2
E43 thru E59	SAME AS E42.	
E60	TERM., STUD	TEO 127-2
E61	SAME AS E60.	
E62 thru E77	SAME AS E61.	
E78	TERM., STUD	TEO 127-2
E79 thru E80	SAME AS E78.	
L1	COIL, RF, FXD	CL240-120
L2 thru L10	SAME AS L1.	

INPUT CHASSIS BOARD

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD, CER	CC100-42
C2 thru C17	SAME AS C1	CC100-42
C19	CAP., FXD, CER	CC100-42
C20 thru C34	SAME AS C19.	
CR1	SCOND DIO	IN914
CR2	SCOND DIO	IN914
E1	TERM., STUD	TEO 127-2
E2 thru E18	SAME AS E1	TEO 127-2
E19	TERM., STUD	TEO 127-2
E20 thru E36	SAME AS E19.	
E37	TERM., STUD	TEO-127-2
E38 thru E54	SAME AS E37.	
E55	TERM., STUD	TEO 127-2
E56 thru E58	SAME AS E55.	
E60 thru E72	SAME AS E55.	
E73	TERM., STUD	TEO 127-2
E74 thru E81	SAME AS E73.	
L1	COIL, RF, FXD	CL 240-120
L2 thru L3	SAME AS L1.	

PA LOAD MOTOR ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A703B1	MOTOR	MO139
A703J1	CONN, RECP, ML	JJ313-1

A-4820

PA TUNE MOTOR ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A702B1	MOTOR	MO 140
A702J1	CONN, RECP, FML	JJ310-2

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAP., FXD	CM111E300J5
C2	CAP., FXD	CM111E360J5
C3	CAP., FXD, CER	CC100-28
C4 thru C7	SAME AS C3.	
L1	COIL, FXD	CL240-120
L2	SAME AS L1.	
R1	RES, FXD, COMP	RC20GF222J
R2	RES, FXD, COMP	RC20GF123J
V1	TUBE, EL	5726

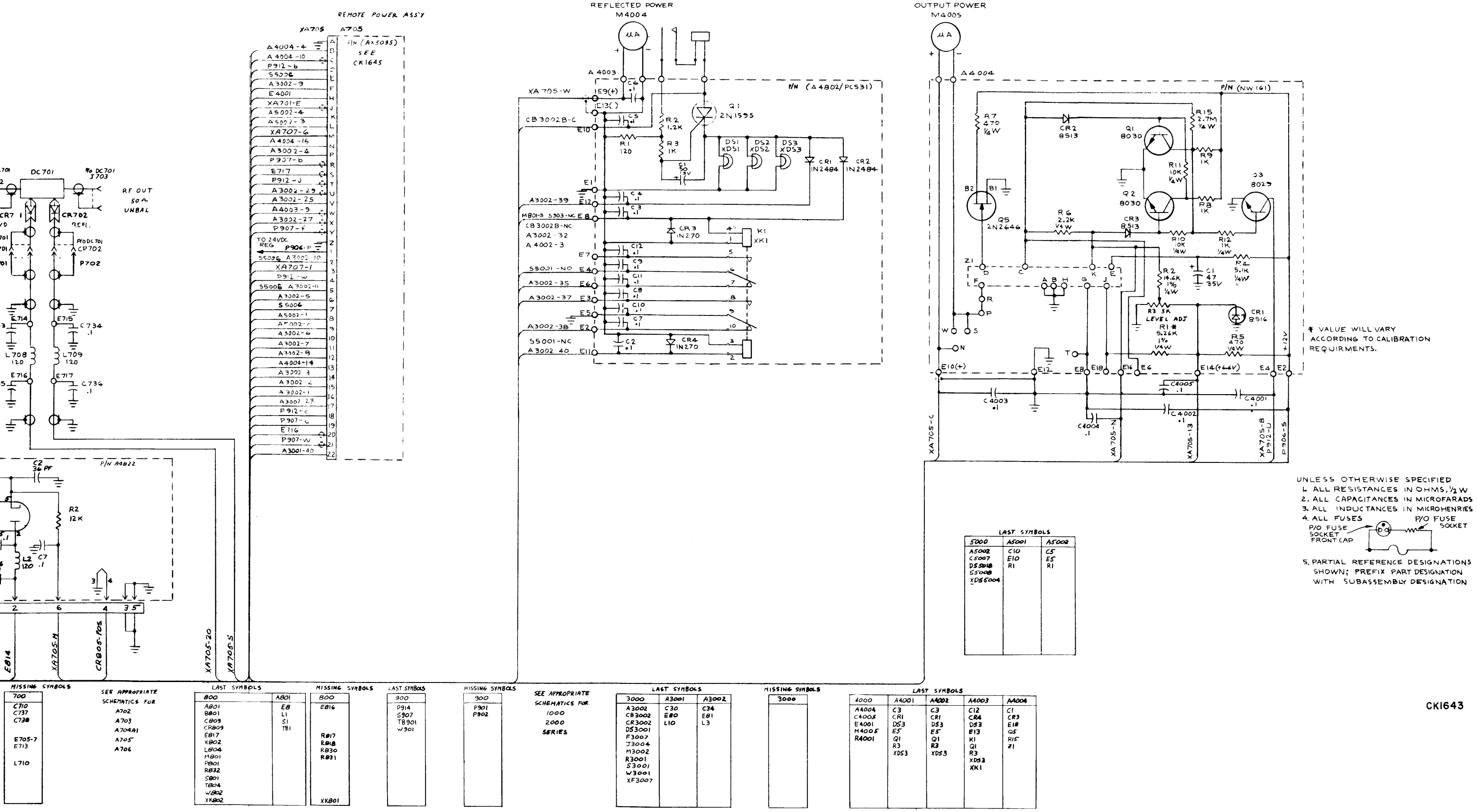
REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A201	BD, ASSY, PC	A-4796
A2002	BD, PC	PC532

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A2001	BD ASY, PC	A-4796
J2002	CONN, RECP, ML	JJ200-10
J2003	CONN, RECP, BNC	UG625/U

SECTION VII
DRAWINGS

7-1. INTRODUCTION.

This section contains the schematic diagrams for the main unit and all drawers of the PALA-10K transmitter.



LAST SYMBOLS

5000	A5001	A5002
A5002	C10	C5
C5007	E10	E5
DS5018	R1	R1
S5008		
XDS5004		

MISSING SYMBOLS

700
C710
C737
C738
E705-7
E713
L710

SEE APPROPRIATE SCHEMATICS FOR
A702
A703
A704A1
A705
A706

LAST SYMBOLS

800	A801
A801	E8
B801	L1
CR809	S1
CR809	TB1
E817	
K802	
L804	
M801	
P801	
R832	
S801	
TB04	
W802	
XK802	

MISSING SYMBOLS

800
E816
R817
R818
R830
R831
XK801

LAST SYMBOLS

900
P914
S907
TB901
W901

MISSING SYMBOLS

900
P901
P902

SEE APPROPRIATE SCHEMATICS FOR
1000
2000
SERIES

LAST SYMBOLS

3000	A3001	A3002
A3002	C30	C34
CB3002	E80	E81
CR3002	L10	L3
DS3001		
F3007		
J3004		
M3002		
R3001		
S3001		
W3001		
XF3007		

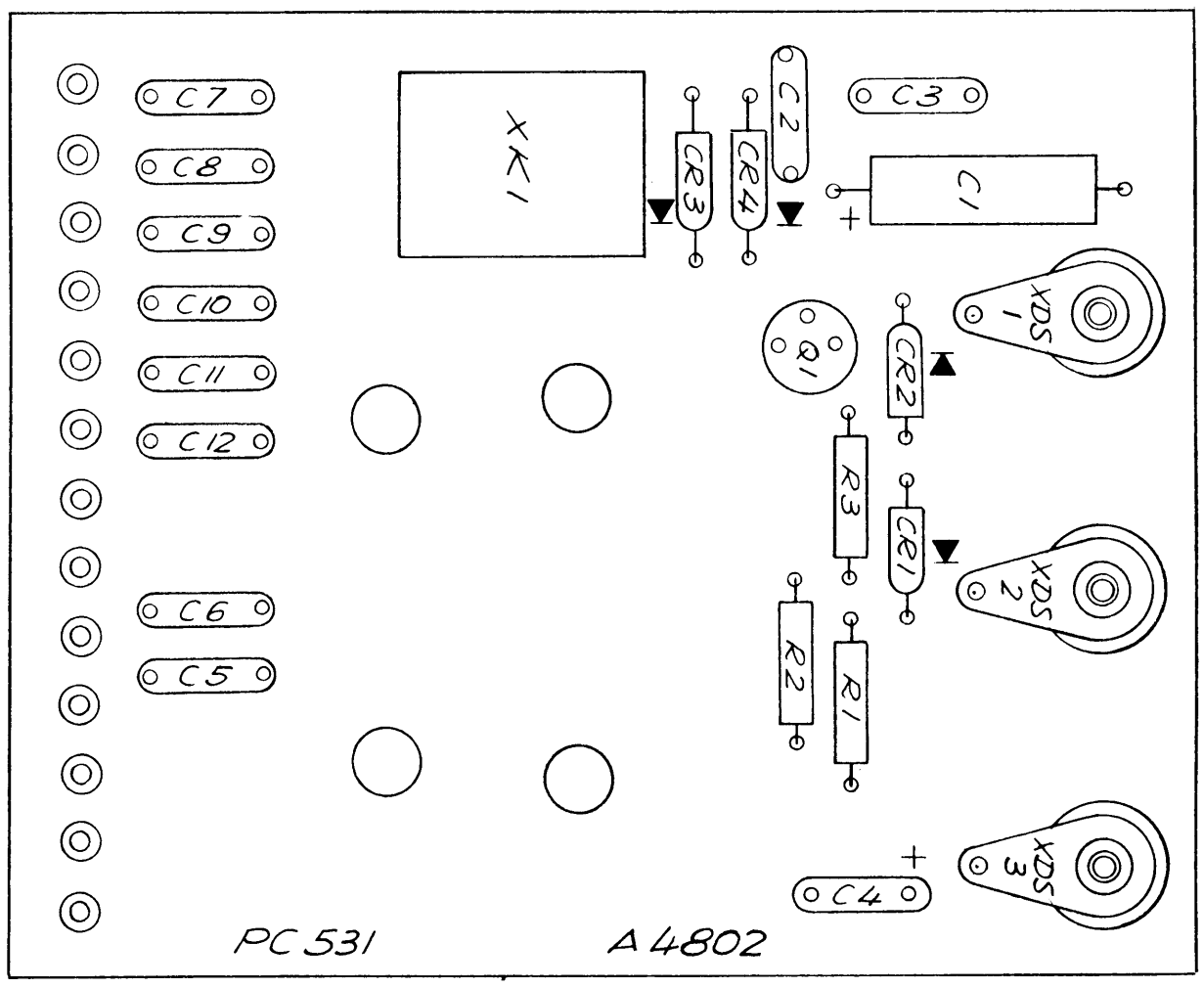
MISSING SYMBOLS

3000

LAST SYMBOLS

4000	A4001	A4002	A4003	A4004
A4004	C3	C3	C12	C1
C4005	CR1	CR1	CR4	CR3
E4001	DS3	DS3	DS3	E18
M4005	E5	E5	E13	Q5
R4001	Q1	Q1	K1	R15
	R3	R3	Q1	Z1
	XDS3	XDS3	R3	
			XDS3	
			XK1	

Figure 7-1. Schematic Diagram, PALA-10K, Sheet 1 of 5


C7
C8
C9
C10
C11
C12
C6
C5
XK1
CR3
C2
CR4
C3
C1
XDS 1
Q1
CR2
R3
CR1
XDS 2
R2
R1
XDS 3
C4
PC 531
A 4802

TO SK2
A706
P/N (AF109)
P903
J2
P904-S
P904-R
P904-Y
P904-X
P904-W
P904-V
P904-D
P904-N
P904-L
P904-K
P904-J
P904-H
TO 24VDC REG P906-P
P904-E
F3001
F3003
F3002
SEE CK1674
E1
E2
P906701
J1 J702
CR701
FWD
DC701
CR702
REFL
TO DC701 J703
RF OUT 50Ω UNBAL
P701
P702
P906701 CP701
P906701 CP702
C735 .1
E716
L708 120
C733 .1
E714
L709 120
E715
C734 .1
E717
C736 .1
A707
XA707
XA705-3
E814
XA705-M
CR805-POS
R1 22K
V1 5726
C3 .1
C4 .1
L1 120
C5 .1
C6 .1
L2 120
C7 .1
C1 30PF
C2 36 PF
R2 12K
P/N AA822
TO SK2
LAST SYMBOLS
700→
A707 C740 CP702 CR702 RC701 E717 J703 L713 P702 R701 S701 T701 V701
V704 XV701
A701 C22 CR2 E4 L4 R17 V2 XV2
A704 A1 B1 C2 E23 L3 S1
A707 C7 L1 R2 V1
MISSING SYMBOLS
700
C710 C737 C738
E705-7 E713
L710
SEE APPROP SCHEMATICS
A702
A703
A704A1
A705
A706

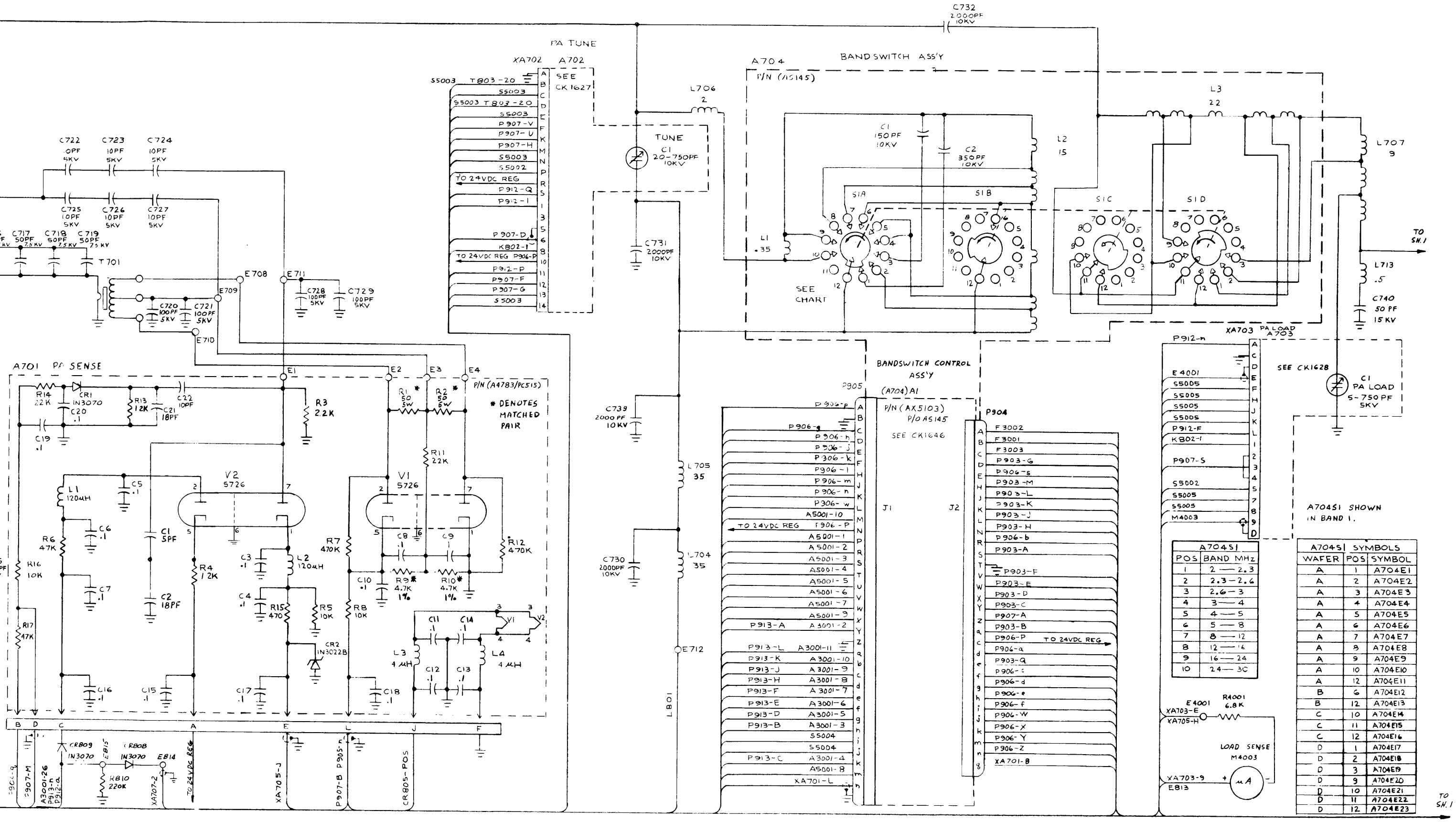
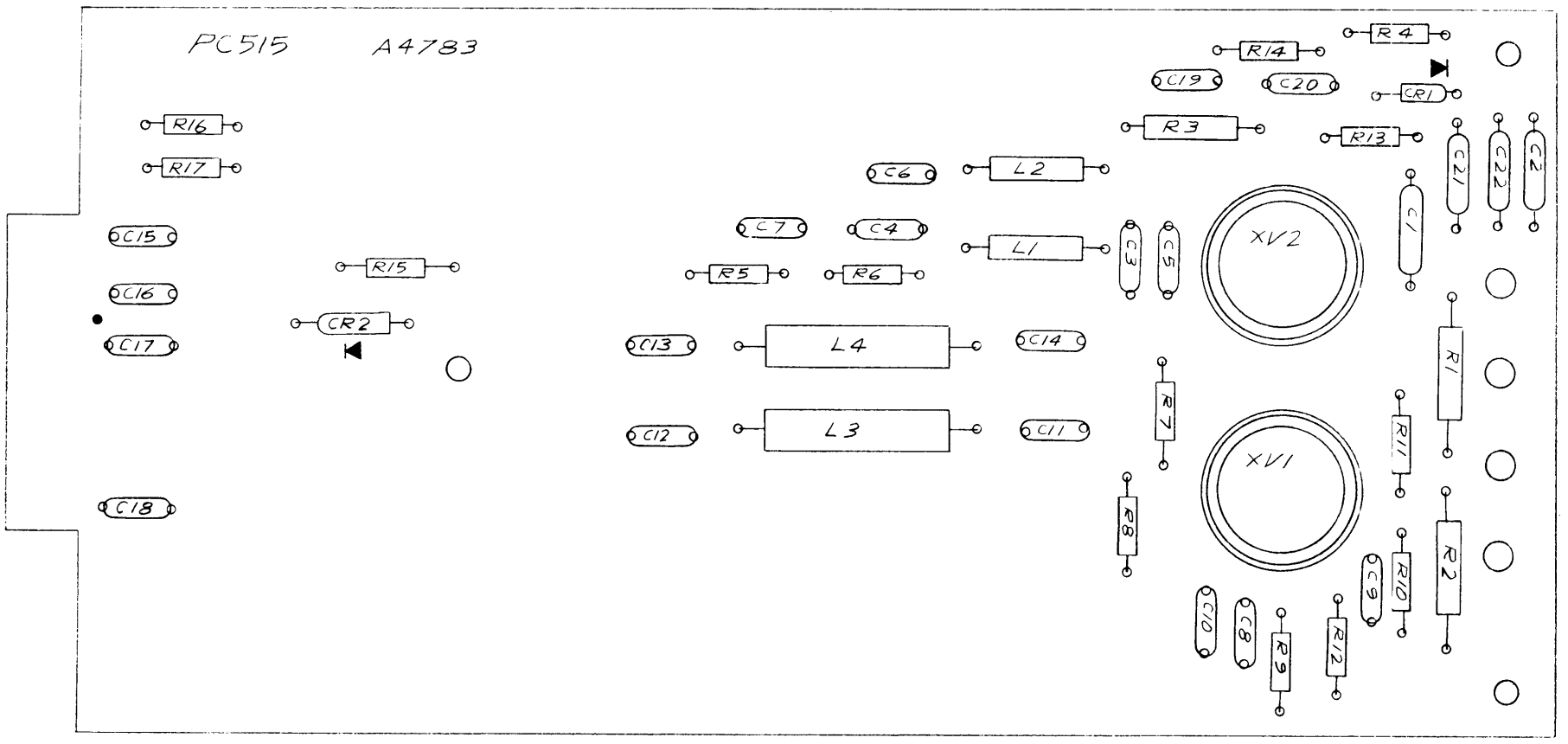


Figure 7-1. Schematic Diagram, PALA-10K, Sheet 2 of 5


PC515 A4783
R16
R17
C15
C16
C17
C18
R15
CR2
C6
L2
C7
C4
L1
R5
R6
C3
C5
XV2
C1
C13
L4
C14
R7
XV1
C12
L3
C11
R8
R14
R4
C19
C20
CR1
R3
R13
C21
C22
C2
R1
R11
R2
C9
R10
C10
C8
R9
R12

TO SW 3
R801
E701
L701 185
C701 .001 5KV
C703 .001 5KV
C702 .001 5KV
L711 185
C706 500PF 5KV
C707 500PF 5KV
C704 500PF 5KV
C705 500PF 5KV
C708 500 PF 5KV
C709 100 PF 15 KV
L12 .4
P906-T
C712 .001
C711 .001
L702 750
E702
R701 27K 2W
E817
P801
J701
C714 6800PF 4KV
C713 6800PF 4KV
E703
T804-8
T804-10
E704
C715 6800PF 4KV
L703 10
V701 8794
XA701
P904-9
P907-M
A3001-26
P913-c
P913-d
B
D
C
R17 47K
R16 10K
R6 47K
C16 .1
C7 .1
C6 .1
L1 120uH
C5 .1
A701 P/C SENSE
C19 .1
R14 22K
C20 .1
CR1 IN3070
R12 22K
CR809 IN3070
E815
K810 220K
C716 50PF 7.5KV
C717 50PF 7.5KV
C718 50PF 7.5KV
C719 50PF 7.5KV
T701
C725 10PF 5KV
C726 10PF 5KV
C722 OPF 4KV
C723 10PF 5KV

TO

DS5014 24.0-30.0
DS5013 16.0-24.0
DS5012 12.0-16.0
DS5011 8.0-12.0
DS5010 5.0-8.0
DS5009 4.0-5.0
DS5008 3.0-4.0
DS5007 2.6-3.0
DS5006 2.3-2.6
DS5005 2.0-2.3

ITCH

P912-E
C5006
P906-P.1
TO 24 VDC REG
DS5003 FAULT

P912-d
C5007 .1
DS5004 READY PC S5007

A3002-16
NO NC NO NC NC NC NO NC
S5007 TUNE

A5002
P/N (A4800/PC534)
XA705-8 E1 C1 .1 DS5018 4
XA705-9 E2 C2 .1 DS5017 3
XA705-L E3 C3 .1 DS5016 2
XA705-K E4 C4 .1 C5 .1 DS5015 1
E5 R1 330 2W

XA705-5
XA705-7
XA708-2
S5006 POWER
XA705-E
ADJ

XA702 E
XA702 B
H
S5003 TUNE
P912-k
F3004
XA702-14
XA702-D
XA702-N
XA702-C
L

XA703-K
XA703-B
+
S5005 LOAD
P912-m
F3004
XA703-7
XA703-J
XA703-F
XA703-H
-

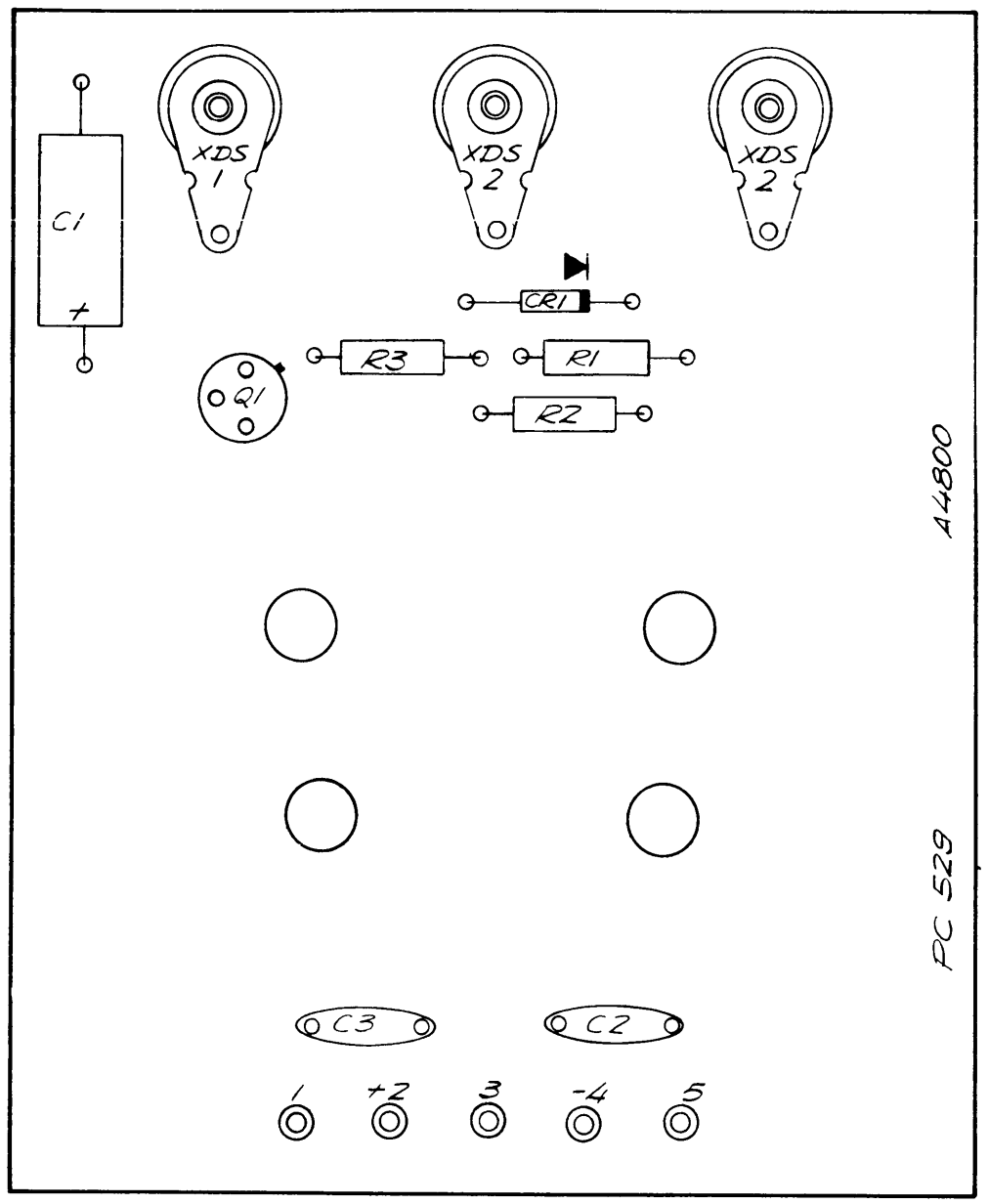
M4001
SCREEN CURRENT
MA
A4001
E2(+)
E4(-)
E1
E5
E3
P/N (A4800/PC529)
E803
A4002-1
A4002-3
R2 1.2K
Q1 2N1595
C3 .1
R3 1K
R1 120
C1 50 15V
DS1 XDS1
DS2 XDS2
DS3 XDS3
CR1 IN2484
C2 .1

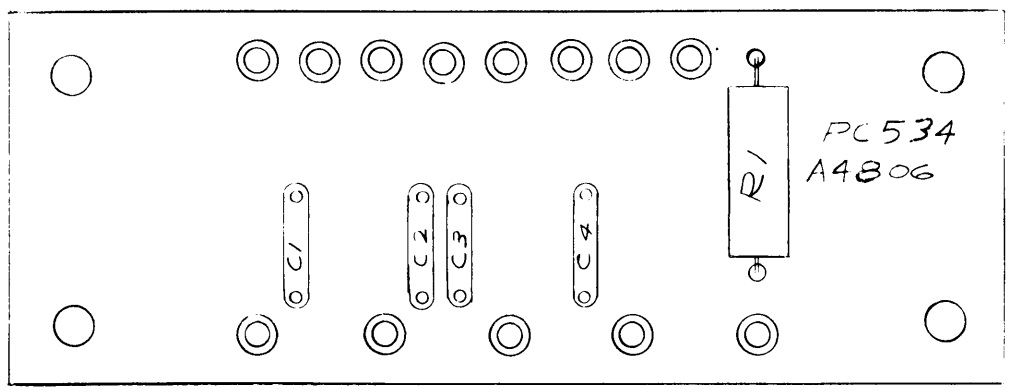
M4002
PLATE CURRENT
A
A4002
E2(+)
E4(-)
E1
E5
E3
P/N (A4800/PC529)
CB07
A4001-1, CB3002B-C
A4001-3 A4003-8
R2 1.2K
Q1 2N1595
C3 .1
R3 1K
R1 120
C1 50 15V
DS1 XDS1
DS2 XDS2
DS3 XDS3
CR1 IN2484
C2 .1

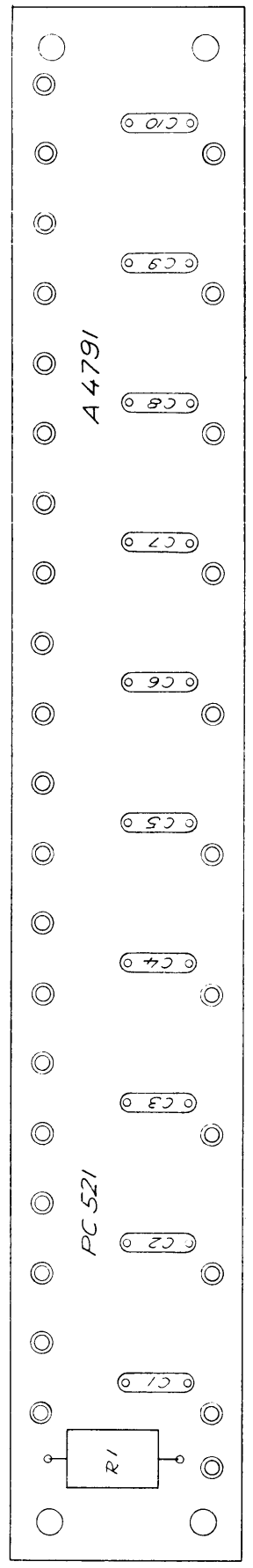
TO SH.2

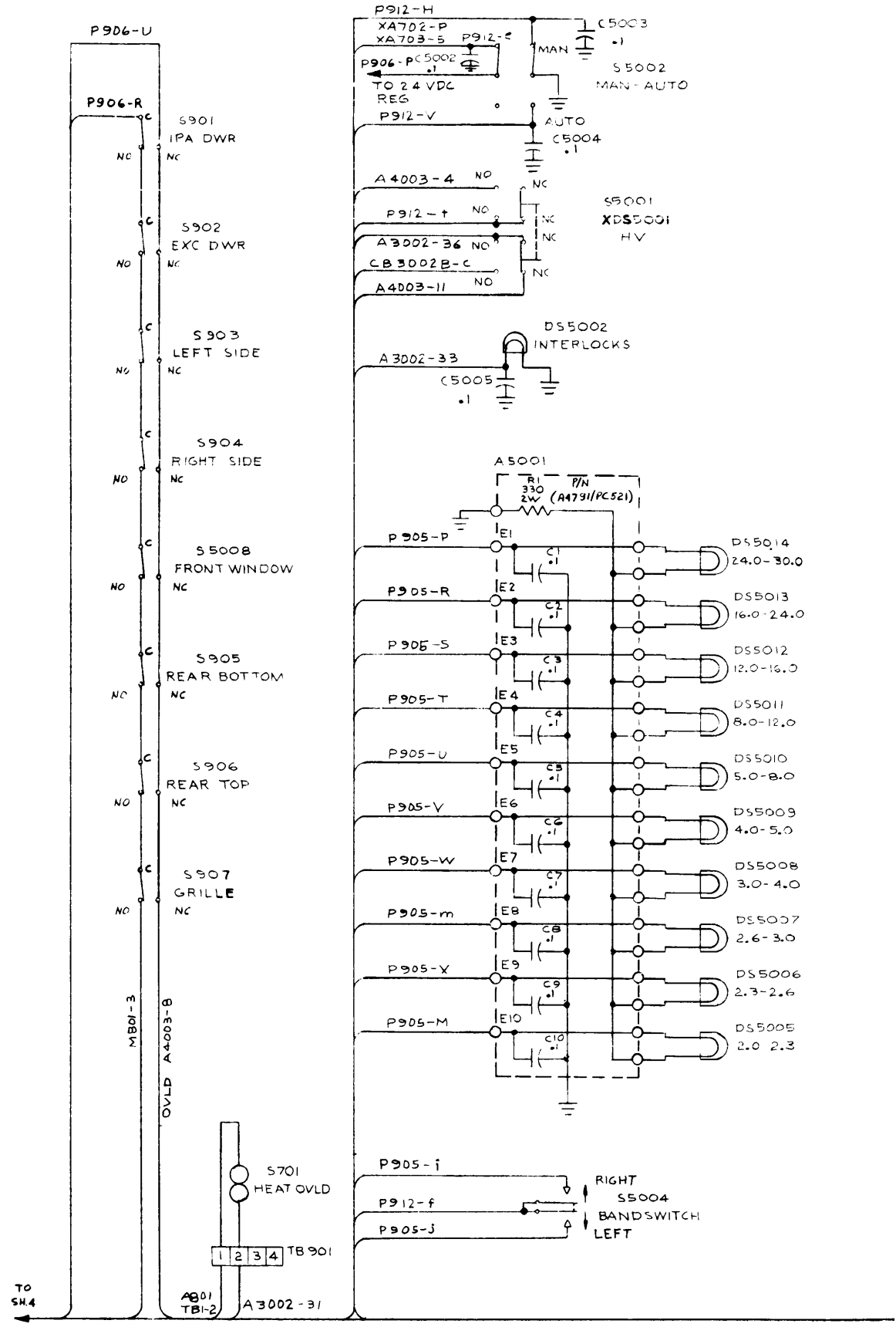
CK1643

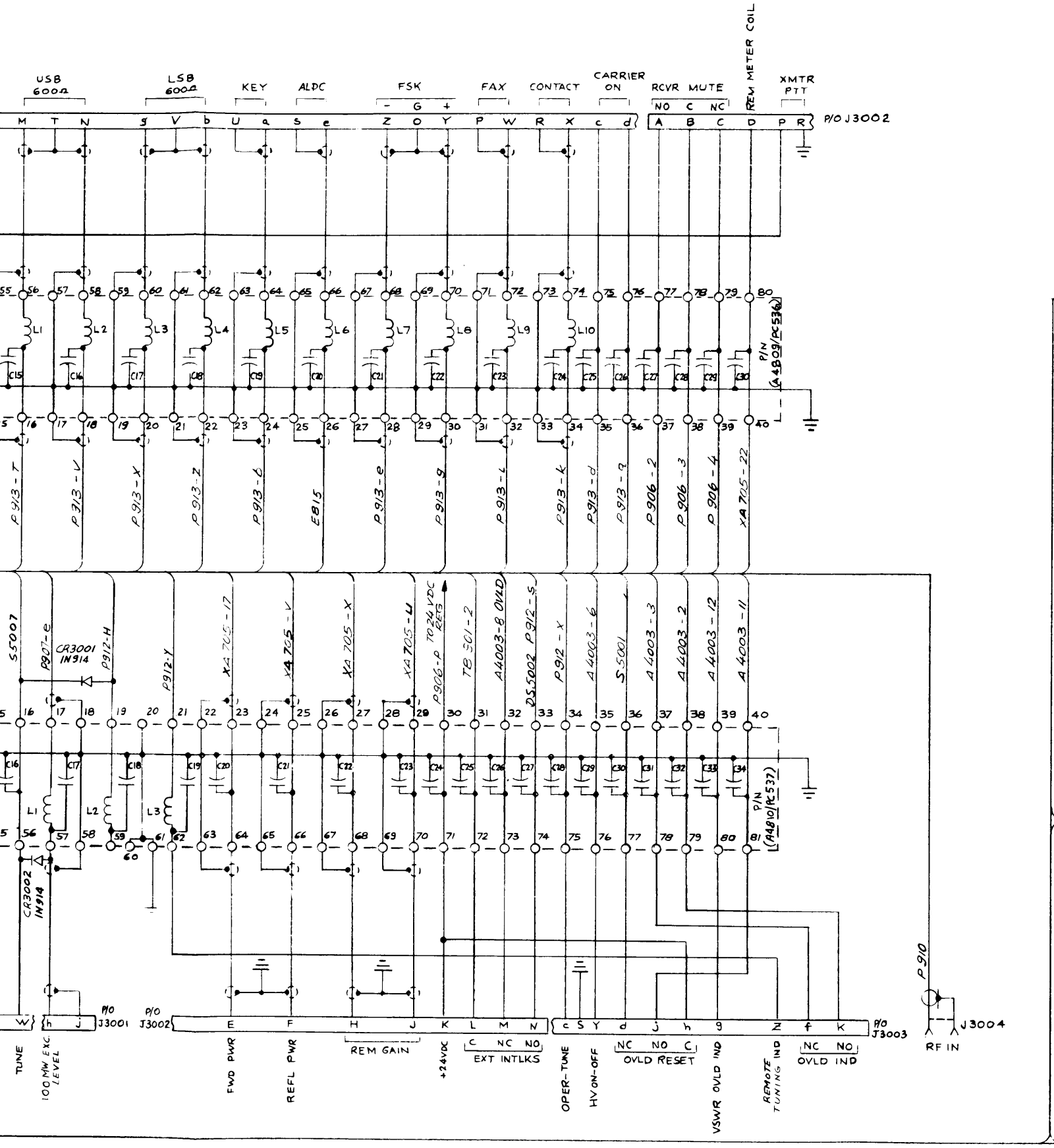
Figure 7-1. Schematic Diagram, PALA-10K, Sheet 3 of 5

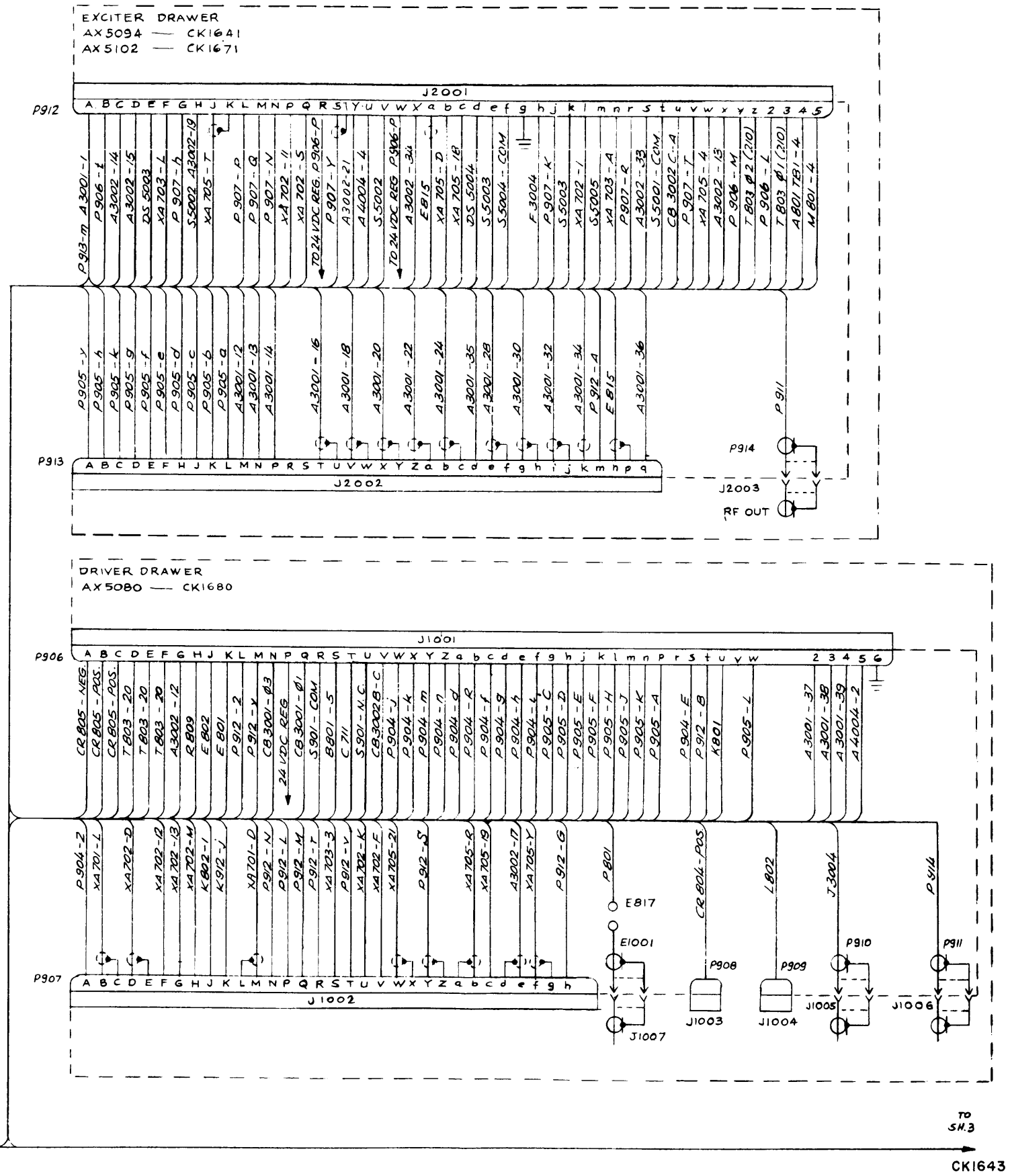

C1
XDS 1
XDS 2
XDS 2
CR1
R3
R1
R2
Q1
C3
C2
1
+2
3
-4
5
A4800
PC 529


C1
C2
C3
C4
R1
PC 534
A4806


C10
C6
C5
C7
C9
C8
C4
C3
C2
C1
R1
A4791
PC 521

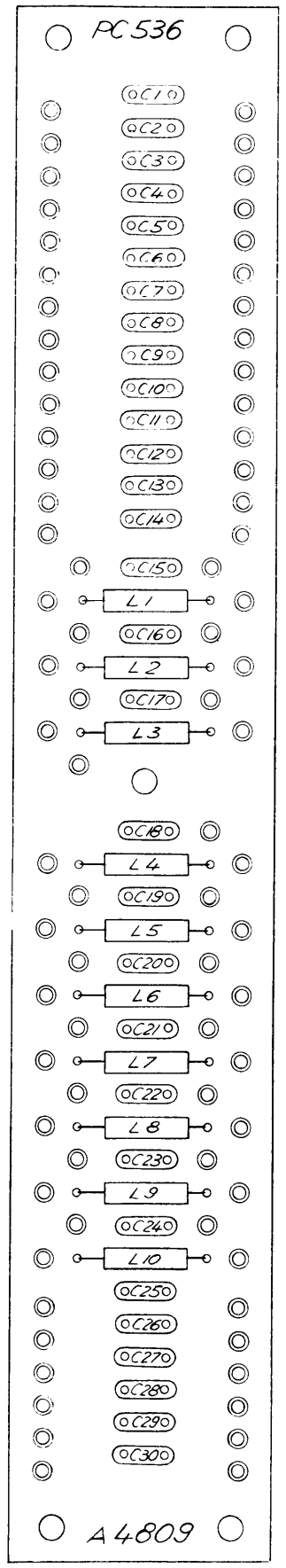

P906-U
P906-R
S901
IPA DWR
S902
EXC DWR
S903
LEFT SIDE
S904
RIGHT SIDE
S5008
FRONT WINDOW
S905
REAR BOTTOM
S906
REAR TOP
S907
GRILLE
NC
NO
C
MB01-3
OVLD A4003-8
P912-H
XA702-P
XA703-5
P912-E
P906-P
C5002 .1
TO 24 VDC REG
C5003 .1
MAN
S5002
MAN-AUTO
P912-V
AUTO
C5004 .1
A4003-4
P912-t
A3002-36
CB3002B-C
A4003-11
S5001
XDS5001
HV
DS5002
INTERLOCKS
A3002-33
C5005 .1
A5001
R1 330 2W
P/N (A4791/PC521)
P905-P
P905-R
P905-S
P905-T
P905-U
P905-V
P905-W
P905-m
P905-X
P905-M
E1
E2
E3
E4
E5
E6
E7
E8
E9
E10
C1 .1
C2 .1
C3 .1
C4 .1
C5 .1
C6 .1
C7 .1
C8 .1
C9 .1
C10 .1
DS5014 24.0-30.0
DS5013 16.0-24.0
DS5012 12.0-16.0
DS5011 8.0-12.0
DS5010 5.0-8.0
DS5009 4.0-5.0
DS5008 3.0-4.0
DS5007 2.6-3.0
DS5006 2.3-2.6
DS5005 2.0 2.3
S701
HEAT OVLD
TB901
1 2 3 4
AB01 TB1-2
A3002-31
P905-j
P912-f
P905-J
RIGHT
S5004
BANDSWITCH
LEFT
TO SH.4

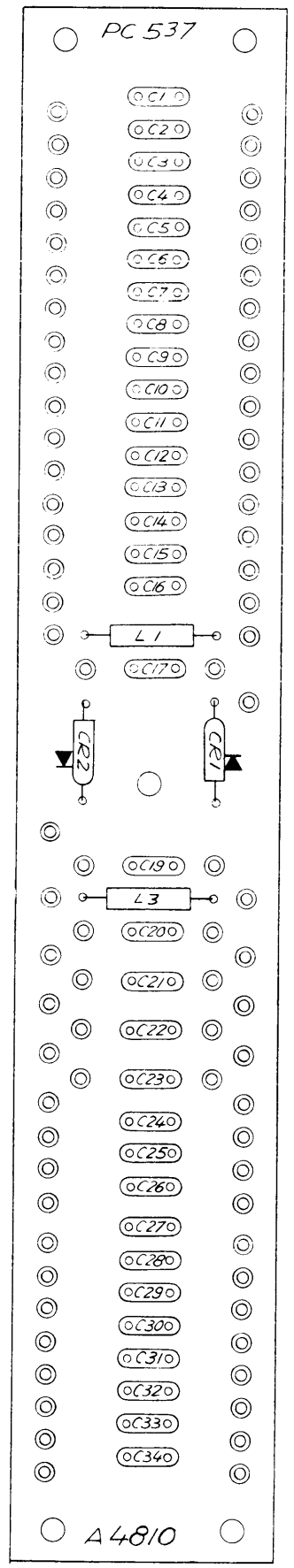


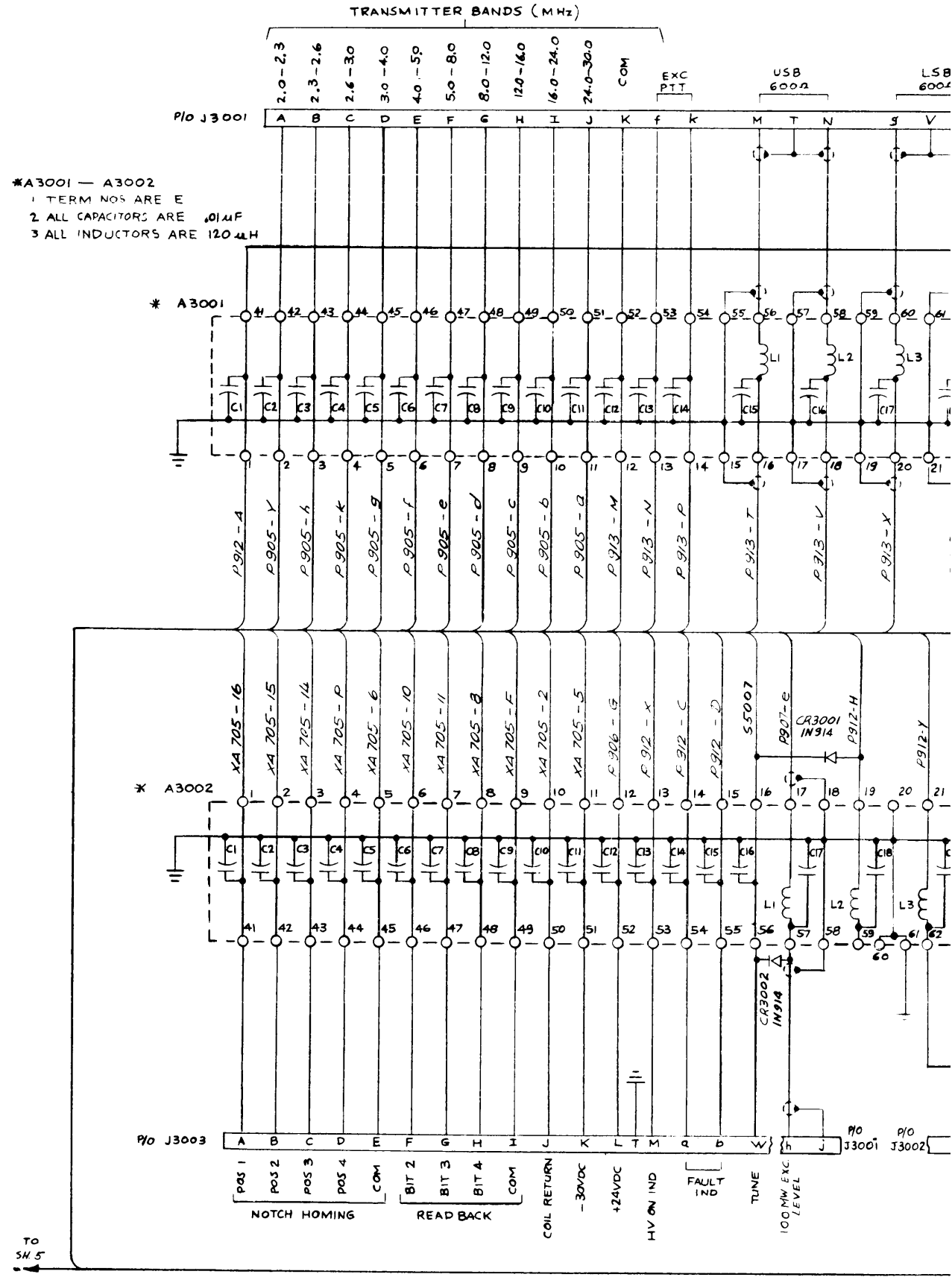


CK1643

Figure 7-1. Schematic Diagram, PALA-10K, Sheet 4 of 5


PC536
OC10
OC20
OC30
OC40
OC50
OC60
OC70
OC80
OC90
OC100
OC110
OC120
OC130
OC140
OC150
L1
OC160
L2
OC170
L3
OC180
L4
OC190
L5
OC200
L6
OC210
L7
OC220
L8
OC230
L9
OC240
L10
OC250
OC260
OC270
OC280
OC290
OC300
A4809


PC537
OC10
OC20
OC30
OC40
OC50
OC60
OC70
OC80
OC90
OC100
OC110
OC120
OC130
OC140
OC150
OC160
L1
OC170
CR22
CR21
OC180
L3
OC190
OC200
OC210
OC220
OC230
OC240
OC250
OC260
OC270
OC280
OC290
OC300
OC310
OC320
OC330
OC340
A4810


TRANSMITTER BANDS (MHz)
2.0-2.3
2.3-2.6
2.6-3.0
3.0-4.0
4.0-5.0
5.0-8.0
8.0-12.0
12.0-16.0
16.0-24.0
24.0-30.0
COM
EXC PTT
USB 600Ω
LSB 600Ω
P/O J3001
A B C D E F G H I J K f k M T N S V
*A3001 — A3002
1 TERM NOS ARE E
2 ALL CAPACITORS ARE .01uF
3 ALL INDUCTORS ARE 120 uH
* A3001
P912-A
P905-V
P905-H
P905-K
P905-S
P905-F
P905-E
P905-D
P905-C
P905-B
P905-Q
P913-N
P913-N
P913-P
P913-T
P913-V
P913-X
XA705-16
XA705-15
XA705-14
XA705-P
XA705-6
XA705-10
XA705-11
XA705-8
XA705-F
XA705-2
XA705-5
P906-13
P912-X
P912-C
P912-D
S5007
P807-E
CR3001 IN914
P912-H
P912-Y
* A3002
L1
L2
L3
CR3002 IN914
P/O J3003
A B C D E F G H I J K L T M a b W h j
P/O J3001
P/O J3002
POS 1
POS 2
POS 3
POS 4
COM
NOTCH HOMING
BIT 2
BIT 3
BIT 4
COM
READ BACK
COIL RETURN
-30VDC
+24VDC
HV ON IND
FAULT IND
TUNE
100 MW EXC LEVEL
TO SH 5

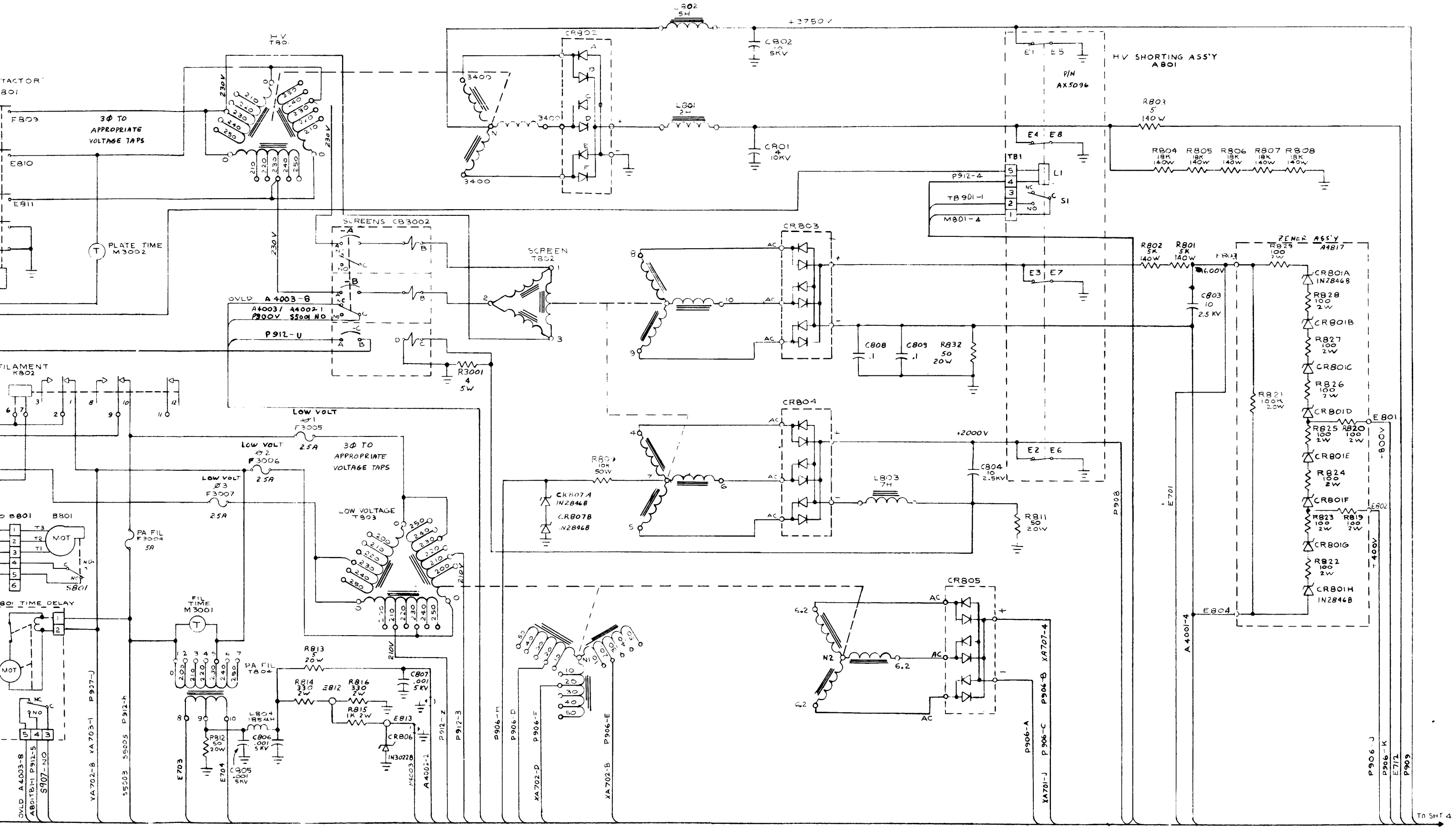
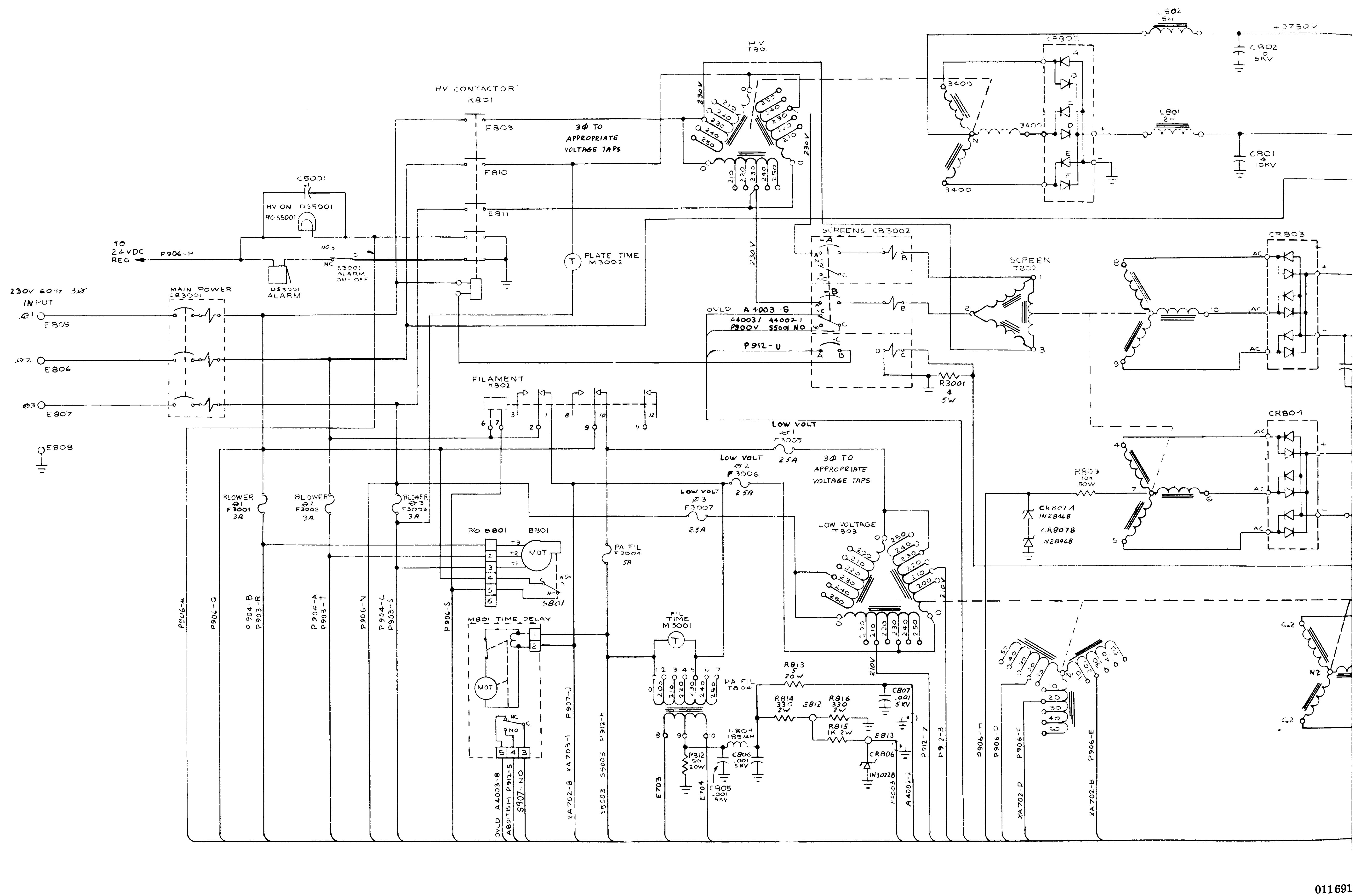


Figure 7-1. Schematic Diagram, PALA-10K, Sheet 5 of 5

CK1643


HV CONTACTOR K801
HV T801
3Ø TO APPROPRIATE VOLTAGE TAPS
PLATE TIME M3002
C5001
HV ON DS5001
TO 24VDC REG
P906-Y
S3001 ALARM ON-OFF
DS3001 ALARM
230V 60Hz 3Ø INPUT
MAIN POWER CB3001
E805
E806
E807
E808
FILAMENT K802
BLOWER Ø1 F3001 3A
BLOWER Ø2 F3002 3A
BLOWER Ø3 F3003 3A
B801
S801
M801 TIME DELAY
SCREENS CB3002
OVLD A4003-8
P912-U
SCREEN T802
R3001 4 5W
LOW VOLT Ø1 F3005 2.5A
LOW VOLT Ø2 F3006 2.5A
LOW VOLT Ø3 F3007 2.5A
LOW VOLTAGE T803
PA FIL F3004 5A
FIL TIME M3001
PA FIL T804
CR801 4 10KV
CR802 10 5KV
L801
L802 5H
+3750V
CR803
CR804
CR807A 1N2846B
CR807B 1N2846B
CR806 1N3022B
LB04 185µH
C806 .001 5KV
C805 .001 5KV
C807 .001 5KV
R812 50 20W
R813 5 20W
R814 330 2W
R815 1K 2W
R816 330 2W
E703
E704
E812
E813
011691

C1001 .01μF 5KV

L1001

RF OUT J1007 E1001

L1105 50

A1002 BANDSWITCH ASS'Y P/N (AS1146)

L1

C7 50 pF 5KV

S1A

L4

L2

C9 1000pF 5KV

C10 1000pF 5KV

C8 1000pF 5KV

S1B

C3 1000pF 5KV

C4 1000pF 5KV

C5 1000pF 5KV

C6 1000pF 5KV

L3 45

C1 1000pF 5KV

C2 1000pF 5KV

K1

E1

CR1 IN547

E2

S2A FRONT

S2B FRONT

S2C FRONT

S2A REAR

S2B REAR

S2C REAR

R1 1K

R2 2.2K

R3 5.0K

R4 20K

XA1001

XA1003-16

XA1003-15

XA1003-14

J1002-K

XA1004-35 XA1004-34

XA1003-36

XA1003-37

XA1003-12

TO 24VDC REG.

XA1003-8

XA1003-9

J1004

XA1002

J1 20 22 21 15 16 17 18 19 11 12 13 14 6 7 8 9 10 1 2 3 4 5 25

R1207 1/ 20W

F1004 BANDSWITCH 5A

J1001-R

CR1103-POS

J1001-L

J1001-M

J1001-N

J1001-P

J1001-S

J1001-H

J1001-J

J1001-K

J1001-B

J1001-C

J1001-D

J1001-E

J1001-F

J1001-W

J1001-X

J1001-Y

J1001-a

A1007-E19

A1002S1 & A1002S2 CHAIN IN BAND 1

A1002S1	
POS	BAND MHz
1	2-2.6
2	2.6-3
3	3-4
4	4-5
5	5-8
6	8-12
7	12-16
8	16-24
9	–
10	24-30
11	–
12	–

A1002S1 SYMBOLS		
WAFER	POS	SYMBOL
A	1	A1002E3
A	2	A1002E4
A	4	A1002E5
A	5	A1002E
A	6	A1002E7
A	7	A1002E8
A	8	A1002E9
A	9	A1002E10
A	10	A1002E11
A	11	A1002E12
A	12	A1002E13
B	1	A1002E14
B	2	A1002E15
B	3	A1002E16
B	4	A1002E17
B	5	A1002E18
B	6	A1002E19
B	8	A1002E20
B	10	A1002E21
B	11	A1002E22
B	12	A1002E23

UNLESS OTHERWISE SPECIFIED:
1. ALL RESISTANCES IN OHMS ½W.
2. ALL CAPACITANCES IN MICROFARADS.
3. ALL INDUCTANCES IN MICRO HENRIES.
4. ALL FUSES

NO FUSE SOCKET FRONT CAP — PIO FUSE SOCKET

5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX PART DESIGNATION WITH THE SUB-ASSEMBLY DESIGNATION.

CK1680

A1006	A1007	A1008
C4	E21	C5
R1	R14	CR3
S2	TP4	E3
8		L2
D1		R7
C4		
CR52		

MISSING SYMBOLS

A1008
C34

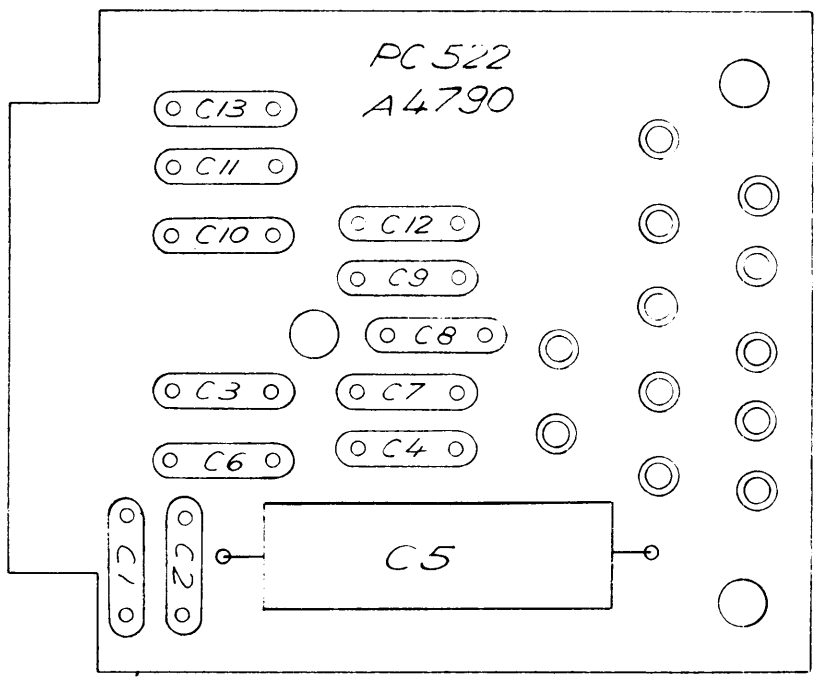
LAST SYMBOLS	MISSING SYMBOLS
1100	1100
C1112	XC1101-3
CR1109	XCR1101-6
E1106	
K1101	
L1101	
R1109	
S1101	
T1101	
TB1102	
XC1106	
XCR1103	
XK1	

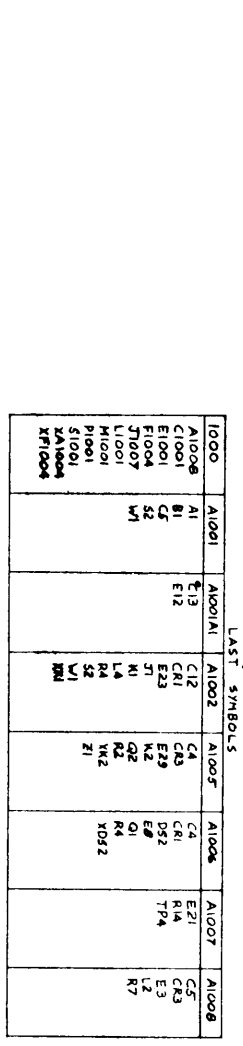
LAST SYMBOLS	MISSING SYMBOLS
1200	1200
C1218	E1205
CR1202	C1209
E1206	
K1201	
R1207	
S1201	
XK1201	

LAST SYMBOLS	MISSING SYMBOLS
1300	1300
B1301	
C1322	
CR1301	
E1315	
L1308	
R1310	
S1302	
V1302	
XV1302	
Z1302	

LAST SYMBOLS	MISSING SYMBOLS
1400	1400
B1401	
C1421	
E1401	
K1401	
L1405	
R1403	
S1401	
V1401	
XV1401	
Z1401	

Figure 7-2. Schematic Diagram, PALA-10K IPA Drawer, Sheet 1 of 4


PC 522
A4790
C13
C11
C10
C12
C9
C8
C3
C7
C4
C6
C1
C2
C5


1000
A1001
A1001A1
A1002
A1005
A1006
A1007
A1008
A1
B1
CF
S2
W1
E13
E12
C12
CR1
E23
J1
K1
L4
R4
S2
V1
XV1
C4
CR3
E29
K2
K2
Z1
C4
CR1
DS2
E9
Q1
R4
XDS2
E21
R14
TP4
CF
CR3
E3
L2
R7
LAST SYMBOLS

TO SHEET 2
A1001
TUNE CAP ASS'Y
C1 23 - 325pf
C2 1000pf 5 KV
C3 1000pf 5KV
C4 1000pf 5KV
C5 1000pf 5 KV
P/O B1
MOT
GEN
P/O B1
A1 (PN 44790 REV F)
XA1001
XA1003-16
XA1003-15
XA1003-14
J1002-K
XA1004-35
XA1004-34
XA1003-36
XA1003-37
XA1003-12
XA1003-9
XA1003-8
TO 24VDC REG.
S1
S2
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
.01
.02
.1
.8
TO SHEET 2

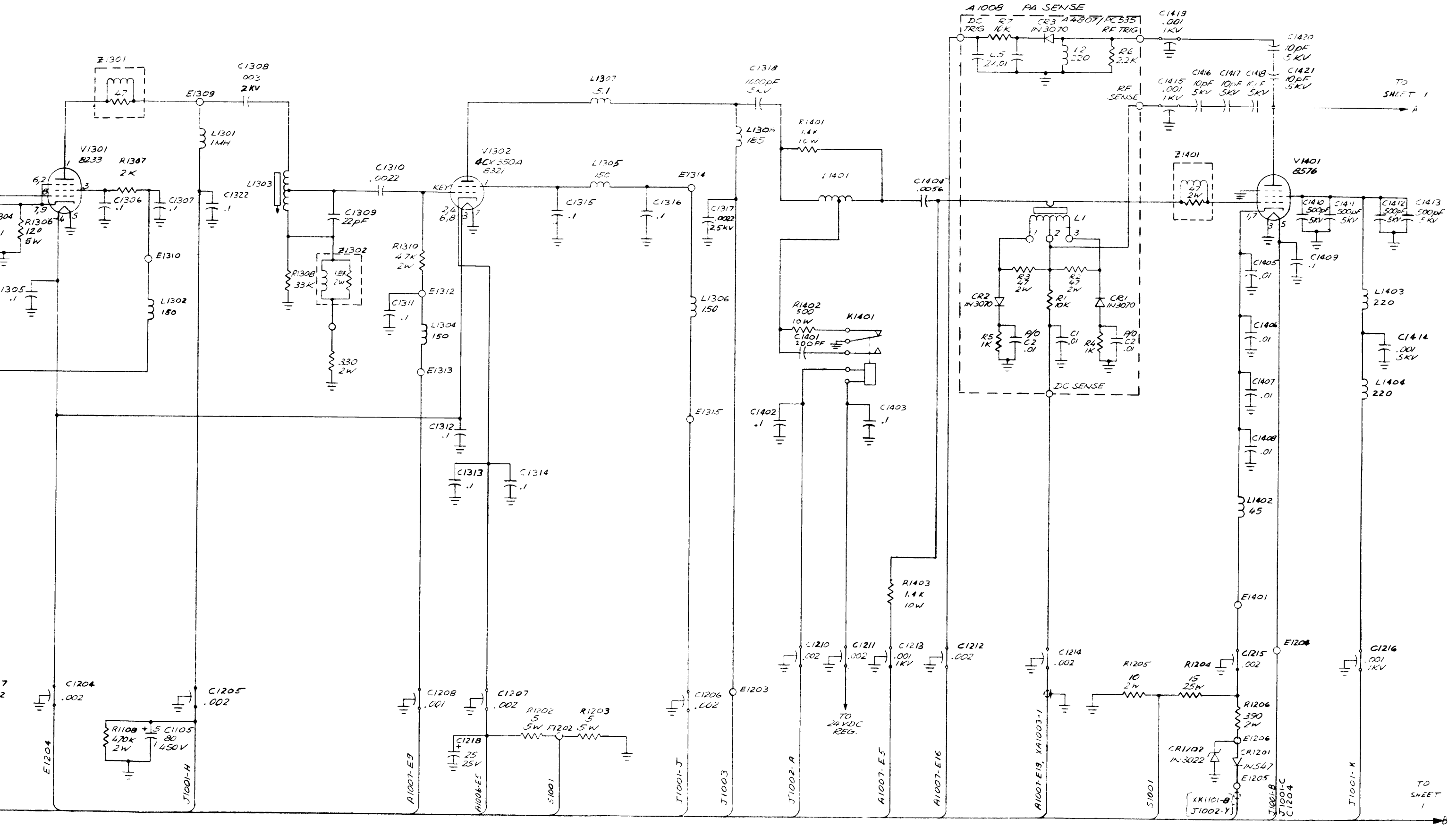
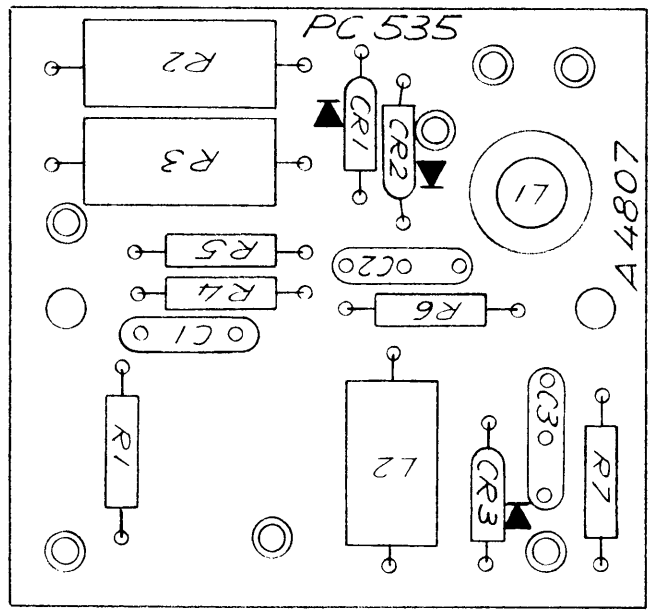
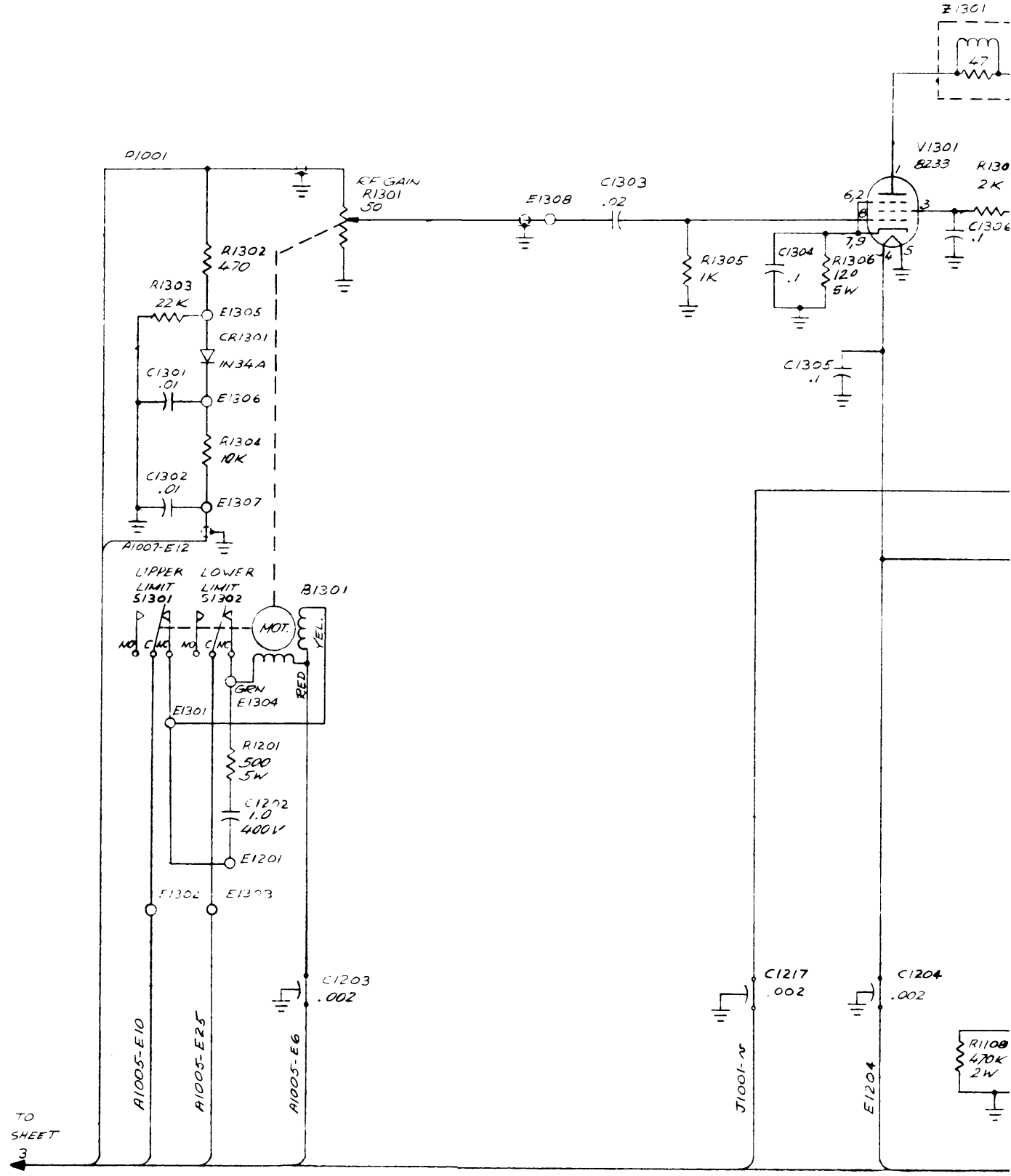


Figure 7-2. Schematic Diagram, PALA-10K IPA Drawer, Sheet 2 of 4


PC 535
A4807
R2
R3
R5
R4
C2
C1
R6
17
CR1
CR2
R1
L2
CR3
C3
R7


Z1301
47
V1301
6233
R130
2K
C1306
.1
D1001
RF GAIN
R1301
50
E1308
C1303
.02
R1305
1K
C1304
.1
R1306
120
5W
C1305
.1
R1302
470
R1303
22K
E1305
CR1301
IN34A
C1301
.01
E1306
R1304
10K
C1302
.01
E1307
A1007-E12
UPPER
LIMIT
S1301
LOWER
LIMIT
S1302
B1301
MOT.
YEL.
RED
GRN
E1304
E1301
R1201
500
5W
C1202
1.0
400V
E1201
E1302
E1303
C1203
.002
C1217
.002
C1204
.002
R1108
470K
2W
A1005-E10
A1005-E25
A1005-E6
J1001-A
E1204
TO
SHEET
3

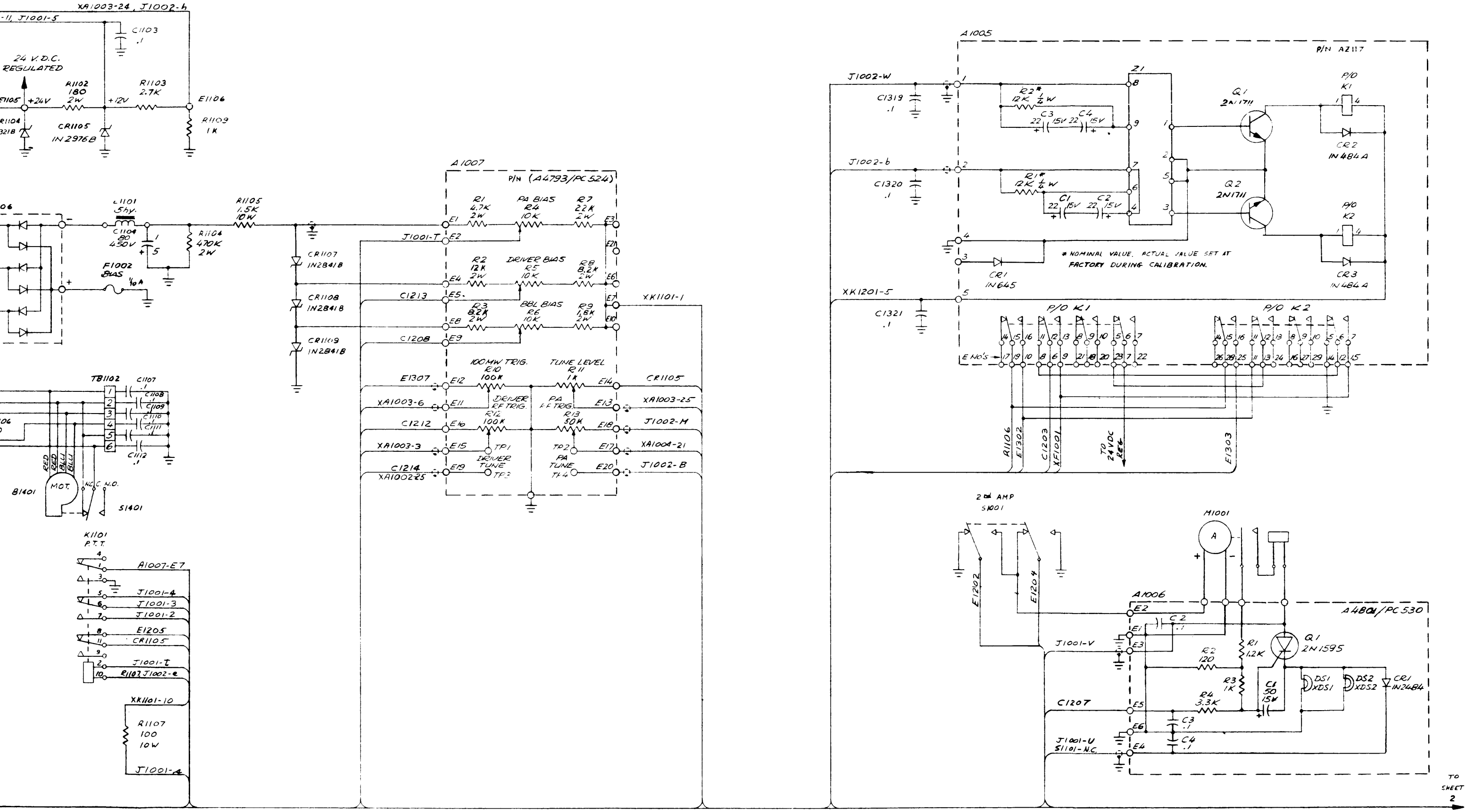
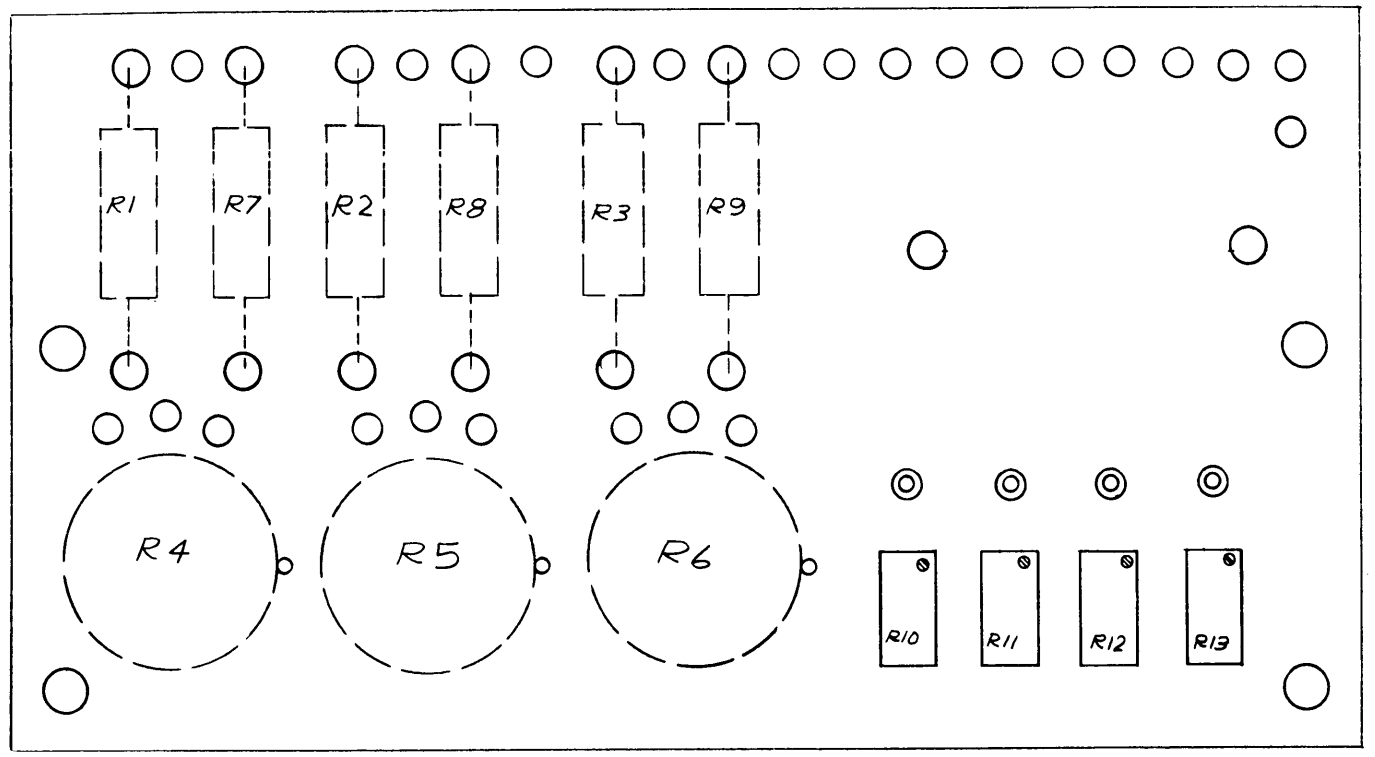
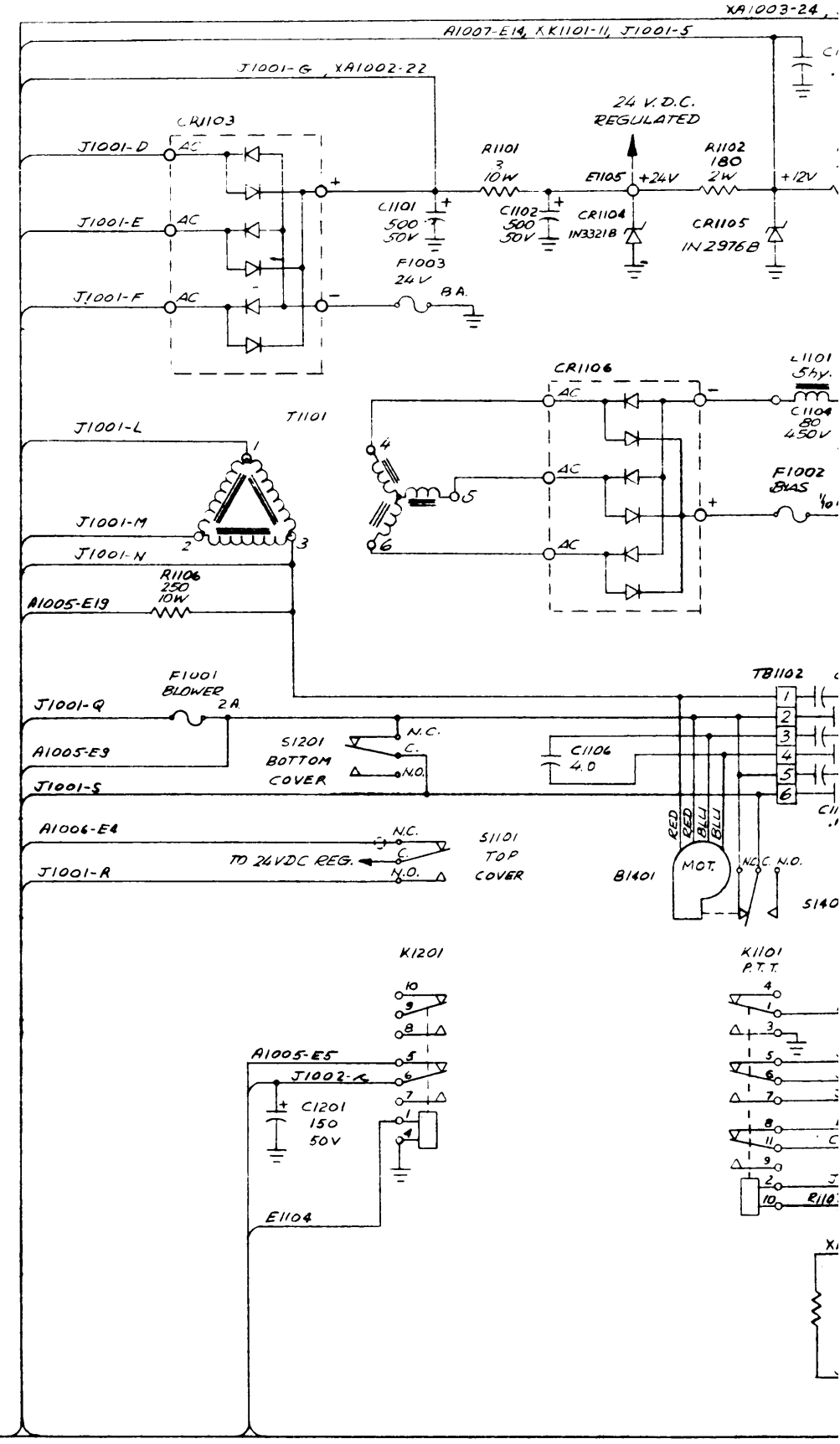


Figure 7-2. Schematic Diagram, PALA-10K IPA Drawer, Sheet 3 of 4


R1
R7
R2
R8
R3
R9
R4
R5
R6
R10
R11
R12
R13

+ C1
XDS1
Q1
R2
R3
XDS2
R1
CR1
R4
C3
C2
C4
PC 530
A4801


XA1003-24
A1007-E18, XK1101-11, J1001-5
J1001-G, XA1002-22
24 V.D.C. REGULATED
CR1103
J1001-D
J1001-E
J1001-F
AC
R1101 3 10W
R1102 180 2W
+12V
E1105
+24V
C1101 500 50V
C1102 500 50V
CR1104 IN3321B
CR1105 IN2976B
F1003 24V 8A
CR1106
C1101 5hy.
C1104 80 450V
F1002 BIAS
T1101
J1001-L
J1001-M
J1001-N
R1106 250 10W
A1005-E19
TB1102
F1001 BLOWER 2A
J1001-Q
A1005-E9
S1201 BOTTOM COVER
N.C.
C.
N.O.
C1106 4.0
J1001-S
A1006-E4
J1001-R
TO 24VDC REG.
S1101 TOP COVER
B1401
MOT.
RED
BLU
K1201
K1101 P.T.T.
A1005-E5
J1002-C
C1201 150 50V
E1104
TO SHEET 4

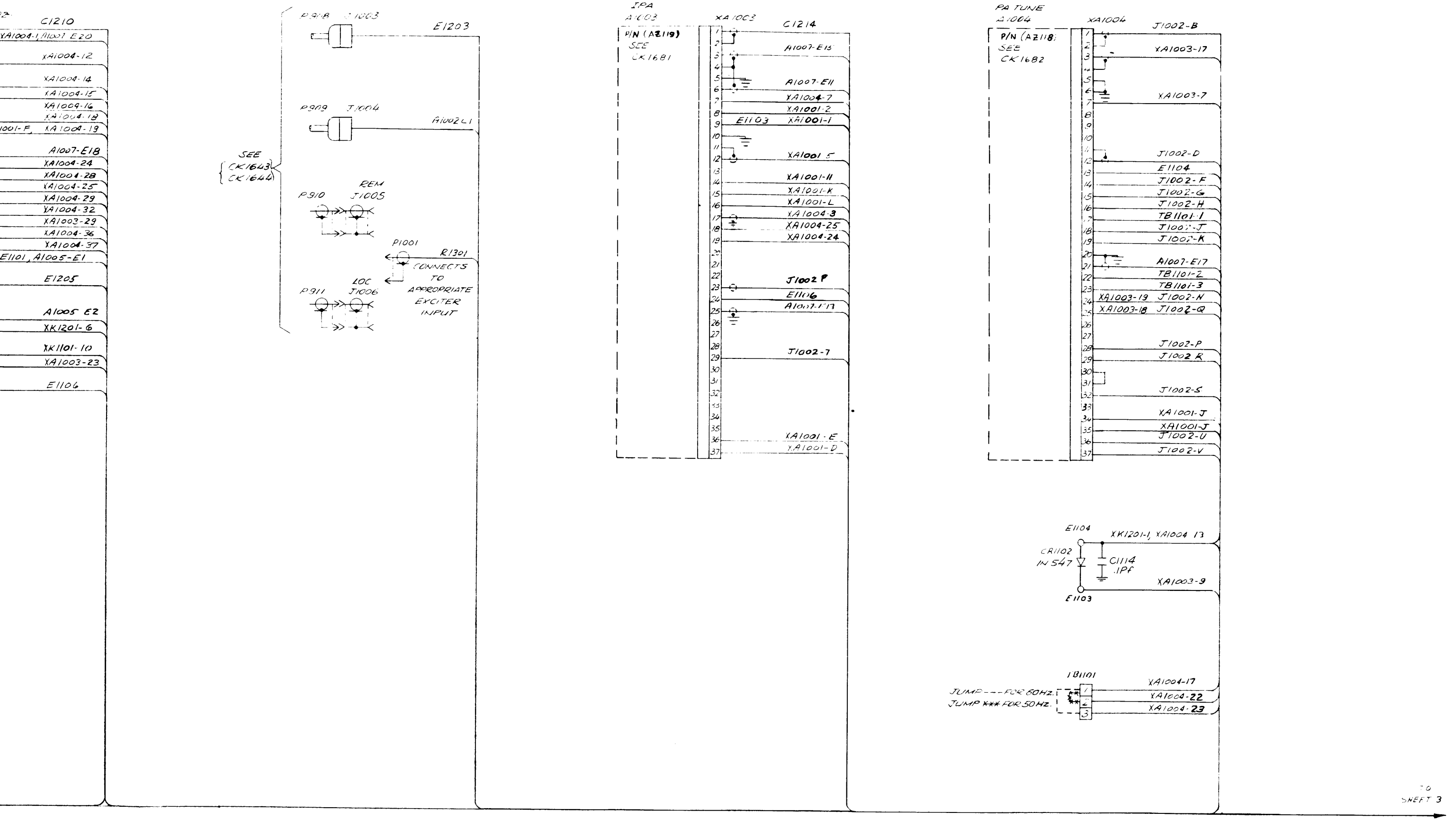
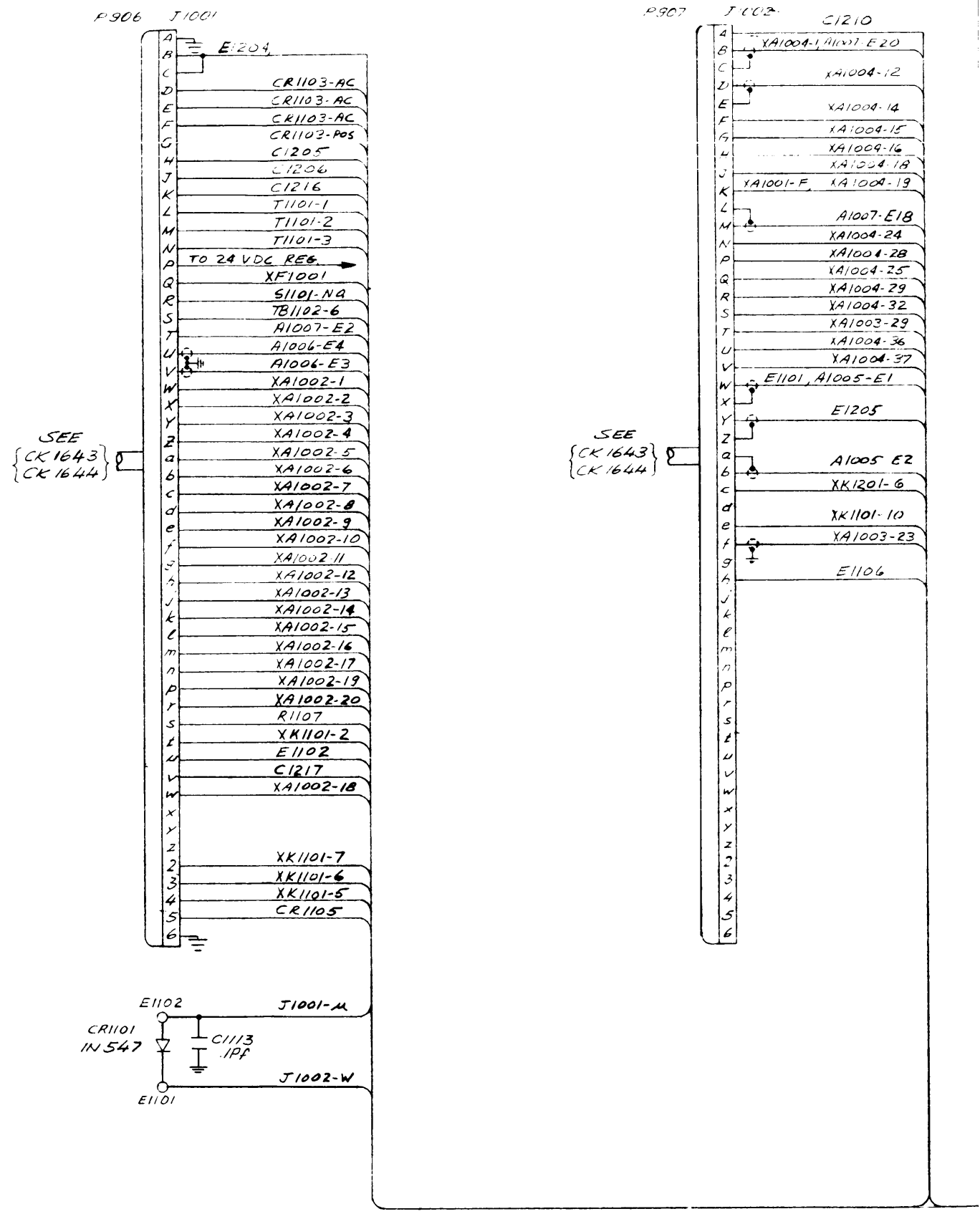
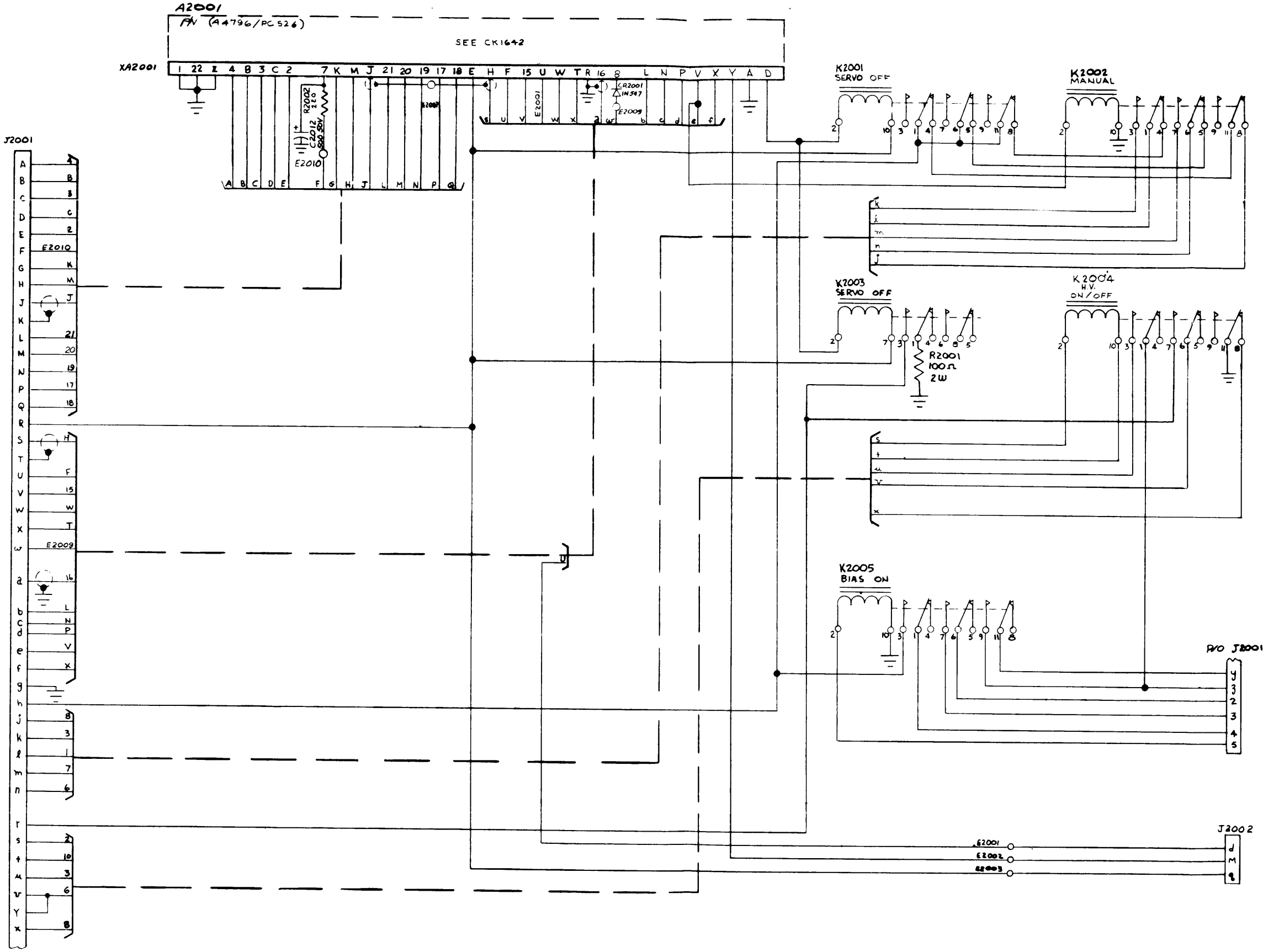


Figure 7-2. Schematic Diagram, PALA-10K IPA Drawer, Sheet 4 of 4


P906 J1001
E1204
CR1103-AC
CR1103-AC
CR1103-AC
CR1103-POS
C1205
C1206
C1216
T1101-1
T1101-2
T1101-3
TO 24 VDC REG.
XF1001
S1101-NA
TB1102-6
A1007-E2
A1006-E4
A1006-E3
XA1002-1
XA1002-2
XA1002-3
XA1002-4
XA1002-5
XA1002-6
XA1002-7
XA1002-8
XA1002-9
XA1002-10
XA1002 11
XA1002-12
XA1002-13
XA1002-14
XA1002-15
XA1002-16
XA1002-17
XA1002-19
XA1002-20
R1107
XK1101-2
E1102
C1217
XA1002-18
XK1101-7
XK1101-6
XK1101-5
CR1105
SEE {CK1643 CK1644}
E1102
J1001-M
CR1101 IN547
C1113 .1PF
J1002-W
E1101
P907 J1003
C1210
XA1004-1, A1007-E20
XA1004-12
XA1004-14
XA1004-15
XA1004-16
XA1004-18
XA1001-F, XA1004-19
A1007-E18
XA1004-24
XA1004-28
XA1004-25
XA1004-29
XA1004-32
XA1003-29
XA1004-36
XA1004-37
E1101, A1005-E1
E1205
A1005 E2
XK1201-6
XK1101-10
XA1003-23
E1106
SEE {CK1643 CK1644}



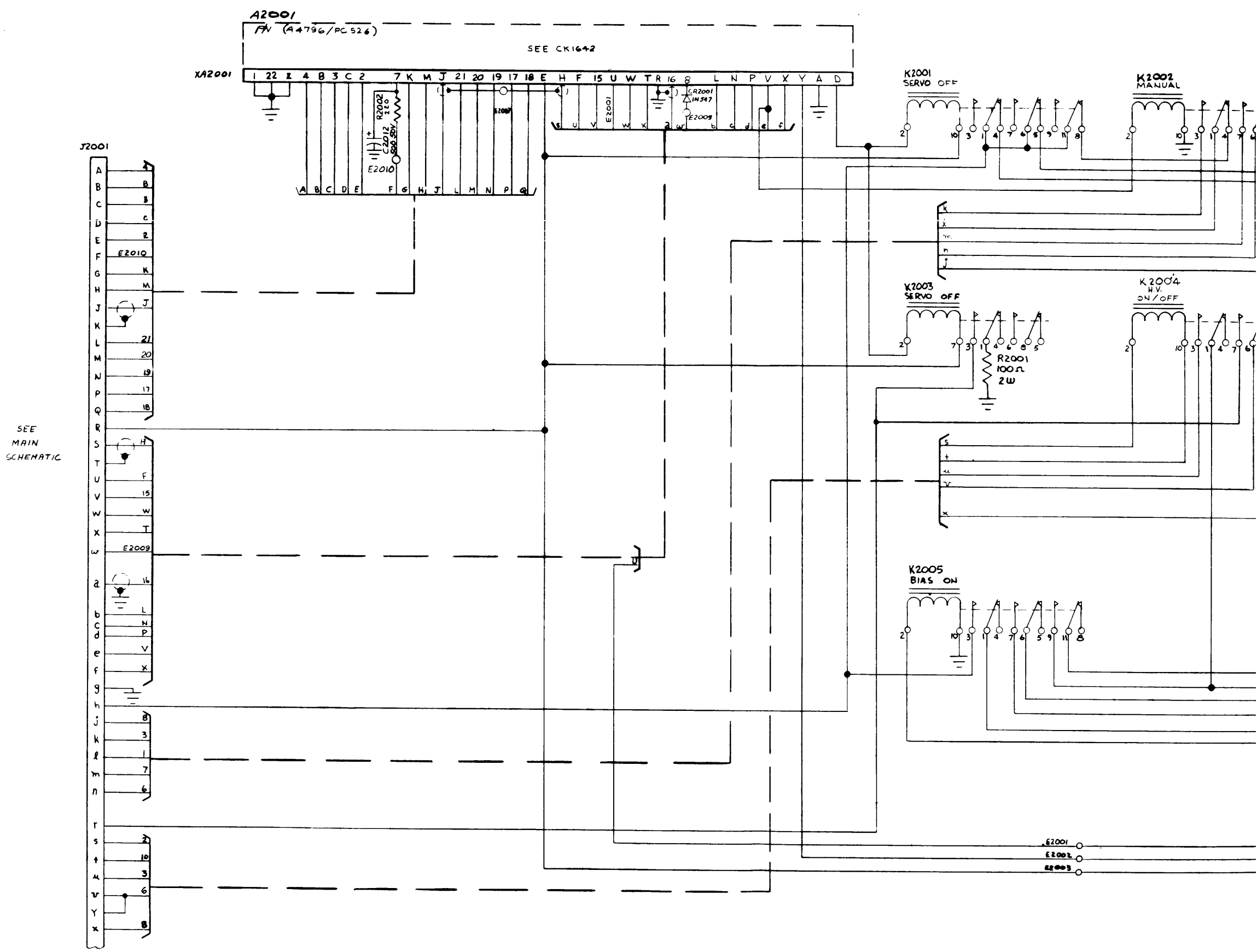
MISSING SYMBOLS	LAST SYMBOLS
C2001-11	A2001
E2004, 5, 6, 8	C2012
	CR2001
	E2010
	J2003
	K2005
	R2002
	W2001
	XK2005
	XA2001

CK1671

— UNLESS OTHERWISE SPECIFIED —
ALL RESISTANCE VALUES ARE IN OHMS
ALL CAPACITANCE VALUES ARE IN MICROFARADS

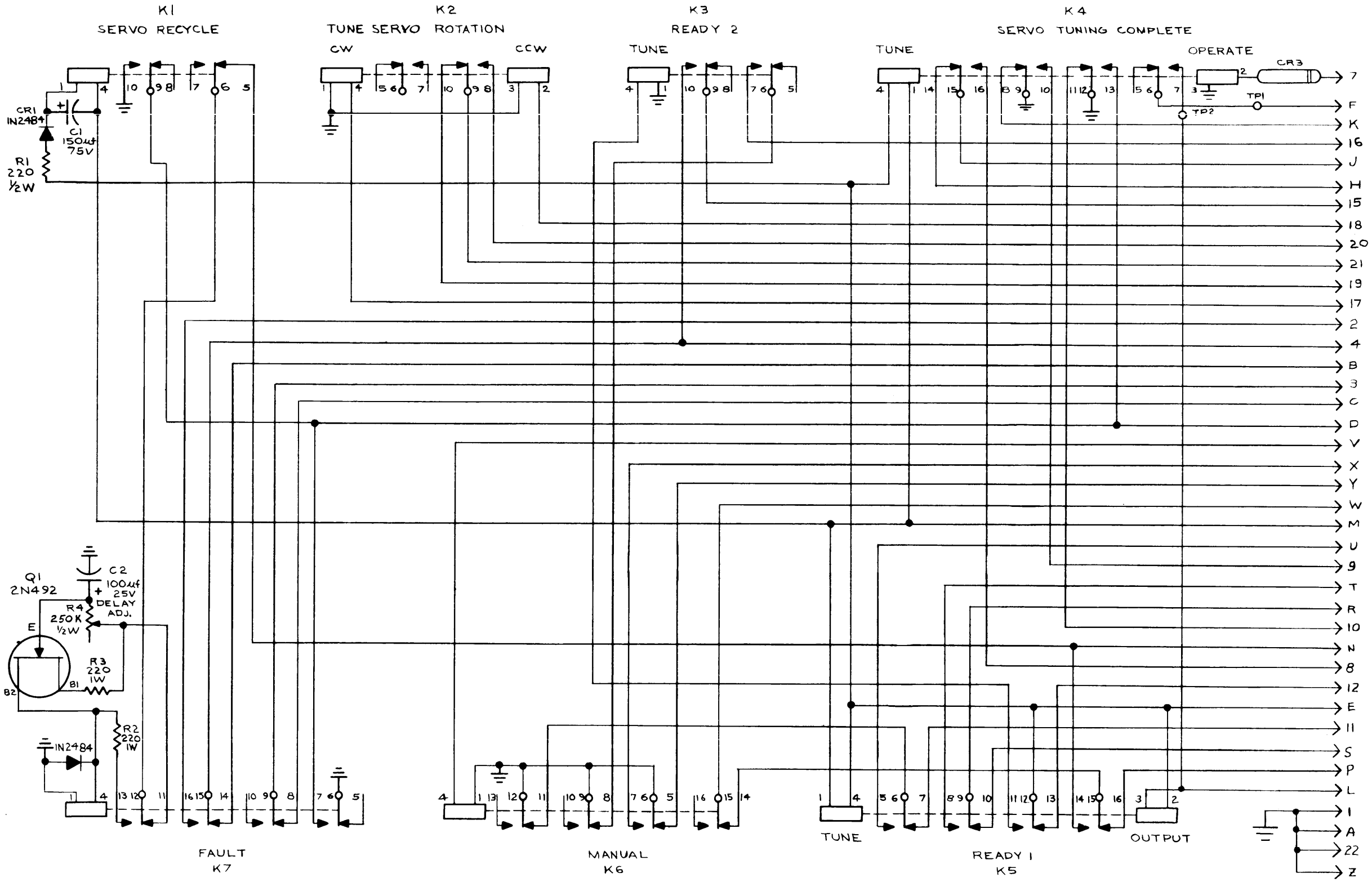
011691035

Figure 7-3. Schematic Diagram, PALA-10K Exciter Drawer



— UNLESS OTHERWISE SPECIFIED —
ALL RESISTANCE VALUES ARE IN OHMS
ALL CAPACITANCE VALUES ARE IN MICROFARADS

Figure 7-3. Schen



SEE EXC DWR SCHEM
A2001

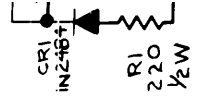
LAST SYMBOLS
C2
CR3
K7
Q1
R4
TP2
XK7

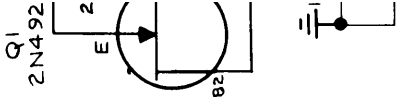
A4796 / PC526

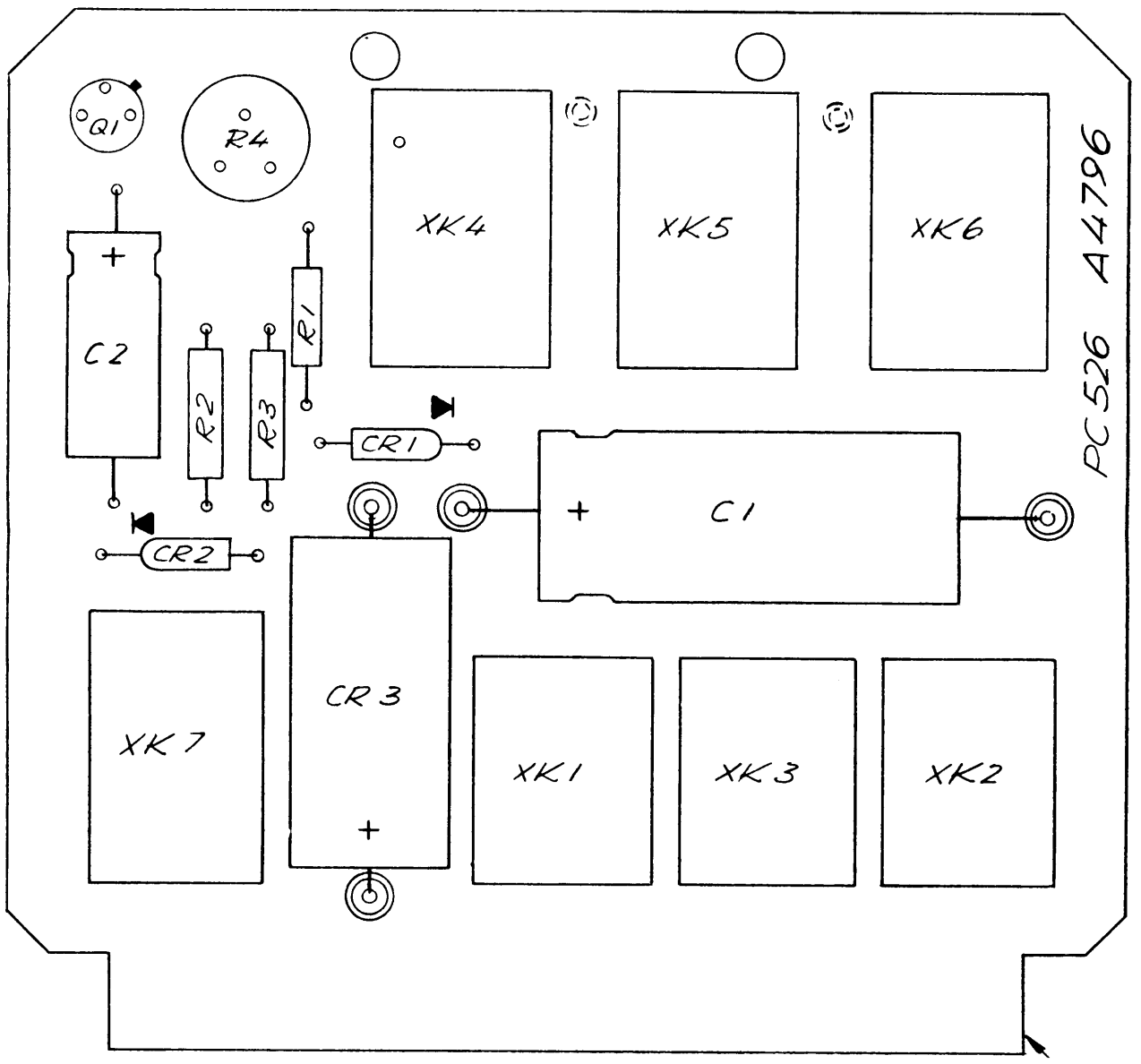
CK1642

PARTIAL REFERENCE DESIGNATIONS ARE SHOWN.
PREFIX THE PART DESIGNATION WITH THE
SUB-ASSEMBLY DESIGNATION.

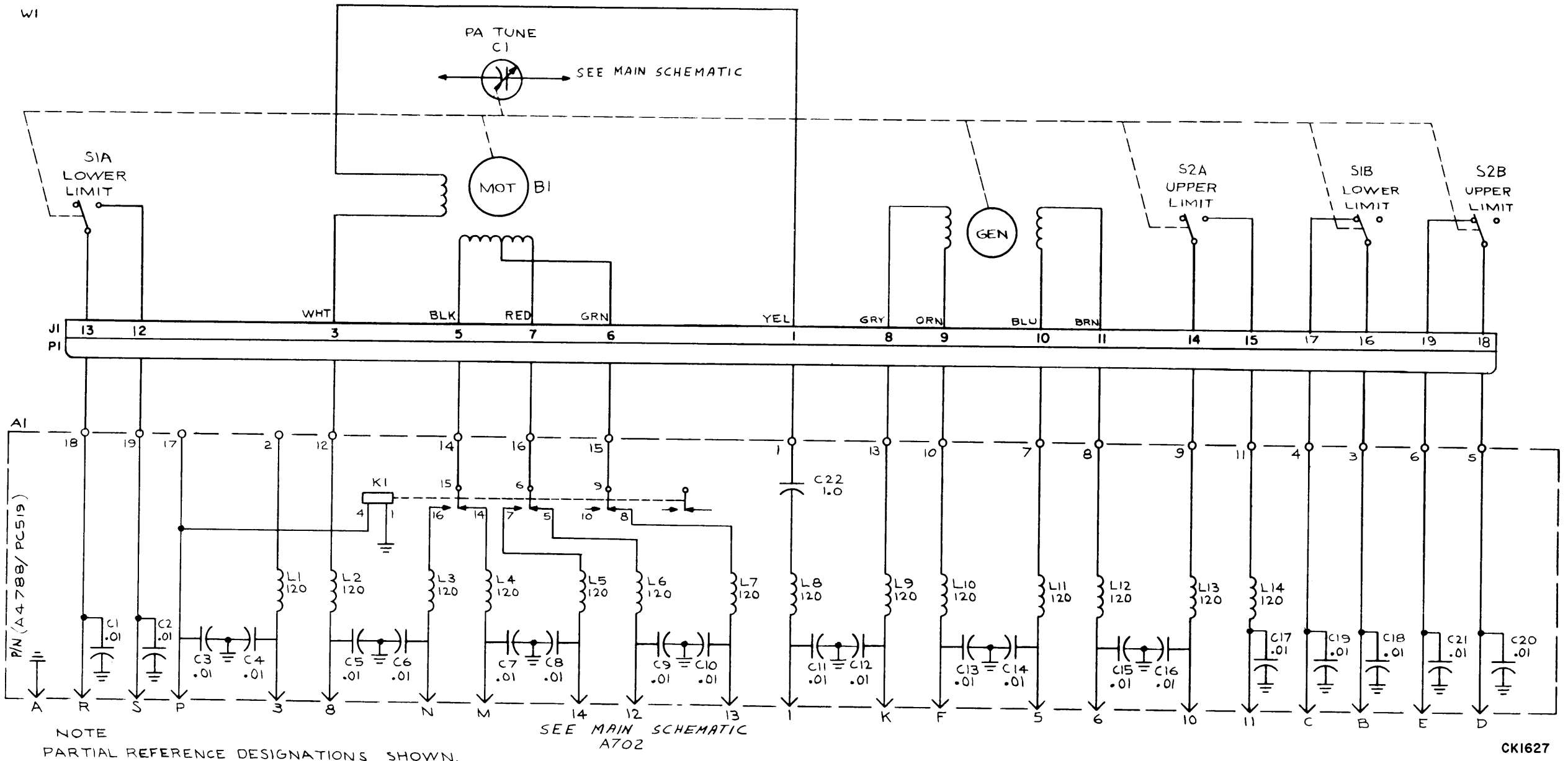
Figure 7-4. Schematic Diagram, PALA-10K Tuning Control Board


CR1
IN2481
R1
220
½W


Q1
2N4921
E
B2

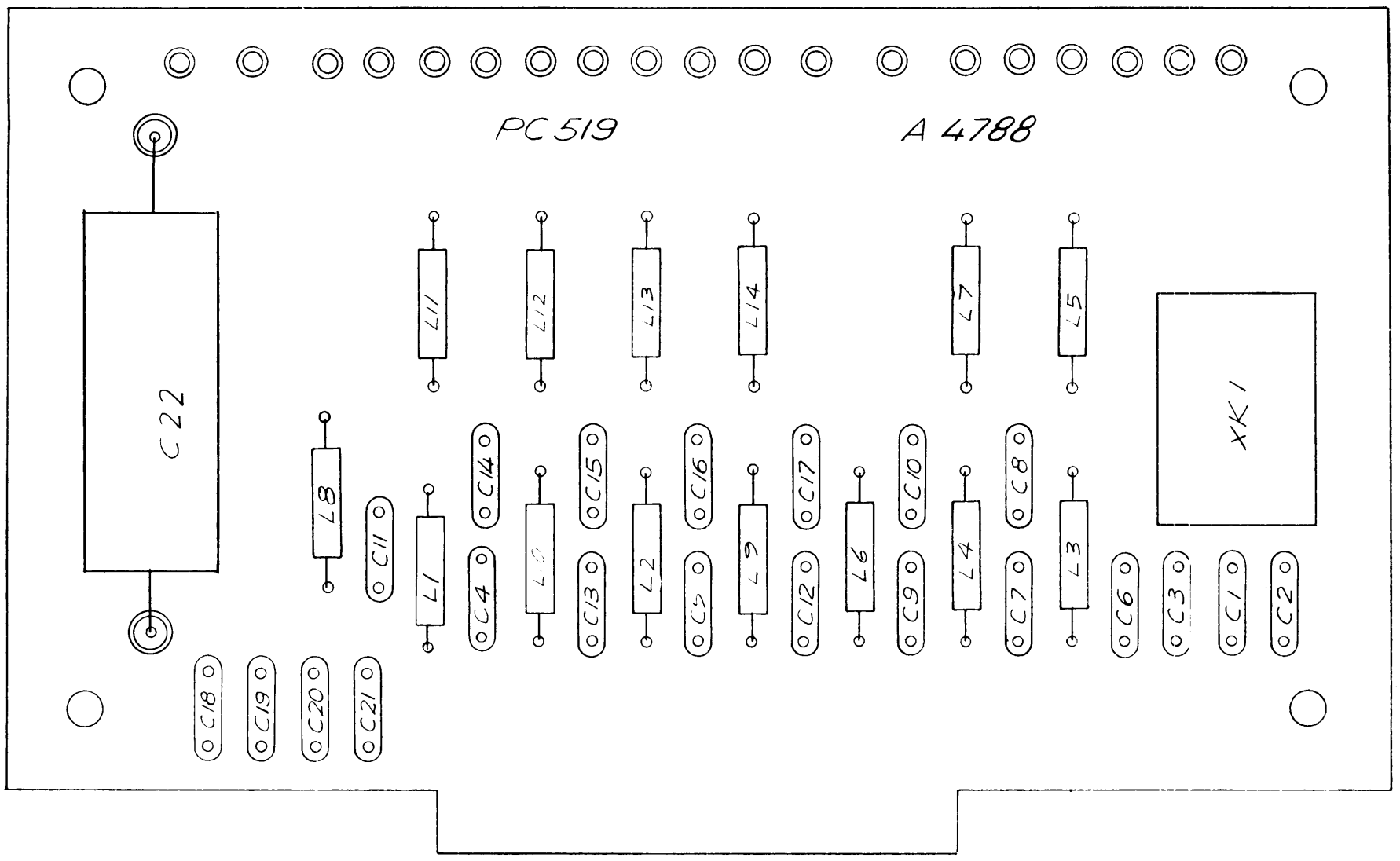

Q1
R4
XK4
XK5
XK6
PC526 A4796
C2
R2
R3
R1
CR1
CR2
C1
XK7
CR3
XK1
XK3
XK2

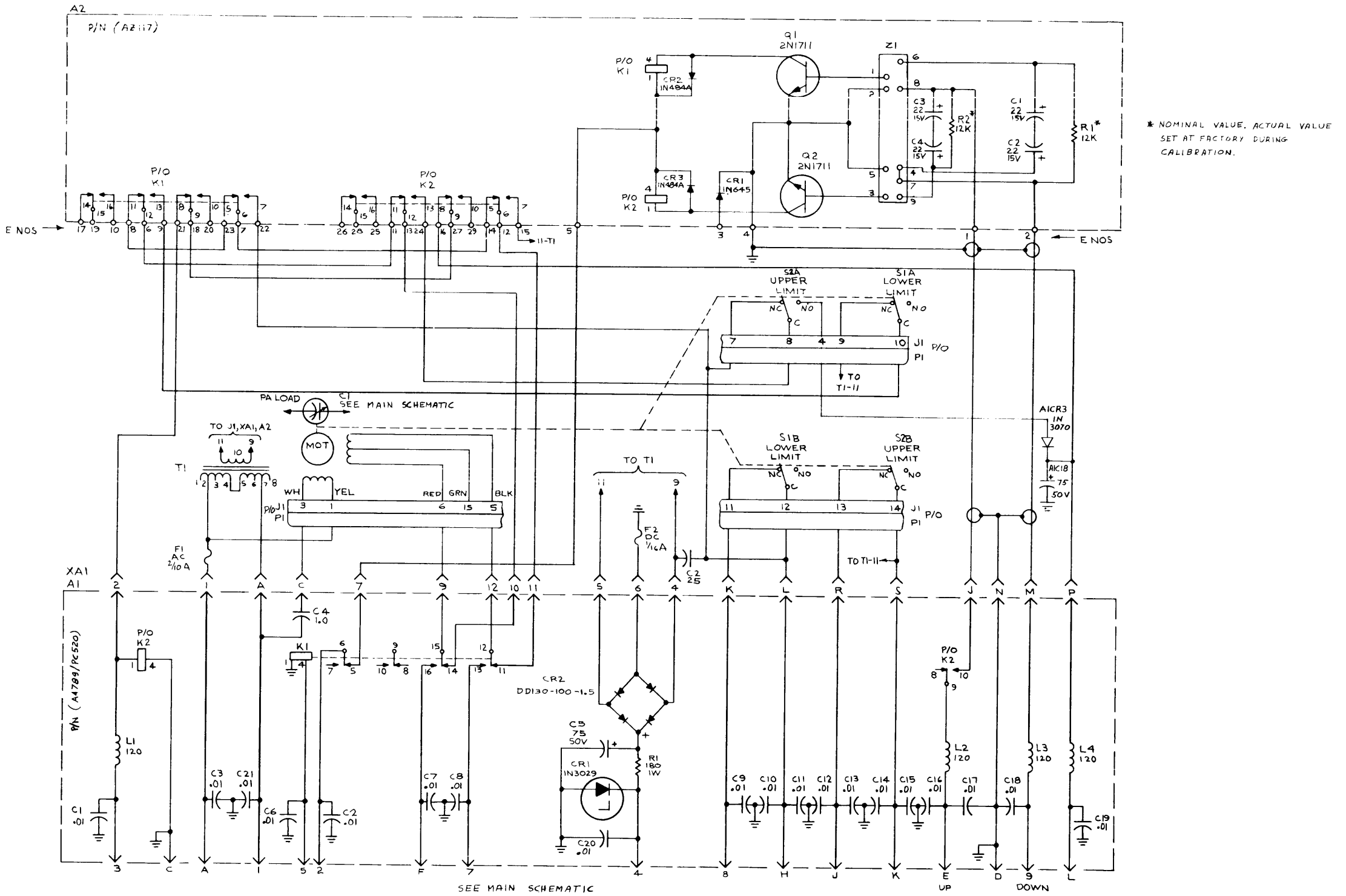
LAST SYMBOLS
A1
A1C22
A1E19
A1K1
A1L14
A1XK1
B1
C1
J1
P1
S2
W1



NOTE
PARTIAL REFERENCE DESIGNATIONS SHOWN, FOR COMPLETE DESIGNATION PREFIX WITH SUBASSEMBLY DESIGNATION.
ALL CAPACITORS ARE IN μF.
ALL INDUCTORS ARE IN μH.

Figure 7-5. Schematic Diagram, PALA-10K Tune Capacitor Assembly


PC 519
A 4788
C22
L11
L12
L13
L14
L7
L5
XK1
L8
C11
L1
C4
C14
L10
C13
C15
L2
C5
C16
L9
C12
C17
L6
C9
C10
L4
C7
C8
L3
C6
C3
C1
C2
C18
C19
C20
C21



* NOMINAL VALUE. ACTUAL VALUE SET AT FACTORY DURING CALIBRATION.

	LAST SYMBOLS	
A1	A2	C2
A1C22	A2C4	F2
A1CR3	A2CR3	J1
A1K2	A2E29	P1
A1L4	A2K2	S2
A1R1	A2Q2	T1
A1XK2	A2R2	W1
	A2XK2	XA1
	A2Z1	XF2

NOTE

PARTIAL DESIGNATION SHOWN. PREFIX WITH SUBASSEMBLY DESIGNATION

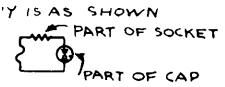
—— UNLESS OTHERWISE SPECIFIED ——

ALL RESISTANCE VALUES ARE IN OHMS, ¼ WATT

ALL CAPACITOR ARE IN µf

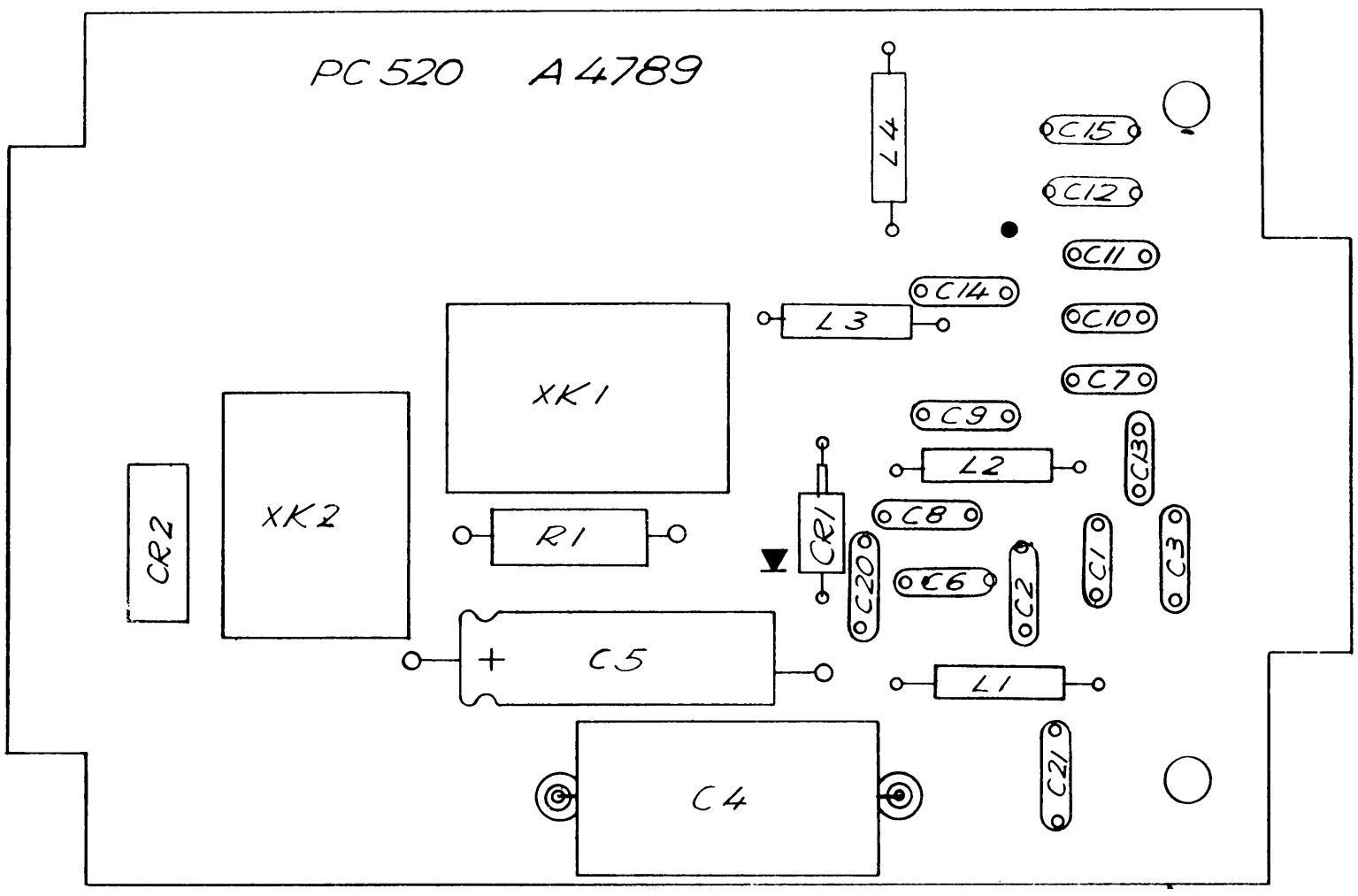
ALL INDUCTORS ARE IN µH

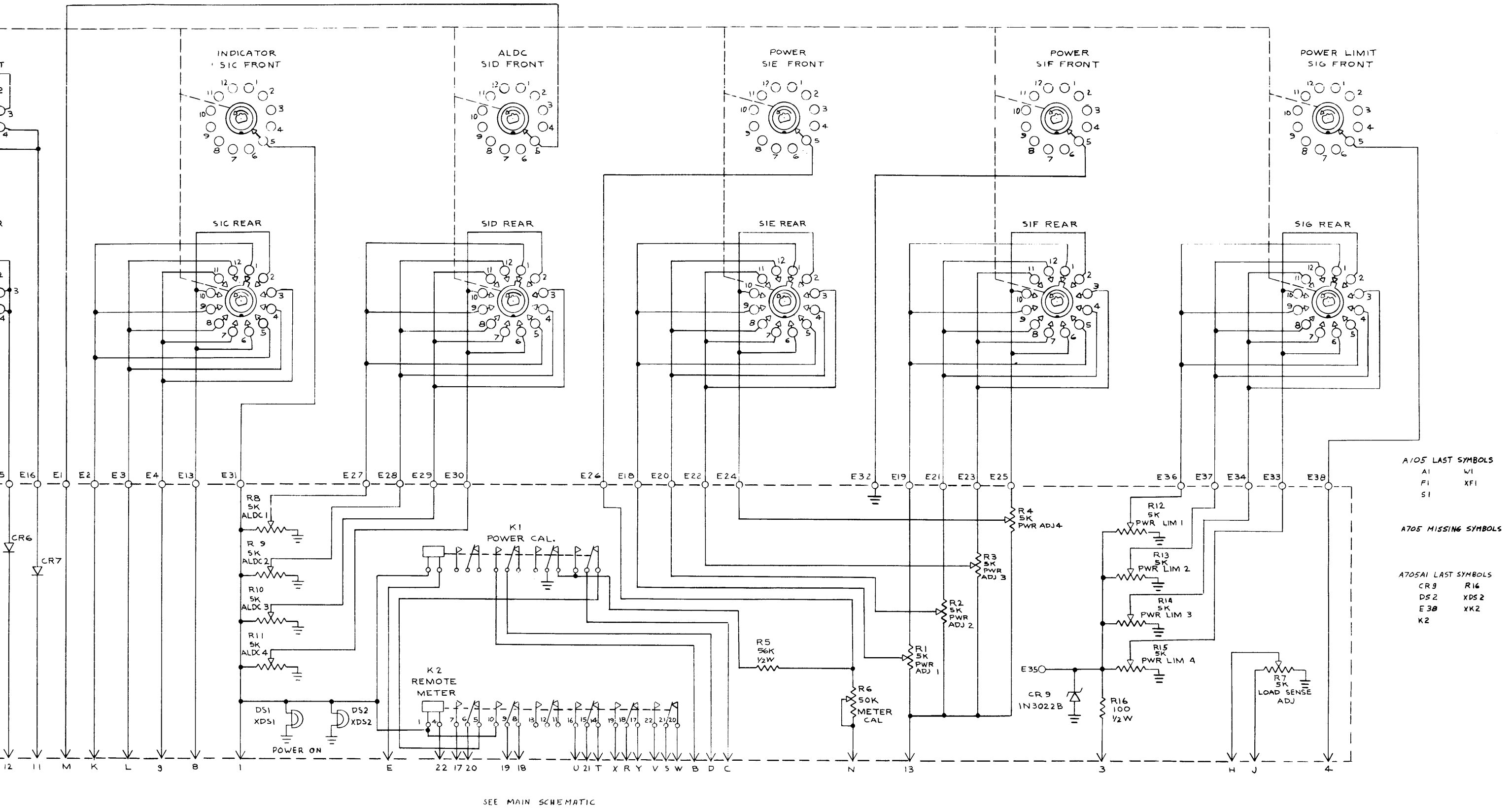
FUSE ASS'Y IS AS SHOWN



CK1628

Figure 7-6. Schematic Diagram, PALA-10K Load Capacitor Assembly

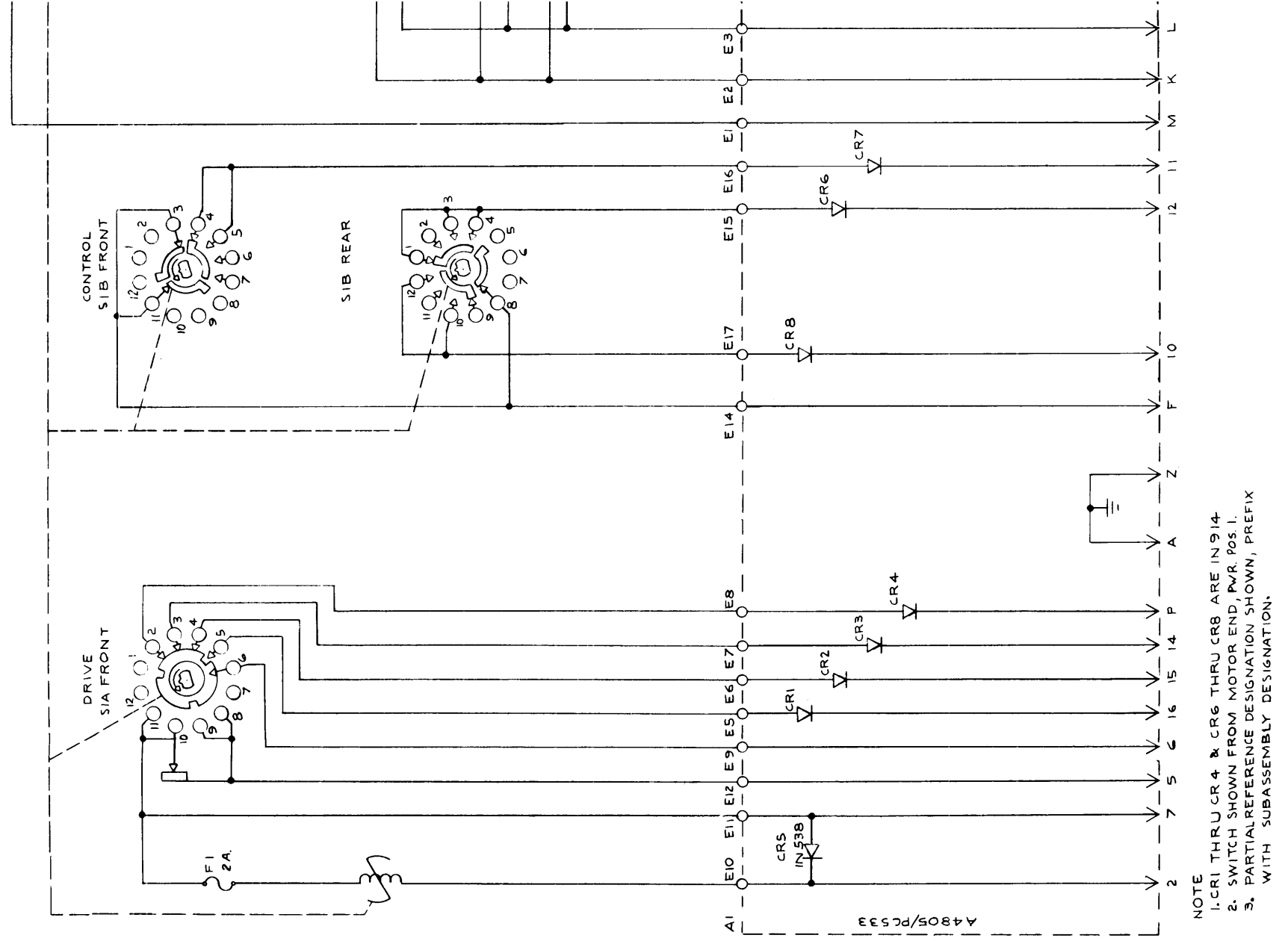

PC 520 A 4789
L4
C15
C12
C11
C14
L3
C10
C7
XK1
C9
L2
C130
XK2
CR2
R1
CR1
C8
C20
C6
C2
C1
C3
+
C5
L1
C21
C4

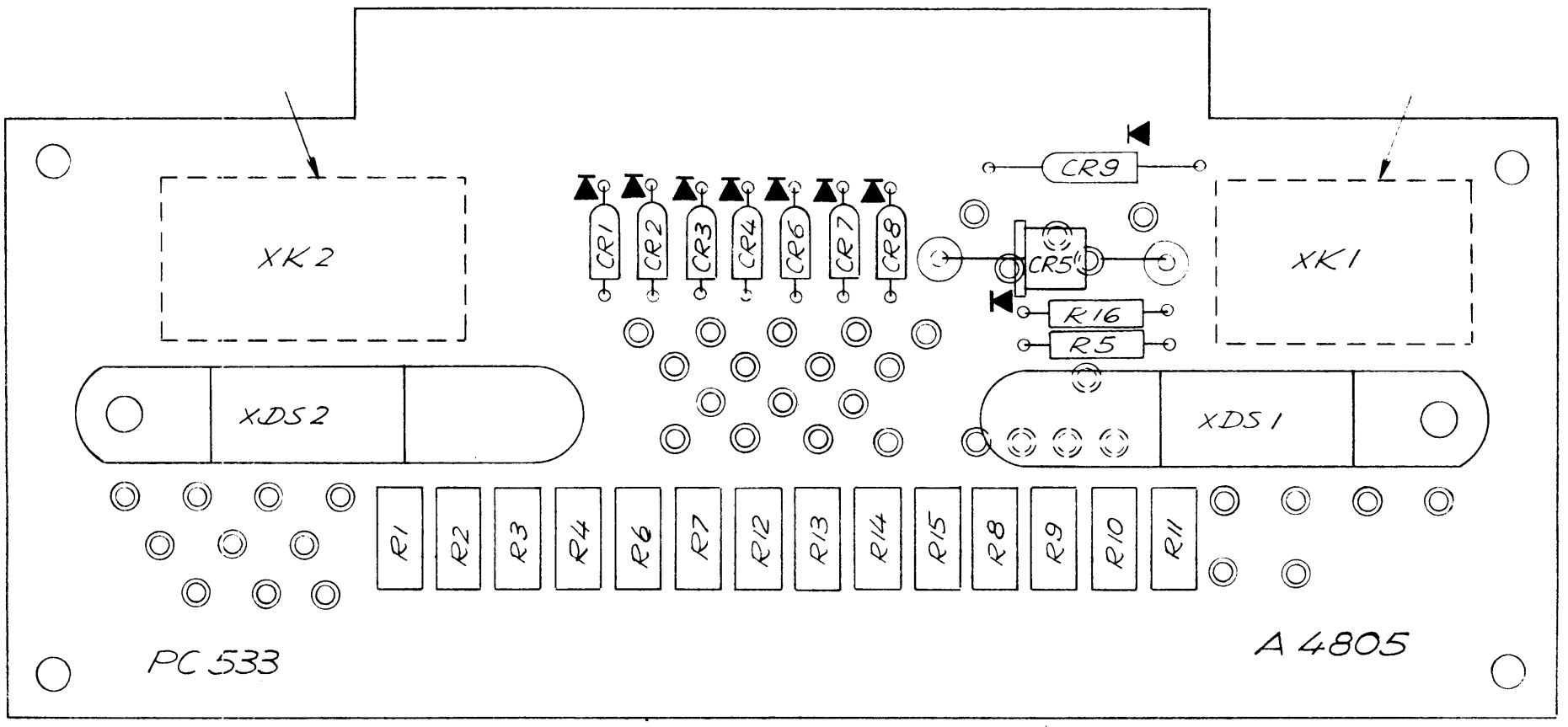


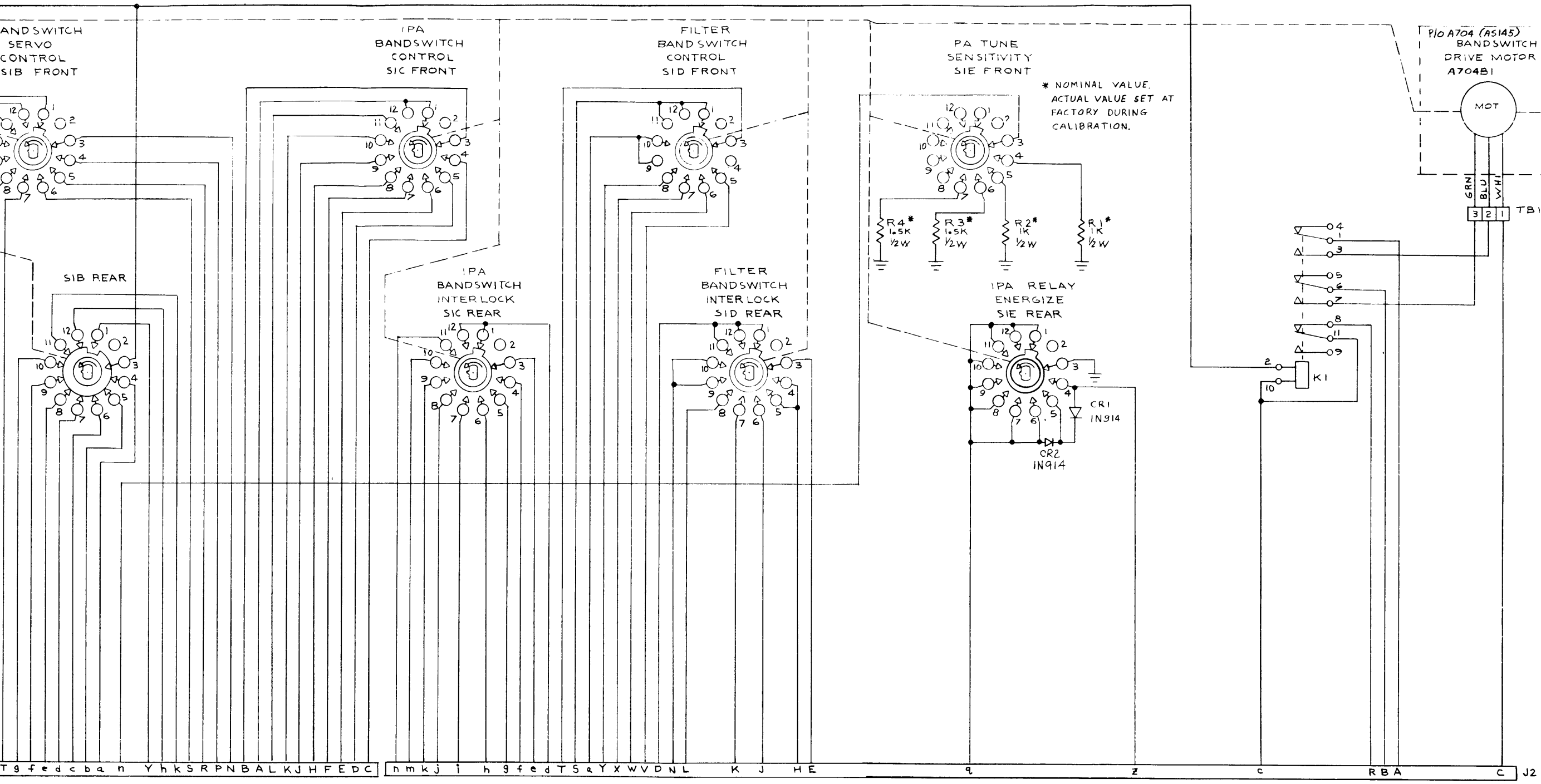
SEE MAIN SCHEMATIC

CK1645

Figure 7-7. Schematic Diagram, PALA-10K Remote Power Assembly


CONTROL S1B FRONT
S1B REAR
DRIVE S1A FRONT
F1 2A.
E1
E2
E3
E5
E6
E7
E8
E9
E10
E11
E12
E14
E15
E16
E17
CR1
CR2
CR3
CR4
CR5 IN538
CR6
CR7
CR8
A
K
L
M
P
Z
F
2
5
6
7
10
11
12
14
15
16
A4805/PC533
NOTE
1. CR1 THRU CR4 & CR6 THRU CR8 ARE IN914
2. SWITCH SHOWN FROM MOTOR END, PWR. POS. 1.
3. PARTIAL REFERENCE DESIGNATION SHOWN, PREFIX WITH SUBASSEMBLY DESIGNATION.


XK2
XK1
XDS2
XDS1
CR1
CR2
CR3
CR4
CR5
CR6
CR7
CR8
CR9
R16
R5
R1
R2
R3
R4
R6
R7
R12
R13
R14
R15
R8
R9
R10
R11
PC 533
A 4805



SEE MAIN SCHEMATIC

OWN
N 1

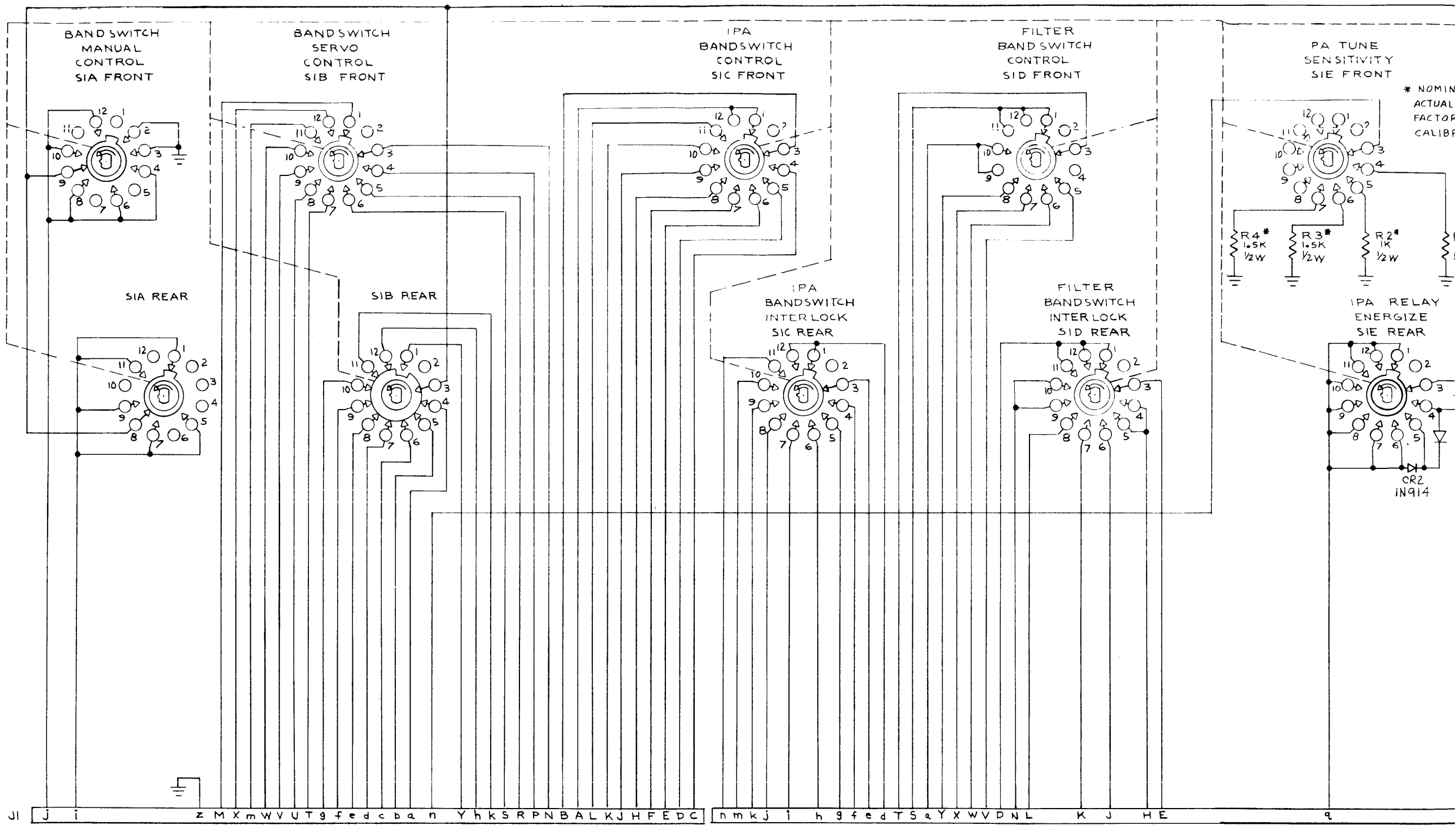
PARTIAL REFERENCE DESIGNATIONS ARE SHOWN PREFIX PART DESIGNATIONS WITH SUBASSEMBLY DESIGNATION. A704A1

LAST SYMBOLS	MISSING SYMBOLS
CR2	
J2	
K1	
R4	
S1	
TB1	
W1	
XK1	

CK1646

Figure 7-8. Schematic Diagram, PALA-10K PA Bandswitch Control

011691035



A7045 1	
POS	BAND- MHz
1	2 — 2.3
12	2.3 - 2.6
11	2.6 - 3
10	3 — 4
9	4 — 5
8	5 — 8
7	8 — 12
6	12 — 16
5	16 — 24
4	24 — 30

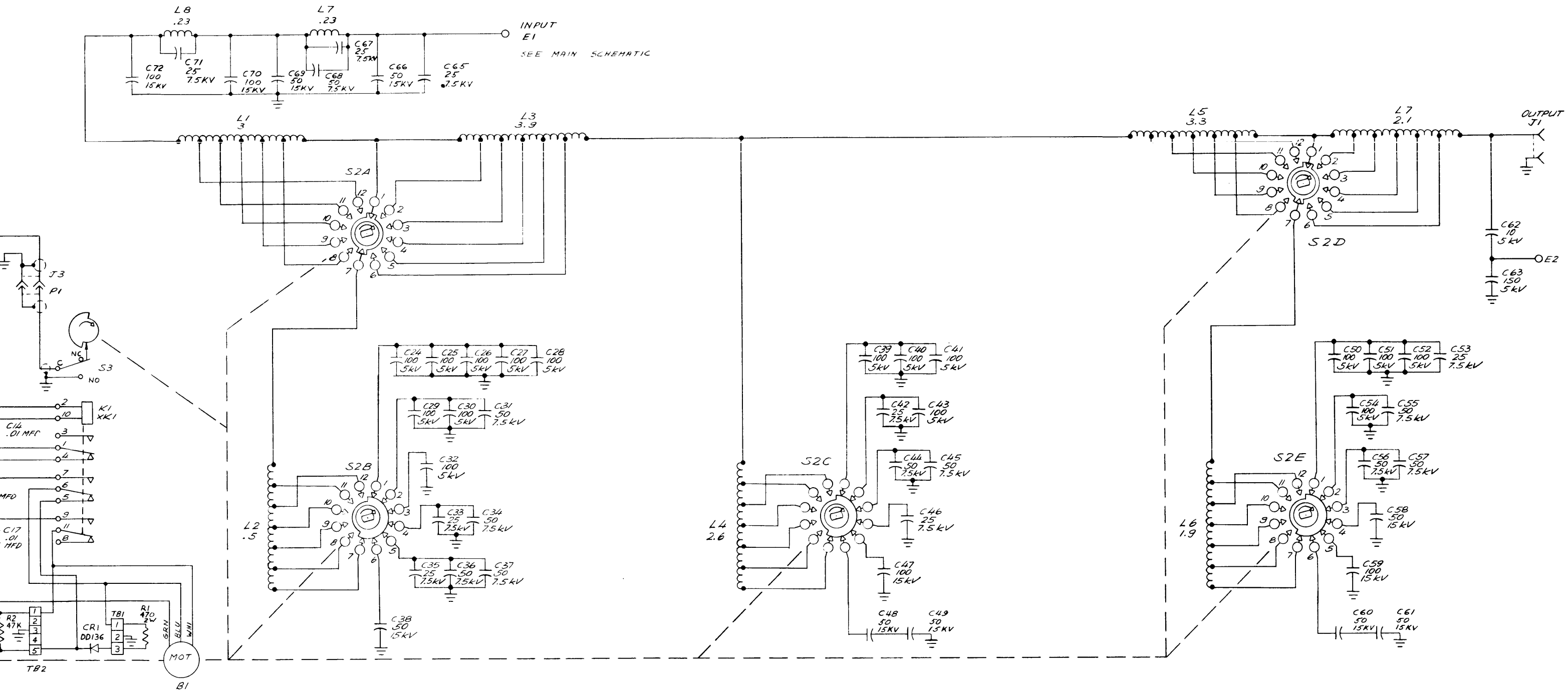
SWITCH SHOWN IN POSITION 1

SEE MAIN SCHEMATIC

PARTIAL REFERENCE DESIGNATIONS ARE SHOWN PREFIX PART DESIGNATIONS WITH SUBASSEMBLY DESIGNATION. A704A1

LAST SYMBOLS	MISSING SYMBOLS
CR2	
J2	
K1	
R4	
S1	
TB1	
W1	
XK1	

011691035



NOTE:
MOTOR IS GEARED TO DRIVE S1 60° & S2 30° PER POSITION

S1	S2	
POS.	BAND MHz	POS.
1	2 - 3	1
3	3 - 5	2
5	5 - 8	3
7	8 - 12	4
9	12 - 16	5
11	16 - 30	6

S2 SYMBOLS

POS.	WAFER A	WAFER B	WAFER C	WAFER D	WAFER E
1	E3	E15	E27	E39	E51
2	E4	E16	E28	E40	E52
3	E5	E17	E29	E41	E53
4	E6	E18	E30	E42	E54
5	E7	E19	E31	E43	E55
6	E8	E20	E32	E44	E56
7	E9	E21	E33	E45	E57
8	E10	E22	E34	E46	E58
9	E11	E23	E35	E47	E59
10	E12	E24	E36	E48	E60
11	E13	E25	E37	E49	E61
12	E14	E26	E38	E50	E62

LAST SYMBOLS

B1	P1
C72	R2
CR1	S3
DS6	TB2
E62	XDS6
J3	XK1
K1	
L8	

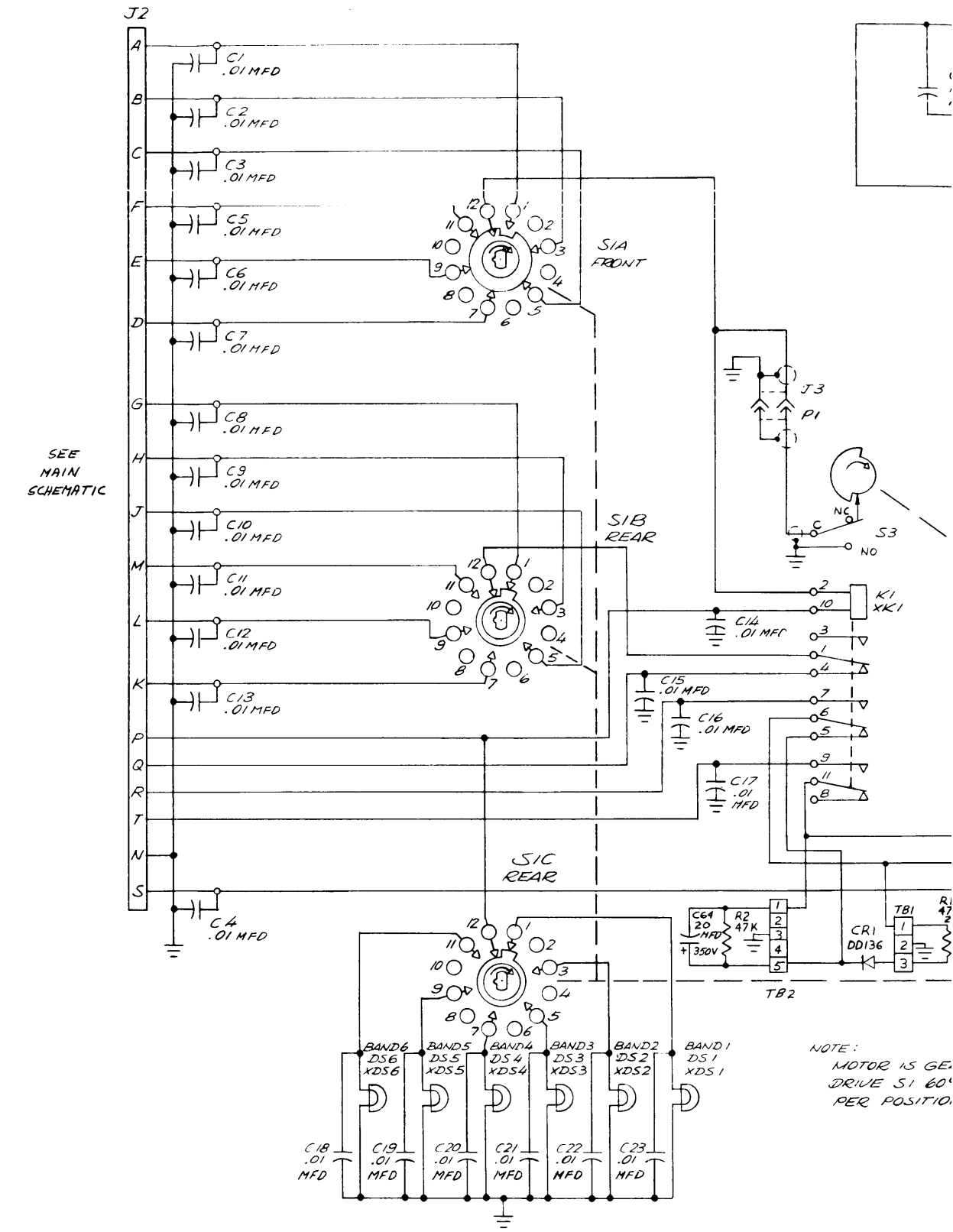
MISSING SYMBOLS

UNLESS OTHERWISE SPECIFIED:
1. ALL CAPACITANCES IN PICOFARADS
2. ALL INDUCTANCES IN MICROHENRIES

PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
3. SWITCH SHOWN IN BAND 1.

CK1674

Figure 7-9. Schematic Diagram, PALA-10K Harmonic Filter


J2
A
B
C
F
E
D
G
H
J
M
L
K
P
Q
R
T
N
S
C1 .01 MFD
C2 .01 MFD
C3 .01 MFD
C5 .01 MFD
C6 .01 MFD
C7 .01 MFD
C8 .01 MFD
C9 .01 MFD
C10 .01 MFD
C11 .01 MFD
C12 .01 MFD
C13 .01 MFD
C4 .01 MFD
SEE MAIN SCHEMATIC
S1A FRONT
S1B REAR
S1C REAR
J3 P1
S3
NC
NO
K1 XK1
C14 .01 MFD
C15 .01 MFD
C16 .01 MFD
C17 .01 MFD
C64 20 MFD 350V
R2 47K
CR1 DD136
TB1
TB2
BAND6 DS6 XDS6
BAND5 DS5 XDS5
BAND4 DS4 XDS4
BAND3 DS3 XDS3
BAND2 DS2 XDS2
BAND1 DS1 XDS1
C18 .01 MFD
C19 .01 MFD
C20 .01 MFD
C21 .01 MFD
C22 .01 MFD
C23 .01 MFD
NOTE:
MOTOR IS GE
DRIVE S1 60
PER POSITIO