PRELIMINARY

TECHNICAL MANUAL

for

GENERAL PURPOSE TRANSMITTER

MODEL HFTM-1KA

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, ONTARIO

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MAMARONECK, N.Y. **OTTAWA, CANADA**

NOTICE

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

Warranty

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

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

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

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

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

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

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

*Electron tubes also include semi-conductor devices.

PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT

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

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

PROCEDURE FOR ORDERING REPLACEMENT PARTS

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

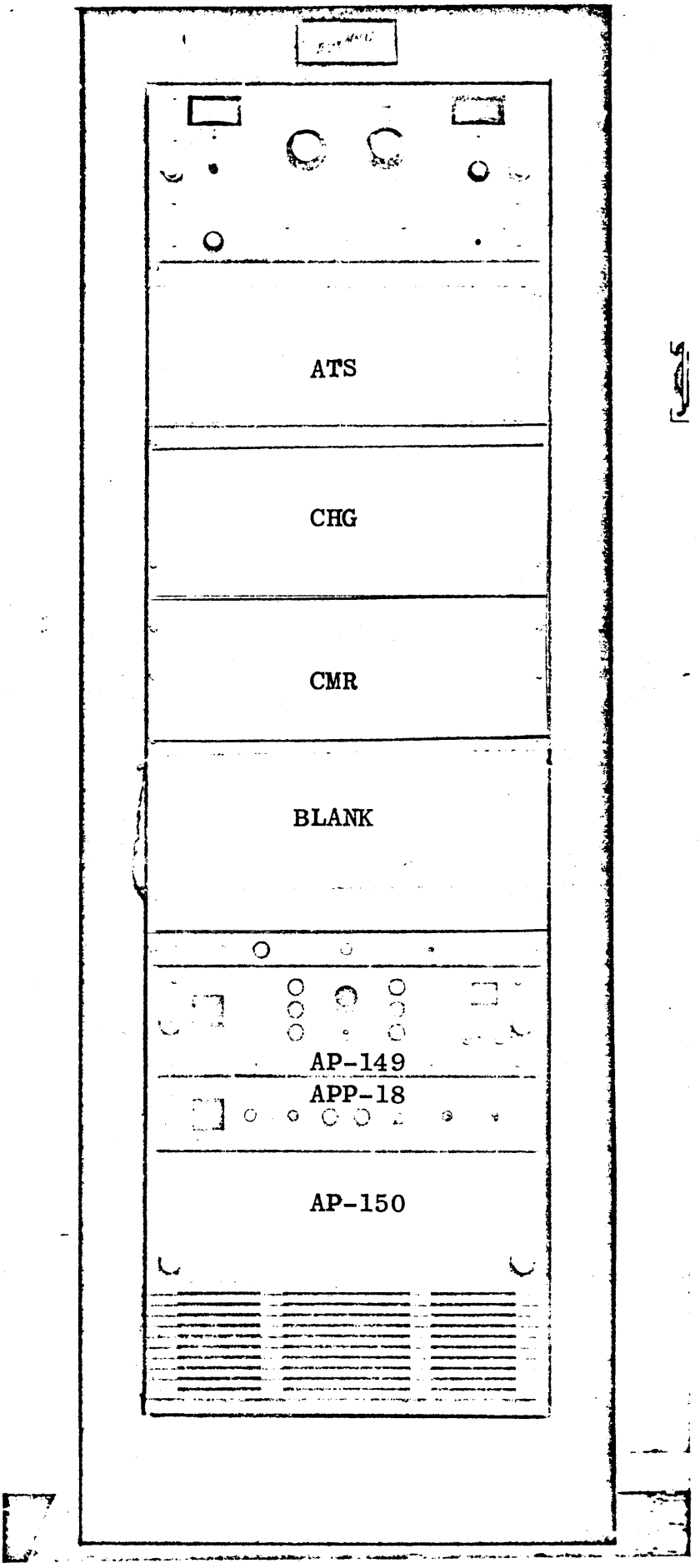
1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT

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

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

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



HFTM-1KA

SECTION 1

GENERAL INFORMATION

1-1 PURPOSE OF EQUIPMENT

The TMC Model TLAM-1K is a High Frequency Radio Transmitter, which delivers 1 Kilowatt (PEP) and average throughout the range of 1.5 MHz to 30 MHz. It is a modern Transmitter for Professional Communication.

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	
RF Amplifier TLAM-1K	
Blank Panel (or filter optional)	
Exciter MMX (can be located in remote exciter rack) (option)	
AP149 L.V. and Bias Supply Drawer	
APP18 Power Distribution Panel	
AP150 HV Power Supply	

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 and external input connections are made through the access hole in the rear of the Transmitter. Transmitter RF power is routed through a directional coupler mounted in the RF Amplifier drawer, and from there leaving the RF Amplifier and ending on a connector mounted in the opening located on the top of the Transmitter. (~~Connector~~ or bottom if desired)

The Transmitter frame houses a two-stage broad band linear amplifier, and power-amplifier, and associated power supplies and control circuits.

Provisions are made to install a switchable or fixed harmonic filter.

Heavy power supply components are mounted on a chassis bolted to the base of the Transmitter.

(1) RF Amplifier TLAM-1K - The RF Amplifier is slide-mounted (top Unit) and serves as amplifier between the exciter and RF output of the Transmitter. The RF Amplifier contains two fully broadbanded RF amplifiers and a final amplifier which provides 1000 watts output. The final tube is air-cooled by a self-contained blower inside the unit. Bandswitching is accomplished manually.

(2) Exciter MMX - The exciter provides the drive for the RF Amplifier from 1.5 - 30 MHz. It also selects the upper and lower sidebands. (OPTION)

(3) Low Voltage and Bias Supply Drawer, AP149 - The Low Voltage and Bias Supply Drawer is slide mounted directly below the exciter MMX. It contains the Filament and Bias Transformer, the Low Voltage Transformer and associated circuitry, the H.V. On-Off Switch, the Filament Timer, the Overload, Bias, and PTT Relay. The Plate and Screen Circuit Breaker, the H.V. Alarm, the H.V. Alarm On-Off Switch and the H.V. ON Indicator Light are located on the Front Panel.

(4) Power-Distribution Panel, APP18 - The Power Distribution Panel is mounted directly below the Low-Voltage and Bias Supply Draw. It contains the Main Power Circuit Breaker, the AC Input Board (A202), the Exciter On-Off Switch, the Power ON, H.V. ON and Interlocks indicater Lights. Mounted on the Front Panel is also a Test Key.

(5) H.V. Power Supply - The Main Power Supply is mounted on the bottom of the Transmitter frame. The Power Supply contains High Voltage Transformer and associated circuitry to provide Plate and Screen Voltages to the RF Amplifiers within the Transmitter.

1-4 TECHNICAL SPECIFICATIONS

FREQUENCY RANGE:	1.5 to 30 MHz standard.
OPERATING MODES:	AM, SSB, ISB, CW, FSK and FAX.

POWER OUTPUT:	1000 watts average and PEP power; continuous key down service.
OUTPUT IMPEDANCE:	50 ohms, unbalanced
STABILITY AND FREQUENCY CONTROL:	Within 1 part in 10^8
TUNING:	Manual
RF INPUT:	Provides full PEP output with approx. 100 mW drive.
SPURIOUS SIGNALS:	At least 50 db down from full PEP output.
HARMONIC SUPPRESSION:	Better than -45db for 2nd harmonic with reference to full PEP output. All other harmonics at least -55db.
HARMONIC FILTERS:	Available fixed for all frequencies above 30 mc or bandswitched for lower frequencies. Resultant harmonics conform to latest requirements.

2. Built-in microphone preamplifier for low level dynamic microphone. Front panel selection and jack.

MIKE INPUT:	-55dbv into 47K ohms. Front panel jack.
AUDIO CONTROL:	Two front panel "fader" controls allow ease in injecting either the microphone or the line inputs into the upper or lower sideband.
METERING:	Meters with special illuminated overload protection.
NOISE:	Power supply ripple 55db down from full PEP output. Other 70db 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:	Overload protection and alarm. Controlled and adjustable ALDC. Safety interlocks at all high voltage points.

PRIMARY POWER:	115/ 230 Volts AC, Single Phase, 50/60 Hz.
POWER REQUIREMENTS:	Maximum 2.75 KW. All solid state power supply.
SIZE:	25-1/4" w. x 30" d. x 72" h.
INSTALLED WEIGHT:	Approximately 600 pounds.
SIZE OF LARGEST SHIPPING CONTAINER:	78-1/2" x 23-1/8" x 31-1/2".
COMPONENTS AND CONSTRUCTION:	Manufactured in accordance with JAN/MIL wherever practicable.

SECTION 2

INSTALLATION

2-1. EQUIPMENT INSPECTION

HFLM-K

The HFTM-1KJ 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 2-2 (typical equipment packaging). The box number and contents are stenciled on the outside of each box.

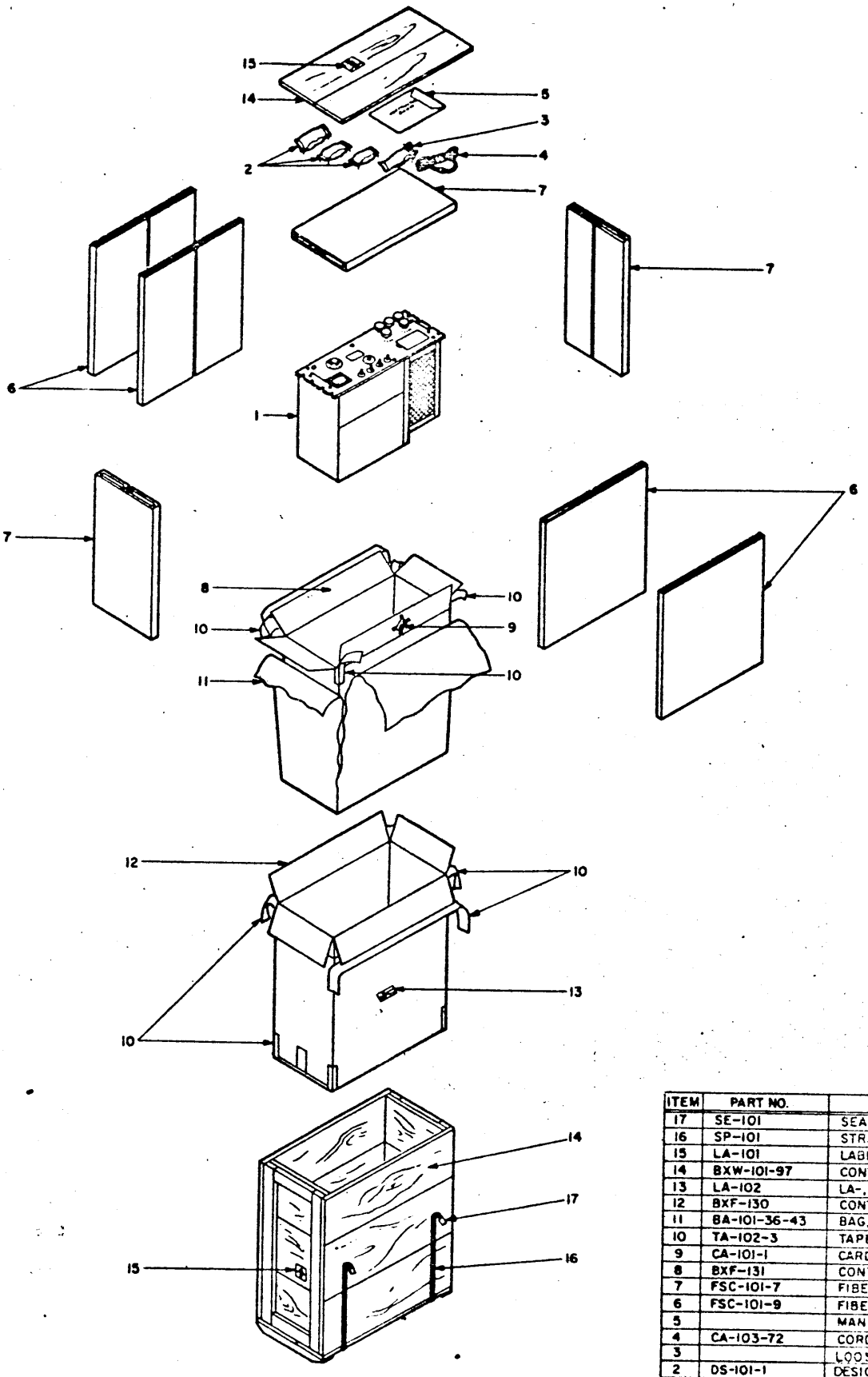
2-3. PRIMARY POWER REQUIREMENTS

The Transmitter requires a single phase source of 230 VAC 50/60 Hz. The maximum power requirement is 2700 watts.

2-4. INSTALLATION PROCEDURES

A minimum number of assemblies, subassemblies, components and hardware have been disassembled from the equipment and separately packaged, thus reducing the possibility of equipment damage in transit. The method of disassembly and separate packaging also permits realistic equipment handling.

Carefully read the instructions for each step. After reading, consider the complexity involved in performing the step; it may be advisable to simulate a complex step before actually doing it. Make sure each step has been completed before proceeding to the next.



ITEM	PART NO.	DESCRIPTION
17	SE-101	SEALS, STRAPPING
16	SP-101	STRAPPING, STEEL
15	LA-101	LABEL, FRAGILE
14	BXW-101-97	CONTAINER, SHIPPING
13	LA-102	LA-, METHOD II
12	BXF-130	CONTAINER, OUTER
11	BA-101-36-43	BAG, BARRIER
10	TA-102-3	TAPE, PRESSURE SENSITIVE
9	CA-101-1	CARD, HUMIDITY INDICATOR
8	BXF-131	CONTAINER
7	FSC-101-7	FIBERBOARD SHEET, CREASED
6	FSC-101-9	FIBERBOARD SHEET, CREASED
5		MANUALS, INSTRUCTION
4	CA-103-72	CORD, LINE
3		LOOSE ITEMS
2	DS-101-1	DESICCANT, 16 UNIT
1		MODULAR UNIT

Figure 2-2 Modular Units, Preparation for Shipment Typical

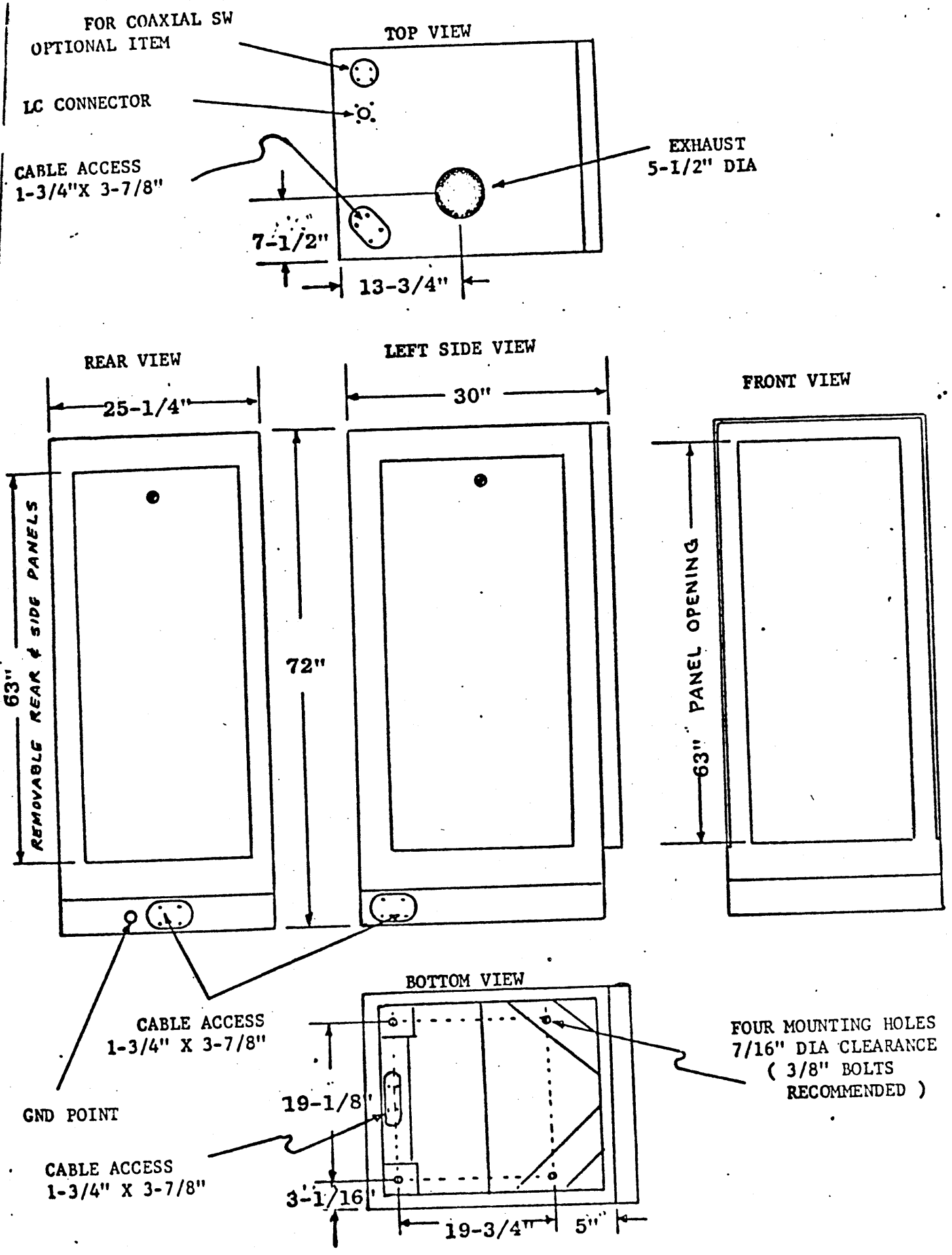


Figure 2-3. Outline Dimensional Diagram

Cables, wires, and other miscellaneous items that are disconnected during equipment disassembly are tagged and taped to the equipment. The information on a given tag indicates the designated terminal on a component to which the tagged item must be connected. Make sure all cables and wires have been connected as designated on tags and that all packing material, tags and tape have been removed before sealing-up the frame or section of the frame with a front panel drawer, or piece of exterior trim.

Temporary removal and replacement of panels, and component mounting assemblies are specifically called out in the procedure in order to install various items. Do not anticipate instructions; to insure correct installation, perform each step exactly as it is written.

NOTE

Refer to the supplied equipment packing list to locate the appropriate crates containing the components, hardware, and units outlined in the following steps.

STEP 1

a. Unpack assorted loose items from crate.

b. Check each item contained agains equipment supplied list.

STEP 2

a. Unpack rack from crate.

b. Position rack upright, remove side and rear panels; this can be accomplished by turning the screw-type fastener located at the top-center of each panel.

c. Remove all packing material from rack and position rack in accordance with pre-installation planning. (See figures 2-1 and 2-2.)

STEP 3 (Primary AC Input Connections)

a. Route AC input cable into base assembly through access hole and secure to appropriate terminals on line filterboard. AC INPUT board located in the APP 18 (Power Distribution Panel)

b. Position and secure filterboard cover to filterboard. top cover on APP 18

STEP 4 (Power Amplifier Tube Installation)

a. Carefully lift tube from crate and position it on top of the

PA tube socket (located in RF Amplifier).

b. Position tube pins to line up with PA tube socket contacts.

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

d. Press tube firmly down into socket. A slight amount of effort may be required to seat tube. Caution should be observed in seating the tube so as not to damage contacts in socket. Check tube seating; it must be all the way down and centered in tube socket.

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

STEP 5

a. Remove rest of the tubes and relays from loose items crate.

b. Install tubes and relays in their respective units; tighten relay and tube clamps where necessary.

STEP 6

a. Installation of Modular Units
(Refer to figure 2-1 for information regarding cabinet location of all modular units.)

The following modular units are slide mounted:

RF Amplifier

Exciter MMX when used in Transmitter.

L.V. & Bias Supply Drawer

To install any slide-mounted unit in its compartment, refer to figure 2-4 and proceed as follows:

1. Untape or unstrap cable assemblies and all other components secured to the rack frame for shipment.

2. Pull center section of associated track out until it locks in an extended position.

3. Position slide mechanisms of modular unit in tracks, and ease modular unit forward into rack until release buttons engage hole in track.

4. Start at the bottom and proceed up to prevent the rack from tipping over.

5. Make the necessary cable and electrical connections to the modular unit.

6. Depress release buttons and slide modular unit completely into compartment.

7. Secure front panel of modular unit to the rack with screws.

STEP 7

a. Using grounding hardware supplied, secure grounding strap to rear of unit in the threaded hole in rear center of base.

b. Make all necessary connections to transmitter junction box.

c. Affix rear panel and right and left panels to Transmitter and secure in place.

d. Connect 50 ohm antenna, or dummy load, to Transmitter antenna connector.

2-5. HIGH VOLTAGE TRANSFORMER CHECK (Primary AC Input)

Once the Transmitter has been installed and all modular units connected, it is recommended that the AC input to the High Voltage Transformer be checked. To do this, carefully read the instructions below and proceed with extreme caution.

NOTE

With Main Power Switch set at OFF, the single phase AC input should measure not less than 1 megohm. The positive side of the high voltage circuit should measure not less than 100 K ohms.

WARNING

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

a. Insure Primary AC BREAKER is OFF and TAGGED.

b. Make sure PA BIAS and 2ND AMP BIAS (1ST and 2ND AMP Bias) potentiometer is turned fomax bias extremely clockwise (to apply maximum Bias to tubes). (PA Bias and 2ND AMP Bias potentiometer extremely clockwise)

c. Place an AC Voltmeter across the single phase input on the HIGH VOLTAGE TRANSFORMER (300 volt AC range).

d. Clear personnel from transmitter and apply AC to Transmitter (remote circuit breaker switch).

e. Place MAIN POWER breaker and PLATE-SCREEN breaker to the "ON" position.

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

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

h. NOTE AC INPUT VOLTAGE.

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.

j. If measured voltage does not correspond with the AC input terminal to the high voltage transformer, relocate the AC input leads to the corresponding terminals on the HV Transformer.

2-6. EXTERNAL TRANSMITTER CONTROL CONNECTION (refer to Fig. 2-5 and CK 1787)

Audio intelligence, key lines enter the Transmitter through TB203 and TB204 in rear of APP-18. Remote exciter input enters the Transmitter through J202 PA RF. If remote RF patch panel is used, the patch panel is connected to J206 RF "IN" and J202 PA RF.

NOTE

Without patch panel, J202 and J206 has to be jumped out.

If remote ALDC patch panel is used, the patch panel is connected to J203 PA ALDC and J207 ALDC out.

NOTE

Without patch panel, J203 and J207 has to be jumped out.

Monitor output is available on J208.

SECTION 3

OPERATOR'S SECTION

3-1 SCOPE

This section gives detailed operating instructions for the ~~HFLM-1K~~ HFLM-1K transmitter.

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 connection is 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 re-inserted 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 occupying 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.

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.

3-4 MANUAL TUNING PROCEDURE (Carrier Only)

STEP	OPERATION	NORMAL INDICATIONS
1	a) Place remote breaker to the ON position. b) Place MAIN POWER breaker (19) to the ON position.	Blower must operate and MAIN POWER ON (21) must illuminate. Interlock lamp (22) will light (provided that all safety interlocks are closed and the time delay cycle has been completed).
2	Place SCREEN and PLATE breaker (13) to ON position.	No indications at this time.
3	Place ALARM ON/OFF Switch (14) to OFF position.	Should alarm switch have been in the ON position with high voltage removed, the audiable high voltage alarm would be on.
4	Set RF Gain (8) to minimum.	No indications.

NOTE

The Transmitter is equipped with protective overload circuitry. Additionally, the PA plate current meter has an overload indicator which can be adjusted to trip at a value set by the operators. Should an overload occur, the meter face will illuminate.

5	Adjust the OVERLOAD INDICATOR (adjustment screw located directly below the meter face of the PA plate current meter) for 600 MA (10).	PA plate current meter will read 600 MA.
6	Select BANDSWITCH position by rotating the "BANDSWITCH KNOB (15) to the desired frequency.	Window on front panel indicates proper band.
7	Adjust PA Bias (18) and 2ND AMP Bias (17) for maximum Bias.	PA and 2ND AMP Bias adjusted to MAX CLOCKWISE position.
8	Press HIGH VOLTAGE Switch (16) to light indicator (it may be necessary to press HIGH VOLTAGE Switch twice.	HIGH VOLTAGE Switch and HIGH VOLTAGE Indicator lamp (23) will illuminate RED when High Voltage is ON.
9	Adjust PA Bias control to 150 MA on PLATE METER (1).	PLATE Meter indicates quiescent current of 150 MA.
10	Push PLATE METER SELECT SWITCH (2) up and adjust 2nd AMP for indications of 200 MA on PLATE METER (1).	PLATE Meter indicates quiescent current of 200 MA when PLATE METER SELECT SWITCH is pushed up.

STEP	OPERATION	NORMAL INDICATIONS
11	Select desired frequency on MMX unmodulated at an RF level of approximately 100 Milliwatts (for operation refer to MMX Technical Manual).	No indications

NOTE

During initial tuning of transmitter, RF output power will be increased or decreased with the RF GAIN CONTROL (8).

12	Adjust RF GAIN CONTROL (8) clockwise slightly to cause an increase in PA Plate Current indication on Plate Meter (1) not to exceed 250 MA.	PLATE Meter (1) will indicate increase in meter reading not to exceed 250 MA.
13	Adjust TUNE CONTROL (6) for a noticeable decrease in Plate current (reasonant dip).	The rotation of the TUNE control will cause the KILLOWATT OUTPUT METER (3) to indicate some output.
14	Operate LOAD CONTROL (7) (Loads or Unloads the transmitter) as necessary to produce a maximum reading on OUTPUT METER (3).	OUTPUT METER will indicate a further increase in power output during loading process.
15	Adjust TUNE control again to make sure the transmitter is right on resonance (steps 13 and 14 may have to be repeated again).	OUTPUT METER will indicate highest value when transmitter is properly tuned into antenna or load.
16	Rotate RF GAIN CONTROL (8) clockwise to increase output power to desired level.	OUTPUT METER indicates desired output level.
17	Rotate RF GAIN CONTROL (8) counter clockwise and press HIGH VOLTAGE Switch (16) to OFF.	OUTPUT METER will indicate zero and high voltage lamp will go out indicating the removal of High Voltage.

CAUTION

The aforementioned procedure outlines "CARRIER" 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

3-5 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 HFTM-1KJ output meter indicates 500W with two tones of equal amplitude applied to the transmitter, PEAK ENVELOPE POWER will be 1000W 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 1 KW PEP, 500 watts average with two tones applied.

With two tones applied, PEP is 2 XP average. If with 16 tones applied, and the system operated at 500 watts average, the transmitter must be capable of handling a peak envelope power of 2.5 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 INDICATIONS

Item No. Fig. 3-1	Panel Designation	Function
1	PLATE CURRENT METER	Indicates 1st, 2nd and PA Plate currents.
2	PLATE CURRENT METER SELECT SWITCH	When pushed "up", plate current Meter indicates 2nd Amp. When pushed "down", plate current meter indicates 1st Amp. In normal position indicates PA Amp plate current.
3	KILOWATT OUT and REFLECTED POWER METER	Indicates output power and reflected power.
4	SWR BUTTON	When pressed, output meter indicates reflected power. Otherwise, meter indicates Kilowatt out.
5	BANDSWITCH CONTROL KNOB	Operates Bandswitch from 1.5 to 30 MHz 1.5 - 2.0, 2.0 - 2.6, 2.6 - 3.0, 3 - 5, 5 - 8, 8 - 12, 12 - 16, 16 - 24, 24 - 30.
6	TUNE CONTROL	Operates tune Capacitor.
7	LOAD CONTROL	Operates load Capacitor.
8	RF GAIN CONTROL	Adjust transmitter power output.
9	ALDC ADJUSTMENT	Adjust ALDC.
	SWR OVERLOAD ADJUSTMENT	SWR and 2nd Amp Plate Current Overload.
	2ND AMP PLATE CURRENT OVERLOAD ADJUSTMENT (adjustments are located on bottom of TLAM-1K)	
10	PA PLATE CURRENT OVERLOAD ADJUSTMENT	Sets PA Plate Current limit to trip-off High Voltage.
11	BLANK PANEL (Filters Optional)	
12	MMX (if used in transmitter)	Exciter (for controls refer to MMX technical manual)
13	PLATE AND SCREEN BREAKER	In ON position, provides and protects Plate and Screen Voltage to tubes.
14	ALARM SWITCH	Turns on High Voltage Alarm

TABLE 3-1, CONTROLS AND INDICATIONS (CONT'D)

Item No. Fig. 3-1	Panel Designation	Function
15	ALARM	Audiable alarm to indicate failure of High Voltage.
16	HIGH VOLTAGE ON and RESET	When pressed to ON position, High Voltage is applied and Switch Indicator and High Voltage Indicator lights. When depressed to OFF position, High Voltage is removed and Switch Indicator goes out.
17	2ND AMP BIAS ADJUSTMENT	Adjust Bias for 2nd Amp.
18	PA BIAS ADJUSTMENT	Adjust Bias for PA Amplifier.
19	MAIN POWER BREAKER	When placed in ON position applies power to 1st, 2nd and PA amplifiers.
20	EXCITER ON-OFF SWITCH	When placed in ON position applies power to Exciter unit.
21	MAIN POWER ON INDICATOR	When lit, indicates that main power is ON.
22	INTERLOCK INDICATOR	When lit, indicates all interlocks are closed and interlock circuit is completed.
23	HIGH VOLTAGE ON INDICATOR	When lit, indicates that High Voltage is ON.
24	TEST KEY	Keys the exciter MMX (used to check out transmitter).
25	BLANK PANEL	
26	FILTER PANEL	

SECTION IV

PRINCIPLES OF OPERATION

4-1 GENERAL

The HFTM-1KJ provides manual tuning over the frequency range of 1.5-30 mHz.

The RF Amplifier contains three RF linear amplifier stages. The first two stages of amplification are broad band tuned. The final stage is a tuned Parallel L circuit, providing an output impedance of 50 ohms. All stages are air cooled.

The output is maintained 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 fig. 4-1)

Fig. 4-1 shows the path of rf input from the exciter (MMX), through the amplifier stages, the output meter circuit, and finally to the Transmitter antenna. RF drive from the exciter (MMX) (100 mw is efficient to provide 1KW output power after amplification) is routed through the "RF GAIN" pot to the first broad band linear amplifier V1, an 8233 tube. V1201, a class A amplifier, provides the necessary drive for the 2nd broad band linear amplifier V1202, a 4CX350A tube. V2 operates as a class A amplifier providing RF drive for the final stage. The final stage, V1301, is an 8576 operating as a class AB1 power amplifier, providing 1000 watts average and PEP output power.

4-3 AC POWER DISTRIBUTION (Refer to fig. 4-2)

a. GENERAL - Single-phase power is supplied to the 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.

b. DETAILED CIRCUIT ANALYSIS - The single phase from the remote breaker unit is routed to the input terminals and from there to the Main Power Breaker, CB201. Closure of the Main Power Breaker applies AC to the Blower and the HV "ON-OFF" Relay, with the blower operating the air switch contact closure providing AC input for the Filament-Bias Transformer T301 and Low Voltage Transformer T302. Should the Blower fail to operate, the air switch would cut off the AC primary input to the Filament-Bias Transformer and Low Voltage Transformer. The Filament-Bias Transformer supplies 6.3 VAC for V1201, V1202 and V1203 filament voltage and the AC input to the Bias Rectifier CR302 (controlled thru Bias relay). The Low Voltage Transformer supplies the AC input voltage for CR301, the Low Voltage rectifier.

The series interlock chain brings 24VDC up to the timer interlock, whereupon closure will route the 24VDC to the Bias ON relay. Contacts of the Bias ON relay will supply AC to the Bias Rectifier CR302.

4-4 DC POWER DISTRIBUTION (Refer to figure 4-3)

a. PLATE AND SCREEN VOLTAGES - Application of AC power to T101 Plate and Screen Voltage Transformer provides Plate and Screen Voltages for the first and second stage of the linear broad band amplifier and the Power-Amplifier. The Plate Voltage of 3500VDC is derived from a full wave bridge rectifier circuit, CR101, then filtered before application to V1301, an 8576 tube.

Full wave bridge rectifier CR102 provides 2000 VDC, the plate voltage for the second Amp. A 4CX350A tube the same full wave bridge rectifier is used for the screen voltages regulated by 200 V zener diodes (IN 2846). The junction of R108 and R111 provides 800 VDC for the PA screen. At the junction of CR104 and CR105 is 400 VDC for the screen of the second broad band amplifier (4CX350A) and 200 VDC at the junction of CR105 and CR106 for the screen voltage of the first broad band amplifier (82331). The junction of R111 and R112 provides 400 VDC for the Plate Voltage of the first broad band amplifier.

b. BIAS VOLTAGE - When the Bias Relay K302 energizes, AC voltage is applied to the bias rectifier CR302 in the L.V. and Bias power supply. The DC output of CR302 is filtered by L301 and L302 and C303 and C304 before application to the zener diode regulator. The DC return for the Bias supply is through F304 to protect the circuit against overloads. Regulated bias voltages are tapped from zeners CR304 and CR305 for application to the two bias potentiometers. The ground necessary for voltage drop across the bias potentiometers is supplied by contacts of the energized PTT relay K301. The bandswitch interlock circuit prevents 24 V 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 -240 VDC to the PA Bias adjust potentiometer. The PA Bias potentiometer is adjusted to provide approximately 150 MA of idle current on the Plate Current Meter when the Meter Select Switch is in its normal position. The junction of CR304 and CR305 provides -120 VDC to the 2nd Amp bias potentiometer before application to the 2nd IPA grid. The 2nd Amp bias potentiometer is adjusted to provide approximately 200 MA of idle current as observed on the Plate Current Meter when the Meter Select Switch is pushed up.

c. 24 VDC SUPPLY - The secondary of the L.V. Transformer T302 provides the AC input to CR301 in the Low Voltage and Bias Supply Drawer. The output of the full wave bridge rectifier CR301 is filtered by C301 and C302 and R301 before being regulated at +24 VDC by zener diode CR303. This regulated 24 VDC is used as Control Voltage for the transmitter. The DC return of the 24 VDC supply is through F305 to protect against overloads.

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

a. 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 K101, the H.V. ON/OFF relay.

b. SIMPLIFIED CIRCUIT ANALYSIS - The regulated 24 VDC interlock voltage is routed through the mechanically closed interlocks to the timer interlock. When the time delay of the TIMER has expired, the 24 VDC energizes the Bias "ON-OFF" relay. From there the 24 VDC is routed through two sets of contacts on the H.V. and Screen Overload Breaker and then to the H.V. "ON-OFF" Switch. From the H.V. "ON-OFF" Switch the 24 VDC is routed through the normally closed contacts of the overload relay to one side of the H.V. "ON-OFF" relay. The H.V. "ON-OFF" relay is energized when the H.V. "ON-OFF" Switch is depressed, providing a path thru the H.V. "ON-OFF" relay to ground.

The H.V. "ON-OFF" relay provides the primary AC input to the PLATE-SCREEN TRANSFORMER T101. When K101 energizes 24 VDC is provided for the H.V. light and the normally closed contacts open removing 24 VDC on the ALARM ON/OFF Switch, disabling the H.V. alarm when H.V. is on and ALARM Switch is in the ON position.

An indication on the Plate Current Meter that hits the red overload pointer provides a contact closure on the meter sensing circuit. The contact closure supplies a gating pulse to trigger an overload SCR, providing a path for the 24 VDC to the overload lamp on the meter, and 24 VDC to the OVLD relay causing it to unlatch and de-energize the H.V. ON-OFF relay.

A DC sample from the reflected power diode is routed thru an operational-amplifier and the SWR ADJ. potentiometer. The DC sample provides a trigger for the associated SCR, providing a path for the 24 VDC to the SWR overload lamp on the RF Amplifier frontpanel.

To restore high voltage, the H.V. "ON-OFF" switch is depressed twice. Pressed the first time, the H.V. "ON-OFF" switch provides 24 VDC to the reset side of the OVLD RELAY and closing the contacts on the relay. Pressed the second time, the H.V. "ON-OFF" switch restores the 24 VDC to the contacts necessary to energize the H.V. "ON-OFF" relay which applies plate and screen voltages to the transmitter again.

Should any of the interlocks open when H.V. is ON, the overload coil on the overload relay is diverted to a line connecting all the normally closed contacts

of the interlocks to the overload side of the overload relay. An open interlock places the transmitter in an overload condition preventing the potentially dangerous application of high voltage when the open interlock is closed.

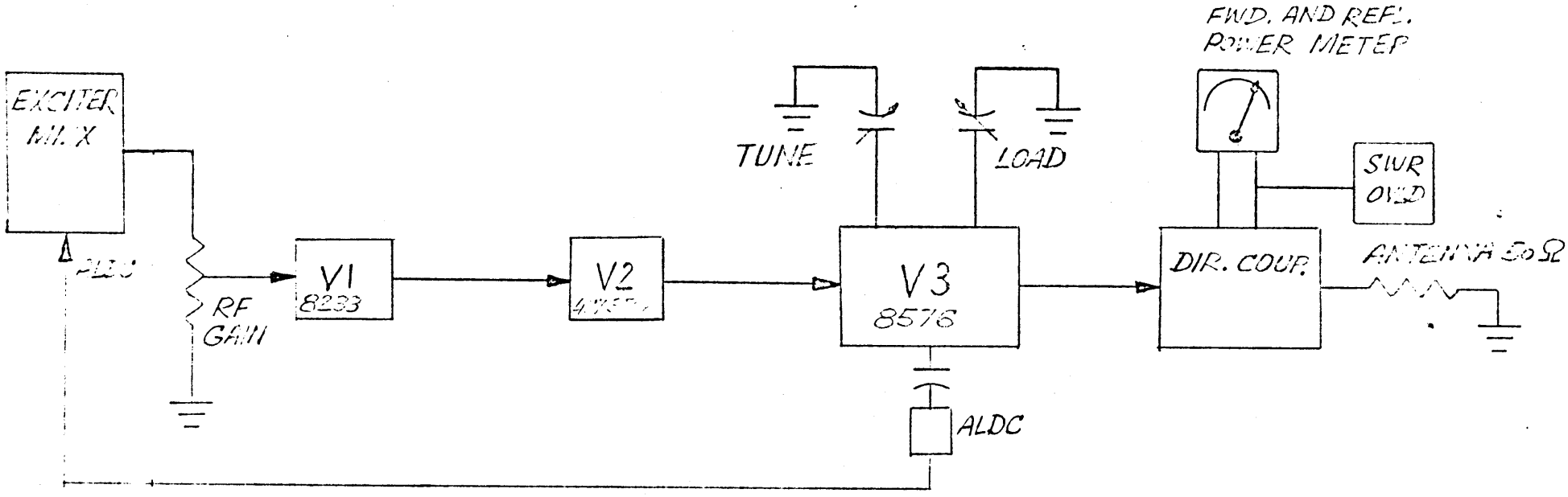
4-6 ALDC

The ALDC circuit provides a feedback voltage to the Exciter to prevent excessive rf output from the transmitter.

A filtered and regulated 24 VDC is routed through the ALDC potentiometer and applied to the ALDC Assembly. This voltage is used to back bias the ALDC rectifier. The threshold adjusted ALDC voltage leaves the ALDC Assembly and is routed to the ALDC input of the Exciter. The ALDC threshold adjustment is normally adjusted on carrier so that increase in rf will not exceed the Power Level reading.

4-7 BANDSWITCH CONTROL

Bandswitching of the transmitter is performed manually with the Bandswitch knob. With the Bandswitch at proper position, 24 VDC is routed thru the Bandswitch Interlock Switch S2 (H.V. Control) to one side of the PTT relay. It can be seen that unless the interlock switch is closed with the bandswitch on the proper contact at rest, the PTT relay will not be energized, resulting in the transmitter being placed close to cut-off.



BLOCK DIAGRAM HFTU 1KJ FIG. 4-1

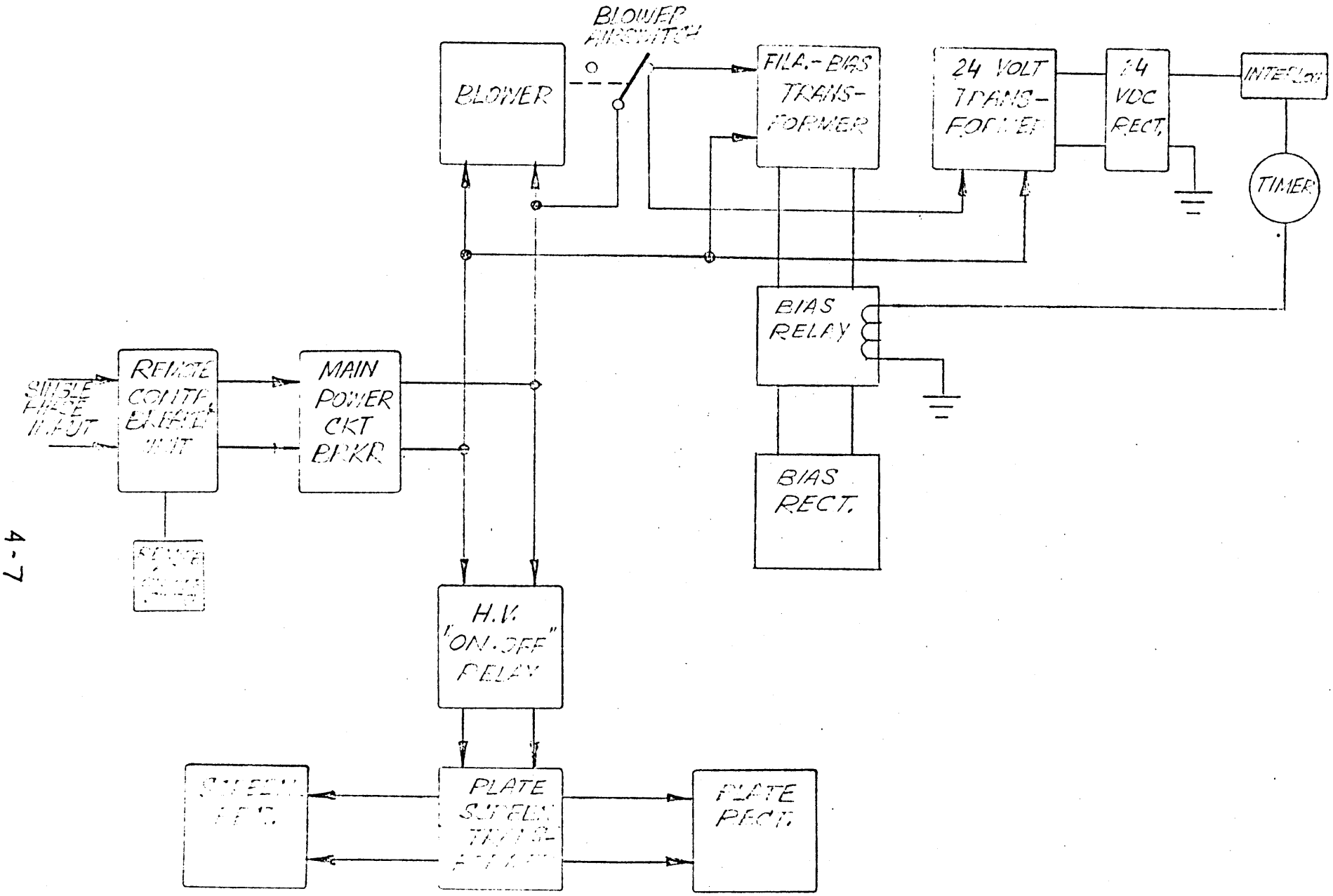
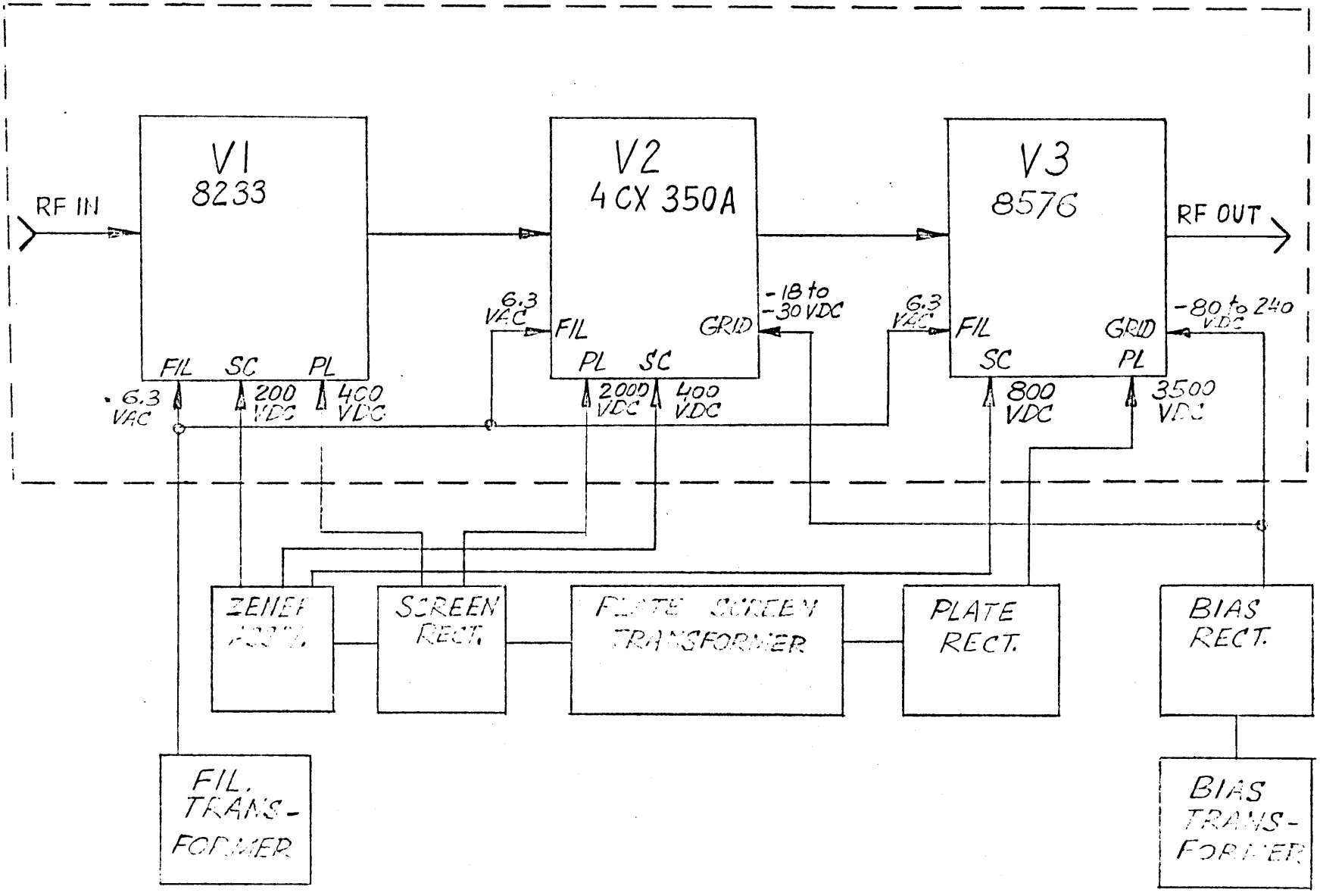


FIGURE 4-2 HEATH IG-1 SIMPLIFIED DIAGRAM AC POWER DISTRIBUTION



HFTM IKJ OPERATING POTENTIAL FIGURE 4-3

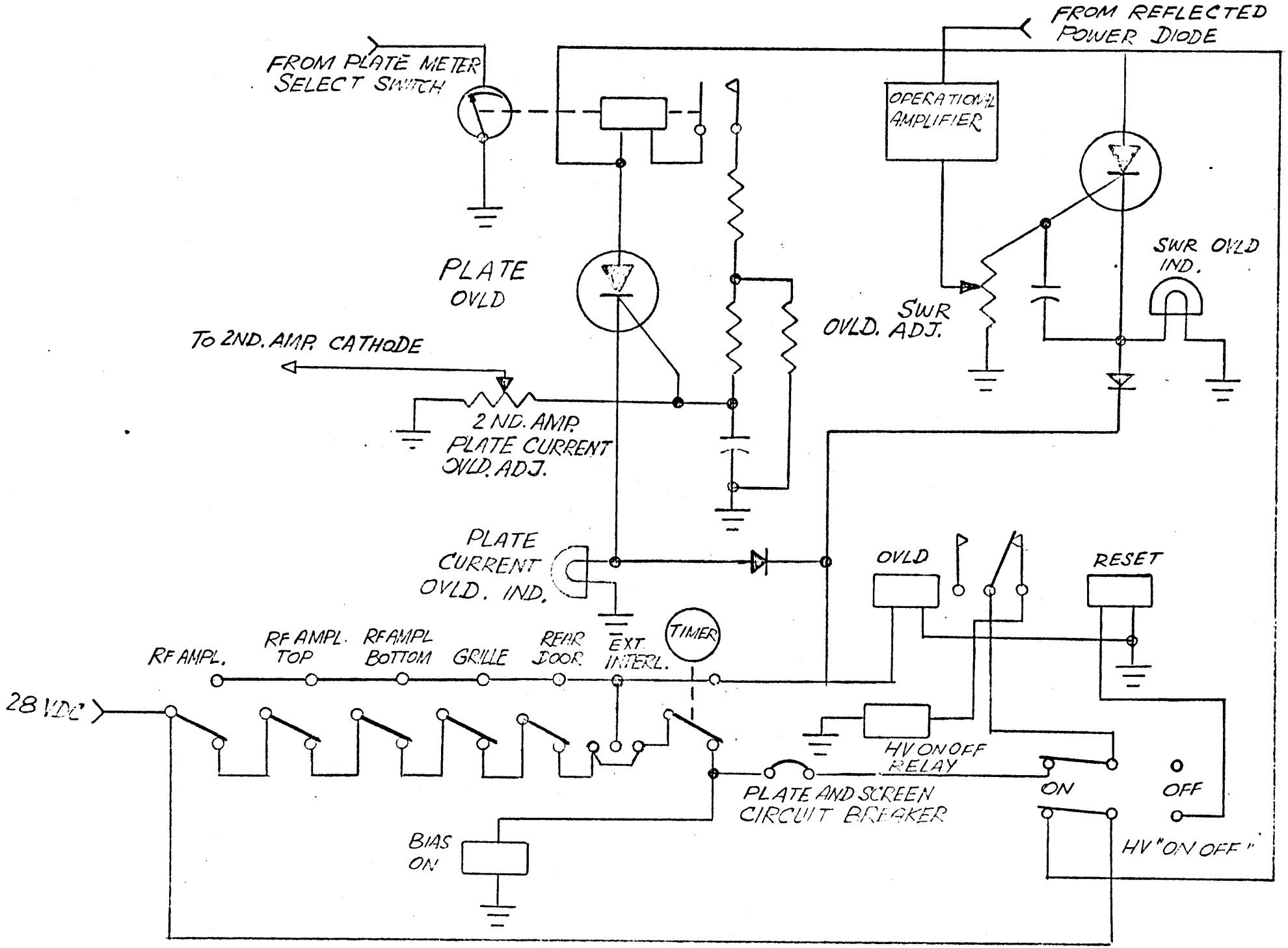


FIG. 4-4 SIMPLIFIED INTERLOCK AND HV OVERLOAD CIRCUITS

SECTION 5

MAINTENANCE

5-1 INTRODUCTION

The HFTM-1KJ 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 replacements of parts.

1. System block diagram (Section 4, Figure 4-1)
2. Fuse location drawing (Figure 5-1)
3. Fuse functions (Table 5-2)
4. System overload and Bias setting procedure
5. 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 (Paragraph 3-4)

b. Operators 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 is as follows:

a. OBSERVATIONS - Observe the operation of transmitter and determine whether the indications are normal or abnormal (refer to operators section).

b. FUSE CHECKS - Should a malfunction occur, a visual check of fuses on the system must be performed. (All fuses are indicating type; refer to Figure 5-1 for fuse location).

c. VOLTAGE CHECKS - At this time, voltage checks are not necessary until localization of the malfunction.

d. LOCALIZATION OF MALFUNCTION - Perform the operational check-out procedure outlined in Paragraph 3-4. 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 will give you a logical sequential order for localizing malfunctions.

e. FIELD MAINTENANCE - Procedures presented on the following pages will give instructions for qualified personnel to maintain, align and/or troubleshoot the HFTM-1KJ 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 precautions 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.
3. Attach test meter to point of test required, re-applying 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, and remove test meter.

TABLE 5-1 OPERATORS TROUBLESHOOTING CHART

No.	Malfunction	Probable Cause of Malfunction
1	Blower will not operate.	Replace defective Blower Fuse.
2	PA Plate current excessive. BBL Plate current excessive.	Replace defective Bias Fuse.
3	Interlock Indicator will not light.	Replace defective DC Fuse.
4	No Bias or 24 VDC Voltage present.	Replace defective Control Fuse.
5	High Voltage Indicator will not light when High Voltage Switch is pressed.	Replace defective Low-Voltage Fuse.

TABLE 5-2 FUSE FUNCTIONS

	Fuse	Function
1	Blower Fuse	Protective fuse for blower lights to indicate fuse defective.
2	Filament Fuse	Protective fuse for Filament and Bias transformer lights to indicate fuse defective.
3	L.V. Fuse	Protective fuse for primary AC input to L.V. transformer lights to indicate fuse defective.
4	Exciter Fuse	Protective fuse for Exciter AC input lights to indicate fuse defective.
5	Exciter Fuse	Protective fuse for Exciter AC input lights to indicate fuse defective.
6	Bias Fuse	Protective fuse for DC return of Bias supply lights to indicate fuse defective.
7	24 VDC Fuse	Protective fuse for DC return of 24 VDC supply lights to indicate fuse defective.
8	Control Fuse	Protective fuse for Low-Volt and Filament and Bias transformer lights to indicate fuse defective.
9	MMX Line Fuse	Protective fuse for MMX lights to indicate fuse defective.
10	MMX Line Fuse	Protective fuse for MMX lights to indicate fuse defective.

5-6 ALDC ADJUSTMENT PROCEDURE

a. 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. 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.

1. Tune and load transmitter to any carrier frequency between 1.5 MHz and 30 MHz.
2. Adjust RF Gain control for a PA Output indication of 700 Watts.
3. Adjust ALDC threshold pot (located on the bottom of the TLAM-1K) until the power output indication commences to decrease.
4. Continue to adjust the ALDC threshold pot for a PA Output indication of 500 Watts.
5. Increase RF Gain (to check ALDC capture) PA Output should remain constant.
6. Reduce RF Drive to minimum and turn off H.V. This completes ALDC adjustment procedure.

The ALDC Adjustment 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 the ALDC potentiometer may be necessary to hold the PA Output constant.

5-7 TRANSMITTER BIAS ADJUSTMENT PROCEDURE

The bias adjustments outlined below are to obtain quiescent plate current values.

NOTE

Static plate current values indicated in the procedure are normal operating values, how-

ever, should abnormal conditions exist, refer to Figure 5-2 (simplified Bias Control Diagram).

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

Step 2 Place Main Power Breaker to ON position.

Step 3 Place Plate-Screen Breaker to ON.

Step 4 Press High Voltage Button to light indicator and apply High Voltage.

Step 5 Observe Plate Current Meter and adjust PA Bias control for indication of 150 MA, as read on meter.

Step 6 Put plate current meter select switch in the 2nd AMP position (up), note plate meter indication, and adjust (Plate current meter select switch held in position) BBL Bias control for an indication of 200 MA as read on the plate meter.

Step 7 Press High Voltage button to OFF and replace Bias Control Cover.

TABLE 5-3, BIAS SUPPLY VOLTAGE

PTT RELAY - CLOSED

Point of Test	Voltage	Reference Designation
A	230 VAC	T303
B	230 VAC	T303
C	-260 VDC	L301
D	-240 VDC	R310
E	-120 VDC	R307
F	- 80 VDC	8576
G	- 22 VDC	4CX350A
H	24 VDC	K301

PTT RELAY - OPEN

Point of Test	Voltage	Reference Designation
A	230 VAC	T301
B	230 VAC	T301

TABLE 5-3, BIAS SUPPLY VOLTAGE (CONT'D)

PTT RELAY - OPEN (CONT'D)

Point of Test	Voltage	Reference Designation
C	-260 VDC	L301
D	-240 VDC	R310
E	-120	R307
F	-240 VDC	8576
G	-120 VDC	4CX350A
H	0 VDC	K301

5-8 OVERLOAD CIRCUIT TEST

a. PURPOSE - The Overload Circuitry functions to protect the transmitter against possible excessive current and VSWR overloads. The simplicity of overload adjustments and indications of overloaded conditions affords ease of overload recognition. To set the PA Plate overload, perform the following:

1. Energize transmitter (Main Power Breaker on, Plate-Screen Breaker on).
2. High Voltage Switch on.
3. Apply RF (11 MHz) to transmitter.
4. Tune transmitter for rated output.
5. Reduce RF drive to minimum.

NOTE

When overload occurs, High Voltage Switch must be pressed twice to re-apply High Voltage. Press to reset Overload and press to apply High Voltage.

5-9 PA PLATE OVERLOAD ADJUSTMENT

Step 1 Adjust Overload indicator (adjustment screw located directly below meter face) for 300 MA as indicated on Plate Current Meter.

Step 2 Increase drive until Plate Current Meter indicates 300 MA. Observe the following:

a. When meter indicator reaches the value of overload indicator setting, the High Voltage will trip off.

b. Plate Current meterface will illuminate, indicating overload in Plate Current.

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

Step 3 Reduce RF drive to minimum and press High Voltage button to reset High Voltage. (HV Switch may have to be pressed twice.)

Step 4 To check further operation of plate overload, increase RF drive again, noting that High Voltage tripped as in Step 2, set overload indicator for indication of 800 MA.

5-10 2ND AMP. PLATE OVERLOAD ADJUSTMENT

Step 1 Repeat paragraph 5-8 and proceed to Step 2.

Step 2 Push "PLATE METER SELECT SWITCH" up and observe 2ND AMP. PLATE CURRENT.

Step 3 Increase drive until 2ND AMP. PLATE CURRENT indicates 300 ma.

Step 4 Adjust 2ND AMP. PLATE CURRENT OVERLOAD POTENTIOMETER until High Voltage trips off (located on bottom of TLAM-1K).

a. Plate current meter will illuminate indicating overload in 2ND AMP PLATE CURRENT.

b. High Voltage will trip OFF, High Voltage indicator will go out.

c. Plate Current Meter will indicate zero.

Step 5 Reduce RF drive to minimum and press High Voltage button to reset High Voltage (High Voltage Switch may have to be pressed twice).

Step 6 To check further operation of 2ND AMP Plate Overload, increase RF drive again, noting that High Voltage tripped as in Step 4.

5-11 SWR OVERLOAD ADJUSTMENT

Step 1 Repeat paragraph 5-8 and proceed to Step 2.

NOTE

In order to create high SWR, the antenna has to be disconnected from the transmitter. A 50 ohm dummy load with a cap. in series could also be used.

Step 2 Remove antenna from transmitter.

Step 3 Press High Voltage button to apply High Voltage.

Step 4 Push SWR button and increase drive until a reading of 110 Watts (corresponding with a VSWR of 2:1) is observed on the reflected power scale.

Step 5 Adjust SWR potentiometer until High Voltage trips OFF (located on bottom of TLAM-1K).

a. Reflected power indicator inside the KILOWATT OUT - SWR Meter will illuminate.

b. High Voltage will trip OFF, High Voltage indicator will go out.

c. Plate current meter will indicate zero.

d. To further check operation of SWR overload, reduce RF drive, press H.V. button to ON and increase RF drive again until overload trips High Voltage OFF.

e. Connect antenna to transmitter. The transmitter is now protected against SWR greater than 2:1.

NOTE

For SWR settings other than 2:1, refer to Figure 5-3.

5-12 TROUBLESHOOTING TRANSMITTER OVERLOAD CIRCUITRY

The overload is designed to remove High Voltage in the event of excessive current conditions. Paragraphs 5-8 thru 5-11 provide information for setting and checking overloads. However, if the overload circuitry does not function in accordance with Paragraphs 5-8 thru 5-11, troubleshoot the circuitry in the following manner.

a. Place Main Power Breaker and Screen Breaker to ON position.

b. Press High Voltage button to ON. Adjust Overload pointer counter clockwise, to make contact with meter pointer, overload lamp should light.

NOTE

If overload lamp on associated meter board does not light, temporarily place a jumper across switch controls on meter board (extreme caution must be taken, due to the fact that High Voltage is present at that time).

(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 24 V on the associated board inputs. The Voltage that lights the overload lamp also enegizes the overload relay.

c. Observe overload relay K303. When the overload lamp lights on the meter board, the overload relay K303 should energize to an overload condition. If the relay does not energize, check for the presence of 24 V (refer to Assembly Drawing for parts of location.)

d. When overload relay K303 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 High Voltage button. Observe overload relay K303. It should latch into rest position and overload lamp should go out.

High Voltage Control Voltage Chart (refer to Figure 5-4)

Test Equipment SIMPSON 260 MULTIMETER or Equivalent

A. Test Conditions

1. Main Power Breaker ON
2. Screens Breaker ON
3. Interlock circuit complete

	Point of Test	Measured Values
A	across the rectifier	28 VAC
B	to ground	24 VDC
C	to ground	24 VDC
D		ground always
E	to ground	24 VDC
F	to ground	24 VDC
G		0 Volts
H		ground always
J	to ground	24 VDC
K		ground always

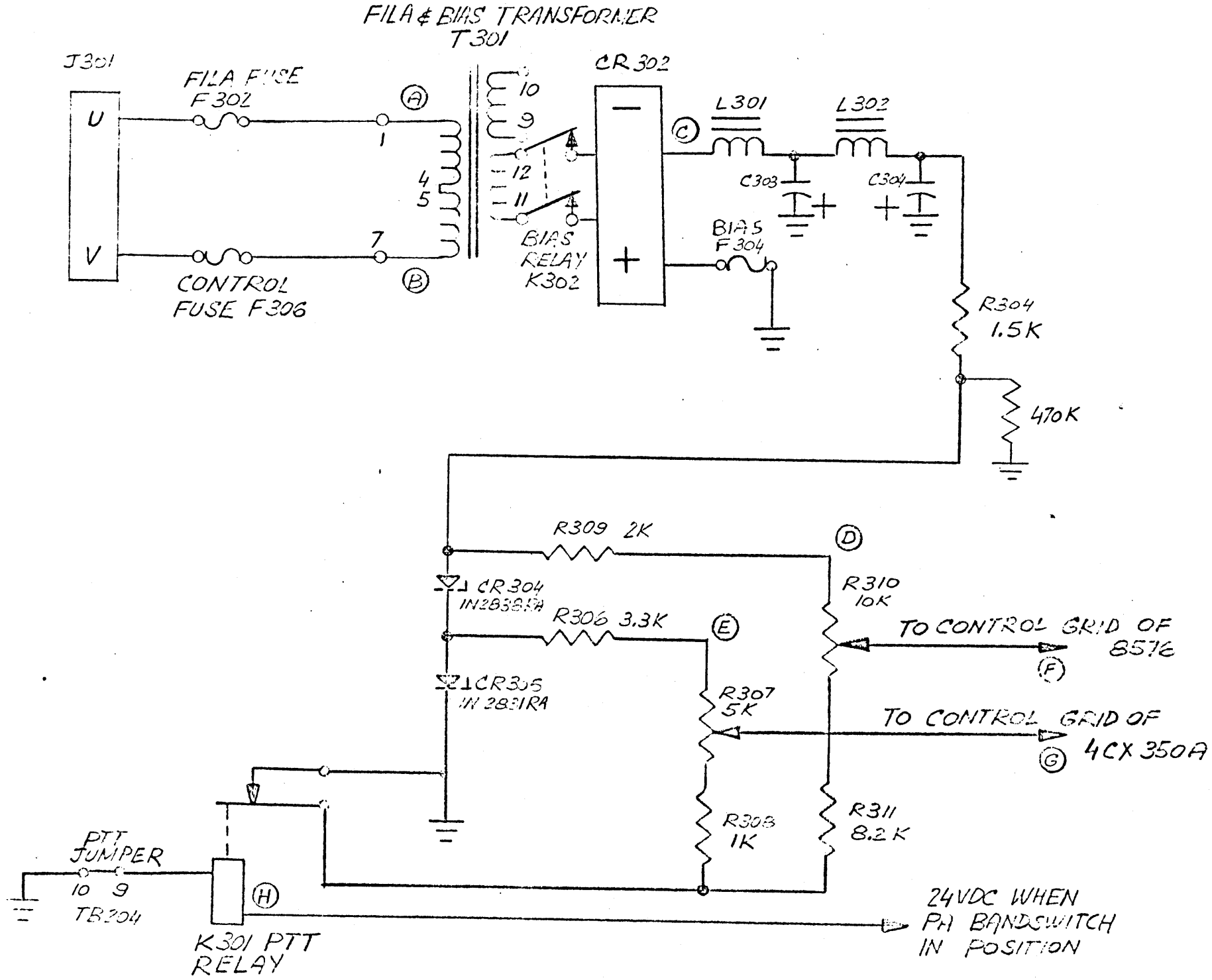
B. Test Conditions

1. Main Power Breaker ON
2. Screens Breaker ON
3. Interlock circuit complete
4. High Voltage button pressed (make sure High Voltage indicator light is on)

	Point of Test	Measured Values
A	across the rectifier	28 VAC
B	to ground	24 VDC
C	to ground	24 VDC
D		ground always
E	to ground	24 VDC
F	to ground	24 VDC
G		24 VDC
H		ground always
J		0 Volts
K		ground always

OBJECT

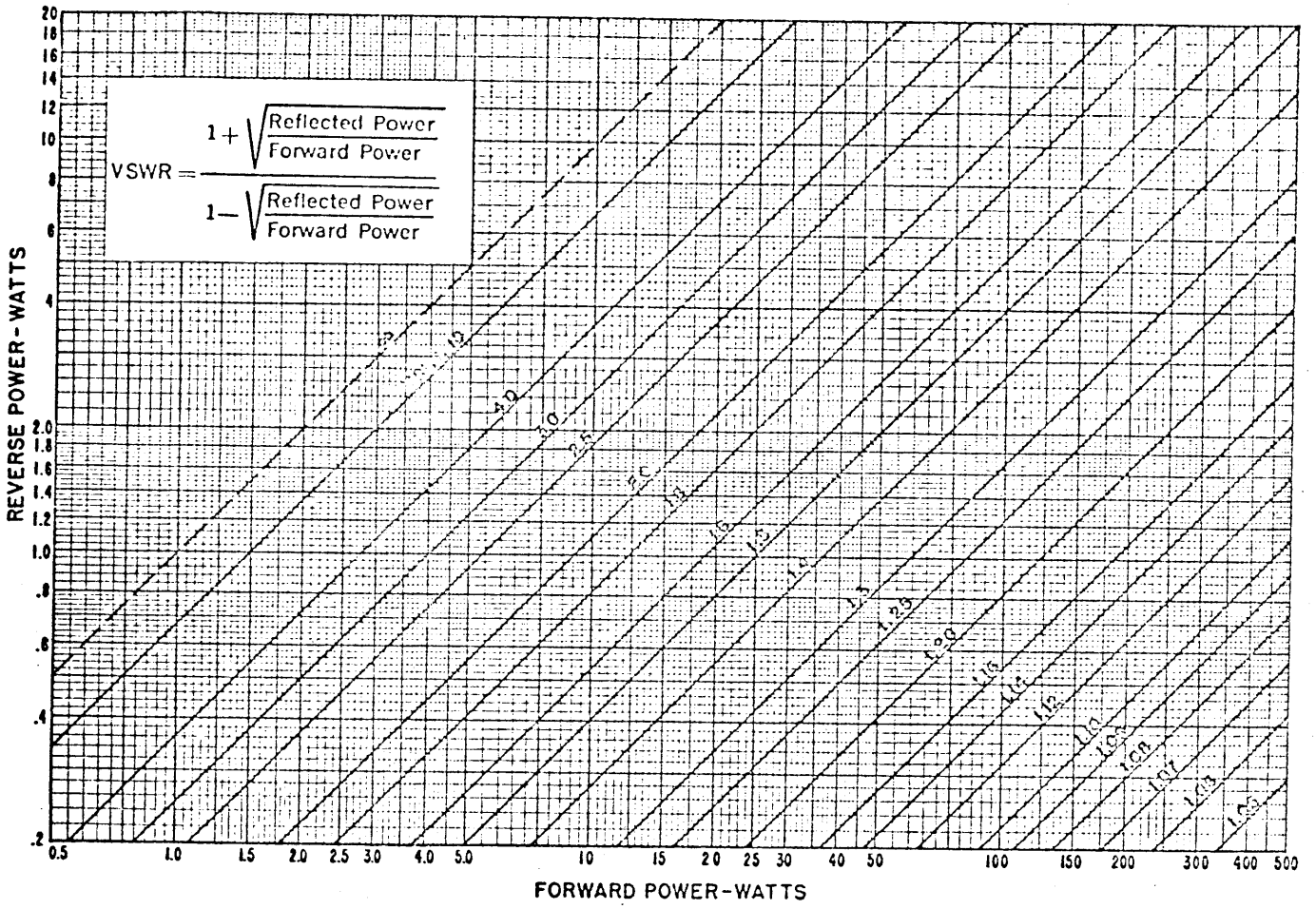
To energize High Voltage Contactor.



SIMPLIFIED BIAS CONTROL DIAGRAM FIGURE 5-3

VSWR NOMOGRAPH

POWER VALUES vs. VSWR



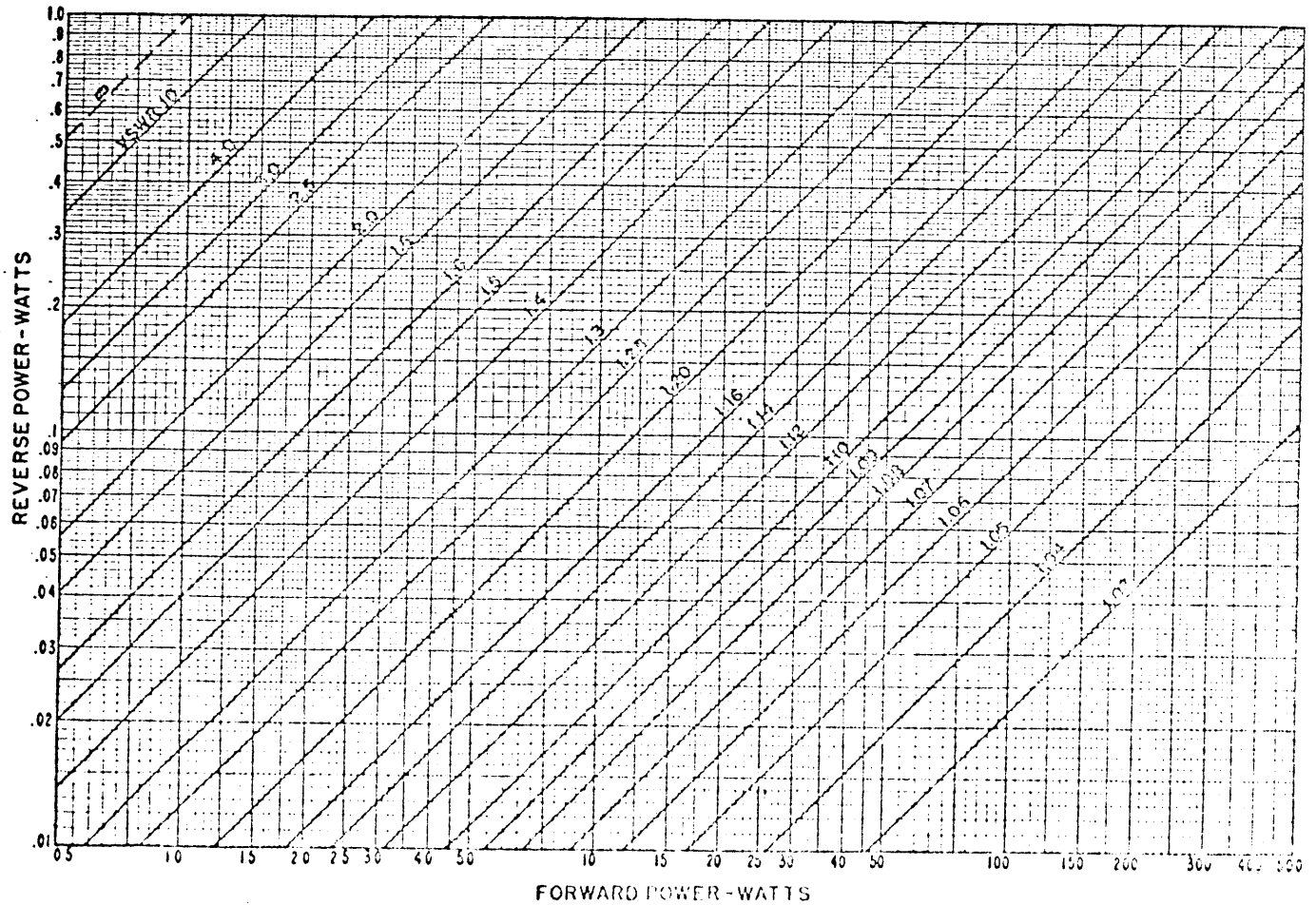


FIGURE 5-3

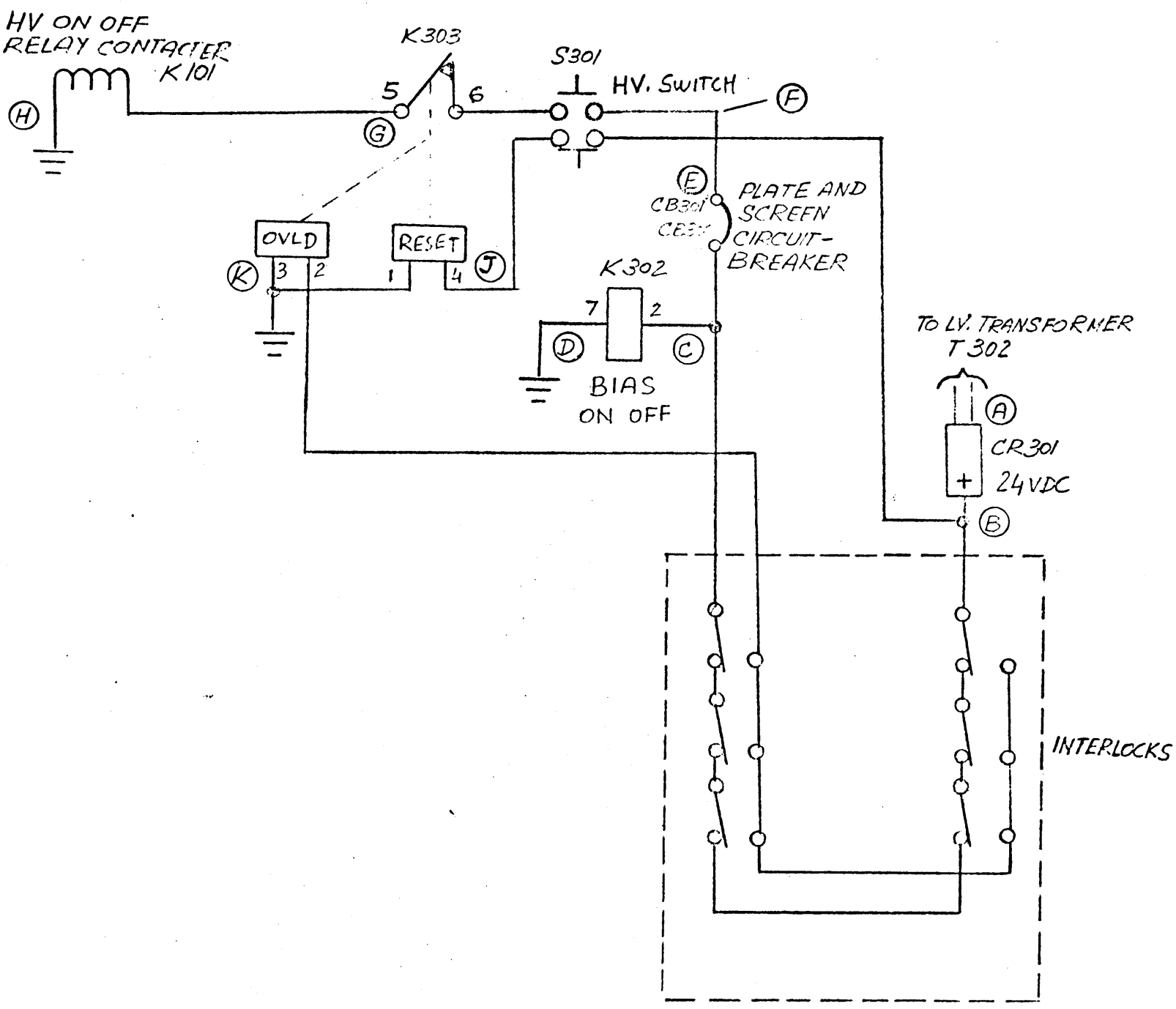


FIG. 5-4 HIGH VOLTAGE CONTROL

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.

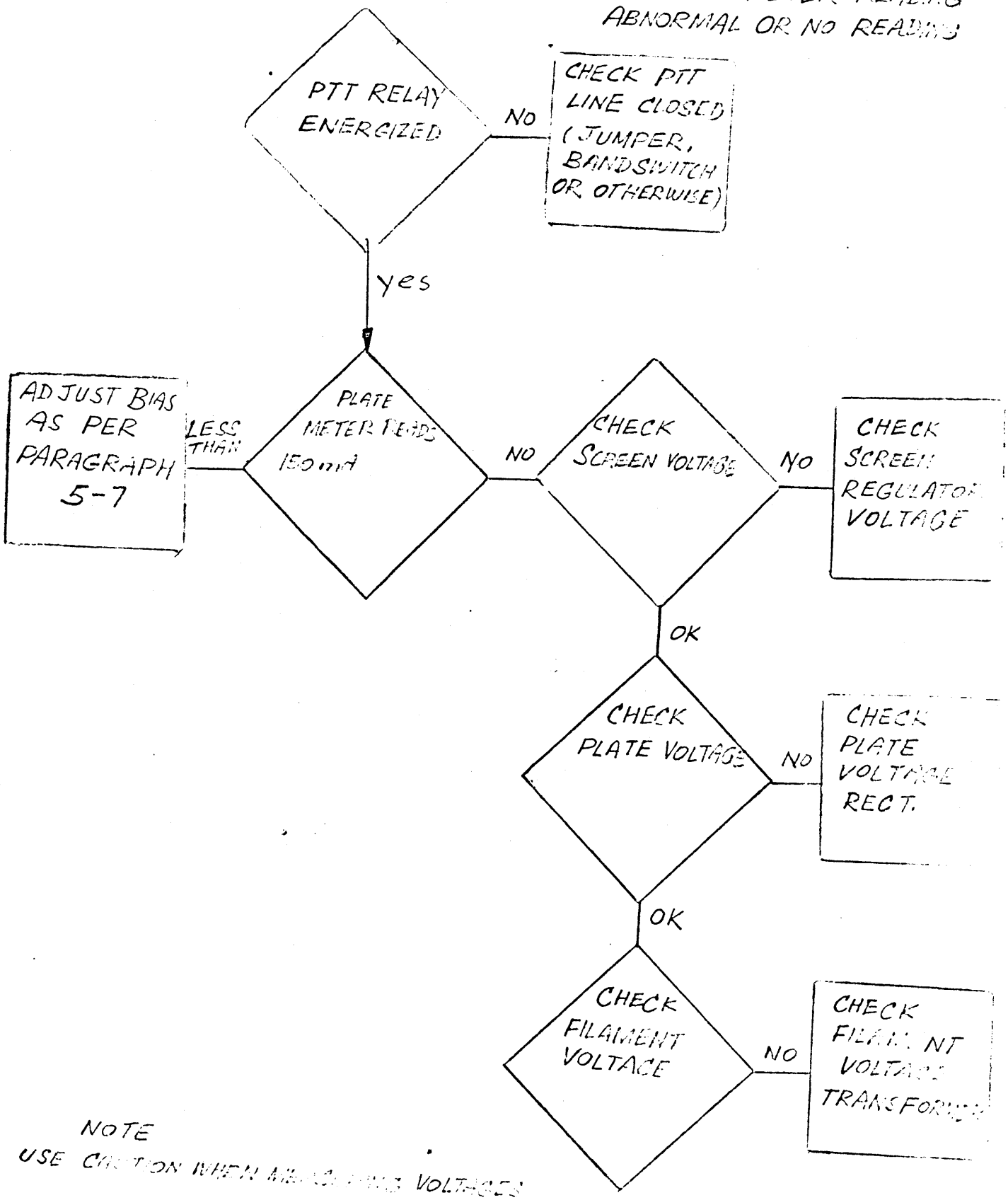
1. Determine the nature of the trouble.
2. Find the programs which described it most completely (refer to program list).
3. Follow the arrow from that block to the first suggested fault - INVESTIGATE.
4. If no trouble can be found, follow the arrow to the next fault suggested - INVESTIGATE.
5. If trouble 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"	PA Plate Meter reading abnormal
Maintenance program "B"	2nd BBL Plate Meter reading abnormal
Maintenance program "C"	No High Voltage
Maintenance program "D"	Main Blower does not operate, interlock indicator light is out.

MAINTENANCE PROGRAM "A"

PROBLEM: PA PLATE METER READING ABNORMAL OR NO READING

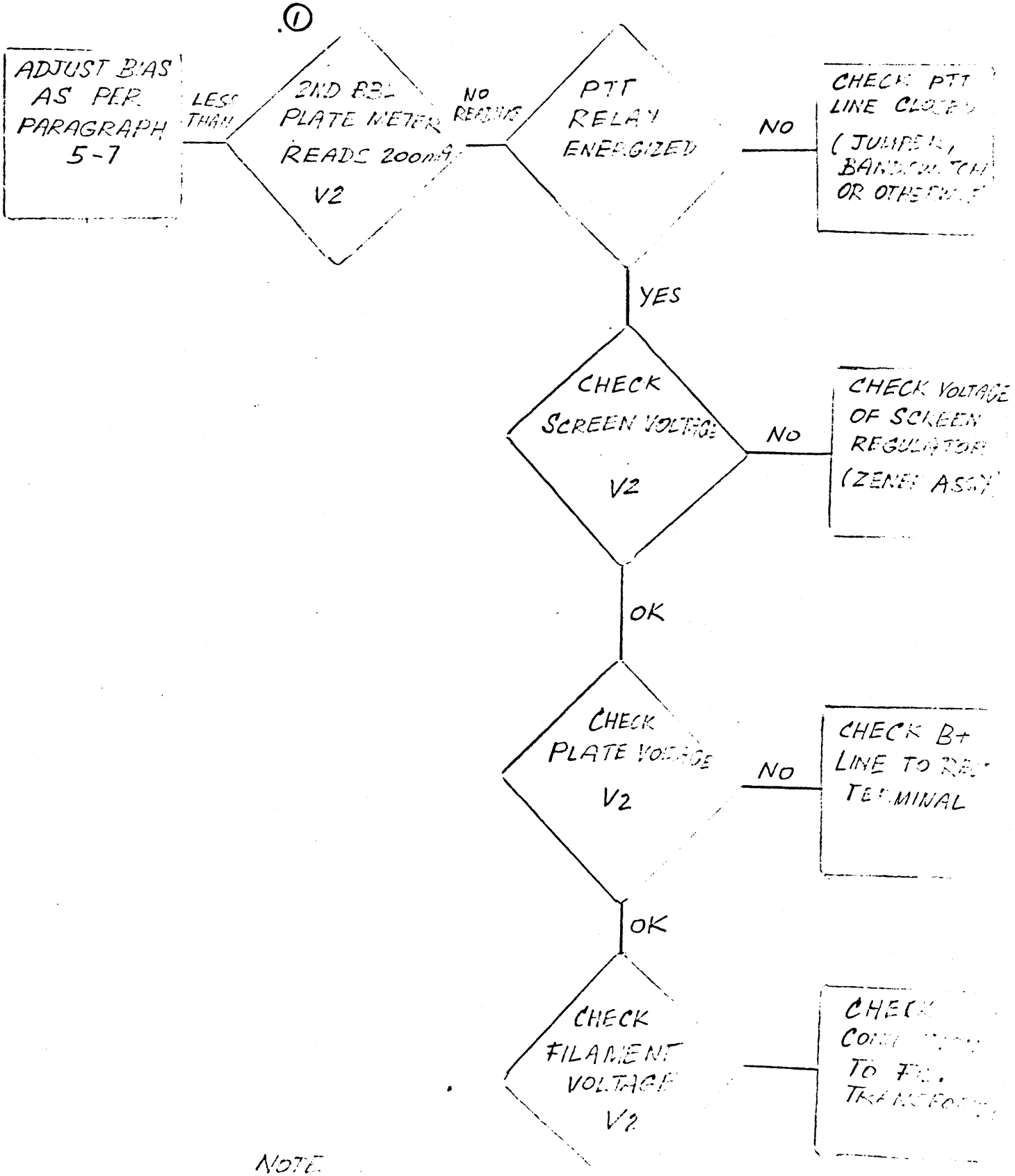


NOTE
USE CAUTION WHEN MEASURING VOLTAGES

TABLE 5-5 TROUBLESHOOTING CHART

MAINTENANCE PROGRAM "3"

PROBLEM: 2ND BBL PLATE METER READING ABNORMAL OR NO READING



NOTE

USE CAUTION WHEN MEASURING VOLTAGES

TABLE 5-5 TROUBLESHOOTING

MAINTENANCE PROGRAM "C"

PROBLEM: H.V. INDICATOR DOES NOT LIGHT

NOTE

MAKE SURE ALL INTERLOCKS ARE COMPLETED AND TIMER HAS CYCLED
PLATE AND SCREEN BREAKER "ON"

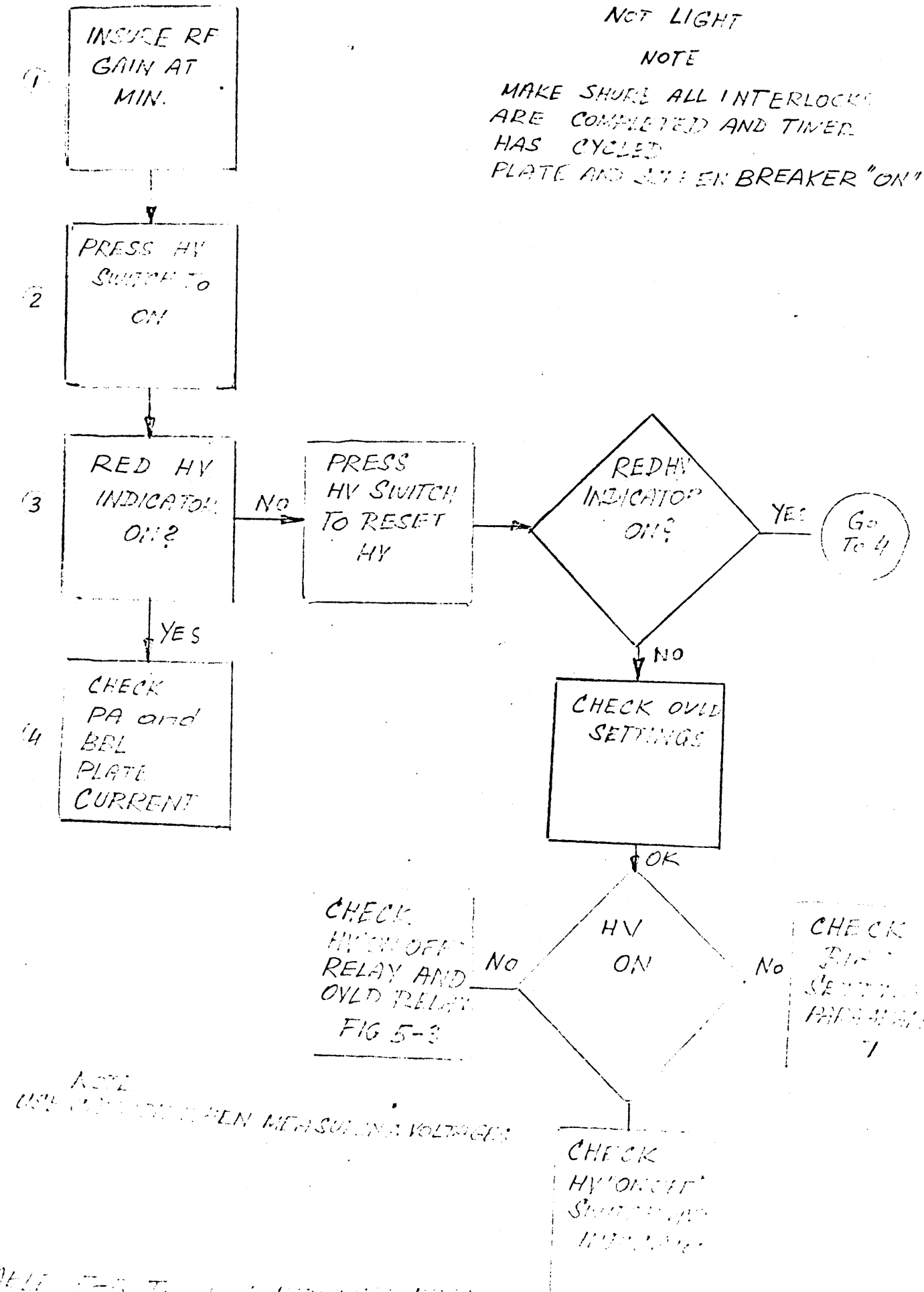
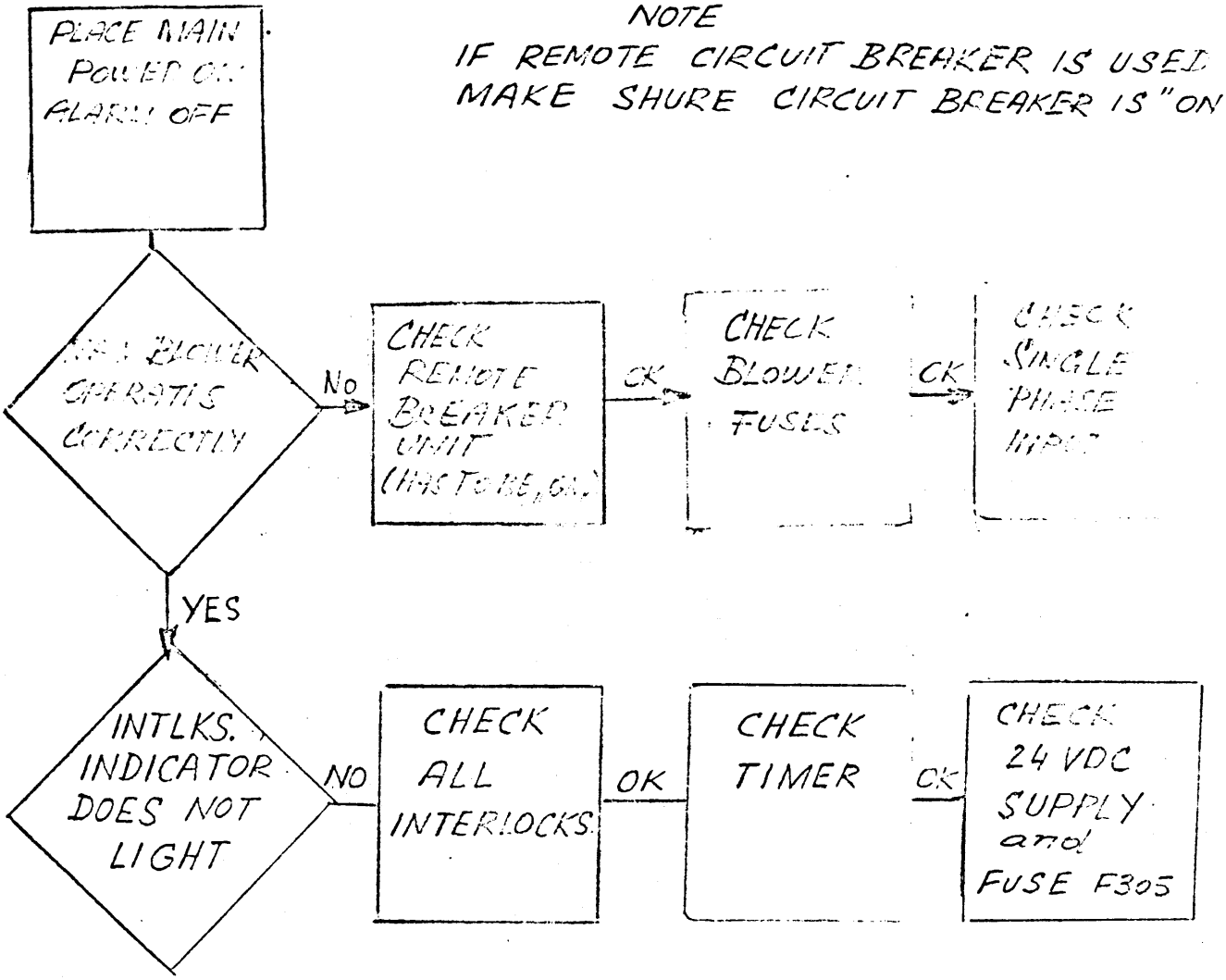


TABLE 5-3

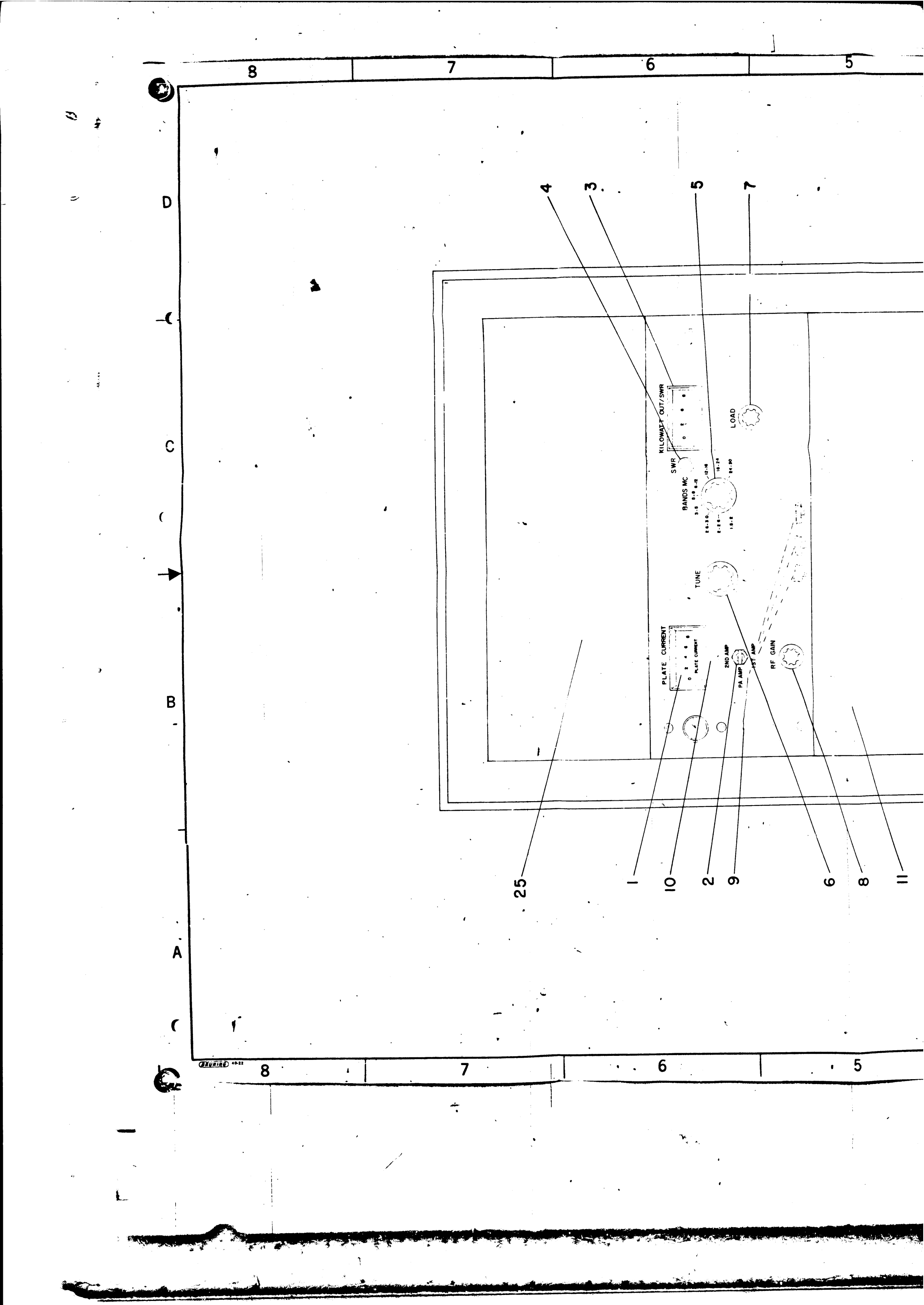
PROBLEM : 1. MAIN BLOWER DOES NOT OPERATE

2. INTELOCK INDICATOR LIGHT IS OUT

NOTE
IF REMOTE CIRCUIT BREAKER IS USED
MAKE SHURE CIRCUIT BREAKER IS "ON"



NOTE
USE CAUTION WHEN TAKING VOLTAGES


8
7
6
5
D
C
B
A
4
3
5
7
KILOWATT OUT/SWR
SWR
LOAD
BANDS MC
TUNE
PLATE CURRENT
PLATE CURRENT
2ND AMP
PA AMP
1ST AMP
RF GAIN
25
1
10
2
9
6
8
11

8 7 6 5

D

C

B

A

9

10

KILOWATT OUT/SWR

LOAD

SWR

BANDS MC

TUNE

PLATE CURRENT

2ND AMP

PA AMP

1ST. AMP

RF. GAIN

REVISIONS							
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED

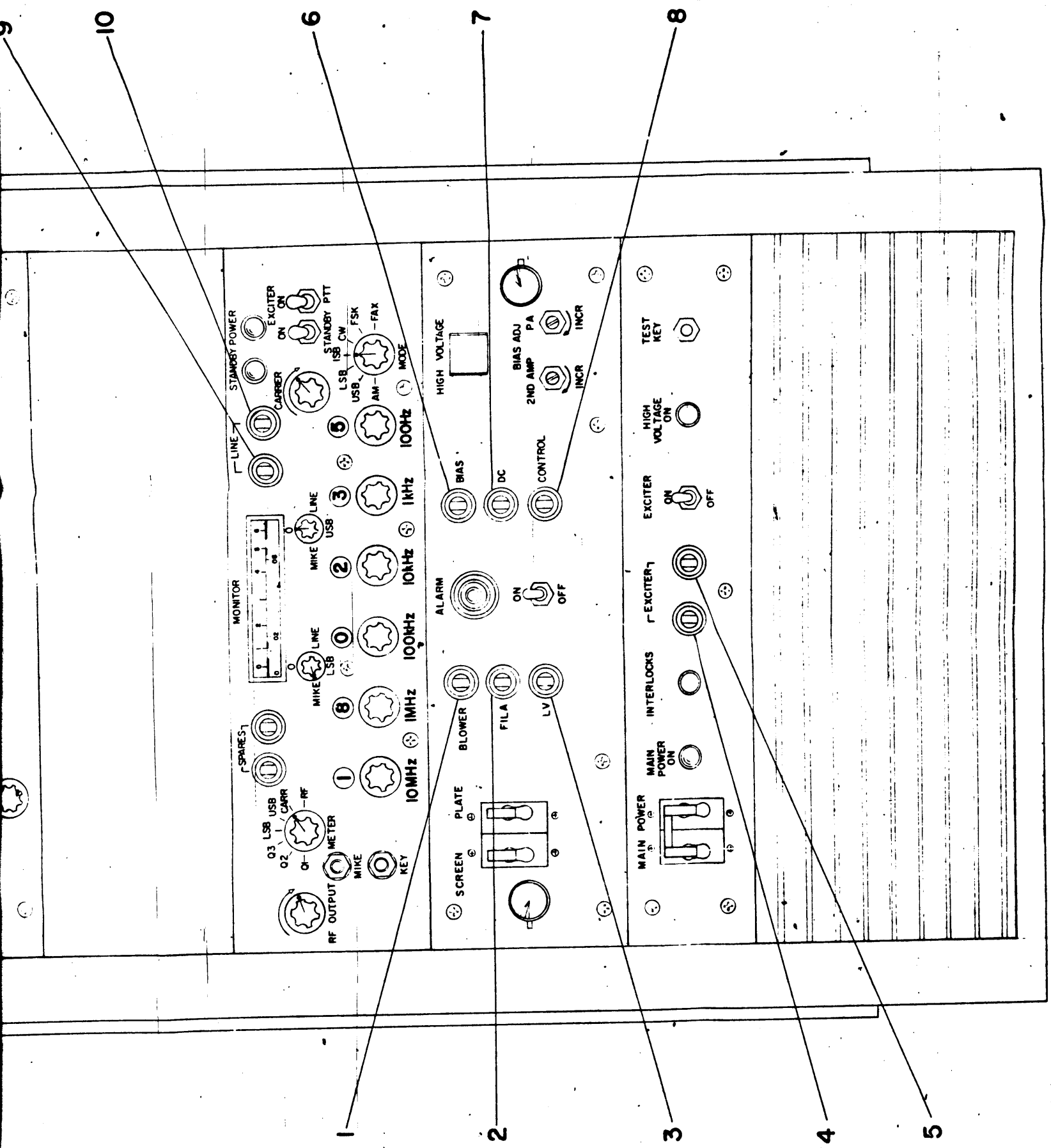


FIGURE 5-1 FUSE LOCATION DRAWING

QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL

LIST OF MATERIAL

QTY / UNIT	MODEL USED ON	ASS'Y NO.
APPLICATION		
	CODE	

NOTICE TO PERSONS RECEIVING THIS DRAWING
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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

TOLERANCES ON

DECIMALS	FRACTIONS
.X ± .05	± 1/64
.XX ± .01	ANGLES
.XXX ± .005	± 0° -30'

MATERIAL

FINISH

		DATE
FINAL APPROVAL		
MECH. DES.		
ELECT. DES.		
CHECKED		
DRAWN		

THE TECHNICAL MATERIEL CORP.
MAMARONECK, NEW YORK

SIZE	CODE IDENT NO.	DWG NO.	ISSUE
D	82679		
SCALE		SHEET	OF

REVISIONS							
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED

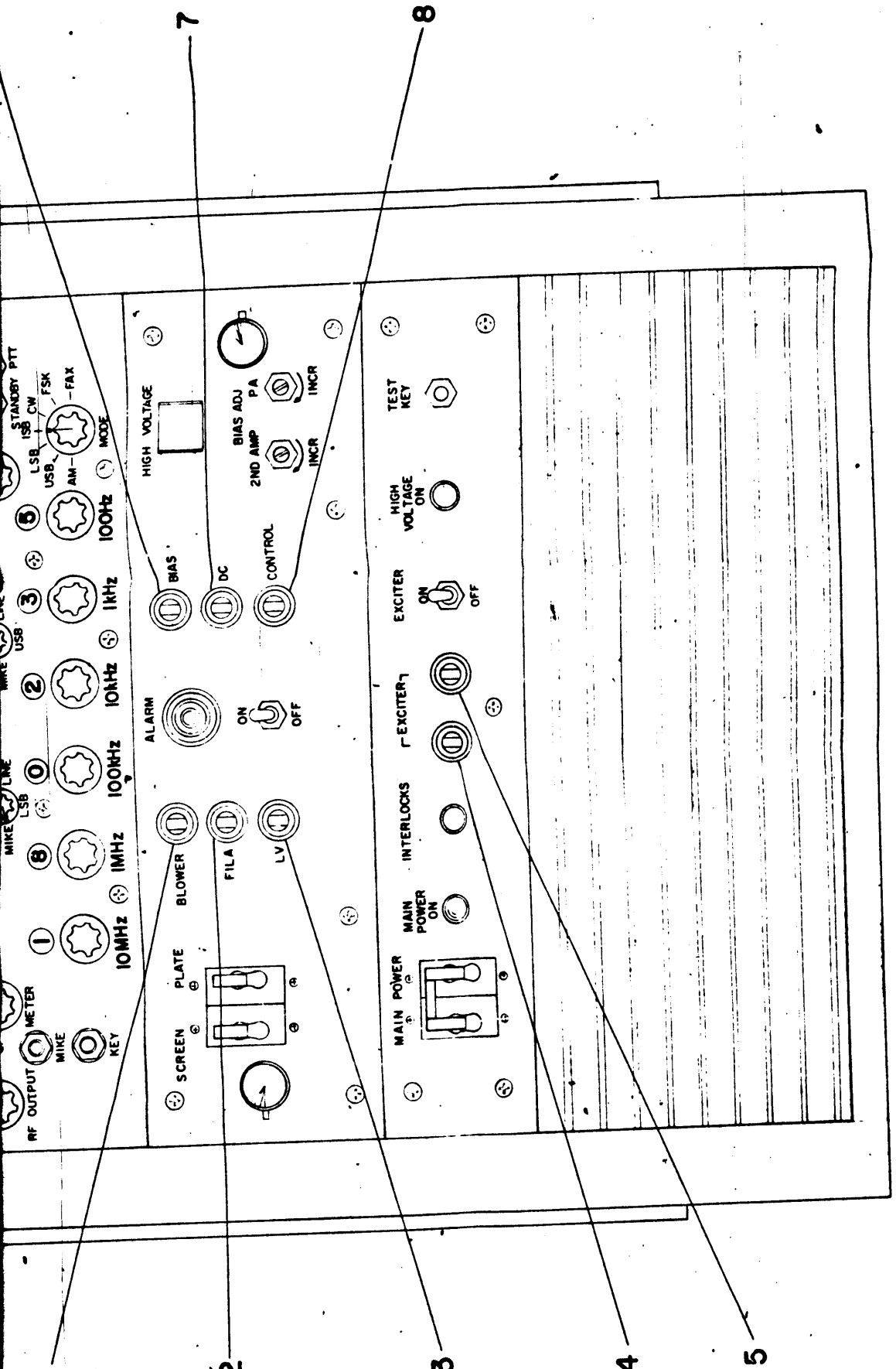

FIGURE 5-1 FUSE LOCATION DRAWING

SYMBOL	DESCRIPTION	PART NO.	ITEM	QTY. REQ.

LIST OF MATERIAL

QTY / UNIT	MODEL USED ON	ASS'Y NO.
	APPLICATION	
	CODE	

NOTICE TO PERSONS RECEIVING THIS DRAWING
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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

TOLERANCES ON

DECIMALS	FRACTIONS
.X ± .05	± 1/64
.XX ± .01	ANGLES
.XXX ± .005	± 0° 30'

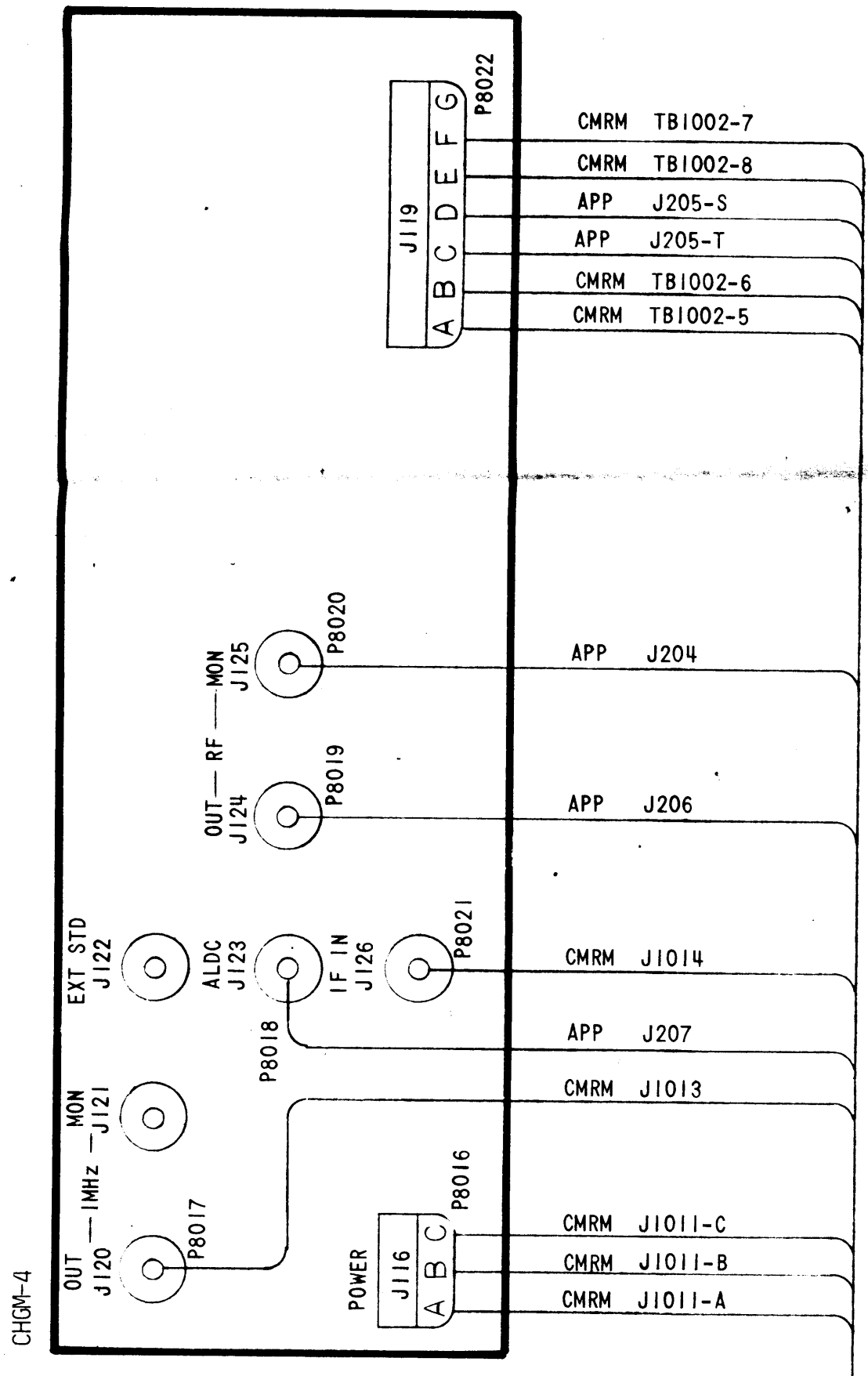
MATERIAL

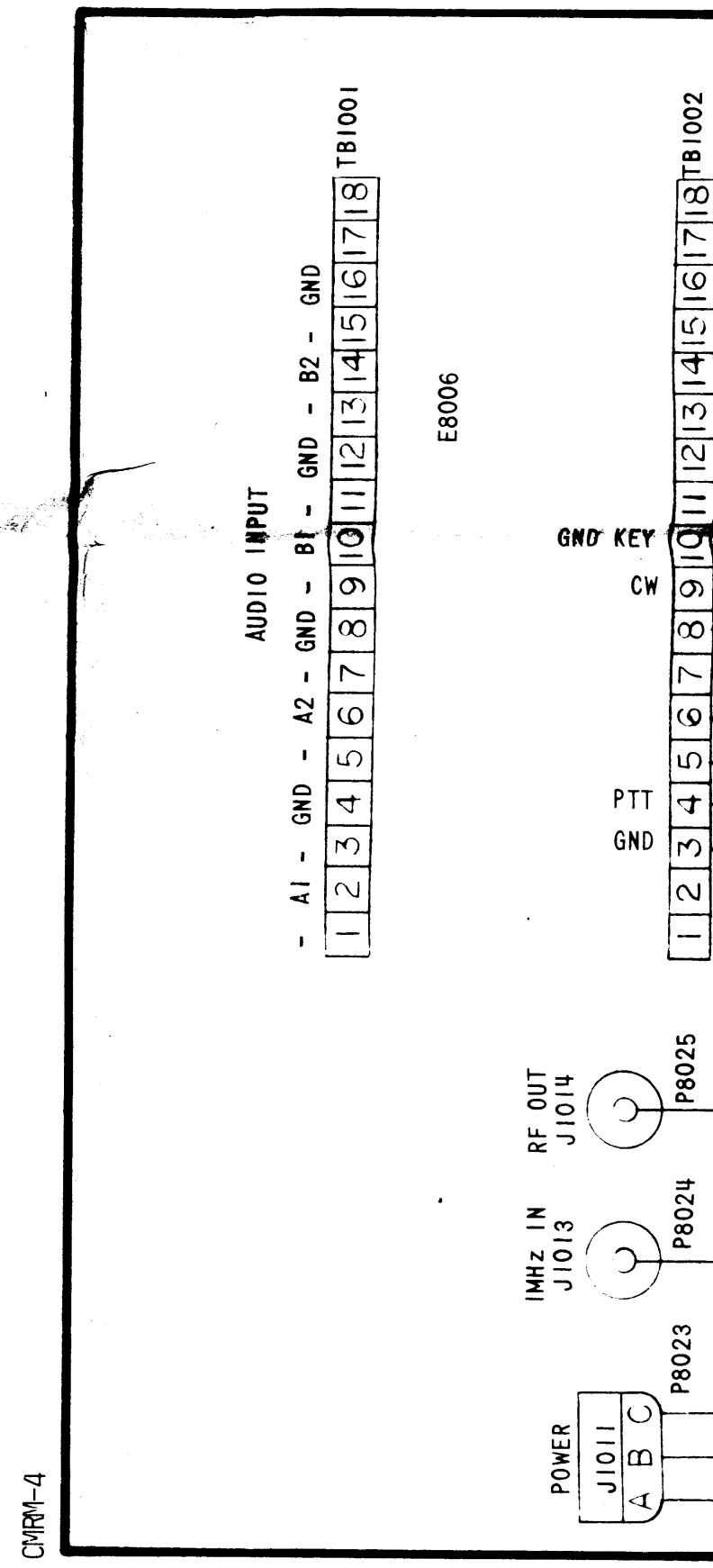
FINISH

	DATE
FINAL APPROVAL	
MECH. DES.	
ELECT. DES.	
CHECKED	
DRAWN	

THE TECHNICAL MATERIEL CORP.
MAMARONECK, NEW YORK

SIZE	CODE IDENT NO.	DWG NO.	ISSUE
D	82679		
SCALE		SHEET OF	





CA1610

1	HFTM-1KA	RAK110-4
QTY / UNIT	MODEL USED ON	ASS'Y NO.

APPLICATION

CODE

UNLESS OTHERW
DIMENSIONS A
AND INCLUDE CHE
OR PLATED

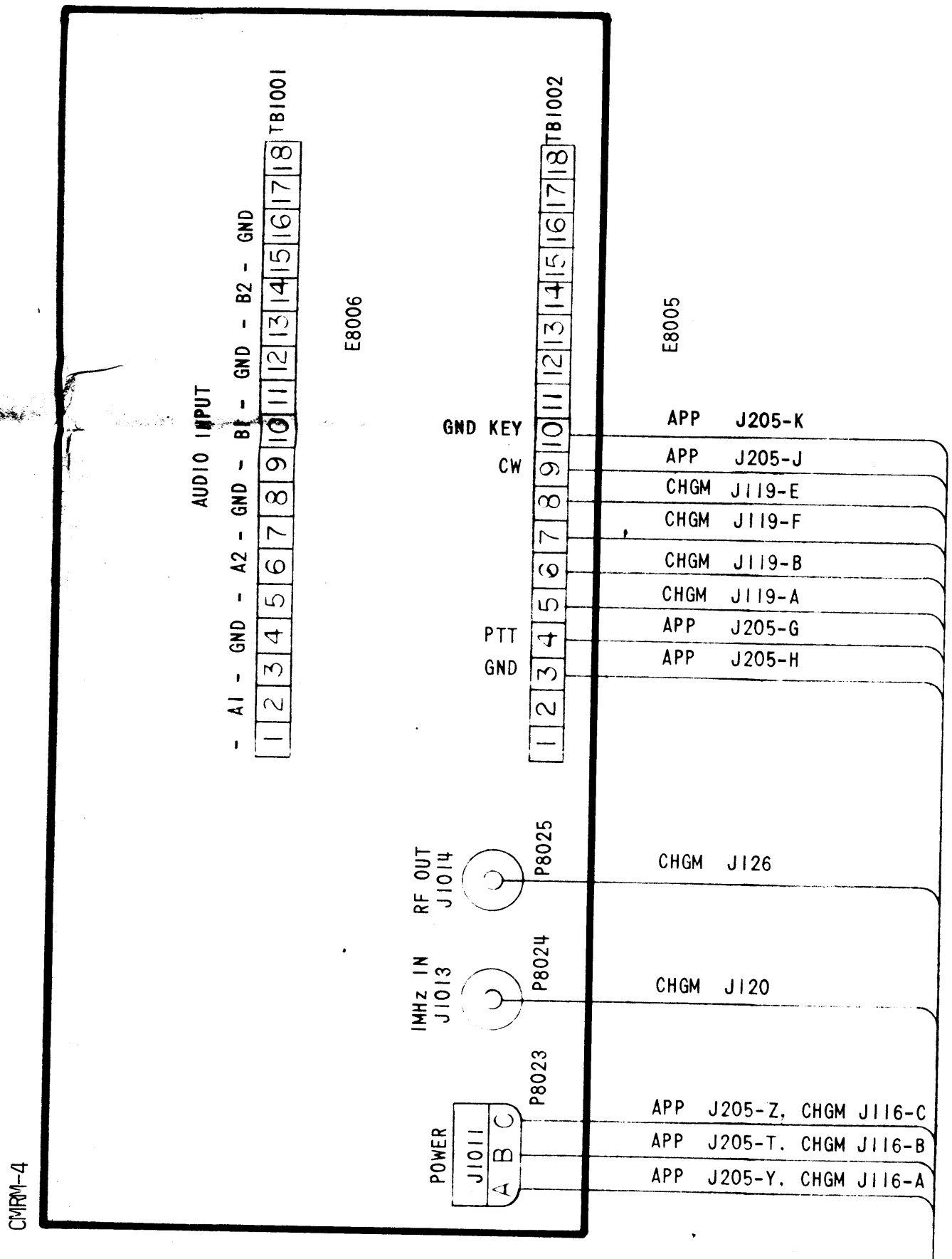
TOLERAN

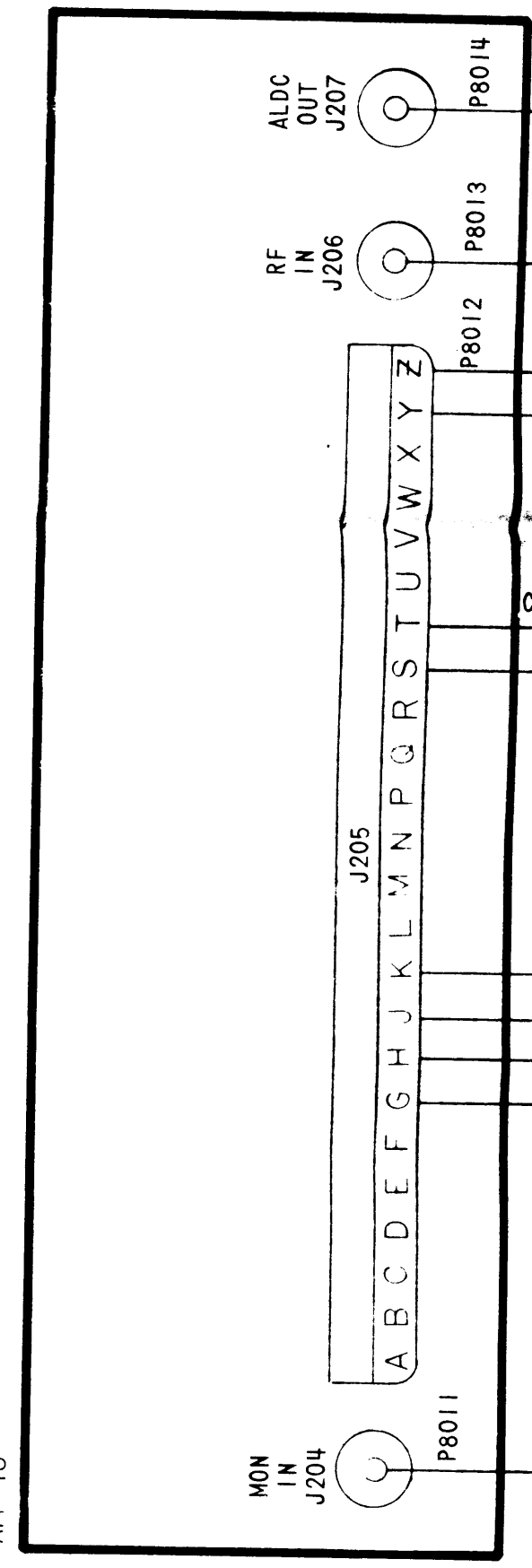
DECIMALS
.X ± .05
.XX ± .01
.XXX ± .005

MATERIAL

FINISH

REVISIONS					
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION
	a			X	ORIGINAL RELEASE FOR PRODUCTION





CA1610

QTY. REQ.	ITEM	PART NO.	DESCRIPTION

LIST OF MATERIAL

HFTM-1KA	RAK110-4
MODEL USED ON	ASS'Y NO.

APPLICATION

	CODE	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

TOLERANCES ON

DECIMALS	FRACTIONS
.X ± .05	± 1/64
.XX ± .01	ANGLES
.XXX ± .005	± 0° -30'

MATERIAL

FINISH

FINAL APPROVAL		DATE
MECH. DES.		DATE
ELECT. DES.		DATE
CHECKED		DATE
DRAWN		DATE

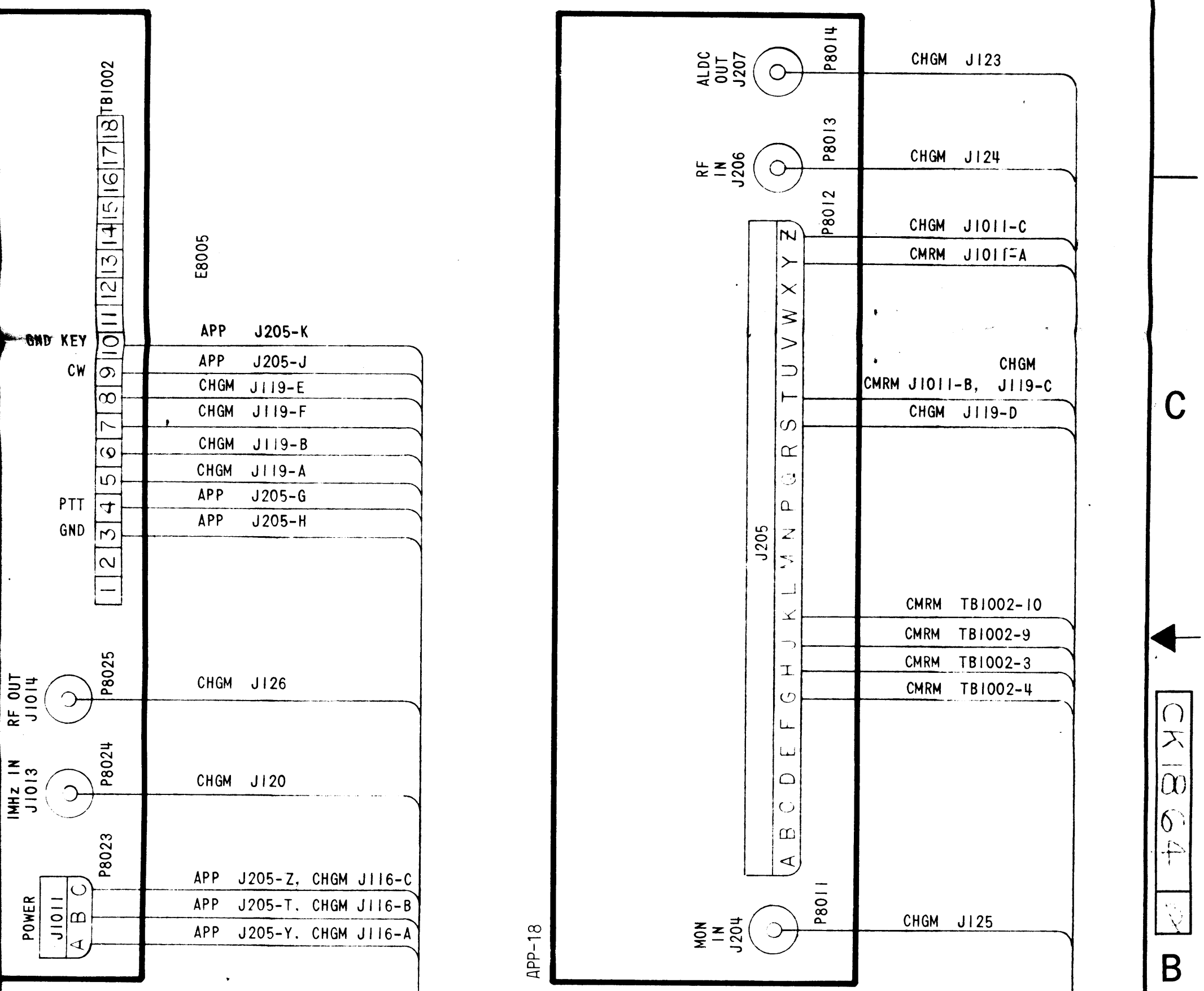
THE TECHNICAL MATE
MAMARONECK, NEW

DIAGRAM, WIRING
EXCITER INTERCONNECT

SIZE	CODEIDENT NO.	DWG NO.
C	82679	CK

SCALE

REVISIONS							
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED
	CD			X	ORIGINAL RELEASE FOR REPRODUCTION	9/4/71	



QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

TOLERANCES ON

DECIMALS	FRACTIONS
.X ± .05	± 1/64
.XX ± .01	ANGLES
.XXX ± .005	± 0° -30'

TERIAL

NISH

FINAL APPROVAL		DATE
MECH. DES.		DATE
ELECT. DES.		DATE
CHECKED		DATE
DRAWN		DATE

THE TECHNICAL MATERIEL CORP.
MAMARONECK, NEW YORK

DIAGRAM, WIRING
EXCITER INTERCONNECT

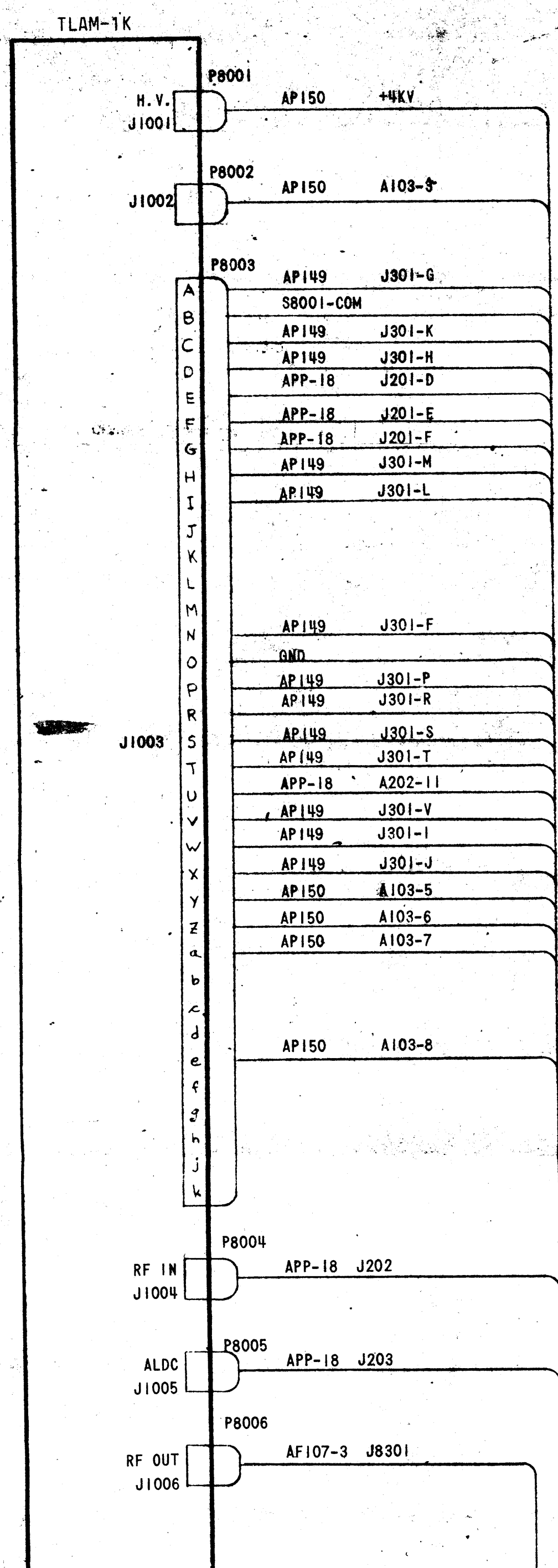
SIZE	CODEIDENT NO.	DWG NO.	ISSU
C	82679	CK 1864	Ø

SCALE | SHEET OF

CK1864

D C B

2 1


TLAM-1K
P8001
H.V.
J1001
AP150 +4KV
P8002
J1002
AP150 A103-9
P8003
J1003
AP149 J301-G
S8001-COM
AP149 J301-K
AP149 J301-H
APP-18 J201-D
APP-18 J201-E
APP-18 J201-F
AP149 J301-M
AP149 J301-L
AP149 J301-F
GND
AP149 J301-P
AP149 J301-R
AP149 J301-S
AP149 J301-T
APP-18 A202-11
AP149 J301-V
AP149 J301-I
AP149 J301-J
AP150 A103-5
AP150 A103-6
AP150 A103-7
AP150 A103-8
P8004
RF IN
J1004
APP-18 J202
P8005
ALDC
J1005
APP-18 J203
P8006
RF OUT
J1006
AF107-3 J8301
AP149
J301
P8007
A B C D E F G H I J K L M N O P R S T U V W X Y Z a b c d e f g h j k

AP149

J301

P8007

AP150 K101-12	
APP-18 J201-T	
AP150 -4KV	
AP150 A103-4	
APP-18 J201-S	
TLAM J1003-N	
TLAM J1003-A	
TLAM J1003-D	
TLAM J1003-W	
TLAM J1003-X	
TLAM J1003-C ; APP18 J201-L	
TLAM J1003-I	
TLAM J1003-H	
APP-18 J201-V	
GND	
TLAM J1003-P	
TLAM J1003-R	
TLAM J1003-S	
TLAM J1003-T	
APP-18 A202-10	
TLAM J1003-V	
AP150 K101-4 & 11, APP-18 J201-A	
APP-18 J201-B	
APP-18 J201-C	
APP-18 J201-G	
APP-18 J201-H	
APP-18 J201-J	
APP-18 J201-M	
APP-18 J201-N	
APP-18 J201-P	
APP-18 J201-U	
APP-18 J201-X	
APP-18 J201-R	
AP150 K101-6	
AP150 K101-7	

APP-18

P8008

J201

AP149 J301-W	
AP149 J301-X	
AP149 J301-Y	
TLAM J1003-E	
TLAM J1003-F	
TLAM J1003-G	
AP149 J301-Z	
AP149 J301-a	
AP149 J301-b	
S8004 N.O.	
S8001-N.C.	AP149 J301-K
AP149 J301-c	
AP149 J301-d	
AP149 J301-e	
AP149 J301-h	
AP149 J301-E	
AP149 J301-B,	AP150 K101-5
AP149 J301-f	
AP149 J301-N	
GND	
APP149 J301-g	

MCU J104

MCU J104

P8009

TLAM J1004 — PA RF J202

P8010

TLAM J1005 — PA ALDC J203

P8011

MON IN J204

A202

AP149 J301-U

AP150 K101-2 & 9 — 10

TLAM J1003-U

AP150 T101-7 — 11

AP150

TB202

OVLD IND	10	
HV IND	9	
HV ON-OFF	8	
GND	7	
RCVR MUTE N.C.	6	
RCVR MUTE COM	5	
RCVR MUTE N.O.	4	E8002
EXT INTLKS N.C.	3	
EXT INTLKS COM	2	
EXT INTLKS N.O.	1	

TB204

	10	
XMTR PTT	9	
XMTR ON	8	
GND	7	
CONT	6	
CONT	5	E8004
FAX -	4	
FAX +	3	
FSK -	2	
FSK +	1	

--- WITH EXCITER CONTROL

*** W/O EXCITER CONTROL

TB201

RECYCLE	10	
RECYCLE	9	
GND	8	
REFL PWR	7	
FWD PWR	6	E8001
REM MTR	5	
GND	4	
OVLD RESET N.C.	3	
OVLD RESET N.O.	2	
24VDC	1	

TB203

	10	
KEY	9	
	8	
PTT	7	
	6	E8003
LSB 600Ω	5	
	4	
	3	
USB 600Ω	2	
	1	

J201

P8012

EXCITER J205

P8013

RF IN J206

P8014

ALDC OUT J207

P8015

MON OUT J208

P8009

PA RF J202

P8010

PA ALDC J203

P8011

MON IN J204

A103

A202

10	
AC INPUT	
7	115/230VAC 1Ø CUSTOMER SUPPLIED
8	
9	

ER CONTROL

R CONTROL

AP150

HV ON-OFF

XK101

1		
2	APP-18	A202-10
3	AP150	T101-1
4	AP149	J301-W
5	DS8001, DS8002	APP-18 J201-T
6	AP149	J301-j
7	AP149	J301-k
8	AP150	T101-1
9	APP-18	A202-10
10		
11	AP149	J301-W
12	AP149	J301-A

A103

3 +2KV	TLAM	J1002
8 +800V	TLAM	J1003-e
6 +400V	TLAM	J1003-Z
7 +400V	TLAM	J1003-a
5 +200V	TLAM	J1003-Y
4 -2KV	AP149	J301-D
+4KV	TLAM	J1001
-4KV	AP149	J301-C
T101 TERM 1	K101-8, K101-3	
T101 TERM 7	APP-18	A202-11

AP150 K101-5

HV ON
DS800

AIR FILTER PNL
S8004
NC

APP-18 J201-K

NO C

RIGHT SIDE
S8001
NC

APP-18 J201-L

TLAM J1003-B

C NO

MCU J103-C

MCU J103-A

MCU-2

P8028

J101

P8029

J102 A B C D

P8026

J103 A B C

S8

S8

S8

P8027

J104 G

APP-

GND

APP-

AP150 K101-5

HV ON
DS8001

HV ON
DS8002

AIR FILTER PNL
S8004
NC

LEFT SIDE
S8003
NC

-18 J201-K

NO C NO C

RIGHT SIDE
S8001
NC

REAR
S8002
NC

-18 J201-L

M J1003-B

C NO C NO

MCU J103-C

MCU J103-A

MCU J103-B

TO TUNER
TU-2

P8034
RF OUT
J8001
P8033

CA480-36-28.00

MCU-2

P8028
J101

P8029
J102
A
B
C
D

CA499-3

CU-2

P8032
J302
TUNER

P8030
A
B
C
D
J303

P8026
J103
A
B
C

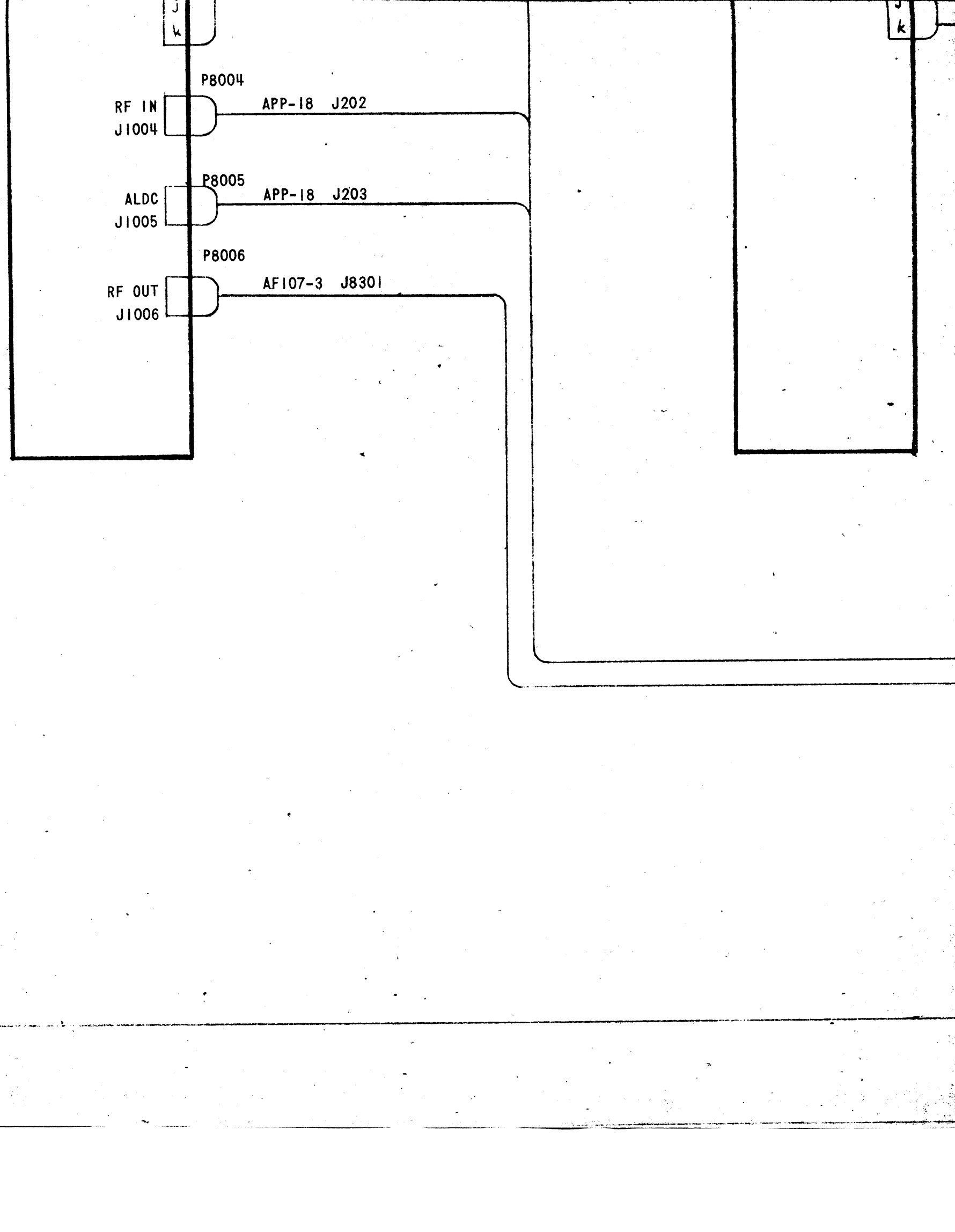
S8001-NO
S8002-C
S8001-NC

TRANSMITTER
J301

P8031

P8027
J104
G

APP-18 J201-r
GND
APP-18 J201-s


J
k
P8004
RF IN
J1004
APP-18 J202
P8005
ALDC
J1005
APP-18 J203
P8006
RF OUT
J1006
AF107-3 J8301
J
k

J
k

AP150 K101-7

P8010

PA ALDC
J203

TLAM J1005

P8011

MON IN
J204

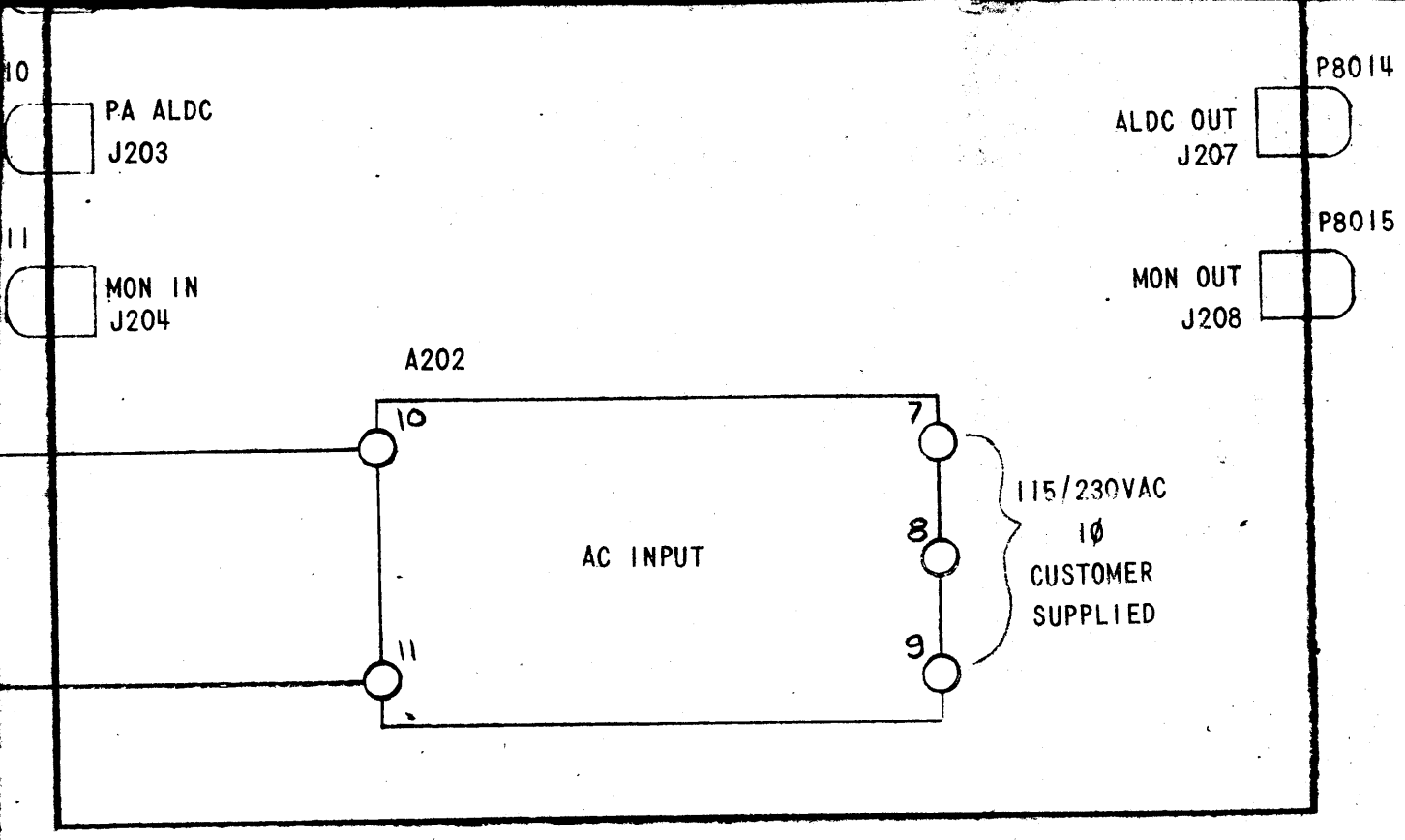
A202

AP149 J301-U
AP150 K101-2 & 9

10

TLAM J1003-U
AP150 T101-7

11

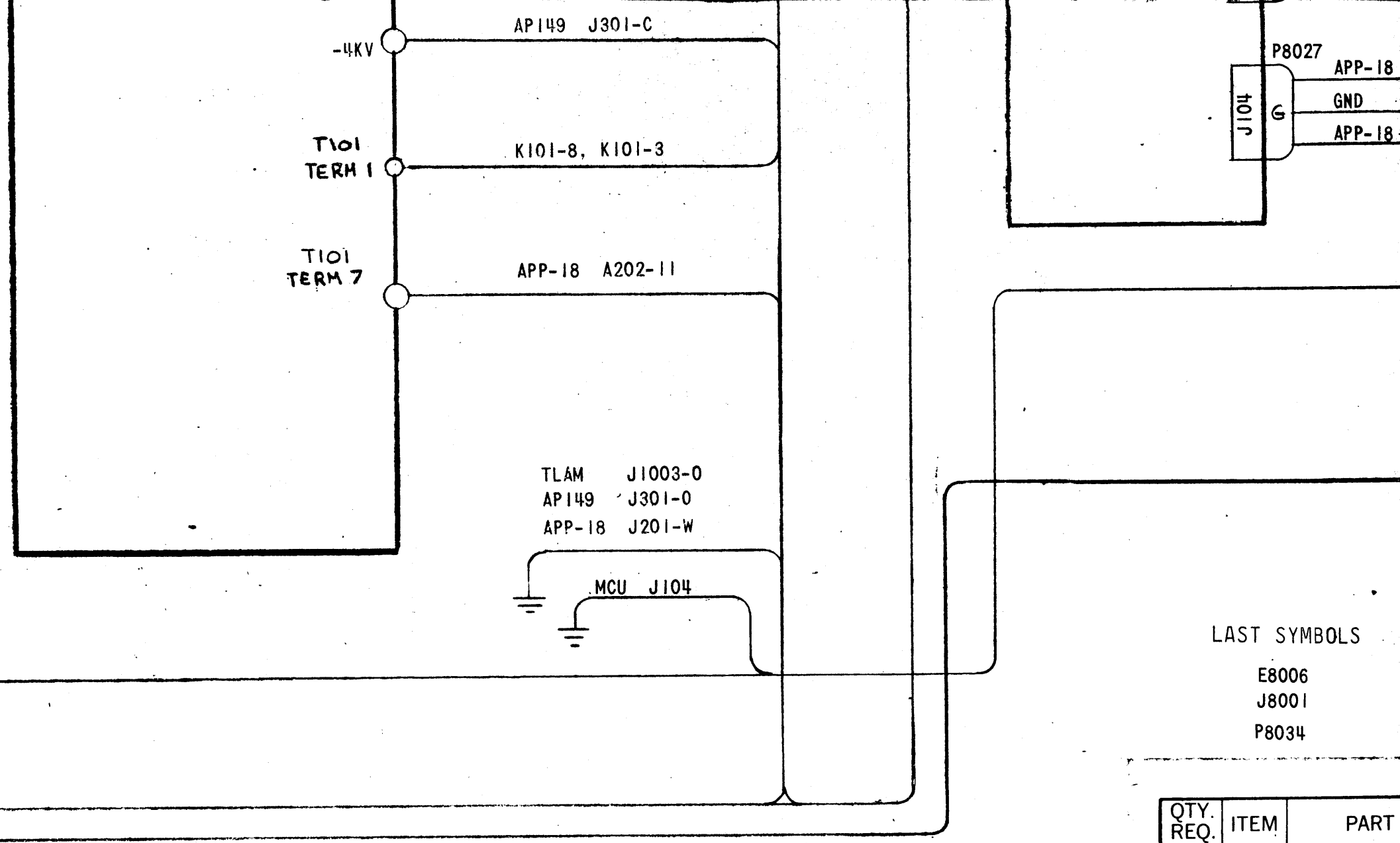


CA1611

CA1594

CA480-36-55.00

ZONE	LTR	
	Ø	ORIGINAL

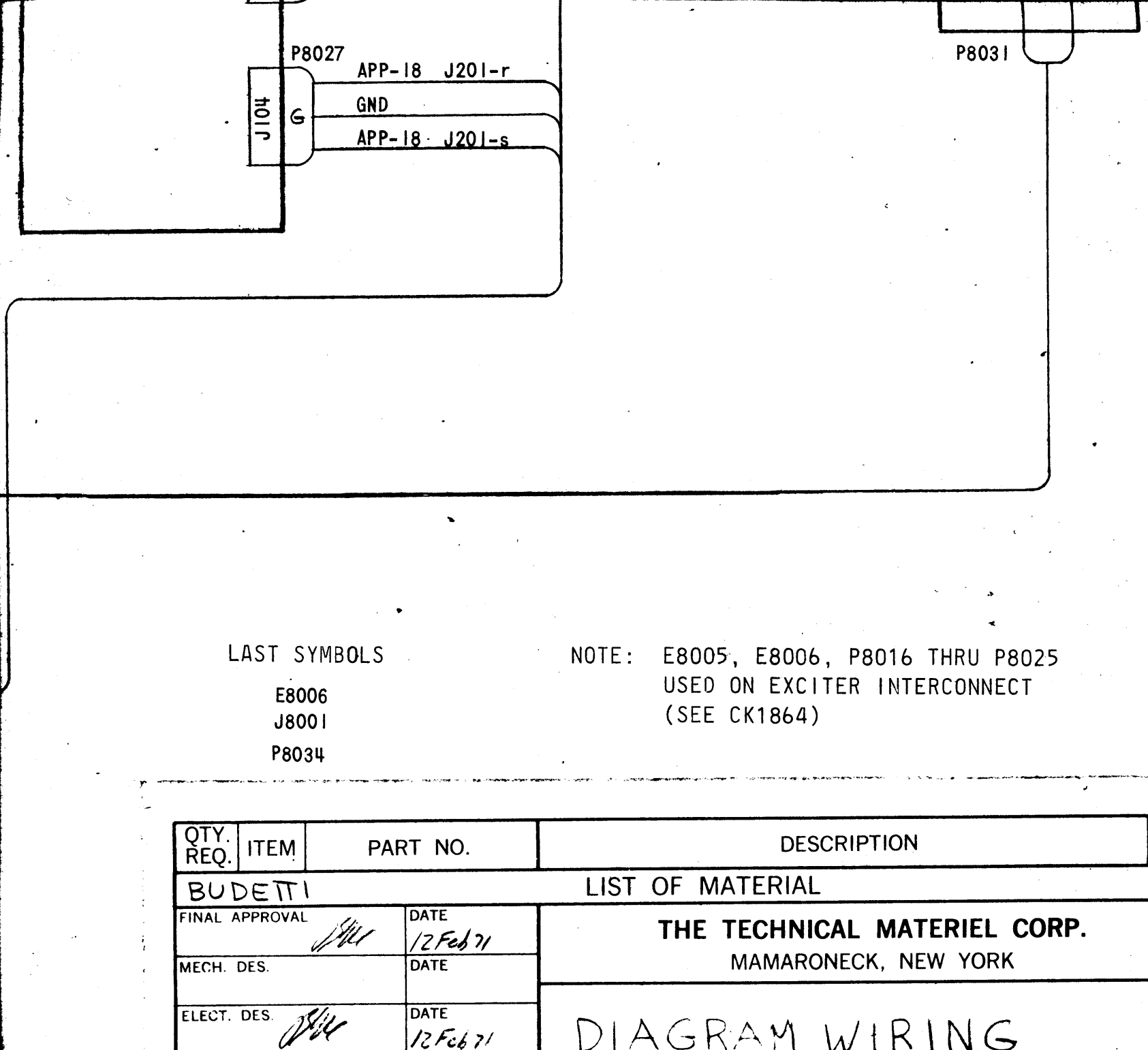


LAST SYMBOLS

E8006
J8001
P8034

QTY. REQ.	ITEM	PART
BUDETTI		
FINAL APPROVAL		DA 12
MECH. DES.		DA
ELECT. DES.		DA 12
CHECKED		DA
DRAWN		DA 9

REVISIONS							
ZONE	LTR	DESCRIPTION	DATE	E.M.N.NO	DRAFT	CHKD	APPD
	Ø	ORIGINAL RELEASE FOR PRODUCTION	2/6/71		CW		R.E.L.



LAST SYMBOLS

E8006
J8001
P8034

NOTE: E8005, E8006, P8016 THRU P8025 USED ON EXCITER INTERCONNECT (SEE CK1864)

QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL

BUDETTI — LIST OF MATERIAL

FINAL APPROVAL	DATE 12 Feb 71
MECH. DES.	DATE
ELECT. DES.	DATE 12 Feb 71
CHECKED	DATE
DRAWN	DATE 9 Feb 71

THE TECHNICAL MATERIEL CORP.
MAMARONECK, NEW YORK

DIAGRAM, WIRING RACK ASY.

RAK110-4 (HFTM-1KA)

SIZE	CODE IDENT.NO.	DWG NO.	ISSUE
	82679	CK1863	Ø

SCALE — SHEET OF

P/O J301

U
F
g
j
b
C
y
M
D
k
V
P
R
S
T
N
O

LOW VOLT F303

LOW VOLT T302

1 C
2 105
3 115
4 125
5 C
6 105
7 115
8 125
C 9
28 10
52 11

CR 301 DD144-6

DC F305

E3 + −

BLOWER F301

FILA. TIMER M301

MOT.
NO
NC
C
2 1 4 3 5
TB301

PLATE CB302

SCREEN CB301

A B C D

BIAS K302

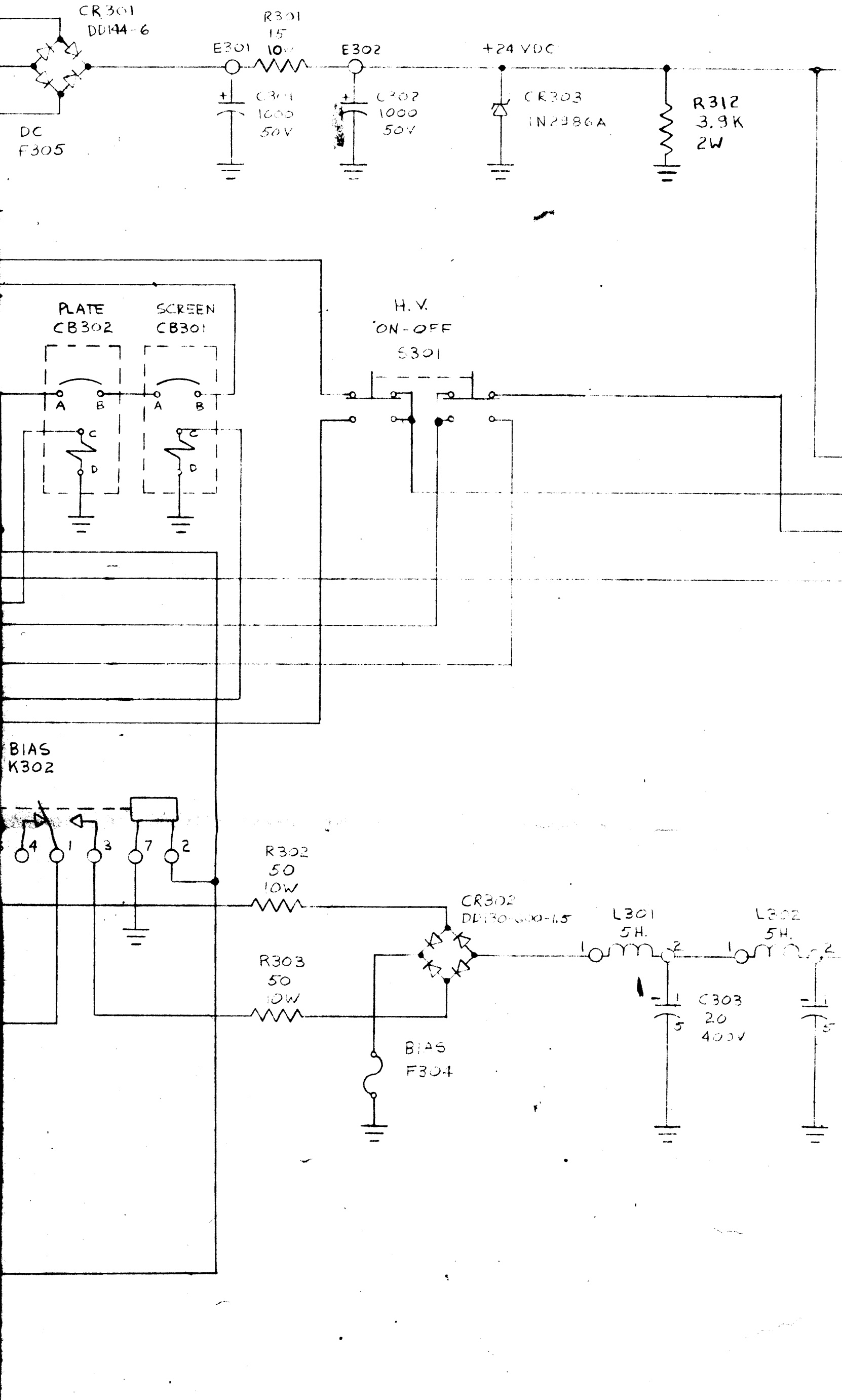
FILA F302

FILA & BIAS T301

1 C
2 105
3 115
4 125
5 C
6 105
7 115
8 125
230 12
230 11
9 10
6.8 9

5 8 6 4 1 3 7 2

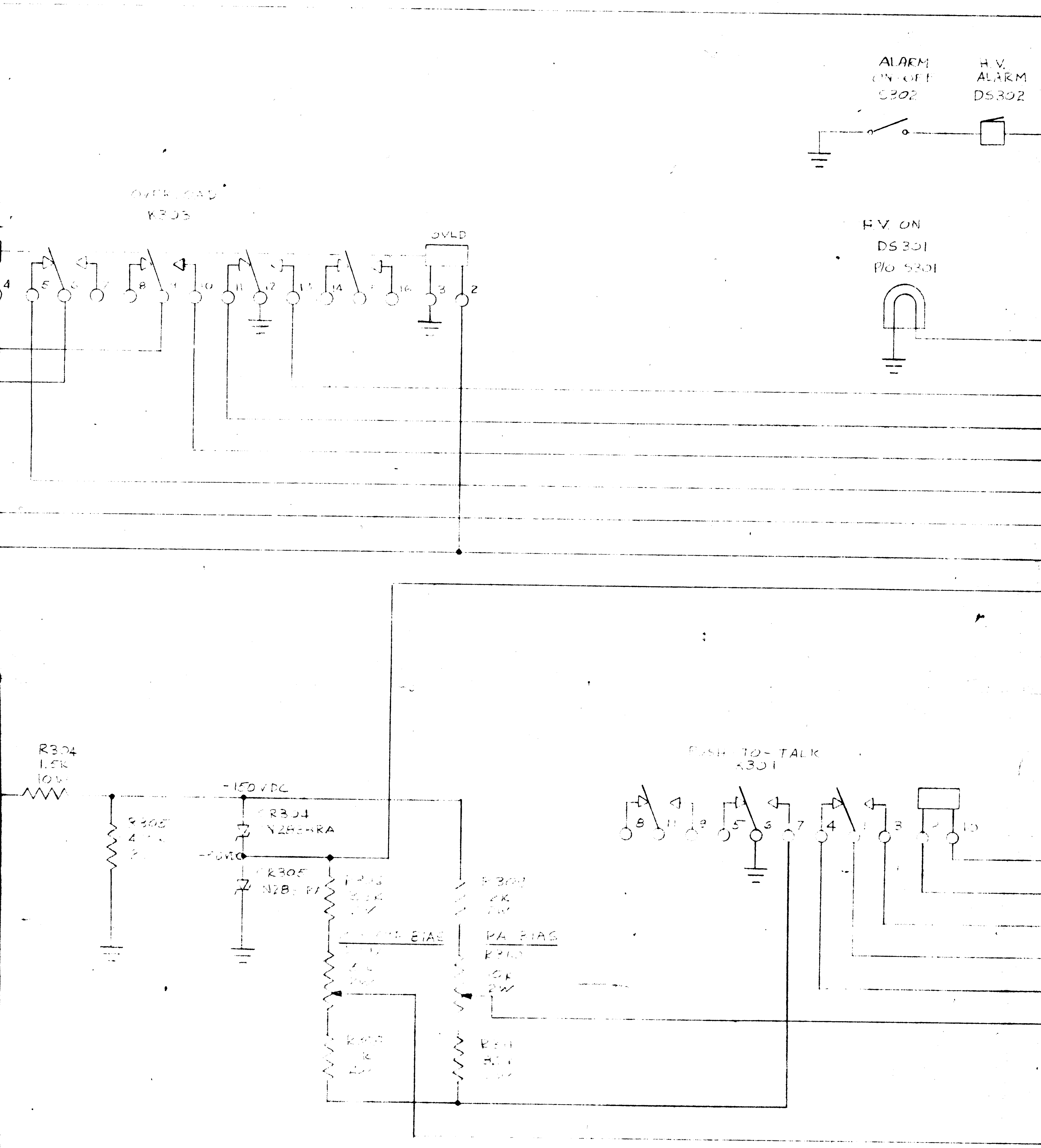
CONTROL F306


CR301
DD144-6
DC
F305
R301
15
10W
E301
E302
+24 VDC
C301
1000
50V
C302
1000
50V
CR303
IN2986A
R312
3.9K
2W
PLATE
CB302
SCREEN
CB301
A
B
C
D
H.V.
ON-OFF
S301
RESET
OVERLOAD
K303
BIAS
K302
R302
50
10W
R303
50
10W
CR302
L301
5H.
L302
5H.
C303
20
400V
C304
20
400V
BIAS
F304
-50VDC

4 | 3 | 2

REVISIONS

E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION
[illegible]	[illegible]	[illegible]		X1	Add J301-[illegible], N
				[illegible]	ORIGINAL RELEASE FOR PRODUCTION

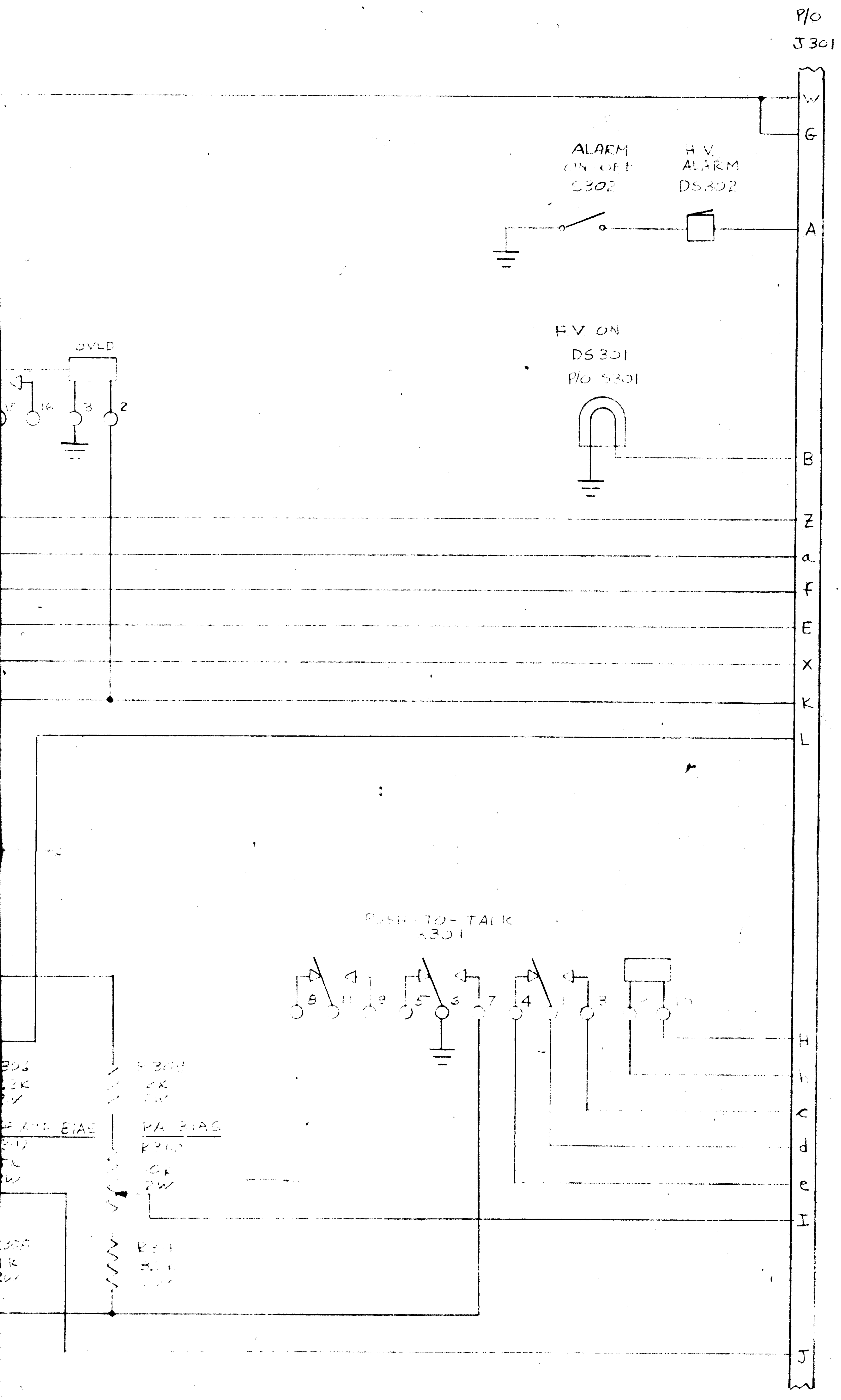


3 | 2 | 1

REVISIONS

E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED
4-	[illegible]	[illegible]		X1	Add J301-b, g, N	14 Oct 70	[illegible]
				X	ORIGINAL RELEASE FOR PRODUCTION	1/26/71	[illegible]

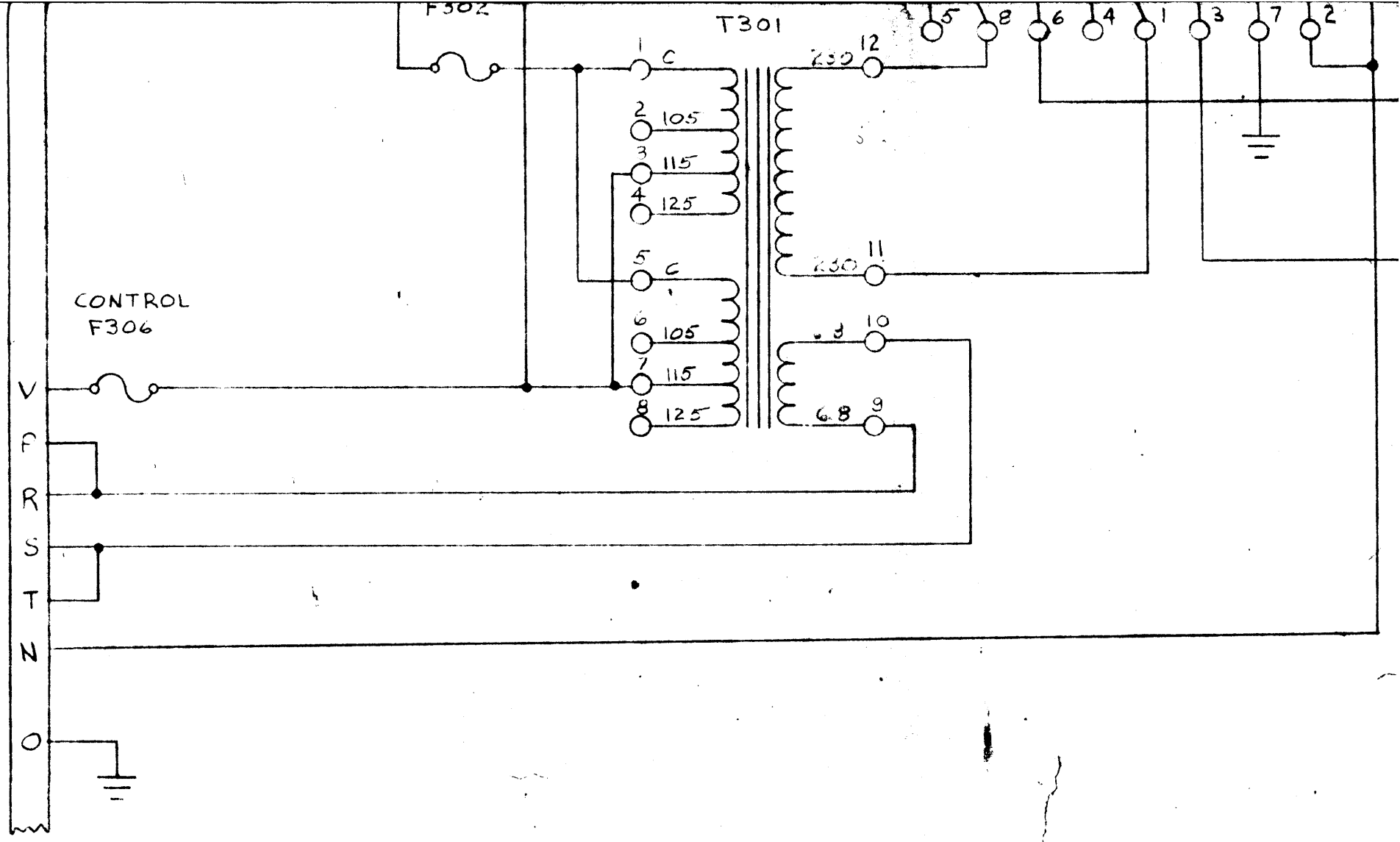
D



C

B

CK1840



LAST SYMBOLS	
C304	R312
CB302	S302
CR305	T302
DS302	XC304
F306	XCR305
J301	XDS301
K303	XF306
L302	XK303
M301	W301
TB301	E306

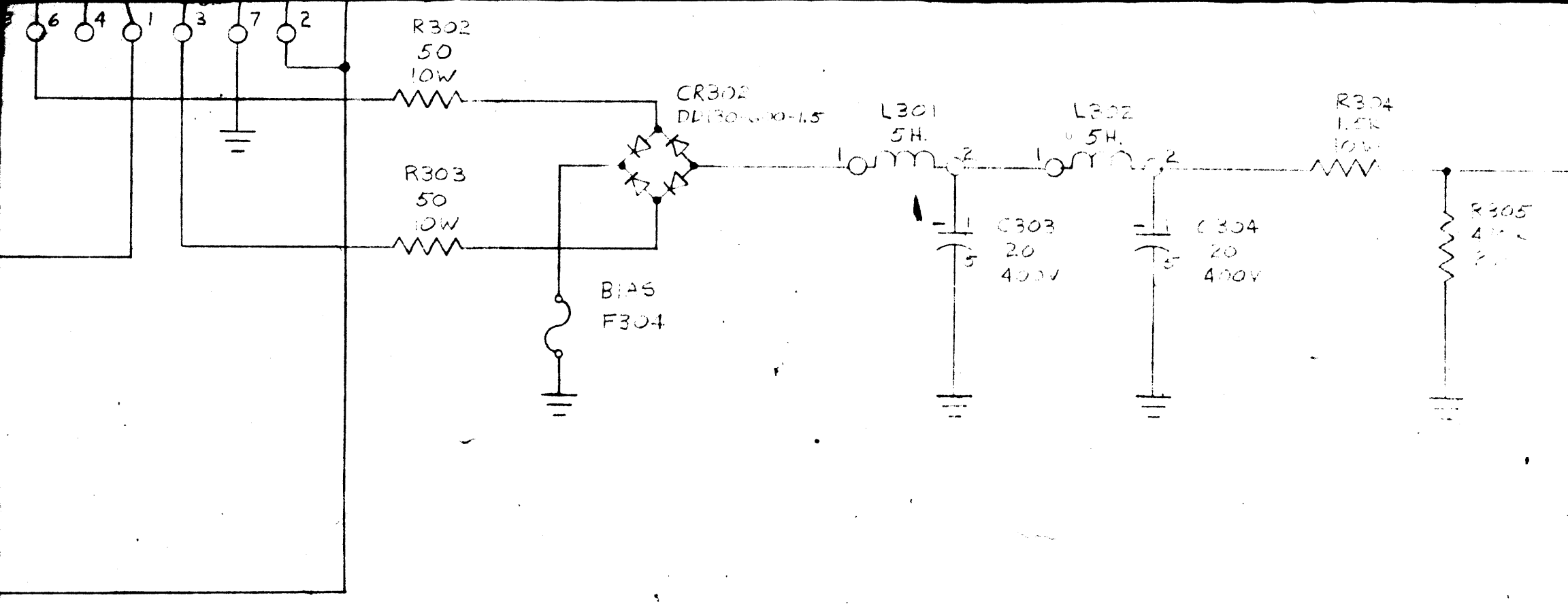
MISSING SYMBOLS
XC 301, 2
XC R 301, 2, 3

E303, 304, 305, 306 NOT SHOWN.

UNLESS OTHER

ALL RESISTAN

ALL CAPACITAN



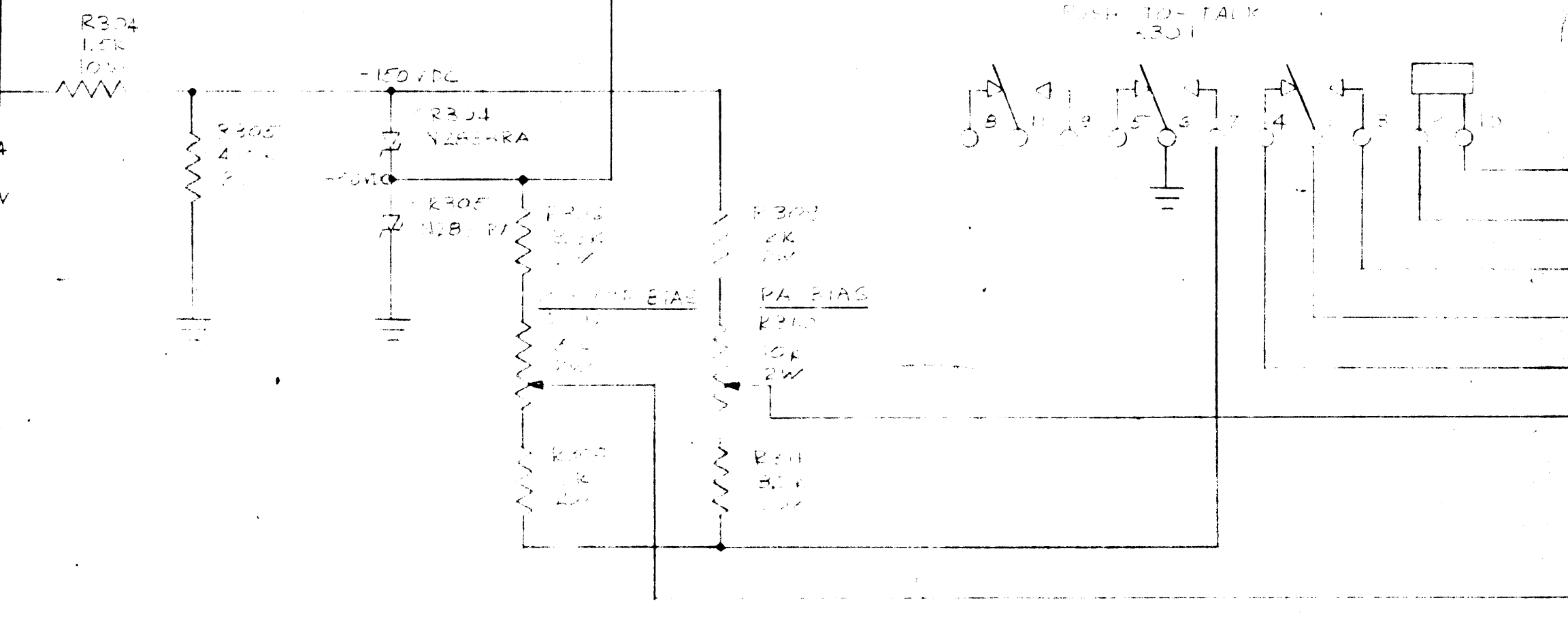
UNLESS OTHERWISE SPECIFIED:

ALL RESISTANCE IN OHMS ½W.

ALL CAPACITANCES IN MFD.

QTY / UNIT	MODEL USED ON
APPLICATION	
	CODE

6 5 4



QTY. REQ.	ITEM	PART NO.	DESCRIPT
RUDETT			LIST OF MATERIAL

FINAL APPROVAL	DATE 25 Jan. 71	THE TECHNICA
MECH. DES.	DATE	MAMARONE
ELECT. DES.	DATE 25 Ja. 71	DIAGRAM, SC
CHECKED	DATE	L.Y ± BIAS SU
DRAWN	DATE 12 AUG 70	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

TOLERANCES ON

DECIMALS	FRACTIONS
.X ± .05	± 1/64
.XX ± .01	ANGLES
.XXX ± .005	± 0° -30'

MATERIAL

FINISH

SIZE	CODE IDENT NO.	DWG NO.
D	82679	C4

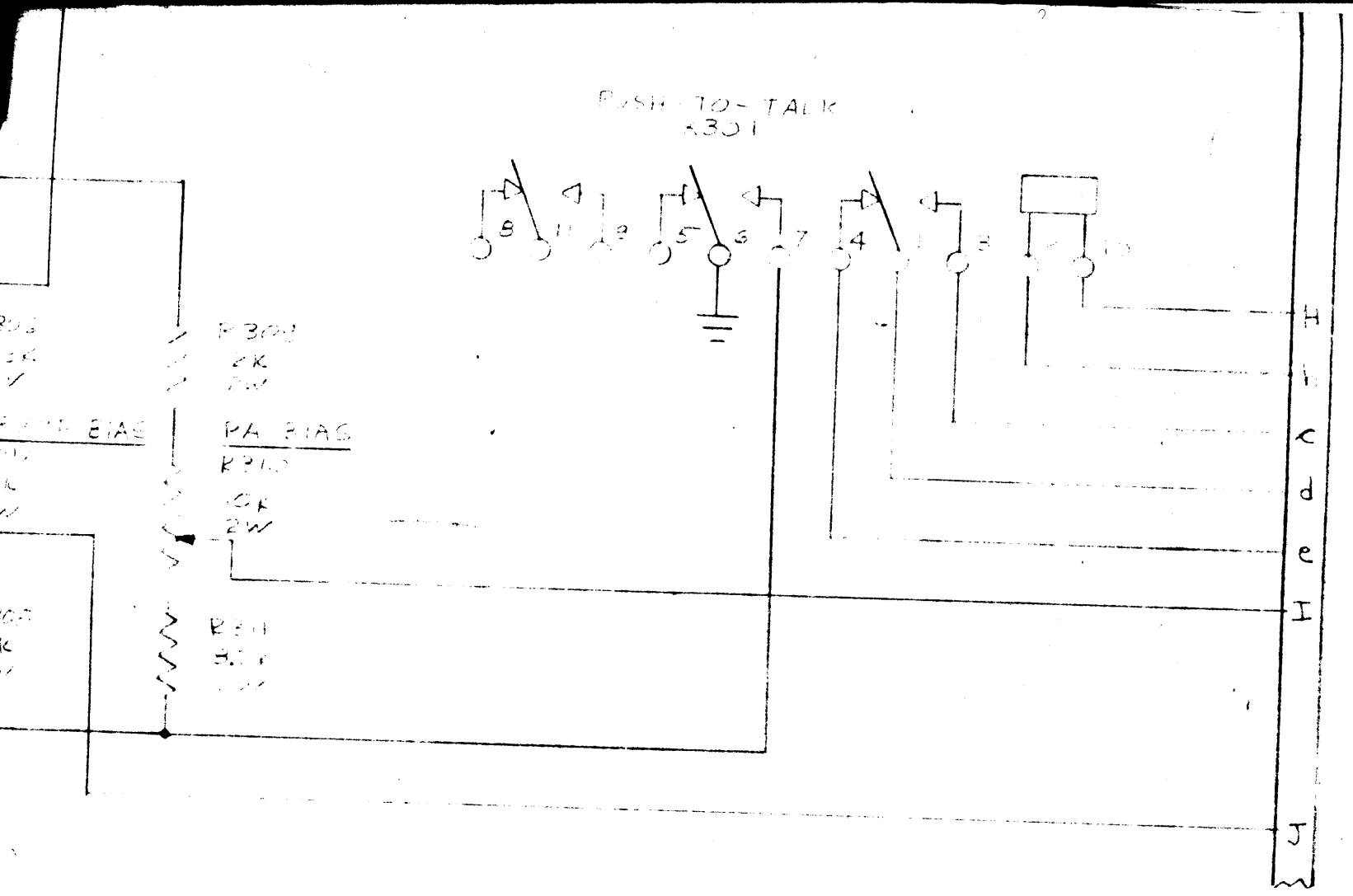
SCALE

AP [illegible]	
MODEL USED ON	ASS'Y NO.

APPLICATION

CODE

4 3 2

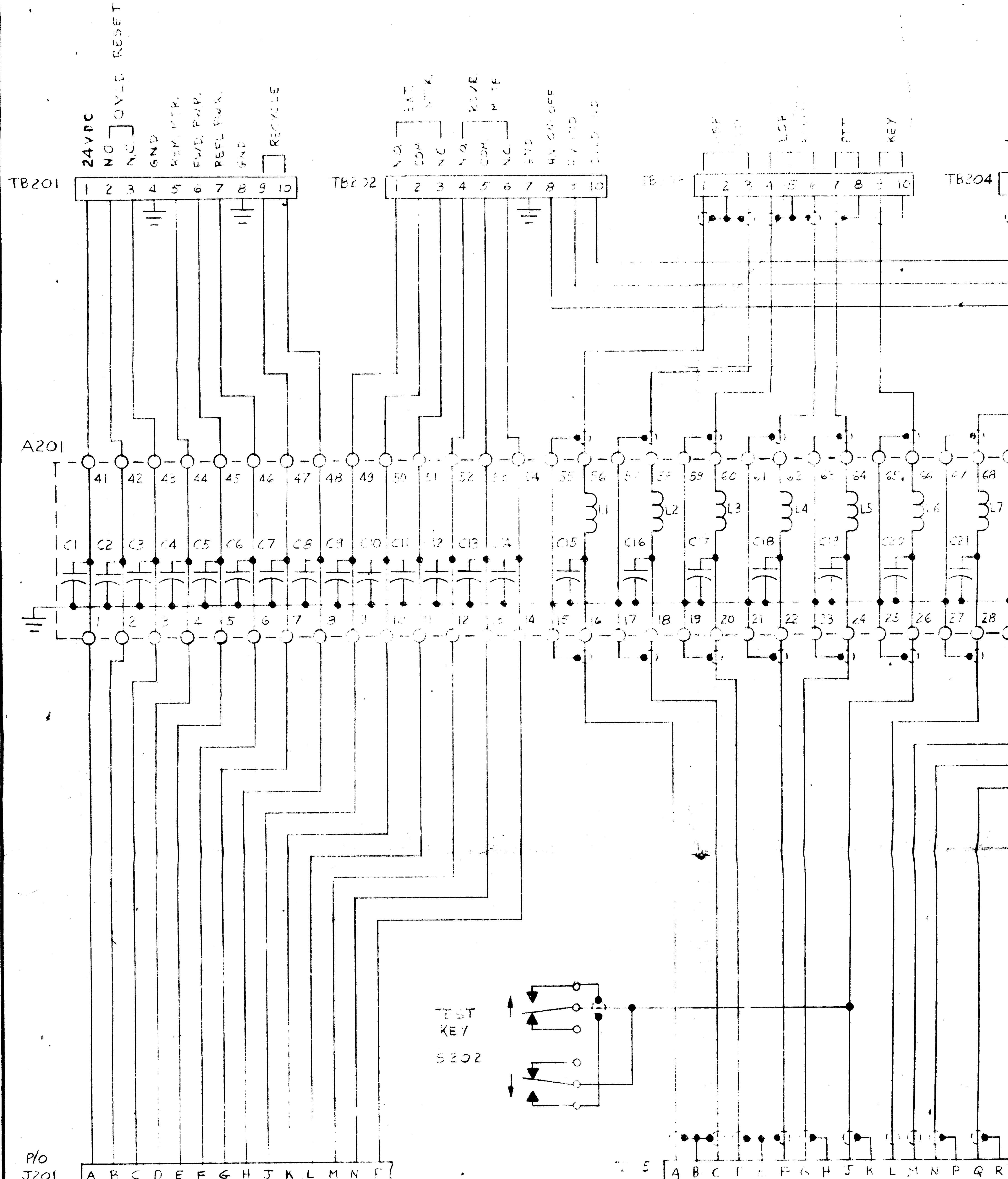


QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL
BUDETT			LIST OF MATERIAL	

LESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES	FINAL APPROVAL	DATE 25 Jan. 71	THE TECHNICAL MATERIEL CORP. MAMARONECK, NEW YORK
TOLERANCES ON DECIMALS ± .05 ± .01 ± .005 FRACTIONS ± 1/64 ANGLES ± 0° -30'	MECH. DES.	DATE	DIAGRAM, SCHEMATIC L.V. & BIAS SUPPLY, AP 149
	ELECT. DES.	DATE 25 Jan. 71	
	CHECKED	DATE	
	DRAWN	DATE 12 AUG 70	
MATERIAL			SIZE D · CODE IDENT NO. 82679 · DWG NO. CK1840 · ISSUE 0
			SCALE · SHEET OF

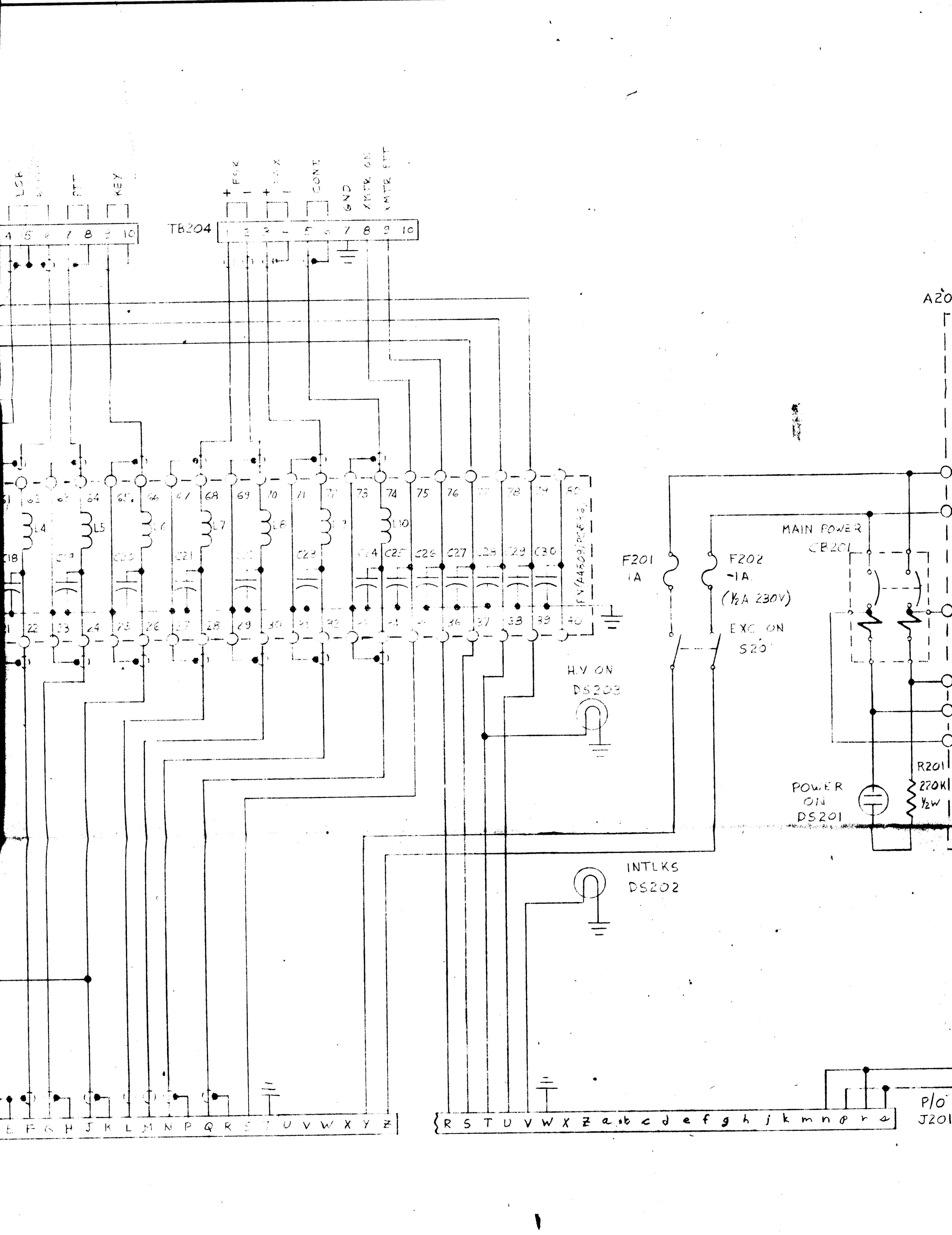
A

3 2 1



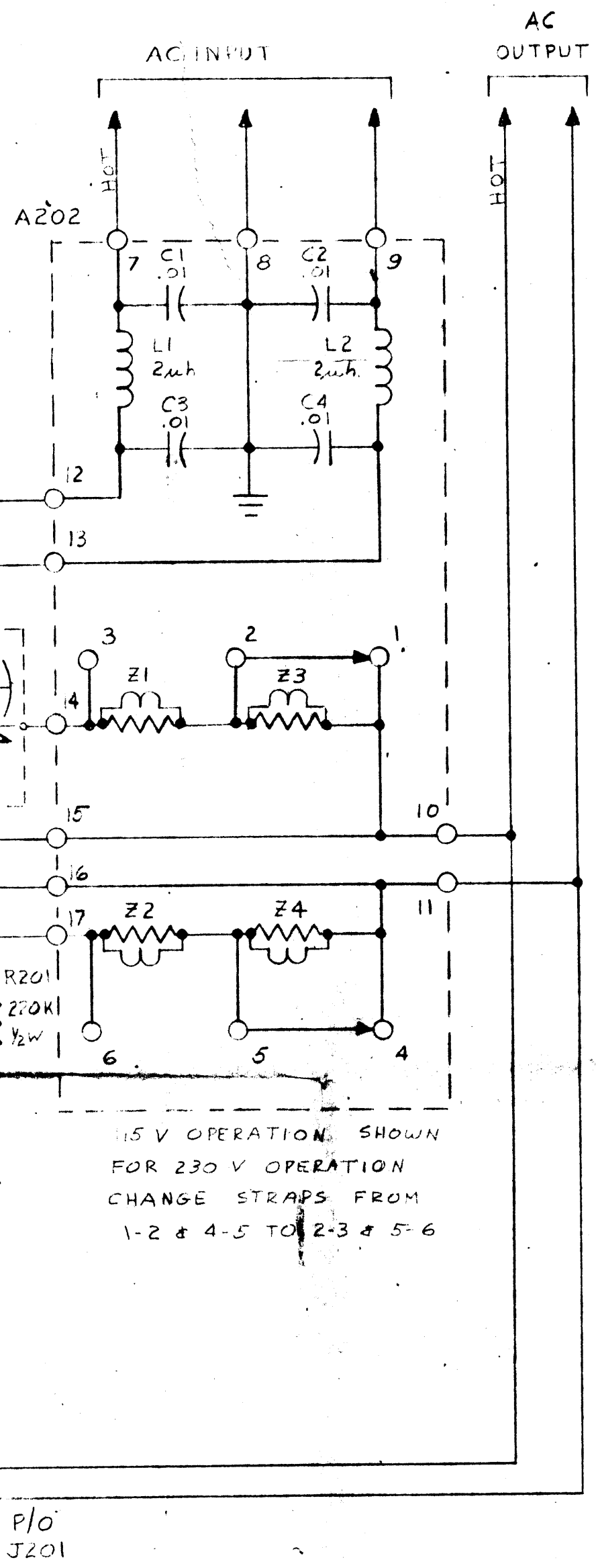
UNLESS OTHERWISE SPECIFIED:
ALL CAPACITORS IN MFD.
ALL INDUCTANCES IN uH.
A201C1-A201C30 ARE .01

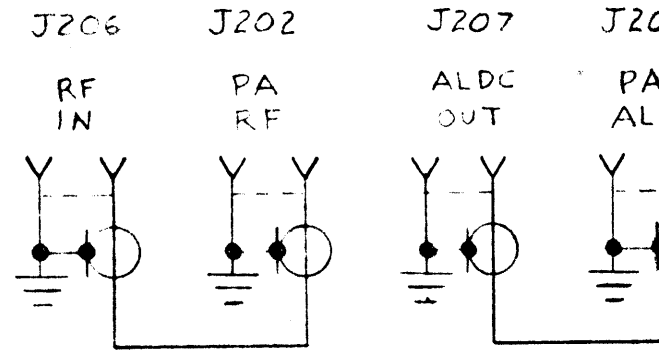
6 5 4


KEY
PTT
TB204
FSK
CONT
GND
XMTR ON
XMTR PTT
A20
L4
L5
L7
L8
L10
C18
C21
C23
C25
C26
C27
C30
F201
1A
F202
1A
(½A 230V)
MAIN POWER
CB201
EXC ON
H.V ON
DS203
INTLKS
DS202
POWER
ON
DS201
R201
270K
½W
P/O
J201

4	3	2

E.M.N.NO	DRAFT	CHKD	ZONE	LTR	REV DESCRIPTIO
	QJ			Ø	ORIGINAL RELEASE FOR PRODU





LAST SYMBOLS

200	A201	A202
A202	C30	C4
CB201	E80	E17
DS203	L10	L2
F202		Z4
J208		
R201		
S202		
TB204		
W208		
XDS203		
XF201		

REVISIONS							
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED
	DJ			D	ORIGINAL RELEASE FOR PRODUCTION	6/27/70	

AC
OUTPUT

HOT

J206 RF IN

J202 PA RF

J207 ALDC OUT

J203 PA ALDC

J208 MON OUT

J204 MON IN

9

12
with.

1

10

11

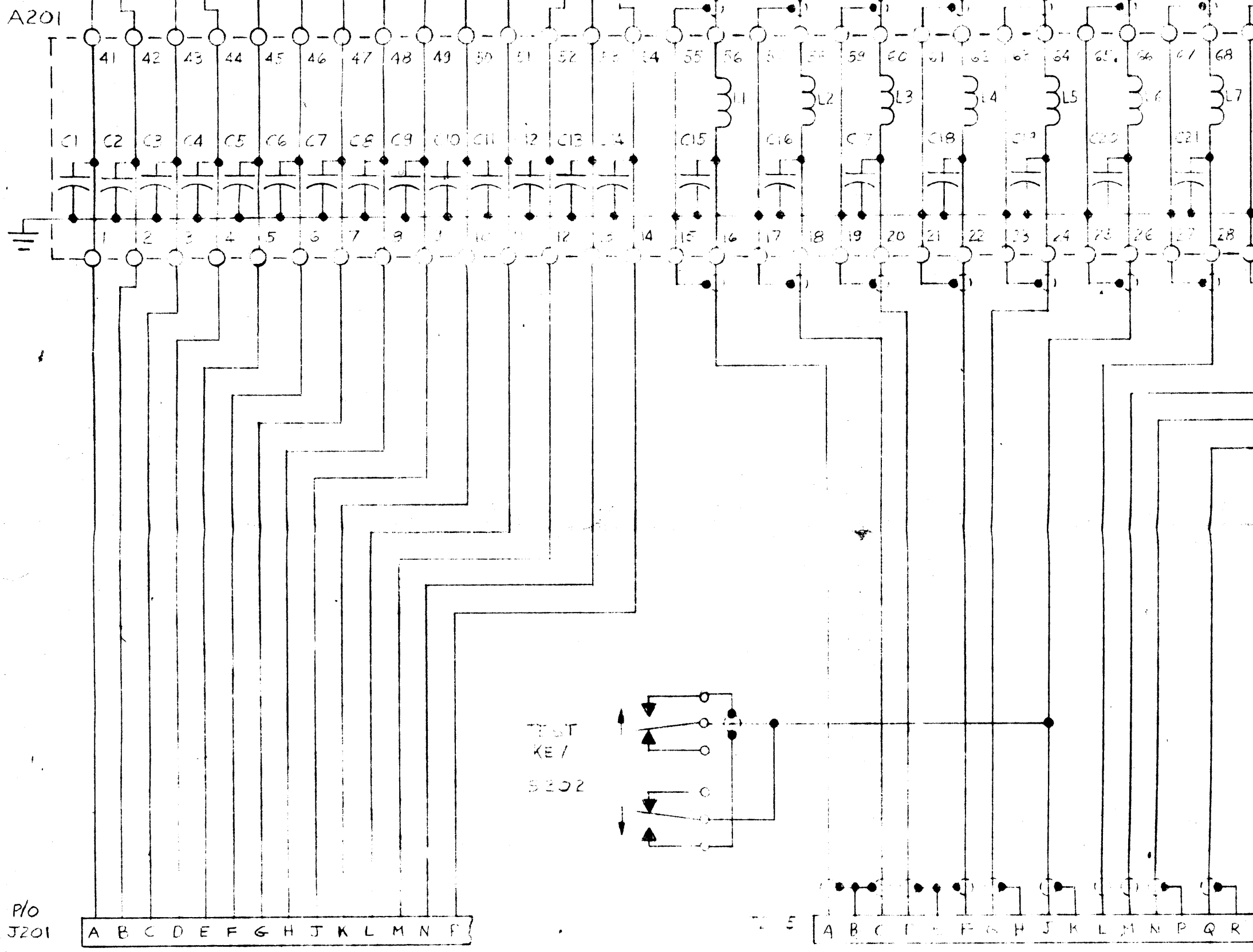
4

SHOWN
TION
FROM
3 & 5-6

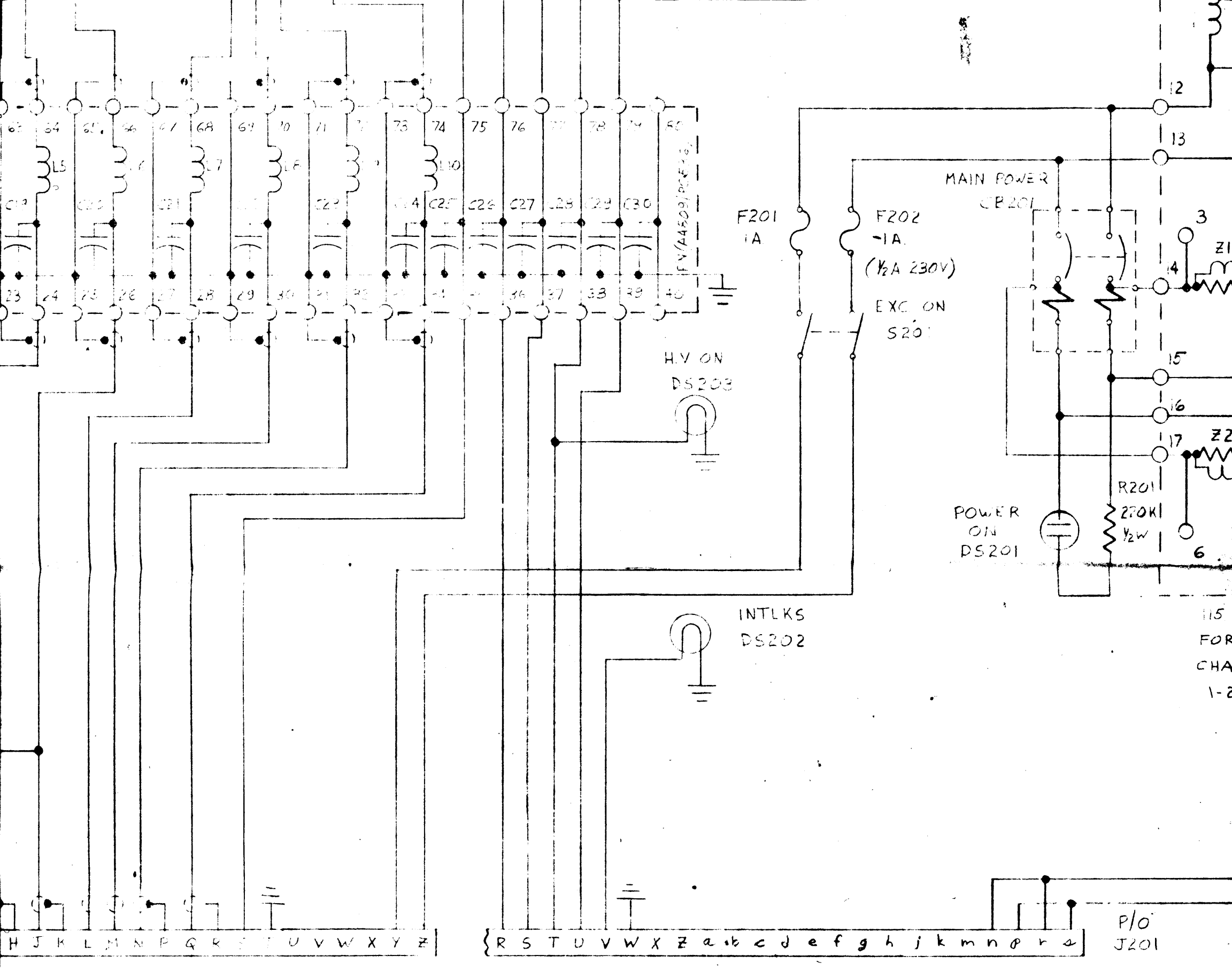
LAST SYMBOLS

200	A201	A202
A202	C30	C4
CB201	E80	E17
DS203	L10	L2
F202		Z4
J208		
R201		
S202		
TB204		
W208		
XDS203		
XF201		

CK1787

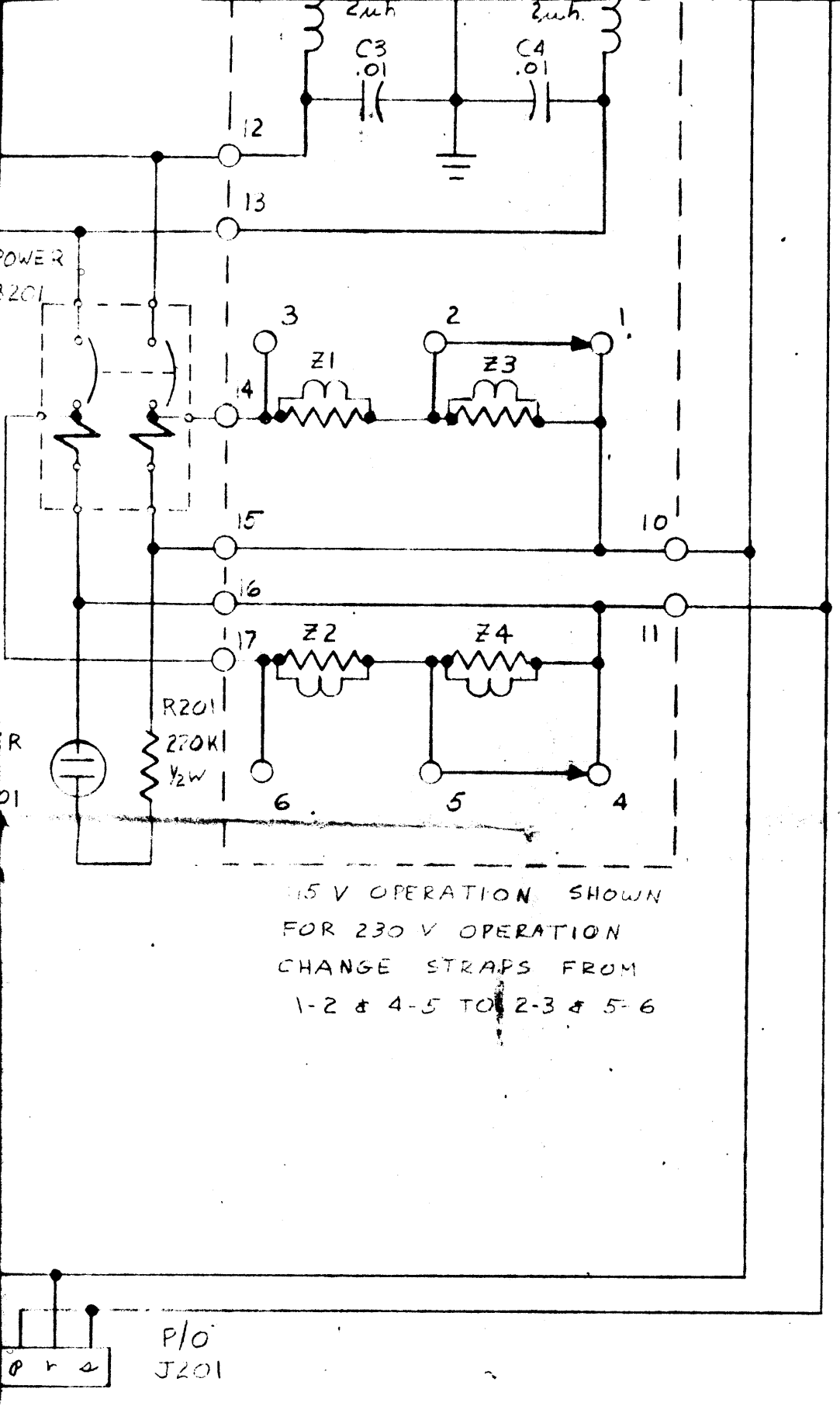


UNLESS OTHERWISE SPECIFIED:
ALL CAPACITORS IN MFD
ALL INDUCTANCES IN MH
A201C1-A201C30 ARE .01
A201L1-A201L10 ARE 10



1	APP-18	
QTY / UNIT	MODEL USED ON	AS
APPLICATION		
	CODE	

6 5 4



P/O
J201

LAST SYMBOLS

200	A201	A202
A202	C30	C4
CB201	E80	E17
DS203	L10	L2
F202		Z4
J208		
R201		
S202		
TB204		
W208		
XDS203		
XF201		

-18	
ODEL USED ON	ASS'Y NO.

PLICATION

	CODE

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

TOLERANCES ON

DECIMALS	FRACTIONS
.X ± .05	± 1/64
.XX ± .01	ANGLES
.XXX ± .005	± 0° -30'

MATERIAL

FINISH

QTY. REQ.	ITEM	PART NO.	DESCRIPTION
BUDETTI			LIST OF MATERIAL

FINAL APPROVAL	DATE 27 AUG 70
MECH. DES.	DATE
ELECT. DES.	DATE 25 AUG 70
CHECKED	DATE
DRAWN	DATE 15 JUN 70

THE TECHNICAL MATERI
MAMARONECK, NEW Y

DIAG, SCHEMATIC

APP-18

SIZE	CODE IDENT NO.	DWG NO.
D	82679	CK17

SCALE

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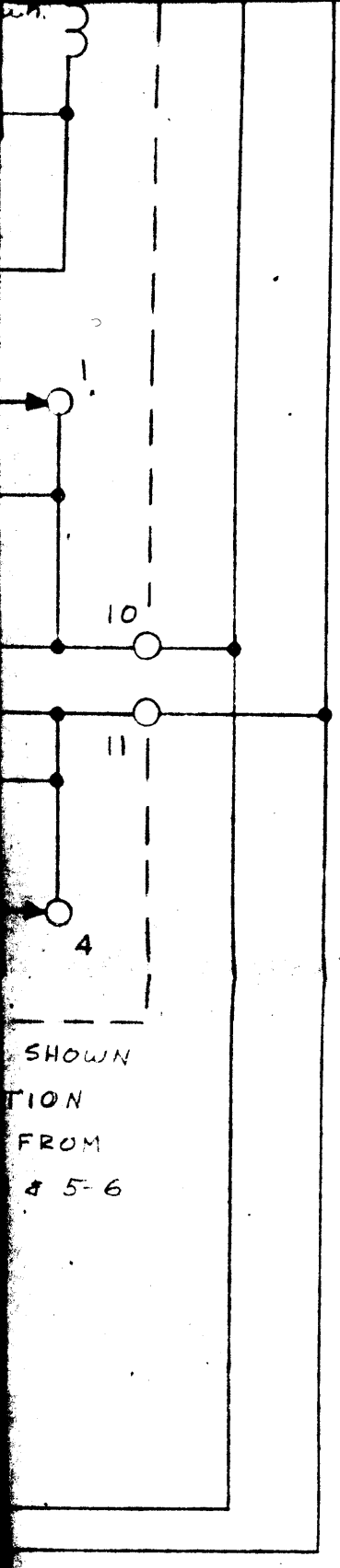

SHOWN
TION
FROM
& 5-6

LAST SYMBOLS

200	A201	A202
A202	C30	C4
CB201	E80	E17
DS203	L10	L2
F202		Z4
J208		
R201		
S202		
TB204		
W208		
XDS203		
XF201		

C

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CK1787 Ø

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QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL
BUDETTI			LIST OF MATERIAL	

SS OTHERWISE SPECIFIED
NSIONS ARE IN INCHES
LUDE CHEMICALLY APPLIED
OR PLATED FINISHES

TOLERANCES ON

ALS	FRACTIONS
.05	± 1/64
.01	ANGLES
.005	± 0° -30'

AL

FINAL APPROVAL		DATE 27 AUG 70
MECH. DES.		DATE
ELECT. DES.		DATE 25 AUG 70
CHECKED		DATE
DRAWN		DATE 15 JUN 70

THE TECHNICAL MATERIEL CORP.
MAMARONECK, NEW YORK

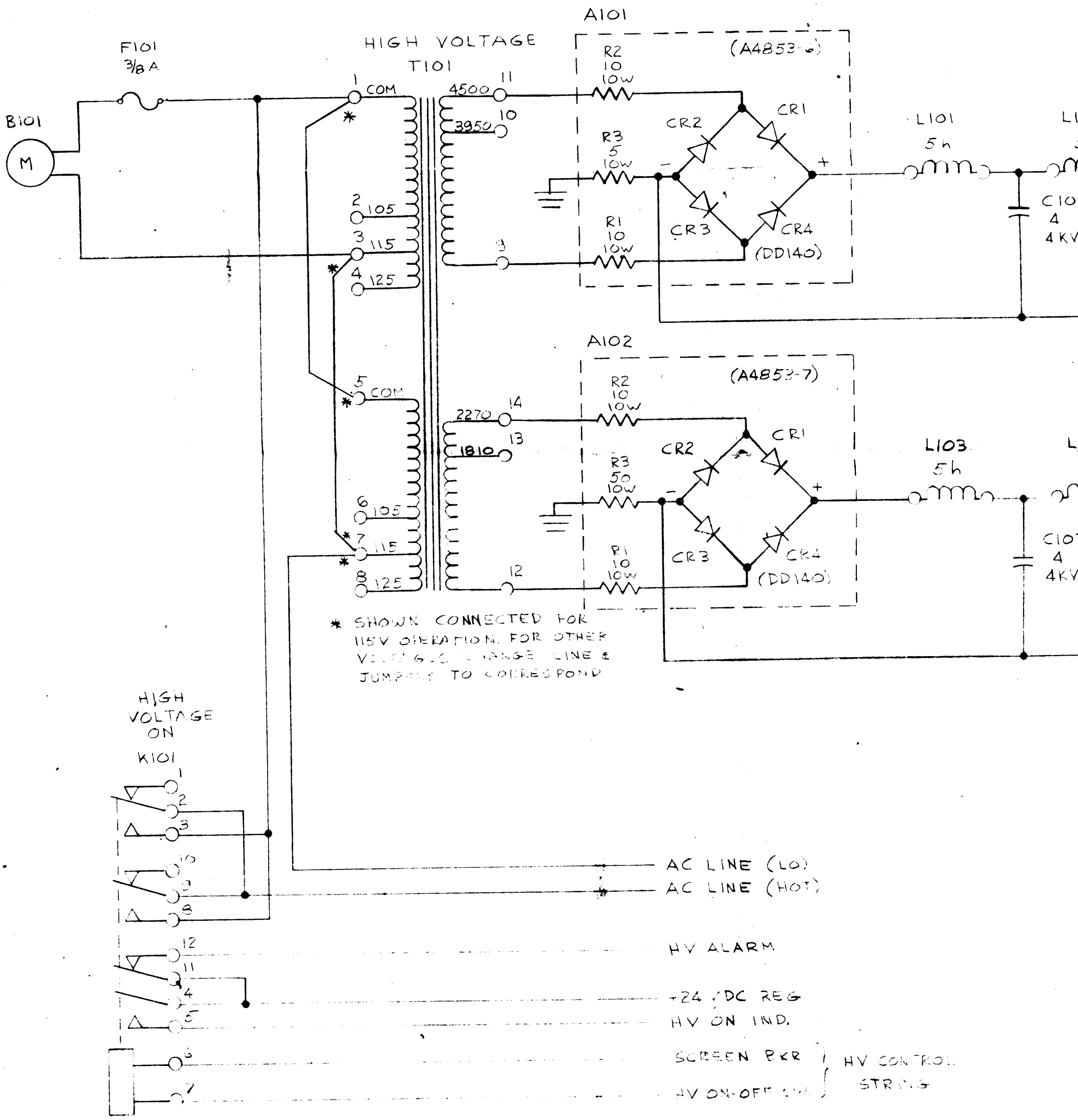
DIAG, SCHEMATIC

APP-18

SIZE	CODE IDENT NO.	DWG NO.	ISSUE
D	82679	CK1787	Ø

SCALE | SHEET OF

8 2 1



LAST SYMBOLS			
100	A101	A102	A103
A103	CR4	CR4	CR2
B101	R3	R3	E8
C105			R9
F101			
K101			
L104			
R102			
T101			
XF101			
XK101			

PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX REFERENCE DESIGNATION WITH ASSEMBLY DESIGNATION.

1	HFLM-1K	AP150
QTY / UNIT	MODEL USED ON	ASS'Y NO.

APPLICATION

CODE

UNLESS OTHE
DIMENSIONS
AND INCLUDE C
OR PLAT

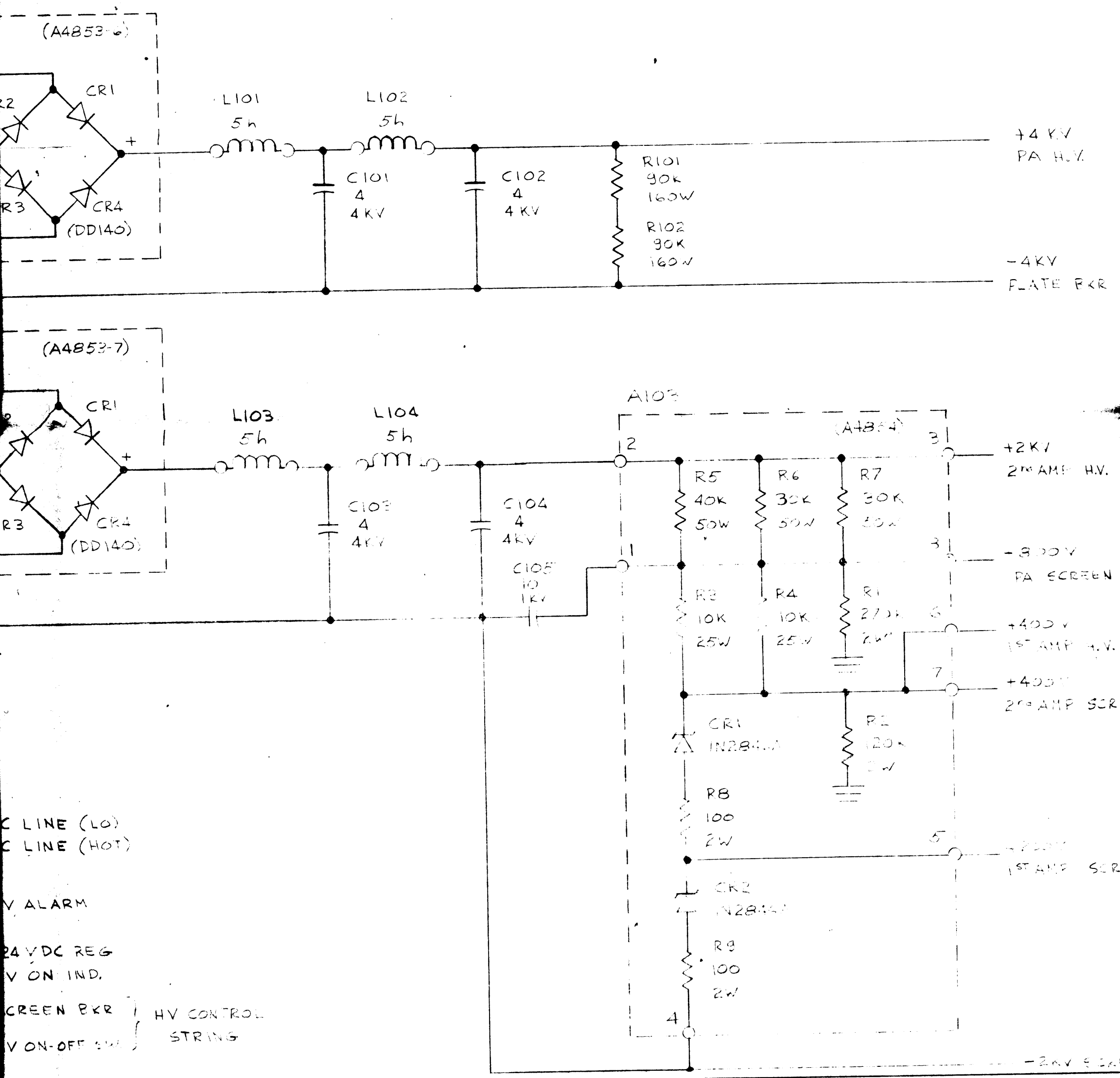
TOLER
DECIMALS
.X ± .05
.XX ± .01
.XXX ± .005

MATERIAL

FINISH

3 2 1

REVISIONS						
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DA
						5/71



QTY. REQ.	ITEM	PART NO.	DESCRIPTION
			LIST OF MATERIAL

EDITT

FINAL APPROVAL		DATE 4 Feb 71
MECH. DES.		DATE
ELECT. DES.		DATE 4 Feb 71
CHECKED		DATE
DRAWN		DATE 12 Jan 71

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

TOLERANCES ON

DECIMALS
.X ± .05
.XX ± .01
.XXX ± .005

FRACTIONS
± 1/64

ANGLES
± 0° -30'

MATERIAL

FINISH

THE TECHNICAL MATERIEL
MAMARONECK, NEW YOR

DIAG[illegible], SCHEMA
HIGH VOLTAGE POWER SU
AP150

SIZE	CODE IDENT NO.	DWG NO.
C	82679	CK184

SCALE

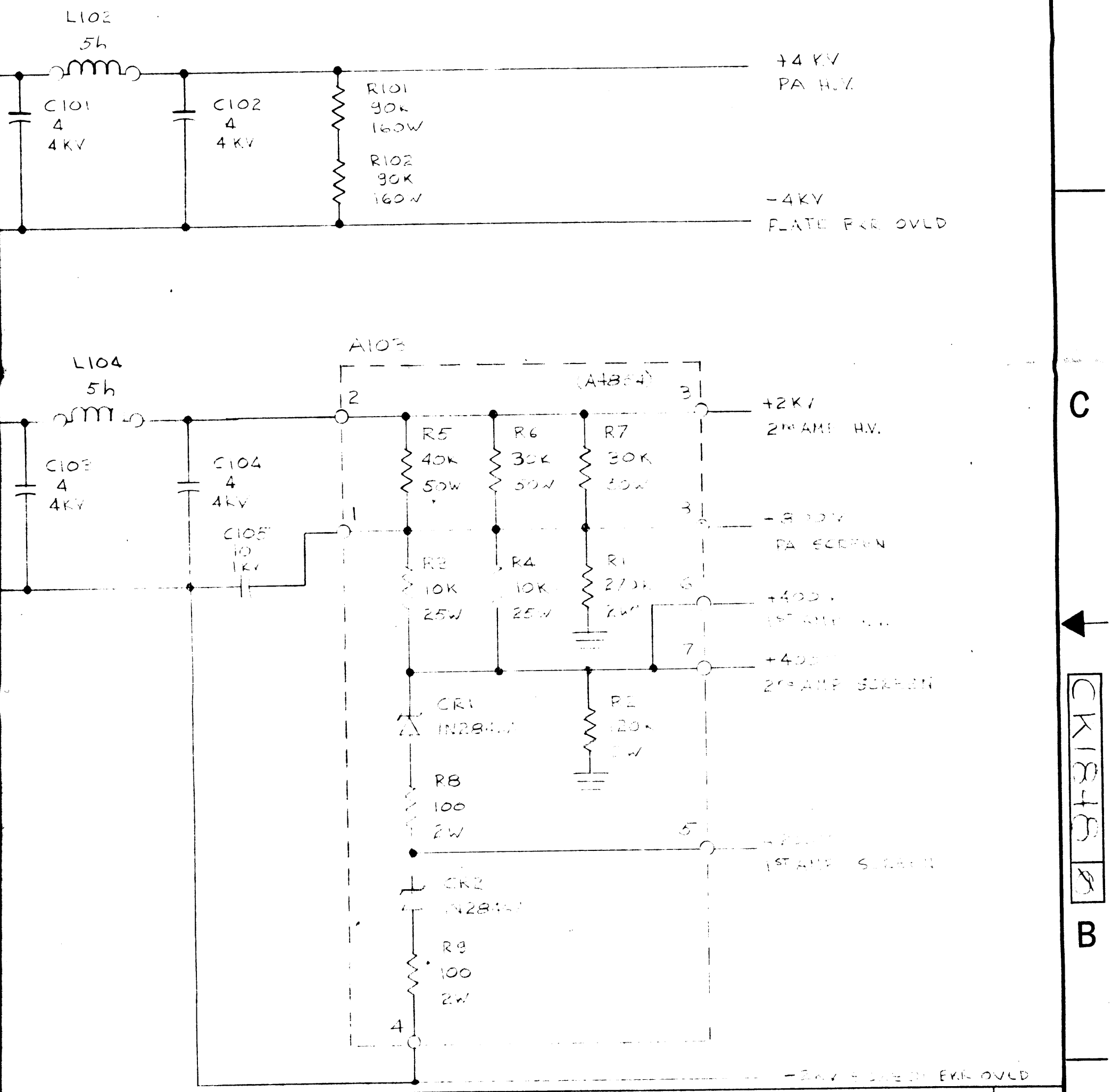
-1K | AP150
EL USED ON | ASS'Y NO.

LICATION

CODE

3 2 1

REVISIONS							
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED
	CD			C		9/30/71	DES



QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL
			LIST OF MATERIAL	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TO INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES	FINAL APPROVAL	DATE 4 Feb 72	THE TECHNICAL MATERIEL CORP. MAMARONECK, NEW YORK
	MECH. DES.	DATE	
TOLERANCES ON DECIMALS .X ± .05 .XX ± .01 .XXX ± .005 FRACTIONS ± 1/64 ANGLES ± 0° -30'	ELECT. DES.	DATE 4 Feb 72	DIAGRAM, SCHEMATIC HIGH VOLTAGE POWER SUPPLY AM-0
	CHECKED	DATE	
	DRAWN	DATE 12 Jan 71	
MATERIAL			SIZE C · CODE IDENT NO. 82679 · DWG NO. CK1843 · ISSUE Ø
FINISH			SCALE · SHEET OF

4	3	2	1

REVISIONS							
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPR

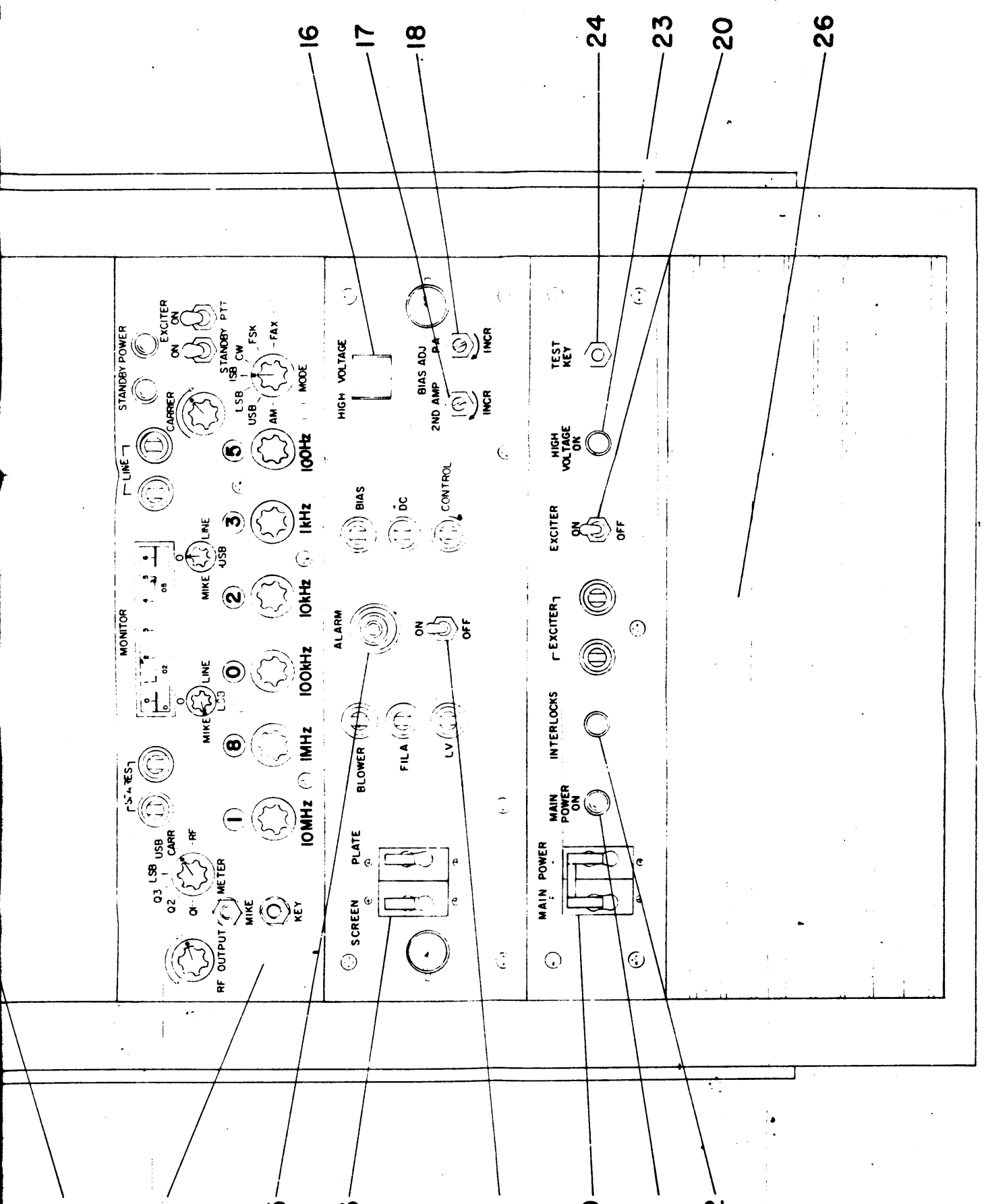


FIGURE 3-1 . CONTROLS AND INDICATORS LOCATION

QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMB

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

TOLERANCES ON

DECIMALS	FRACTIONS
.X ± .05	± 1/64
.XX ± .01	ANGLES
.XXX ± .005	± 0° 30'

MATERIAL

FINISH

	DATE
FINAL APPROVAL	
MECH. DES	
ELECT. DES.	
CHECKED	
DRAWN	

THE TECHNICAL MATERIEL CORP.
MAMARONECK, NEW YORK

SIZE	CODE IDENT NO.	DWG NO.	ISS
D	82679		

SCALE | SHEET OF

QTY / UNIT	MODEL USED ON	ASS'Y NO.
APPLICATION		
	CODE	

4	3	2	1