KCNO 94.5 FM
LYMAN JAY'S MANUAL

CCA

FM-3,000D, 3KW FM BROADCAST TRANSMITTER TECHNICAL MANUAL

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FM-3,000D

TECHNICAL SPECIFICATIONS

Performance Specifications

Type of Emission	F3 FM
Frequency Range (specify)	87.5 to 108 mhz
Rated Power Output 87.5 – 108 mhz	3500 watts
RF Output Impedance	50 ohms (1 5/8")
Input Impedance (Audio)	600 ohms
Input Audio Level	0 dbm max.
Amplitude vs. Frequency	± ½ db 50 to 15,000 cycles
Carrier Frequency Stability	± 1000 cycles
Modulation Capability	± 100 KC
Audio Frequency Distortion	1.0% max. 50-100 cycles 0.5% max. 100-7500 cycles 1.0% max. 7500-15,000 cycles
FM Noise below ± 75KC	65 db
AM Noise, RMS	55 db below carrier
Harmonic Attenuation (Ratio of any single harmonic to carrier)	At least 80 db

Electrical Specifications

Power Line Requirements:	
Voltage (Specify)	230V, 50/60 cycles, 3 phase or 1 phase
Slow Line Variations	± 5%
Rapid Line Variations	± 3%
Power Consumption	6,000 watts (approx.)
Power Factor (approx.)	90%

Mechanical Specifications

Transmitter-overall dimensions	
Width	34"
Height	76"
Depth	32"
Gross Weight	1400 lbs. approx.
Ambient Temperature	0° to 50°C

DESCRIPTION

GENERAL

The FM-3, 000D, 3KW Broadcast Transmitter is designed particularly to provide service for major metropolitan and large service markets. In conjunction with the CCA Subsidiary Generator, service can be simultaneously transmitted in conjunction with normal program information. In addition, when used with a type approved stereo generator and exciter it can meet FM stereo requirements and simultaneous SCA transmission.

MECHANICAL

The FM-3, 000D is housed in medium sized modern cabinet which occupies approximately 9 square feet of floor space. Associated with this cabinet and included with the equipment is a harmonic filter and directional coupler that are installed in the output transmission line on top of the cabinet.

The transmitter is so designed that normal operation is achieved without any requirement for opening any doors. Front panel controls are available at a convenient hip level.

Within the transmitter exists one circuit breaker and slow blow fuses for backup protection, fast acting, reliable overload relays, and toggle switches for preliminary tuning procedures. In addition, the RF tuning controls are all available on the front panel.

Indicating lights describe the status of every major circuit.

3 ½" modern meters are prominently displayed on the front meter panel. These meters indicate all major functions as required by the FCC. In addition, an incident and reflected power output meter exists on this front panel.

Vertical panel construction is used throughout the equipment to minimize the affect of blind spots created with shelf construction.

200% reserve in cooling is utilized in the equipment. All air entering the cabinet must come though a filtered rear cabinet door. The outlet air is available at the top of the cabinet.

There is no external vault with the FM-3,000D. All components are mounted within the one cabinet save for the external harmonic filter and directional coupler.

ELECTRICAL

The FM-3,000D consists of a standard type approved FM broadcast exciter capable of producing 10 watts power output. Actually, only three watts are required to drive the 8122 IPA. This tube is normally used at 400 mc. Thus perfect isolation between input and output circuits is easily achieved at the comparatively low VHF FM frequencies, and thus no requirement for neutralization of this stage exists.

A Pi network couples the energy from this stage to the 3CX3000A7 power amplifier. This high mu, zero bias triode has its grid connected directly to DC ground and thus all problems associated with neutralization, RF bypass, and other malfunctions common to high power FM amplifier stages are non-existent. Both the loading and tuning circuits are essentially variable shunt inductances. The output power from the equipment is developed across the fixed inductance section of the loading inductance. Following the output circuit there exists a harmonic filter which attenuates all harmonics of the transmitter output a minimum of 60db and a directional coupler which reads both the incident and reflected power to the output transmission line.

The control circuit of the equipment is such that front panel switches operate contactors, which in turn supply the operating voltages to the equipment. This design permits remote control operation.

All power supplies within the equipment utilize conservatively rated silicon rectifiers. Each silicon has associated with it RG circuits to prevent damage due to transients. A minimum reserve of 100% exists both in PIV and current for every silicon.

The equipment includes an automatic overload recycling circuit, which will restore plate voltage to the transmitter after a fault and repeat this procedure three times. If the fault still persists the equipment will remain off. If the fault does not persist the automatic overload recycling circuit will automatically clear itself and be available for three more recycles in the event of a fault.

THEORY OF OPERATION

EXCITER PANEL

Refer to the instruction book on the type-approved exciter used in the transmitter. CCA has available several exciters, a vacuum tube serrasoid exciter recommended for economy and simultaneous monaural and SCA operation, a vacuum tube Direct FM Exciter and a solid state Direct FM Exciter.

IPA

The intermediate power amplifier of the FM-3, 000D is essentially a Class C amplifier, which normally operates at UHF. This approach eliminates any requirement for neutralization and achieves perfect isolation between input and output circuits. The input to this stage contains both a tuning and loading control for an inverted Pi network.

The output circuit of this stage is a Pi network, which also serves as the PA input circuit. The IPA has an output power capability in excess of 300 watts, but only 150 watts of drive is required on the final stage. Thus, conservative operation is assured.

POWER AMPLIFIER

The final amplifier of the FM-3, 000D is a zero bias, high mu triode, identified by the Eimac type number 3CX3000A7. This ceramic triode has a power gain of approximately 20 in the grounded grid configuration. The tube is so rated that with the grid connected directly to DC ground and RF drive, that the plate dissipation of the tube cannot be exceeded. The ability to ground the grid eliminates the requirement for RF bypasses, a bias supply, and assures perfect isolation between input and output circuits. No neutralization is required for this stage.

The output circuit of the power amplifier utilizes shunt inductance as loading and tuning controls.

CONTROL LADDER

Referring to the schematic on the transmitter, it can be seen that the application of the main circuit breaker S1 will apply voltage to the line voltage meter M1. Rotating the switch S13 in its three positions will enable the operator to read voltage in any of the desired positions. The application of the start switch S2 will actuated the start contactor K4. Its contacts will apply voltage to the control transformer T2. The secondary of the control transformer will apply voltage to the PA blower as well as applying voltage to the exciter power supply. Simultaneous to the application of the voltage to the blower and the exciter power supply, voltage is also supplied to transformer T3. This transformer feeds a rectifier and filter system which develops screen voltage for the intermediate power amplifier. This voltage is applied to the screen of the intermediate power amplifier through the auxiliary contact of the plate contactor. Thus, only upon the application of the plate contactor will screen voltage be applied to the intermediate power amplifier.

After the blower is in operation, the air interlock S7 associated with it, will close. Assuming that the PA front door interlock and the back door interlocks are closed, the front panel interlock light I2 will register.

The application of the front panel filament switch S3 will operate the filament contactor K15. Its contact completes the circuit to the primary of the filament transformer. Simultaneous to the application voltage to the filament contactor, voltage is also applied to the main time delay relay K2. After 60 seconds, this relay will close and the front panel "ready" light will register. Providing that the remote interlock

terminals TB6-18 and TB6-17 are completed, the application of the front panel PLATE ON switch, S4 will complete the circuit to the plate contactor, K1. The contacts of K1 apply voltage to the main high voltage plate supply. This supply is a three phase, full wave, bridge circuit, whose main output voltage is used to supply half voltage to the 8122 serving as an IFA. Both outputs are filtered by LC circuits to assure substantial hum reduction consistent with the 55 db AM hum specification of the equipment.

The application of the "tune-operate" switch essentially changes the voltage on the screen of the intermediate power amplifier. This change in screen voltage will increase the drive to the power amplifier, and thus the output power will increase. Normally, the transmitter is initially tuned in the "TUNE" position.

The transmitter control system also incorporates a three cycle recycling system. In the event of an overload, the contacts of k11, K12, K13, or K14 will momentarily close. Their contacts will complete the circuit to the auxiliary overload relay K3. When this relay closes, its contacts will open the control ladder and plate voltage will be removed. An auxiliary contact of relay K3 keeps this relay closed intil the one second time delay relay K6 operates. When this relay operates, the first holding relay K5 opens the circuit that operates the overload auxiliary relay K3. Thus, the control circuit of the transmitter is restored to operation, and, in the event of no reoccurrence of failure within the nest 60 seconds, the overload clearing relay K10 will operate and restore the equipment to its pre-overload condition. On the other hand, if a second fault should occur within 60 seconds, the contacts of K7 will serve as a path for operating the overload auxiliary relay K3 and thus the plate voltage will be removed again from the transmitter. After one second,

the time delay relay K8 will operate and the second holding contactor K7 will interrupt the circuit which completed the overload auxiliary (K3) circuit. Thus, the plate voltage will again be restored to the transmitter. In the event of a third fault within 60 seconds, the relay K9 will operate which will maintain the overload auxiliary relay closed until the equipment is manually reset by operation of the overload reset switch S5 or, in the remote position, the remote overload reset switch.

FM-3000D/DS INSTALLATION INSTRUCTIONS

Step #1

Remove the transmitter from its packing boxes. Generally this will consist of the following:

(1) Main Cabinet
(1) Harmonic Filter and Directional Coupler
(1) Elbow (1 5/8") packed within cabinet
(1) Carton containing (1) crystal; (2) 60 sec. Time delay relays; (2) 1 sec. Time delay relays; (2) OD3; (2) Plug in Electrolytic capacitors. (Packed in Cabinet)
(1) 3CX3000A7 mounted in PA socket
(1) 8122 mounted in IPA socket

Observe the equipment for any apparent physical damage. If any exists, contact the carrier and your sales representative.

Step #2

Install the cabinet in position and connect a substantial ground strap between the cabinet frame and a known station ground.

Step #3

Refer to drawing #C30, 054 (three Phase) or C30, 53 (single Phase) and install the components that are normally mounted on the base but have been removed for shipment. Interconnect these components with the appropriate low voltage and high voltage harnesses matching the tags on the wires with the component terminals.

Step #4

Install the following components in their sockets on the front of the main control panel:

(2) 60 second time delay relays

(2) 1 second time delay relays

Step #5

Remove the tape that has been used to secure, during shipment, components on the control panels; the 8122 tube and miscellaneous components within the PA Box and cabinet.

Step #6

Refer to the instruction book on the exciter used and install those parts required in the exciter "installation".

Step #7

Refer to drawing #A18, 246 and install the elbow, harmonic filter, and directional coupler as described. Connect the "load" end of the directional coupler to the antenna end of the system. Taped to the top of the cabinet are two shielded wires with fittings. Detach the tape and secure the fittings on the directional coupler. (Match the color of the fitting with that of the coupler connection)

Step #8

Terminate the directional coupler with a known 50 ohm load. An antenna tuned to the transmitter frequency and matched for 50 ohms will serve as an appropriate termination. The normal output fitting of the transmitter is 1 5/8" EIA, 50 ohms. If a different fitting is used for the transmission line, a transition must be used.

Step #9

Connect air ducts to the two exhaust outlets on top of the cabinet. These

external ducts should not have pressure drop greater than 0.1". A reasonable arrangement is a maximum of one elbow, minimum diameter of 4", maximum length of ten feet. It is imperative that the exhaust air is not recirculated.

Step #10

Connect the monitor cable to the BNC fitting that exists on top of the PA Box. Access to this fitting may be had form the top of the cabinet.

Step #11

Connect the audio cable to terminals 1, 2, and 3 (ground) of terminal board TB-6.

Step #12

Be sure all switches on the front panel are "OFF".

Step #13

Connect the three phase 208/230 volt power line to terminals 1, 2, 3, and 4 (ground) of the transmitter.

Step #14

Remove the tape that may have been used to protect the inside of both the front and rear PA covers during shipment.

THE TRANSMITTER INSTALLATION HAS NOW BEEN COMPLETED.

FM-3000D TUNING PROCEDURE

Step #1

Turn the main line circuit breaker "ON". The AC line voltage meter should register. Turn the front panel line switch and monitor each phase of the power line.

Step #2

Turn the "Start" switch to "ON". Relay K4 will be heard to close, the start light will register and the blower will be heard to operate. Assuming that the PA interlock and rear door interlock are closed, within a few seconds the air interlock will close and the interlock light will register.

Step #3

Turn the PA filament switch to "ON". After 60 seconds the front panel "ready" light will register.

Step #4

Refer to the technical data that was supplied with the equipment. Set the PA and IPA tuning controls to the settings indicated. Assuming that the exciter has been pretested on frequency, there is no requirement to tune the exciter at this point. However, for completeness the tuning instructions related to the exciter should be followed.

Step #5

Turn the "tune-operate" switch to "tune". Then turn the plate switch to "ON". The "plate" light should register and the front panel voltmeter will indicate approximately 4KV.

Step #6

Adjust the IPA input tuning controls to obtain a maximum indication of grid current on the IPA. This can be determined on the PA multimeter switch. The input controls of the IPA are the two knobs located on the left hand side off the PA. The top control is the IPA input tuning while the lower control is the IPA input loading.

Step #7

Adjust the IPA output tuning control for a maximum indication of PA plate current.

Step #8

Adjust the PA tuning and loading controls for maximum power output indication in the "INC" (incident) position consistent with minimum plate current.

Step #9

Turn the "INC-REF" switch to the REF (reflected) position. If a substantial indication exists in the reflected position, this indicates that there is mismatch to the termination of the transmission line. Thus, the transmitter should be turned off immediately and the termination of the transmission line investigated. If there is no mismatch indicated, the following steps should be pursued:

Step #10

Turn the "Tune-operate" switch to the "operate" position. This control increases the screen voltage on the IPA, thus, the drive to the final stage is increased and an increase in power output should result. Re-adjust the PA tuning and loading controls for a maximum power output consistent with minimum plate current. Each time the output circuit controls are tuned, the IPA plate tuning should be re-adjusted. The

reason for this is that the final stage is operated grounded grid. In a grounded grid stage the plate current forms part of the input impedance of the PA stage and thus, a change in tuning of the output circuit will affect the input impedance to that stage.

Step #11

Adjust the output control located on the control panel to obtain the desired power output. The resultant output power should correspond with the test data supplied with the equipment.

Step #12

Keep the transmitter in this condition for a approximately one half hour and during this period, adjust the PA tuning and loading controls to obtain a stable condition whereby rated power output is achieved with efficiency. After 30 minutes of operation (the equipment should become stable) the settings of the controls should represent permanent conditions.

Step #13

Turn the PA plate and filament switches to OFF. Due to the design of the control ladder under this condition, the PA blower will remain on, thus it will provide "after cooling" for the transmitter. After five minutes the transmitter can be turned off. It should be noted that the equipment utilizes ceramic tubes, which do not require "after" cooling, but assuming that time is available it is reasonable to provide some "after cooling" to the equipment.

The equipment has now been tuned RF wise. In order for the transmitter to operate with audio, the audio information should be applied to terminals 1 and 2 of terminal board TB6. The audio input

required for 100% modulation is approximately zero DBM at 400 cycles. (At 15000 cycles, the audio level for 100% modulation is, according to the pre-emphasis curve, 17 db less in level).

IT IS RECOMMENDED THAT IN NORMAL OPERATION, THE TRANSMITTER BE TURNED AS FOLLOWS:

Keep the line circuit breaker on the "tune operate" switches in the "operate" condition.

TO TURN ON TRANSMITTER:

Step #1 – Turn "start" switch on.

Step #2 – Turn "PA filament" switch on.

Step #3 – Wait approximately five minutes and turn "PA plate" switch on.

TO TURN OFF EQUIPMENT:

Step #1 – Turn "plate" switch off.

Step #2 – Turn "PA filament" switch off.

Step #3 – Keep transmitter in this condition for approximately five minutes and turn "start" switch off.

NOTE:

The transmitter incorporates a front panel control, R47, which controls the filament voltage to the power amplifier tube. This control should be turned counter-clockwise until the power output indication on the front panel shows evidence of decreasing. At this point the voltage should be increased to achieve the original value of output power.

With new tubes, the filament control will not affect the power output and thus, the control should be set in its maximum counter clockwise condition.

As the tube ages, the control should be turned clockwise to increase the filament voltage. Following this technique, the tube life of the PA tube can be substantially increased. It not unusual to experience 10, 000 to 20, 000 hours of tube life on the 3CX3000A7 when used in the CCA FM-3000D.

REMOTE CONTROL

The CCA FM-3, 000D has been designed with remote control in mind. Thus, all FCC metering and control functions are available in the equipment without the necessity of adding additional parts save for a motor driven rheostat.

In order to operate by remote control, all the switches within the cabinet will be in their normal positions save for a the switch S10, which should be switched to the "remote" position.

The actuation of the "remote" switch disconnects the controls of the main control panel from the circuit. The equipment may then be operated as follows:

TO TURN ON FILAMENTS

The remote control system must connect a short between terminals 11 and 12 of terminal board TB6. (located on left side of cabinet when viewed from rear)

TO TURN ON PLATE

The remote control system must connect a short between terminals 15 and 16 of terminal board TB6.

TO RESET OVERLOAD

Interrupt the connection between terminals 13 and 14 of terminal board TB6.

TO METER PA PLATE VOLTAGE

Measure the voltage between terminal 19 of terminal board TB6 and ground.

TO METER PA CATHODE CURRENT

Measure the voltage between terminal 20 of terminal board TB6 and ground.

TO METER PA POWER OUTPUT

Install separate power output detector.

TO RAISE AND LOWER POWER OUTPUT

Install CCA MR-1D Motor Driven Rheostat in series with the IPA cathode return.

MISCELLANEOUS CONTROLS

There exist within FM-3, 000D several controls that are pre-adjusted at the factory and, in general, do not require re-adjustment. These are presented below for completeness"

EXCITER CONTROLS

See exciter instruction book.

PA

R29 – This control is located on the bottom of the meter panel and is used to calibrate the output meter. It is generally calibrated when the transmitter is terminated with a known power meter. It is normally provided to the customer pre-calibrated and there is no requirement for re-adjustment unless there is a serious doubt in the mind of the customer that the power output meter is not reading properly. Generally, as long as the power output meter and the associated transmitter readings are consistent with the technical data provided, there is no need to re-examine the calibration of the Watt Meter.

RECOMMENDED MAINTENANCE

WEEKLY

1. Vacuum door filter on rear door.

2. Check meter readings with data of previous week to verify that there are no tubes that indicated any aging.

MONTHLY

Open rear door and RF covers and vacuum all of the parts upon which dust may have settled.

SIX MONTHS

Remove filter on rear door. Verify that it is clean. If not, restore with new standard door filter, generally, the filter is re-usable and all it requires is a thorough cleaning with a vacuum cleaner.

TWELVE MONTHS

Depending on the economics of the broadcast facility, it may be desirable every Twelve months, whether the tubes show evidence of aging or not, to replace the inexpensive tubes in the transmitter. This includes the exciter tubes, the regulator tubes, and possibly the IPA. One may want to delay the replacement of the IPA for eighteen months. The power amplifier tube need not be replaced until it definitely shows signs of aging. This will be evidenced by the slumping off of emission and inability to achieve rated power output. When the tube exhibits these characteristics, extended life may be obtained by increasing the filament voltage on the tube.

AMENDMENT TO CCA – FM-3000D

Amendment #1

For those broadcasters who require a single-phase operation of the FM-3000D, CCA has converted the normal 3-phase power supply to a single-phase system. In this change there is a double LC filtering and only four half-wave rectifier elements. This change has resulted in a rearrangement of components on the base of the cabinets. The components on the base are arranged as described below. This information should be used during the installation procedure on the transmitter. It will in no way affect the operation of the transmitter.

"TROUBLE SHOOTING"

PROBLEM: - Power Output Low, All metering save for output indication are normal.

SOLUTION: - Readjust PA plate tuning to be sure that PA plate current dip is in the same position as before. If so, probable solution is defective diode or other component in Power Output metering circuit.

PROBLEM: - Power Output Low, PA Plate Current Low, IPA cathode Current low, IPA grid current high, PA Plate voltage slightly high.

SOLUTION: - IPA has lost screen voltage. Check diodes in screen supply feed thru capacitors and other components in screen supply.

PROBLEM: - PA tuning control is in maximum or minimum position resonance cannot be obtained in the output circuit.

SOLUTION: - Transmitter load (antenna) is not properly matched (50 ohms). This can be observed by substantial reading in "reflected" position of power output meter. A properly tuned antenna can be driven within the tuning range of the transmitter.

PROBLEM: - Intermittents in high voltage power supply. (H.V. contactor chattering)

SOLUTION: - This generally indicates an instability in the control ladder. A faulty air interlock or an impediment in the air system, or a faulty time delay relay will cause this condition.

PARTS LIST (LESS EXCITER)

IPA – PA

Symbol	Description	USED IN 1000	3000	5000
C4	Capacitor, Fixed Ceramic Disc, .01 ufd	X	X	X
C7	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C8	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C9	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C10	Capacitor, Fixed, 200 pf, 7.5KV	X	X	X
C11	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C12	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C13	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C14	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C15	Capacitor, Fixed Ceramic, 500 uf, 30KV	X	X	
C16	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C17	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C20	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C21	Capacitor, Variable Air, 149-6	X	X	X
C22	Capacitor, Variable Air, 154-11	X	X	X
C23	Capacitor, Fixed (F.D.), 7.5KV	X		
C23A	Capacitor, Fixed, 25 pf		X	
C23B	Capacitor, Fixed, 50 pf		X	
C24	Capacitor, Fixed, 1000 pf, 5KV	X	X	X
C25	Capacitor, Fixed, 1000 pf, 5KV	X	X	X
C26	Capacitor, Fixed, 1250 pf, 5KV	X		
C27	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C28	Capacitor, Fixed (F.D.), 7.5KV	X		
C28A	Capacitor, Fixed (F.D.), 7.5KV	X		
C29	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C30	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C31	Capacitor, Feedthru, .01 ufd or 1000pf	X	X	X
C32	Capacitor, Fixed Ceramic Disc, .01 ufd	X	X	X
C33	Capacitor, Fixed Ceramic Disc, .01 ufd	X	X	X
C34	Capacitor, Fixed Ceramic Disc, .01 ufd	X	X	X
C35	Capacitor, Fixed Ceramic Disc, .001 ufd	X	X	X
C36	Capacitor, Fixed Ceramic Disc, .001 ufd	X	X	
C37	Capacitor, Fixed Ceramic Disc, .001 ufd	X		X
C38	Capacitor, Fixed Ceramic Disc, 500 uf, 30KV	X	X	X
C39	Capacitor, Fixed Ceramic Disc, .001 ufd	X	X	
C40	Capacitor, Fixed Ceramic Disc, .001 ufd	X	X	X

Symbol	Description	USED IN 1000	3000	5000
C41	Capacitor, Fixed Ceramic Disc, .001 ufd	X	X	X
C42	Capacitor, Fixed Ceramic Disc, .001 ufd	X		X
C43	Capacitor, Fixed Ceramic Disc, .001 ufd	X	X	
C44	Capacitor, Fixed (F.D.), 7.5KV	X		
C45	Capacitor, Fixed (F.D.), 7.5KV	X		
C46	Capacitor, Fixed Ceramic Disc, .001 ufd	X	X	X
C47	Capacitor, Fixed Ceramic Disc, .01 ufd	X	X	X
C48	Capacitor, Fixed Ceramic Disc, .001 ufd	X		
C49	Capacitor, Fixed Ceramic Disc, .001 ufd	X		
C50	Capacitor, Fixed Ceramic Disc, .001 ufd	X		
C51	Capacitor, Fixed Ceramic Disc, .001 ufd	X		
C52	Capacitor, Fixed Ceramic Disc, .001 ufd	X		
C53	Capacitor, Fixed Ceramic Disc, .001 ufd	X		
C55	Capacitor, Fixed Ceramic Disc, .001 ufd	X		
C57	Capacitor, Variable Air, 154-8			X
C58	Capacitor, Variable Air, 154-11			X
C60	Capacitor, Blocking		X	X
C61	Capacitor, Ceramic Disc, .001 ufd, 1KV			X
C62	Capacitor, Fixed Ceramic, 1000pf, 5KV		X	X
CR3	Crystal, 1N39B	X	X	X
D.C.	Directional Coupler	X	X	X
H.F.	Harmonic Filter	X	X	X
J1	Receptacle	X	X	X
J2	Receptacle	X	X	X
J3	Receptacle	X	X	X
L5	Coil	X	X	X
L6	Coil - CCA	X	X	X
L7	Coil - CCA	X	X	X
L8	Coil			X
L9	Coil	X	X	X
L10	Coil	X	X	X
L11	Coil	X	X	X
L12	Coil (Input Tuning)	X	X	
L13	Coil (Tuning)	X	X	X
L14	Coil (Loading)	X	X	X
L15	Coil		X	X
L16	Coil - CCA	X	X	X
L17	Coil, R.F. Choke, Z50	X	X	X
L18	Coil		X	X

Symbol	Description	USED IN 1000	3000	5000
M2	Meter – Multimeter, 0 – 100 percent	X	X	X
M2	Meter – Plate, 0 – 2 Amps D.C.		X	X
M4	Meter – Plate, 0 – 1 Amps D.C.	X		
M5	Meter – R.F. Output	X	X	X
R26	Resistor, Fixed 22 1/2W	X	X	X
R27	Resistor, Fixed 100 20W	X	X	X
R28	Resistor, Fixed 1 2W	X	X	X
R29	Potentiometer 500 - 100W	X	X	X
R30	Resistor 450 10W		X	X
R31	Resistor, Fixed 10 1/2W	X	X	X
R32	Resistor, Adj. 50 200W		X	X
R32	Resistor, Adj. 250 200W	X		
R33	Resistor, Adj. 50 200W		X	X
R33	Resistor, Adj. 250 200W	X		
R34	Resistor, Fixed 1 2W	X	X	X
R35	Resistor, Fixed 1 2W	X	X	X
R36	Resistor, Fixed 1 2W	X	X	X
R37	Resistor, Fixed 1 2W		X	X
R38	Resistor, Fixed 1 2W			X
R39	Resistor, Fixed 950	X	X	X
R40	Resistor, Fixed 10 50W	X	X	
R41	Resistor, Fixed 1.2K 2W	X	X	X
R42	Resistor, Fixed 1.2K 2W	X	X	X
R43	Resistor, Fixed 1.2K 2W	X	X	X
R44	Resistor, Fixed 1.2K 2W	X	X	X
R45	Resistor, Carbon 100 2W			X
R46	Resistor 10 2W			X
R47	Resistor, Adj. 25 100W	X	X	X
R48	Resistor, Fixed 1.2K 2W	X	X	X
R49	Resistor, Fixed 1.2K 2W	X	X	X
R50	Resistor, Fixed 1.2K 2W	X	X	X
R51	Resistor, Fixed 1.2K 2W	X	X	X
R52	Resistor, Fixed 300 10W	X		
R53	Potentiometer 5K 2W	X	X	X
R54	Resistor, Fixed 5K 25W			X
R55	Resistor, Fixed 1 2W	X	X	X
R56	Resistor, Fixed 36K 2W	X	X	
R57	Resistor, Fixed 36K 2W	X	X	
S11	Switch	X	X	X

Symbol	Description	USED IN 1000	3000	5000
S12	Switch - Wafer	X	X	X
T4	Transformer	X	X	X
T5	Transformer			X
V15	Tube 8122	X	X	X
V16	Tube 3CX1000A7	X	X	X

PARTS LIST (LESS EXCITER)

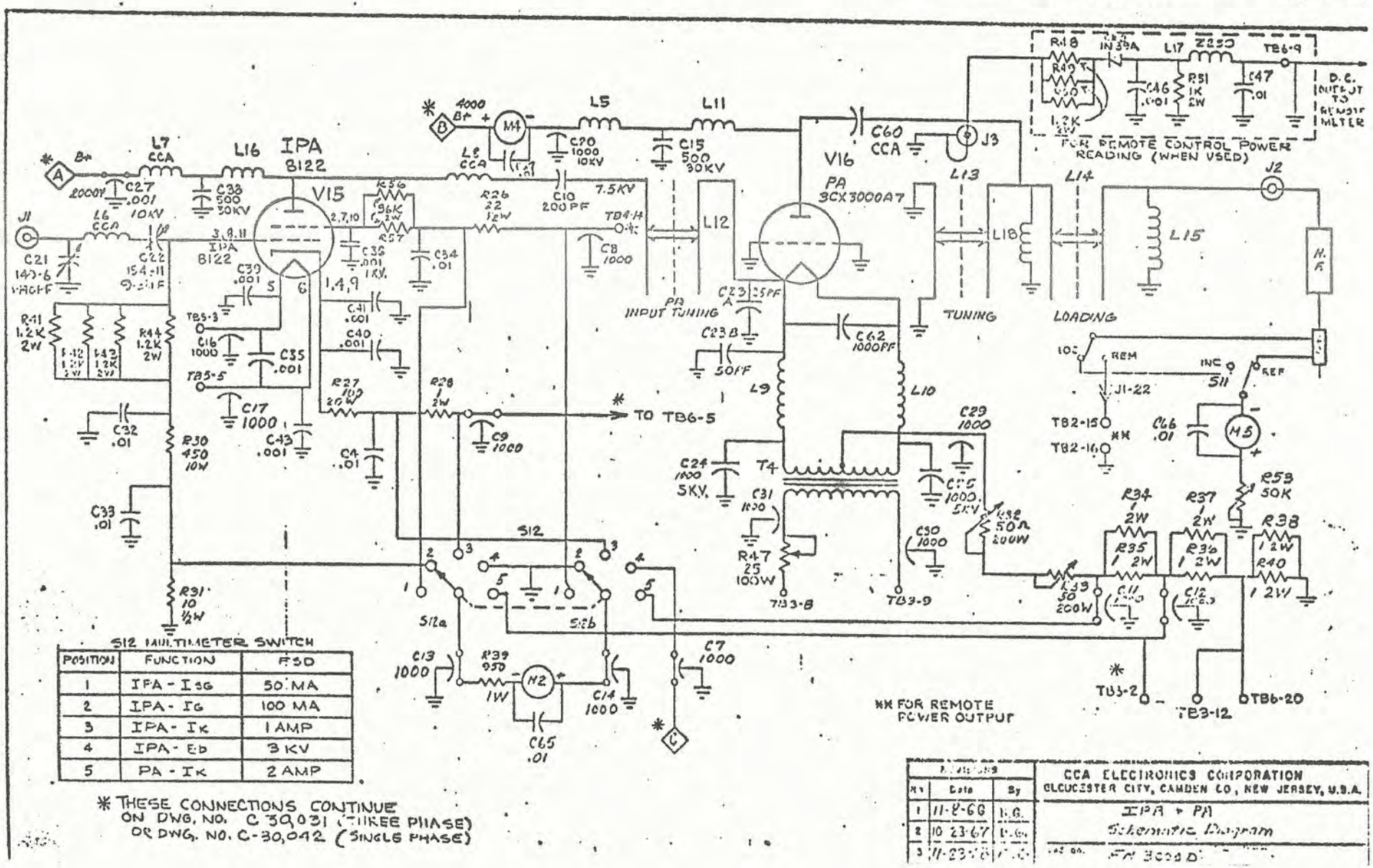
CONTROL & POWER SUPPLY

Symbol	Description	USED IN 1000	3000	5000
BL1	Blower, 115V AC	X	X	X
C1	Capacitor, Fixed, Glass .2 mfd, 10KV	X	X	X
C2	Capacitor, Fixed, Oil 4 mfd, 5KV	X	X	X
C3	Capacitor, Fixed, Oil 4 mfd, 2KV	X		
C3	Capacitor, Fixed, Oil 4 mfd, 5KV		X	X
C5	Capacitor, Fixed, Oil 10 mfd, 1KV	X	X	X
C6	Capacitor, Fixed, Oil 10 mfd, 1KV	X	X	X
C18	Capacitor, Fixed Ceramic Disc, .01 mfd, 3KV	X	X	X
C19	Capacitor, Fixed Ceramic Disc, .01 mfd, 3KV	X	X	X
C54	Capacitor, Fixed, Oil 4 mfd, 5KV	X	X	X
C63	Capacitor, Fixed Ceramic Disc, .01 mfd	X	X	X
C64	Capacitor, Fixed Ceramic Disc, .01 mfd	X	X	X
CB1	Circuit Breaker, 30 Amp, 2 Pole	X		
CB1	Circuit Breaker, 30 Amp, 3 Pole		X	
CB1	Circuit Breaker, 40 Amp, 3 Pole			X
CR1	Rectifier, 2.5KV @ 1.1A	X	X	X
CR2	Rectifier, 2.5KV @ 1.1A	X	X	X
F1	Fuse, Slo-Blo #3AG 5 Amp	X	X	X
F2	Fuse, Slo-Blo #3AG 5 Amp	X	X	X
F3	Fuse, Slo-Blo #3AG 5 Amp	X	X	X
F4	Fuse, Slo-Blo #3AG 1 Amp	X	X	X
F5	Fuse, Slo-Blo #3AG 2 Amp	X	X	X
I1	Lamp, Indicator, 6.0V, H2	X	X	X
I2	Lamp, Indicator, 6.0V, H2	X	X	X
I3	Lamp, Indicator, 6.0V, H2	X	X	X
I4	Lamp, Indicator, 6.0V, H2	X	X	X
I5	Lamp, Indicator, 6.0V, H2	X	X	X
K1	Relay, Plate Contactor, 115VAC, 3 Pole, 1 Aux.	X	X	X
K2	Relay, Time Delay, 60sec. - 115V AC	X	X	X

Symbol	Description				USED IN 1000	3000	5000
K3	Relay, Aux, 115v AC, DPDT				X	X	X
K4	Relay, Start, 230V, 2 Pole				X	X	X
K5	Relay, Aux, 115v AC, DPDT				X	X	X
K6	Relay, Time Delay, 1 sec. - 115V AC				X	X	X
K7	Relay, Aux, 115v AC, DPDT				X	X	X
K8	Relay, Time Delay, 1 sec. - 115V AC				X	X	X
K9	Relay, Aux, 115v AC, DPDT				X	X	X
K10	Relay, Time Delay, 60sec. - 115V AC				X	X	X
K11	Relay, Overload, DPDT				X	X	X
K12	Relay, Overload, DPDT				X	X	X
K13	Relay, Overload, DPDT				X	X	X
K14	Relay, Overload, DPDT				X	X	X
K15	Relay, Filament Contactor, 115V AC, 2 Pole					X	X
L1	Choke, Filter, 5H @ 1.25A				X	X	
L1	Choke, Filter, 5H @ 1.75A						X
L2	Choke, Filter, 15H @ 350mA				X	X	X
L3	Choke, Filter, 8H @ 200mA				X	X	X
L4	Choke, Filter, 8H @ 200mA				X	X	X
L19	Choke, Filter, 5H @ 1.25A				X		
M1	Meter, Line Voltage, 0 – 300V AC				X	X	X
M3	Meter, Voltmeter, D.C., 0 – 5 KV				X	X	
M3	Meter, Voltmeter, D.C., 0 – 6 KV						X
R1	Resistor, Fixed	22K	10%	50W	X	X	X
R2	Resistor, Fixed	75K	10%	200W	X		
R2	Resistor, Fixed	100K	10%	200W		X	X
R3	Resistor, Fixed	100K	10%	200W		X	X
R3	Resistor, Fixed	75K	10%	200W	X		
R4	Resistor, Fixed	75K	10%	200W	X		
R4	Resistor, Fixed	100K	10%	200W		X	X
R5	Resistor, Fixed	1M	1%	2W	X	X	X
R6	Resistor, Fixed	1M	1%	2W	X	X	X
R7	Resistor, Fixed	1M	1%	2W	X	X	X
R8	Resistor, Fixed	1M	1%	2W	X	X	X
R9	Resistor, Fixed	1M	1%	2W	X	X	X
R10	Resistor, Fixed	100K	10%	2W	X	X	X
R11	Resistor, Fixed	1.2K		1/2W	X	X	X
R12	Resistor, Fixed	1M	1%	2W	X	X	X
R13	Resistor, Fixed	1M	1%	2W	X	X	X

Symbol	Description				USED IN 1000	3000	5000
R14	Resistor, Fixed	1M	1%	2W	X	X	X
R15	Resistor, Fixed	100K	10%	2W	X	X	X
R16	Resistor, Fixed	800		25W	X	X	X
R17	Resistor, Fixed	800		25W	X	X	X
R18	Resistor, Fixed	15K		25W	X	X	X
R19	Resistor, Fixed	5K		25W	X	X	X
R20	Resistor, Fixed	2	5%	2W	X	X	X
R21	Resistor, Fixed	25K		10W	X	X	X
R22	Resistor, Fixed	10	5%	1/2W	X	X	X
R23	Resistor, Fixed	1	1%	2W		X	X
R23	Resistor, Fixed	2	1%	2W	X		
R24	Resistor, Fixed	800		25W	X	X	X
R25	Resistor, Fixed	1M	1%	2W			X
R58	Resistor, Fixed	1	1%	2W		X	X
R58	Resistor, Fixed	2	1%	2W	X		
S1	Switch, Wafer, 5 Position					X	X
S2	Switch, Start				X	X	X
S3	Switch, Filament				X	X	X
S4	Switch, Plate				X	X	X
S5	Switch, O.L. Reset				X	X	X
S6	Switch, Tone Operate				X	X	X
S7	Switch, (Air) Air Flow Switch				X	X	X
S8	Switch, PA				X	X	X
S9	Switch, Back Door				X	X	X
S10	Switch, Wafer – 4 Poles, 2 Position				X	X	X
T1	Transformer				X		
T1	Transformer					X	X
T2	Transformer				X	X	X
T3	Transformer				X	X	X
TB1	Terminal Block, 4 Terminals					X	X
TB1	Terminal Block, 3 Terminals				X		
TB3	Terminal Block, 16 Terminals				X	X	X
	Marking Strip, 16 Terminals				X	X	X
TB4	Terminal Block, 16 Terminals				X	X	X
	Marking Strip, 16 Terminals				X	X	X
TB6	Terminal Block, 20 Terminals				X	X	X
	Marking Strip, 20 Terminals				X	X	X

Symbol	Description	USED IN 1000	3000	5000
Z1	Rectifier, Silicon, 11KV @ 1.1Amp	X	X	X
Z2	Rectifier, Silicon	X	X	X
Z3	Rectifier, Silicon	X	X	X
Z4	Rectifier, Silicon	X	X	X
Z5	Rectifier, Silicon		X	X
Z6	Rectifier, Silicon		X	X



S12 MULTIMETER SWITCH

POSITION	FUNCTION	FSD
1	IPA - I_{SG}	50 MA
2	IPA - I_G	100 MA
3	IPA - I_K	1 AMP
4	IPA - E_B	3 KV
5	PA - I_K	2 AMP

* THESE CONNECTIONS CONTINUE ON DWG. NO. C-30,031 (THREE PHASE) OR DWG. NO. C-30,042 (SINGLE PHASE)

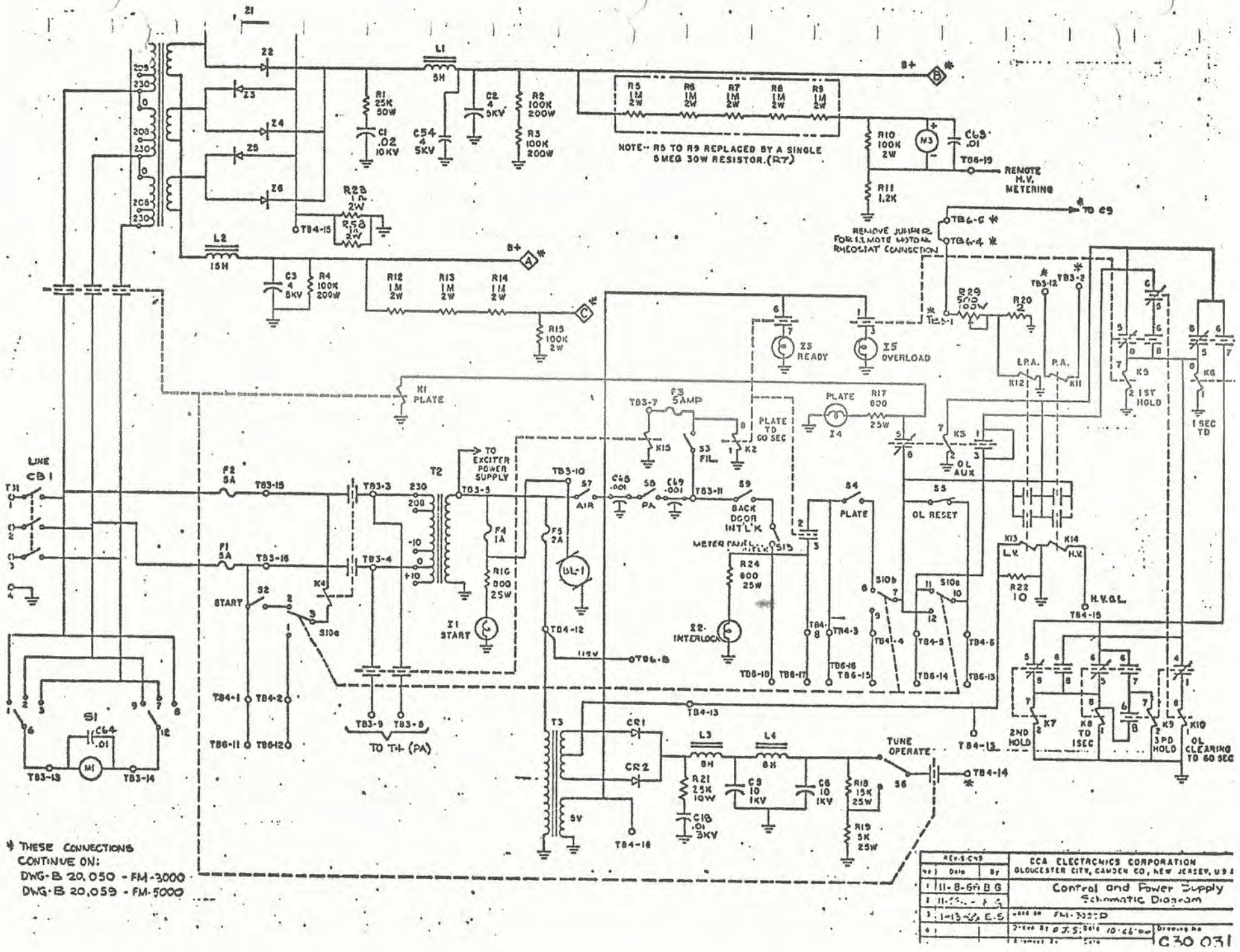
** FOR REMOTE POWER OUTPUT

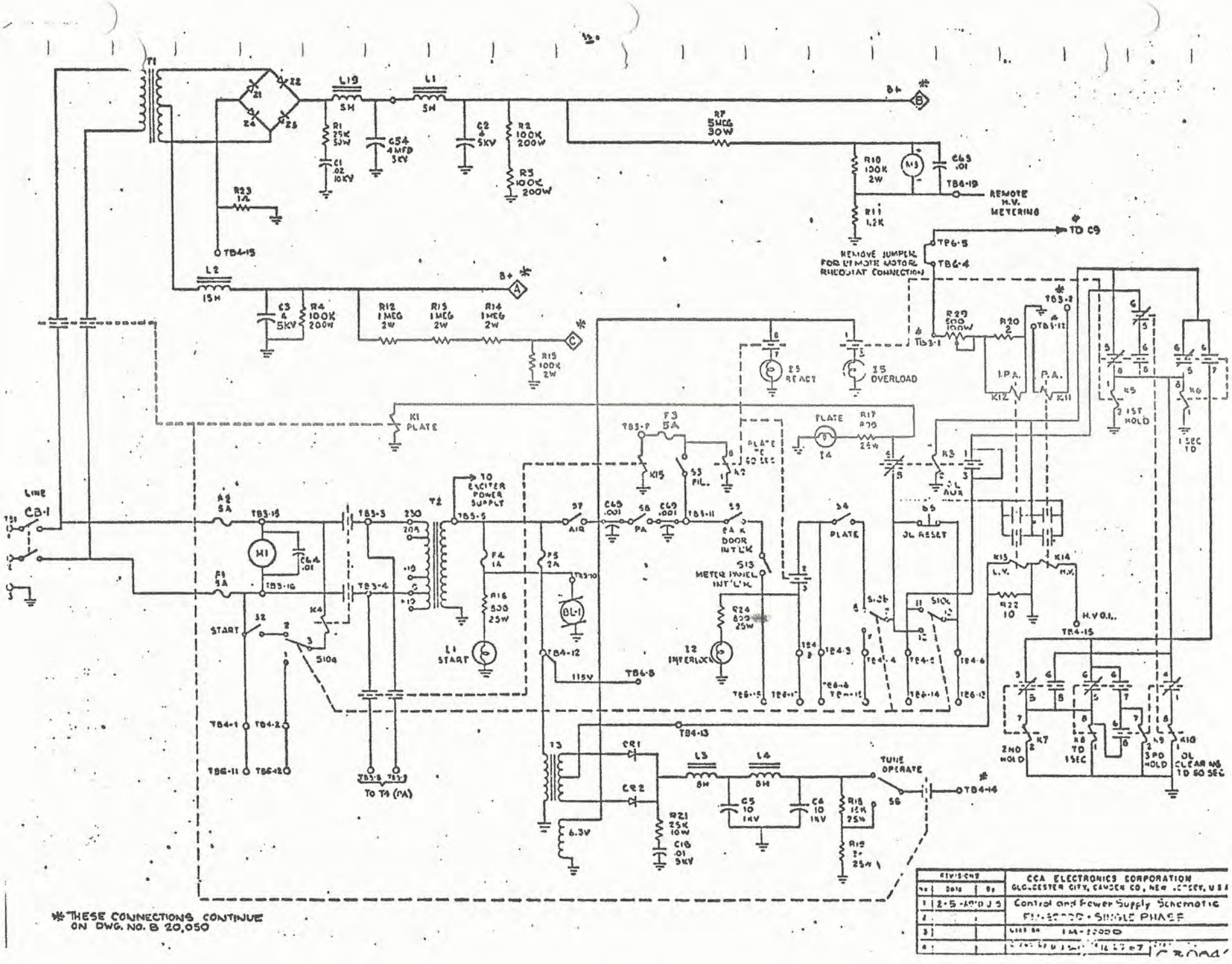
REVISIONS		
NO	Date	By
1	11-8-66	R.G.
2	10-23-67	R.G.
3	11-23-68	R.G.

CCA ELECTRONICS CORPORATION
GLOUCESTER CITY, CAMDEN CO., NEW JERSEY, U.S.A.

IPA + PA1
Schematic Diagram

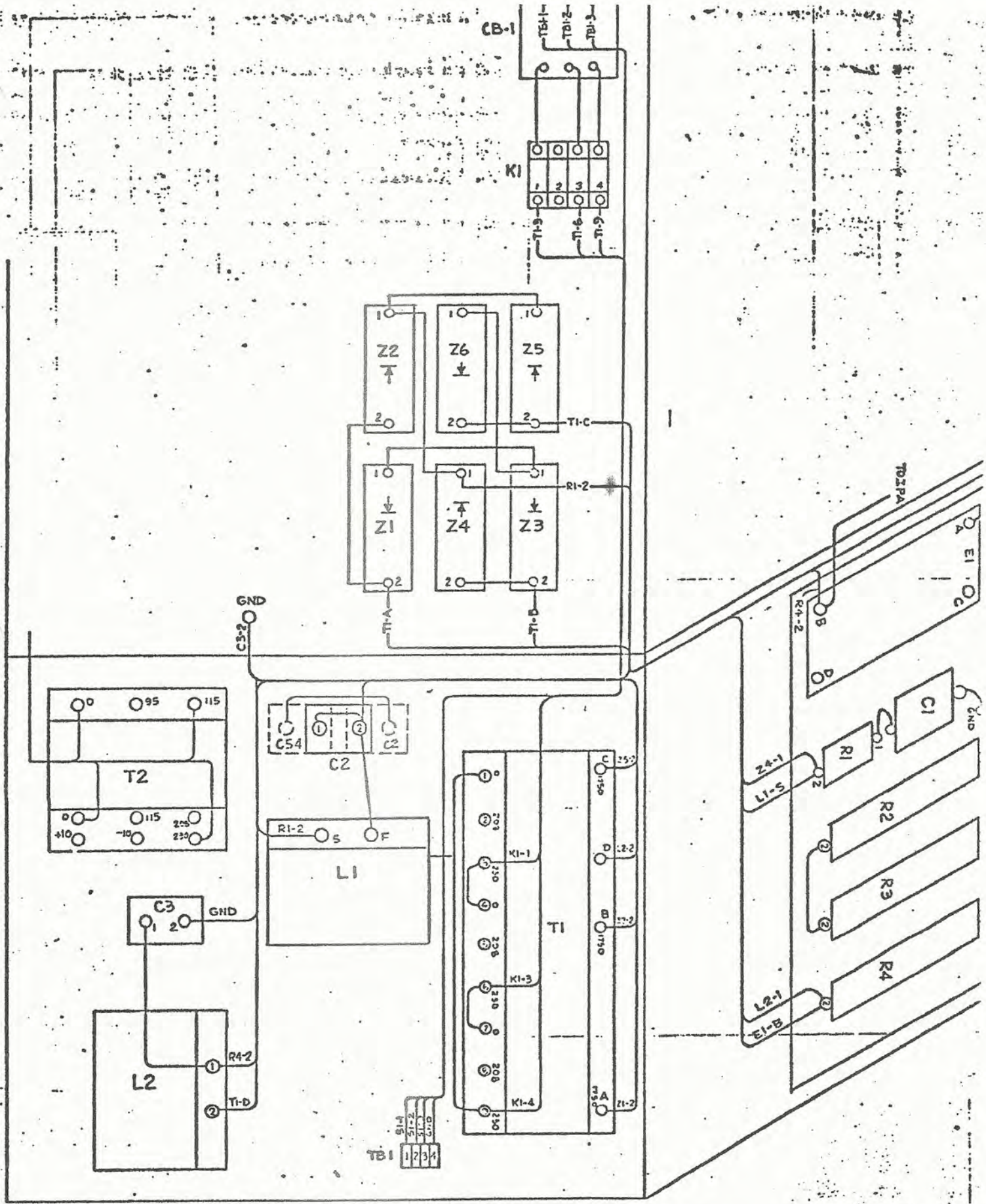
SIZE DO. FW 30048





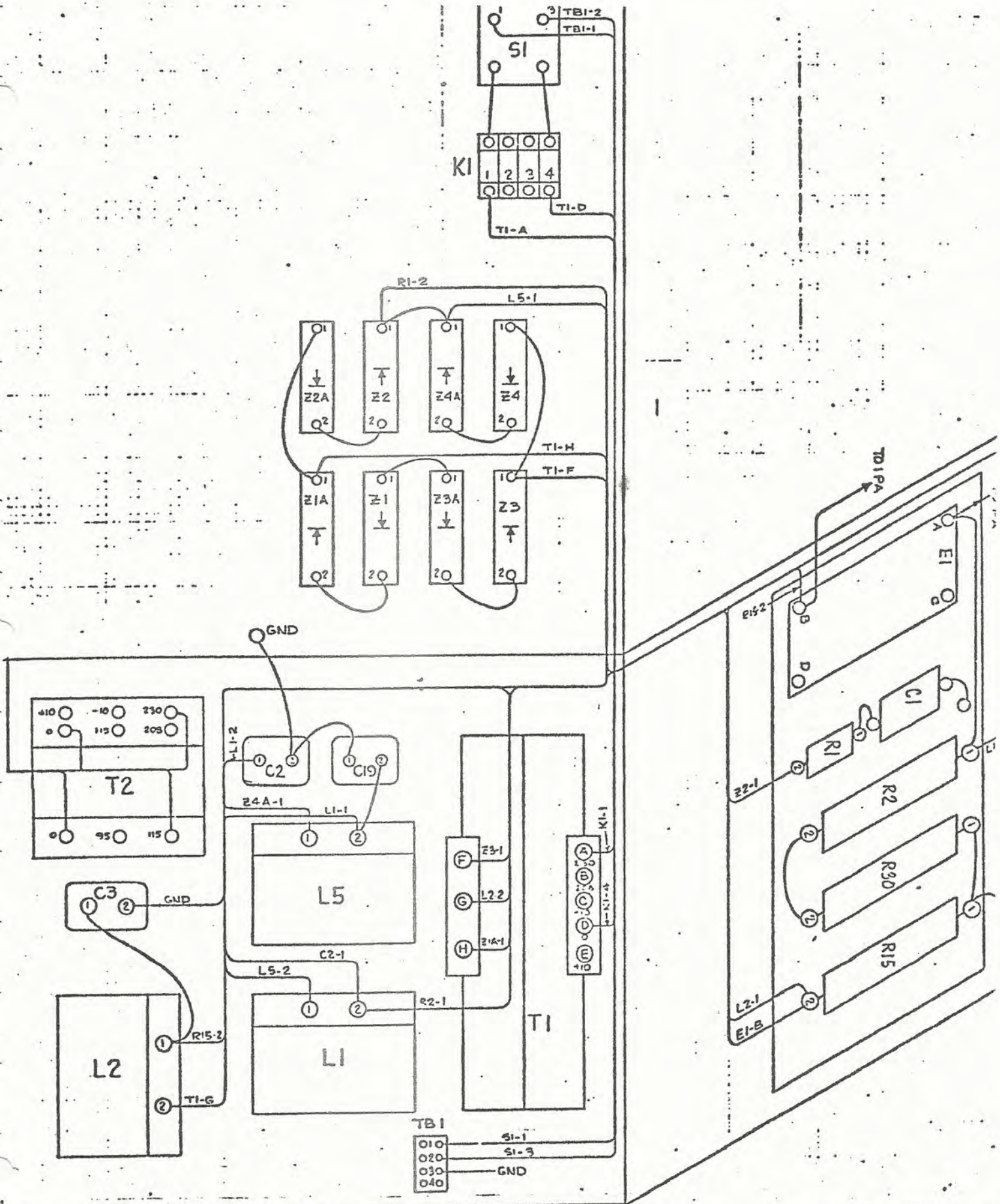
*THESE CONNECTIONS CONTINUE ON DWG. NO. B 20,050

REVISIONS			CCA ELECTRONICS CORPORATION
No	Date	By	GLOUCESTER CITY, CAMDEN CO., NEW JERSEY, U.S.A.
1	2-5-A[illegible]	J S	Control and Power Supply Schematic
2			FM-[illegible]-SINGLE PHASE
3			USED ON FM-[illegible]
4			[illegible]



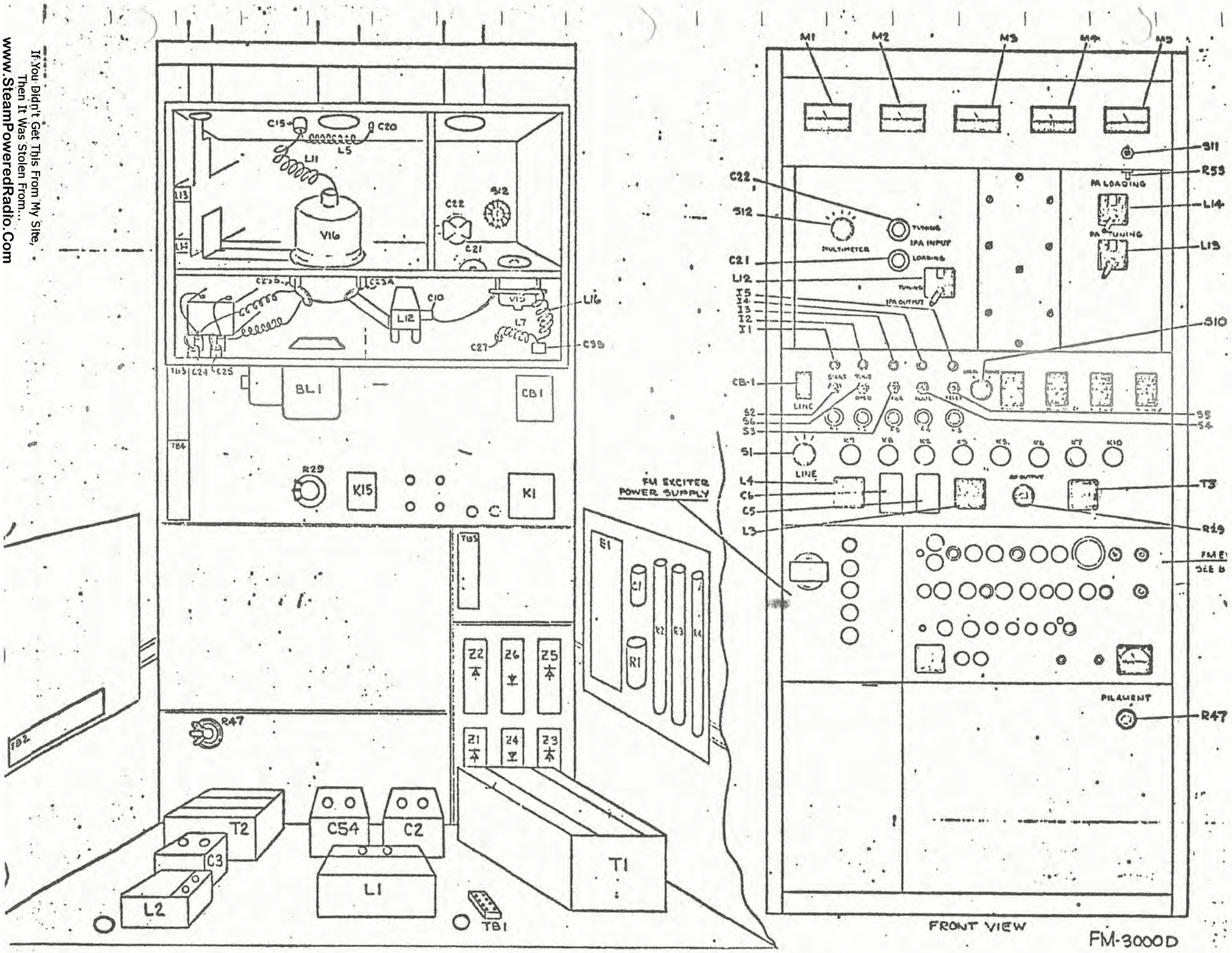
Bottom of Unit

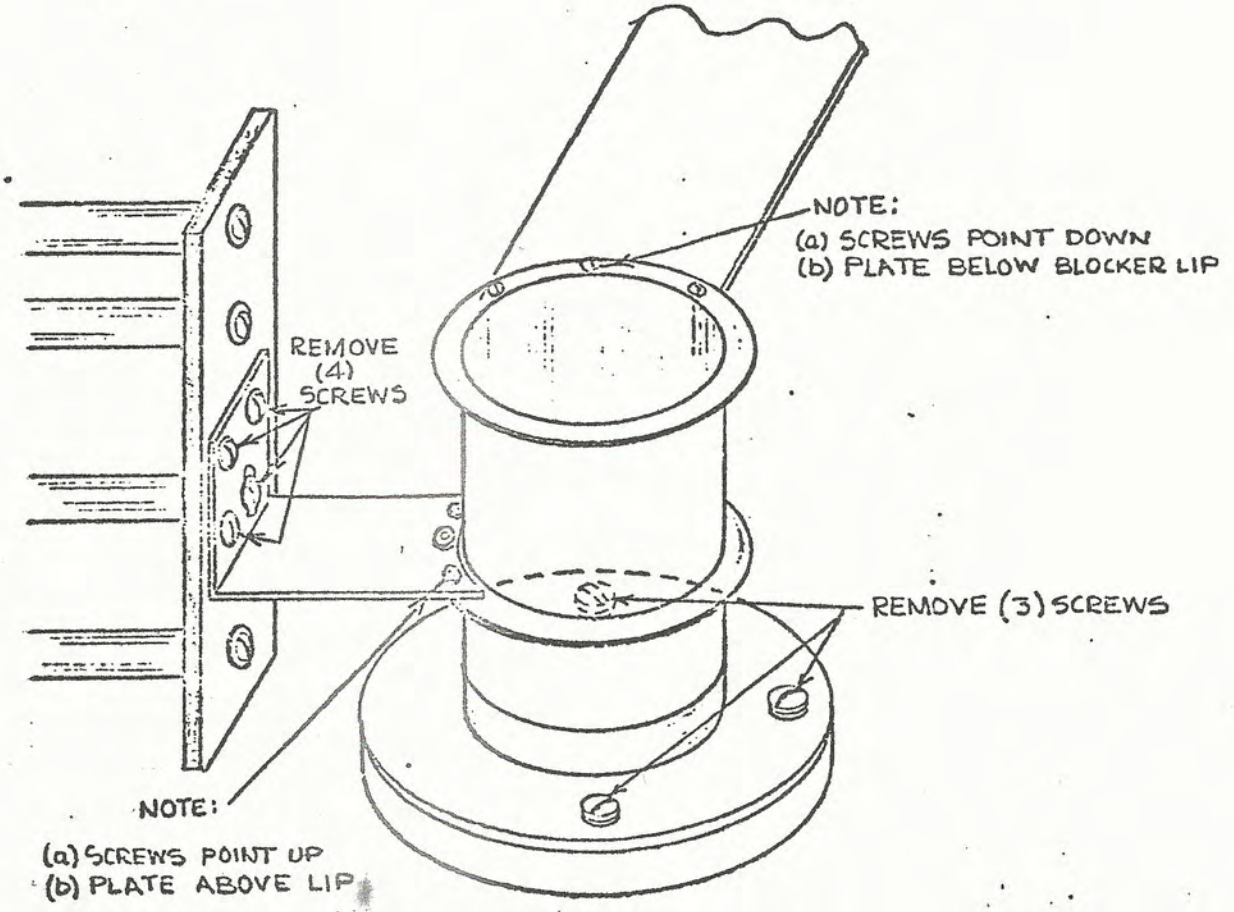
REVISIONS			CCA ELECTRONICS COMPORA
No	Date	By	GLOUCESTER CITY, CAMDEN CO., NEW
1	11/23/60	BG	Exploded Wiring Diagr
2			(Transmitter Bas
3			Used on FM-3000D/5000D
4			Drawn By PTS Date 10-26-60



REVISIONS			CCA ELECTRONICS CORPORATION
No	Date	By	GLOUCESTER CITY, CAMDEN CO., NEW JERSEY, U
1			EXPLODED WIRING DIAGRAM
2			TRANSMITTER BASE
3			Used on FM-3000 SINGLE HIAS
4			Drawn By DJS Date 1-2-68 Drawing No C30.0
5			Approved By Date

C30.0

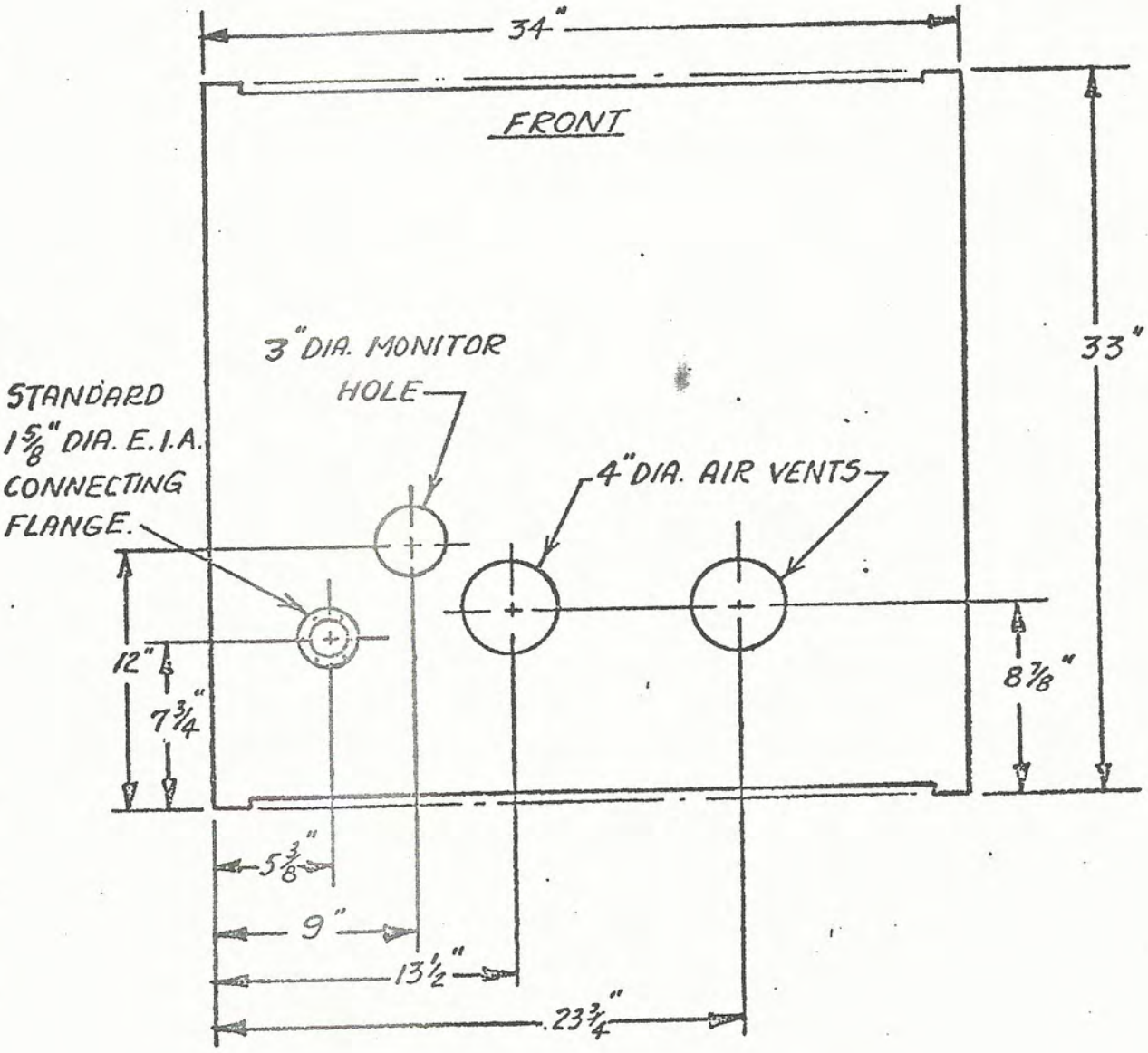




PA TUBE REMOVAL PROCEDURE

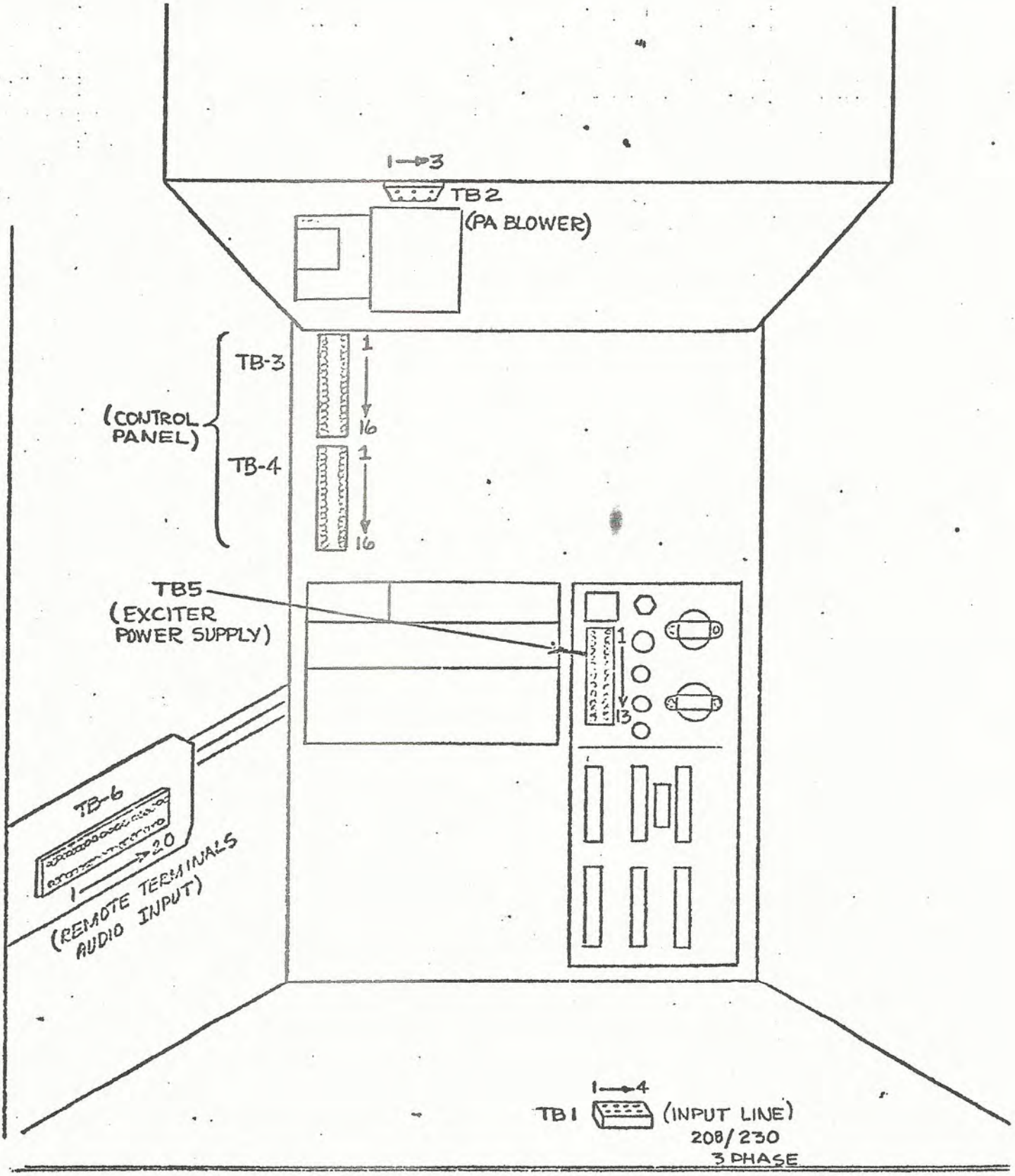
A 18,253

TOP VIEW



TOP LAYOUT OF CABINET
FM-3000 D
FM-5,000 D

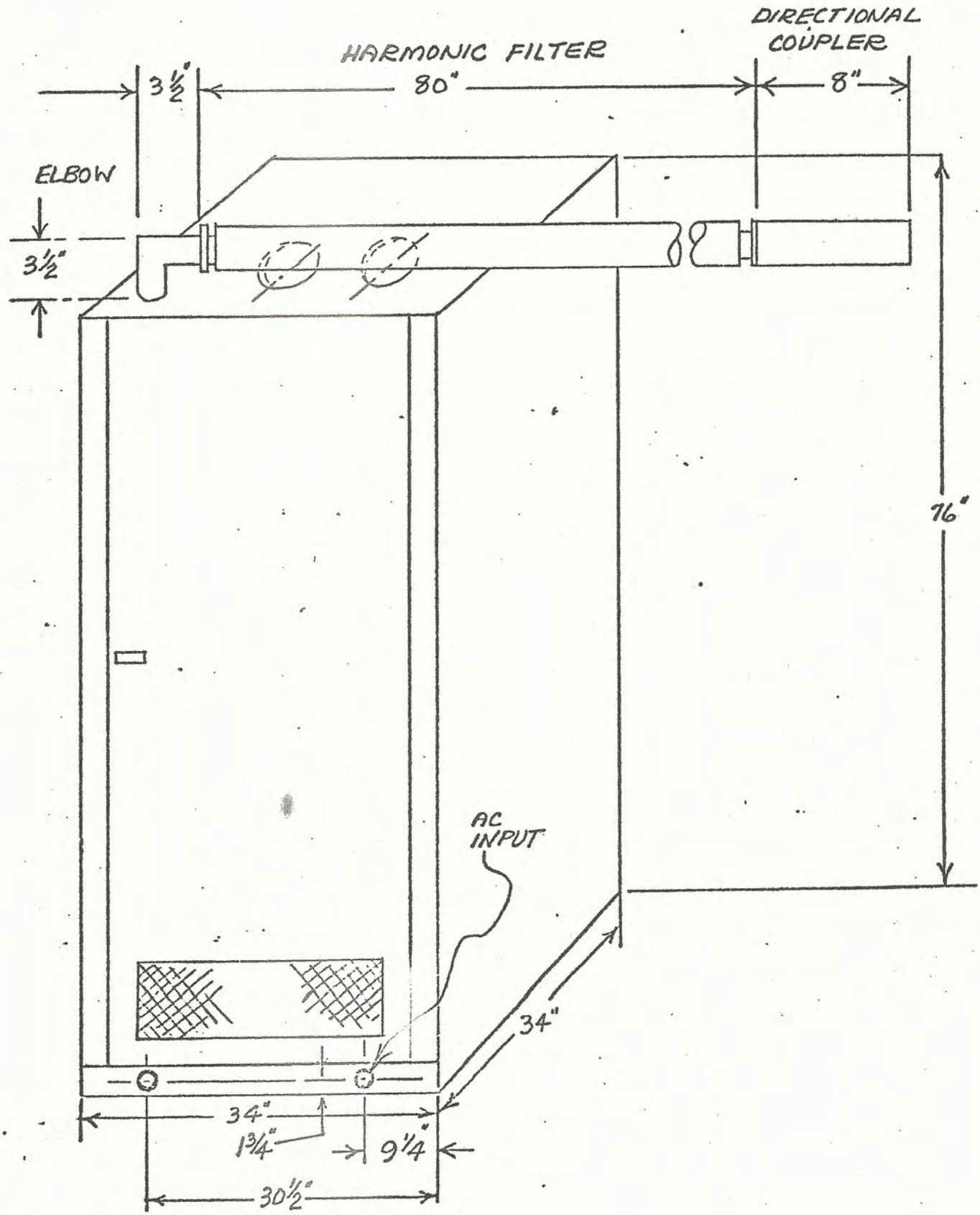
A 18, 24 S



TERMINAL BOARD LOCATION
FM-1000D - FM-3000 - FM-5000

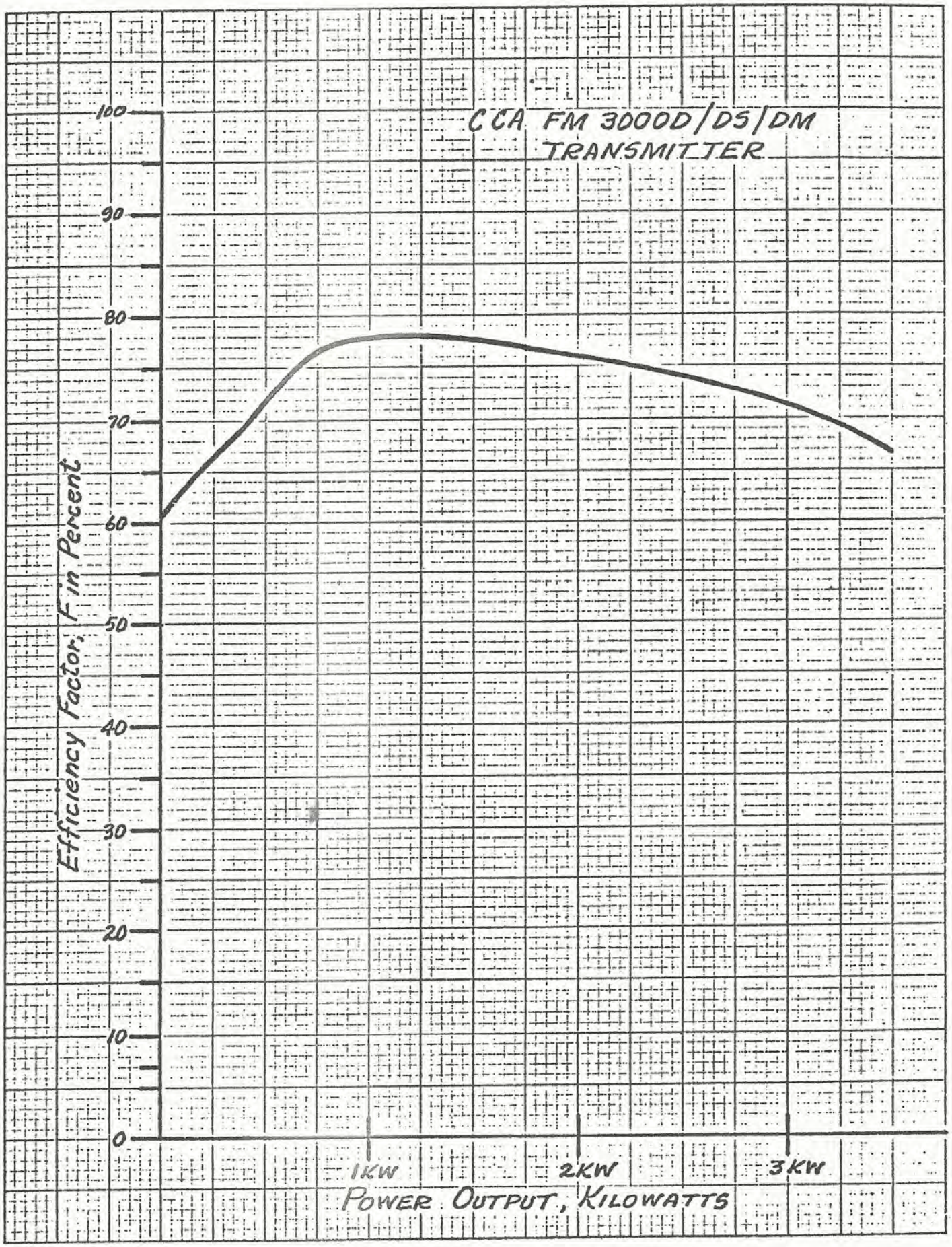
Superceeded by
Dwg of same number.

A18,254

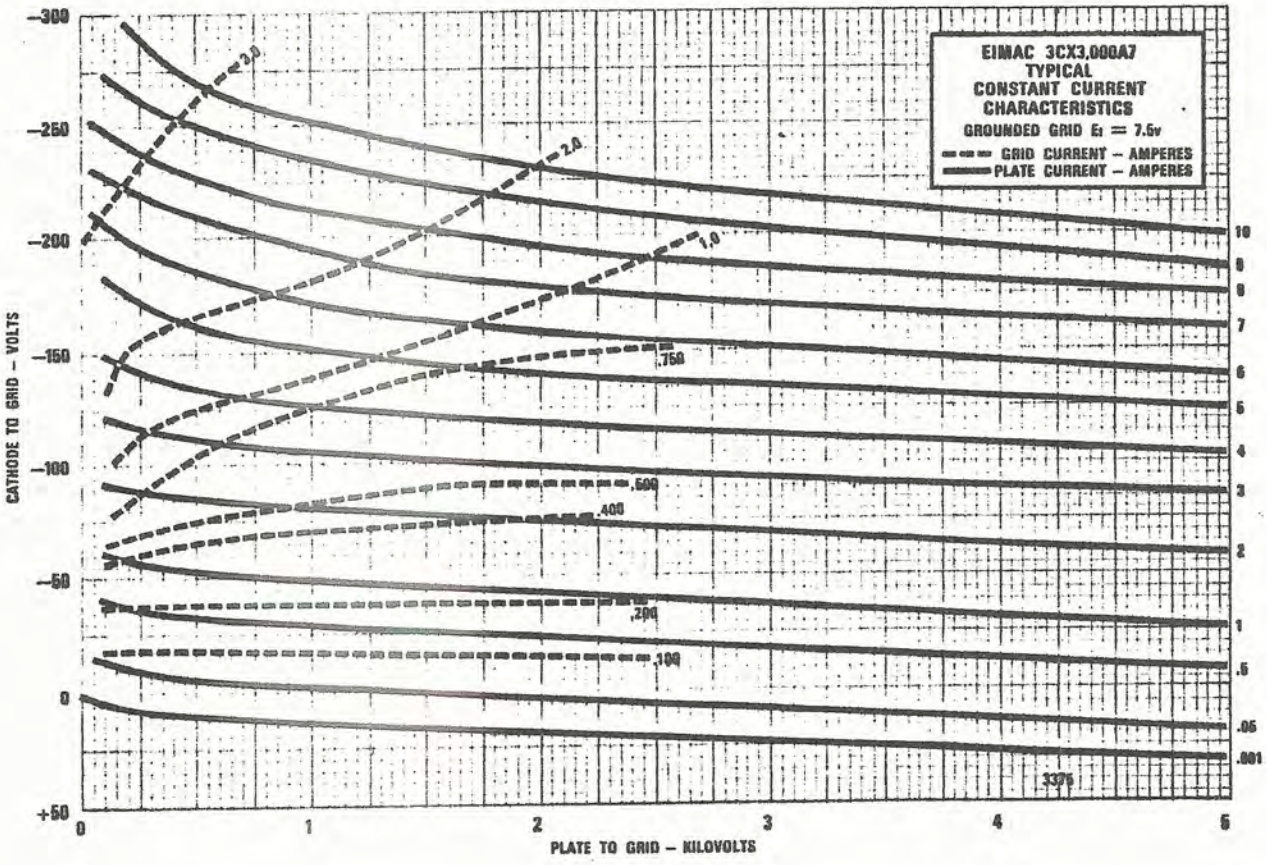


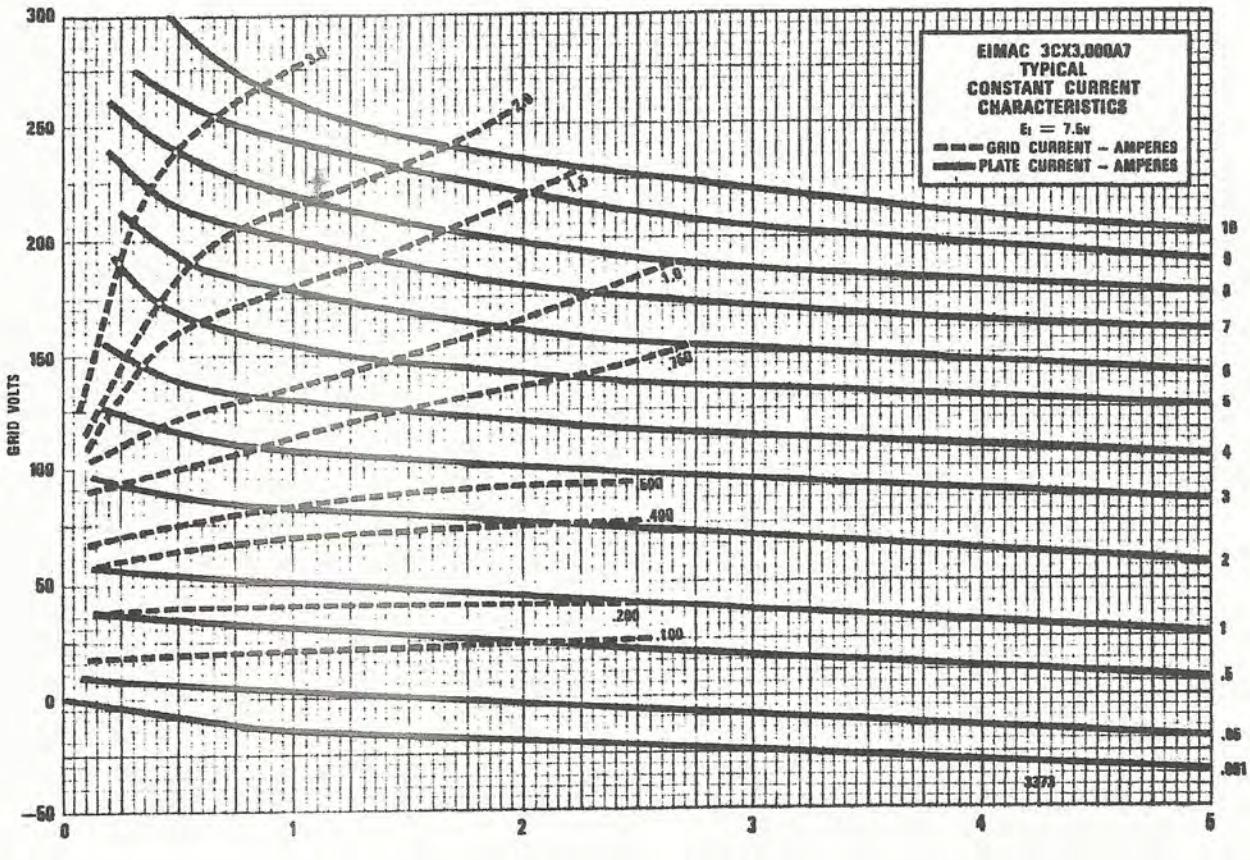
CABINET OUTLINE
(REAR VIEW)
FM-3,000D

A-18,246A



KEUFFEL & ESSER CO

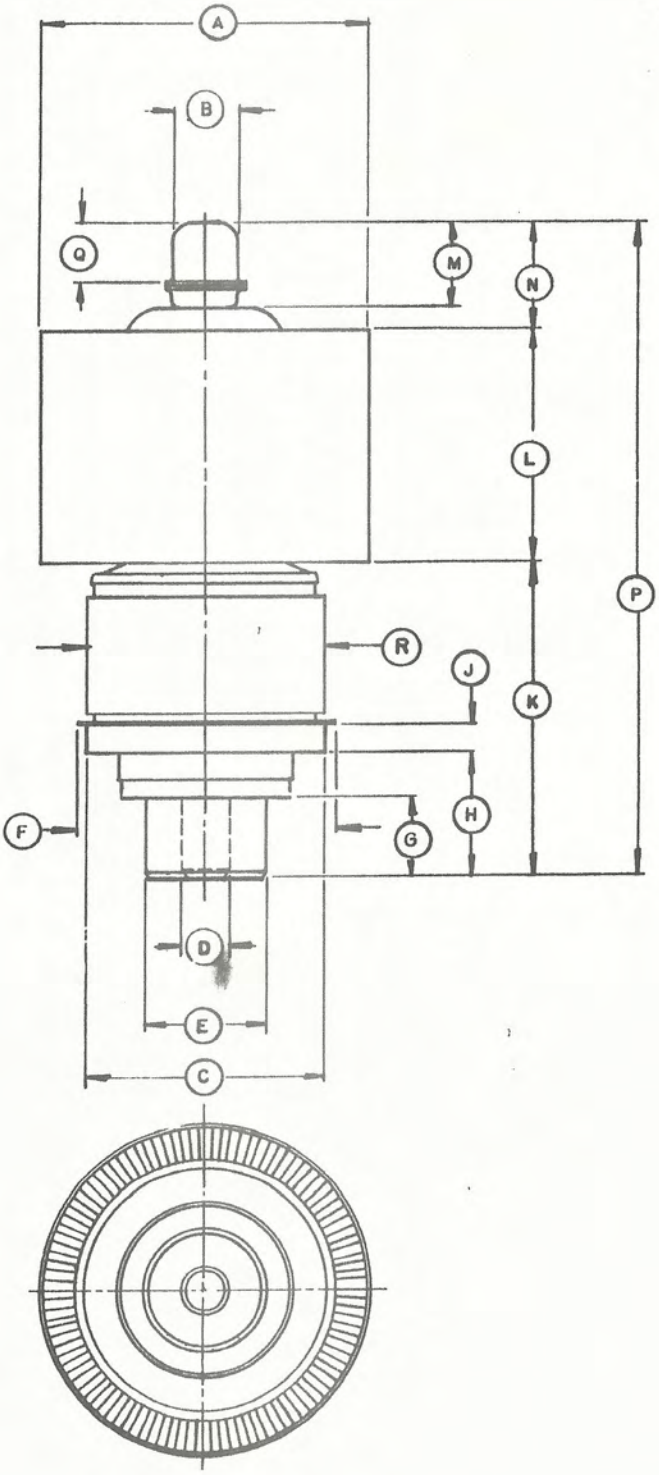




DIMENSIONS IN INCHES

DIMENSIONAL DATA

REF.	MIN.	MAX.	NOM.
A	4-3/32	4-5/32	
B	25/32	27/32	
C	2.990	3.010	
D	.615	.635	
E	1.490	1.510	
F		3-5/8	
G	13/16	15/16	
H	1-3/8	1-5/8	
J	25/64	27/64	
K	3-7/8	4-1/4	
L	2-15/16	3-1/16	
M	1	1-1/8	
N	1-3/16	1-11/16	
P	8	9	
Q	11/16	13/16	
R	2.998	3.002	



RF LINEAR AMPLIFIER CLASS-B, GROUNDED-GRID

MAXIMUM RATINGS

DC PLATE VOLTAGE	5000 VOLTS
DC PLATE CURRENT	2.5 AMPS
PLATE DISSIPATION	3 KW
GRID DISSIPATION *	225 WATTS

*Approximate value

TYPICAL OPERATION, Single-Tone Conditions

DC Plate Voltage	4000	4800	4800 volts
Zero-Signal DC Plate Current*	.250	.350	.325 amps
Max-Signal DC Plate Current	2.00	1.68	2.0 amps
Max-Signal DC Grid Current	.610	.462	.596 amps
Driving Impedance	47.5	50	46.3 ohms
Resonant Load Impedance	1210	1720	1425 ohms
Max-Signal Driving Power	420	293	410 watts
Peak Envelope Plate Output Power	6030	6000	7266 watts
Power Gain	14.3	20.4	17.70 times
Plate Dissipation	2285	2275	2775 watts

RF LINEAR AMPLIFIER CARRIER CONDITIONS, GRID-DRIVEN

MAXIMUM RATINGS

DC PLATE VOLTAGE	5000 VOLTS
DC PLATE CURRENT	2.5 AMPS
PLATE DISSIPATION	3 KW
GRID DISSIPATION *	225 WATTS

*Approximate value

TYPICAL OPERATION, Carrier Conditions

DC Plate Voltage	4000 volts
DC Grid Voltage	0 volts
Zero-Signal DC Plate Current*	.250 amps
DC Plate Current	.740 amps
DC Grid Current	.135 amps
Peak Driving Voltage	85 volts
Driving Power	11.5 watts
Plate Output Power	1130 watts
Plate Dissipation	1830 watts
Peak RF Plate Voltage	2000 volts
Resonant Load Impedance	1750 ohms

AF AMPLIFIER OR MODULATOR CLASS-B, GRID-DRIVEN

MAXIMUM RATINGS (Per Tube)

DC PLATE VOLTAGE	5000 VOLTS
DC PLATE CURRENT	2.5 AMPS
PLATE DISSIPATION	3 KW
GRID DISSIPATION *	225 WATTS

*Approximate value

TYPICAL OPERATION, Two Tubes, Sinusoidal Wave

DC Plate Voltage	4000 volts
DC Grid Voltage	0 volts
Zero-Signal DC Plate Current*	.500 amps
Max-Signal DC Plate Current	3.575 amps
Max-Signal DC Grid Current	.585 amps
Driving Power	115 watts
Peak AF Driving Voltage (per tube)	190 volts
Load Resistance, Plate-to-Plate	2720 ohms
Max-Signal Plate Output Power	10,500 watts
Plate Dissipation (per tube)	1850 watts

NOTE: "TYPICAL OPERATION" data are obtained by calculation from published characteristic curves and confirmed by direct tests. No allowance for circuit losses, either input or output, has been made.

APPLICATION

Input Circuit — When the 3CX3000A7 is operated as a grounded-grid rf amplifier, the use of a resonant tank in the cathode circuit is recommended in order to obtain greatest linearity and power output. For best results with a single-ended amplifier it is suggested that the cathode tank circuit operate at a "Q" of five or more.

Cooling—The maximum temperature rating for the anode core and seals of the 3CX3000A7 is 250°C. Sufficient forced-air cooling must be provided to keep the temperature of the anode core and the temperatures of the ceramic-to-metal seals below 250°C. Tube life is usually prolonged if these areas are maintained at temperatures below the maximum rating. Minimum air flow requirements to maintain anode-core and seal temperatures below 250°C at sea level with an inlet-air temperature of 50°C are tabulated for air-flow in the anode-to-base and base-to-anode directions. At higher ambient temperatures, frequencies above 30 MHz or at higher altitude, a greater quantity of air will be required. It is suggested that temperatures be monitored in any new installation to insure proper cooling.

Anode-to-Base Air Flow[1]

Anode Dissipation watts	Sea Level Air Flow CFM	Sea Level Pressure Drop inches water	10,000 Feet Air Flow CFM	10,000 Feet Pressure Drop inches water
1500	33	.6	48	.9
2500	66	1.25	96	1.82
3000	72	1.40	105	2.04

Base-to-Anode Air Flow

Anode Dissipation watts	Sea Level Air Flow CFM	Sea Level Pressure Drop inches water	10,000 Feet Air Flow CFM	10,000 Feet Pressure Drop inches water
1500	32	.6	47	.9
2500	57	1.0	83	1.5
3000	64	1.07	93.4	1.56

*Since the power dissipated by the filament represents about 385 watts and since grid dissipation can, under some conditions represent another 225 watts, allowance has been made in preparing this tabulation for an additional 610 watts.

[1]When air is supplied in the anode-to-base direction, a minimum of 3 cfm must be directed into the filament-stem structure between the inner and outer filament terminals to maintain the base seals below 250°C. No separate air is required with base-to-anode airflow.

Eimac®

EIMAC
Division of Varian
SAN CARLOS
CALIFORNIA

3CX3000A7

HIGH-MU POWER TRIODE

The EIMAC 3CX3000A7 is a ceramic to metal, high-mu, forced-air cooled, external anode transmitting triode with a maximum plate dissipation rating of 3000 watts. Relatively high power output as an amplifier, oscillator, or modulator may be obtained from this tube at low plate voltages. The 3CX3000A7 is an exact replacement for the EIMAC 3X3000A7 and is suggested for use where higher ambient temperatures are to be expected, or greater reliability is required. The all ceramic and metal construction allows a greater margin of safety with respect to tube operating temperatures while permitting higher processing temperatures to insure longer life.

The tube has a rugged, low inductance cylindrical filament-stem structure, which readily becomes part of a linear filament tank circuit for VHF operation. The grid provides thorough shielding between the input and output circuits for grounded-grid applications and is conveniently terminated in a ring between the plate and filament terminals.

The 3CX3000A7 is intended to be used as a zero bias class B amplifier in audio or radio frequency applications. Operation with zero grid bias offers circuit simplicity by eliminating the bias supply. In addition, grounded-grid operation is attractive, since a power gain of over twenty times can be obtained.

GENERAL CHARACTERISTICS

ELECTRICAL

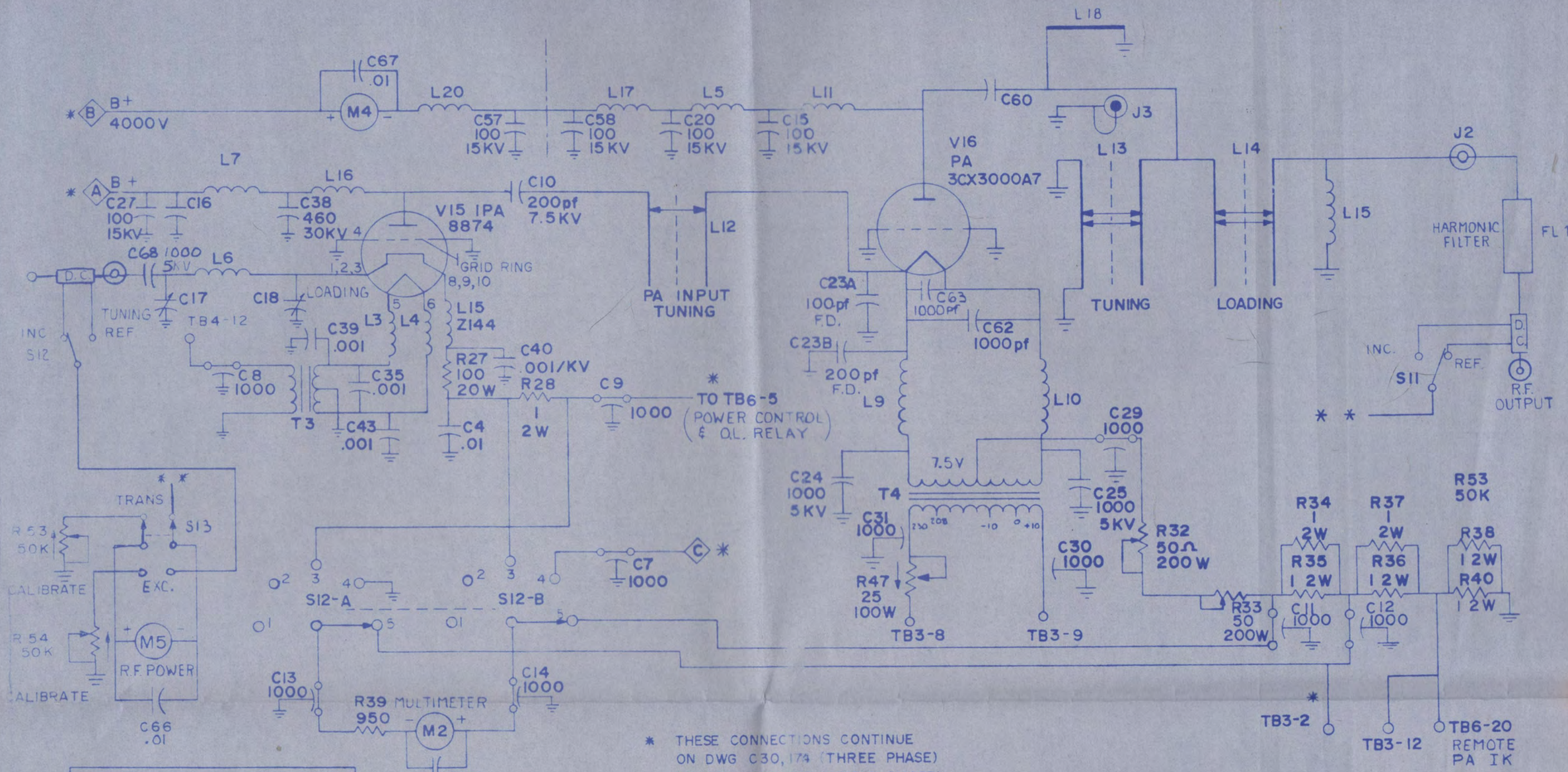
Filament: Thoriated-Tungsten		
Voltage	7.5	volts
Current	51	amperes
Amplification Factor	160	
Interelectrode Capacitances:		
Grid-Filament	38	pF
Grid-Plate	24	pF
Plate-Filament	0.6	pF

MECHANICAL

Base	See outline drawing
Operating Position	Vertical, base up or down
Cooling	Forced air
Maximum Operating Temperatures:	
Anode Core and Seals	250°C
Maximum Dimensions:	
Height	8.6 inches
Diameter	4.16 inches
Net Weight	6.25 pounds
Shipping Weight	17 pounds

(Effective 5-15-67)

Printed in U.S.A.



S12 MULTIMETER		
POS	FUNCTION	FSD
1		
2		
3	IPA Ik	1 AMP
4	IPA Eb	3KV
5	IPA Ik	2 AMP

* THESE CONNECTIONS CONTINUE ON DWG C30,174 (THREE PHASE) OR DWG C30,175 (SINGLE PHASE)

** THIS CONNECTION CONTINUES WERE INDICATED BY ASTERISKS.

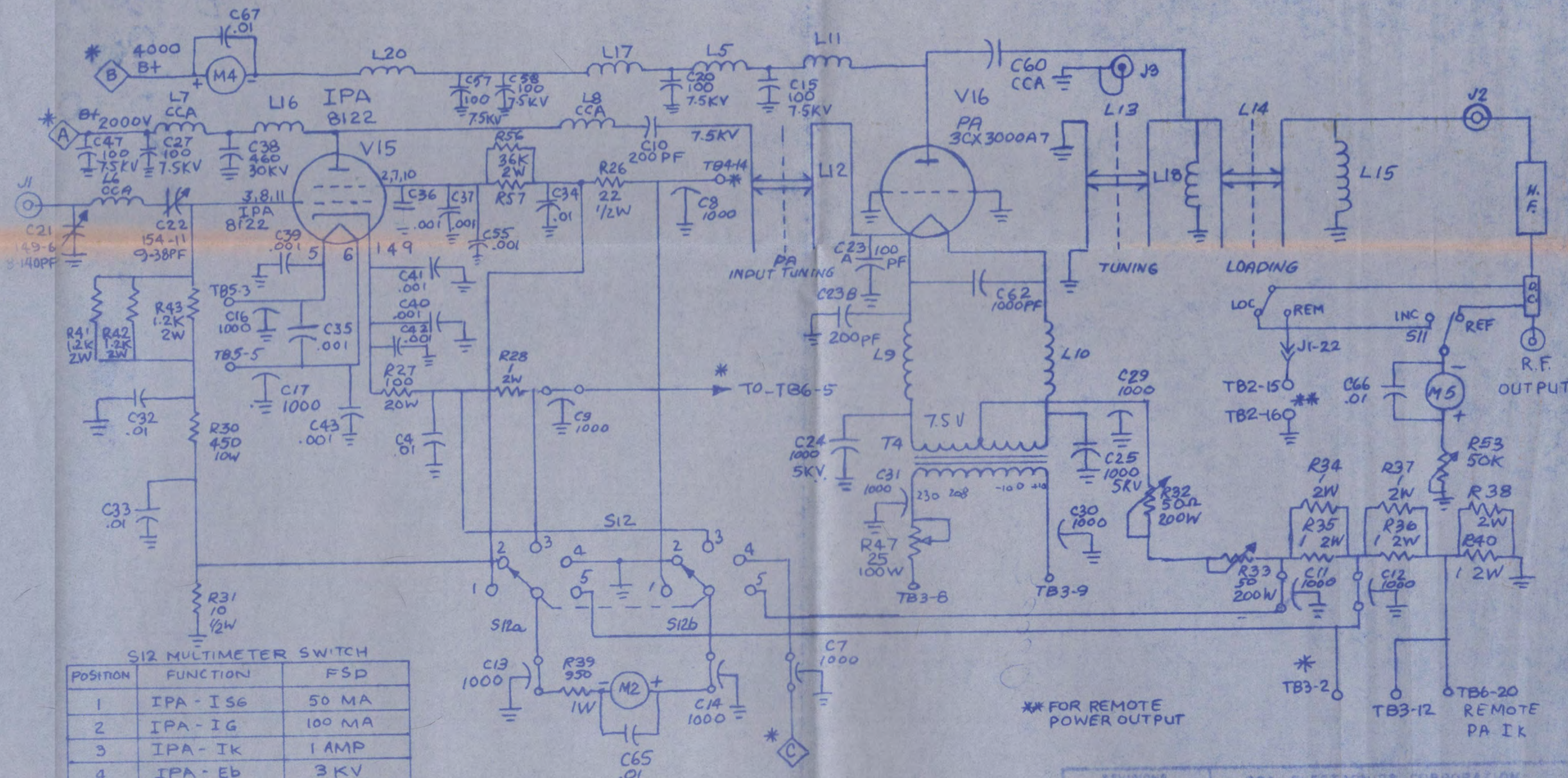
REVISIONS		
No	Date	By
1	12-7-76	CBS
2	11-3-77	CBS
3		
4		
5		

CCA ELECTRONICS CORPORATION

IPA & PA SCHEMATIC DIAGRAM

Used on: FM 3000 D/E 1 & 3

Drawn By	Date	Drawing No.
JYT	4-15-76	B20,249
Approved	Date	



S12 MULTIMETER SWITCH

POSITION	FUNCTION	FSD
1	IPA - ISG	50 MA
2	IPA - IG	100 MA
3	IPA - IK	1 AMP
4	IPA - Eb	3 KV
5	PA - IK	2 AMP

* THESE CONNECTIONS CONTINUE ON DWG. NO. C30,031 (THREE PHASE) OR DWG. NO. C-30,042 (SINGLE PHASE)

REVISIONS					
			No.	Date	By
			1	11-8-66	B.G.
			2	10-23-67	B.G.
			3	11-23-68	B.G
7	6-19-73	BG NL	4	2-5-69	E.S.
6	4-24-72	NAL	5	3-10-72	BG

CCA ELECTRONICS CORPORATION
GLOUCESTER CITY, CAMDEN CO., NEW JERSEY U.S.A.

IPA - PA
Schematic Diagram

Used on: FM 3000B
Drawn By: | Date: | Drawing No.
Approved By: | Date:

B 20,050

Z1 Z2 Z3 Z4 Z5 Z6

T1 208 230 208 230 208 230

L1 5H

R1 25K 50W

C1 .02 10KV

C54 4 5KV

C2 4 5KV

R2 100K 200W

R3 100K 200W

B+ B

R5 1M 2W R6 1M 2W R7 1M 2W R8 1M 2W R9 1M 2W

NOTE R5 TO R9 REPLACED BY A SINGLE 5 MEG 30W RESISTOR (R7)

R10 100K 2W

M3

C63 .01

TB6-19

REMOTE H.V. METERING

R11 1.2K 2W

TO C9

TB6-5 *

REMOVE JUMPER FOR REMOTE MOTOR RHEOSTAT CONNECTION

TB6-4 *

R23 1Ω 2W

R58 1Ω 2W

TB4-15

L2 15H

B+ A

C3 4 5KV

R4 100K 200W

R12 1M 2W R13 1M 2W R14 1M 2W

C

R15 100K 2W

TB3-12 * TB3-2 *

R29 500 100W

TB3-1 *

R20 2 3W

I3 READY

I5 OVERLOAD

I.P.A. K12 P.A. K11

K1 PLATE

F3 5AMP

TB3-7

PLATE TD 60 SEC

PLATE R17 800 25W

I4

K15 S3 FIL. K2

TO EXCITER POWER SUPPLY

TB3-10

S7 AIR

C68 1000

S8 PA

C69 1000

TB3-11

S9 BACK DOOR INTL'K

METER PANEL INTL'K S13

S4 PLATE

S5 OL RESET

K3 OL AUX

K5 1ST HOLD

K6 1 SEC TD

LINE CB1

TB1

F2 5A

TB3-15

TB3-3 230 208 -10 0 +10

T2

TB3-5

F4 3A

F5 3A

R16 800 25W

BL-1

F1 5A

TB3-16

TB3-4

START S2

K4

S10a

I1 START

TB4-12

115V TB6-8

I2 INTERLOCK

TB6-18 TB6-17 TB6-16 TB6-15

TB4-8 TB4-3 TB4-4

S10b S10c

TB6-14 TB6-5 TB6-6 TB6-13

K13 L.V. K14 H.V.

R22 10

H.V.O.L.

TB4-15

TB4-1 TB4-2

TB6-11 TB6-12

TB3-9 TB3-8

TO T4 (PA)

S1

C64 .01

M1

TB3-13 TB3-14

TB4-13

T3

CR1 CR2

5V

L3 8H L4 8H

R21 25K 10W

C19 .005 3KV

C18 .005 3KV

TB4-16

C5 10 1KV

C6 10 1KV

R18 15K 25W

R19 5K 25W

TUNE OPERATE S6

TB4-14 *

K7 2ND HOLD

K8 TD 1SEC

K9 3PD HOLD

K10 OL CLEARING TD 60 SEC

* THESE CONNECTIONS CONTINUE ON:
DWG-B 20,050 - FM-3000
DWG-B 20,050 - FM-5000

REVISIONS			CCA ELECTRONICS CORPORATION GLOUCESTER CITY, CAMDEN CO., NEW JERSEY, U.S.A.		
No.	Date	By	Control and Power Supply Schematic Diagram		
1	11-8-66	B.G			
2	11-23-68	B.G			
3	1-13-69	E.S.	Used on: FM-3000D		
4	4-24-72	N.L.	Drawn By D.J.S	Date 10-26-66	Drawing No. C30,031
5	6-19-73	BG NL	Approved By	Date /	

MULTIMETER SWITCH (S8)		
POS	FUNCTION	F.S.D
1	IPA I_K	500mA
2	IPA E_b	5KV
3	PA I_K	2A

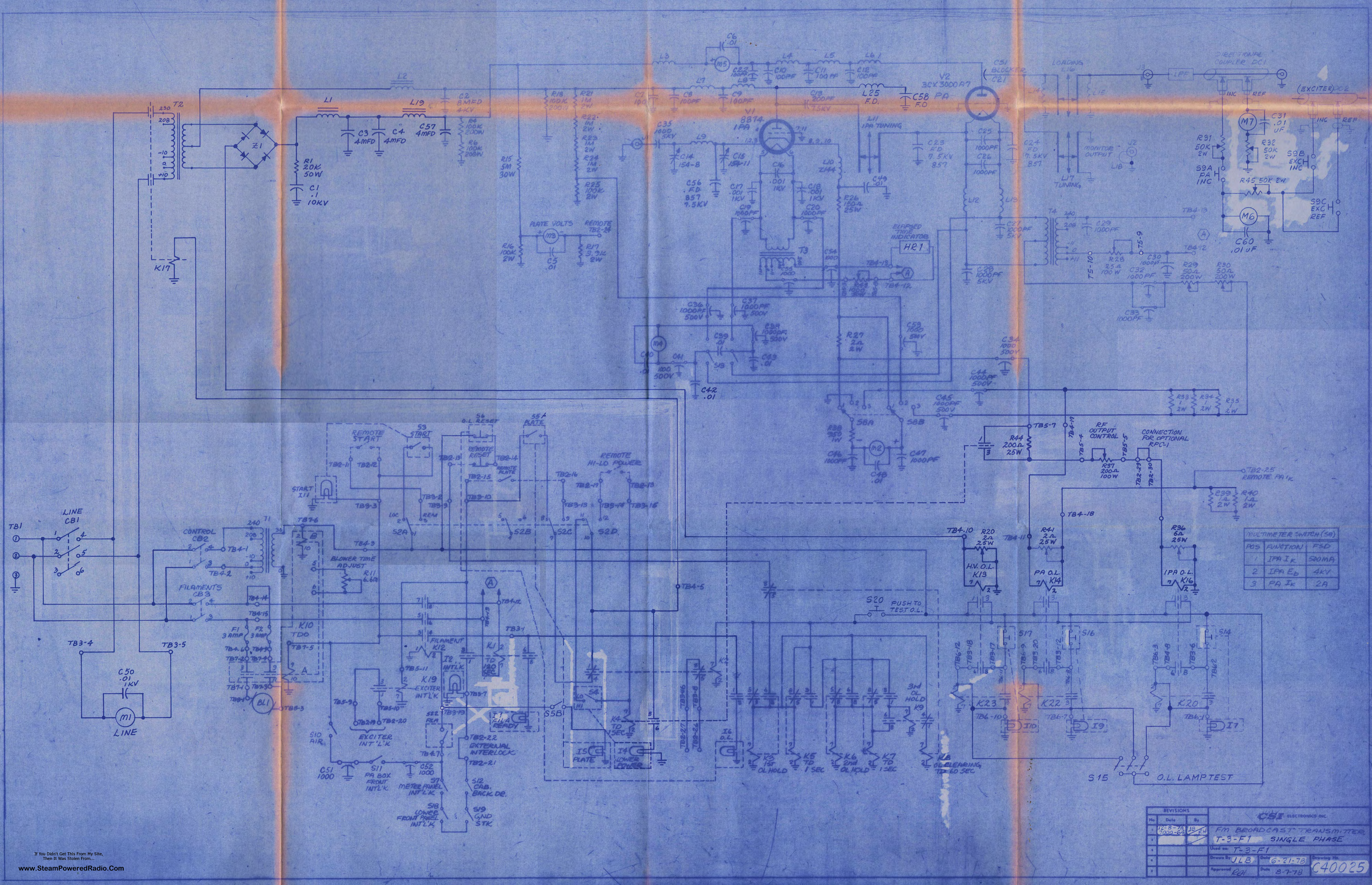
NOTE- OPTIONAL FILAMENT REGULATOR
TB7-1, TB7-2 INPUT; TB7-3, TB7-4 OUTPUT; (Remove Jumpers)
K21, K24 OPTIONS.
K25 ADDED 2-20-84

No.	Date	By	No.	Date	By
6	2-20-84	MAD	1	REV. 10-7-76 K14, K16	D.J.S.
7	3-13-85	[illegible]	2	5-18-78 7000-18	[illegible]
8			3	11-14-81	[illegible]
9			4	11-15-82	MAD
10			5	SHEET 2 ADD GEN'L REV.	[illegible]

CSI ELECTRONICS INC

FM BROADCAST TRANSMITTER

Used on: FM3 OE SINGLE PHASE
Drawn By: D.J.S. Date: 4-6-76 Drawing No. C40000
Approved: Sheet 2 of



MULTIMETER SWITCH (S8)		
POS	FUNCTION	FSD
1	IPA I_K	500MA
2	IPA E_b	4KV
3	PA I_K	2A

REVISIONS			
No	Date	By	
1	12-3-79 7000-694	JLB	RH
2			
3			
4			
5			
6			

CSI ELECTRONICS INC.

FM BROADCAST TRANSMITTER

T-3-F1 SINGLE PHASE

Used on: T-3-F1

Drawn By: JLB Date: 6-21-78

Approved: RH Date: 8-7-78

Drawing No. C40025

T1 Z1 Z2 Z3 Z4 L19 5H L1 5H R1 25K 50W C1 .02 10KV C54 4 MFD 5KV C2 4 5KV R2 100K 200W R3 100K 200W R7 5 MEG 30W B+ B R23 1Ω TB4-15 L2 15H C3 4 5KV R4 100K 200W R12 1 MEG 2W R13 1 MEG 2W R14 1 MEG 2W R15 100K 2W B+ A C K1 PLATE

R10 100K 2W M3 C63 .01 TB6-19 REMOTE H.V. METERING R11 1.2K TO C9 TB6-5 TB6-4 REMOVE JUMPER FOR REMOTE MOTOR RHEOSTAT CONNECTION TB3-2 TB3-12 TB3-1 R29 500 100W R20 2 3W I.P.A. P.A. K12 K11 K5 1 ST HOLD K6 1 SEC TD

6 7 I3 READY 3 I5 OVERLOAD

LINE CB-1 TB1 F2 5A TB3-15 TB3-16 F1 5A M1 C64 .01 TB3-3 230 205 -10 0 +10 TB3-4 T2 TO EXCITER POWER SUPPLY TB3-5 S7 AIR C68 1000 S8 PA C69 1000 TB3-11 S9 BACK DOOR INT'L'K S13 METER PANEL INT'L'K F3 5A TB3-7 K15 S3 FIL. 8 K2 PLATE TO 60 SEC I4 PLATE R17 800 25W 5 8 K3 7 1 2 3 OL AUX S4 PLATE 2 3 S5 OL RESET S10b 8 7 S10c 11 10 12 K13 L.V. K14 H.V. R22 10 H.V.O.L. TB4-15

F4 3A F5 3A TB3-10 BL-1 R16 800 25W I1 START S2 START 2 3 K1 S10a TB4-1 TB4-2 TB6-11 TB6-12 TB3-8 TB3-9 TO T4 (PA) TB4-12 115V TB6-8 I2 INTERLOCK R24 800 25W TB4 3 TB4-3 TB4-4 TB4-5 TB4-6 TB6-18 TB6-17 TB6-16 TB6-15 TB6-14 TB6-13 TB4-13

T3 CR1 CR2 6.3V R21 25K 10W C19 .005 3KV C18 .005 3KV L3 8H L4 8H C5 10 1KV C6 10 1KV R18 15K 25W R19 3K 25W TUNE OPERATE S6 TB4-14

5 6 6 8 8 K7 2ND HOLD 8 8 5 6 7 8 7 6 8 K8 TD 1 SEC 6 6 5 7 8 1 8 K9 2 3PD HOLD 4 1 8 K10 OL CLEARING TD 60 SEC

*THESE CONNECTIONS CONTINUE ON DWG. NO. B 20,050

REVISIONS			CCA ELECTRONICS CORPORATION GLOUCESTER CITY, CAMDEN CO., NEW JERSEY, U.S.A.		
No.	Date	By	Control and Power Supply Schematic FM-3000D - SINGLE PHASE		
1	2-5-69	D.J.S.			
2	6-25-73	BG NL	Used on: FM-3000D		
3			Drawn By D.J.S.	Date 12 29 67	Drawing No. C30,042
4			Approved By	Date	
5					