TECHNICAL MANUAL

FOR

HFLM-10K (Rev. B)

PUBLICATION NUMBER

202-2112-000

ISSUE DATE

Sept. 1980

THE TECHNICAL MATERIEL CORPORATION

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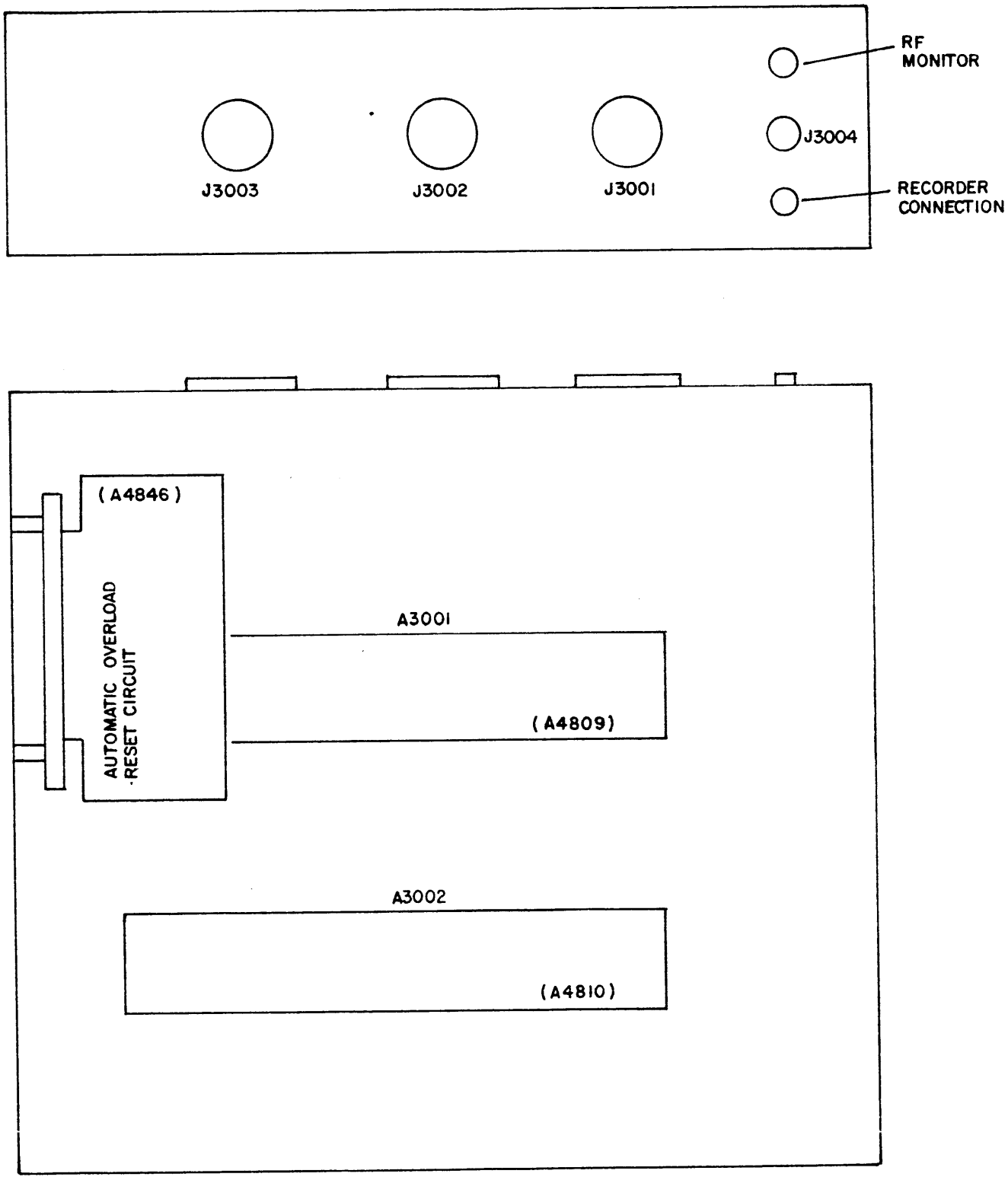
*Electron tubes also include semi-conductor devices.

ADDENDUM 1

The HFLM-10K Rev. B when linked with a CON-(S) console has certain optional features built into the transmitter. The following paragraphs will discuss these requirements and the reader must intergrate this information into the transmitter system.

1. This transmitter is equipped with an Automatic Overload Reset Circuit. The circuit is housed on a printed circuit board and is located in the Input Chassis Assembly see figure 5-10 (Exciter Interconnect). In this same area two (2) connectors appear for RF Monitor and Recorder. A switch is provided in this area to defeat the Automatic Overload Reset Circuit, this is accomplished by disabling the +24 V supply to the circuit. A detailed discussion of the Automatic Overload Reset Circuit is outlined in the preceeding paragraphs.

2. A local/remote switch is located on the main control panel adjacent to the HV ON switch. This switch delegates control of the Transmitters High Voltage. Thus if the switch is local, High Voltage control is at the transmitter. If the switch is remote, High Voltage control is placed at the console CON-(S). Note, to place control at the console the local/remote switch must be set at remote and the High Voltage switch must be initiated. Also when the local/remote switch indicates remote a signal is sent to the console which will illuminate a lamp indicating which transmitter has Main Power ON.



Input Chassis Assembly

Transmitter Automatic Reset Circuit

Theory of Operation

Ref: CK-1838

The transmitter automatic reset circuit is provided for automatic overload reset operation. It has the capability of being set for two (2) thru eight (8) overload resets. When the amount of overloads encountered within a predetermined period of time reaches the maximum number selected, the reset circuit will remain in a static condition keeping the transmitter in an overload condition. The automatic overload circuit is cleared by setting the HV ON-OFF switch to OFF.

Power to the reset circuit is provided by the transmitter being controlled. The reset circuit can be defeated simply by removal of the +24 VDC supply line. +24 VDC is necessary to operate the timing circuits and the relay driver circuits. By use of series resistor R1 and zener CR1 +5 VDC is developed for the operation of the IC's. Latching relay K2 is provided as an additional protect for automatic operation, to remove power from the reset card.

Transistors Q1, Q7, Q8 and unijunction Q2 comprise the automatic reset timing circuit. Transistors Q3, Q4, Q5 and unijunction Q6 comprise the counter clear timing circuit.

Integrated circuits Z1, Z4 and Z5 contain the logic gates necessary for control. Z2 is a BCD counter and finally Z3 is a BCD to decimal converter. Transistors Q11, Q10 and Q9 with relay K2 comprise the addition protect necessary during the initial power ON condition of the transmitter.

Initial Counter Clear Circuit:

When power is switched On, C5 will charge to +5 volts through R20. Q5 goes into saturation at the same time, resulting in a logic "0" or low (0V) on pin 1 of Z1D. This low is inverted to a high to pin 4 of Z1C. The combined gating action at Z1C results in a momentary high out of Z1C pin 6. This high will be present for the amount of time it takes for C5 to charge to +5V, after which the level will drop to a low. The momentary high presented to pins 2 and 3 of BCD counter (Z2) will "clear" the counter and insure that the counting sequence always starts from zero (0).

This initial clear pulse will also be seen through Z5B, Z5D, Z4D, and will arrive at pin 4 of Z4C as a momentary low. The momentary low on Z4C pin 4 will then be inverted to a high to pin 10 of Z4B. Pin 9 of Z4B will be at a high and the coincidence of both highs will cause a low out of Z4B. As this low is fed back into Z4C a "latch" will result with Z4C remaining high and Z4B remaining low. Z4A then presents a high to Q3. This will

forward bias Q3 on, resulting in Q4 being reversed biased keeping it cut off. With Q4 cut off, power is removed from the counter clear timing circuit.

Automatic Reset Timing Circuit:

The automatic timing circuit normally has power removed by the action of the ground from the reset condition of the overload relay in the transmitter. CR2 and CR3 form an "OR" circuit to control transistor switch Q1. A logic high on CR2 or CR3 will turn Q1 on. When an overload occurs in the transmitter, ground is lifted from CR2. +24 volts will then be seen through R5 to CR2 which will forward bias Q1 on. Supply voltage is now supplied to the reset timing circuit. Q7 will turn on due to the positive voltage thru R3 to its base. C3 will begin to charge because of the potential difference across it from R2 (+) to base of Q7 (-). C3 will continue to charge until the threshold voltage of Q2 has been reached. When the threshold voltage of Q2 is exceeded, the unijunction will "fire" providing a discharge path for C3. When the unijunction (Q2) is triggered, a 150 msec pulse is developed. This pulse is coupled through relay driver Q8 to K1. K1 will energize and reset the overload condition in the transmitter. With the transmitter overload reset, CR2 will be grounded again.

In order to insure proper relay operation for the pulse duration, +24V is fed back to CR3 by normally open contacts of K1. Q1 will remain on until K1 has dropped out. Power is then removed from the reset timing circuit. When an additional overload occurs, the above sequence is repeated.

Overload Reset Counting Circuit:

R13, R14, Z1A and Z1B monitor the operation of K1. The contact bounce normally found with relays is removed by this circuit, insuring proper presentation of pulses to the BCD counter (Z2), count input. When K1 operates, the output of Z1B which is normally low will switch to a high. When K1 drops out the output of Z1B will return to a low. During the high to low transition of Z1B, BCD counter (Z2) output will change. The four line output (A, B, C, D) will change from all lows to a high on A and lows on B, C, and D. The four line output will follow a binary format with A, B, C and D displaying binary 1, 2, 4, and 8 respectively. The binary counter output will change for each overload reset operation. If the maximum amount of overloads has not been reached in the prescribed time, and the transmitter is in the reset condition, Z2 (BCD counter) will be reset to zero (o).

Maximum Overload Detector Circuit:

B C D to Decimal Decoder (Z3) monitors the output of the B C D counter (Z2) and will have one low output for each B C D input for a total of ten (10) different outputs. A strap wire matrix is provided which enables the user to select two (2) thru eight (8) resets. When the maximum amount of resets have been reached the selected output will switch to a low. The low will be seen at CR2. CR3 input will be open; this combination will result in Q1 being reversed biased to cut off. Power will then be removed from the auto reset timing circuit. The overload relay in the transmitter will be in the overload condition. This condition will inhibit the counter clear timing circuit from clearing the B C D counter. The transmitter will be kept in the overload condition until the HV ON-OFF switch is set to OFF. This action will reset the overload relay and remove power from the automatic reset board by applying ground to the base of Q12. When the HV ON-OFF switch is set to On, proper operation is then resumed.

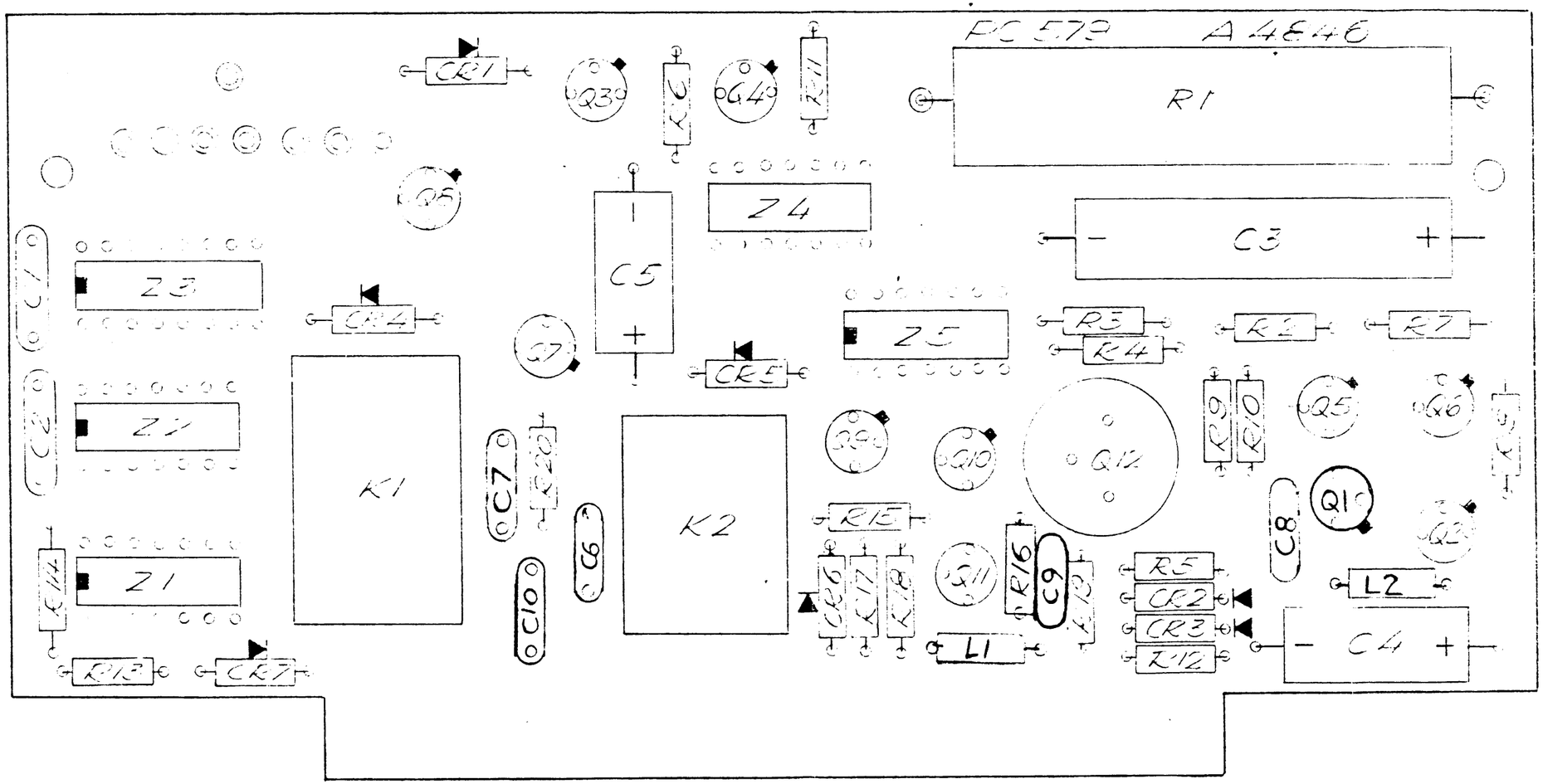
Counter Clear Timing Circuit:

Q4 is being kept "OFF" by the initial "ON" state of Q3 and the subsequent "latch" of Z4C and Z4B. In order to turn Q4 on, the "latch" must be reversed. This is accomplished as follows:

When K1 operates, the high from Z1A will switch to a low. This low is seen on pin 9 of Z4B. The output of Z4B will then swing high. As both inputs of Z1C are now high the output of Z1C will go low to keep Z1B output high. The "latch" has now been reversed. Z4A inverts the high to a low causing Q3 to be reversed biased to cut off. +24V will now be seen at the base of Q4 thru R6. The forward bias on Q4 drives it to saturation. Supply voltage is now applied to the clear timing circuit. Circuit operation will be the same as previously described for the auto reset timing circuit. When the threshold voltage of Q6 is exceeded the uni-junction will "fire" providing a discharge path for C4. This condition will reverse bias Q5 to cut off for a logic high at the output of Q5. A resulting pulse width of 15 msec is presented to Z1D pin 1. If Z1D pin 2 is not grounded by the overload relay in the transmitter, the 15 msec pulse will be seen through Z1C to the clear input of the B C D counter (Z2) and will clear the counter (all outputs will be low). The high from Q5 will arrive at Z4C as a low and will cause the latching circuit of Z4C and Z4B to reverse its logic levels (high out of Z4C and low out of Z4B). Q3 will now become forward biased and Q4 will cut off removing power from the clear timing circuit. R7 is used to provide sufficient current drain to keep Q4 in conduction during the charging sequence of the clear timing circuit.

"Protect" Circuit:

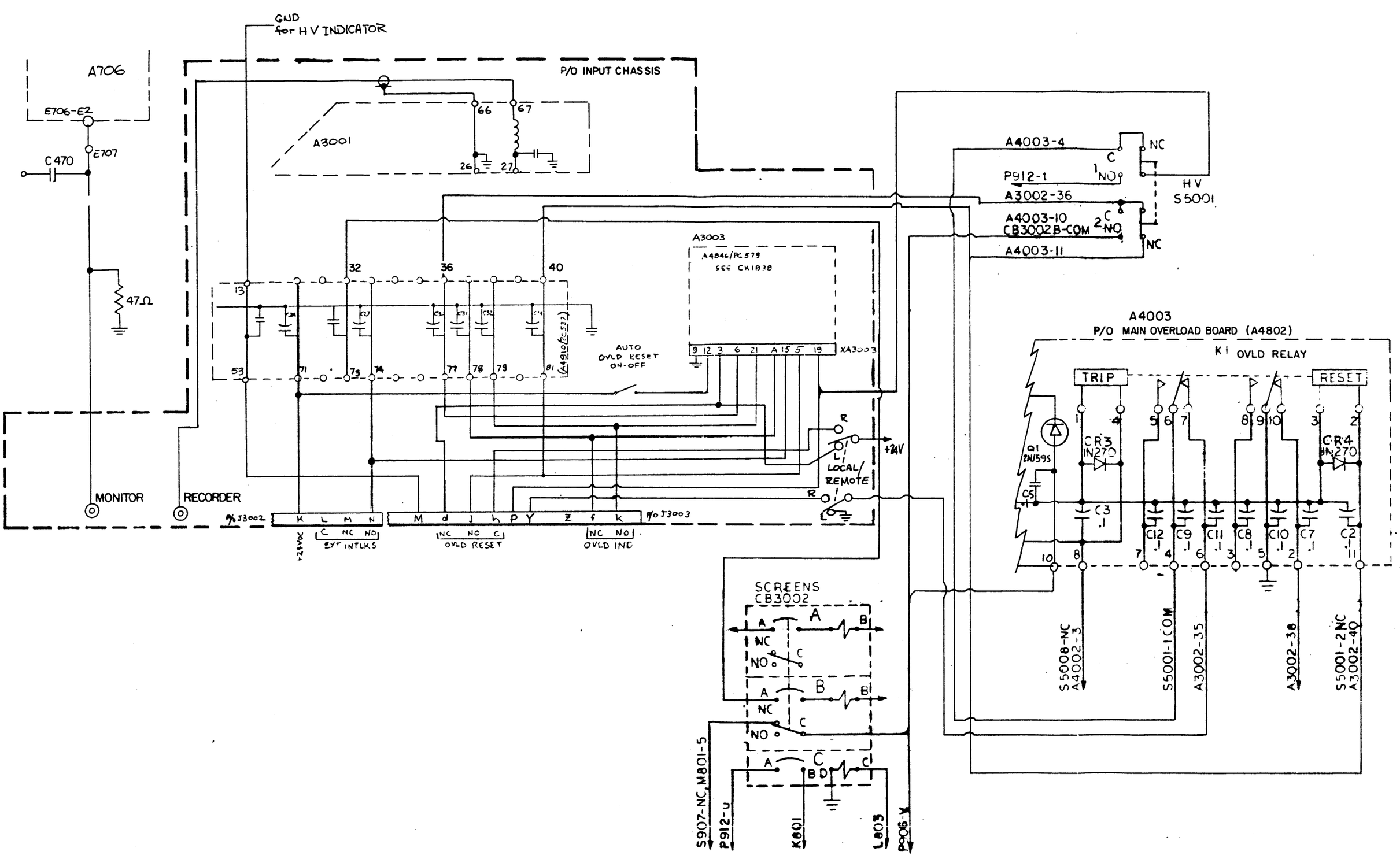
Q11 is monitoring the end of the interlock line. If 24V is missing for any reason on this line Q11 will switch a low to Q10, Q10 will go high and Q9 will switch low. This low will energize the trip coil of K2 and power will be removed from the reset circuit board. In order to restore power to the reset circuit board, the HV ON-OFF switch must be set OFF and then ON. This feature is used in cases where the transmitter is first turned on and the timer has not cycled. Another condition is when an interlock has been opened. The operator is compelled to reset the HV ON-OFF switch for proper operation. Finally, coming from pin 2 of Z3 (B C D to decimal decoder) is the "fail safe" line. This line comes into use in case the maximum overload detection circuit did not work. A low from this output will also cause the trip coil of K2 to energize removing power from the reset circuit board.



Automatic Overload
Reset Circuit Assembly
(A4846)

TRANSMITTER AUTO RESET BD ASSY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	Capacitor	CX119-104M
C2	Same as C1	
C3	Capacitor, Fixed, Electrolytic	CE105-75-50
C4	Capacitor, Fixed, Electrolytic	CE105-20-50
C5	Capacitor, Fixed, Electrolytic	CE105-1-15
CR1	Semiconductor, Device, Diode	1N3826
CR2	Semiconductor, Device, Diode	1N914
CR3	Same as CR2	
CR4 thru CR7	Semiconductor, Device, Diode	1N270
K1	Relay, Armature	RL156-8
K2	Relay, Armature	RL156-9
Q1	Transistor	2N697
Q2	Transistor	2N492
Q3 thru Q5	Same as Q1	
Q6	Same as Q2	
Q7 thru Q11	Same as Q1	
Q12	Transistor	2N1485
R1	Resistor, Fixed, WW 150 ohms, 10W	RR116-150W
R2	Resistor, Fixed, Composition	RC07GF473J
R3	Resistor, Fixed, Composition	RC07GF472J
R4 thru R6	Same as R3	
R7	Resistor, Fixed, Composition	RC20GF222J
R8	Resistor, Fixed, Composition	RC20GF225J
R9	Resistor, Fixed, Composition	RC07GF102J
R10	Same as R9	
R11 thru R16	Same as R3	
R17	Same as R7	
R18	Resisistor, Fixed, Composition	RC07GF103J
R19	Same as R9	
R20	Same as R9	
Z1	IC Network	NW176
Z2	IC Network	NW174
Z3	IC Network	NW165
Z4	Same as Z1	
Z5	Same as Z1	



Automatic Overload
Reset Circuit Interconnect

8 7 6

D C B

Q 12
2N 1485

R1
150/10W
+5V

CR1
IN3826

C6
.1

R19
1K

K1

4 1 16 15 14 13 12 11 10 9 8 7 6 5

CR2
IN914

R5
4.7K

Q1
2N697

R12
4.7K

CR4
IN4245

CR3
IN 914

R3
4.7K

R4
4.7K

R2
47K

Q8
2N 697
RELAY DRIVER

C3
75/50 V

Q2
2N492

Q7
2N 697

AUTO RESET
TIMING CKT.

R6
4.7K

Q3
2N697

R11
4.7K

Q4
2N697

+5V

R10
1K

R9
1K

R7
2.2K

R8
2.2M

Q6
2N492

C 4
20/50V

Q5
2N697

COUNTER CLEAR
TIMING CKT.

+5V
14
11 A 13
12
Z 4
9 B 8
10 LATCH
6 C 5
4
2 D 3
1
7

C9
.1

6 5

+5V
R14
4.7K
R13
4.7K

+5V
14
13
A
11
12
8
B
9
10
Z5
5
C
6
4
2
D
3
1
7

13
12
8
5
4
3

+5V
R20
1K
C5
1.5

11
A
12
SWITCH
BOUNCE
ELIMINATOR
9
B
8
10
Z1
5
C
6
4
2
3
D
1
7

COUNT
INP
CLE
CR
IN

BCD
DECI
DECO
B
COU

3	2	1

REVISIONS							
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED
				A		7/7/71	
						3/3/73	

L1
220
19
C9
.1

L2
220
21
C8
.1

8
4
7
6
3
5
2
1
9
13
10
12

+5V

2 3 4 5 6 7 8

BCD TO
DECIMAL
DECODER

8 9 13 14 11 10 1 2

Z3

5
12

3 6 7 4

+5V

1 12 9 8 11

A B C D

BCD
COUNTER

Z2

5
10

14 2 3

INPUT

CLEAR

C2
.1

C1
.1

CR7
IN4245

A

K2

TRIP

RESET

4 1 6 7 3 2

CR5
IN4245

CR6
IN4245

C10
.1

Q11
2N697

R18
10K

15

C7
.1

R15
4.7K

Q9
2N697

Q10
2N697

R16
4.7K

R17
2.2K

3 2 1

REVISIONS							
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED
				A	[illegible]	[illegible]	[illegible]

D

C

B

1
20
19

L2
220
21

C8
.1

8
4
7
6
3
5
2
1
9
13
+5V
10
12

2 3 4 5 6 7 8

+5V

8 9 13 14 11 10 1 2

Z3

5

12

3 6 7 4

+5V

1 12 9 8 11

A B C D

Z2

5

10

14 2 3

TO
AL
ER

TER

R

C2
.1

C1
.1

45

A

K2

TRIP

RESET

4 1 6 7 3 2

CR5
IN4245

CR6
IN4245

C10
.1

Q11
2N697

R18
10K

15

Q9
2N697

R15
4.7K

Q10
2N697

R16
4.7K

R17
2.2K

C7
.1

CR3
IN 914

R2
47K

R3
4.7K

R4
4.7K

Q8
2N 697
RELAY DRIVER

Q2
2N492

C3
75/50 V

Q7
2N 697

AUTO RESET
TIMING CKT.

R6
4.7K

Q4
2N697

Q3
2N697

R11
4.7K

+5V

R7
2.2K

R8
2.2M

R9
1K

R10
1K

Q6
2N492

C 4
20/50V

Q5
2N697

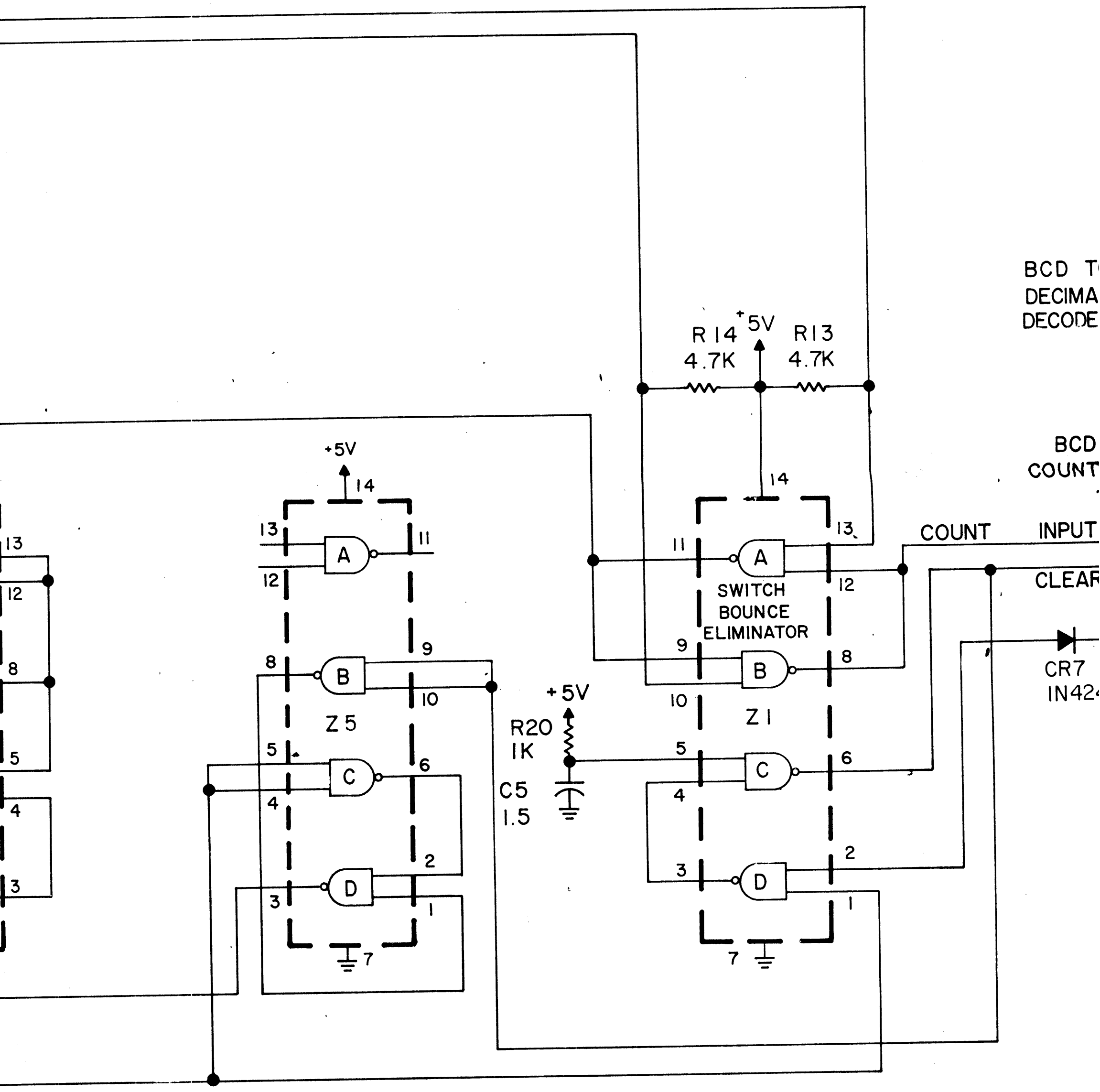
COUNTER CLEAR
TIMING CKT.

+5V
14
A
B
C
D
LATCH
Z 4
7

UNLESS OTHERWISE NOTED:

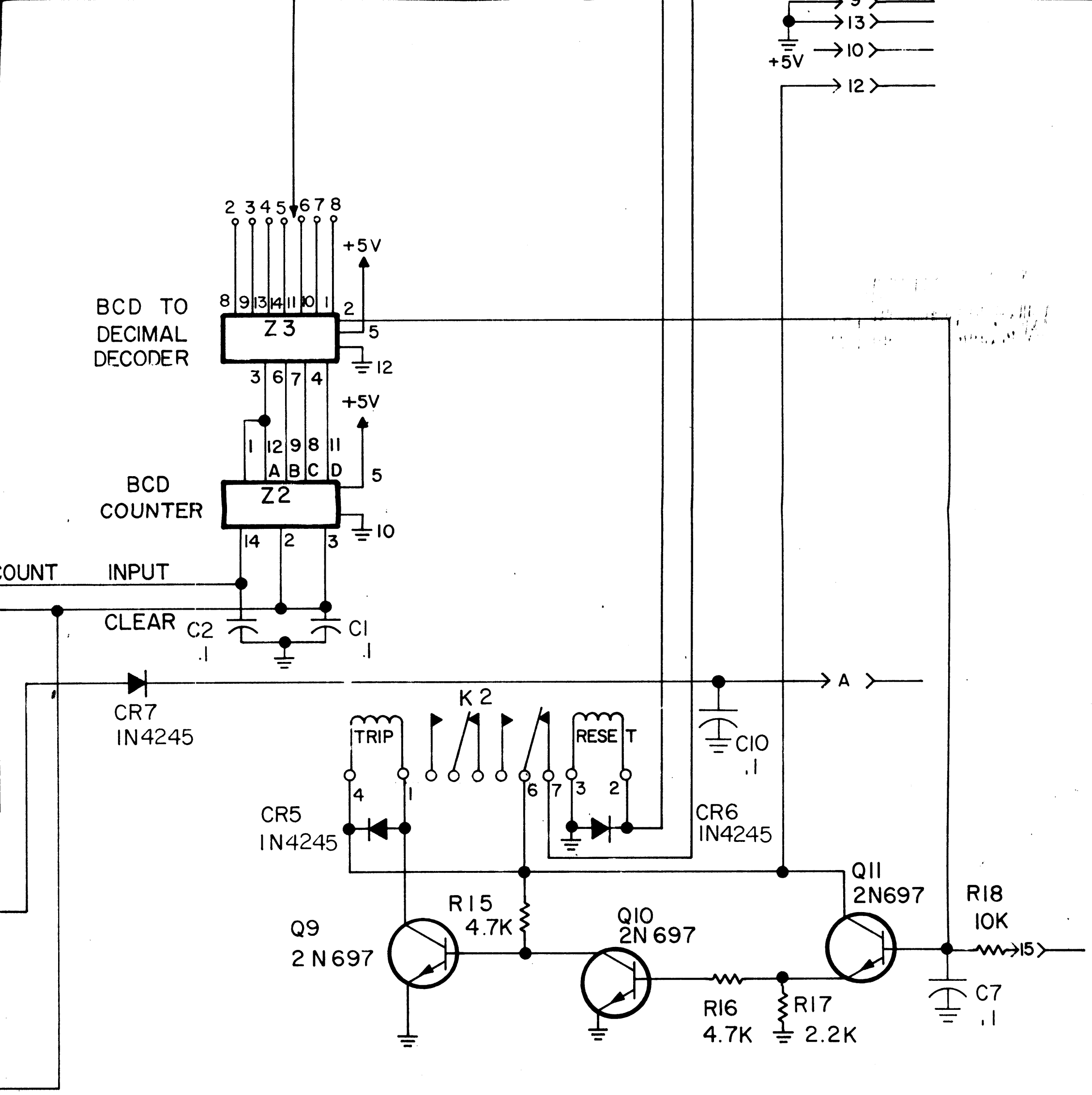
1. ALL RESISTOR VALUES ARE IN OHMS 1/4 W
2. ALL CAPACITOR VALUES ARE IN MICROFARADS

LAST
Z5
K2
CR7
Q12
R20
C10
L2



LAST SYMBOLS	MISSING SYMBOLS
Z5 K2 CR7 Q12 R20 C10 L2	

QTY / UNIT	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

ASS'Y NO.

CK1838-A

Automatic Overload
Reset Circuit Schematic
(A4846)

m

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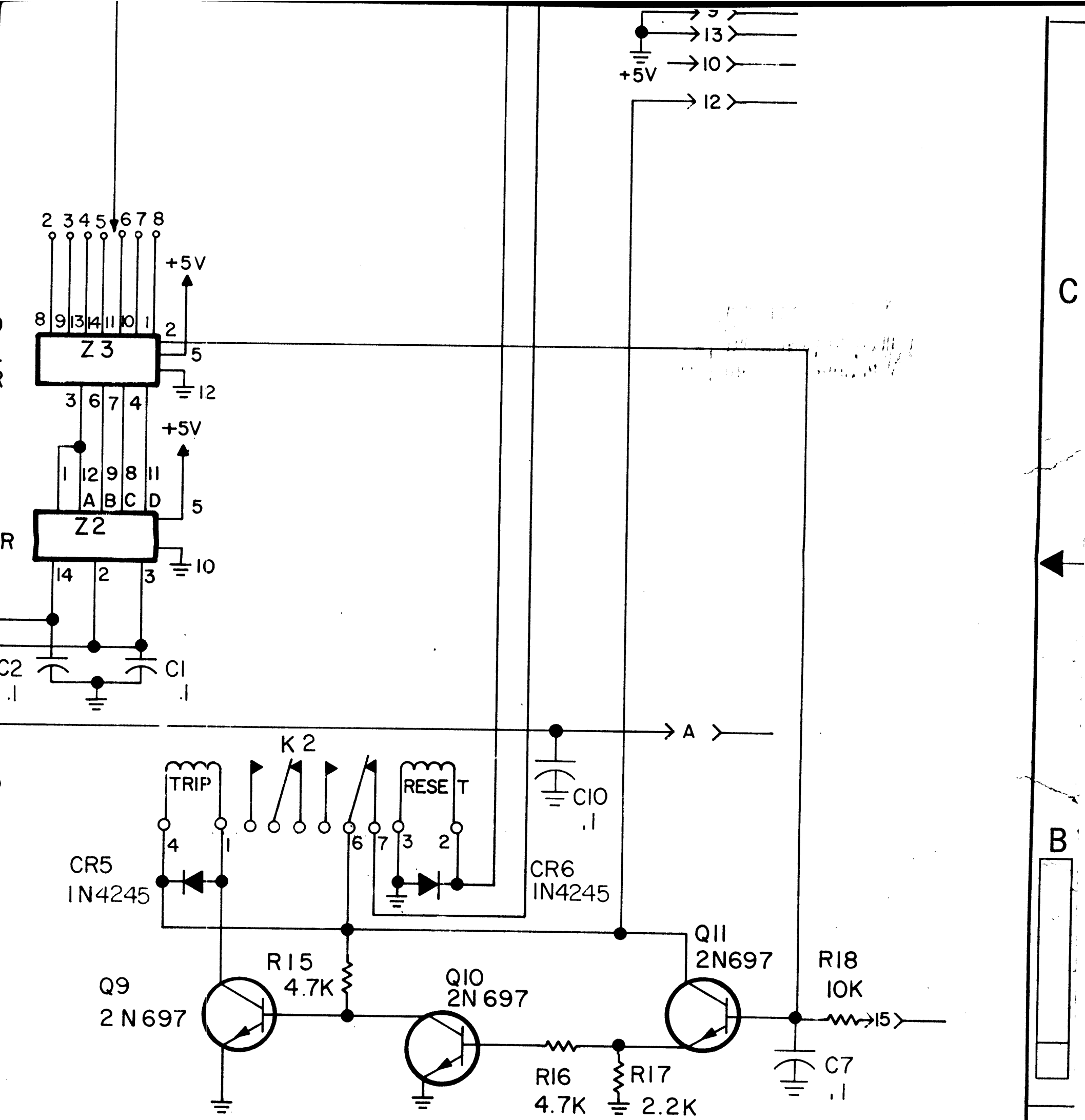


UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
INCLUDE CHEMICALLY APPLIED
OR PLATED FINISHES

TOLERANCES ON

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

MATERIAL

SH

CK1838-A

Automatic Overload
Reset Circuit Schematic
(A4846)

A

3 2 1

TABLE OF CONTENTS

TABLE OF CONTENTS (cont)

LIST OF TABLES

LIST OF ILLUSTRATIONS

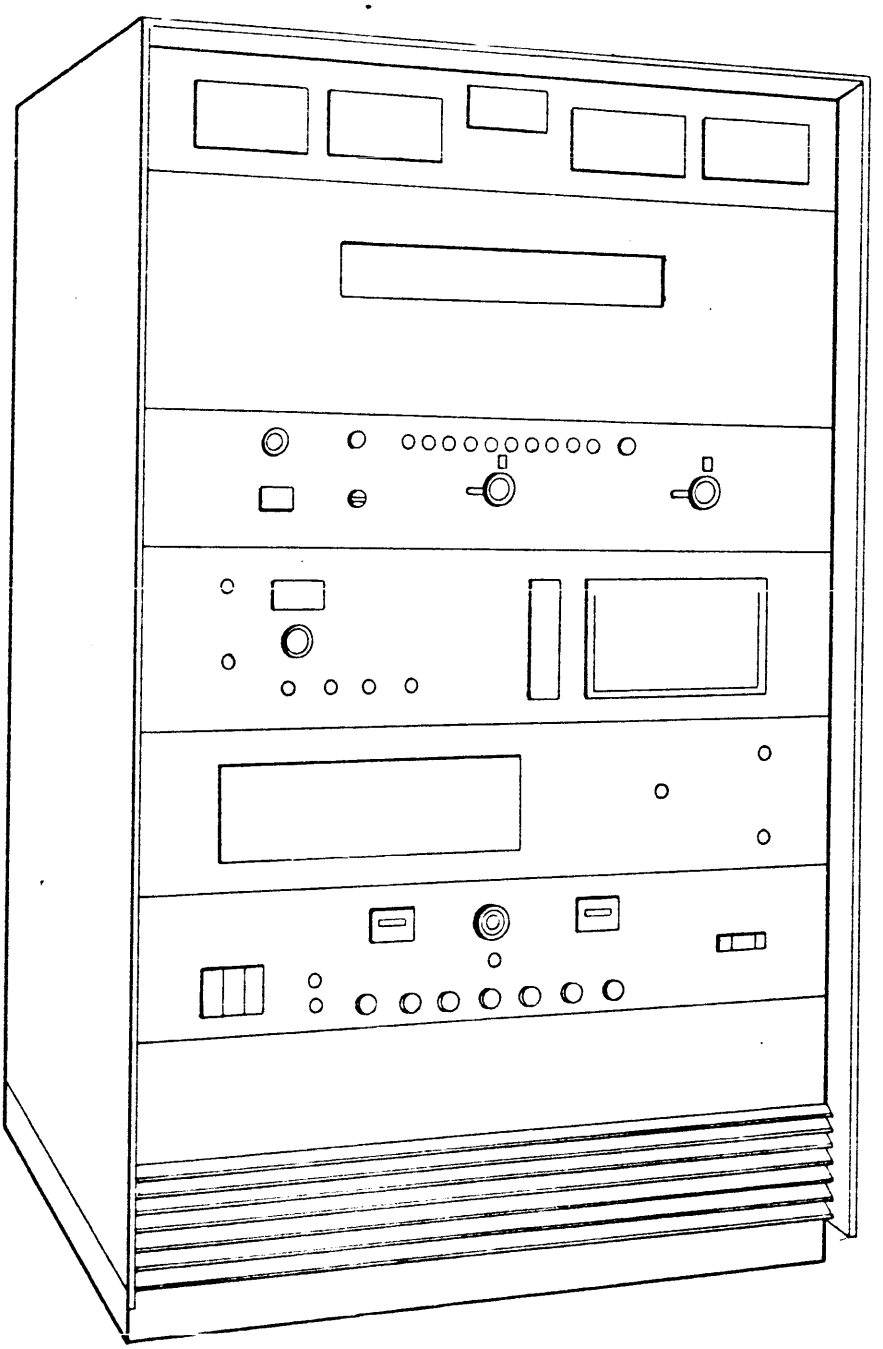


Figure 1-1. HFLM-10K (Rev B) High Frequency Linear Amplifier

SECTION 1

GENERAL INFORMATION

1-1. PURPOSE OF EQUIPMENT

The HFLM-10K is a conservatively-rated high-powered linear amplifier which delivers 10 kilowatts PEP (peak envelope power) or 10KW average power throughout the frequency range of 2 to 30 mHz. The HFLM-10K will accept the output of any exciter providing 100 milliwatts drive. Additionally, the amplifier also contains circuitry that provides rapid tuning, either locally or remotely, as desired.

NOTE

The HFLM-10K is basically an amplifier. When combined with an exciter, it is referred to as a transmitter. Although this manual details the HFLM-10K, the unit is referred to as a transmitter, where applicable.

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	AX5164
Meter Panel	AX5165
PA Section	AX5170
IPA Drawer	AX5232
Exciter Drawer	AX5168
Main Power Panel	AX5169
Input Chassis	AX5101
Main Power Supply	AP153
Main Control Panel	AX5166
Harmonic Filter	AF110

1-3. DESCRIPTION OF EQUIPMENT

a. GENERAL. As shown in figure 1-1, the unit consists of a single frame, housing all the components of the transmitter. Primary power connections are made through the access hole on the base assembly. External exciter transmitter control connections are made to the exciter remote assembly. Transmitter r-f power is routed through a directional coupler mounted in the opening located on the top of the transmitter. The transmitter

frame houses an exciter drawer, a two-stage broad band linear amplifier, an intermediate power amplifier, 10-kw power amplifier, and associated power supplies and control circuits. The r-f components are distributed through the upper portion of the frame. Heavy power supply components are bolted to the base channels of the frame.

b. MAIN METER PANEL. The main meter panel contains four meters. The meters monitor PA PLATE current, PA SCREEN current, REFLECTED power, and PA OUTPUT power. The PA QUTPUT meter is calibrated in kilowatts (average power).

c. POWER AMPLIFIER. The power amplifier section is mounted below the main meter panel. It contains the power amplifier tube (4CX10,000J) especially designed for sideband work. The output circuit is a modified parallel L circuit designed to match an unbalanced antenna of 50 ohms with a vswr of 3:1. The automatic tuning and loading components are located in the PA compartment.

d. IPA DRAWER. The IPA drawer is slide mounted directly below the main control panel for the power amplifier and serves as the intermediate power amplifier between an associated exciter and power amplifier. The IPA drawer contains two fully broadbanded r-f amplifiers and a final amplifier which provides approximately 500 watts drive to the PA section. The final IPA and 2ND amp tubes are air-cooled by a self-contained blower within the drawer. Bandswitching is accomplished via the bandswitch control on the main control panel. Transmitter bias supply and 24 volts d-c supply are located in the IPA drawer.

e. EXCITER DRAWER. Normally, the exciter drawer houses an exciter (Model MMX( )-2 or Model SME-6). However, when the transmitter is to be driven from an external source, the exciter drawer is fitted with a blank panel. A TEST, AUDIO TEST input jack and EXCITER MONITOR jack are mounted on the exciter drawer for monitoring and testing purposes.

f. MAIN POWER PANEL. The main power panel, mounted directly below the exciter drawer, controls the application of primary power, filament and screen voltages to the IPA and PA sections of the transmitter. Other front panel controls include a high voltage aural ALARM with its ON/OFF switch, PLATE and FILAMENT time meters, which monitor the time voltage has been applied to both the plate and filaments of the power amplifier tube, and EXCITER ON/OFF switch, which applies a-c power to the exciter when one is mounted in the exciter drawer.

g. MAIN POWER SUPPLY. The main power supply is mounted on the bottom of the transmitter frame. The power supply contains a high-voltage transformer and associated circuitry to provide plate and screen voltages to the r-f amplifiers within the transmitter.

h. HARMONIC FILTER. (Customer option) The harmonic filter is an automatically switched filter network which decreases the harmonic content of the PA signal. The filter is mounted in the front of the PA section directly behind the PA window. Six filter sections cover the frequency range of the transmitter.

1-4. TECHNICAL SPECIFICATIONS

FREQUENCY RANGE:	2 to 30 mHz standard.
OPERATING MODES:	SSB, ISB, CW, AM, FSK and FAX (with the appropriate exciter). Four channel ISB with SBG-4 or TMX adapter.
POWER OUTPUT:	10,000 watts 2 tone PEP. (10 kw average.)
OUTPUT IMPEDANCE:	50 ohms unbalanced with 3:1 vswr; EIA flange for 1-5/8 inches coaxial.
STABILITY and FREQUENCY CONTROL:	Depends on exciter used.
TUNING:	Manual.
RF INPUT:	Provides full PEP output with 100 milliwatt r-f input.
REMOTE OPERATION:	Facilities for remote operation including mode, frequency, power level and readback available.
SPURIOUS SIGNALS:	At least 60 db below full PEP output.
HARMONIC SUPPRESSION:	Second harmonic at least 50 db down from PEP output. Third harmonic at least 65 db down from PEP output.
HARMONIC FILTERS:	Available fixed for all frequencies above 30 mHz or bandswitched for lower frequencies. Resultant harmonics conform to latest requirements.
AUDIO INPUT:	Depends on exciter used.
METERING:	Meters with special illuminated overload protection.
NOISE:	Power supply ripple 55 db down from full PEP output. Other 70 db down.

1-4. TECHNICAL SPECIFICATIONS (cont)

COOLING:	Filtered forced air cooling, semi-pressurized cabinet.
ENVIRONMENTAL:	Designed to operate in any ambient temperature between the limits of 0 to 50°C for any value of humidity to 90%.
SPECIAL FEATURES:	Adjustable power output levels with overload and bias protection, and alarm. Controlled and adjustable ALDC. Safety interlocks at all high voltage points.
PRIMARY POWER:	210, 220, 230, 240, 250 volts, 50/60 Hz, 3 phase, Delta or Wye. (Other voltages available on special request).
POWER REQUIREMENTS:	Maximum 27,000 watts. All solid state power supply.
SIZE:	33-1/2 inches wide x 38-3/4 inches deep x 68-3/4 inches high standard.
INSTALLED WEIGHT:	Approximately 1300 pounds.
SHIPPING WEIGHT:	Approximately 1660 pounds.
SIZE OF LARGEST SHIPPING CONTAINER:	43 inches wide x 49 inches long x 81 inches high.
COMPONENTS AND CONSTRUCTION:	Manufactured in accordance with JAN/MIL wherever practicable.

SECTION 2

INSTALLATION

WARNING

Strictly adhere to the order of presentation of the procedures detailed in this section. Failure to follow the indicated order could result in personnel injury and could cause possible equipment damage.

2-1. EQUIPMENT INSPECTION

The HFLM-10K was assembled, calibrated, and tested at the factory before shipment. Inpsect all packages for possible damage during transit. Carefully unpack each crate as indicated by the packing list provided with the shipment. Inspect all packing material for parts that may have been shipped as loose items, (connector, technical manuals, hardware, etc.).

2-2. EQUIPMENT PACKAGING

The equipment is shipped in boxes as shown in figure 2-1 (typical equipment packaging). The box number and contents are stenciled on the outside of each box. Whether an equipment is crated or uncrated, various precautions must be observed in handling to prevent personnel injury and/or damage to the equipment.

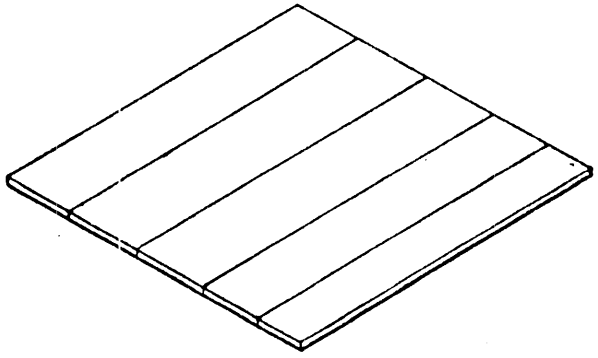
2-3. PACKAGING DATA

The transmitter is packed in seven crates (table 2-1), including loose items crate (table 2-2). Each crate is assigned a number which appears on the crate. Table 2-1 also lists the crated weights and dimensions of the transmitter. Figure 2-1 shows typical packaging. Figure 2-2 illustrates the outline dimensions.

2-4. INSPECTION AND DAMAGE

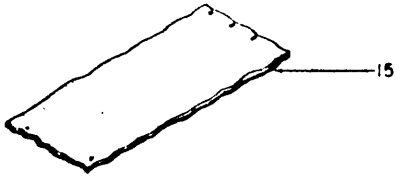
Inspect the outside of all crates for possible transit damage. While following the procedural installation instructions, carefully unpack each crate as indicated. Inspect all packing material for parts which may have been shipped as loose items.

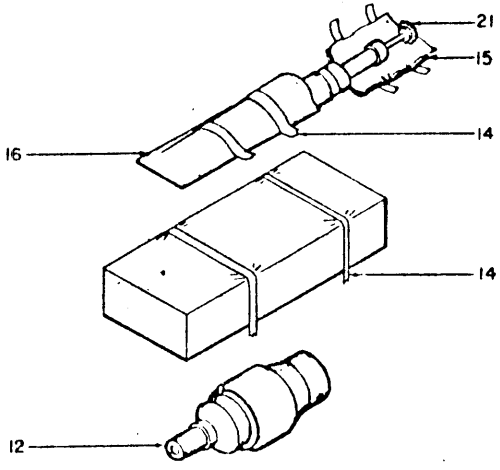
With respect to equipment damage for which the carrier is liable, The Technical Materiel Corporation will assist in describing methods of repair and furnishing of replacement parts.

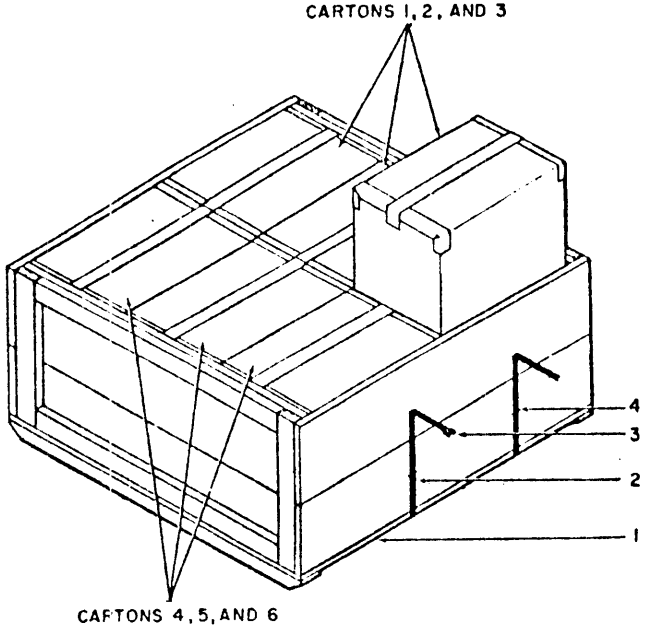


LEGEND

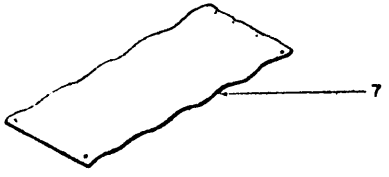
1. WOODEN BOX
2. STEEL STRAPPING
3. STRAPPING SEALS
4. STEEL STAPLES
5. BARRIER BAG
6. FIBERBOARD BOX
7. CELLULOSIC WADDING
8. FIBERBOARD BOX
9. PRESSURE SENSITIVE TAPE
10. BARRIER BAG
11. FIBERBOARD BOX
12. CAPACITOR
13. MOULDED CUSHIONING
14. MARKING TAPE
15. TISSUE PAPER
16. BARRIER BAG
17. FIBERBOARD BOX
18. BARRIER BAG
19. PRESSURE SENSITIVE TAPE
20. FIBERBOARD BOX
21. SHAFT AND GEAR

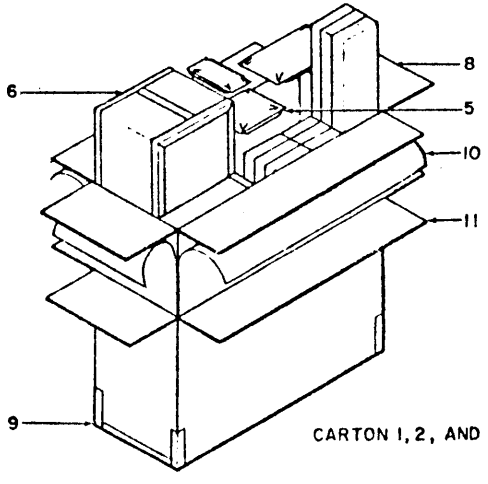




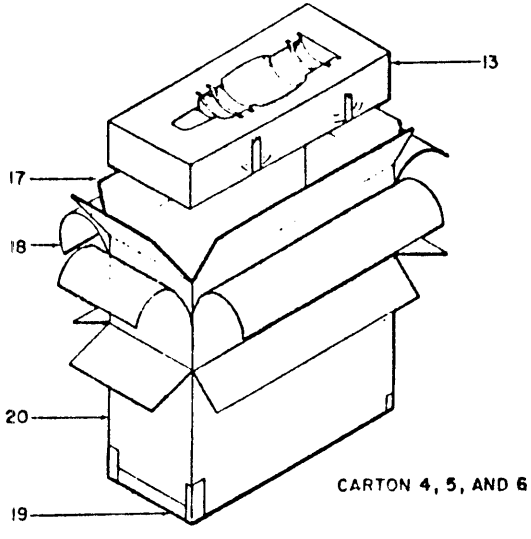


DETAIL A AND B IN SHIPPING CRATE





DETAIL B



DETAIL A

Figure 2-1. Typical Equipment Packaging

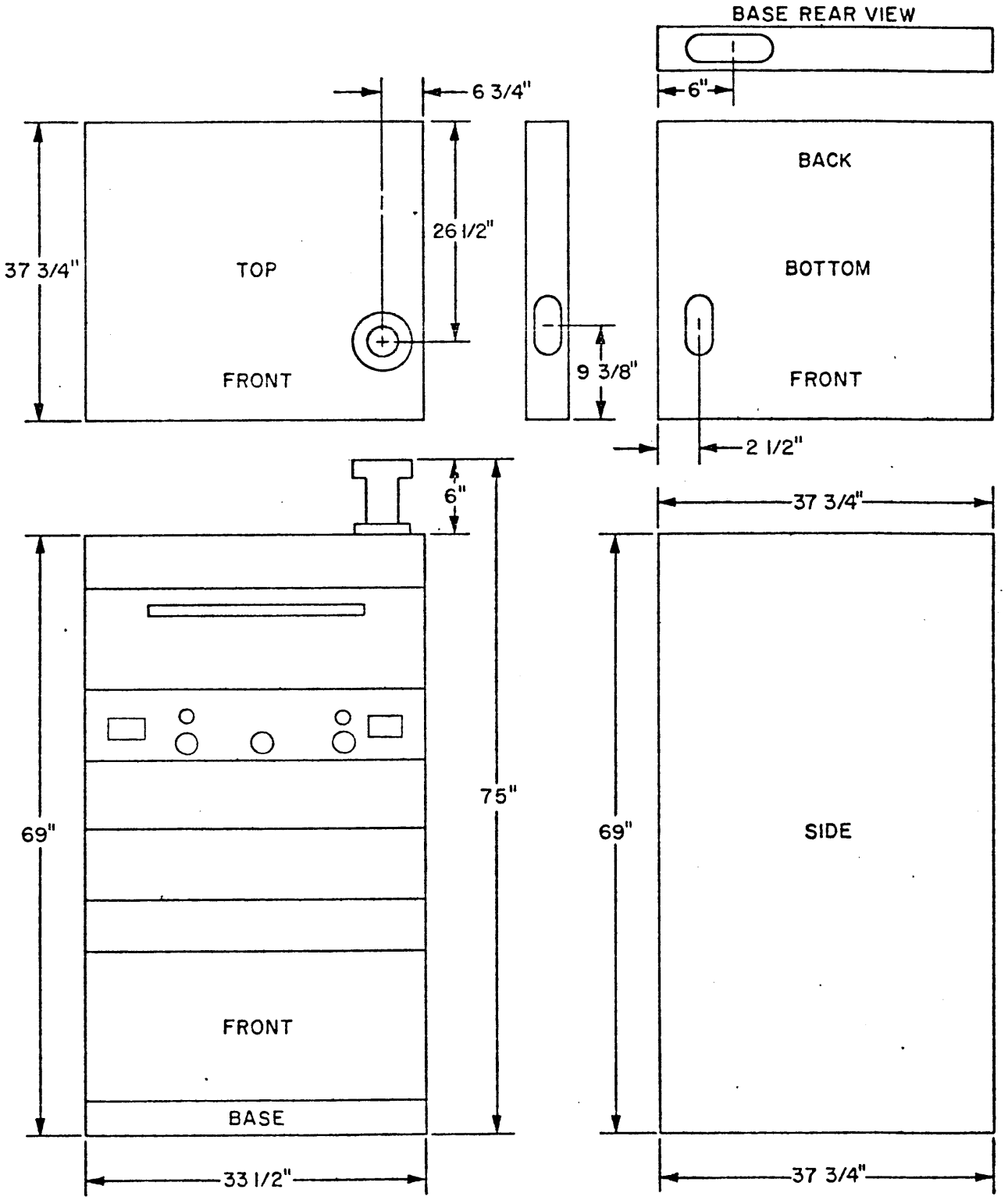


Figure 2-2. Outline Dimensional

TABLE 2-1. CRATED WEIGHTS, DIMENSIONS, AND CONTENTS

Crate No.	Contents	Gr. Wt.	Cu. Ft.	Dimensions (Inches) D	W	H
1	Loose Items	100	8.6	28-3/4	19-3/4	24
2	Frame	947	96.8	48	42-3/8	80-1/4
3	Exterior Covers	280	20.7	73-3/8	45-3/8	14-1/8
4	TF203	536	7.9	28-3/4	19-3/4	24
5	Driver Drawer AX5167	195	14.9	41	31	19-3/8
6	Exciter Drawer AX5168	190	14.9	41	31	19-3/8
7	TF410	275	4.6	24-5/8	17-5/8	17-1/2

TABLE 2-2. LOOSE ITEMS

1. Shorting Stick, 1 each, TMC P/N A1990-6
2. Connector, 1 each, TMC P/N MS3106B32-7P
3. R-f Connector, 1 each, TMC P/N JJ246-50
4. Cable Clamp, 1 each. TMC P/N MS3057-20
5. Bushing, 1 each, TMC P/N MS3420-16A
6. Bushing, 1 each, TMC P/N MS3420-20A
7. Lug, 3 each, TMC P/N TE197-6-25
8. Lug, 1 each, TMC P/N TE197-6-37
9. BNC Connector, 1 each, TMC P/N UG88/U
10. Washer, 4 each, TMC P/N FW10HBN
11. Washer, 20 each, TMC P/N FW25HBN
12. Washer, 16 each, TMC P/N FW31HBN
13. Washer, 4 each, TMC P/N LWE10MRN
14. Washer, 20 each, TMC P/N LWS25MRN
15. Washer, 8 each, TMC P/N LWS31HBN
16. Screw, 20 each, TMC P/N SCHH2520-SS12

TABLE 2-2. LOOSE ITEMS (cont)

17. Screw, 8 each, TMC P/N SCHH3118BN20

18. Screw, 4 each, TMC P/N SCBP1032BN10

19. NUT, 8 each, TMC P/N NTH3118BN20

20. Output Connector, 1 each, TMC P/N DC 104 removed from top of frame.

21. Tube Electron, 1 each, TMC P/N 4CX10,000J removed from PA section

22. Resistor, 1 each, TMC P/N RW118F502 ref./sym. R802 removed from PS section

23. Resistor, 1 each, TMC P/N RW118F252 ref./sym. R801 removed from PS section

24. Resistor, 1 each, TMC P/N RW118F310 ref./sym. R803 removed from PS section

25. Relays, 4 each, TMC P/N RL168-3C-10-24DC ref./sym. K2004 and K2005 removed from exciter

26. Tube Electron, 1 each, TMC P/N 8576 removed from driver drawer

27. Warranty, for TMC P/N 8576 tube electron

28. Test Data, 1 set

29. Technical Manuals, 2 each

2-5. UNCRATING METHODS

The following information briefly outlines general uncrating methods. They must be adhered to when unpacking the transmitter to prevent damage. Keeping in mind previously discussed information on material handling, packaging data, inspection and damage, proceeed as follows:

a. Remove wire straps or bands from around the crate with a pair of snips.

b. Unless otherwise specified. remove nails from three sides of the crate with a nail puller. Do not use claw hammer, pinch bar, etc.

c. When the sides have been removed, rip off the moisture-proof paper. If a knife is used, care should be exercised not to mar equipment.

d. If equipment is not packed in a cardboard carton, remove it from crate.

e. If after removing moisture-proof paper a cardboard carton is encountered, carefully open with a case cutter or remove tape.

f. Where applicable, remove the following:

1. Creased cardboard blocking pieces.

2. Barrier bags.

3. Tape.

4. Molded cushioning.

5. Cellulose wadding.

6. Tissue paper.

g. Check off items unpacked on the packing list or equipment supplied list.

NOTE

Anticipating the possibility of repacking the transmitter for relocation, it is suggested that all packing crates and materials be saved. Total storage area required can be calculated using dimensions in table 2-1.

2-6. INSTALLATION OF MODULAR UNITS AND LOOSE ITEMS

(Refer to figure 2-3 for installation information regarding cabinet location of all modular units.) The IPA drawer and exciter drawer units are slide mounted. To install any slide mounted unit in its compartment, proceed as described below for each modular unit.

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

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

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

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

e. Make the necessary cable and electrical connections to the modular units.

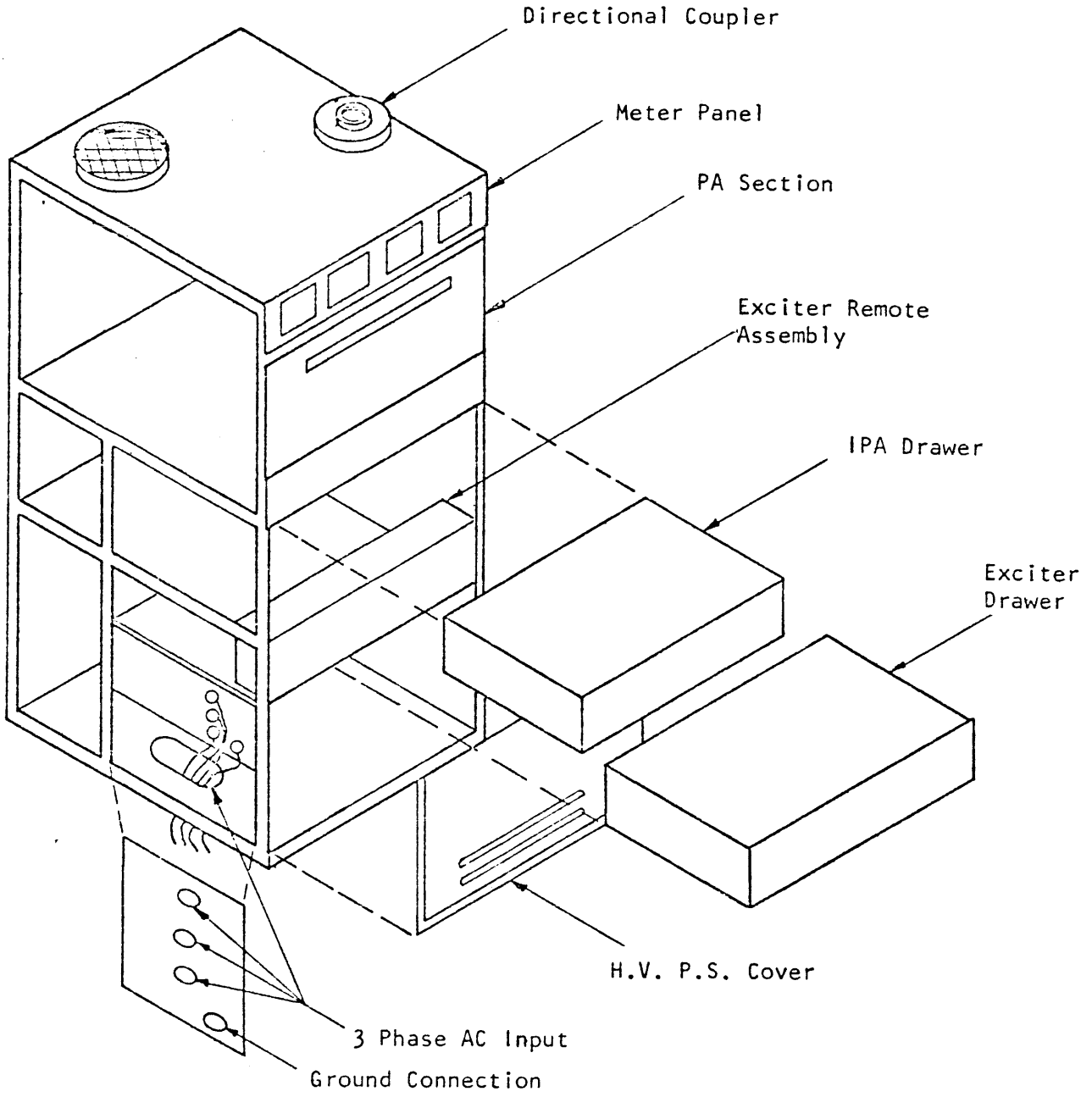


Figure 2-3. Typical Installation

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

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

The loose items must be installed. These consist of the top coupler, resistors in the power supply section, relays and a tube in the exciter drawer. Proceed as follows:

a. Install the coupler on the top of the unit by inserting the coupler into its access hole and securing with four nuts and four washers.

b. Install the three resistors R801, R802 and R803 in the power supply section (figure 5-9) by inserting each resistor into its clip mounting.

c. Insert relays K2004 and K2005 in the exciter drawer, (figure 5-13) by inserting each relay into its socket.

d. Insert tube V1401 in the driver drawer (figure 5-12) by inserting the tube into its socket.

2-7. PRIMARY POWER REQUIREMENTS

The Transmitter requires a three phase source voltage of 210-250 volts ac 50/60 Hz. The maximum power requirement is 27,000 watts.

When the transmitter is required to use a 440 volt ac source, reference to figure 7-1, page 7-3 will be helpful in following the ac connection.

2-8. PRIMARY AC INPUT CONNECTIONS (See figure 2-3)

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

CAUTION

Insure primary three-phase ac is off and tagged before making connections to the transmitter.

a. Loosen panel locks on the cover of the high voltage power supply, and temporarily remove cover. (Place cover is safe place to avoid damaging or scratching.)

b. Loosen and remove lockwashers and nuts from terminals E805, E806 and E807 (figure 7-1, sheet 1 and figure 5-11)on primary a-c input board. (Do not discard.)

c. Connect primary three-phase a-c cables to a-c input board and secure with hardware removed in step b.

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

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

2-9. HIGH VOLTAGE TRANSFORMER INSTALLATION (PRIMARY AC POWER MUST BE OFF)

CAUTION

The high-voltage transformer is extremely heavy. Use fork-lift or some lifting device when attempting installation.

a. Remove transformer from crate. Position transformer in such a manner that when installed in the bottom of frame, the front of primary terminals of transformer will be facing the front of the transmitter. (Transformer should enter frame from the rear of the power supply section.)

NOTE

If transformer is to be installed from the front, request information from TMC engineering services for detailed procedures.

NOTE

All transmitter primary a-c taps should be set up in accordance with station's primary a-c voltage (210 to 250 volts ac).

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

c. Refer to figure 5-10 and position transformer in frame accordingly. Connect transformer leads in the following manner. Refer to figure 2-4 and connect CA682-2 to transformer primary terminals. Each of the three primary sections has three heavy insulated leads that must be connected between terminal "0" and the corresponding primary a-c input voltage tap (210, 220, 230, 240, and 250). The length of each heavy lead is such that they will align with the voltage tap sections to which they must be connected.

Additionally, there are small insulated leads that must be connected to the primary sections. (See figure 2-4.) Connect:

Violet lead to 230-volt terminal of first primary winding.
White lead to 230-volt terminal of second primary winding.
Gray lead to 230-volt terminal of third primary winding.

2-10. TRANSFORMER SECONDARY CONNECTIONS

The secondary terminals of transformer T801 are located at the rear of the transmitter. Connect secondary leads in the following manner. (See figure 5-10.

NOTE

Left, middle, and right terminals when viewed from the rear of the transmitter.

CONNECT FROM	CONNECT TO
Top rectifier (CR802)	left 3400-volt terminal on T801
Middle rectifier (CR802)	middle 3400-volt terminal on T801
Bottom rectifier (CR802)	right 3400-volt terminal on T801
Choke (L802)	neutral terminal on T801

WARNING

Insure that all personnel are clear from transmitter before proceeding.

2-11. PRIMARY PHASE ROTATION CHECK

Apply primary a-c voltage to the transmitter and set MAIN POWER circuit breaker to ON. The main blower should operate. Operate BANDSWITCH control and observe that band indicators light from left to right as the BANDSWITCH control is operated. Also, check that the main blower (figure 5-10) is rotating in the direction of the arrow indicated on the hub of the blower.

NOTE

If blower rotation or band indicator lighting sequence is incorrect, set MAIN POWER circuit breaker to OFF, insure primary a-c power is off, and reverse any two a-c input phase leads. Blower rotation and bandswitch indicator lighting sequence should be correct.

2-12. POWER AMPLIFIER TUBE (V701) INSTALLATION

CAUTION

Insure primary a-c power and MAIN POWER breakers are OFF and tagged before installing PA tube.

CAUTION

Do not bend the finger contacts located inside the mounting socket. Check contacts carefully before attempting to install the tube in the socket.

a. Remove the four screws from the air duct at the top of the cabinet.

b. Pull out thermostat S701.

c. Loosen clamp, slide up bottom section, and remove flue.

d. Carefully lift tube V701 up into air duct in PA section of frame until base of tube clears socket.

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

f. In one motion while firmly grasping tube, rotate tube approximately a quarter turn and push tube firmly down into socket. A slight amount of effort may be required to seat tube. Be careful not to damage the finger contacts in the socket when seating tube. Check tube seating; it must be all the way down and centered in tube socket.

g. Secure with retaining strap to post.

h. Slide the two flue sections together and slide flue over the tube.

i. Extend the flue and secure with the clamp.

j. Secure air duct to top of cabinet with four screws and insert thermostat S701.

CAUTION

Before proceeding with installation procedures, remove bias control cover on front of IPA drawer to expose the bias adjustment controls and adjust PA BIAS, IPA BIAS, and 2ND AMP BIAS. Pull out the IPA drawer and adjust 1ST AMP BIAS control for maximum bias (maximum clockwise).

2-13. PA FILAMENT VOLTAGE CHECK (See figure 5-10 and 7-1)

CAUTION

Insure primary a-c power and MAIN POWER breakers are OFF and tagged before connecting meter.

Once the power amplifier tube has been installed in the tube socket, perform the following filament voltage checks:

a. Remove rear cover to expose bottom of V701.

b. Connect a-c voltmeter between the center pin of V701 and the right pin at the junction of C713 and L703.

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

d. Insure that personnel are clear and set primary power circuit breaker and MAIN POWER circuit breaker to ON. HIGH VOLTAGE and SCREENS circuit breakers must be OFF.

e. Wait approximately 3 minutes for proper warmup and measure the filament voltage. It should be between 7.3 to 7.5 volts ac.

f. If measured voltage is not within the specified limits, set MAIN POWER and primary power circuit breakers to OFF.

g. Relocate the connection on terminal No. 2 of T804 to a terminal (3, 4, 5, 6, or 7) that will provide a secondary output of 7.3 to 7.5 volts ac. Repeat steps d, e, and f as necessary to obtain the proper filament voltage requirement.

NOTE

For longer tube life, it is suggested that the filament be operated closer to its lower limit of 7.3 volts ac.

h. After the correct value has been obtained, set MAIN POWER circuit breaker and primary power ciruit breaker to OFF and remove the test meter and leads.

2-14. LOW VOLTAGE TRANSFORMER T803 CONNECTIONS (See figure 5-10)

The low voltage transformer T803 is a three-phase transformer with multi-tapped primary windings. Once the primary a-c voltage value has been measured, the measured value should coincide with the appropriate tap on low voltage transformer T803. For example, for a primary a-c voltage value of 230 volts ac, the connections should then be on the 230v taps on T803. Do not remove the connection marked "0". To change T803 primary taps, proceed as follows:

a. Set MAIN POWER circuit breaker and primary power circuit breaker to OFF.

b. On each of the primary windings of T803, relocate the connection to coincide with the measured primary a-c voltage value. Do not change the connection on the terminal marked "0".

c. Secure hardware on transformer terminal.

2-15. INPUT CHASSIS (See figure 2-5)

External input connections are made at the input chassis assembly located in the rear portion of the transmitter directly below the exciter drawer. Audio intelligence, CW, FSK, and FAX input connections are made at jack J3001 on the input chassis assembly. The mating plug for J3001 is supplied as a loose item. Make the external signal input connections to mating plug MS3106B32-7P prior to connecting to J3001.

NOTE

The HFLM-10K leaves the factory wired for local control operation. Mating plugs that connect to input chassis jacks J3002 and J3003 are supplied as loose items, and are prewired with connections between pins on each plug for local transmitter operation. These mating plugs supplied as loose items must be connected to J3002 and J3003 on the input chassis.

2-16. HIGH VOLTAGE CHECK AND BIAS ADJUSTMENT

WARNING

Prior to applying high voltage, close all drawers and fasten with panel locks and replace all covers and fasten with mounting hardware.

After the transmitter has been installed and the checks and adjustments performed as indicated in the previous paragraphs, the high voltage should be checked and the bias adjustments performed. These checks and adjustments are performed from the front of the unit. Connect a proper antenna to the top of the transmitter coupler or dissipate transmitter power into a dummy load. Proceed as follows:

a. Set primary power, MAIN POWER and SCREENS circuit breakers to ON.

b. Set ALARM ON/OFF switch to OFF.

c. Set r-f drive from assoicated exciter to minimum.

d. Adjust the OVERLOAD INDICATOR (adjustment screw located directly below each meter face) on each meter for the following values:

PA PLATE current	3-1/2 amperes
PA SCREEN current	80 ma
IPA plate current	800 ma
REFLECTED power	as desired

e. Press HIGH VOLTAGE switch. After a short time delay, the HIGH VOLTAGE indicator should light. (It may be necessary to press the HIGH VOLTAGE switch twice.)

f. Adjust PA BIAS control for an indication of 0.65 ampere on the PA PLATE current meter.

g. Adjust IPA BIAS control for an indication of 190-210 ma on IPA plate current meter.

h. Hold PLATE METER switch up and adjust 2ND AMP BIAS control for an indication of 190-210 ma in IPA plate current meter.

i. Replace bias control cover, press HIGH VOLTAGE switch to remove high voltage, and extend IPA drawer out on its chassis tracks to expose 1ST AMP BIAS control. The HIGH VOLTAGE indicator will extinguish and the PLATE meters will indicate zero.

j. Pull interlock shaft outward to defeat IPA drawer interlock, and press HIGH VOLTAGE switch to apply high voltage. The HIGH VOLTAGE indicator will light and the PLATE meters will indicate PA and IPA plate currents.

k. Set PLATE METER switch to 1ST AMP position and adjust 1ST AMP BIAS control for 30-40 ma. The 1ST AMP BIAS control is located on the underside of the IPA drawer.

l. Press HIGH VOLTAGE switch, set MAIN POWER and SCREEN circuit breakers to OFF, reinsert IPA drawer interlock, and push in and secure the IPA drawer.

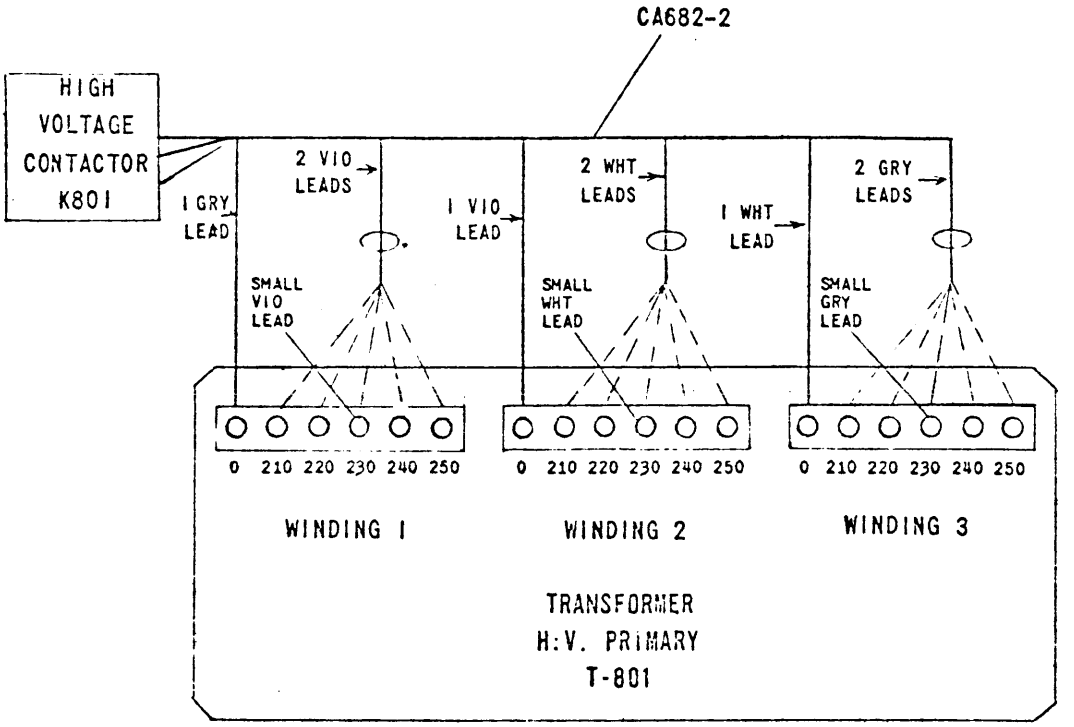


Figure 2-4. Transformer HV Primary Connections

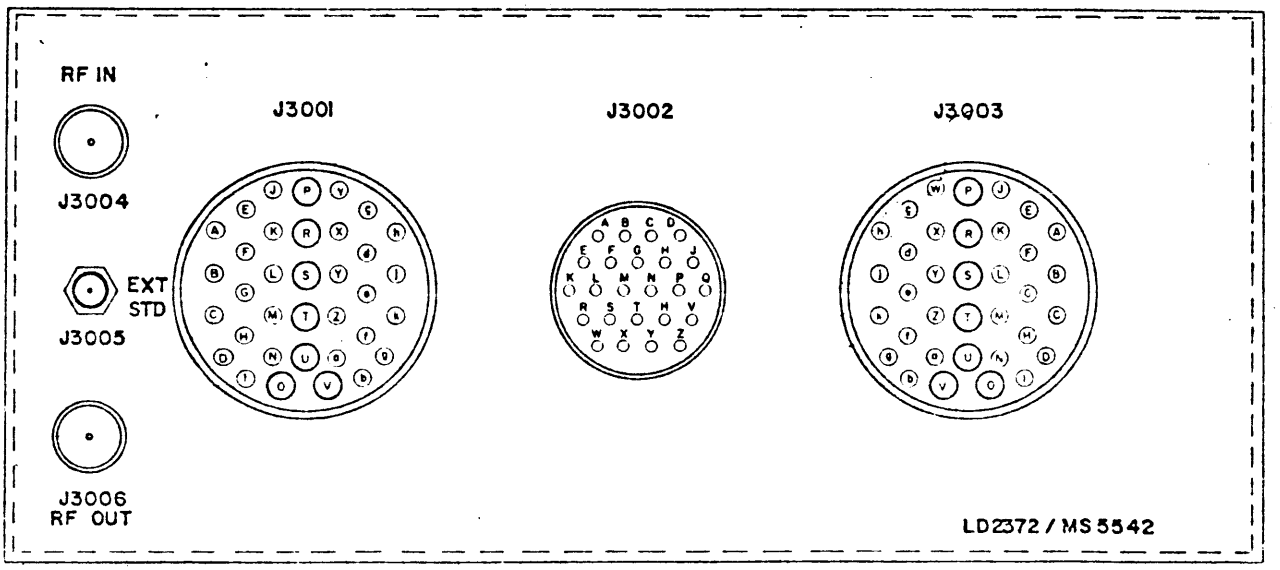


Figure 2-5. Input Chassis (As viewed from rear of transmitter)

SECTION 3

OPERATORS SECTION

3-1. GENERAL

The HFLM-10K is basically an amplifier. When combined with an exciter, it is referred to as a transmitter. This section details the functions of the HFLM-10K front panel controls and indicators.

3-2. CONTROLS AND INDICATORS

Table 3-1 details the functions of the HFLM-10K operating controls and indicators. Figure 3-1 locates the controls and indicators.

TABLE 3-1. CONTROLS AND INDICATORS

ITEM NO. (Fig. 3-1)	PANEL DESIGNATION	FUNCTION
1	PA SCREEN current meter	Indicates PA screen current of 10-kw amplifier and PA screen overload. Meter lights to indicate overload.
2	PA PLATE current meter	Indicates PA plate current of 10-kw amplifier and PA plate overload. Meter lights to indicate overload.
3	TECHNIMATIC light	Lights to indicate MAIN POWER circuit breaker is set to ON and primary power is applied to transmitter.
4	REFLECTED power meter	Indicates reflected power on upper meter scale and SWR on lower meter scale.
5	PA OUTPUT meter	Indicates average PA output power.
6	Not Used	
7	BANDSWITCH control	Operates PA bandswitch in manual operation only. Lateral movement of control to the left or right rotates the PA bandswitch to next position.

TABLE 3-1. CONTROLS AND INDICATORS (cont)

ITEM NO. (FIG. 3-1)	PANEL DESIGNATION	FUNCTION
8	INTERLOCKS indicator	Lights to indicate all interlocks are closed and interlock circuit is complete.
9	ALDC adjustment	Adjust amount of desired ALDC (clockwise-maximum ALDC).
10	HIGH VOLTAGE on/off switch indicator	When pressed to on position, high voltage is applied to PA and IPA plate circuits and switch indicator lights. When pressed to off position, high voltage is removed and switch indicator goes out.
11	PA TUNE control	Operates PA tune capacitor.
12	PA Band indicators	One lamp for each position. Lights to indicate PA bandswitch control positions: 2-2.3, 2.3-2.6, 2.6-3, 3-4, 4-5, 5-8, 8-12, 12-16, 16-24, and 24-30.
13	Not Used	
14	Not Used	
15	Not Used	
16	Not Used	
17	PA LOAD control	Operates PA loading capacitor.
18	PLATE METER switch	When activated (up position), IPA PLATE METER indicates 2ND AMP plate current, or 1ST AMP plate current when switch is pressed down. In neutral position, PLATE METER indicates IPA plate current.
19	IPA PLATE METER	Indicates 1ST AMP, 2ND AMP, and IPA plate currents. (Meter illuminates to indicate overload.
20	RF GAIN control	Adjust transmitter power output.
21	IPA TUNE control	Tunes IPA resonance during operation.

TABLE 3-1. CONTROLS AND INDICATORS (cont)

ITEM NO. (FIG 3-1)	PANEL DESIGNATION	FUNCTION
22	ALARM indicator	Audible alarm to indicate high voltage failure.
23	FILAMENT time meter	Registers total time (in hours and minutes) voltage has been applied to the PA filaments.
24	MAIN POWER circuit breaker	In ON position, applies primary power to transmitter.
25	EXCITER ON/OFF switch	In ON position, applies a-c power to exciter. (Used only when exciter is installed in exciter drawer.)
26	PLATE time meter	Registers total time (in hours and minutes) d-c plate voltage has been applied to PA plate circuit.
27	SCREENS circuit breaker	In ON position, applies screen voltage to PA tube.
28	ALARM ON/OFF switch	In ON position, activates high voltage ALARM indicator.
29	TEST KEY switch	In up position, switch locks and provides keyline closure in the CW mode for test purposes or for manual tuning in the CW mode. In neutral position, keyline is open.
30	AUDIO TEST jack	The audio test jack is used for exciter audio input and test purposes.
31	EXCITER MONITOR	Monitor jack for external equipment to monitor exciter output.

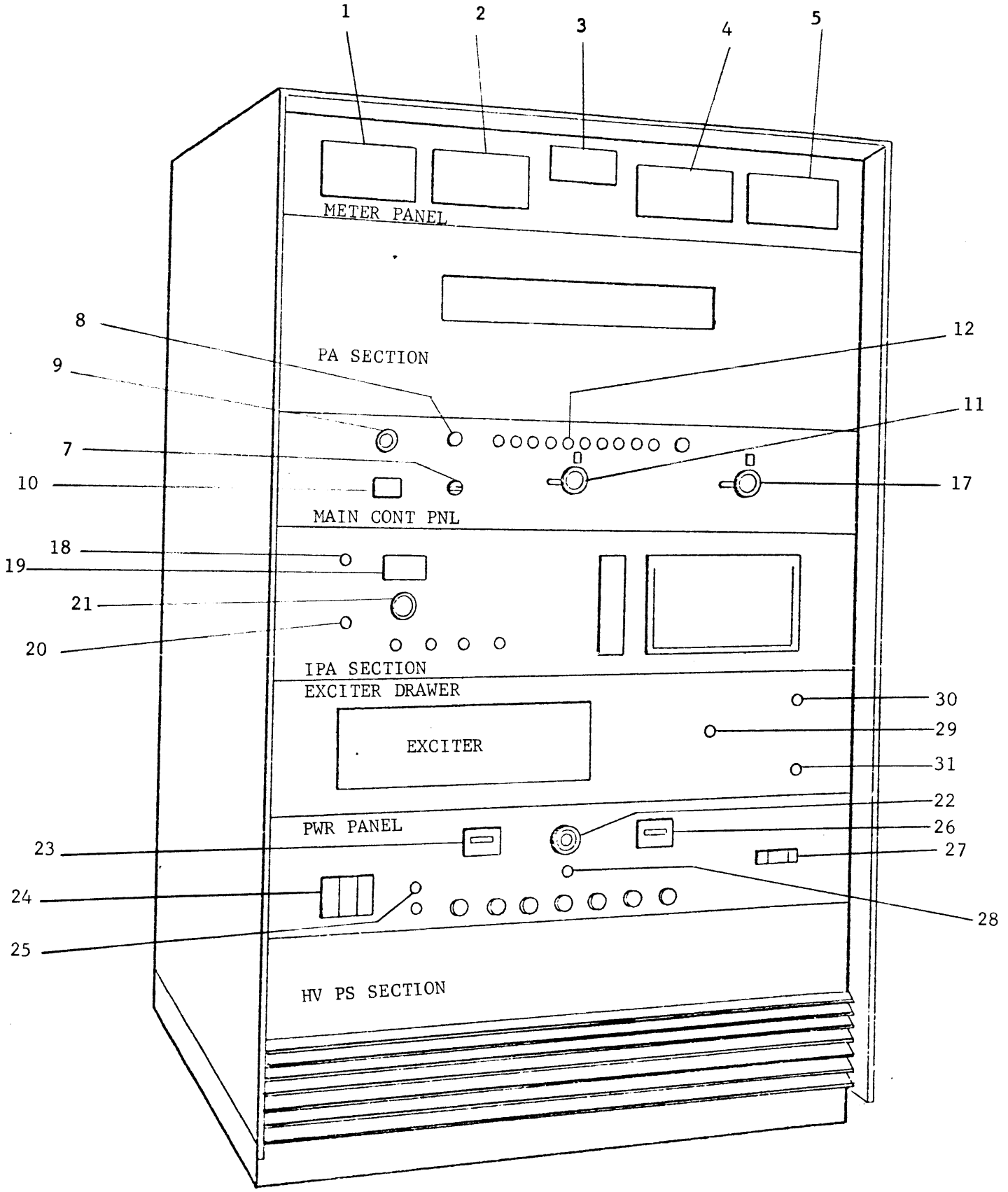


Figure 3-1. Controls and Indicators

3-3. TUNING PROCEDURE (Carrier Only).

STEP	OPERATION	NORMAL INDICATIONS
1	Place MAIN POWER breaker (24) the ON position.	Main blower and IPA blower must operate. Technimatic light (3) and Band indicator (12) must illuminate. INTERLOCK LAMP (8) will light if all safety interlocks are closed and the time delay cycle has been completed.
2	Place SCREEN breakers (27) to ON position.	No indications.
3	Place ALARM ON/OFF switch (28) to the OFF position.	Should alarm switch have been in the ON position with High Voltage removed, the audible high voltage ALARM would be on.
4	Set RF OUTPUT from associated exciter to minimum.	No indications.

NOTE

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

5 Check the Overload Indicator (adjustment screw located directly below the meter face on each meter) on each meter for values listed:

PA PLATE current	3-1/2 amps max.
PA SCREEN current	80 ma.
IPA PLATE current	800 ma.
REFLECTED POWER	Set to desired value.

6	Select bandswitch position by holding BANDSWITCH control (7) first to left until band indicator lights, then holding BANDSWITCH control to the right until the next band indicator lights.	Band indicator (12) will illuminate to indicate frequency band selected.

STEP	OPERATION	NORMAL INDICATIONS
	NOTE The indicated quiescent values stated below are for the best sideband distortion; however, when operating cw readjust quiescent value to lower limits as stated below.	
7	Press HIGH VOLTAGE pushbutton (10) to light indicator. (It may be necessary to press HIGH VOLTAGE pushbutton twice in case one of the overloads tripped.)	HIGH VOLTAGE indicator will illuminate RED when High Voltage is ON.
8	Check for an indication on the PA PLATE current meter (2).	PA PLATE current meter indicates quiescent current of .65 amperes (.5 to .75 amperes).
9	Check for an indication of PLATE meter (19).	IPA PLATE meter (19) indicates quiescent current of 200 ma (190 to 210 ma).
10	2ND AMP Press IPA METER SELECT switch (18) up, and check for indication on IPA PLATE meter (19).	IPA PLATE meter will indicate 200 ma when METER SELECT switch is pressed up (190 to 210 ma).
11	1ST AMP Press IPA METER SELECT switch (18) down, and check for indication on IPA PLATE meter.	IPA PLATE meter will indicate 40 ma when METER SELECT switch is pressed down (30 to 40 ma).
12	Rotate RF GAIN control (20) to maximum counterclockwise position. Apply (output from external exciter) the desired operating frequency, unmodulated at an RF level of approximately 100 milliwatts to the RF input jack (J3004).	For controls on exciter, refer to the exciter Technical Manual.
	NOTE During initial tuning of HFLM, RF OUTPUT POWER will be increased or decreased with the RF GAIN control (20) on HFLM.	

STEP	OPERATION	NORMAL INDICATIONS
13	Adjust RF GAIN control (20) clockwise slightly to cause an increase in IPA PLATE current indication on PLATE meter (19) not to exceed 250 ma.	PLATE meter (19) will indicate increase in meter reading not to exceed 250 ma.
14	Adjust IPA TUNE control (21) for a PA PLATE current peak on PA PLATE current meter (2).	The rotation of IPA TUNE control will cause IPA output to be applied to PA indicating resonance. At this time the PA PLATE current meter (2) will indicate an increase from quiescent, and the IPA meter (19) indication will decrease. (dip)

CAUTION

Initially set PA LOAD control to minimum load or zero on counter. During Tuning of Power Amplifier do not exceed PA PLATE current reading of 1.0 amperes. Should an overload occur, High Voltage indication will go out. To reset HIGH Voltage, decrease RF drive and press to light HIGH VOLTAGE indicator. (HIGH VOLTAGE pushbutton must be pressed twice to energize High Voltage.)

15	Rotate PA TUNE control (11) as necessary to cause a noticeable resonant dip in PA PLATE current meter (2) indicator.	PA PLATE current meter will indicate resonant dip and OUTPUT METER will indicate power output.
16	Rotate PA LOAD control (17) as necessary to produce a maximum reading on PA OUTPUT meter (5).	PA OUTPUT meter (5) will indicate a further increase in Power Output during loading process. When transmitter is properly loaded screen current should be less than 40 ma for full RF output.

NOTE

STEPS 15 and 16 have to be repeated until HFLM is properly loaded into antenna or 50 ohm dummy load.

17	Readjust IPA TUNE control (21) for peak indication on the PA OUTPUT meter indication.	PA OUTPUT meter may indicate a slight increase in meter reading.

STEP	OPERATION	NORMAL INDICATIONS
18	Rotate RF GAIN control (20) clockwise to increase PA Output Power Level to desired power level.	PA OUTPUT meter indicates desired output level.
19	Rotate RF GAIN control (20) counterclockwise and press HIGH VOLTAGE switch to OFF.	PA OUTPUT meter will indicate zero and HIGH VOLTAGE lamp will go out indicating the removal of High Voltage.

NOTE

The above outlined procedure has presented a logical sequence for manually tuning the HFLM-10K on a selected CARRIER frequency at the desired or rated AVERAGE power output level. Modulating techniques will depend upon the exciter that is used. Refer to paragraph 3-4 for POWER OUTPUT indications under multitone multichannel transmissions, before the reapplication of excitation to the transmitter.

3-4. AVERAGE POWER OUTPUT INDICATIONS

When two tones of equal amplitude are applied to an SSB system, the ratio of peak to average power is (.405 x PEP) .405 x 10 kw = 4.05 kw. This relationship is valid for two tones only. Thus, it is apparent that when the unit output meter indicates 4.05 with two tones of equal amplitude applied to the transmitter, peak envelope power will be 10 kw.

NOTE

PA OUTPUT Meter indicates average power ONLY.

In Multichannel, multitone transmission modes where more than two tones are used, a definite relationship exists between the average power as read on the OUTPUT meter and the peak envelope power developed. A chart in graphic form (figure 3-2) indicates the ratio of average power to PEP as a function of tones, for reference in determining peak to average power ratios on this (HFLM) power output meter, which indicates true average power for CW (one tone) only.

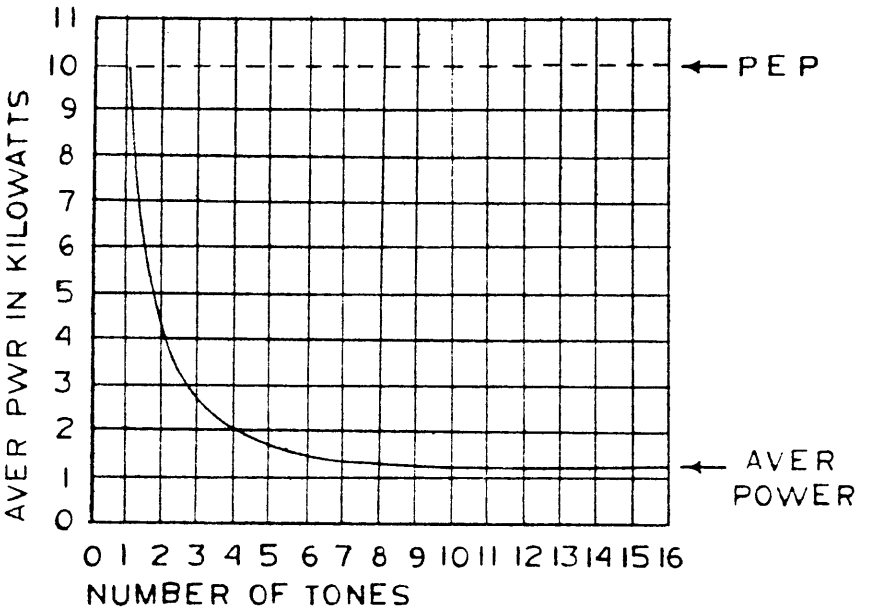


Figure 3-2. Ratio Average Power and PEP as a Function of Tones

FREQ	IPA TUNE	PA TUNE	PA LOAD	PA SCREEN	PA PLATE	FWD PWR	REFL PWR
2.0 MHz		166	153		2.2A	10 KW	
4.0 MHz		077	121		1.8A	10 KW	
8.0 MHz		103	080		1.7A	10 KW	
10 MHz		075	075		1.6A	10 KW	
12 MHz		084	071		1.7A	10 KW	
15 MHz		62	67		1.6A	10 KW	
18 MHz		73	65		1.8A	10 KW	
20 MHz		063	062		1.6A	10 KW	
25 MHz		065	054		1.6A	10 KW	
28 MHz		054	054		1.5A	10 KW	

Figure 3-3. Transmitter Typical Tuning Chart

SECTION 4

PRINCIPLES OF OPERATION

4-1. GENERAL

The HFLM-10K is functionally divided into three sections as follows: rf amplifier, power supply and control circuitry. The following paragraphs describe each section on a functional level and shows the interrelationship between each section. References are made to simplified drawings and schmatic diagrams contained in Section 7.

4-2. RF AMPLIFIER CIRCUIT ANALYSIS

a. Block Diagram Description. (Refer to figure 4-1) Figure 4-1 shows the path of the rf signal from an exciter routed through the amplifier stages, the harmonic filter, output metering circuits and finally to the 50 ohm transmitting antenna or dummy load. Tuning capacitors are used to resonate the intermediate power amplifier and power amplifier stages.

b. Detailed Circuit Analysis. (Refer to figure 7-2, sheet 2) The rf output from an exciter (at least 100 milliwatts) is applied to RF GAIN potentiometer R1301 (which controls transmitter power output), and coupled through C1301 to the grid of the 1ST RF AMPLIFIER, V1301.

(1) The 1ST RF AMP operates as a broadband class A amplifier providing an amplification of approximately 5. The rf output appearing at the plate of V1301 is routed through coupling capacitor C1308, broadband transformer L1303, and capacitor C1310 to the input grid of 2nd amplifier V1302.

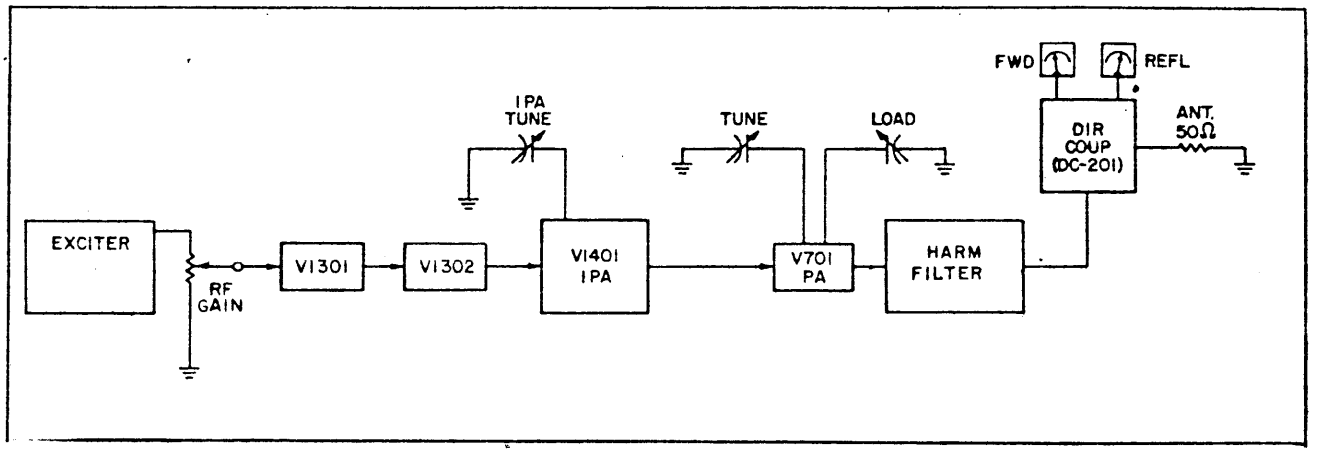


Figure 4-1. Block Diagram

(2) 2ND AMPLIFIER, V1302, operates as a class A amplifier providing further rf amplification. The amplified signal appearing at the plate of V1302 is routed through inductor L1307, capacitor C1318, inductor L1401 and coupled through capacitor C1404 to the grid of intermediate power amplifier (IPA) V1401. The 1st and 2nd rf amplifiers being broadband amplifiers require no resonate tuning to obtain output from their respective plate circuit. Note the relay K1401 provides a ground to the center tap at broadband transformer L1401 when energized. Relay K1401 is energized only in bandswitch positions above the 12-16 MHz position; in any position below 12-16 MHz, K1401 deenergizes and inserts R1402 in series with the center tap of transformer L1401. This arrangement provides impedance matching throughout the frequency range of the HFLM.

(3) The IPA operating as a class AB_1 amplifier provides the required drive input power to the final power amplifier (PA). When an rf signal amplified by the preceding stages is applied to grid of the IPA, rf will appear at the plate circuit when the variable IPA TUNE capacitor has been adjusted to resonate the IPA plate circuit to the frequency that appears at the grid circuit. When the IPA TUNE capacitor is adjusted and the IPA plate circuit approaches resonance, IPA plate current will decrease from quiescence, rf will be amplified in the plate circuit and routed through the nine position IPA BANDSWITCH (preset to a band that corresponds to exciter frequency), to RF OUT jack E1001. Plate meter M1001 monitors IPA plate current. A dip on the meter indicates IPA resonance and maximum transfer of rf power from the IPA to the input of the final power amplifier, V701.

(4) POWER AMPLIFIER, V701, operates as a class AB_1 final amplifier providing 10 kilowatts of power to a 50 ohm antenna or dummy load. The rf power developed in the IPA stage is routed through IPA RF OUT jack E1001 to E817 via P801 and J701, and coupled through capacitor C713 to the filament cathode of V701. The PA tube input is connected in an rf grounded grid, cathode-fed configuration. PA output circuit consists of Bandswitch Assembly A704, TUNE Capacitor Assembly A702, LOAD Capacitor Assembly A703, and Harmonic Filter Assembly AF110.

When rf power from the IPA is applied to the PA input, with BANDSWITCH and TUNE and LOAD capacitors adjusted to resonate PA plate circuit, rf output appearing at the plate will be routed through inductor L706 via BANDSWITCH and inductor L707 to the harmonic filter (figure 7-6) for harmonic attenuation. The rf power then passes through the harmonic filter and directional coupler DC701 to 50 ohm antenna or dummy load.

The TUNE and LOAD capacitors serve to match the output impedance of the 50 ohm antenna up to a maximum VSWR of 3:1.

c. RF Tuning Indicators.

(1) PLATE METER M1001 on the IPA monitors IPA plate current, 1st rf amplifier plate current and 2nd rf amplifier plate current. When all transmitter operating dc voltages are applied, M1001 will monitor the cathode

current of IPA tube V1401. Also during the tuning of the IPA, M1001 will indicate a dip at resonance. M1001 will also indicate increases in IPA plate current as the input grid is being driven from a preceding stage.

(2) Plate current of the 1st rf amp is monitored only when PLATE METER switch S1001 is pressed down. When current is drawn through the cathode of V1301, cathode current is monitored through resistors R1305, R1306, capacitor C1205 to wiper of S1001; the wiper of S1001 is normally grounded. Depressing S1001 down removes the ground connection and connects the cathode to the plate meter via terminal A10006-E2.

(3) Plate current of the 2nd rf amp is monitored only when PLATE METER switch S1001 is pressed in the up position. When current is drawn through the cathode of V1302, cathode current is monitored through capacitor C1206 and resistor R1202 to the wiper, on the second section of S1001; second wiper of S1001 is normally grounded. Pressing S1001 up removes the ground connection and connects V1302 cathode to PLATE METER via terminal A1006-E2.

(4) PA PLATE current meter monitors the cathode current for:

(a) Quiescence (determined by setting on PA bias potentiometer A1007R4).

(b) Resonance (indicated by a dip in meter indication as PA TUNE capacitor is adjusted to the point of resonance).

(c) Total PA plate current drawn at rated output.

Filament transformer T804 supplied filament voltage and current to the filament cathode V701. The center tap of T804 secondary (pin) connected to filter network consisting of capacitors C805, C806, inductor L804 and resistor R813 is connected to PLATE current meter M4002 via A4002 pin 2. As drive and/or bias voltage is increased or decreased the PLATE current meter will indicate a corresponding change.

4-3. POWER SUPPLY ANALYSIS (Refer to figure 4-2)

a. AC POWER DISTRIBUTION.

(1) General - Three-phase power is supplied to three input terminals located at the bottom rear of the transmitter. Safety and protective interlocks are employed throughout the transmitter to prevent application of high voltage until specific requirements are met to prevent injury to personnel and damage to the transmitter.

(2) Detailed Circuit Analysis - Phases 1 and 2 at the input terminals E805 and E806 are routed through the EXCITER ON/OFF switch S3002 to supply ac input to an exciter. AC input to the exciter is present when EXCITER ON/OFF switch is in ON position, independent of the position of the MAIN POWER breaker, CB3001. AC input can be controlled via a remote circuit breaker to remove primary power from the HFLM.

Closure of the MAIN POWER breaker provides 3 phase input to the PA blower, B801 and phases 1 and 3 to the IPA blower, B1401. The air switches for the PA and IPA blowers are normally closed when the blowers are not operating. When the blowers commence operating their respective air switches open, preventing a closure of phase 1 to the filament relay, K802. Should one of the blowers fail to operate, the contact closure of the air switch energizes the filament relay, opening its normally closed contacts, removing the ac to the primaries of the filament transformers T803 and T804.

With the blowers operating properly, ac input power is applied to the PA filament transformer T804 and the IPA filament transformer (Low Voltage) T803. The FILAMENT elapse meter records total filament time on the PA tube. The contacts of the time delay prevent a closure of the series interlock chain until the 5-minute delay has expired. The PA filament transformer supplies approximately 6.0 vac to the PA filament. The low voltage transformer T803 supplies 3 phase ac to the IPA filament rectifier CR805, and the +24vdc rectifier, CR1103. The output of the IPA filament rectifier provides 6.3vdc filament voltage to the IPA tubes.

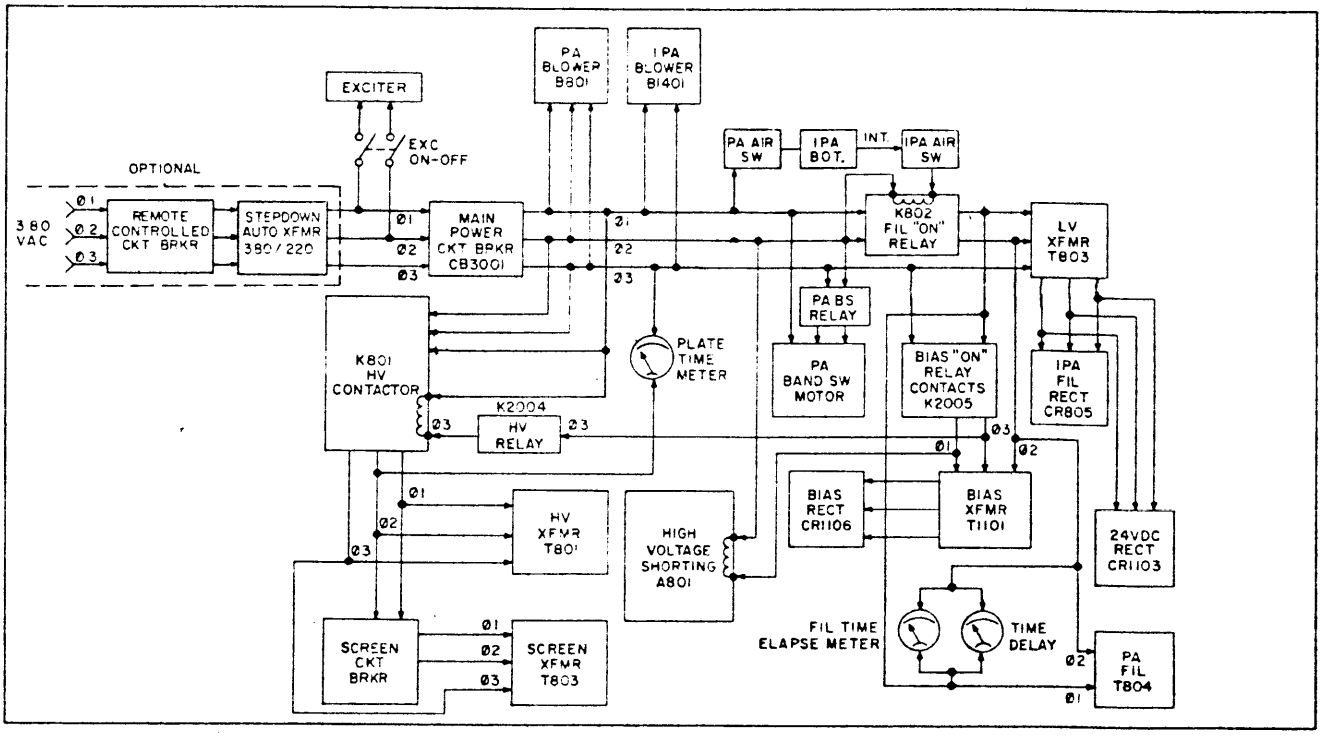


Figure 4-2. AC Power Distribution

The series interlock chain carries 24vdc to the filament timer interlock, whereupon closure will route the 24vdc to the bias on relay, K2005. Contacts 1 and 3 of the bias on relay route phase 1 to the HV shorting coil, A801, removing the shorting ground to the HV power supply. The HV shorting relay also routes the 24vdc interlock voltage to one side of the HV on/OFF relay, K2004.

b. DC Power Distribution. (Refer to figure 7-1, sheet 1 and figure 4-3)

(1) Plate Voltage - Application of 3 phase power input to the high voltage transformer, T801 provides plate voltage for the IPA and PA tubes. The PA plate voltage of 7500vdc is derived from a full wave bridge rectifier circuit, CR802A through CR802F, then filtered by C801 and L801 before application to the PA plate. Resistors R801 through R807 are bleeders for the supply. One half of the value of the PA plate voltage (3750vdc) is available at the neutral tap of T801 secondary. This 3700vdc is the plate voltage for the IPA tune and is filtered by L802 and C802 before application to the IPA plate.

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

The voltage divider consisting of R810 and R809 provides plate and screen voltages for the 1st rf amplifier tube, which is derived from the neutral leg of transformer T802. (Screen voltage is regulated by zener diodes CR807A and CR807B).

(2) Screen Voltage - Closure of the screen circuit breakers provides 2 of the 3 phase input to the screen transformer, T802. The output of the full wave bridge rectifier CR803 is 2000vdc and regulated by 200V zener diodes, CR801A through CR801H. The top of the zener stack provides 1600vdc for the PA screen. The 800vdc required for the IPA section is developed at the junction of zener diode CR801D and resistor R825. The 400vdc required for the screen of V1302 is developed at the junction of zener diode CR801F and resistor R823. The dc return for this supply is through the screen overload circuitry on screen overload board PC529 to protect against excessive current drain should an overload occur.

(3) Bias Voltage (Refer to figure 7-3, sheet 1) - When the Bias ON relay K2005 energizes, two of three phase input is applied to the bias transformer T1101 located in the IPA drawer. The secondary output of T1101 is applied to full wave bridge rectifier CR1106. The output of CR1106 (approximately -400vdc) is filtered by L1101 and C1104 before application to the zener diode regulators through R1105. The dc return for the bias supply is through F1002 to protect the circuit against overloads.

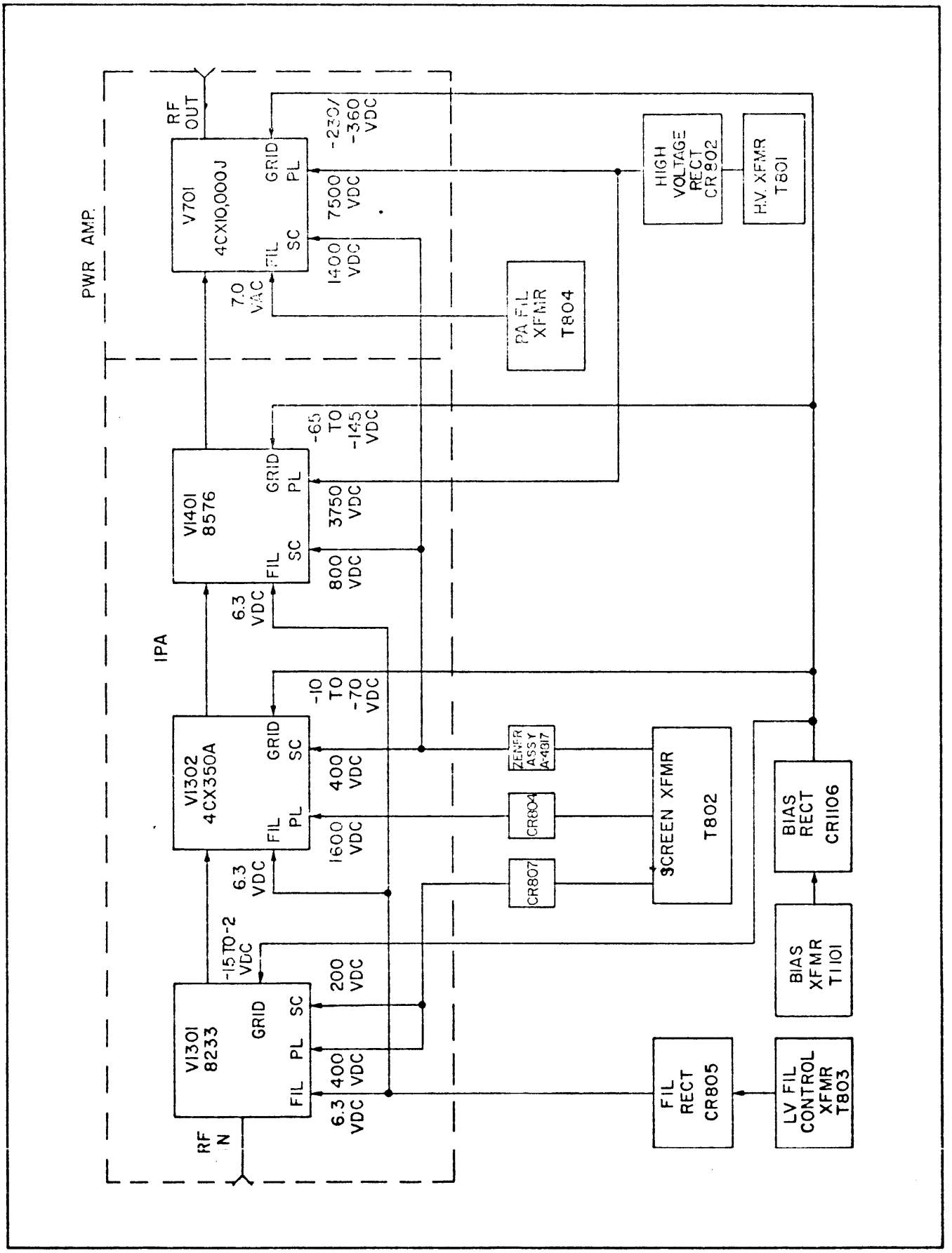


Figure 4-3. HFLM-10K Operating Potentials

Regulated bias voltage is tapped from the zener diodes CR1107, CR1108, CR1109 for application the the four bias potentiometers (PA, IPA 2ND AMP and 1ST AMP). The ground necessary for voltage drop across the bias potentiometers is supplied by contacts (1) and (3) of PTT relay K1101 (when K1101 is energized). The bandswitch interlock circuit prevents 24vdc from reaching the PTT relay during band changes to keep the amplifier stages at maximum bias, or close to cut-off.

The bias supply provides -360vdc to the PA BIAS potentiometer before application to the grid of the PA tube. The PA BIAS potentiometer is adjusted to provide approximately 500 to 650 ma of idle current as indicated on the PA PLATE current meter. The junction of CR1107 and CR1108 provides -240vdc to the IPA BIAD adjust potentiometer. The IPA BIAS potentiometer is adjusted to provide approximately 200 ma of idle current of the IPA PLATE current meter when the meter switch is in its normal position. The junction of CR1108 and CR1109 provides -120vdc to the 2ND AMP BIAS adjust potentiometer before application to the 2ND amp grid. The 2ND AMP BIAS potentiometer is adjusted to provide approximately 200 ma of idle current as observed on the IPA PLATE current meter when the METER switch is pressed UP. The 1ST AMP BIAS potentiometer is adjusted to provide approximately 65 ma of idle current as observed on the IPA PLATE current meter when the METER switch is pressed DOWN.

(4) 24VDC Supply - The secondary of low voltage filament and control transformer T803 provides 20 vac 3 phase input to 24 volt rectifier CR1103 in the IPA drawer. The output of the full wave bridge rectifier, CR1103, is filtered by C1101 and C1102 and regulated at +24vdc by zener diode CR1104. This regulated 24vdc is used as control voltage for the HFLM. The dc return for the supply is through 24v fuse F1003 to protect against overloads.

4-4. CONTROL CIRCUITRY

a. Protective Overloads and Interlocks. (Refer to figure 4-4)

(1) General - The interlock and overload circuitry of the HFLM provides protection for the equipment and operating personnel. An open interlock or overload condition will de-energize K2004, the HV ON/OFF relay.

(2) Simplified Circuit Analysis - The regulated 24vdc interlock voltage is routed through the mechanically closed interlocks to the filament timer interlock. When the time delay of the filament timer has expired it's contacts close and the 24vdc energizes the bias on relay which in turn energizes the HV shorting relay. Contacts on the HV shorting relay route the 24vdc to one side of the HV ON/OFF relay through the normally closed

contacts of the heat overload and external interlocks. The HV ON/OFF relay is energized when the HV ON/OFF switch is depressed, providing a path through the reset contacts of the Main Overload relay and through the Remote HV ON/OFF provision to ground. The HV ON/OFF relay provides phase 3 to K801, the HV contactor coil. When K801 energizes, a ground is provided for the remote and local HV lights. The normally closed contacts of K801 open removing the ground on the ALARM ON/OFF switch, disabling the HV ALARM when high voltage is on and the ALARM switch is in the ON position. An indication on the IPA PLATE current meter, PA PLATE current meter, PA SCREEN current meter, or REFLECTED power meter, which is equivalent to the red overload pointer setting, provides a contact closure on the associated meter sensing circuit. The contact closure supplies a gating pulse to trigger an overload SCR, providing a path for the 24vdc to the associated overload lamp on the meter, and 24vdc to the main overload relay causing it to energize. The energized overload relay opens the ground path to the HV ON/OFF relay K2004. To restore high voltage, the HV ON/OFF switch is depressed so that its contacts open, removing the 24vdc applied to the meter contact coils. The open meter contacts no longer provide a gating pulse to the specific overload SCR opening the voltage path to the overload lamp and removing the 24vdc to the main overload relay. The main overload relay de-energizes, keeping its contacts to the overload position. Depressing the HV ON/OFF switch again will place its contacts in the closed (reset) position, restoring high voltage and resetting the overload relay.

Should any of the interlocks open when the high voltage is on, the 24vdc applied to the HV ON/OFF relay is diverted to a line connecting all the normally closed contacts of the interlocks to the input of the main overload relay. An open interlock therefore places the HFLM in an overload condition, preventing the potentially dangerous application of high voltage when the open interlock is closed, In either condition, overload or opened interlock the HV switch must be pressed twice to restore high voltage.

b. ALDC. The ALDC circuit provides a negative feedback voltage to an exciter to prevent excessive rf output from the HFLM. The potentiometer located behind technimatic light cover on printed circuit board A705 is the ALDC threshold level for 10 KW.

The desired ALDC adjustment for any other power level below 10 KW is located on the front panel of the Driver Drawer. This front panel knob control (see figure 3-1 callout 9) will prevent any excessive rf output below 10 KW.

c. ALDC Control. Control of the ALDC is accomplished two different ways, both conditions are described in the following paragraphs.

Condition (b) The output power meter M4005 transfers a sampling of the output power at TB703-1 to the input of the ALDC circuit A707-7. This positive sampling voltage is then applied to the first of two series connected intergrated circuit amplifiers. The amplifier output of A707 pin 2 is applied to the exciter to control the exciter power output, thereby controlin the transmitter power output.

Condition (a) A sample of the transmitter r-f output appears at terminal A706E2 of the harmonic filter A706. The voltage passes through capacitor divider network C704 and C741, and is rectified by the ALDC rectifier assembly A708. The positive voltage is then applied to the input of the ALDC amplifier assembly A707 at pin 7. The ALDC amplifier consists of two series connected integrated circuit amplifiers. The amplifier output at pin 2 is applied to the exciter to control the exciter power output, thereby controlling the transmitter power output.

The control of the potentiometer (located on the driver drawer) adjusted to the desired power limits should hold the transmitter output.

d. Bandswitch Control. (Refer to figure 4-5 and 7-5)

(1) General - Bandswitching within the HFLM is performed with the PA BANDSWITCH control.

(2) Detailed Circuit Analysis - Bandswitching is accomplished by providing a ground to the PA bandswitch. The ground thus provided will then be routed to the PA bandswitch relay which supplies ac voltage to the PA bandswitch motor.

(3) Manual Control - Pin (X) on XA2001 provides ground to the common arm of the bandswitch control lever (S5004). The two poles of this switch are connected to pins (i) and (j) of J1 (Bandswitch Control Assembly). When the neutral arm is moved to the right, the ground picked up at pin (i) is routed through PA bandswitch manual control rear wafer to pin (2) of the PA Bandswitch relay K1. Pin 10 of the PA bandswitch relay has a fixed +24vdc applied. The PA bandswitch relay energizes, routing phase 1 and 2 from pins (A) and (B) of J2 to the PA bandswitch motor A704B1. With phase 3 already present on the motor from pin (C) of J2, the motor moves the switches coupled to it, one position. The PA bandswitch manual control, rear wafer having moved one position in a counterclockwise direction, has moved into an open position (2.3-2.6 band) therefore removing the ground to the PA bandswitch relay. To move the PA bandswitch motor further, the ground on the common arm must now be supplied to pin (j), or the arm must be moved to the left. Moving the neutral arm to the left will now supply a ground to the PA bandswitch relay through the PA bandswitch control, front wafer moving the PA bandswitch motor one more position. Therefore, the PA bandswitch manual control lever must be moved to the left and right to move the PA bandswitch in a stepping manner.

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

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

Refer to figure 7-2, sheet 4 and note that a ground provided at pin (B) A704J is routed through the IPA bandswitch control, front wafers to the notch homing control wafer on the IPA bandswitch. When a ground is seen at pin (2) of K1, 28vdc present at pin (22) of J1 will energize K1, routing 28vdc to the IPA bandswitch ledex motor. The IPA bandswitch ledex motor will rotate until the notch opens the ground connection to K1.

e. Harmonic Filter. (Refer to figure 7-6) - The output from the PA tuning circuit is applied to Harmonic Filter, AF110 which provies up to 25 db harmonic rejection at the HFLM output. The Harmonic Filter is a low pass, fixed filter supplying harmonic suppression (with minimum insertion loss) from the second harmonic of 17 MHz and up.

f. 8-12 MHz Band Decoupling. Due to a natural resonance created by the combination of components in the 8 to 12 MHz band. It is necessary to decouple C739 when the transmitter is not tuned to the 8 to 12 MHz band.

Refer to figure 7-1 for a schematic representation. The band indicator assembly A5001 pin 4 receives 24 volts dc when tuned to position 7 of A704A1-SB1 wafer. 24 vdc then is transferred to assembly A710 (the 8-12 MHz Decoupling Assembly). At A710-TB1 terminal 3, the appearance of 24 vdc energizes A710-K2 relay. Contact 4 and 1 close thus allowing 230 vac phase 2 to appear at A710-K1 contactor. The contactor now opens removing C739 from the circuit allowing A702-C1 capacitor to tune correctly.

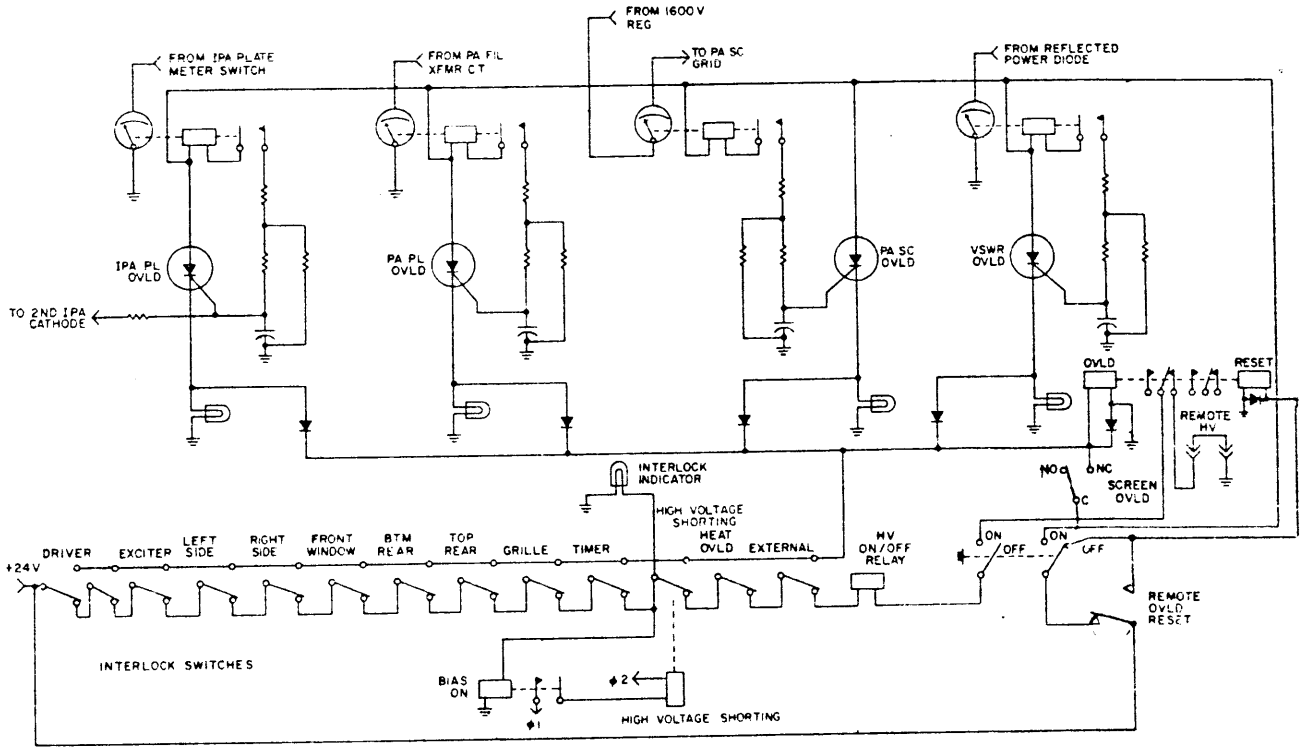


Figure 4-4. Protective Overloads and Interlocks

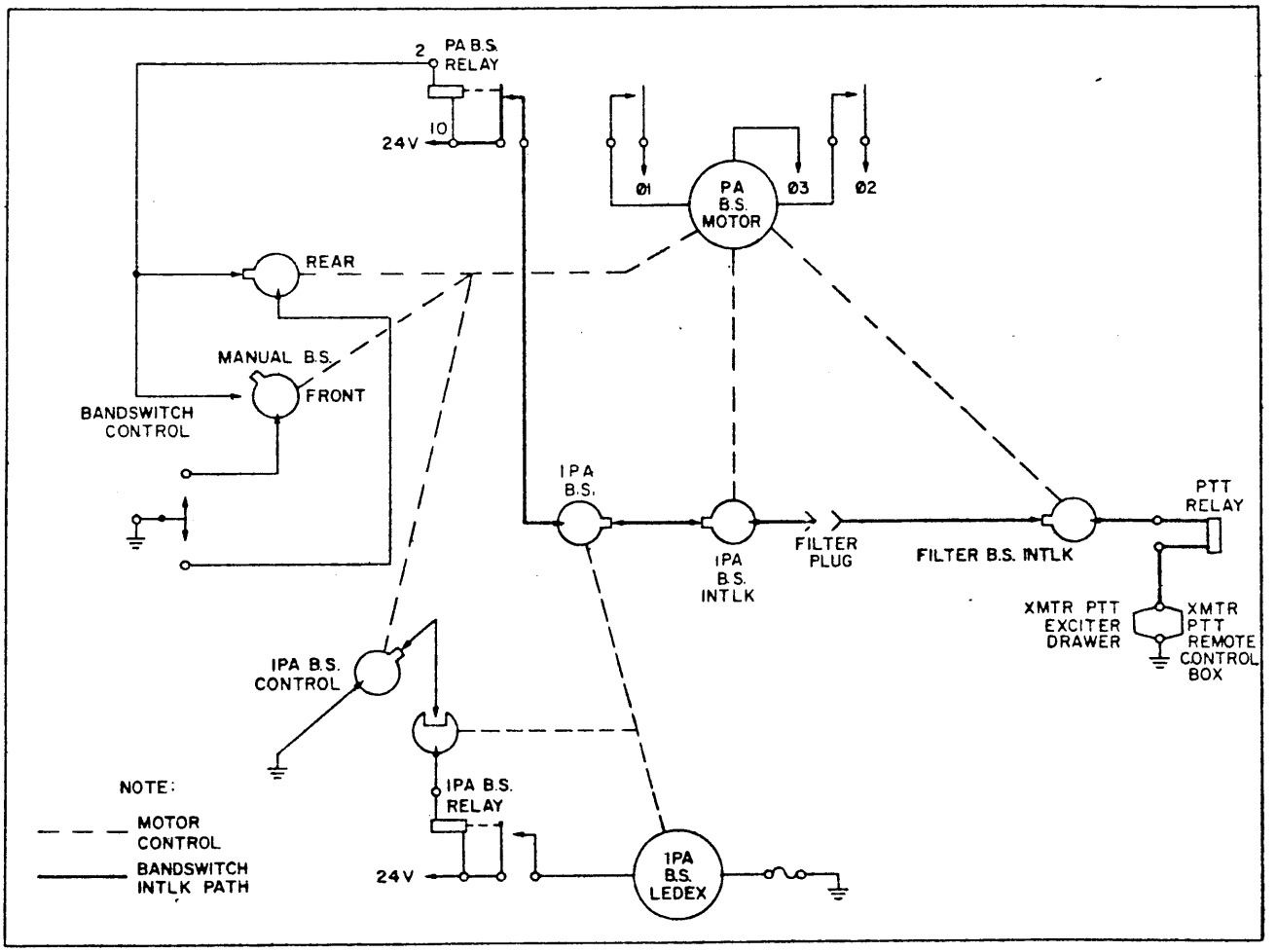


Figure 4-5. Bandswitch Control

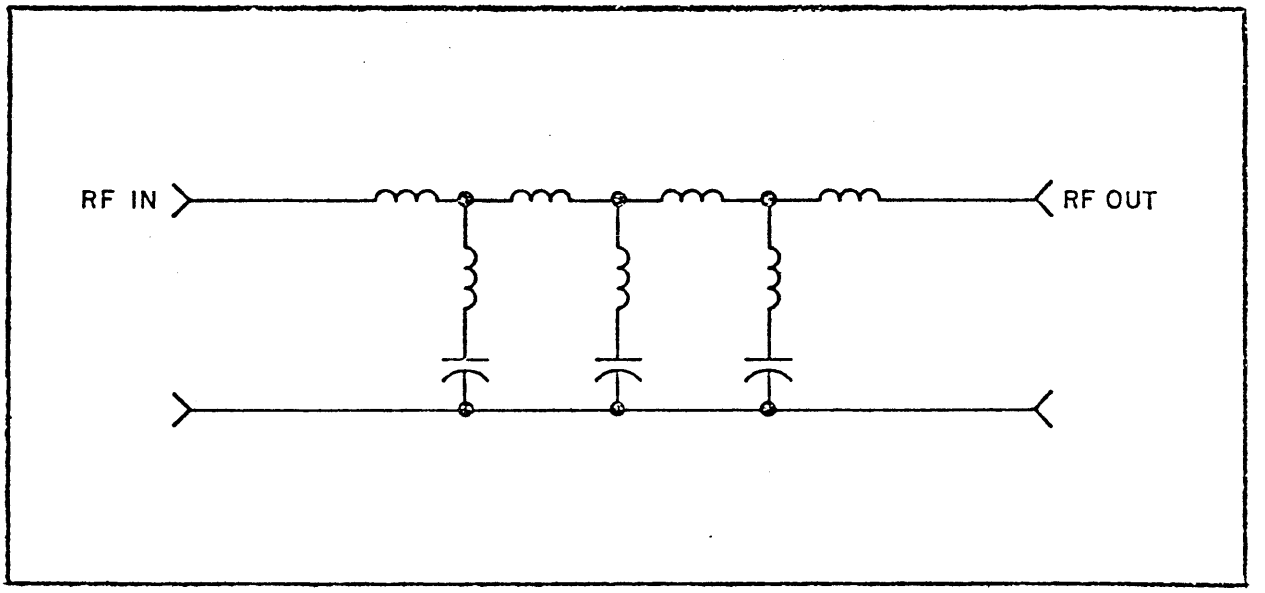


Figure 4-6. Equivalent Circuit of Harmonic Filter, AF110

SECTION 5

MAINTENANCE

5-1. INTRODUCTION

The HFLM-10K 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.

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

a. Fuse Location Diagram (figure 5-5)

b. Fuse Functions (table 5-3)

c. System Overload and Bias Setting Procedure

d. Alignment Procedure

e. Maintenance Programs (for troubleshooting)

5-2. LIST OF TEST EQUIPMENT REQUIRED

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

5-3. OPERATORS MAINTENANCE PROCEDURE

a. Refer to operational checkout procedures for manual or automatic depending on desired mode of operation (Operators Manual).

b. Operators troubleshooting chart (table 5-1 and figure 5-5, Fuse Locations.

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 ddirt, 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. Trichloroethylene 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 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 trichloroethylene, avoid contact with painted surfaces, due to its paint removing effects.

5-5. TROUBLESHOOTING

The first step in troubleshooting the manual system is as follows.

a. OBSERVATIONS. Observe the operation of the transmitter and determine whether the indications are normal or abnormal. (Refer to operators manual for both manual and automatic tuning).

b. FUSE CHECKS. If a malfunction occurs a visual check of fuses on the system must be performed. (See figure 5-5 for fuse location)

c. VOLTAGE CHECKS. A this time voltage checks are not necessary until localization of the malfunction has taken place.

d. LOCALIZATION OF MALFUNCTION. Perform the tuning check-out procedure outline in paragraph 3-3, Section 3. Use of this procedure will help localize the particular fault at hand.

Troubleshooting charts have been specially prepared to assist in localizing a malfunction. The table presents a logical sequential order for localizing malfunctions.

e. FIELD MAINTENANCE. Procedures presented on the following pages give instructions for qualified personnel to maintain, align, and/or troubleshoot the HFLM-10K.

WARNING

When it becomes necessary to measure transmitter voltages, use extreme caution. Hazardous voltage potentials are present although the MAIN POWER circuit 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 HIGH-VOLTAGE POINTS WITH SHORTING STICK PROVIDED.

3. ATTACH TEST METER TO POINT OF TEST DESIRED AND REAPPLY 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 AND SHORT OUT ALL HIGH VOLTAGE POINTS; REMOVE TEST METER.

TABLE 5-1. OPERATORS TROUBLESHOOTING CHART

NO.	MALFUNCTION	PROBABLE CAUSE OF MALFUNCTION
1	IPA blower B1401 does not operate.	REPLACE IPA BLOWER FUSE F1001 (2 AMPS)
2	INTERLOCK indicator DS5002 does not light.	CHECK +24 VDC SUPPLY (E1105)
3	PA PLATE CURRENT excessive, IPA PLATE CURRENT excessive, overloads continue to trip.	REPLACE BIAS FUSE F1002 (1/10 AMP)
4	BANDSWITCH control does not operate.	REPLACE 24VDC FUSE F1003 (8 AMPS)
5	IPA BANDSWITCH A1002 does not change frequency bands.	REPLACE IPA BANDSWITCH FUSE F1004 (5 AMPS)

TABLE 5-1. OPERATORS TROUBLESHOOTING CHART (cont)

NO.	MALFUNCTION	PROBABLE CAUSE OF MALFUNCTION
6	MAIN blower B801 does not operate.	REPLACE, after checking presents of 01, 02, 03.
7	RF Gain Control does not operate.	Check signal at (E1207).
8	HIGH VOLTAGE indicator DS5001 does not light when switch is pressed.	Check (Exciter Drawer K2004 Relay).
9	PA SCREEN meter M4001 indicates no reading with high voltage on.	REPLACE, after checking CR803.
10	PA M4002 and IPA M1001 plate meter indicate no reading on high voltage on.	Ø1 LOW VOLTAGE FUSE F3005 OR (5 AMPS) Ø2 LOW VOLTAGE FUSE F3006 OR (10 AMPS)
11	Transmitter output power suddenly drops to zero.	Ø3 LOW VOLTAGE FUSE F3007 OR (5 AMPS)
12	Filament time meter M3001 inoperative.	REPLACE PA FIL FUSE F3004 (5 AMPS)

5-6. ALDC ADJUSTMENT PROCEDURE

The ALDC adjustments maintain a constant reference during modulating emission modes. The transmitter provides a negative d-c voltage which is adjustable and proportional to the transmitter output. This voltage is available at the exciter drawer ALDC plug P2003 and at pin e of the remote connector J3001.

a. Slide technimatic light cover up to expose ALDC back bias adjust.

b. Rotate the front panel ALDC control counterclockwise for minimum ALDC action and tune transmitter to a carrier frequency of 12 MHz.

c. Adjust RF GAIN control for a PA OUTPUT indication of 10,000 watts. Adjust front panel ALDC control clockwise until output meter indicates 5,000 watts.

d. Adjust ALDC back bias adjust until there is no further increase in PA output indication.

e. Adjust front panel ALDC control counterclockwise for minimum ALDC action.

f. Adjust RF GAIN control to re-establish 10,000 watts with front panel ALDC control set at maximum counterclockwise position.

g. Adjust ALDC back bias potentiometer until PA output commences to decrease.

NOTE

The back bias adjustment determines the ALDC holding range. Once the back bias is adjusted for a specific output level the front panel ALDC control is used from that power level and downward.

5-7. TRANSMITTER BIAS ADJUSTMENT PROCEDURE

The bias adjustments outlined below are to obtain the proper quiescent plate current values. Before the bias adjustments can be made the bias control cover must be removed from the front panel of the IPA drawer to expose the bias potentiometers. Loosen the front panel locks on the IPA drawer and extend the drawer on its slides. The 1ST AMP BIAS potentiometer R1303 is available through a hole provided in the bottom cover of the drawer. See figure 5-1 for the location of the remaining controls.

NOTE

Quiescent plate current values indication in the procedure are normal operating values. However, if an abnormal condition exists refer to figure 5-2, Simplified Bias Control Diagram,

a. Set the PA BIAS A1007R4, IPA BIAS A1007R5 and the 2ND AMP BIAS A1007R6 potentiometers to the maximum clockwise position. (Bias voltage will be at the maximum value.)

b. Defeat the IPA drawer interlock switch S901. (Pull the plunger out until it locks.)

c. Set the MAIN POWER circuit breaker CB3001 to ON. Set the SCREENS circuit breaker CB3002 to ON.

CAUTION

Insure that a dummy load or antenna is connected to the transmitter output J703 and that the RF drive control R1301 is at the maximum counter-clockwise position. (Minimum drive)

d. Press the HV switch S5001 to apply the high voltage. Check the PA PLATE CURRENT meter M4002 to see that the PA tube is biased at or near cutoff. Check the IPA drawer PLATE meter M1001 to see that the IPA tube is biased at or near cutoff. Press the IPA drawer meter switch S1001 to the 2ND AMP position (up) and check the PLATE meter to see that the 2ND AMP tube is biased at or near cutoff.

e. Press the PLATE METER switch to the 1ST AMP position (down) and adjust the 1ST AMP BIAS potentiometer R1303 for a reading of 30-40 ma on the meter. R1303 is located on the underside of the IPA drawer and is accessible through a hole in the bottom cover.

f. Release the meter switch and press the HV switch to turn the high voltage OFF. Slide the drawer back into the unit and re-lock the front panel.

g. Press the HV switch to turn the high voltage on.

h. Observe the PA PLATE CURRENT meter M4002 and adjust the PA BIAS potentiometer A1007R4 to obtain a reading of 0.5 to 0.65 amperes on the meter.

i. Observe the IPA drawer PLATE meter M1001 and adjust the IPA BIAS potentiometer A1007R5 to obtain a reading of 190-210 ma on the meter.

j. Press the IPA drawer meter switch to the 2ND AMP position and observing the meter, adjust the 2ND AMP BIAS potentiometer to obtain a reading of 190-210 ma.

k. Press the HV switch to turn the high voltage OFF and replace the bias control cover on the IPA drawer.

5-8. OVERLOAD CIRCUIT TEST (See figure 5-3 for control location)

The overload circuitry protects the transmitter against excessive currents and VSWR. The simplicity of overload adjustments and indications of overloaded conditions affords ease of overload recognition. To set the overloads, proceed as follows:

a. Energize transmitter, (set MAIN POWER CB3001 and SCREENS CB3002 circuit breakers to ON.)

b. Press HIGH VOLTAGE switch S5001 to apply the high voltage.

c. Apply r-f source (11 mHz) to r-f input of transmitter J3004 or P2004.

d. Manually tune transmitter for rated output.

e. Reduce r-f drive to minimum.

NOTE

To reset an overload, the HIGH VOLTAGE switch S5001 must be pressed twice (press to reset overload, press to apply high voltage). If a malfunction occurs and overload circuitry does not function normally, refer to paragraph 5-13 for troubleshooting information.

5-9. PA PLATE OVERLOAD ADJUSTMENT

a. Adjust overload indicator (adjustment screw located directly below meter face) for 2 amperes as indicated on the PA PLATE current meter M4002.

b. Increase drive until the PA PLATE current meter indicates 2 amperes. Observe the following:

1. When meter indication reaches the value of the overload indicator setting, the high voltage trips off.

2. PA PLATE current meter illuminates indicating overload in the PA PLATE current.

3. Meter indicator remains at the overload value to indicate value which caused overloaded condition.

c. Reduce r-f drive to minimum and press HIGH VOLTAGE button to reset high voltage. (HIGH VOLTAGE switch may have to be pressed twice.)

d. To further check operation of plate overload, increase r-f drive again noting that high voltage is tripped as in step 1. Set overload indicator for an indication of 3-1/2 amps as read on the PA PLATE current meter.

5-10. PA SCREEN OVERLOAD ADJUSTMENT

a. Repeat paragraph 5-8a thru d and proceed to step b.

b. Reduce r-f drive and set PA SCREEN overload indicator to 30 milli-amps as indicated on the PA SCREEN current meter M4001.

c. Increase r-f drive and operate PA TUNE and PA LOAD controls S5003 and S5005 to draw screen current, (under-load transmitter).

d. Further increase the r-f drive until meter indicator reaches value set on overload indicator.

e. Observe the following:

1. High voltage trips OFF (indicated by HIGH VOLTAGE indicator extinguishing).

2. PA SCREEN meter face illuminates and meter indicator remains at the overloaded value.

3. PA PLATE current and IPA plate current meters indicate zero.

f. To further check operation of PA screen overload, reduce r-d drive, press HIGH VOLTAGE button to reapply high voltage and increase drive until overload trips at overload indicator value.

g. Reset overload indicator to 80 ma.

5-11. SWR OVERLOAD ADJUSTMENT

a. Repeat paragraphs 5-8a thru d and proceed to step b.

b. Press HIGH VOLTAGE switch S5001 to remove high voltage. (HIGH VOLTAGE indicator DS5001 extinguishes).

c. Rotate 5 kw reflected power diode element CR702 (located in directional coupler DC701) 180 degrees. (Arrow on diode element should be in direction of r-f output from transmitter to antenna after it has been rotated 180 degrees).

d. Press HIGH VOLTAGE button to apply high voltage. Set reflected power overload indicator to 2.0:1 as indicated on the bottom scale on REFLECTED power meter M4004.

e. Increase r-f drive until REFLECTED power indicator reaches overload indicator value and observe the following:

1. High voltage trips OFF. (HIGH VOLTAGE indicator extinguishes).

2. REFLECTED power meter illuminates.

3. REFLECTED power indicator remains at the overload value to further indicate overload.

4. PA and IPA plate current meters will indicate zero.

5. To further check operation of SWR overload, reduce r-f drive, press HIGH VOLTAGE button, to re-apply high voltage and increase r-f drive again until overload trips high voltage off.

6. Restore 5 kw (reflected power) diode element to original position (arrow on diode element facing direct opposite of 20 kw forward diode).

7. Set SWR overload indicator to desired value.

5-12. IPA PLATE CURRENT OVERLOAD ADJUSTMENT

a. Insure r-f drive is at minimum setting.

b. Energize transmitter, (MAIN POWER and SCREENS circuit breakers CB3001 and CB3002 set to ON, HIGH VOLTAGE switch S5001 pressed to ON.

c. Set IPA PLATE overload indicator to 250 ma as read on IPA plate current meter M1001.

d. Remove bias control cover and adjust IPA BIAS potentiometer A1007R5 counterclockwise noting PLATE meter indication. When IPA plate current meter indicates 250 ma (value of IPA plate current overload setting), observe the following indications:

1. High voltage trips OFF. (HIGH VOLTAGE indicator extinguishes).

2. IPA plate meter illuminates.

3. IPA plate meter indicator remains at overloaded value.

4. PA plate current meter indicates zero.

5. Adjust IPA BIAS potentiometer maximum clockwise and press HIGH VOLTAGE switch twice to apply high voltage.

6. Readjust IPA BIAS control counterclockwise to restore original state plate current value of 190-210 ma as read on the IPA plate current meter.

7. Reset overload indicator to indicate 800 ma as read on the IPA plate current meter.

5-13. TROUBLESHOOTING TRANSMITTER OVERLOAD CIRCUITRY

The overload is designed to remove high voltage in the event of excessive current conditions. Paragraph 5-8 through 5-12 provides information for checking and setting overloads. However, if the overload circuitry does not function in accordance with paragraphs 5-8 through 5-12, troubleshoot the circuitry in the following manner:

a. Temporarily remove PA window. Loosen meter panel locks and lower meter panel on its hinges to expose rear side.

b. Extend IPA drawer on its slides and remove top cover. Defeat the IPA drawer interlock switch S901.

c. Set MAIN POWER and SCREENS circuit breakers (dual section) to ON, single section of SCREENS circuit breaker must be in OFF position.

d. Adjust overload pointer counterclockwise to make contact with meter pointer. The overload lamps should light.

NOTE

If overload lamp on associated meter board does not light, temporarily place a jumper across switch contacts on meter board, (Refer to assembly drawing on associated schematic diagram for parts location.) IF overload lamps do not light with jumper, check Q1, and/or the presence of 24 volts on the associated board inputs. The voltage that lights the overload lamp also energizes the overload relay.

e. Observe overload relay A4003K1, when the overload lamps light on any meter board. A4003K1 should energize to an overload condition. If A4003K1 does not energize check A4003E8 for the presence of 24 volts. (Refer to assembly drawing for parts location.)

NOTE

When an overload condition exists, the associated meter overload lamp should light. However, should more than one set of overload lamps light, check isolation diode CR1 on each overload board.

f. When an overload relay A4003K1 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 switch.

g. Observe overload relay A4003K1. It should latch into the reset position and associated overload lamps should extinguish. If overload relay A4003K1 does not reset, check for the presence of 24 volts on A4003E11.

TITLE	REFERENCE SYMBOL	SCHEMATIC DIAGRAM ((Figure)
PA PLATE OVERLOAD BOARD	A4002	Figure 7-1 (Sheet 5)
PA SCREEN OVERLOAD BOARD	A4001	Figure 7-1 (Sheet 5)
MAIN OVERLOAD BOARD	A4003	Figure 7-1 (Sheet 5)
IPA PLATE OVERLOAD BOARD	A1006	Figure 7-2 (Sheet 2)

TABLE 5-2. INTERLOCK LOCATION

FIGURE 5-4 REFERENCE NUMBER	TITLE	SYMBOL NUMBER	FUNCTION
1	IPA DRAWER BOTTOM COVER	S1201	With IPA drawer bottom cover removed, the switch is opened deenergizing the Filament Relay K801.
2	IPA DRAWER	S1101	With IPA drawer top cover removed, the switch is opened deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.
3	IPA DRAWER	S901	With the IPA drawer extended, The switch is opened deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.
4	EXCITER DRAWER	S902	With the EXCITER drawer extended, the switch is opened deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.
5	LEFT SIDE	S903	With the left side skin removed, the switch is opened deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.
6	RIGHT SIDE	S904	With the right side skin removed, the switch is opened deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.
7	FRONT WINDOW	S5008	With the window panel removed, the switch is opened deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.

TABLE 5-2. INTERLOCKS LOCATION (cont)

FIGURE 5-4 REFERENCE NUMBER	TITLE	SYMBOL NUMBER	FUNCTION
8	REAR BOTTOM	S905	With the rear bottom skin removed, the switch is opened deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.
9	REAR TOP	S906	With the rear top skin removed, the switch is opened deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.
10	POWER SUPPLY GRILLE	S907	With the front grille panel removed, the switch is opened deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.
11	TIME DELAY	M801	If the time delay has not elapsed, the switch is opened deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.
12	HV SHORTING ASSEMBLY	A801S1	If the HV Shorting Assembly does not energize, the switch is opened deenergizing the HV ON-OFF relay K2004 and the INTERLOCKS indicator DS5002.
13	HEAT OVERLOAD		If the PA tube compartment becomes overheated, the switch opens deenergizing the HV ON-OFF relay K2004, BIAS ON relay K2005, INTERLOCKS indicator DS5002, HV SHORTING ASSEMBLY A801 and tripping the OVERLOAD relay A4003K1.
14	EXTERNAL	PINS L, M AND N J3001	If pins L and N are not connected the HV relay K2004 and the INTERLOCKS indicator DS5002 are not energized. If pins L and M are connected the OVERLOAD relay A4003K1 is tripped.

TABLE 5-3. FUSE LOCATIONS

FIGURE 5-5 REFERENCE NUMBER	PANEL DESIGNATION	SYMBOL NUMBER	VALUE (AMPS)	PROTECT FUNCTION
1	BLOWER	F1001	2	B1401 IPA BLOWER K802 Filament relay
2	BIAS	F1002	1/10	Bias voltage circuits A707 ALDC assembly negative voltage circuits.
3	24 VDC	F1003	8	Unregulated and regulated +24 VDC circuits Regulated +12V circuits
4	BANDSWITCH	F1004	5	A1002S2 IPA bandswitch solenoid
5	BLOWER Ø1	F3001	3	B801 Main blower B701 Top fan A706 Harmonic filter AC input A704B1 PA bandswitch motor
6	BLOWER Ø2	F3002	3	B801 Main blower B701 Top fan A706 Harmonic filter AC input A704B1 PA bandswitch motor
7	BLOWER Ø3	F3003	3	B801 Main blower A706 Harmonic filter AC input A704B1 PA bandswitch motor M3002 PA plate elapsed time meter
8	PA FILAMENT	F3004	5	T804 PA filament transformer M801 Time delay M3001 Filament elapsed time meter A801L1 HV shorting assembly

TABLE 5-3. FUSE FUNCTIONS (cont)

FIGURE 5-5 REFERENCE NUMBER	PANEL DESIGNATION	SYMBOL NUMBER	VALUE (AMPS)	PROTECT FUNCTION	
9	LOW VOLTAGE Ø1	F3005	5	T803	Low Voltage transformer
				K801	HV contactor
				T1101	Bias transformer
10	LOW VOLTAGE Ø2	F3006	10	T803	Low voltage transformer
				M3001	Filament elapsed time meter
				T804	PA filament transformer
				K801	HV contactor
				T1101	Bias transformer
11	LOW VOLTAGE Ø3	F3007	5	T803	Low voltage transformer
12	EXCITER AC	F3008	1	B2001	Exciter drawer fan
					Exciter AC

TABLE 5-5. TROUBLESHOOTING CHARTS

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

These charts of 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, follows these instructions.

1, Determine the nature of the trouble.

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

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

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

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

6. Proceed as in Line 3 above.

MAINTENANCE PROGRAM LIST

Maintenance Program "A" IPA Plate Meter reading abnormal.

Maintenance Program "B" 2nd IPA Plate meter reading abnormal.

Maintenance Program "C" No. HV

Maintenance Program "D".

1. Main Blower does not operate.
2. Bandswitch and Interlock lamps out.

Maintenance Program "E" Interlock Lamp does not light.

Table 5-5. Troubleshooting Chart (cont)

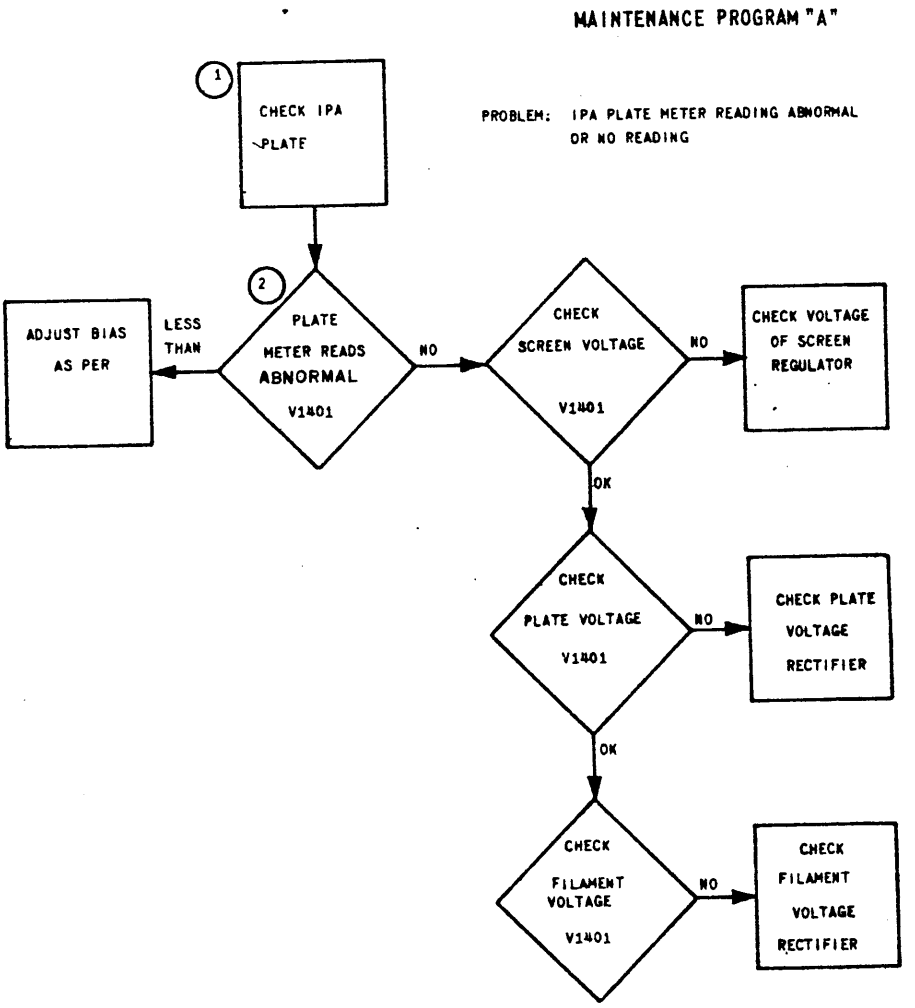
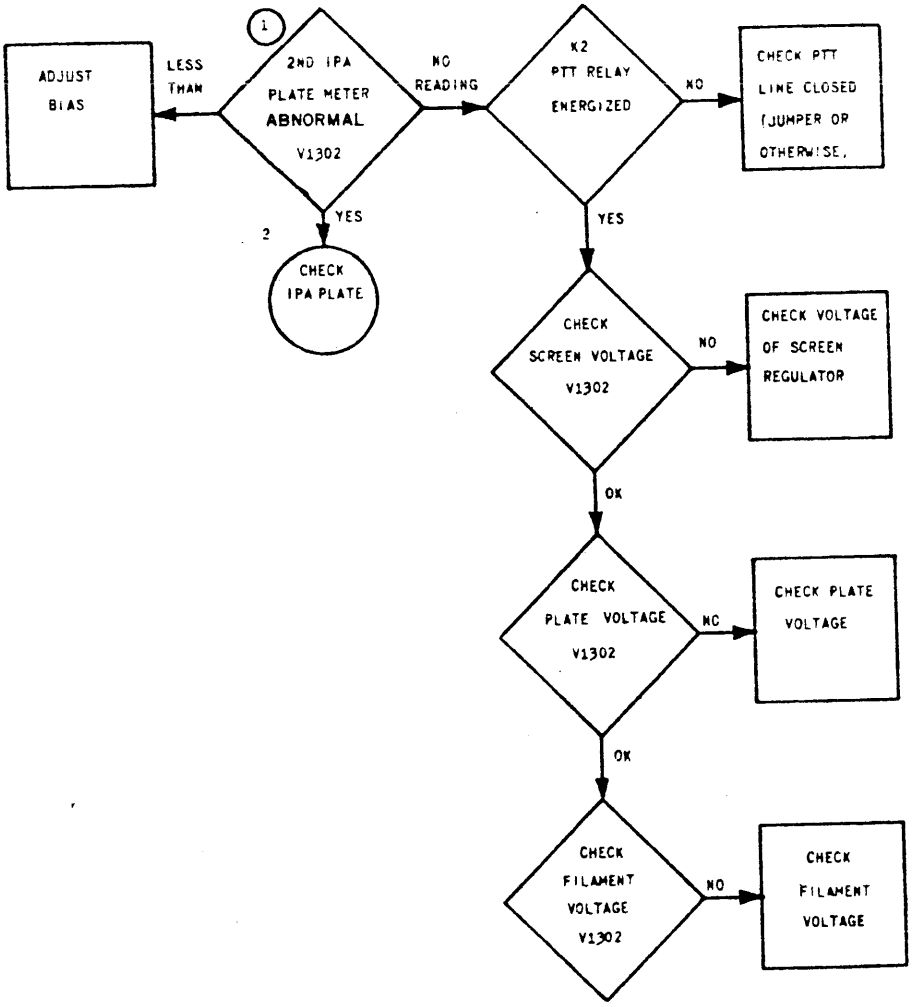


Table 5-5. Troubleshooting Chart (cont)

MAINTENANCE PROGRAM B

PROBLEM. 2ND IPA READING ABNORMAL OR NO READING



USE CAUTION WHEN MEASURING VOLTAGES

Table 5-5. Troubleshooting Chart (cont)

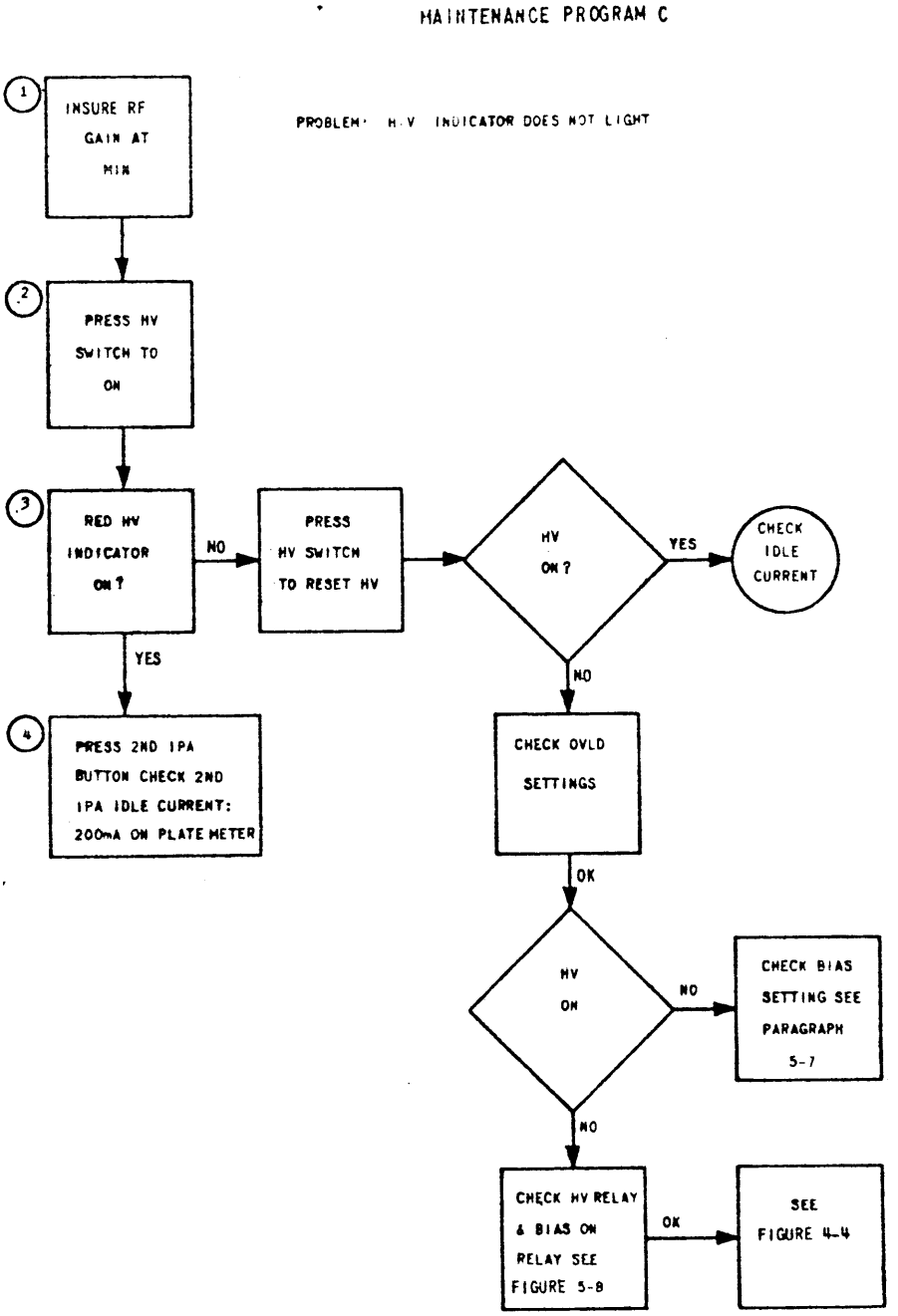


Table 5-5. Troubleshooting Chart (cont)

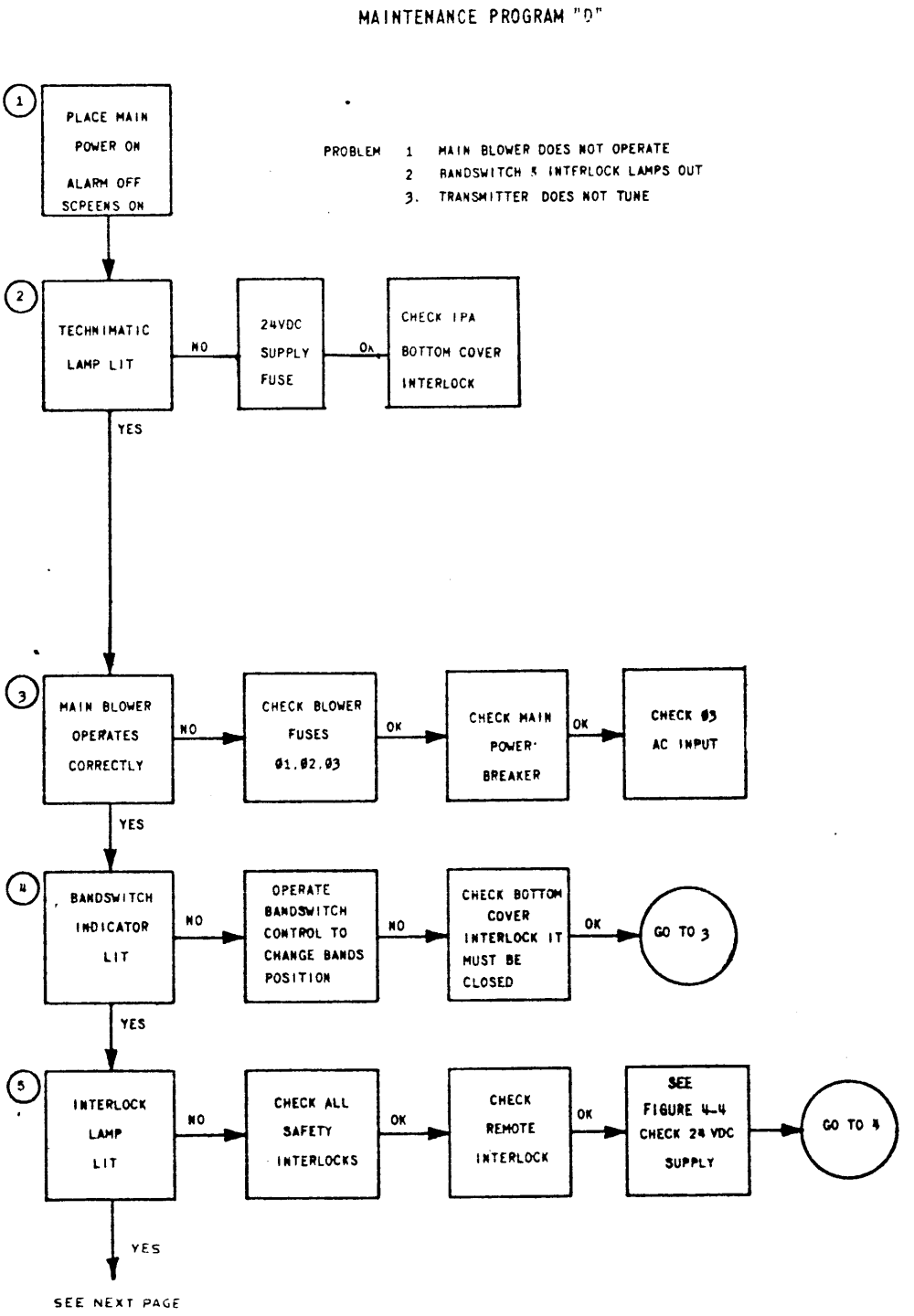


Table 5-5. Troubleshooting Chart (cont)

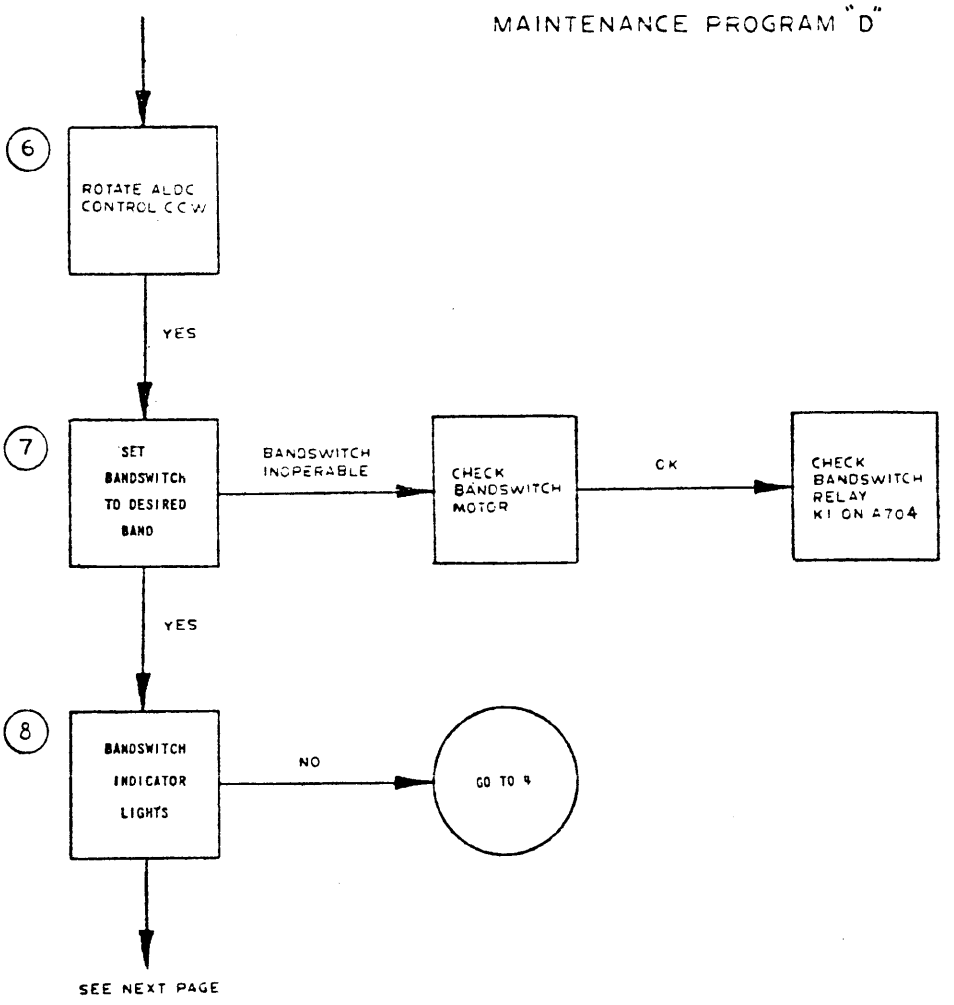


Table 5-5. Troubleshooting Chart (cont)

MAINTENANCE PROGRAM "D"

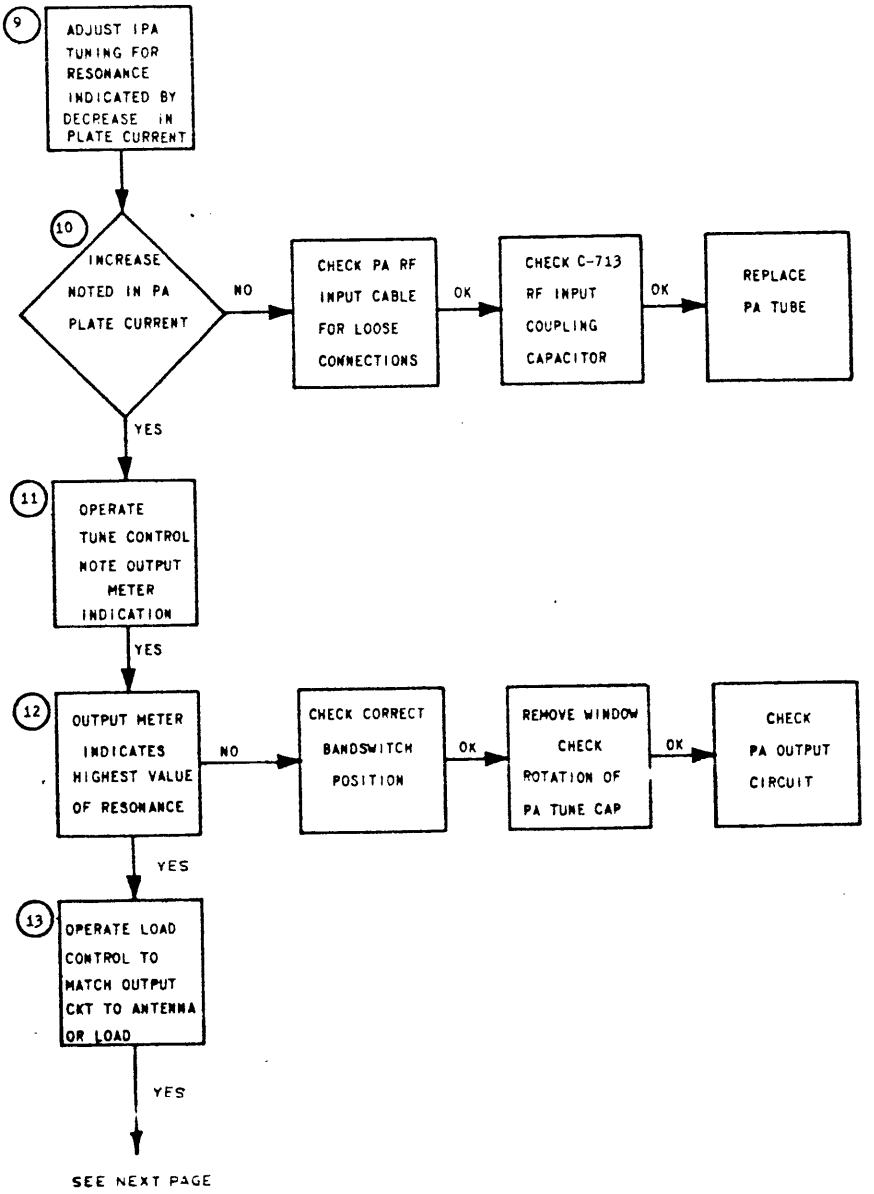


Table 5-5. Troubleshooting Chart (cont)

MAINTENANCE PROGRAM "D"

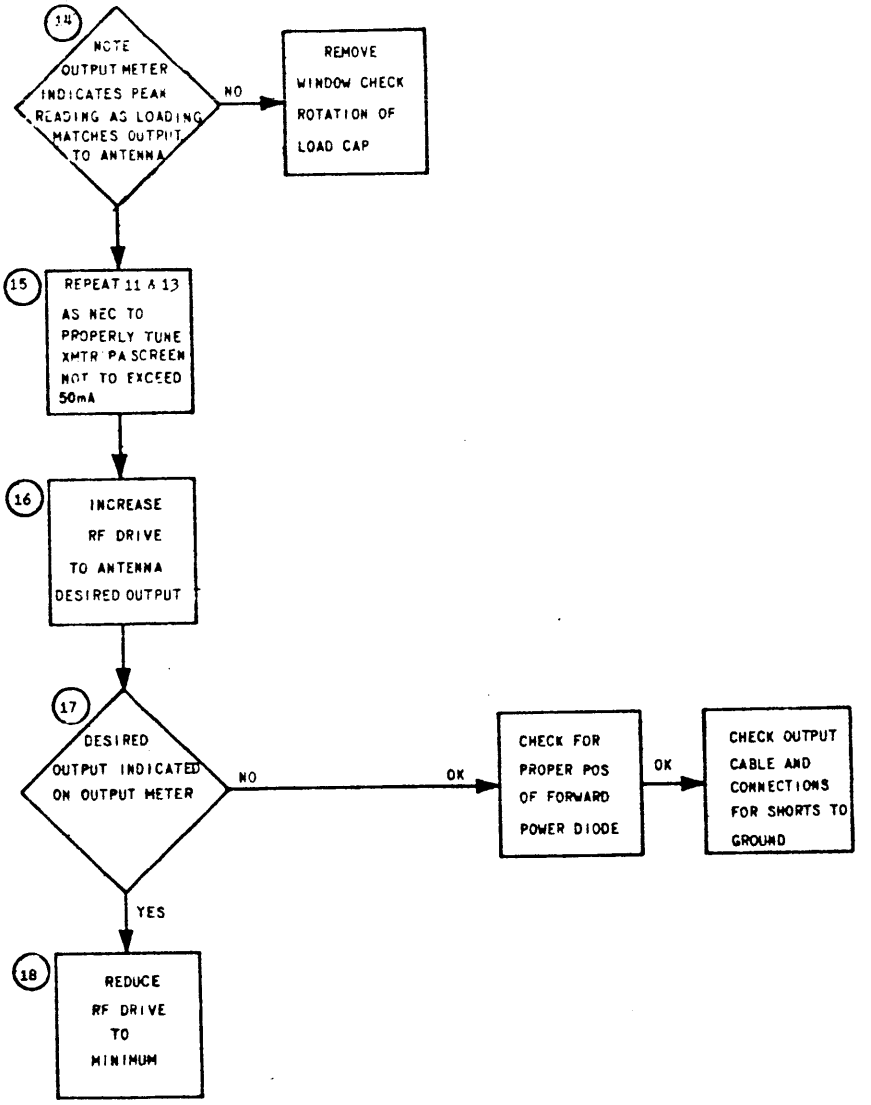
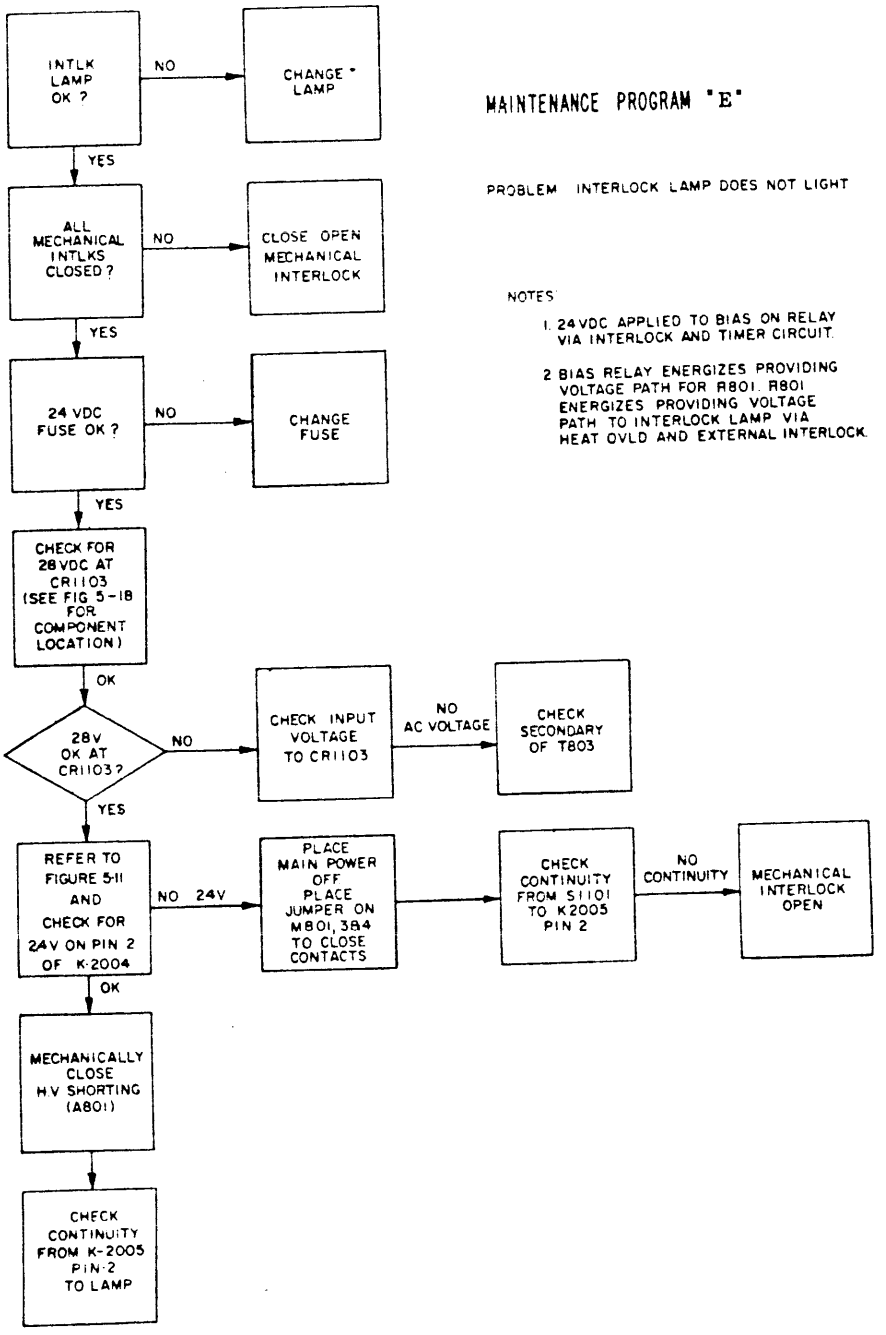


Table 5-5. Troubleshooting Chart (cont)



REF SYM	TUBE TYPE	TUBE FUNCTION	STATIC PLATE CURRENT ADJ TO	MAX AVAILABLE BIAS VOLTAGE
V1301	8233	1ST AMP.	30-40ma	-15VDC
V1302	4CX350	2ND IPA	190-210ma	-70 VDC
V1401	8576	IPA	190-210ma	-145 VDC
V701	4CX10,000J	PA	.50-.650A	-360 VDC

NOTE:

1. MAX BIAS VOLTAGE WILL BE PRESENT IF:
   A. BANDSWITCH NOT IN PROPER POSITION.
   B. PTT RELAY NOT ENERGIZED.
   C. BIAS CONTROLS ARE AT MAX CLOCKWISE.

2. WHEN MAX BIAS VOLTAGE IS PRESENT AT V1301, V1302, V1401, V701 THE STATIC PLATE CURRENT IS REDUCED TO ZERO WHICH PLACES THE AMPLIFIERS AT OR NEAR CUTOFF.

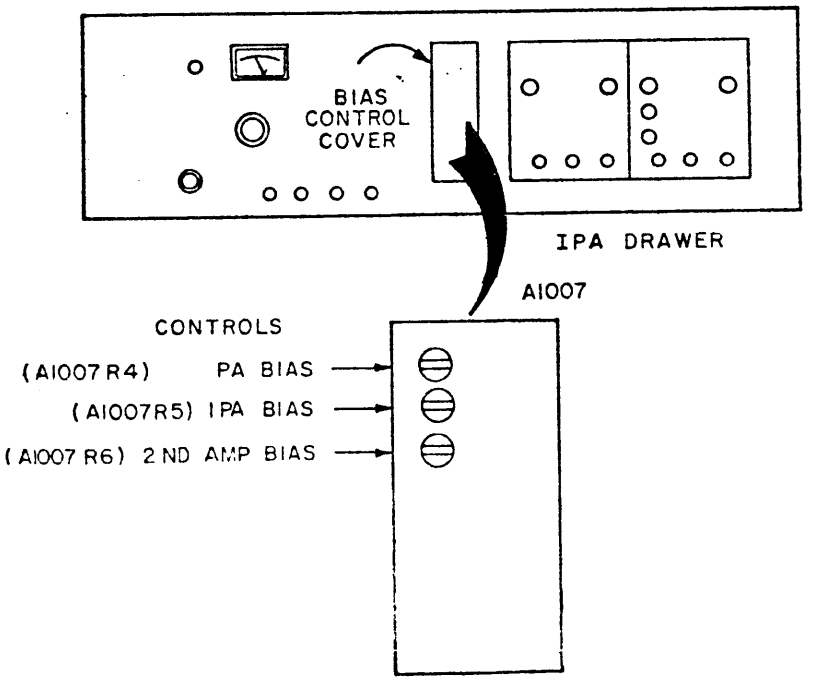
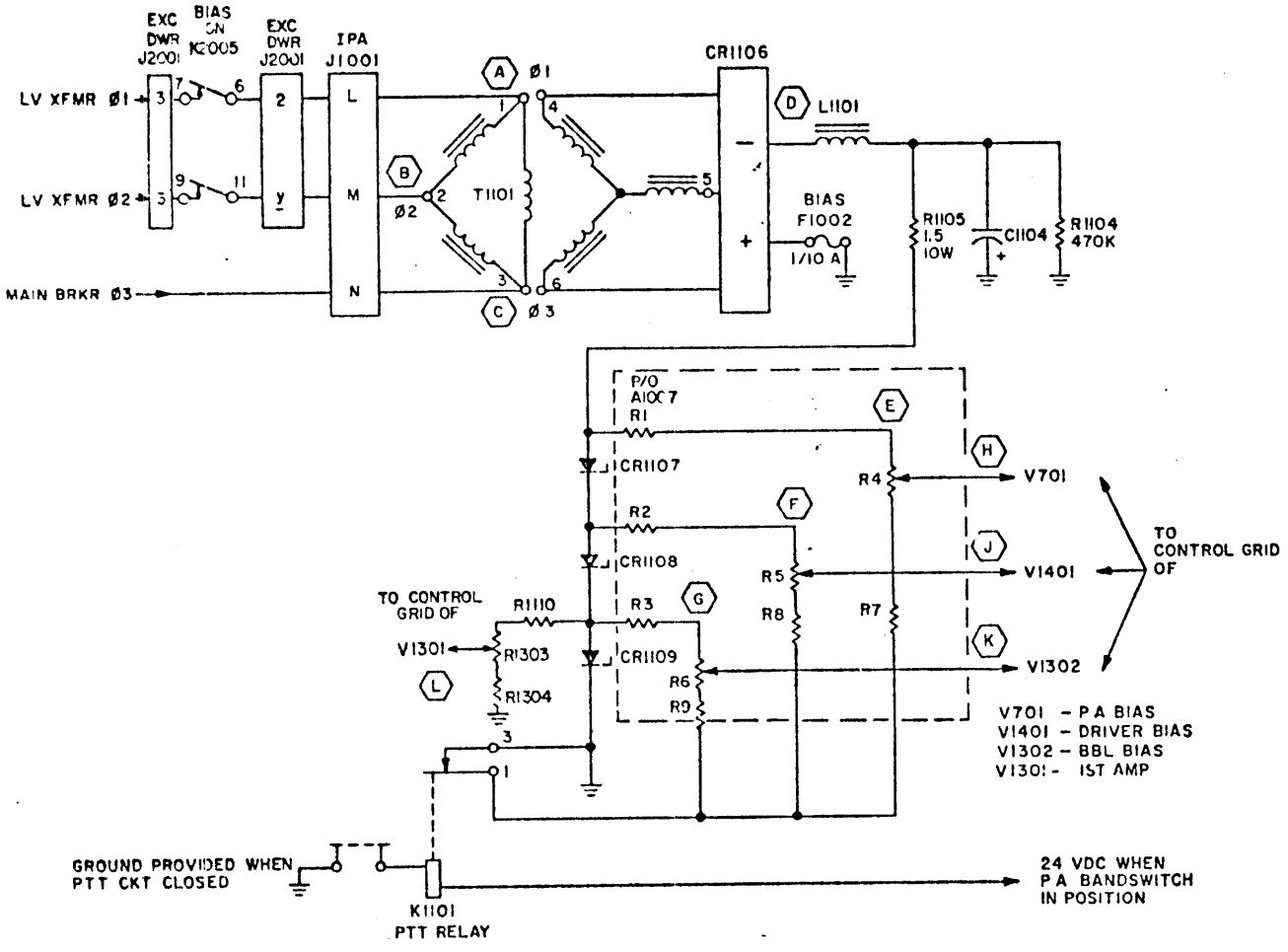


Figure 5-1. Bias Controls



BIAS SUPPLY VOLTAGE (PTT RELAY CLOSED)					
POINT OF TEST	VOLTAGE	REFERENCE DESIGNATION	POINT OF TEST	VOLTAGE	REFERENCE DESIGNATION
A	230 VAC Ø1	T1101	G	- 70 VDC	R6
B	230 VAC Ø2	T1101	H	-360 TO -230 VDC	V701
C	230 VAC Ø3	T1101	J	-145 TO -85 VDC	V1401
D	-420 VDC	L1101	K	-70 TO -10 VDC	V1302
E	-360 VDC	R4	L		V1301
F	-145 VDC	R5	-15 TO -2 VDC		

BIAS SUPPLY VOLTAGE (PTT RELAY OPEN)					
POINT OF	VOLTAGE	REFERENCE DESIGNATION	POINT OF	VOLTAGE	REFERENCE DESIGNATION
A	230 VAC Ø1	T1101	G	-120 VDC	R6
B	230 VAC Ø2	T1101	H	-360 VDC	V701
C	230 VAC Ø3	T1101	J	-240 VDC	V1401
D	-420 VDC	L1101	K	-120 VDC	V1302
E	-360 VDC	R4	L	-15 TO -2VDC	V1301
F	-240 VDC	R5			

Figure 5-2. Simplified Bias Control Circuit

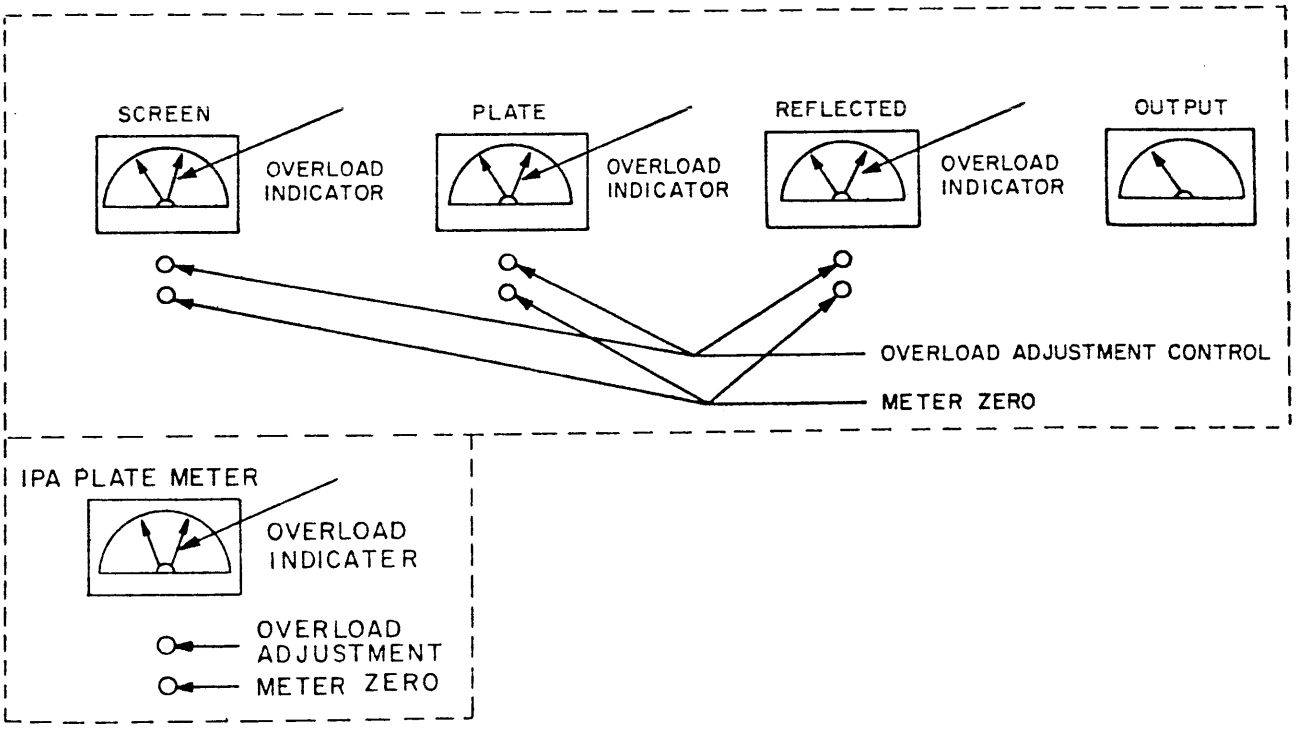


Figure 5-3. Overload Adjustments

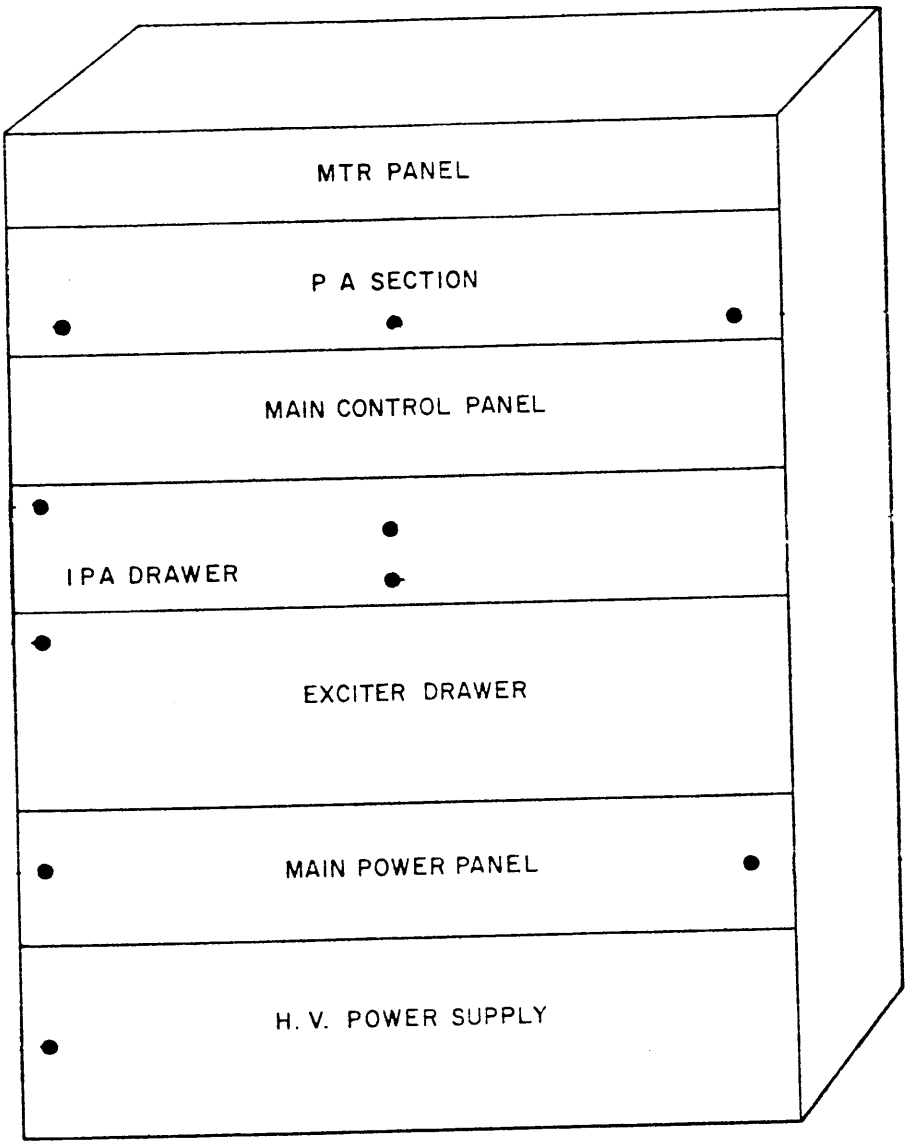


Figure 5-4. Interlock Location

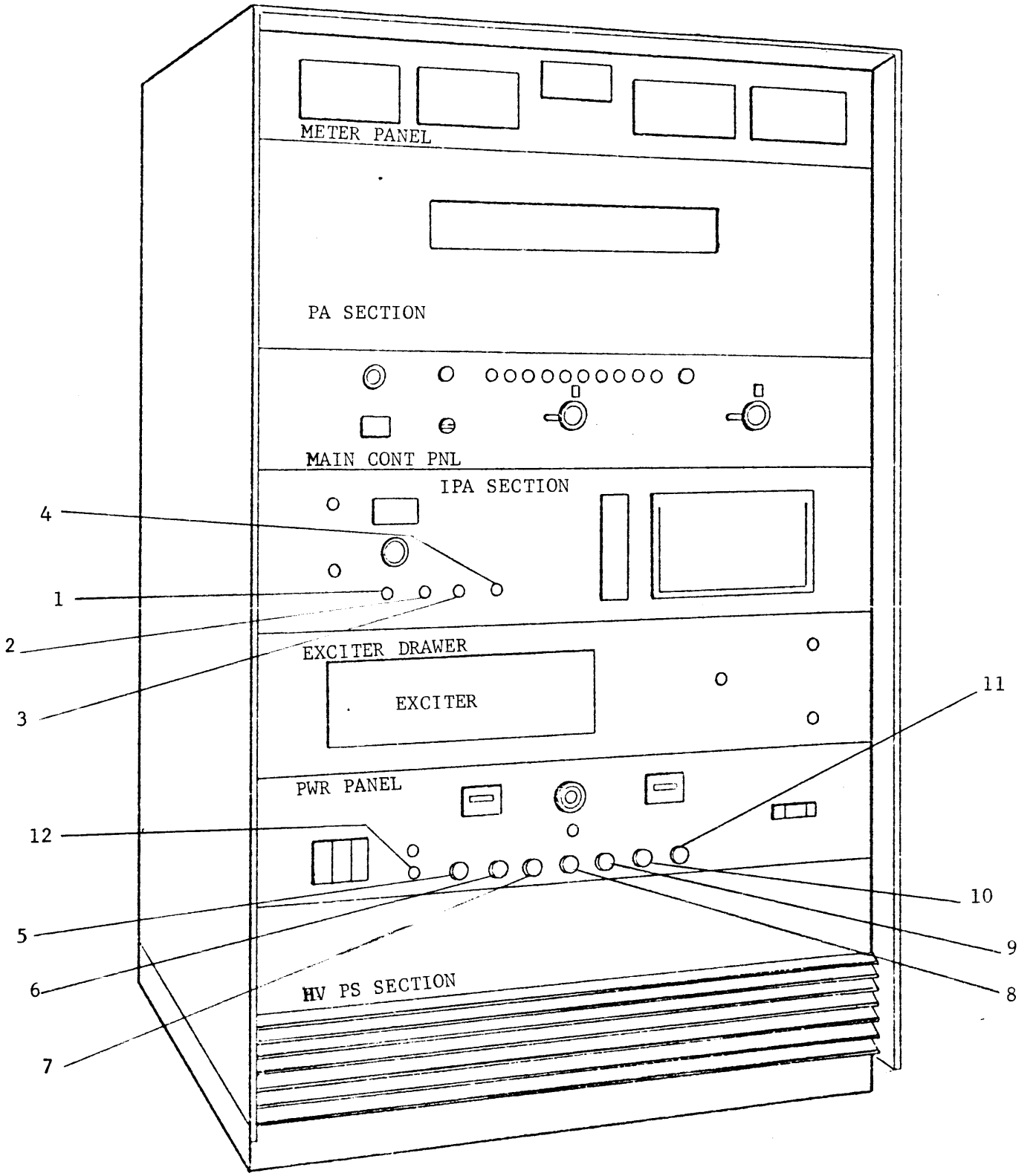


Figure 5-5. Fuse Location

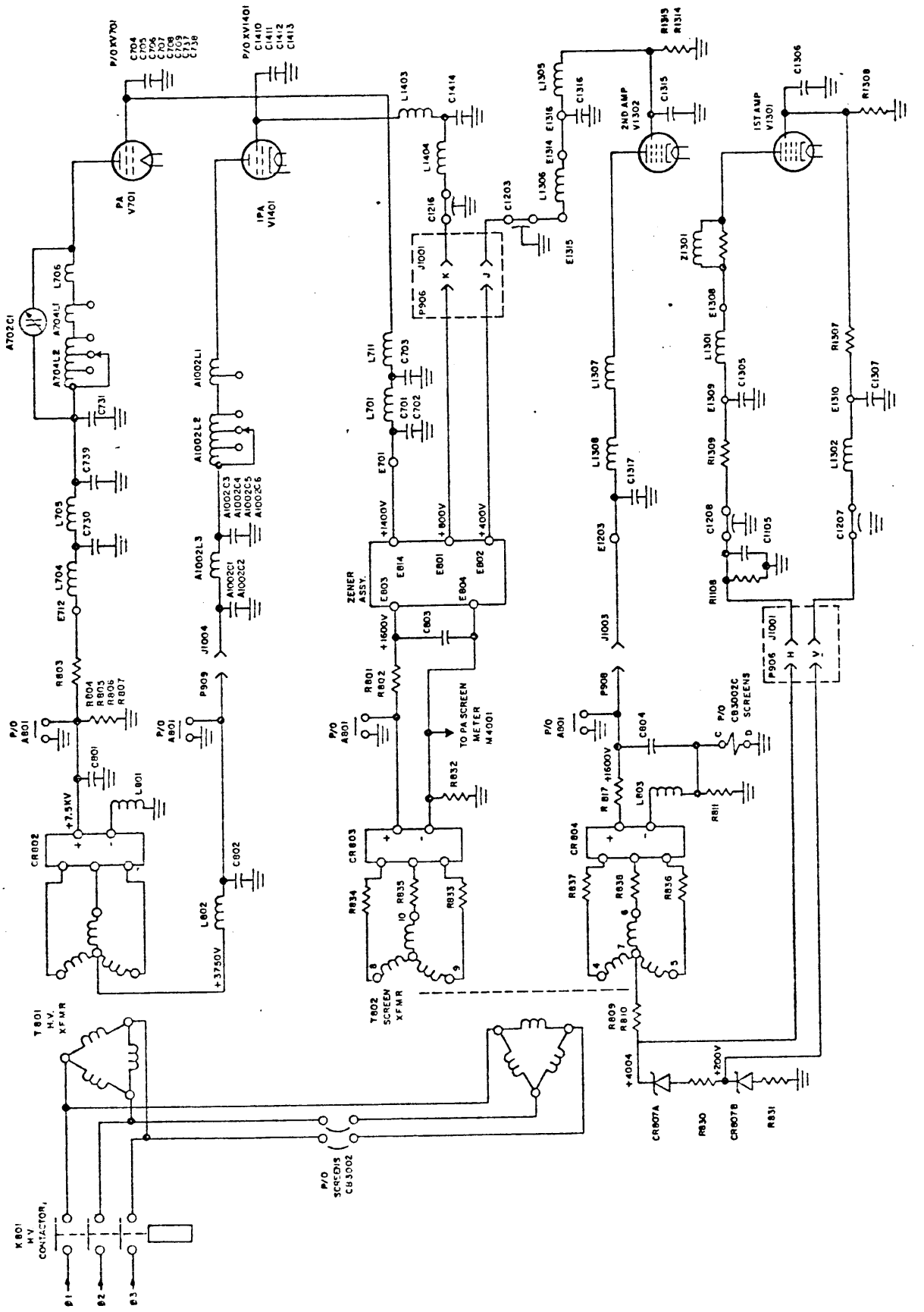
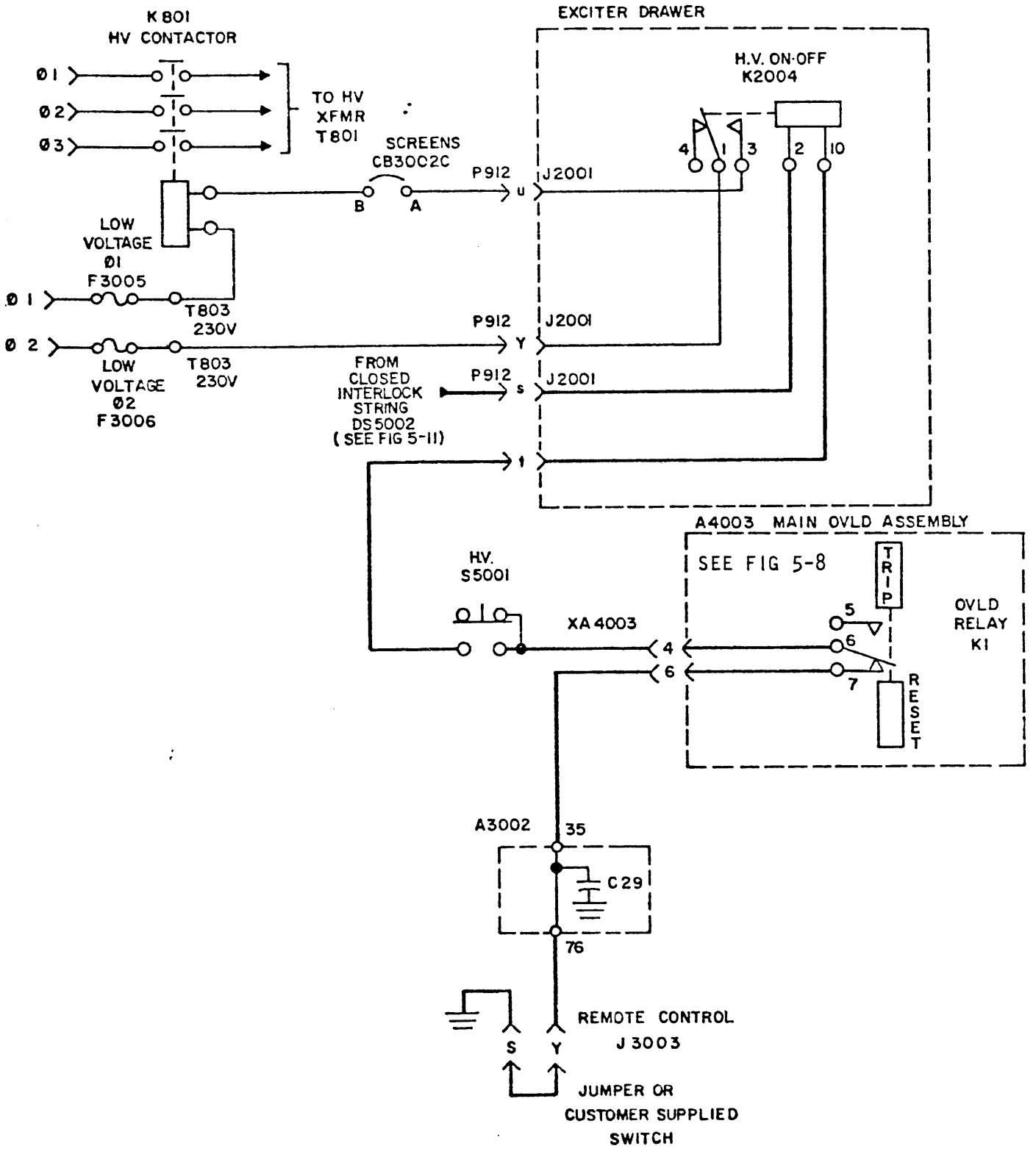


Figure 5-6. Simplified Diagram Plate and Screen Circuits V1301, V1302, V1401 and V701



004751094 Figure 5-7. High Voltage Control 5-30

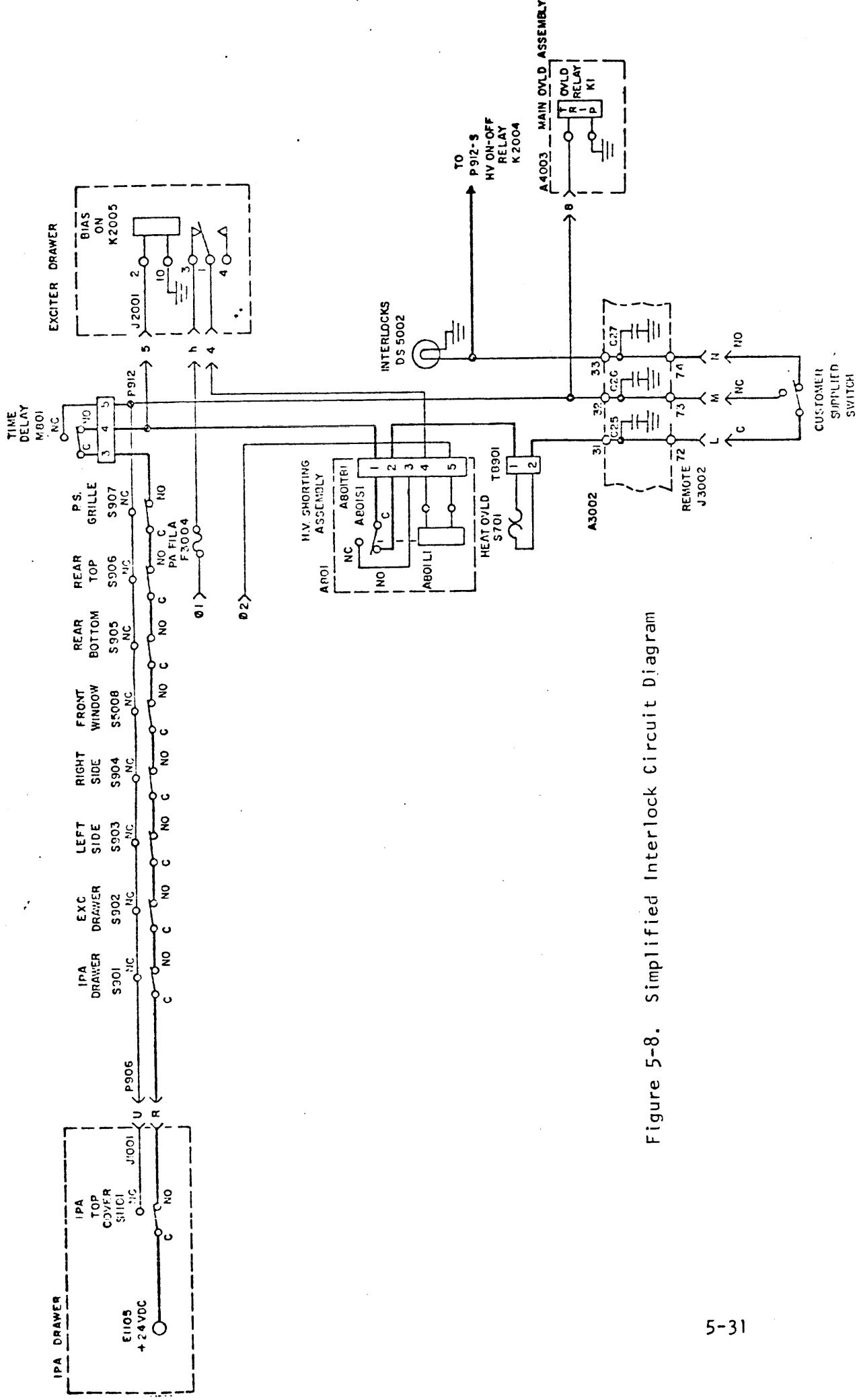


Figure 5-8. Simplified Interlock Circuit Diagram

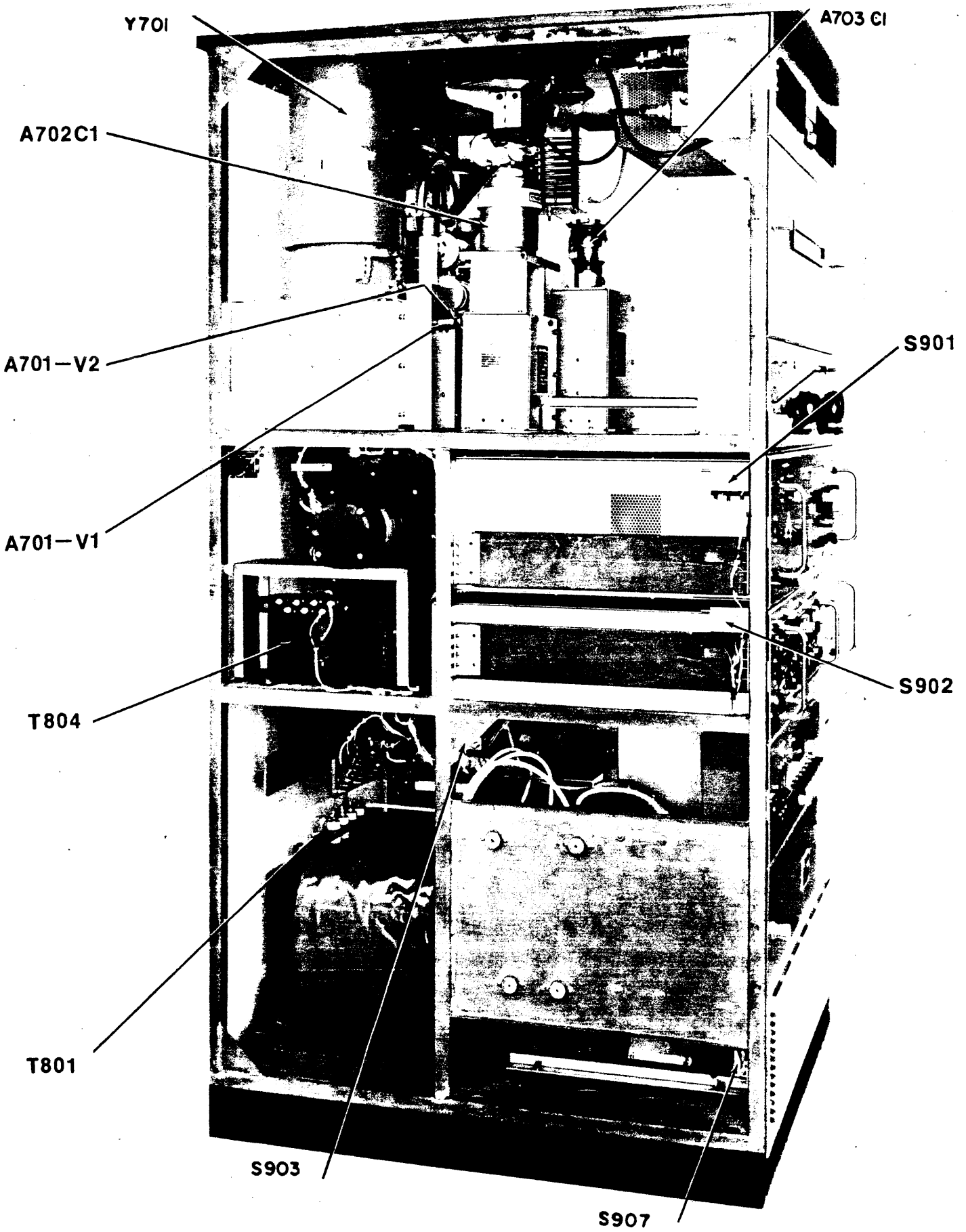


Figure 5-9. Transmitter Overall Front and Leftside View

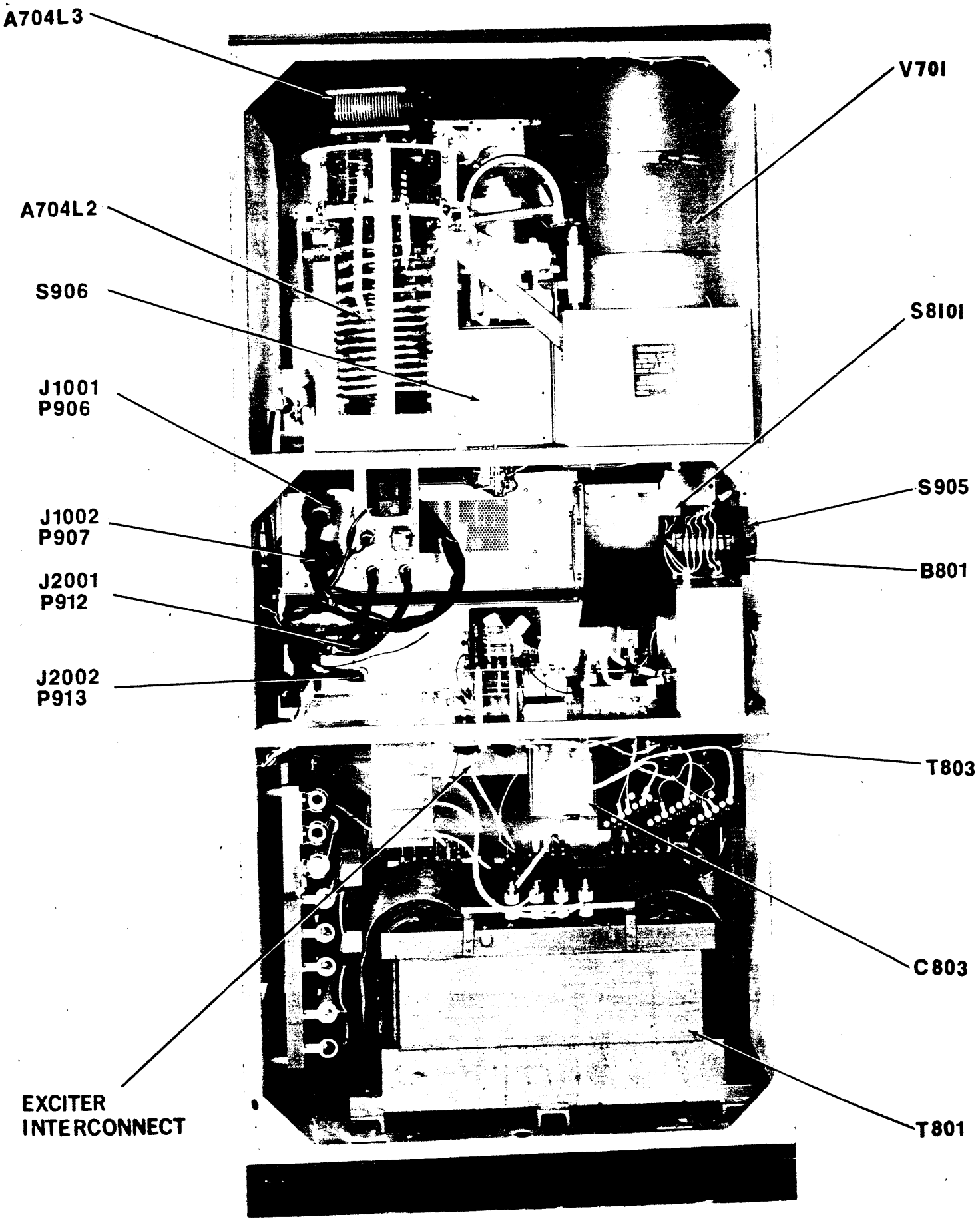


Figure 5-10. Transmitter Overall Rear View

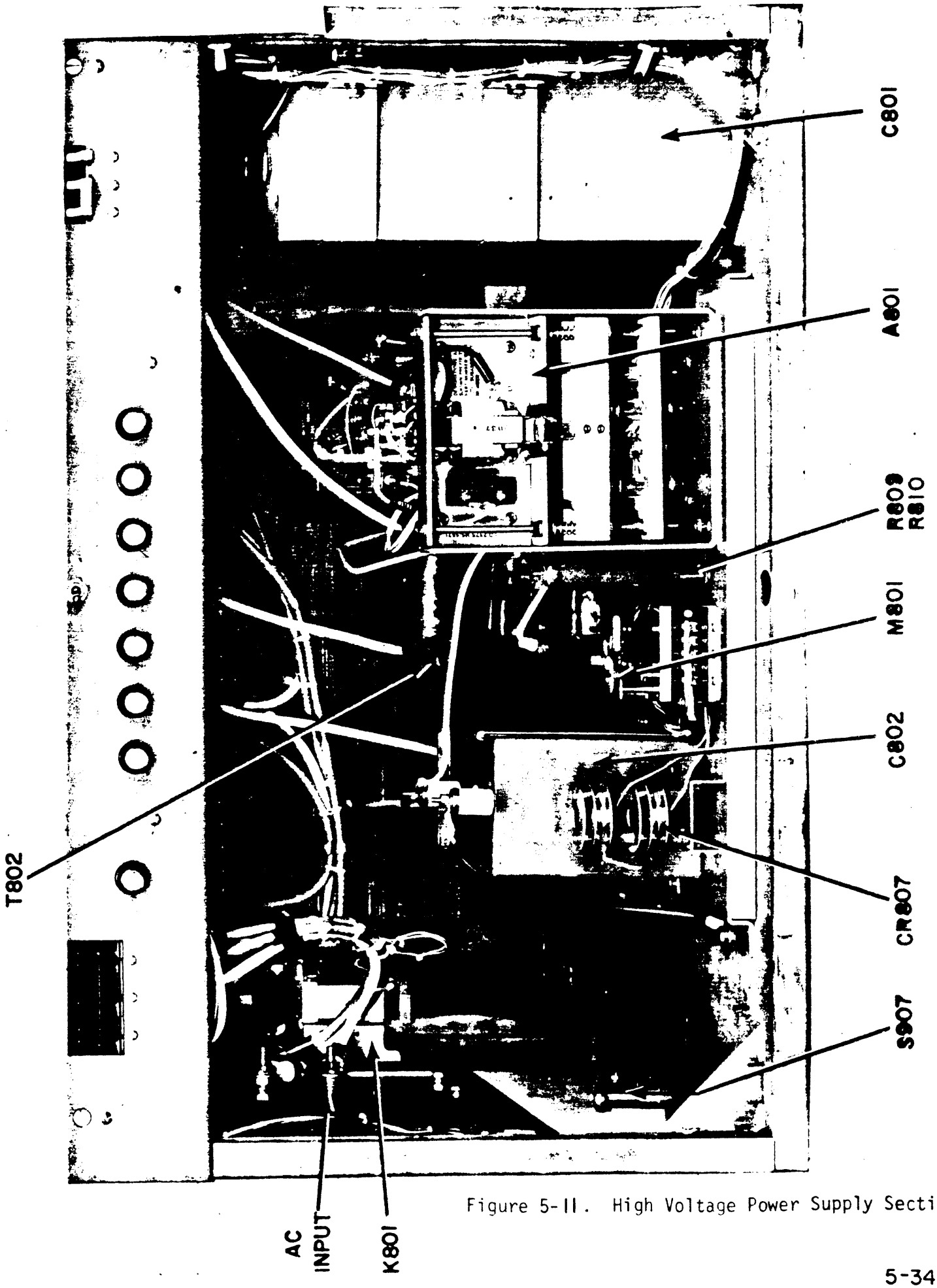
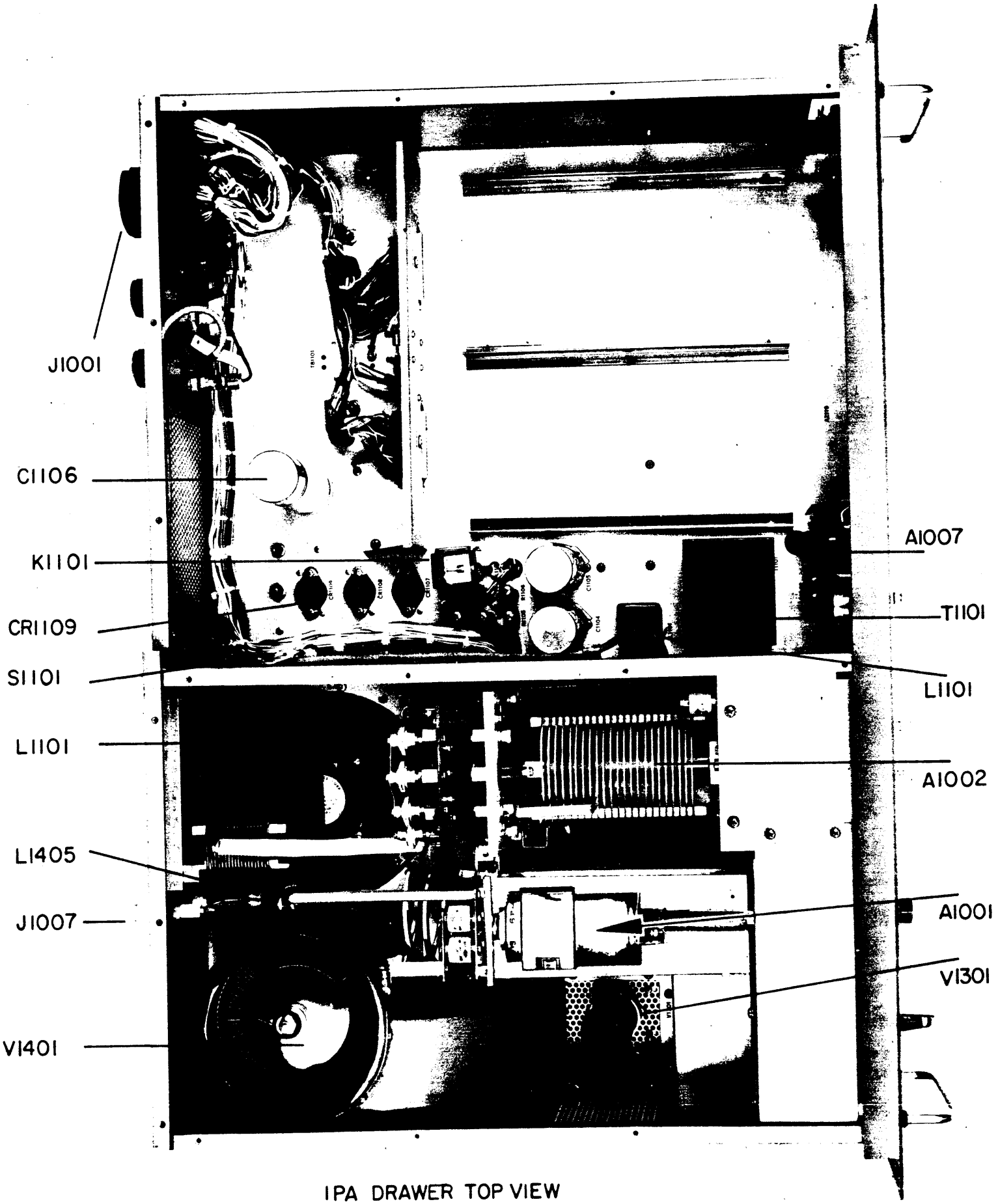


Figure 5-11. High Voltage Power Supply Section



IPA DRAWER TOP VIEW
FIGURE 5-12

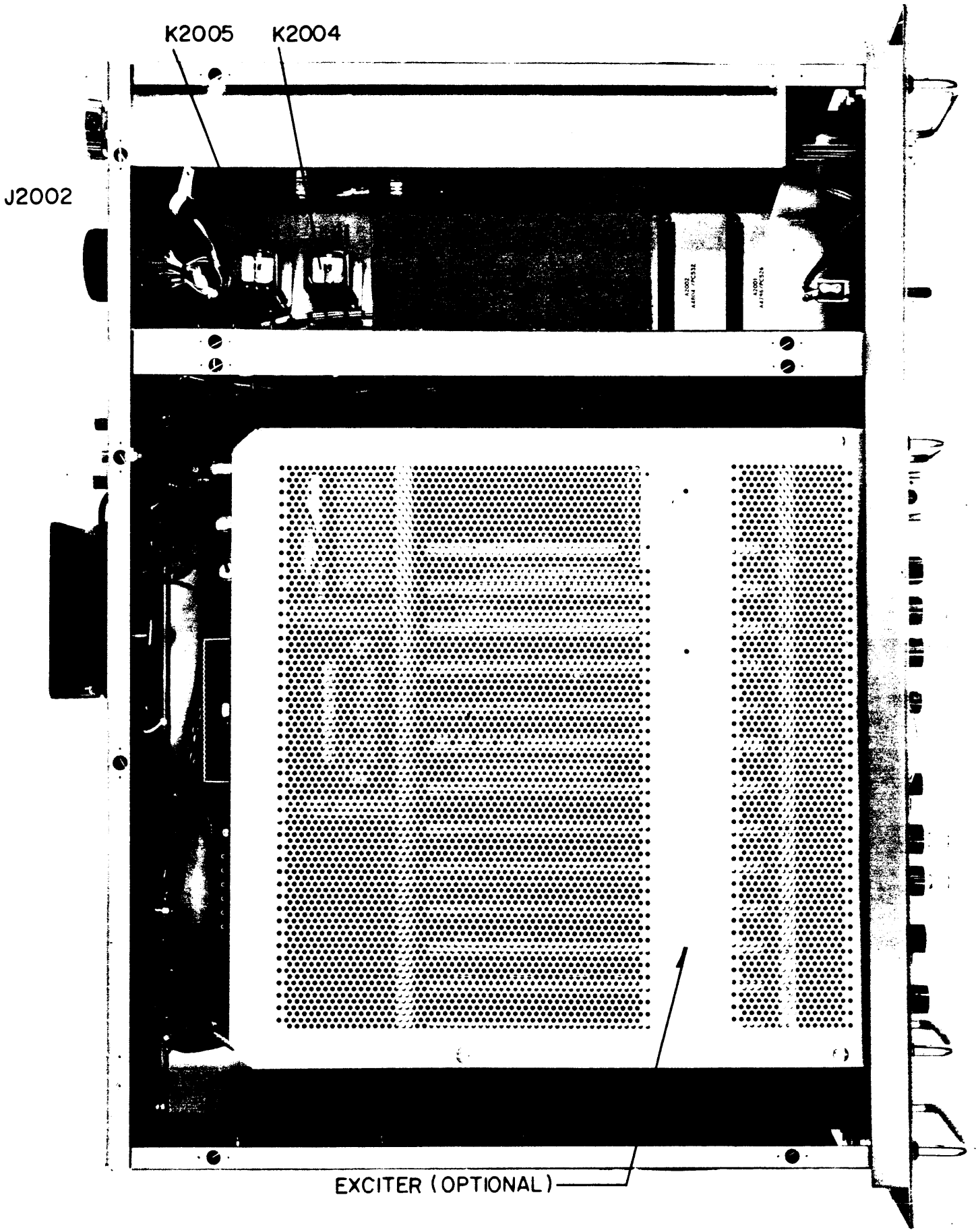
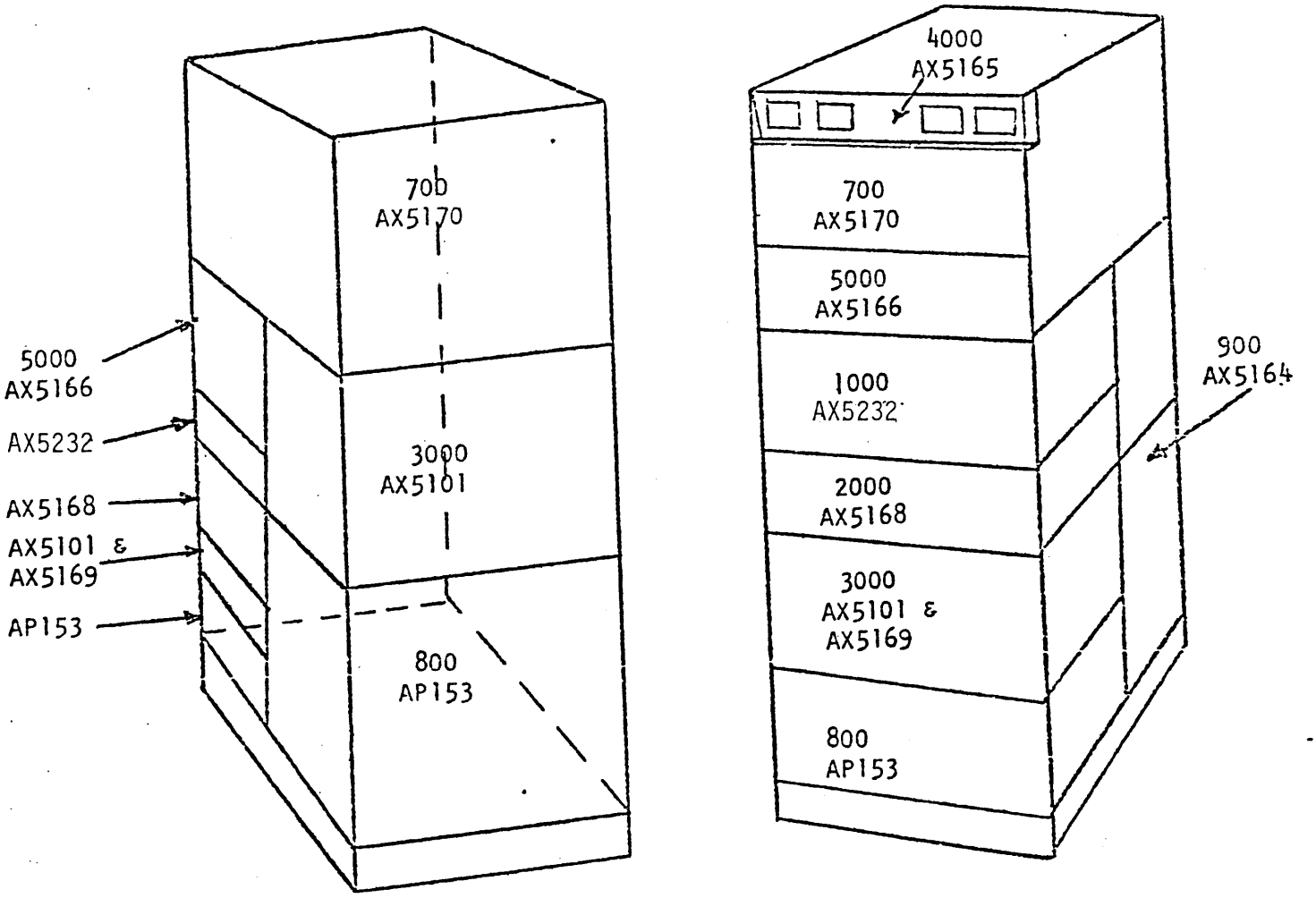


Figure 5-13. Exciter Drawer Top View



ASSEMBLY NO.	NAME	SYMBOL SERIES
AX5170	PA SECTION	700
AP153	POWER SUPPLY	800
AX5164	MAIN FRAME SUB ASSY	900
AX5232	IPA DRAWER	1000
AX5168	EXCITER DRAWER	2000
AX5101	INPUT CHASSIS	3000
AX5169	MAIN POWER PANEL ASSY	3000
AX5165	METER PANEL	4000
AX5166	MAIN CONTROL PANEL	5000

Figure 6-1. Assembly location Drawing HFL( )-10K

SECTION 6

PARTS LIST

6-1. INTRODUCTION

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

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

a. Reference symbol.

b. Description as indicated in parts list.

c. TMC part number.

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

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

The Technical Materiel Corporation
Attention: Sales Department
700 Fenimore Road
Mamaroneck, New York 10543

NOTE

The parts list in this section applies to all HFL( )-10K/REV B series linear amplifiers. When using the parts list, particular attention should be paid to "Reference Notes". These notes are used to identify parts which are peculiar to a particular linear amplifier, i.e. HFL-10K (automated linear amplifier), HFLM-10K (manual linear amplifier). The reference notes are listed as follows:

Reference Note	Description
1	All items referenced to this note are supported by a parts breakdown provided on a separate list.
2	All items referenced to this note are used only on automated equipment, i.e. HFLA-10K linear amplifier.
3	All items referenced to this note are used only on manual equipment, i.e. HFLM-10K linear amplifier.
4	All items referenced to this note are customer options.
5	All items referenced to this note are nominal values.

POWER AMPLIFIER SECTION

SYMBOL SERIES 700

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A701	PA Sense Board Assembly (Ref Notes 1, 2)	A-4835
A702	Tune Capacitor Assembly (Ref Note 1)	AX5171
A703	Load Capacitor Assembly (Ref Note 1)	AX5172
A704	Bandswitch Assembly (Ref Note 1)	AS163
A705	Remote Power Assembly (Ref Note 1)	AX5173
A706	Harmonic Filter Assembly (Ref Notes 1, 4)	AF110
A707	ALDC Assembly (Ref Note 1)	A-4856
A708	ALDC Printed Circuit Board Assembly (Ref Note 1)	A5742
B701	Fan, Axial	BL105
C701 thru C703	Capacitor, Fixed, Ceramic	CC109-38
C704 thru C709	Capacitor, Fixed, Ceramic	CC109-36
C710	Capacitor, Fixed, Ceramic	CC100-32
C711	Capacitor, Fixed, Ceramic	CK70AW102M
C712	Same as C711	
C713 thru C715	Capacitor, Fixed, Ceramic	CC115-2-6800
C716 thru C719	Capacitor, Fixed, Ceramic	CC109-19
C720	Capacitor, Fixed, Ceramic	CC109-28
C721	Same as C720	
C722 thru C727	Capacitor, Fixed, Ceramic (Ref Note 2)	CC109-6
C728	Same as C720	
C729	Same as C720	
C730 thru C732	Capacitor, Fixed, Ceramic	CC120-202-A25
C733 thru C736	Capacitor, Fixed, Ceramic	CC100-28
C737	Same as C704	
C738	Same as C704	
C739	Same as C730	
C740	Capacitor, Fixed, Mica	CM15C050J03YY
C741	Capacitor, Fixed, Mica	CM15C180J03YY
C742 thru C747	Same as C733	

POWER AMPLIFIER SECTION (cont)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C748	Not Used	
C749	Not Used	
C750	Capacitor, Fixed, Electrolytic	CP41B1EF405K
CR701	Detector Element	DD119-10
CR702	Detector Element	DD119-9
DC701	Directional Coupler	DC104-3
E701	Insulated Bowl	NS112-2
E702	Insulated Standoff	NS3W0108
E703	Contact Feed-thru	AX707
E704	Same as E703	
E705	Not Used	
E706	Not Used	
E707	Terminal Turret	TE102-2
E708 thru E710	Insulated Feed-thru (Ref Note 2)	TE169-4
E711	Insulated Feed-thru	TE101-3
E712	Insulated Standoff	NS3W0320
E713	Not Used	
E714 thru E717	Same as E707	
F701	Fuse, Cartridge	FU102-.5
J701	Connector, Receptacle, RF	UG560/U
J702	P/O DC701	
J703	P/O DC701	
J704	Connector, Receptacle, Male 24/C	MS3102A24-28P
J705	Not Used	
J706	Connector, Receptacle, Female 4/C	MS3102A14S-2S
L701	Coil, RF, Fixed	CL178
L702	Coil, RF, Fixed	CL100-5
L703	Coil, Filament	CL444
L704	Coil, RF, Fixed	CL166
L705	Same as L704	
L706	Coil, RF, Fixed	CL442
L707	Coil, Output Assembly	CL443
L708	Coil, RF, Fixed	CL240-120
L709	Same as L708	
L710	Not Used	
L711	Same as L701	

POWER AMPLIFIER SECTION (cont)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
P701	Connector, Plug, RF	PL254
P702	Same as P701	
P703	Plug, Tip	PL163-2
P704	Connector, Plug, Male 4/C	MS3106A14S-2P
R701	Resistor, Fixed, Composition	RC42GF471J
R702	Resistor, Fixed, Composition (Ref Note 2)	RC32GF221J
R703	Resistor, Fixed, Composition (Ref Note 2)	RC32GF471J
S701	Thermo Switch	SS104-2
T701	Transformer, RF (Ref Note 2)	TZ229
TB701	Terminal Strip Barrier	TM102-2
TB702	Terminal Strip Barrier	TM102-4
TB703	Terminal Strip Barrier	TM102-8
V701	Tube Electron	4CX10,000J
XA701	Connector, Receptacle, Female, PC	JJ287-20
XA702	Connector, Receptacle, Electrical PC	JJ293-15DFE
XA703	Same as XA701	
XA704	Not Used	
XA705	Connector, Receptacle, Electrical PC	JJ319-22DFE
XA706	Not Used	
XA707	Socket, El Tube	TS101-P01
XF701	Fuse Holder, Indicator	FH104-3
XV701	Tube Socket Assembly (Ref Note 2)	AX743-1
XV701	Tube Socket Assembly (Ref Note 3)	AX743-2

BANDSWITCH ASSEMBLY (AS163)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A704A1	Switch Assembly Control (Ref Note 1)	AX5103
A704B1	Motor	M0129
A704C1	Capacitor, Fixed, Ceramic (Ref Note 3)	CC109-31
A704C1 thru A704C4	Capacitor, Fixed, Ceramic (Ref Note 2)	CC109-31
A704E1 thru A704E8	Contact Assembly	A-1701
A704E9	Contact Assembly	AX573
A704E10	Same as A704E9	
A704E11	Contact Wiper	PM1176
A704E12	Contact Assembly	A-1700-2
A704E13	Contact Shorting	MS5613
A704E14A	Contact Switch	MS1601-4
A704E14B	Contact Switch	MS1601-5
A704E15	Contact Rotor	PM1430
A704E16A	Same as A704E14A	
A704E16B	Same as A704E14B	
A704E17 thru A704E21	Contact Assembly	A1701-2
A704E22	Same as A704E12	
A704E23	Same as A704E17	
A704L1	Coil, RF, HF	CL441
A704L2	Coil, Main Tank	CL445
A704L3	Coil Assembly	CL440
A704P1	Connector, Plug, Male	MS3106A14S-7P

A704A1

CONTACT SWITCH ASSEMBLY (AX5103)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A704A1C1	Capacitor, Fixed, Ceramic	CX119-104M
A704A1CR1	Semiconductor, Device, Diode	1N645
A704A1CR2	Same as A704A1CR1	
A704A1J1	Connector, Receptacle, Female	JJ200-9
A704A1J2	Connector, Receptacle, Male	JJ200-10
A704A1J3	Connector, Receptacle, Female 3/C	MS3102A14S-7S
A704A1K1	Relay, Armature	RL168-3C10-24DC
A704A1R1	Resistor, Fixed, Composition (Ref Note 5)	RC20GF102J
A704A1R2	Same as A704A1R1	
A704A1R3	Resistor, Fixed, Composition (Ref Note 5)	RC20GF152J
A704A1R4	Same as A704A1R3	
A704A1S1	Switch, Rotary	SW526
A704A1W1	Wiring Harness Branched	CA1494
A704A1XK1	Socket, Relay	TS100-6

A705

REMOTE POWER ASSEMBLY (AX5173)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A705A1	Power Output Control (Ref Notes 1, 2)	A-4805
A705A1	Power Output Control (Ref Notes 1, 3)	A-4805-2
A705F1	Fuse, Cartridge (Ref Note 2)	FU102-2
A705S1	Switch, Rotary Ledex (Ref Note 2)	SW530
A705XF1	Fuse Holder, Indicator (Ref Note 2)	FH104-11

A705A1

POWER OUTPUT CONTROL (A-4805-2)

(Ref Note 3)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
DS1 , DS2	LAMP, INCAND	BI101-1820
K1, K2	RELAY, ARM	RL156-8
R8	RESIST. VAR	RV111-U-502A
XK1, XK2	SOCKET, RELAY	TS171-4

A706

HARMONIC FILTER ASSEMBLY (AF110)

(Ref Note 4)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A706C1	Capacitor, Fixed, Ceramic	CC109-28
A706C2	Capacitor, Fixed, Ceramic	CC109-13
A706C3	Same as A706C1	
A706C4	Same as A706C2	
A706C5 thru A706C8	Same as A706C1	
A706C9	Same as A706C2	
A706C10 thru A706C13	Same as A706C1	
A706C14	Same as A706C2	
A706C15	Same as A706C2	
A706C16	Same as A706C1	
A706C17	Capacitor, Fixed, Ceramic	CC109-5
A706C18	Capacitor, Fixed, Ceramic	CC109-19
A706C19	Same as A706C1	
A706J1	Jack, Tip	JJ114-2
A706L1	Coil, RF	CL449-3
A706L2	Coil, RF	CL449-1
A706L3	Coil, RF	CL449-2
A706L4	Same as A706L3	
A706L5	Same as A706L2	
A706L6	Same as A706L1	

A707

ALDC ASSEMBLY (A-4856)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A707A1	ALDC Can Assembly (Ref Note 1)	A-4855
A707R1	Resistor, Fixed, Composition	RC20GF221J
A707R2	Resistor, Fixed, Composition	RC07GF474J
A707R3	Resistor, Fixed, Composition	RC07GF101J
A707R4	Resistor, Fixed, Composition	RC07GF682J
A707R5	Same as A707R1	
A707R6	Resistor, Fixed, Composition	RC07GF471J
A707R7 thru A707R29	Refer to A707A1 List	
A707R30	Resistor, Fixed, Composition	RC07GF682J

POWER SUPPLY

SYMBOL SEREIS 800

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A801	Shorting Relay Assembly (Ref Note 1)	AX5096
B801	Fan, Centrifugal, 3 Phase	BL145
C801	Capacitor, Fixed, Paper	CP103
C802	Capacitor, Fixed, Plastic	CX113-2
C803	Capacitor, Fixed, Paper	CP105
C804	Same as C803	
C805 thru C807	Capacitor, Fixed, Ceramic	CC109-38
CR801A thru CR801H	Semiconductor, Device, Diode	1N2846A
CR802A thru CR802F	Rectifier, Semiconductor, Device	DD128-3
CR803	Rectifier, Semiconductor, Device	DD129
CR804	Same as CR803	
CR805	Rectifier, Semiconductor, Device	DD150
CR806	Semiconductor, Device, Diode	1N3022B
CR807A	Semiconductor, Device, Diode	1N2846A
CR807B	Same as CR807A	
E801 thru E804	Screw, Machine	SCBP0832BN10
E805 thru E807	Screw, Machine, H.H.	SCHH3118BN24
E808	Screw, Machine, H.H.	SCHH2520BN24
E809 thru E811	Contact Kit, Single	P0183
E812	Terminal Turret	TE102-2
E813	Same as E812	
E814	Same as E801	
E815	Not Used	
E816	Contact,RF	A-1654-2
E817	Same as E816	
K801	Relay Solenoid 3 Phase	RL130-3
K802	Relay Armature	RL184-1
L801	Reactor, .8h	TF5035
L802	Reactor, 5h	TF5034

POWER SUPPLY (cont)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L803	Reactor, 7h	TF5013
L804	Coil, Fixed, RF	CL178
M801	Timer Interval	T1105-1
P801	Connector, Plug, HN	PL253-1
R801	Resistor, Fixed, Wirewound	RW118F252
R802	Resistor, Fixed, Wirewound	RW118F502
R803	Resistor, Fixed, Wirewound	RW118F310
R804 thru R807	Resistor, Fixed, Wirewound	RW116-6033
R808	Resistor, Fixed, Wirewound	RW109-42
R809	Resistor, Fixed, Wirewound	RW105-29
R810	Same as R809	
R811	Resistor, Fixed, Wirewound	RW110-7
R812	Same as R811	
R813	Resistor, Fixed, Wirewound	RW110-3
R814	Resistor, Fixed, Composition	RC42GF331J
R815	Resistor, Fixed, Composition	RC42GF102J
R816	Same as R814	
R817	Resistor, Fixed, Wirewound	RW116-2028
R818	Resistor, Fixed, Wirewound	RW110-43
R819	Resistor, Fixed, Composition	RC42GF101J
R820	Same as R819	
R821	Same as R818	
R822 thru R831	Same as R819	
R832	Same as R811	
R833 thru R838	Resistor, Fixed, Wirewound.	RW109-7
S801	Micro-switch, Low torque	SW252
T801	Transformer, Power, Step-Up	TF203
T802	Transformer, Power, Step-Up	TF386
T803	Transformer, Power, Step-Up	TF384
T804	Transformer, Power, Step-Down	TF421
XK801	Not Used	
XK802	Socket, Relay	TS196-1
	Use the following Transformers for 380 to 440 volt operation (only)	
T801	TF203 is replaced with - - - - - - - - - - - - - - - -	TF437
T802	TF386 is replaced with - - - - - - - - - - - - - - - -	TF438
T805	TF342 is added	TF342

Shorting Relay Assembly (AX5096)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A801E1 thru A801E4	Nut, Cap	NTC2520BN6
A801E5 thru A801E8	Nut, Round	NT159
A801L1	Solenoid, Elec	SZ100-60
A801S1	Switch, Sensing, SPDT	SW260
A801TB1	Terminal, Board Barrier	TM102-5
A801W1	Cable, Shorting Assembly	CA1504
A801W2 thru A801W5	Cable, Jumper Assembly	CA409-45-2.37
A801W6	Cable, Jumper Assembly	CA409-69-4.00
A801W7	Same as A801W6	

MAIN FRAME SUB ASSEMBLY

SYMBOL SERIES 900

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
E901	Terminal, Strip Finger	TM105-5AR
E902	Same as E901	
P901	Not Used	
P902	Not Used	
P903	Connector, Plug, Female, 24/C	MS3106B24-28S
P904	Connector, Plug, Female, 27/C	PL212-10
P905	Connector, Plug, Male, 37/C	PL212-9
P906	Connector, Plug, Female, 52/C	MS3106B32-414S
P907	Connector, Plug, Male, 52/C	MS3106B32-414P
P908	Connector, Plug, Male, 1/C	MS3106B18-16P
P909	Connector, Plug, Female, 1/C	MS3106B18-16S
P910	Connector, Plug, BNC	PL244-1
P911	Same as P910	
P912	Connector, Plug, Female, 52/C	MS3108B32-414S
P913	Same as P904	
P914	Same as P910	
S901 thru S906	Switch, Interlock	SW230
S907	Switch, Roller	SW260
TB901	Terminal, Strip Barrier	TM102-4
TB902	Terminal, Strip Barrier	TM102-8
TB903	Same as TB902	
TB904	Terminal, Strip Barrier	TM102-14
TB905	Terminal, Strip Barrier	TM102-7

METER PANEL ASSEMBLY (AX5165)

SYMBOL SERIES 4000

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A4001	Overload Board	A-4800
A4002	Same as A4001	
A4003	VSWR Board	A-4802
A4004	Network	NW161
C4001	Capacitor, Fixed, Ceramic	CC100-28
C4002 thru C4005	Capacitor, Fixed, Ceramic	CC100-28
E4001	Terminal Board, Lug	TM117-1
M4001	Ammeter, Screen	MR215-2
M4002	Ammeter, Plate	MR215-1
M4003	Ammeter, Load Sense	MR191-15
M4004	Ammeter, Reflected Power	MR214
M4005	Ammeter, Output Power	MR213
R4001	Resistor, Fixed, Composition	RC20GF682J

A1000

IPA DRAWER (AX5232)

SYMBOL SERIES 1000

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A1001	Tune Capacitor Assembly (Ref Notes 1, 2)	BMA544
A1001	Tune Capacitor Assembly (Ref Notes 1, 3)	BMA544-1
A1002	Bandswitch Assembly (Ref Note 1)	AS146
A1003	IPA Servo Amplifier (Ref Note 2)	AZ119
A1004	PA Servo Amplifier (Ref Note 2)	AZ120
A1005	Drive-Up Assembly (Ref Notes 1, 2)	BMA503
A1006	Plate Meter Assembly (Ref Note 1)	A-4801
A1007	Bias Control Assembly (Ref Notes 1, 2)	A-4833
A1007	Bias Control Assembly (Ref Notes 1, 3)	A-4833-2
A1008	IPA Sense Assembly (Ref Notes 1, 2)	A-4807
C1001	Capacitor, Fixed, Ceramic	CC109-6
E1001	Button Contact	PM1332
F1001	Fuse, Cartridge	FU102-2
F1002	Fuse, Cartridge	FU102-.1
F1003	Fuse, Cartridge	FU102-8
F1004	Fuse, Cartridge	FU102-5
J1001	Connector, Receptacle, Male 52/C	MS3102A32-414P
J1002	Connector, Receptacle, Female 52/C	MS3102A32-414S
J1003	Connector, Receptacle, Female 1/C	MS3102A18-16S
J1004	Connector, Receptacle, Male	MS3102A18-16P
J1005	Adapter, Connector, RF	UG492/U
J1006	Same as J1005	
J1007	Connector, Receptacle, RF	UG560/U
L1001	Transformer, Output Matching	TR192
M1001	Meter	MR216-1
P1001	Connector, Plug, BNC	PL244-1
S1001	Switch Lever	SW523-3
XA1001	Connector, Receptacle, Female	JJ287-20
XA1002	Connector, Receptacle, Female 25/C	JJ310-2F
XA1003	Connector, Receptacle, Female 37/C	JJ310-5F
XA1004	Same as XA1003	
XA1005	Connector, Receptacle, Female 15/C	JJ310-1
XF1001	Fuseholder, Indicator	FH104-3
XF1002	Same as XF1001	
XF1003	Fuseholder, Indicator	FH104-11
XF1004	Same as XF1003	

A1001

TUNE CAPACITOR ASSEMBLY (BMA544-1 - Manual)

(Ref Not 3)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A1001C1	Capacitor, VAC, Air	CB178
A1001C4	Capacitor Fixed .	CX102-J-202M

A1001

TUNE CAPACITOR ASSEMBLY (BMA544 - Automatic)

(Ref Note 2)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A1001A1	Printed Circuit Board Assembly (Ref Note 1)	A4790
A1001B1	Motor	M0126
A1001C1	Capacitor, Variable, Vac	CB178
A1001C4	Capacitor, Fixed	CX102-J-202M
A1001S1	Switch	SW353-2
A1001S2	Same as A1001S1	

A1005

DRIVE-UP ASSEMBLY (BMA543)

(Ref Note 2)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A1005A1	Drive-Up Control	AZ131

BANDSWITCH ASSEMBLY (AS146)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A1002C3 thru A1002C6	Capacitor, Fixed, Ceramic	CC109-38
A1002C7	Capacitor, Fixed, Ceramic	CC109-19
A1002C8	Capacitor, Fixed, Ceramic	CC116-9
A1002C9	Same as A1002C8	
A1002C10	Capacitor, Fixed, Ceramic	CC116-8
A1002C11	Same as A1002C10	
A1002C1	Cap, Fxd. Plastic	CX102-K-202M
A1002CR1	Semiconductor, Device, Diode	1N547
A1002CR2	Same as A1002CR1	
A1002E1	Terminal, Stud, Insulated	TE102-2
A1002E2	Same as A1002E1	
A1002E3 thru A1002E5	Contact, Leaf, Spring	PM1210-4
A1002E6	Contact Wiper	PM1415
A1002E7 thru A1002E20	Same as A1002E3	
A1002E21	Contact, Leaf, Spring	PM1210-5
A1002E22	Same as A1002E3	
A1002E23	Same as A1002E3	
A1002J1	Connector, Receptacle, Male	JJ313-2F
A1002K1	Relay, Armature DPDT	RL168-2C10-24DC
A1002L1	Coil, RF	CL489
A1002L2	Coil, Main Tank	CL446
A1002L3	Coil	CL292
A1002R1	Resistor, Fixed, Composition (Ref Note 2)	RC20GF472J
A1002R2	Resistor, Fixed, Composition (Ref Note 2)	RC20GF103J
A1002R3	Resistor, Fixed, Composition (Ref Note 2)	RC20GF392J
A1002S1A	Wafer, IPA	PX1083
A1002S1B	Wafer, Output	PX1082
A1002S2	Switch, Ledex	SW429
A1002W1	Cable, Ledex Assembly	CA1522
A1002XK1	Socket, Relay	TS100-3

IPA DRAWER (AX5232)

SYMBOL SERIES 1100

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1101	Capacitor, Fixed, Electrolytic	CE116-10VN
C1102	Same as C1101	
C1103	Capacitor, Fixed, Ceramic	CC100-28
C1104	Capacitor, Fixed, Electrolytic	CE51C800R
C1105	Same as C1104 .	
C1106	Capacitor, Fixed, Paper	CP41B1EF405K
C1107 thru C1112	Capacitor, Fixed, Ceramic	CC100-37
C1113 thru C1117	Capacitor, Fixed, Ceramic (Ref Note 2)	CC100-28
CR1101	Semiconductor, Device, Diode (Ref Note 2)	1N547
CR1102	Same as CR1101	
CR1103	Rectifier, Semiconductor, Device	DD146-2
CR1104	Semiconductor, Device, Diode	1N3321B
CR1105	Semiconductor, Device, Diode	1N2976B
CR1106	Rectifier, Semiconductor, Device	DD124
CR1107 thru CR1109	Semiconductor, Device, Diode	1N2841R
E1101 thru E1107	Turret Terminal	TE102-2
K1101	Relay, Armature 3PDT	RL168-3C10-24DC
L1101	Coil, Choke	TF5028
R1101	Resistor, Fixed, Wirewound 10W	RW109-2
R1102	Resistor, Fixed, Composition	RC42GF181J
R1103	Resistor, Fixed, Composition	RC20GF272J
R1104	Resistor, Fixed, Composition	RC42GF474J
R1105	Resistor, Fixed, Wirewound 10W	RW109-20
R1106	Resistor, Fixed, Wirewound 10W	RW109-14
R1107	Resistor, Fixed, Wirewound 10W	RW109-9
R1108	Same as R1104	
R1109	Resistor, Fixed, Composition	RC20GF102J
R1110	Resistor, Fixed, Composition	RC32GF223J
R1111	Resistor, Fixed, Wirewound 10W	RW109-30
S1101	Switch, Interlock	SW219
T1101	Transformer, Power	TF375

IPA DRAWER (AX5232)

SYMBOL SERIES 1100 (cont)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
TB1101	Not Used	
TB1102	Terminal Board Barrier	TM102-6
XC1101 thru XC1103	Not Used	
XC1104	Socket, Capacitor	TS100-3
XC1105	Same as XC1104	
XCR1101 thru XCR1106	Not Used	
XCR1107 thru XCR1109	Socket, Semiconductor, Device	TS166-1
XK1101	Socket, Relay	TS100-6
XK1102	Socket, Relay	TS100-6

IPA DRAWER (AX5232)

SYMBOL SERIES 1200

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1201	Not Used	
C1202	Capacitor, Fixed (Ref Note 2)	CN114-1R0-4J
C1203	Capacitor, Fixed, Ceramic	CK70AW202M
C1204	Capacitor, Fixed, Ceramic	CK70AW102M
C1205 thru C1212	Same as C1203	
C1213	Capacitor, Fixed, Ceramic	CC108-4P1000M
C1214	Same as C1203	
C1215	Same as C1203	
C1216	Same as C1213	
C1217	Same as C1203	
C1218	Capacitor, Fixed, Electrolytic	CE105-25-25
C1219	Capacitor, Fixed, Ceramic (Ref Note 2)	CC100-16
C1220	Same as C1219	
C1221	Capacitor, Fixed, Ceramic (Ref Note 2)	CC100-37

SYMBOL SERIES 1200 (cont)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CR1201	Semiconductor, Device, Diode (Ref Note 2)	1N547
CR1202	Semiconductor, Device, Diode (Ref Note 2)	1N3022B
CR1203	Semiconductor, Device, Diode (Ref Note 2)	1N645
CR1204	Semiconductor, Device, Diode (Ref Note 2)	
E1201	Turret Terminal	TE102-2
E1202	Same as E1201	
E1203	Bushing, Slot Head	TE101-3
E1204	Same as E1203	
E1205	Same as E1201	
E1206	Turret Terminal (Ref Note 2)	TE102-2
E1207	Same as E1201	
E1208	Same as E1206	
E1209	Same as E1206	
E1210	Same as E1201	
K1201	Relay, Armature (Ref Note 2)	RL156-1
K1202	Relay, Arm.	RL156-9
R1201	Resistor, Fixed, Wirewound 5W (Ref Note 2)	RW107-28
R1202	Resistor, Fixed, Composition	RR114-5W
R1203	Same as R1202	
R1204	Resistor, Fixed, Wirewound 25W	RW111-5
R1205	Resistor, Fixed, Composition	RC42GF100J
R1206	Resistor, Fixed, Composition (Ref Note 2)	RC42GF391J
R1207	Resistor, Fixed, Wirewound 20W	RW110-1
R1208	Resistor, Fixed, Composition (Ref Note 2)	RC20GF822J
R1209,14	Resistor, Fixed, Composition (Ref Note 2)	RC20GF222J
R1210	Resistor, Fixed, Composition (Ref Note 2)	RC20GF223J
R1211	Same as R1202	
S1201	Switch, Interlock	SW219
XK1201	Socket, Relay	TS171-1
XK1202	Socket, Relay	TS171-1

IPA DRAWER (AX5232)

SYMBOL SERIES 1300

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B1301	Motor, RF Gain (Ref Note 2)	M0136-5-UH-F
C1301	Capacitor, Fixed, Ceramic	CC100-35
C1302	Capacitor, Fixed, Ceramic	CC100-44
C1303	Capacitor, Fixed, Ceramic	CC100-43
C1304	Same as C1302	
C1305 thru C1307	Capacitor, Fixed, Ceramic	CC100-32
C1308	Capacitor, Fixed, Ceramic	CC100-31
C1309	Capacitor, Fixed, Mica	CM111E220J5S
C1310	Capacitor, Fixed, Mica	CM112F222F3S
C1311 thru C1313	Capacitor, Fixed, Ceramic	CC100-37
C1314	Same as C1302-	
1315	Capacitor, Fixed, Ceramic	CC100-23
C1316	Same as C1315	
C1317	Capacitor, Fixed, Mica	CM50B222G03
C1318	Capacitor, Fixed, Ceramic	CC100-38
E1301 thru E1304	Terminal, Teflon	TE169-1
E1305 thru E1317	Turret Terminal	TE102-2
L1301	Coil, RF	CL101-2
L1302	Coil, RF	CL140-2
L1303	Coil, RF	CL460
L1304 thru L1306	Same as L1302	
L1307	Inductor, Fixed	CL459
L1308	Coil, RF	CL178
R1301	Resistor, Variable, Composition	RV4NAYSK500A
R1302	Resistor, Fixed, Composition	RC20GF102J
R1303	Resistor, Variable, Composition	RV106UX8B252A
R1304	Resistor, Fixed, Composition	RC20GF271J
R1305	Resistor, Fixed, Composition	RC32GF100J
R1306	Resistor, Fixed, Composition	RC42GF120J
R1307	Resistor, Fixed, Composition	RC42GF222J
R1308	Resistor, Fixed, Composition	RC42GF183J
R1309	Resistor, Fixed, Wirewound 10W	RW109-28

IPA DRAWER (AX5232)

SYMBOL SERIES 1300 (cont)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R1310	Resistor, Fixed, Composition	RC20GF333J
R1311	Resistor, Fixed, Composition	RC42GF331J
R1312	Resistor, Fixed, Composition	RC42GF472J
R1313	Resistor, Fixed, Composition	RC42GF154J
R1314	Same as R1313 .	
S1301	Switch Limit (Ref Note 2)	SW353-2
S1302	Same as S1301	
V1301	Tube, Electron	8233
V1302	Tube, Electron	4CX350A
XV1301	Socket, Tube Electron	TS198
XV1302	Socket, Tube Electron	TS197
Z1301	Parasitic Suppressor	A-1546-2
Z1302	Parasitic Suppressor	A-1546-4

IPA DRAWER (AX5232)

SYMBOL SERIES 1400

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B1401	Blower, Centrifugal	BL126
C1401	Not Used	
C1402	Capacitor, Fixed, Ceramic	CC100-37
C1403	Same as C1402	
C1404	Capacitor, Fixed, Mica	CM112F562J5S
C1405	Capacitor, Fixed, Mica	CM35F103F03
C1406	Same as C1405	
C1407	Capacitor, Fixed, Ceramic	CC100-32
C1408	Not Used	
C1409	Same as C1407	
C1410 thru C1413	Capacitor, Fixed, Ceramic	CC109-36
C1414	Capacitor, Fixed, Ceramic	CC109-38
C1415	Capacitor, Fixed, Ceramic (Ref Note 2)	CC108-4P1000M
C1416 thru C1418	Capacitor, Fixed, Ceramic (Ref Note 2)	CC109-6
C1419	Same as C1415	

SYMBOL SERIES 1400 (cont)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1420	Same as C1416	
C1421	Same as C1416	
E1401	Insulator, Standoff	NS3W0108
E1402	Insulator, Standoff (Ref Note 3)	NS3W0204
K1401	Relay, Armature	RL185-1
L1401	Transformer, Interstage	TR193
L1402	Not Used	
L1403	Coil, RF	CL140-6
L1404	Same as L1403	
L1405	Coil, RF	CL138
R1401	Resistor, Fixed, Composition	RR116-1400W
R1402	Not Used	
R1403	Same as R1401	
R1404	Resistor, Fixed, Composition	RR116-20W
R1405	Resistor, Fixed, Composition	RR114-5W
S1401	Switch, Air	SW252
V1401	Tube, Electron	8576/PL264J
XV1401	Socket, Tube, Electron	TS182

Exciter Drawer (AX5168)
SYMBOL SERIES 2000

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A2001	Tuning Control Board (Ref Notes 1, 2)	A-4834
A2002	Channel Band Select (Ref Note 2)	PC532
B2001	Fan, Vent	BL106-2
C2001 thru C2011	Capacitor, Fixed, Ceramic	CK70AW202M
C2012	Capacitor, Fixed, Ceramic (Ref Note 2)	CC100-28
C2103	Same as C2012	
E2001 thru E2003	Turret Terminal	TE102-2
E2004 thru E2006	Terminal Board Finger	TM105-6AL
E2007	Not Used	
E2008	Same as E2001	
J2001	Connector, Receptacle, Male 52/C	MS3102A32-414P
J2002	Connector, Receptacle, Male 37/C	JJ200-10-
J2003	Connector, BNC	JJ172
J2004	Same as J2003	
J2005	Jack Telephone	JJ116-10
K2001	Relay, Armature 3PDT (Ref Note 2)	RL168-3C10-24DC
K2002	Same as K2001	
K2003	Relay, Armature DPDT (Ref Note 2)	RL168-2C10-24DC
K2004	Relay, Armature 3PDT	RL168-3C10-24DC
K2005	Same as K2004	
L2001	Coil, RF	CL101-3
P2001	Connector, Plug, Female 24/C	MS3106B24-28S
P2002	Connector, Plug, Female 3/C	MS3106B16S-5S
P2003 thru P2005	Connector, Plug, BNC	PL244-1
R2001	Resistor, Fixed, Wirewound	RW110-21
R2002	Same as R2001	
S2001	Switch, Lever	SW186-3
TB2001	Terminal, Strip Barrier	TM102-4
XA2001	Connector, Receptacle, PC Board	JJ319-22DFE
XA2002	Same as XA2001	
XK2001	Socket, Relay	TS100-6
XK2002	Same as XK2001	
XK2003 thru XK2005	Socket, Relay	TS101-P01

MAIN POWER PANEL ASSEMBLY (AX5169)
and
INPUT CHASSIS ASSEMBLY (AX5101)

SYMBOL SERIES 3000

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A3001	Exciter Input Assembly (Ref Note 1)	A-4809
A3002	Transmitter Input Assembly (Ref Note 1)	A-4810
CB3001	Circuit Breaker, 3PST	SW448
CB3002A,B	Circuit Breaker, DPST	SW527
CB3002C	Circuit, Breaker, SPST	SW525
DS3001	Generator, Audio Signal	BZ101-2
F3001 thru F3003	Fuse, Cartridge	FU102-3
F3004	Fuse, Cartridge	FU102-5
F3005	Same as F3004	
F3006	Fuse, Cartridge	FU102-10
F3007	Same as F3004	
F3008	Fuse, Cartridge	FU102-1
J3001	Connector, Receptacle, Female	MS3102A32-7S
J3002	Connector, Receptacle, Male	MS3102A24-28S
J3003	Connector, Receptacle, Male	MS3102A32-7P
J3004	Connector, Receptacle, BNC	JJ172
M3001	Indicator, Elapsed Time (50 cycle oper)	MR198-2
M3001	Indicator, Elapsed Time (60 cycle oper)	MR198-1
M3002	Indicator, Elapsed Time (50 cycle oper)	MR198-2
M3002	Indicator, Eleapse Time (60 cycle oper)	MR198-1
S3001	Switch, Toggle SPST	ST103-5-62
S3002	Switch, Toggle DPST	ST103-24-62
XF3001 thru XF3008	Fuseholder, Indicator	FH104-3
W3001	Wiring Harness, Branched	CA1520

VSWR BOARD (A-4802)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A4003C1	Capacitor, Fixed, Electrolytic	CE105-50-15
A4003C2 thru A4003C12	Capacitor, Fixed, Ceramic	CC100-28
A4003CR1	Semiconductor, Device, Diode	1N2484
A4003CR2	Same as A4003CR1	
A4003CR3	Semiconductor, Device, Diode	1N270
A4003CR4	Same as A4003CR3	
A4003DS1 thru A4003DS3	Lamp, Incandescent	B1101-1820
A4003E1 thru A4003E13	Terminal, Stud	TE127-3
A4003K1	Relay, Armature DPDT	RL156-9
A4003Q1	Transistor	2N1595
A4003R1	Resistor, Fixed, Composition	RC20GF121J
A4003R2	Resistor, Fixed, Composition	RC20GF122J
A4003R3	Resistor, Fixed, Composition	RC20GF102J
A4003XDS1 thru A4003XDS3	Lampholder	TS107-4
A4003XK1	Socket, Relay with retainer	TS171-5

MAIN CONTROL PANEL (AX5166)

SYMBOL SERIES 5000

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A5001	Band Indicator Assembly (Ref Note 1)	A-4791
A5002	Power Level Indicator Assembly (Ref Notes 1, 2)	A-4806
C5001 thru C5006	Capacitor, Fixed, Ceramic	CC100-28
C5007	Capacitor, Fixed, Ceramic (Ref Note 2)	CC100-28
DS5001 thru DS5003	Lamp, Incandescent	BI110-7
DS5004	Lamp, Incandescent (Ref Note 2)	BI110-7
DS5005 thru DS5014	Lamp, Incandescent	BI116-1-5
DS5015 thru DS5018	Lamp, Incandescent (Ref Note 2)	BI116-1-5
R5001	Resistor, Variable, Composition (Ref Note 3)	RV4NAYSA102A
R5002	Resistor, Fixed, Composition (Ref Note 3)	RC20GF102J
S5001	Switch, Push	SW522-1
S5002	Switch, Toggle DPDT (Ref Note 2)	ST103-24-62
S5003	Switch, Lever (Ref Note 2)	SW523-3
S5004	Switch, Lever	SW523-1
S5005	Same as S5003	
S5006	Switch, Lever (Ref Note 2)	SW523-2
S5007	Switch, Push (Ref Note 2)	SW522-2
S5008	Switch, Interlock	SW230
XDS5001	Part of S5001	
XDS5002	Light, Indicator	TS153-13
XDS5003	Light, Indicator	TS153-8
XDS5004	Part of S5007	

Section 7

DRAWINGS

7-1. INTRODUCTION

This section contains the schematic diagrams for the main unit and all drawers of the HFLM-10K linear amplifier. In addition, this section contains component location drawings for all printed circuit board assemblies and their material lists.

TABLE 7-1. DRAWINGS AND MATERIAL LISTS

K801

DETAIL (B)

230VAC
T803-Ø1

CB3002C-B

M3002
(T) PLATE TIME

WHEN A 440VOLT AC SOURCE IS USED DELETE THIS CONNECTION AND CONNECT AS PER DETAIL (B) (ABOVE)

HV CONTACTOR
K801

E809

E810

E811

TB904-9
P906-U

(230VAC)
T803-Ø1

CB3002C-B

ALARM
ON-OFF
S3001

ON C

HV OFF
ALARM
DS3001

PLATE
TIME

(T)

M3002

A3002-30
P906-Z

HIGH VOLTAGE
T801

(LINE)

210 220 230 240 250

(230)

(2301)

(LINE)

210 220 230 240 250

(LINE)

(230)

370 380 390 420 440

440 420 390 380 370

370 380 390 420 440

3400

N

3400

LINE CONNECTIONS ON TRANSFORMERS ARE CONNECTED TO THE APPROPRIATE VOLTAGE TAPS ON THE PRIMARY.

T801, T803, T804

SCREENS
CB3002

A B C D

NC NO C

S907-NC, M801-5

P912-u

K801

T805

BLOWER Ø1
F3001
3a

BLOWER Ø2
F3002
3a

BLOWER Ø3
F3003
3a

P/O
B801

1 2 3 4 5 6

T3 T2 T1

MOT

MAIN
BLOWER
B801

S801
NC
C
NO

PA
FILAMENT
F3004
5a

LOW VOLT
Ø1
F3005
5a

LOW VOLT
Ø2
F3006
10a

LOW VOLT
Ø3
F3007
5a

MAIN
POWER
CB3001

INSERT WHEN 440VAC SOURCE IS USED SEE DETAIL (A)

EXCITER ON/OFF
S3002

OFF

ON

EXCITER
AC
F3008 1a

E805 E806 E807 E808

230 VAC EXCITER SWITCH INPUT

Ø1 Ø2 Ø3

230V AC SOURCE 50/60Hz

380-440V AC SOURCE 50/60Hz

A3Q1TB1-5

P906-N

P913-S

P913-R

A710-TB1-1
J706-A, P904-B

A709-TB1-2
P904-A, XF701

P903-S P904-C

P906-S

6 7 3 2 1 5 4 10 11 12 8 9

FILAMENT
K802

P906-Q

T801
HIGH VOLTAGE

USED WHEN A 440 VOLT A C POWER SOURCE IS AVAILABLE

T802
SCREEN

230VAC SOURCE USES TF386
440VAC SOURCE USES TF438

L802 5H

+3750 V

C802 10 5 KV

C801 4 10 KV

CR802

L801 0.8H

PA HV SUPPLY

SCREEN T802

R834 50 10W

R835 50 10W

R833 50 10W

CR803

PA SCREEN SUPPLY

SCREENS CB3002

R831 100 2W

R830 100 2W

IN284CA

IN284CA

R809 10K 50W

R810 10 K 50W

CR807B

CR807A

R837 50 10W

R838 50 10W

R836 50 10W

CR804

R817 2K 200W

+1600V

C804 10 2.5KV

L803 7h

2ND AMP PLATE SUPPLY

R811 50 20W

P912-U

K801

L803

P906-Y

P906-H

P908

A4001-4

TIME DELAY M801

CB3002B-NC

A801TB1-1

S907-NO

PA FILAMENT T804

(LINE)

200 210 220 230 240 250

R812 50 20W

C805 .001 5KV

C806 .001 5KV

L804 185

R813 5 20W

R814 330 2W

R815 1K 2W

R816 330 2W

C807 .001 5KV

PA FILAMENT F3004 5a

FILAMENT TIME M3001

LOW VOLT Ø1 F3005 5a

LOW VOLT Ø2 F3006 10a

LOW VOLT Ø3 F3007 5a

LOW VOLTAGE T803

CR805

IPA DC FILAMENT SUPPLY

P906-Q

P907-J

XA702-8, XA703-1

P912-Z

P912-Y

TB904-4

P912-3

K801

P906-F

XA702-B

P906-E

XA702-D

P906-D

XA701-J P906-B&C

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

R804 60K 200W
R805 60K 200W
R806 60K 200W
R807 60K 200W

R802 5K 140W
R801 2.5K 140W
+1600V
C803 10 2.5K
R832 50 20W

HV SHORTING ASS'Y A801 (AX5090)
E4 E8
E3 E7
E2 E6
E1 E5
NC S1 C NO
L1
TB1
5 4 3 2
E902
XF3002
P912-4
TB901-1
M801-4, P912-5

R817 2K 200W
+1600V
C804 10 2.5KV
L803 7h
R811 50 20W
CB3002C-C
P908
A4001-4
P909
E712
R803 31 140W

R814 330 2W
R815 1K 2W
E812
E813 XA703-9
R813 5 20W
R816 330 2W
CR806 IN3022B A4002-2
C807 .001 5KV

N2
6.2
6.2
6.2
AC
AC
AC
+
IPA DC FILAMENT SUPPLY
XA701-J P903-B, C

ZENER ASSY
E803
+1400V
R829 100 2W
CR801A IN2846A
R828 100 2W
CR801B IN2846A
R827 100 2W
CR801C IN2846A
R826 100 2W
CR801D IN2846A
R825 100 2W
CR801E IN2846A
R824 100 2W
CR801F IN2846A
R823 100 2W
CR801G IN2846A
R822 100 2W
CR801H IN2846A
R821 100K 20W
R818 100K 20W
E814
R820 100 2W
E801
+800V
R819 100 2W
E802
+400V
R808 45K 10W
E804
A4812

E701
P906-K
P906-J

TO SH 2

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

R804 60K 200W
R805 60K 200W
R806 60K 200W
R807 60K 200W

R802 5K 140W
R801 2.5K 140W
+1600V
E803
C803 10 2.5K
R832 50 20W

HV SHORTING ASS'Y A801
(AX5096)
E4 E8
E3 E7
E2 E6
E1 E5
NC S1 C NO
L1
TB1
5 4 3 2
E902
XF3002
P912-4
TB901-1
M801-4 P912-5

ZENER ASSY
R829 100 2W
CR801A IN2846A
+1400V
R828 100 2W
CR801B IN2846A
R827 100 2W
CR801C IN2846A
R826 100 2W
CR801D IN2846A
R821 100K 20W
R818 100K 20W
E814
R820 100 2W
E801
+800V
R825 100 2W
CR801E IN2846A
R824 100 2W
CR801F IN2846A
R819 100 2W
E802
+400V
R823 100 2W
R808 45K 10W
CR801G IN2846A
R822 100 2W
CR801H IN2846A
E804
A4812

E701
P906-K
P906-J

TO SH 2

(230VAC)
T803-Ø1
CB3002C-B
ALARM
ON-OFF
S3001
ON C
HV OFF
ALARM
DS3001
PLATE
TIME
T
M3002
A3002-30
P906-Z
LINE CONNECTIONS ON TRANSFORMERS ARE CONNECTED TO THE APPROPRIATE VOLTAGE TAPS ON THE PRIMARY.
T801, T803, T804
(LINE)
210 220 230 240 250
(230)
3400
SCREENS
CB3002
S907-NC, M801-5
P912-u
K801
T805
BLOWER Ø1
F3001
3a
BLOWER Ø2
F3002
3a
BLOWER Ø3
F3003
3a
P/O
B801
MAIN
BLOWER
B801
MOT
S801
PA
FILAMENT
F3004
5a
LOW VOLT
Ø1
F3005
5a
LOW VOLT
Ø2
F3006
10a
LOW VOLT
Ø3
F3007
5a
MAIN
POWER
CB3001
INSERT WHEN 440VAC SOURCE IS USED
SEE DETAIL (A)
EXCITER ON/OFF
S3002
OFF
ON
EXCITER
AC
F3008 1a
E805
E806
E807
E808
230 VAC EXCITER
SWITCH INPUT
Ø1 Ø2 Ø3
230V AC SOURCE 50/60Hz
380-440V AC SOURCE 50/60Hz
A9QITB1-5
P906-N
P913-S
P913-R
A710-TB1-1
J706-A, P904-B
A709-TB1-2
P904-A, XF701
P903-S P904-C
P906-S
FILAMENT
K802
P906-Q

T805
DETAIL (A)
TO
CB3001
Ø1
Ø2
Ø3
440
380
230
220
208
195
T804 TO BE USED ONLY WHEN A 440 VOLT AC SOURCE IS REQUIRED

PA HV SUPPLY

SCREEN T802

PA SCREEN SUPPLY

R835 50 10W

R833 50 10W

SCREENS CB3002

R831 100 2W

R830 100 2W

IN284CA

IN284CA

CR807B

CR807A

R809 10K 50W

R810 10K 50W

R837 50 10W

R838 50 10W

R836 50 10W

CR804

R817 2K 200W

+1600V

C804 10 2.5KV

L803 7h

2ND AMP PLATE SUPPLY

R811 50 20W

CB3002 C-C

K801

L803

P906-V

P906-Y

P906-H

P908

A4001-4

P909

E712

TIME DELAY M801

CB3002B-NC

A801TB1-1

S907-NO

P912

PA FILAMENT T804

E703

E704

L804 185

R814 330 2W

R815 1K 2W

R812 50 20W

C805 .001 5KV

C806 .001 5KV

R813 5 20W

R816 330 2W

E812

E813

C807 .001 5KV

FILAMENT TIME M3001

E901

(LINE)

200 210 220 230 240 250

LOW VOLTAGE T803

N1

N2

6.2

2.9

CR805

IPA DC FILAMENT SUPPLY

P906-Q

P907-J

XA702-8, XA703-1

P912-Z

P912-Y

T8904-4

P912-3

K801

P906-F

XA702-B

P906-E

XA702-D

P906-D

P906-A

XA701-J P906-B&C

F3001

F3002

440

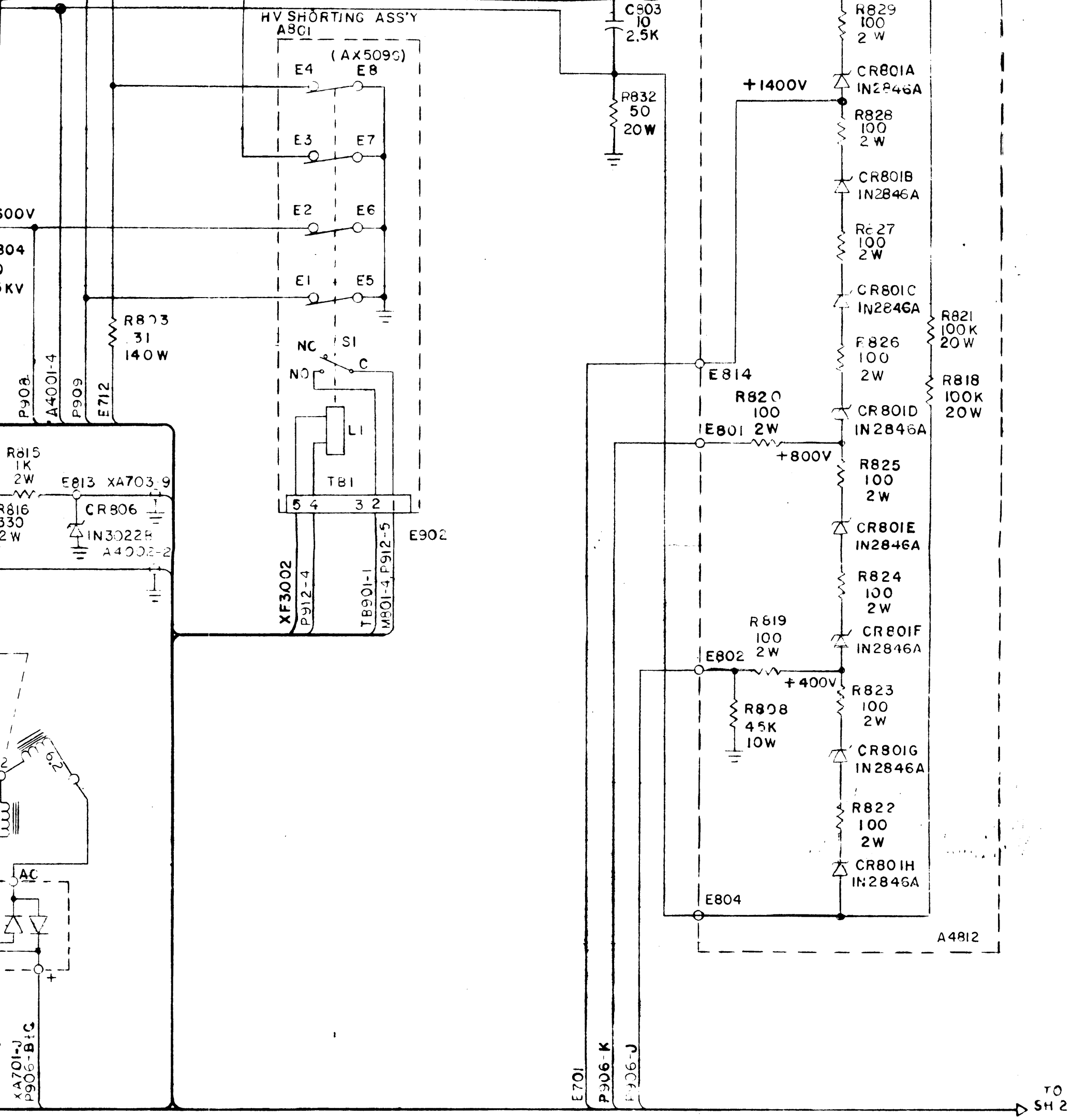
F3002

IS REQUIRED

800		
LAST SYMBOLS		MISS SYM
A801	S801	
B801	T804	E815
C807	XK802	
CR807		
E817		
K802		
L804		
M801		
P801		
R838		XK801

A80	
LAST SYM	MISS SYM
E8	
L1	
S1	
TB1	

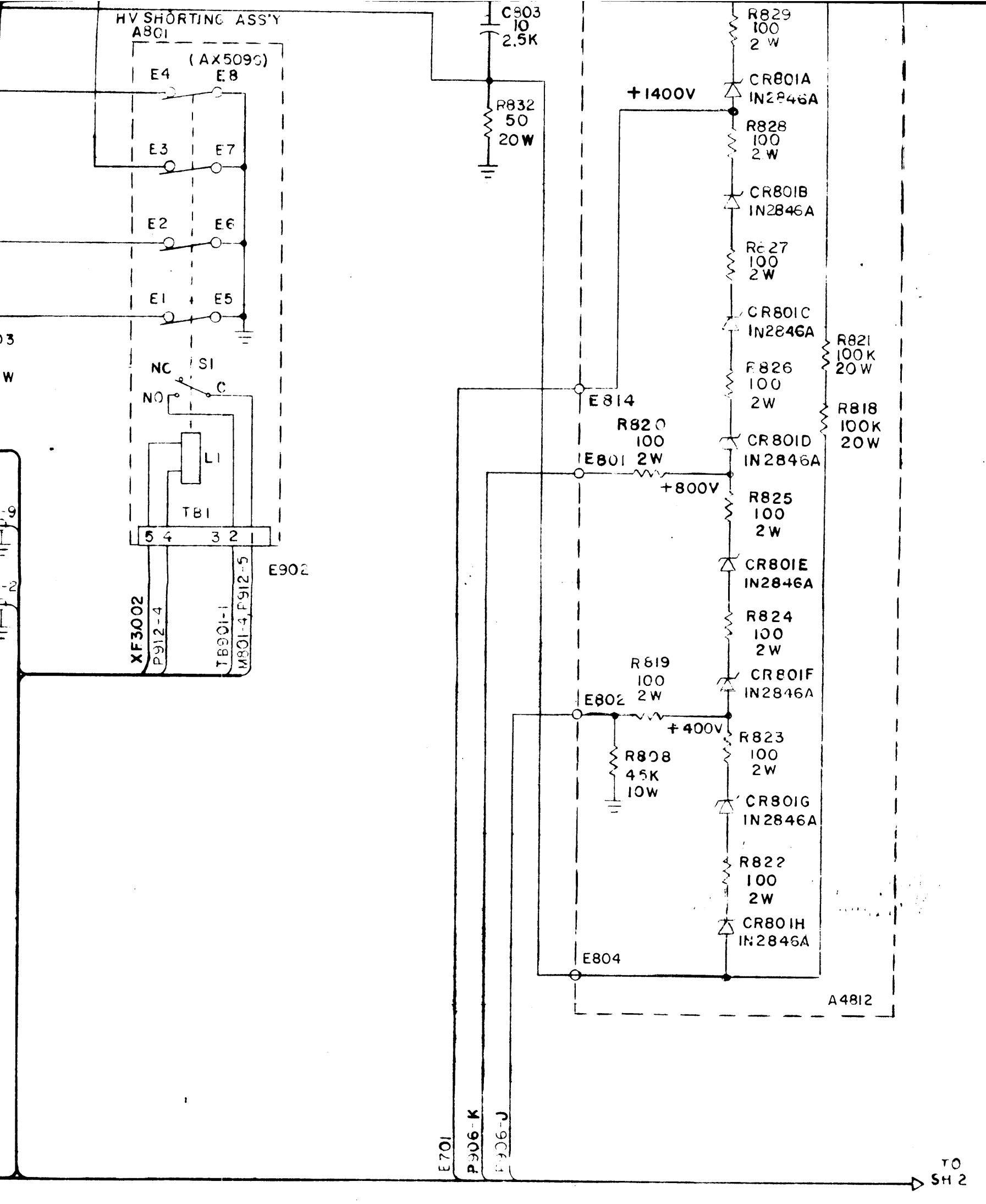
3000	
LAST SYM	MISS SYM
A300	
CR3002	1
E3001	
F3008	
L3004	
M3002	
P3002	
XF3008	



QTY REQ	ITEM	PART NO.	DESCRIPTION	SYMBOL

Figure 7-1. Schematic Diagram, HFL( )-10K
(Sheet 1 of 5)

CK2177-Ø

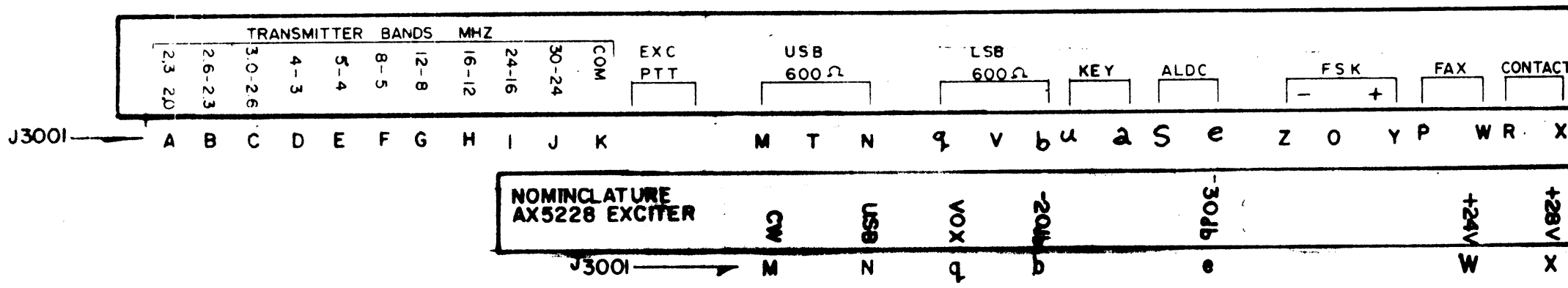


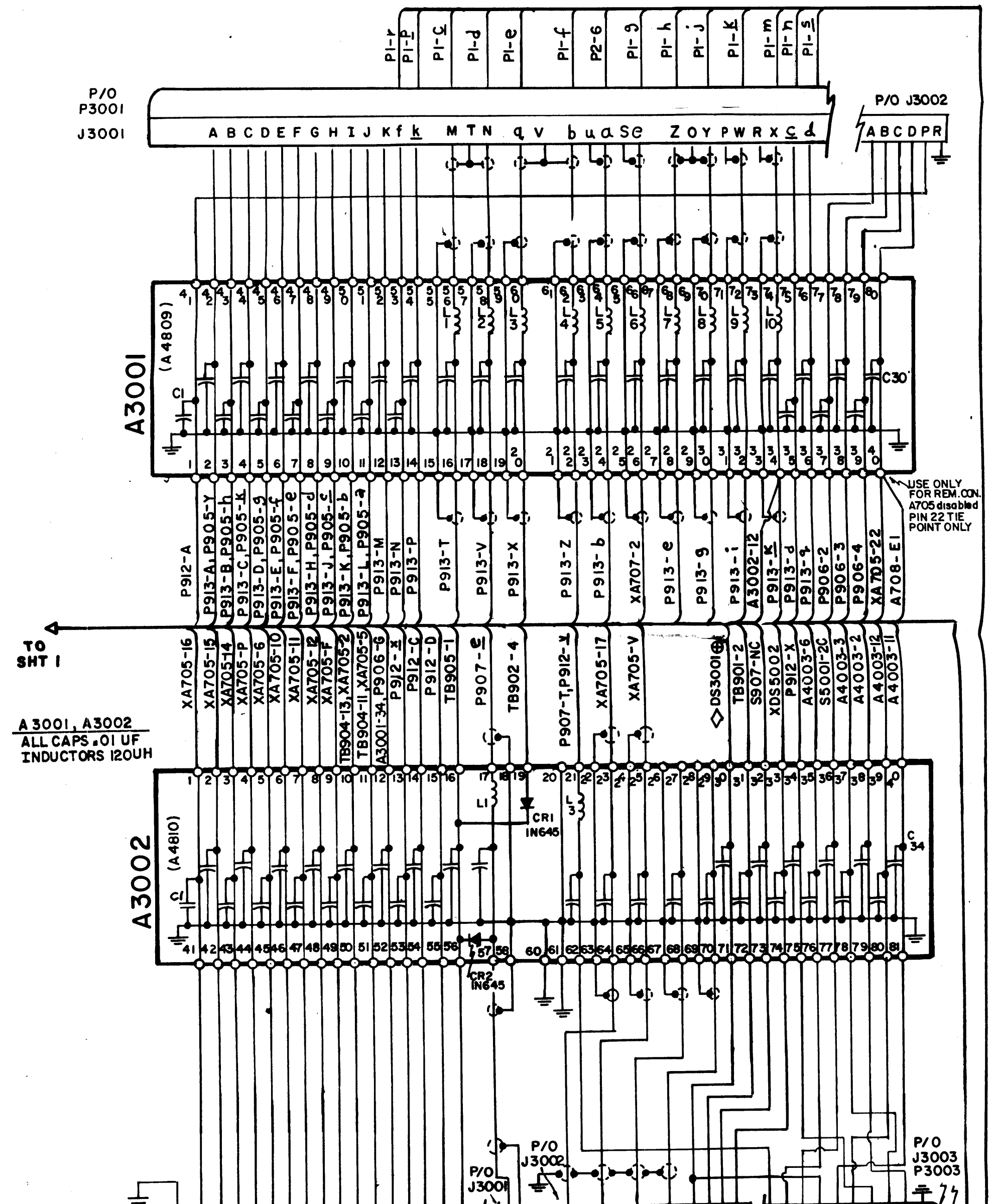
QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL

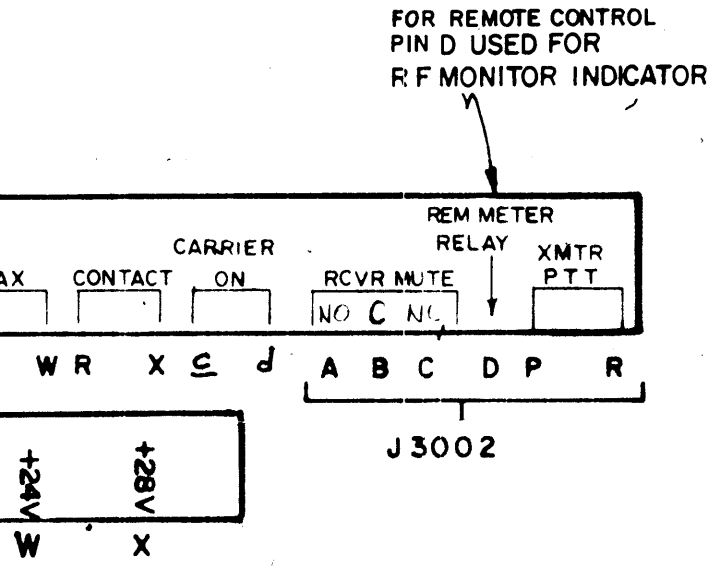
Figure 7-1. Schematic Diagram, HFL( )-10K
(Sheet 1 of 5)

CK2177-Ø

MMX-2A NOMINCLATURE







NOTE INPORTANT

THE FOLLOWING PINS ARE JUMPERED IF NO EXTERNAL CONNECTIONS ARE USED.

J3002 PINS P & R
J3002 PINS L & N
J3003 PINS K & L
J3003 PINS S & Y
J3003 PINS d & h

DRIVER DRAWER (AX5232) REF CK2179

J1001 P906 — P907 J1002

CR805 ⊖	P904-Z
CR805 ⊕	XA701-L
CR805 ⊕	
T803-Ø1-20V	XA702-6
T803-Ø2-20V	
T803-Ø3-20V	XA702-12
A3002-12	XA702-13
R809	XA702-M
E802	P912-Z
E801	P912-J
P912-2	
P912-Y	XA701-D
XF3007	P912-N
◇ XA702-10, XF55003	P912-L
XF3001	P912-M
S901-C	P912-r
B801-5	XA703-3
C711	A3002-21
S5008-NC	XA702-K
CB3002B-COM	XA702-F
P904 J	P912-J
P904 K	
P904-m	P912-S
P904 n	
P904 d	
P904 R	
P904 f	XA705-19
P904 g	
P905 h	A3002-17
P904 i	
P905 C	
P905 D	P912-G
P905 E	T803-Ø3-210V
P905 F	XA703-1
P905 H	XA703-B
P905 J	XA707-8
P905 K	
P905 A	
P905-g	P912-6
P904-E	
P912-B	TB905-1
K801-NO	TB905-2
CR807E	
P905-L	A801E2 — P908 — J1003
P904-P	
P905-P	
◇ DS3001 ⊕, P912-R	P909 J1004
A3001-37	A801E1
A3001-38	
A3001-39	P910 J1005
	J3004
	P911 J1006
	P914

E816

J1007 E1001 E817 P801

REFERENCE CK1955
EXCITER DRAWER FOR MMX-2A (AX516

J2001 P912 — P913 J2002

P913-m, A3001-1	A3001-2
P906-t	A3001-3
A3002-14	A3001-4
A3002-15	A3001-5
TB904-10	A3001-6
XA703-L	A3001-7
P907-h	A3001-8
TB902-4	A3001-9
P907-W	A3001-10
	A3001-11
P907-P	A3001-12
P907-Q	A3001-13
P907-N	A3001-14
XA702-11	XF3008
XA702-5	S3002
◇ P906-Z	A3001-16
P907-Y	
	A3001-18
TB703-7	
TB902-5	A3001-20
◇	
A3002-34	A3001-22
T803-Ø2 230V	
P907-J	A3001-24
P913-n, XA707-2	
XA705-D	A3001-35
TB703-8	A3001-28
TB905-2	
TB902-6	A3001-30
55004-COM	
	A3001-32
XF3004	
P907-K	A3001-34
TB903-3	P912-A
XA702-1	P912-a
TB904-3	
XA703-B	A3001-36
P907-R	
XDS5002	
S 5001-1-NO	
CB3002C-A	
A3002-21	P911
A3002-13	
P906-M	
T803-Ø2-210V	
P906-L	
T803-Ø1-210V	
A801TB1-4	
A801TB1-1	

P914 J2002

This Drawer USED with MMX-2A or SME-( ) EXCITERS ONLY

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

REFERENCE CK2168

EXCITER DRAWER FOR MMX-2B (AX5230)

AX5168)

913 J2002

RF OUT

914 J2003

J2001 P912

P913-m, A3001-1	A3001-2
P906-t	A3001-3
A3002-14	A3001-4
A3002-15	A3001-5
TB904-10	A3001-6
XA703-L	A3001-7
P907-h	A3001-8
TB902-4	A3001-9
P907-W	A3001-10
	A3001-11
P907-P	A3001-12
P907-Q	A3001-13
P907-N	A3001-14
XA702-11	XF3008
XA702-S	S3002
P906-z	A3001-16
P907-Y	
	A3001-18
TB703-7	
TB902-5	A3001-20
	A3001-22
A3002-34	
T803-02-230V	A3001-24
P907-J	
P913-n, XA707-2	
XA705-D	A3001-35
TB703-8	A3001-28
TB905-2	
TB902-6	A3001-30
S5004-COM	
	A3001-32
XF3004	
P907-K	A3001-34
TB903-3	P912-A
XA702-1	P912-a
TB904-3	
XA703-B	A3001-36
P907-R	
XDS5002	
S5001-1 NO	
CB3002C-A	
A3002-21	
A3002-13	
P906-M	
T803-02-210V	
P906-L	
T803-01-210V	
A801TB1-4	
A801TB1-1	
P907-2	

P913 J2002

P911

P914

RF OUT J2003

REMOTE PLUG

P2-A, P2-B, P2-C, P2-D, P2-E, P2-F, P2-H, P2-J, P2-K, P2-L, P2-M, P2-N, P2-P, P2-R, P2-S, P2-T, P2-V, P2-W, P2-X, P2-Y, P2-Z, P2-a, P2-b, P2-c, P2-d, P2-e, P2-f, P2-g, P2-h, P2-j, P2-k, P2-l, P2-m, P2-n, P2-p, P2-r, P2-3, P2-u, P2-v, P2-x, P2-4, P2-5

RMT-A, RMT-B, RMT-C, RMT-D, RMT-E, RMT-F, RMT-H, RMT-J, RMT-K, RMT-L, RMT-M, RMT-N, RMT-P, RMT-R, RMT-S, RMT-T, RMT-V, RMT-W, RMT-X, RMT-Y, RMT-Z, RMT-a, RMT-b, RMT-c, RMT-d, RMT-e, RMT-f, RMT-g, RMT-h, RMT-j, RMT-k, RMT-l, RMT-m, RMT-n, RMT-p, RMT-q, RMT-r, RMT-u, RMT-v, RMT-x, RMT-y, RMT-z, P3001-a

P2

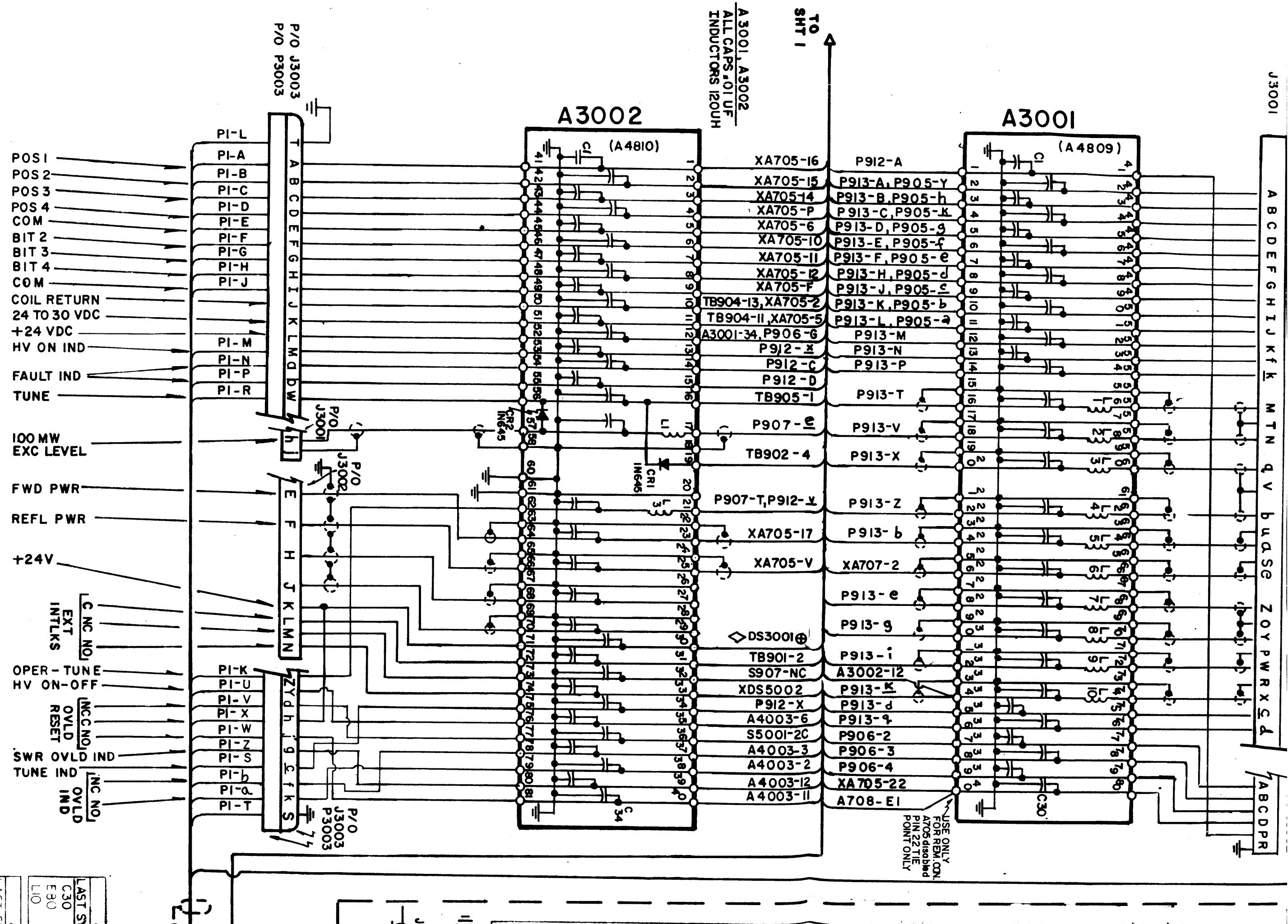
(ISB)

(LSB)

TO SIDERACK (REF CK2178)

This Drawer USED with AX5228 EXCITER or MMX( )-2B EXCITER

THIS CABLE (CA1835)


P/O J3003
P/O P3003
PI-L
PI-A
PI-B
PI-C
PI-D
PI-E
PI-F
PI-G
PI-H
PI-J
PI-M
PI-N
PI-P
PI-R
PI-K
PI-U
PI-V
PI-X
PI-W
PI-Z
PI-S
PI-b
PI-d
PI-T
POS 1
POS 2
POS 3
POS 4
COM
BIT 2
BIT 3
BIT 4
COM
COIL RETURN
24 TO 30 VDC
+24 VDC
HV ON IND
FAULT IND
TUNE
100 MW EXC LEVEL
FWD PWR
REFL PWR
+24V
EXT INTLKS
C NC NO
OPER - TUNE
HV ON-OFF
OVLD RESET
NCC NO
SWR OVLD IND
TUNE IND
OVLD IND
NC NO
P/O J3001
P/O J3002
P/O J3003
P3003
A3002
(A4810)
A3001
(A4809)
A3001, A3002
ALL CAPS .01 UF
INDUCTORS 120UH
TO SHT 1
XA705-16
XA705-15
XA705-14
XA705-P
XA705-6
XA705-10
XA705-11
XA705-12
XA705-F
TB904-13, XA705-2
TB904-11, XA705-5
A3001-34, P906-G
P912-x1
P912-C
P912-D
TB905-1
P907-e1
TB902-4
P907-T, P912-x
XA705-17
XA705-V
DS3001
TB901-2
S907-NC
XDS5002
P912-X
A4003-6
S5001-20
A4003-3
A4003-2
A4003-12
A4003-11
P912-A
P913-A, P905-Y
P913-B, P905-h
P913-C, P905-k
P913-D, P905-g
P913-E, P905-f
P913-F, P905-e
P913-H, P905-d
P913-J, P905-c1
P913-K, P905-b
P913-L, P905-a
P913-M
P913-N
P913-P
P913-T
P913-V
P913-X
P913-Z
P913-b
XA707-2
P913-e
P913-g
P913-i
A3002-12
P913-k1
P913-d
P913-q
P906-2
P906-3
P906-4
XA705-22
A708-E1
USE ONLY FOR REM. CON. A705 disabled PIN 22 TIE POINT ONLY
C30
J3001
A B C D E F G H I J K f k M T N
q v b u s e Z O Y P W R x C d
A B C D P R
C34
CR2
E81
L3
E80
L10
LAST SYM

CR805 ⊕	XA701-L
CR805 ⊕	
T803-Ø1-20V	XA702-6
T803-Ø2-20V	
T803-Ø3-20V	XA702-12
A3002-12	XA702-13
R809	XA702-M
E802	P912-Z
E801	P912-J
P912-2	
P912-Y	XA701-D
XF3007	P912-N
◇ XA702-10, XMTS5003	P912-L
XF3001	P912-M
S901-C	P912-r
B801-5	XA703-3
C711	A3002-21
S5008-NC	XA702-K
CB3002B-COM	XA702-F
P904 J	P912-J
P904 K	
P904-m	P912-S
P904 n	
P904 d	
P904 R	
P904 f	XA705-13
P904 g	
P905 h	A3002-17
P904 i	
P905 C	
P905 D	P912-G
P905 E	T803-Ø3-210V
P905 F	XA703-1
P905 H	XA703-B
P905 J	XA707-8
P905 K	
P905 A	
P905-g	P912-6
P904-E	
P912-B	TB905-1
K801-NO	TB905-2
CR807B	A801E2 P908 J1003
P905-L	
P904-P	
P905-P	
◇ DS3031 ⊕ P912-R	P909 J1004
A3001-37	A801E1
A3001-38	
A3001-39	
	P910 J1005
	J3004
	P911 J1006
	P914

E816

J1007 E1001 P801 E817

P907-L	A3001-3
A3002-14	A3001-4
A3002-15	A3001-5
TB904-10	A3001-6
XA703-L	A3001-7
P907-h	A3001-8
TB902-4	A3001-9
P907-W	A3001-10
	A3001-11
P907-P	A3001-12
P907-Q	A3001-13
P907-N	A3001-14
XA702-11	XF3008
XA702-5	S3002
◇ P906-Z	A3001-16
P907-Y	
	A3001-18
TB703-7	
TB902-5	A3001-20
◇	
A3002-34	A3001-22
T803-Ø2 230V	
P907-J	A3001-24
P913-n, XA707-2	
XA705-D	A3001-35
TB703-8	A3001-28
TB905-2	
TB902-6	A3001-30
S5004-COM	
	A3001-32
XF3004	
P907-K	A3001-34
TB903-3	P912-A
XA702-1	P912-a
TB904-3	
XA703-B	A3001-36
P907-R	
XDS5002	
S5001-1-NO	
CB3002C-A	
A3002-21	P911
A3002-13	
P906-M	
T803-Ø2-210V	
P906-L	
T803-Ø1-210V	
A801TB1-4	
A801TB1-1	

P914 J2003

RF OUT

This Drawer USED with MMX-2A or SME-( ) EXCITERS ONLY

P910

CA1835 (REMOTE ONLY)

J3004

RF INPUT

P3003-A P3003-B P3003-C P3003-D P3003-E P3003-F P3003-G P3003-H P3003-J P3003-Z P3003-T P3003-M P3003-g P3003-b P3003-W P3003-C

A B C D E F G H J K L M N P R S

P1

TO SIDE

(REF CK

A3001	
LAST SYM	MISS SYM
C30	
E80	
L10	

A3002	
LAST SYM	MISS SYM
C34	C18
CR2	
E81	E59
L3	L2

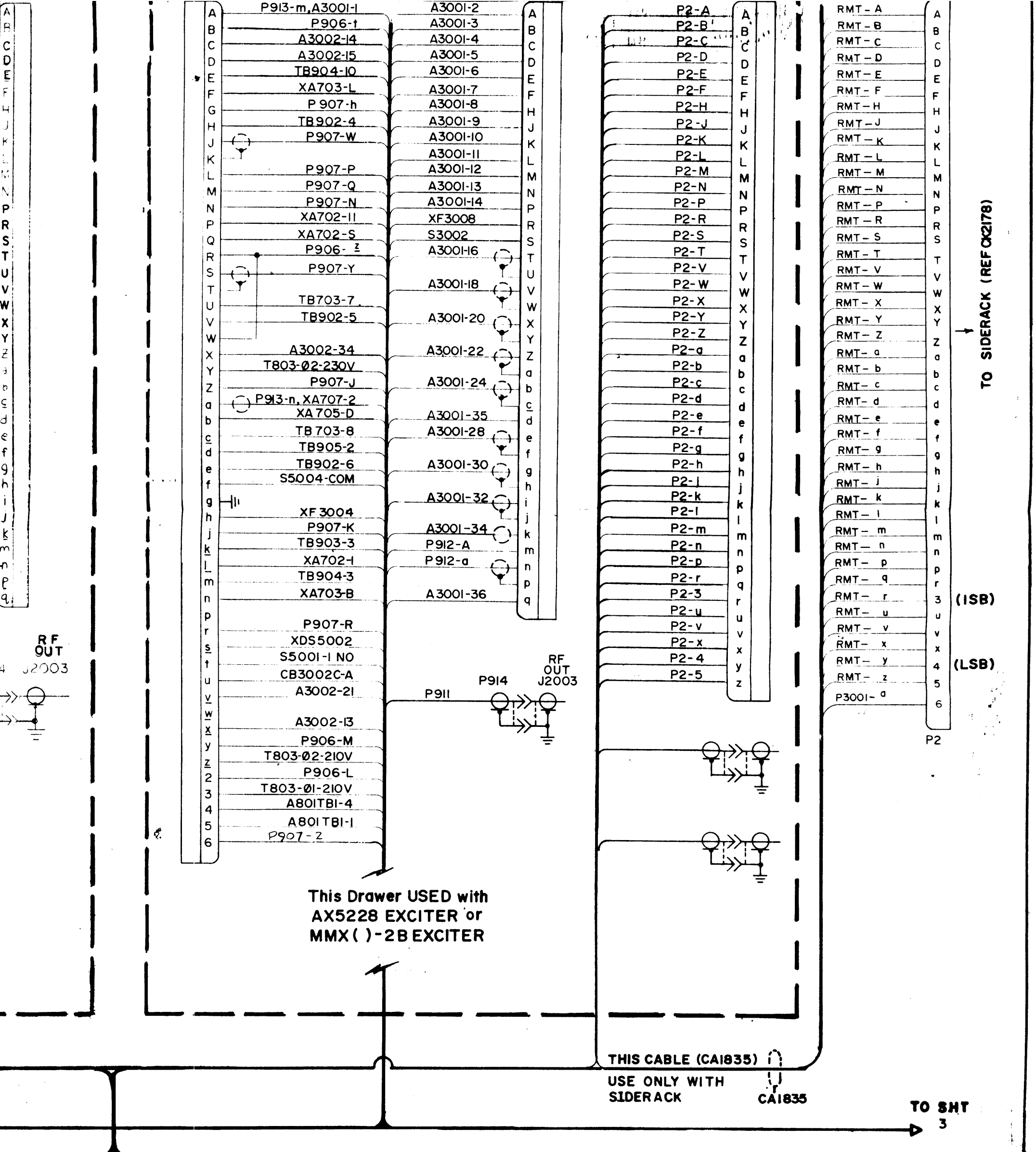
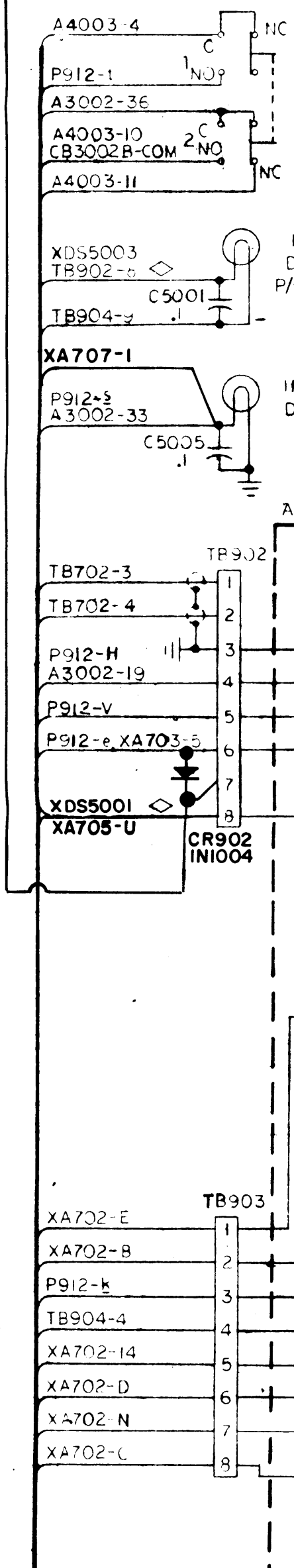
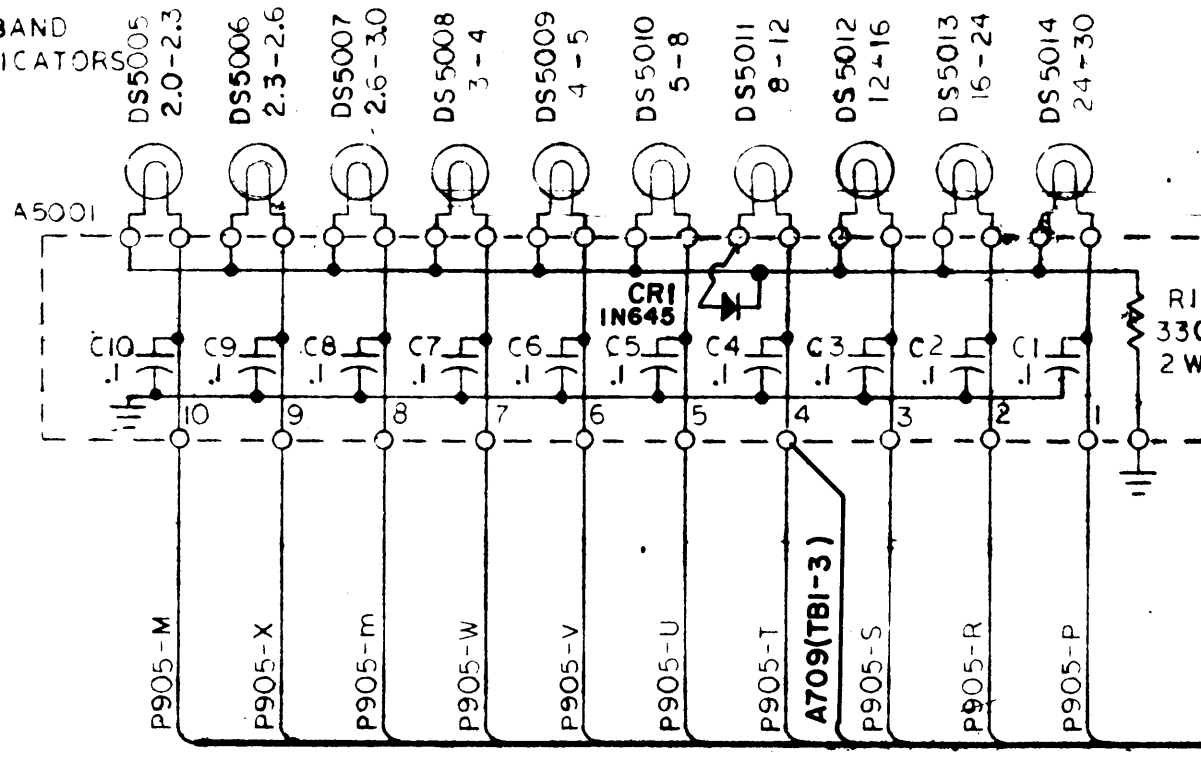


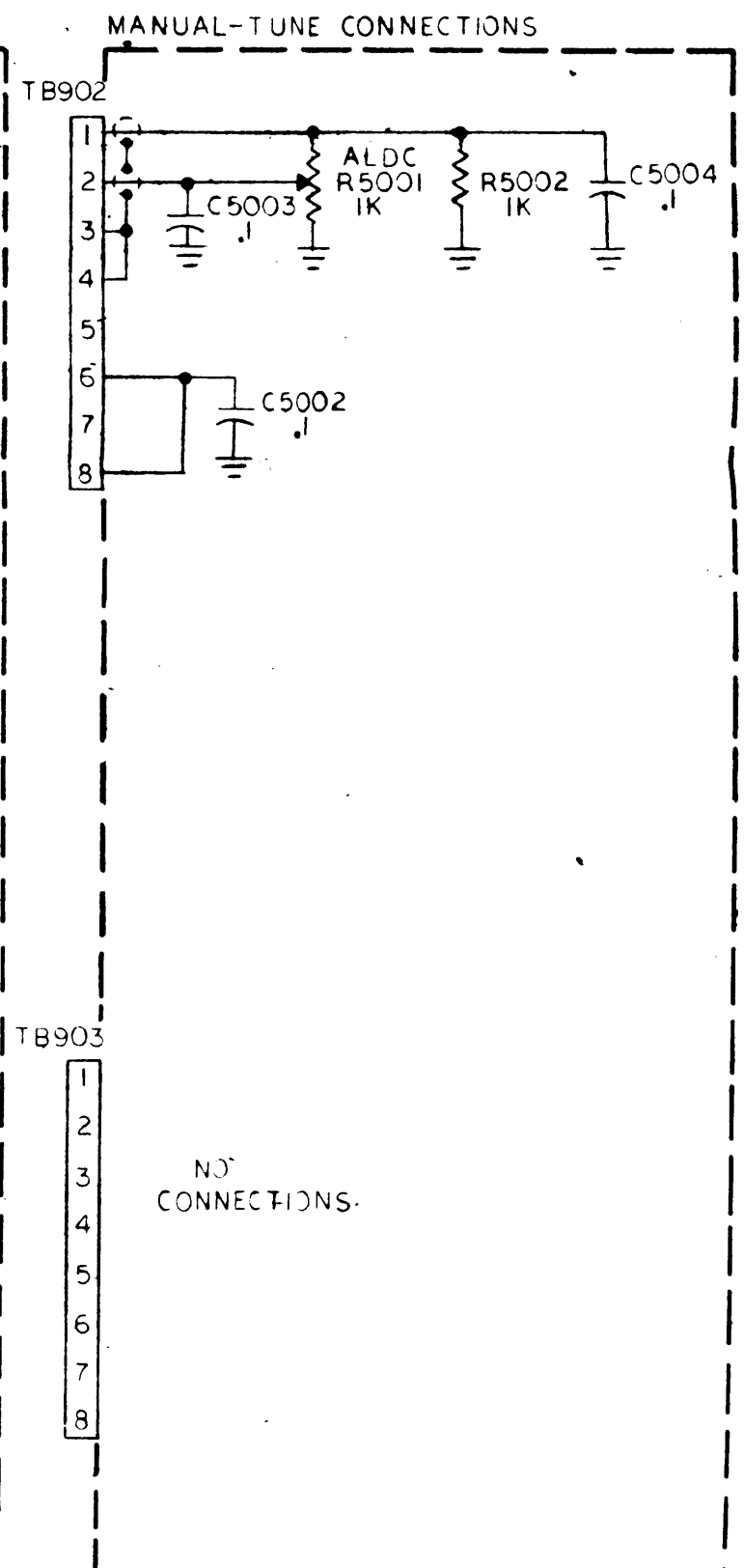
Figure 7-1. Schematic Diagram, HLF( )-10K
(Sheet 2 of 5)

CK2177-0


A4003-4
C
NC
P912-t
NO
A3002-36
A4003-10
CB3002B-COM
2 C
NO
NC
A4003-11
HV
S5001
XDS5003
TB902-b
C5001
.1
TB904-y
HV ON
DS5001
P/O S5001
XA707-1
P912-s
A3002-33
C5005
.1
INTLKS
DS5002


BAND
INDICATORS
DS5005
2.0-2.3
DS5006
2.3-2.6
DS5007
2.6-3.0
DS5008
3-4
DS5009
4-5
DS5010
5-8
DS5011
8-12
DS5012
12-16
DS5013
16-24
DS5014
24-30
A5001
CR1
IN645
C10 .1
C9 .1
C8 .1
C7 .1
C6 .1
C5 .1
C4 .1
C3 .1
C2 .1
C1 .1
R1
330
2 W
10
9
8
7
6
5
4
3
2
1
P905-M
P905-X
P905-m
P905-W
P905-V
P905-U
P905-T
A709(TBI-3)
P905-S
P905-R
P905-P

AUTO-TUNE CONNECTIONS
TB902
TB702-3
TB702-4
P912-H
A3002-19
P912-V
P912-e XA703-5
XDS5001
XA705-U
CR902
IN1004
MAN-AUTO
S5002
AUTO
MAN
C5004
.1
C5003
.1
C5002
.1
TB903
XA702-E
XA702-B
P912-k
TB904-4
XA702-14
XA702-D
XA702-N
XA702-C
H
L
TUNE
S5003


MANUAL-TUNE CONNECTIONS
TB902
ALDC
R5001
1K
R5002
1K
C5004
.1
C5003
.1
C5002
.1
TB903
NO
CONNECTIONS.

DS 5014
24-30

P905-P

R1
330
2W

(A4791/PC52)

P905-1

P912-f

P905-J

RIGHT

BANDSWITCH
S5004

LEFT

AUTO-TUNE CONNECTIONS

MANUAL-TUNE
CONNECTIONS

P/O
TB904

XA703-K
XA703-8
P912-m
T803-Ø2(230V), TB903-4
XA703-7
XA703-J
XA703-F
XA703-H

1
2
3
4
5
6
7
8

LOAD
S5005

+

K801-NO, XDS5001
P912-E
P906-P, XDS5001

9
10

C5006
.1

FAULT
DS5003

P/O
TB904

A3002-11
XA705-7
A3002-10
XA705-E

11
12
13
14

POWER
S5006

ADJ

P/O
TB904

1
2
3
4
5
6
7
8
9
10
11
12
13
14

C5006
.1

HV ON
DS5003

A3002-16, P90
XA703-10

CR90
INIC

P907-6

P912-d, P907-
XA 703-6

XA705-8

XA705-9

XA705-L

XA705-K

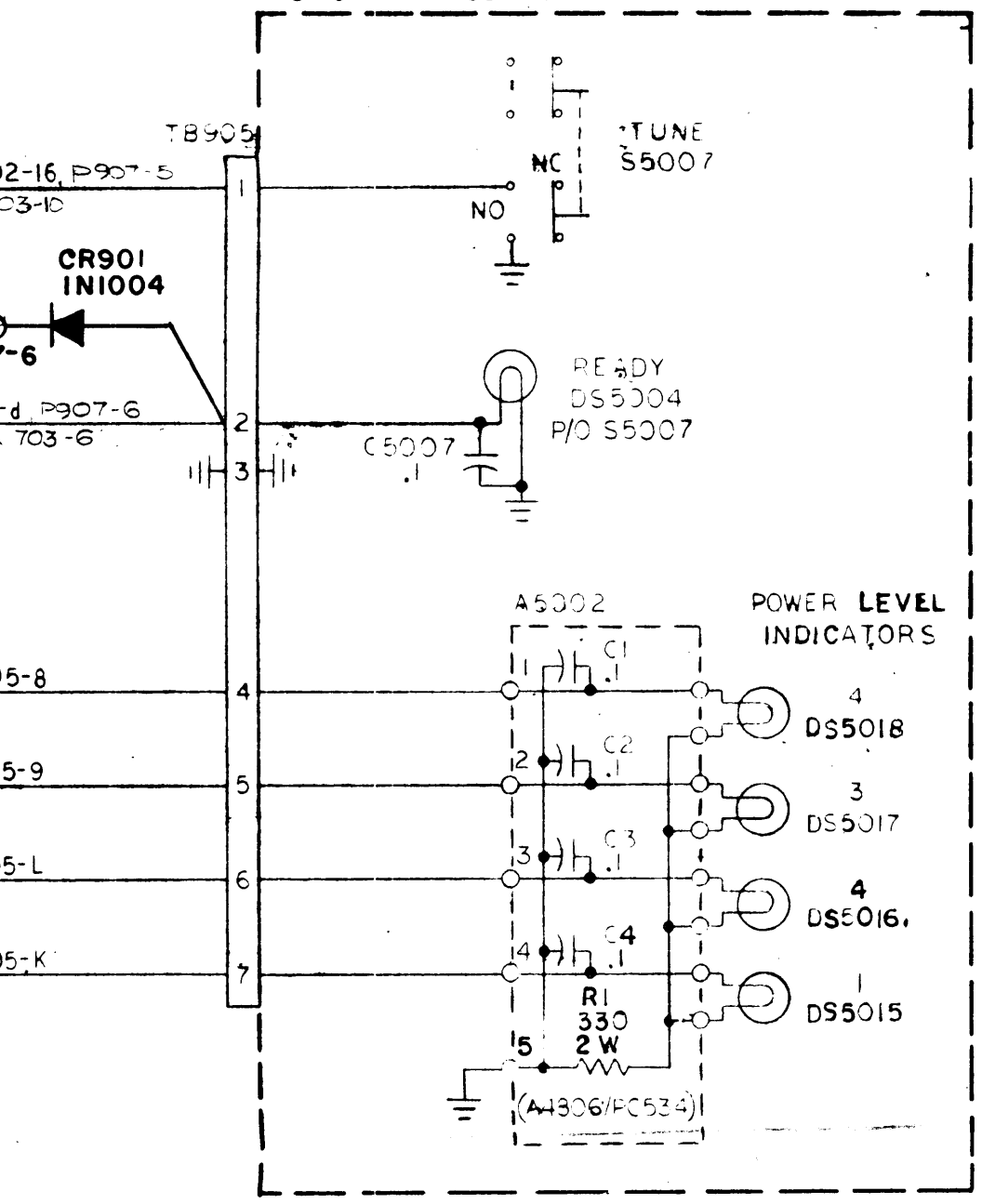
P906-R

A4003-8
A4001-3
A3002-32
CB3002B-NC
P906-U

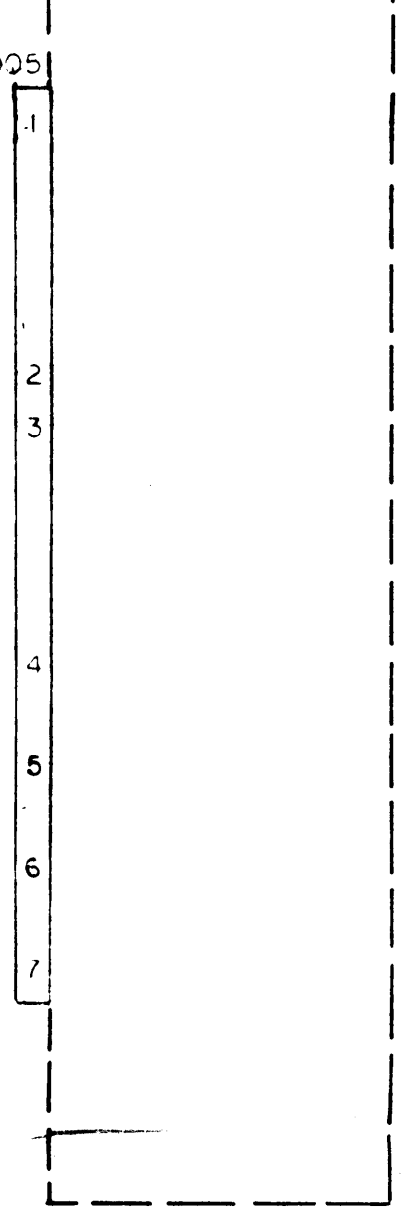
M801-3

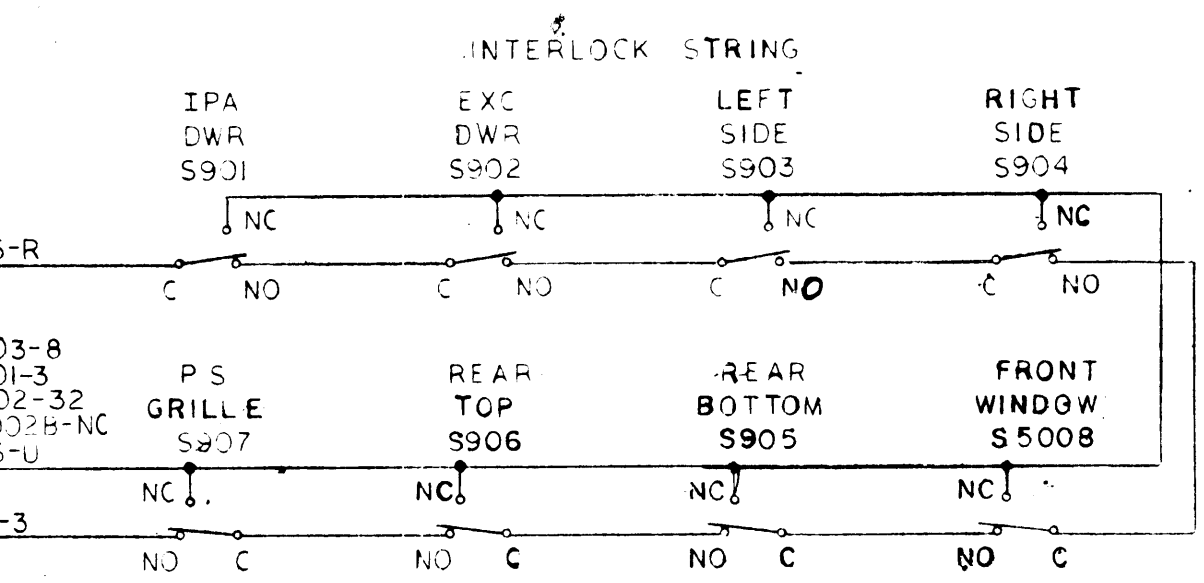
REVISIONS							
ZONE	LTR	DESCRIPTION	DATE	E.M.N.NO	DRAFT	CHKD	APPD

AUTO-TUNE CONNECTIONS



MANUAL TUNE CONNECTIONS





A4003-10
CB3002B-COM
A4003-11
C
NO
NC

XDS5003
TB902-6
C5001 .1
TB904-9
HV ON
DS5001
P/O S5001

XA707-1
P912-S
A3002-33
C5005 .1
INTLKS
DS5002

CR1 IN645
C10 .1
C9 .1
C8 .1
C7 .1
C6 .1
C5 .1
C4 .1
C3 .1
C2 .1
C1 .1
R1 330 2W
10 9 8 7 6 5 4 3 2 1
P905-M
P905-X
P905-m
P905-W
P905-v
P905-U
P905-T
A709(TB1-3)
P905-S
P905-R
P905-P

AUTO-TUNE CONNECTIONS

TB902
TB702-3
TB702-4
P912-H
A3002-19
P912-V
P912-e XA703-5
XDS5001
XA705-U
CR902
IN1004
MAN-AUTO
S5002
AUTO
MAN
C5004 .1
C5003 .1
C5002 .1

MANUAL-TUNE CONNECTIONS

TB902
ALDC
R5001
1K
R5002
1K
C5004 .1
C5003 .1
C5002 .1

TB903
XA702-E
XA702-B
P912-k
TB904-4
XA702-14
XA702-D
XA702-N
XA702-C
TUNE
S5003
H
L

TB903
NO
CONNECTIONS.

TO
SH. 2

900	
LAST SYM	MISS SYM
E902	
P914	P901,2
S907	
TB905	
CR902	

R1
330
2 W

(A4791/PC52)

P905-P

LEFT

AUTO-TUNE CONNECTIONS

MANUAL-TUNE CONNECTIONS

P/O TB904

XA703-K
XA703-8
P912-m
T803-Ø2(230V), TB903-4
XA703-7
XA703-J
XA703-F
XA703-H

1
2
3
4
5
6
7
8

LOAD
S5005

+

K801-NO, XDS5001
P912-E
P906-P, XDS5001

9
10

FAULT
DS5003

C5006
.1

P/O TB904

A3002-11
XA705-7
A3002-10
XA705-E

11
12
13
14

POWER
S5006

ADJ

P/O TB904

1
2
3
4
5
6
7
8
9
10
11
12
13
14

C5006
.1

HV ON
DS5003

A3002-16, P907-
XA703-10

CR901
IN100

P907-6

P912-d, P907-6
XA 703-6

XA705-8
XA705-9
XA705-L
XA705-K

P906-R

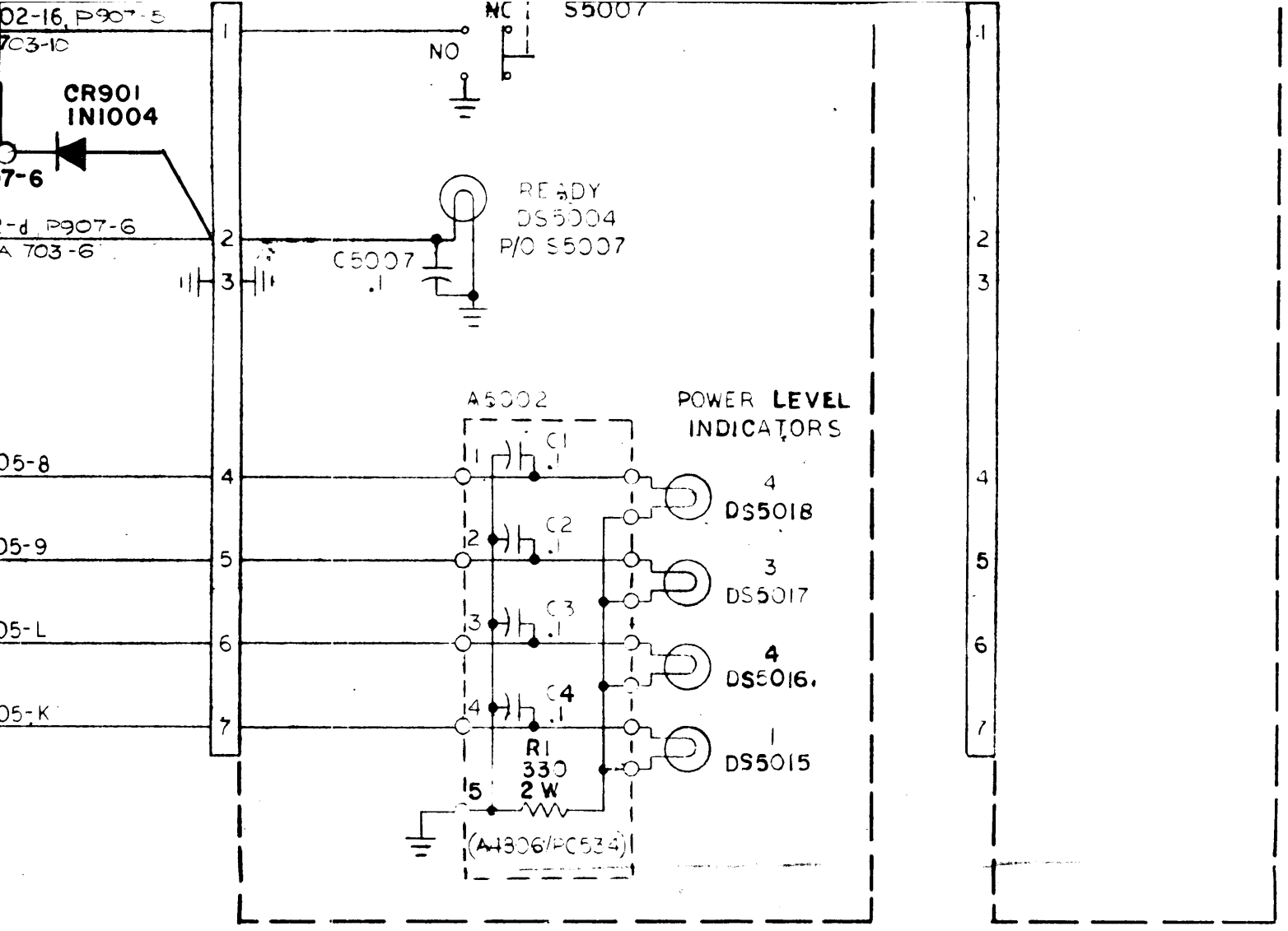
A4003-8
A4001-3
A3002-32
CB3002B-NC
P906-U

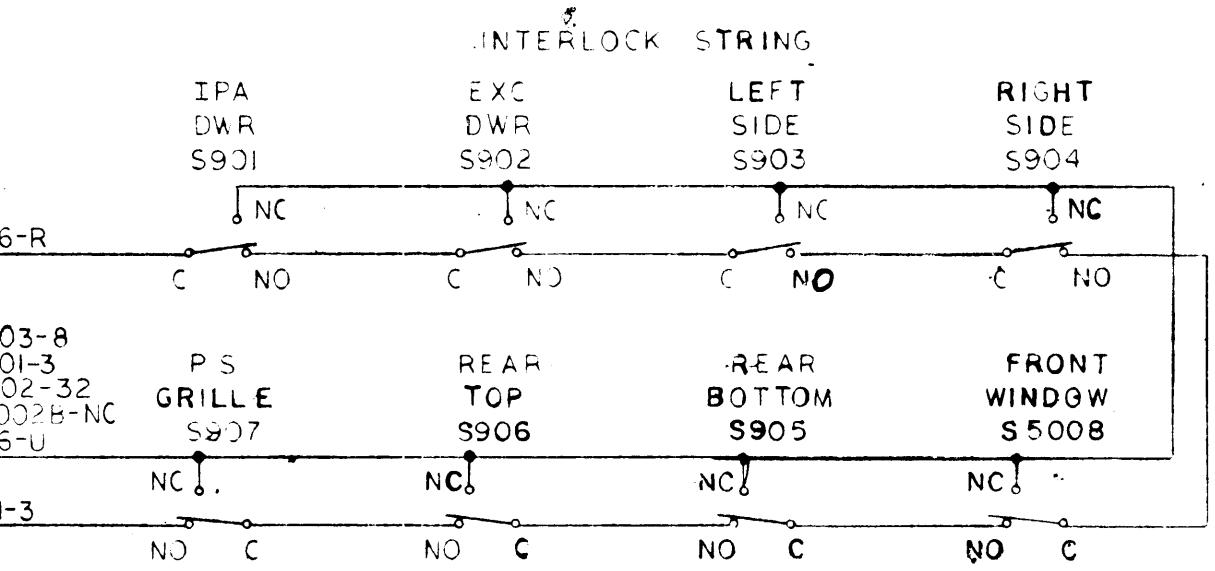
M801-3

A5001	
LAST SYM	MISS SYM
C10 CR1 R1	

A5002	
LAST SYM	MISS SYM
C4 R1	

5000	
LAST SYM	MISS SYM
A5002 C5007 DS5018 R5002 S5008 XDS5004	





TO SH 4

QTY REQ	ITEM	PART NO.	DESCRIPTION	SYMBOL

Figure 7-1. Schematic Diagram, HFL( )-10K
(Sheet 3 of 5)

7-7/7-8

CK2177-Ø

E814
E701
L701 185
L711 185
C701 .001 5 KV
C702 .001 5 KV
C703 .001 5 KV
C704 500pf 5 KV
C705 500pf 5 KV
C706 500pf 5 KV
C707 500pf 5 KV
C708 500pf 5 KV
C709 500pf 5 KV
C737 500pf 5 KV
C738 500pf 5 KV
V701 4CX10000J
C711 .001
L702 750
E702
R701 470 2W
P906-T
C712 .001
C710 500 V
P801
J701
C713 6800pf 4 KV
E817
L703 10
E703
T804-8
C714 6800pf 4 KV
E704
T804-10
C715 6800pf 4 KV
MANUAL-TUNE CONNECTIONS
V701 4CX10000J
C716 50pf 7.5KV
C717 50pf 7.5KV
C718 50pf 7.5KV
C719 50pf 7.5KV
XA701
NO CONNECTIONS
L E D B J F
TO SH.3
A702
-FOR
FOR
XA702
AUTO-TUNE CONNECTIONS
C716 50pf 7.5KV
C717 50pf 7.5KV
C718 50pf 7.5KV
C719 50pf 7.5KV
C725 10pf 5KV
C726 10pf 5KV
C727 10pf 5KV
A701
PA SENSE
T701
E708
E709
E710
R12 470K
R2 50 5W
R11 22K 2W
R1 50 5W
V1 5726
R7 470K
C720 100pf 5 KV
C721 100pf 5 KV
C722 10pf 5KV
C723 10pf 5KV
C724 10pf 5KV
E711
E1
E2
E3
E4
R3 22K 2W
C728 100pf 5 KV
C729 100pf 5 KV
V2 5726
C1 10pf
C2 18pf
R6 22K
C5 .1
R4 12K
T803-Ø2-15V
T8903-2

702 PA TUNE CAP ASS'Y

FOR AUTO-TUNE : SEE CK1757

FOR MANUAL-TUNE: AS SHOWN. NO CONNECTIONS TO XA702.

TUNE
A702CJ
20-750pf
10 KV

(AX5171)

A B C D E F K M N P S T 10 1 3 5 6 8 11 12 13 14

TB903-2
T803-Ø2-15V
TB903-8
T803-Ø1-15V
TB903-1
P907-V
P907-U
P907-H
TB903-7
XA703-5
P912-Q
P906-P
P905-N
P912-L
P907-D
TB803-Ø3 (230V)
P912-P
P907-F
P907-G
TB903-5

C731
2000pf
10 KV

L705
.2

A704 BANDSWITCH ASS'Y

SHOWN IN POSITION 1, BAND 1 (2-2.3 MHz.)

L1
.35

AUTO-TUNE CONNECTIONS

C1 100pf 15 KV
C2 100pf 15 KV
C3 100pf 15 KV
C4 100pf 15 KV

S1A BOTTOM
S1B TOP

L2
15

WHI
BLU
GRN

A B C P1

A704A1J3

NSE

(A4835/PC574)

R1 & R2, R9 & R10 ARE MATCHED PAIRS.

C8 .1
R10 47K
1K POT
R9 47K
C7 .1
C9 .1
R8 10K
C15 .1

XA701
L
K

P905-n, P907-B

L1 120
R13 470
C3 .1
C4 .1
R5 10K
CR1 1N3022B
C14 .1

E
C

XA705-J

R4 12K

R15 SHOWN AS NOMINAL VALUE. ACTUAL VALUE SET AT FACTORY DURING CALIBRATION.

D

P907-M

R14 10K
R15 47K
C6 .1

B

P904-9

L2 4
C10 .1
C11 .1
C13 .1
C12 .1
L3 4
V2

J

CR805⊕

F

C739
2000pf
10 KV

L705
35

C730
2000pf
10 KV

L704
35

E712

R803

P905 A704A1 BANDSWITCH CONTROL ASS'Y

P906-f
P906-g
P906-h
P906-j
P906-k
P906-L
P906-m
P906-n
P906-w
A5001-10
XA702-R, P904-5
A5001-1
A5001-2
A5001-3
A5001-4
A5001-5
A5001-6
A5001-7
A5001-9
A3001-2
A3001-11
A3001-10
A3001-9
A3001-8
A3001-7
A3001-6
A3001-5
A3001-3
S5004-R NO
S5004-L NO
A3001-4
A5001-8
XA701-L
P906-Y
P906-r

A B C D E F H J K L M N P R S T U V W X Y Z a b c d e f g h i j k m n p q

A704A1J1

A704A1J2

SEE CK1646

(AX5103)

A710

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

C732
2000pf
10 KV

AND 1 (2-2.3 MHz.)

C4
100pf
15 KV

(AS163)

L3
22

L707
9

SIB
TOP

SIC
BOT.

SID
TOP

MANUAL TUNE CONNECTIONS

C1
100 pf
15 KV

SIA
BOTTOM

B1

WHT
BLU
GRN
MOT

SEE CHARTS BELOW

A B C P1

A704A1J3

A704A1
BANDSWITCH
CONTROL
ASS'Y

SEE
CK1646

P904

A704A1J1

A704A1J2

A	XF3002
B	XF3001
C	XF3003
D	P903-G
E	P906-S
F	
H	P903-M
J	P903-L
K	P903-K
L	P903-J
M	
N	P903-H
P	
R	P906-b
S	P903-A
T	
U	
V	P903-F
W	P903-E
X	P903-D
Y	P903-C
Z	P907-A
a	P903-B
b	
c	P905-N
d	P906-a
e	P903-Q
f	P906-S
g	P906-d
h	P906-e
i	P906-f
j	P906-W
k	P906-X
m	P906-Y
n	P906-Z
p	P906-Z
q	XA701-B

(AX5103)

A703 PA LOAD CAP ASS'Y

FOR AUTO-TUNE SEE CK1636
FOR MANUAL-TUNE AS SHOWN. NO CONNECTIONS TO XA703.

LOAD
A703C1
5-750pf
5 KV

(AX5172)

XA703

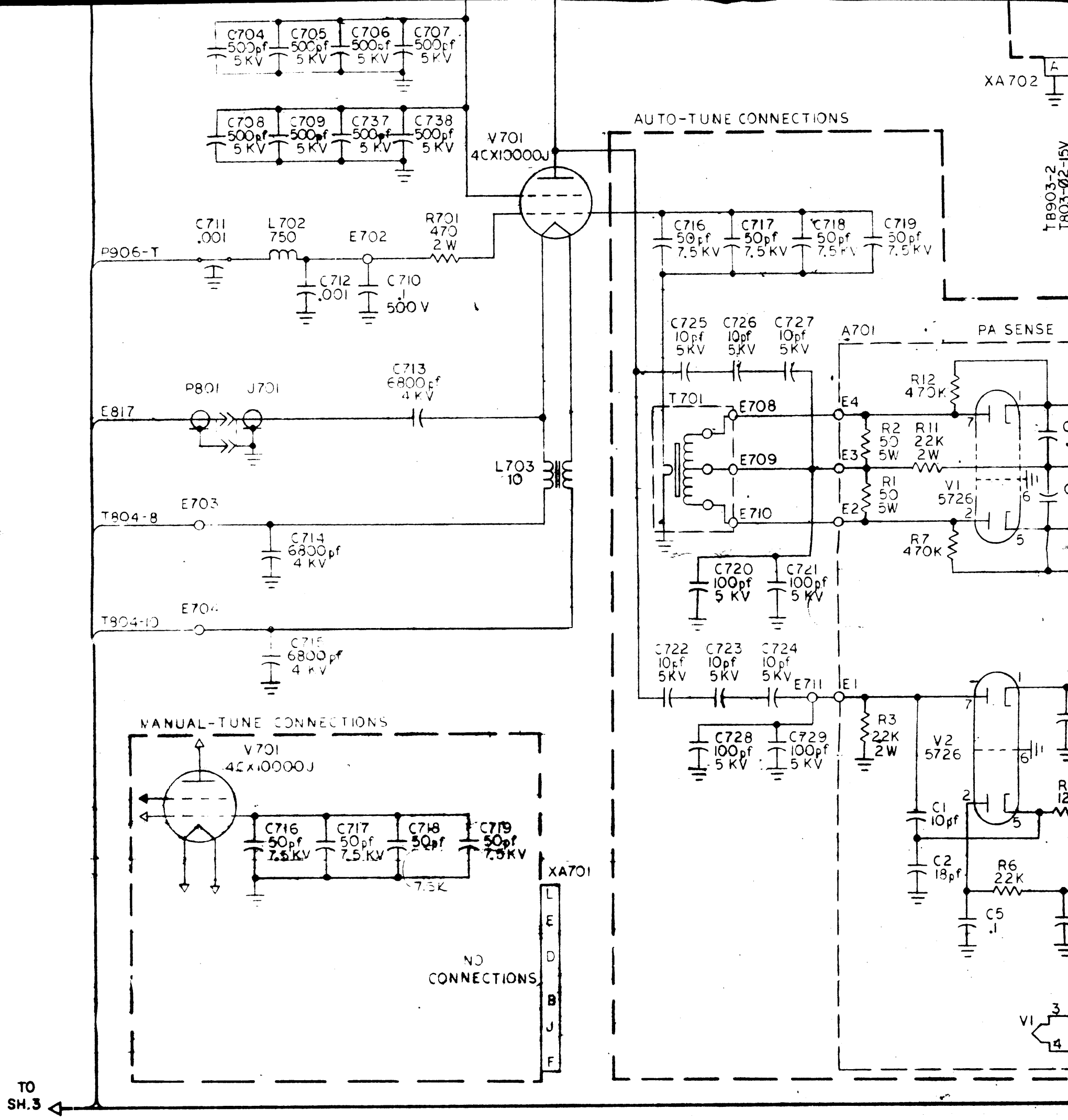
A B C D E F H J K L I 3 10 5 7 8 9 D 6

P907-L, P912-n
P907-K
TB701-1
TB904-7
TB904-8
TB904-6
TB904-1
P912-F
T803-Ø3 (230V)
P907-S
TB905-1
TB902-6, XA702 P
TB904-5
TB904-2
TB701-2, E813
TB905-2

A704S1	
POS	MHz
1	2.0-2.3
2	2.3-2.6
3	2.6-3.0
4	3-4
5	4-5
6	5-8
7	8-12
8	12-16
9	16-24
10	24-30
11	——
12	——

A704S1 TERMINAL SYMBOLS					
WAFER	POS	SYMBOL	WAFER	POS	SYMBOL
A	1	A704E1	B	12	A704E13
A	2	E2	C	10	E14
A	3	E3	C	11	E15
A	4	E4	C	12	E16
A	5	E5	D	1	E17
A	6	E6	D	2	E18
A	7	E7	D	3	E19
A	8	E8	D	9	E20
A	9	E9	D	10	E21
A	10	E10	D	11	E22
A	12	E11	D	12	A704E23
B	6	A704E12			

TO SH.5



700		A701		A704		A708		A710	
LAST SYM	MISS SYM	LAST SYM	MISS SYM	LAST SYM	MISS SYM	LAST SYM	MISS SYM	LAST SYM	MISS SYM
A709 P704	C748,49	C15		A1		C7		C3	
B701 R703	C741	CR1		B1		CR2		K2	
C750 S701	E705,6,13	E4		C4		E5		F1	
CP702 T701	J705	L3		L3		L1		TB1	
CR702 TB703	L705	R15		P1		Q1			
DC701 V701	XA704,6	V2		S1		R5			
E717 XA707		XV2							
F701 FX701									
J706 XV701									
L711									

NOTE:
SEE AP
FOR LA
CHARTS
SUB - A

A702
A702-

A703
A703-A
A703-A

A704-

A705
A705-A

A706

A707

(AX5171)

A702 A B C D E F K M N P S R 10 1 3 5 6 3 11 12 13 14

TB903-2 T803-Ø2-15V
TB903-8
T803-Ø1-15V TB903-6
TB903-1
P907-V
P907-U
P907-H
TB903-7
XA703-5
P912-Q
P906-P P905-N
P912-L
P907-D
TB803-Ø3 (230V)
P912-P
P907-F
P907-G
TB903-5

C731 2000pf 10 KV

C1 100pf 15 KV
C2 100pf 15 KV
C3 100pf 15 KV
C4 100pf 15 KV

S1A BOTTOM
S1B TOP

L2 15

WHI
BLU
GRN
A B C P1
A704A1J3

SENSE

(A4835/PC574)

R1 & R2, R9 & R10 ARE MATCHED PAIRS.

C8 .1
R10 47K
1K POT
R9 47K
C7 .1
C9 .1
R8 10K
XA701
P905-n, P907-B
C15 .1

L1 120
R13 470
C3 .1
C4 .1
R5 10K
CR1 1N3022B
C14 .1
XA705-J

R4 12K

R15 SHOWN AS NOMINAL VALUE. ACTUAL VALUE SET AT FACTORY DURING CALIBRATION.

P907-M

R14 10K
R15 47K
P904-9

C6 .1
L2 4
CR805
C10 .1
C11 .1
C13 .1
C12 .1
L3 4
V1
V2

C739 2000pf 10 KV
L705 35
C730 2000pf 10 KV
L704 35
E712
R803

P905 A704A1

P906-P
P906-g
P906-h
P906-j
P906-k
P906-L
P906-m
P906-n
P906-W
A5001-10
XA702-R, P904-9
A5001-1
A5001-2
A5001-3
A5001-4
A5001-5
A5001-6
A5001-7
A5001-9
A3001-2
A3001-11
A3001-10
A3001-9
A3001-8
A3001-7
A3001-6
A3001 5
A3001-3
S5004-R NO
S5004-L NO
A3001-4
A5001-8
XA701-L
P906-Y
P906-r

A704A1J1

BANDSWITCH CONTROL ASS'Y

SEE CK1646

(AX5103)

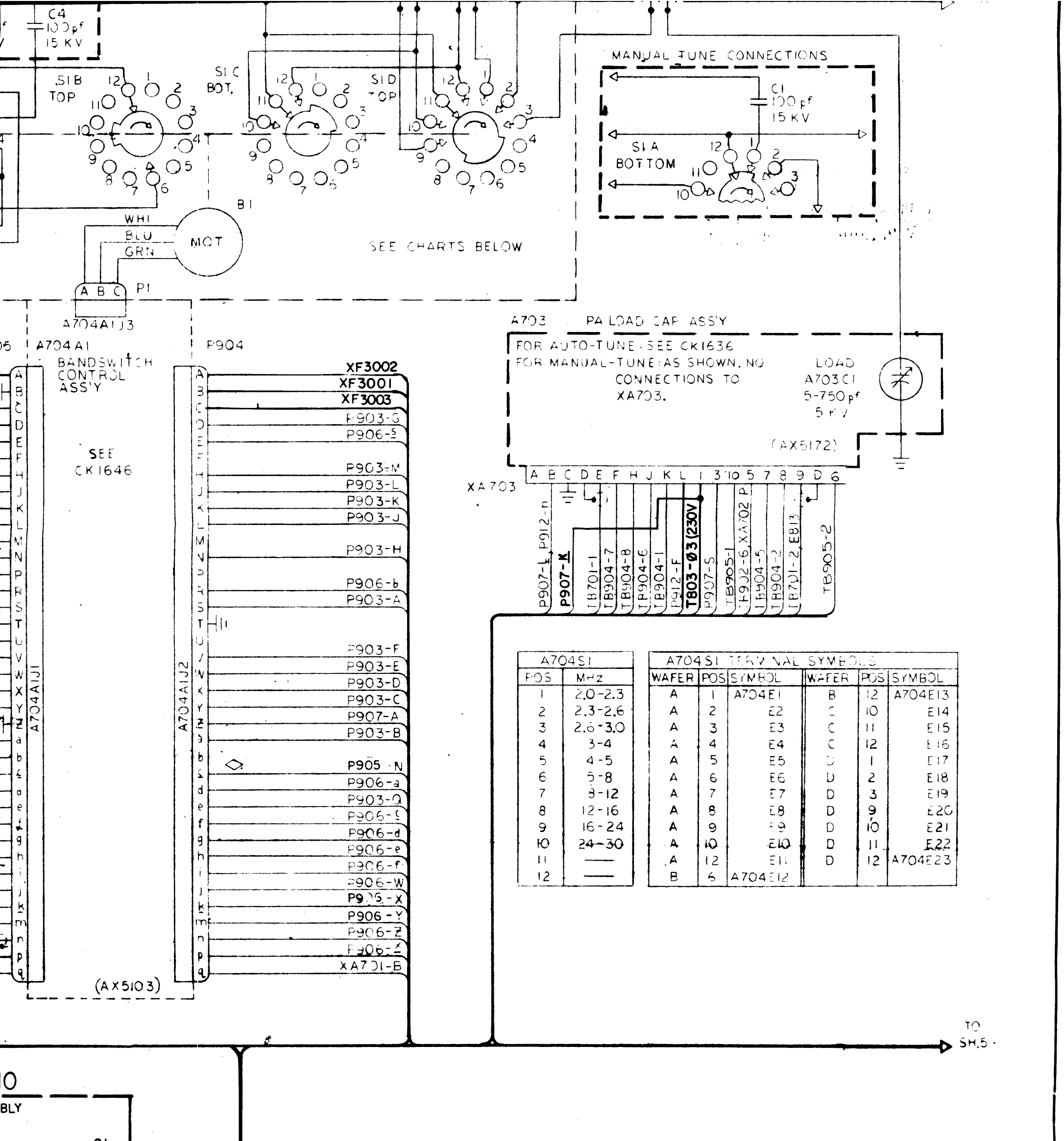
NOTE:
SEE APPROPRIATE SCHEMATICS FOR LAST & MISSING SYMBOLS CHARTS FOR THE FOLLOWING SUB-ASSEMBLIES:

A702
A702-A1
A703
A703-A1
A703-A2
A704-A1
A705
A705-A1
A706
A707

A710

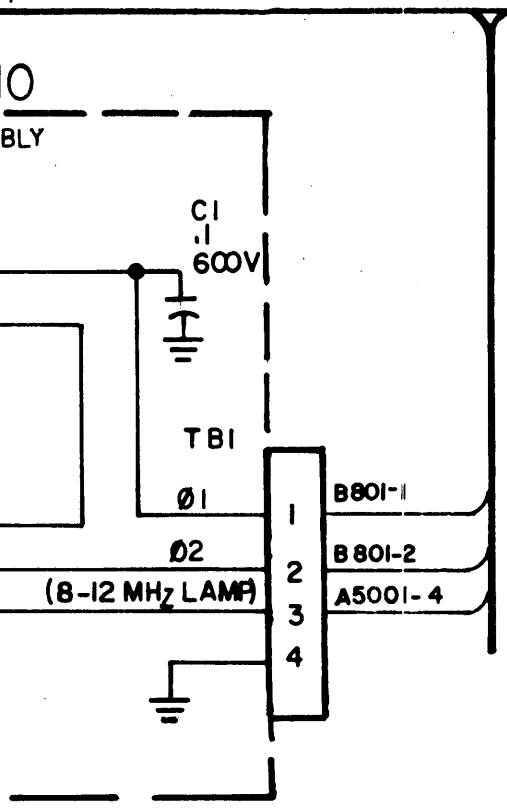
8-12MHz DECOUPLING ASSEMBLY

K1
F1, 2A
C1 .1 600V
K2 SHOWN IN THE 8-12MHz BAND
K2
2 7 4 1 3 5 8 6
TB1
Ø1
Ø2
(8-12MHz LAMP)
C2 .1 600V
C3 .1 600V
1 2 3 4



A704S1	
POS	MHz
1	2.0-2.3
2	2.3-2.6
3	2.6-3.0
4	3-4
5	4-5
6	5-8
7	8-12
8	12-16
9	16-24
10	24-30
11	—
12	—

A704S1 TERMINAL SYMBOLS					
WAFER	POS	SYMBOL	WAFER	POS	SYMBOL
A	1	A704E1	B	12	A704E13
A	2	E2	C	10	E14
A	3	E3	C	11	E15
A	4	E4	C	12	E16
A	5	E5	D	1	E17
A	6	E6	D	2	E18
A	7	E7	D	3	E19
A	8	E8	D	9	E20
A	9	E9	D	10	E21
A	10	E10	D	11	E22
A	12	E11	D	12	A704E23
B	6	A704E12			



QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL

Figure 7-1. Schematic Diagram, HFL( )-10K
(Sheet 4 of 5)

7-9/7-10

CK2177-Ø

J704 A B C D E F G H J K L M N P Q R S T

P903 CONNECTS TO J704 WHEN FIXED FILTER OR NO FILTER IS USED.

RF OUTPUT J703

P/O D.C.

A706 HARMONIC FILTER

TO SH 4

A706E1

A706J1

J702 P/O D.C.

DC701

FWD CR701

REFL CR702

CP701 P/O D.C.

CP702 P/O D.C.

P701

P702

P903 A706J2

P904-S
P904-d
P904-Y
P904-X
P904-W
P904-V
P904-D
P904-N
P904-L
P904-K
P904-J
P904-H
XA705-U
P904-e
J706-A
XF3003
XF701

SEE APPROPRIATE SCHEMATIC DIAGRAM FOR FILTER USED.

E714 E715

C733 .1 C734 .1

L708 120 L709 120

E716 E717

C735 .1 C736 .1

XA705-S

XA705-20

A706E2

P703 E707

A708 (RF SENSE)

R5, 1K R4, 1K R1 2.2K

C740 5pf

XA705-M E3

Q 2N1711

C4 .01 CR1 IN914

C5 25UF, 50V. 01 C1

A3001-40

L1 220 UF C6 .1

R3, 4.7K CR2 IN914 E2

C7 18 PF E5

C741 18pf

C3 4UF, 50V

R2, 1K C2 .1UF

PC797 A5742

E4

AUTO-TUNE CONNECTIONS

XA707 A707 ALDC

TB703-1

P907-m, XA705-1

P912-a, A3001-26

XDS5002

TB702

XA705-3

XA705-4

TB902-1

TB902-2

C742 .1
C743 .1
C744 .1
C745 .1
C746 .1
C747 .1

SEE CK1850

(A4856)

MANUAL-TUNE CONNECTIONS

XA707 A707

C742 .1
C743 .1
C744 .1
C745 .1
C746 .1
C747 .1

SEE CK1850

(A4856)

TB702

TB703-7
TB703-1
P912-b
TB904-14
A3002-9
TB701-1, A5626-10
XA701-E, A5626-1
TB905-7
TB905-6
A708-2, A5626-
TB703-4
A3002-4
E717
TB902-8, P903-
A3002-25
A4003-9
XA707-8, A5626
A3002-10
TB702-1
TB702-2
A3002-11
A3002-5
TB904-12
TB905-4
TB905-5
A3002-6
A3002-7
A3002-8
TB703-5
A3002-3
A3002-2
A3002-1
A3002-23
TB703-8
P907-5
E716
A3001-40
A801TB1-2
A3002-31
XF3001, P903-
XF3002, P903-1

TO SH 4

NOTE 1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR

POWER

XA705 — A705 LEVEL ASS'Y

A
B
C
D
E
F
H
J
K
L
M
N
P
S
U
V
W
Z
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
22

5626-10

A5626-11

A5626-8

,P903-P

A5626-9

* SHIELDS OF PINS C & 20 STIED TOGETHER. (AX5173)

FOR AUTO-TUNE:
SEE CK1645

FOR MANUAL-TUNE:
SEE CK1947

HEAT OVLD

TB901 — S701

1
2
3
4

TOP FAN
B701

MOT

GRN-BLU
RED
YEL
VIO-BRN

P704
J706

A B C D

P903-R

P903-T

TOP FAN
F701
1/2 A

C750
4
600V

SCREEN CURRENT
M4001

MA

A4001

+ −

CR803
A4002-1

2
4
1

R2
1.2K

Q1
2N1595

OVLD
IND

DS1

C3
.1

R1
120

R3
1K

DS2

C1
50
15V

DS3

5

C2
.1

CR1
1N2484

A4002-3,S904-NC

3

(A4800/PC529)

PLATE CURRENT
M4002

A

A4002

C807

2
4
1

A4001-1,A4003-10

R2
1.2K

Q1
2N1595

OVLD
IND

C3
.1

R1
120

R3
1K

DS1

DS2

C1
50
15V

DS3

5

C2
.1

CR1
1N2484

A4001-3,A4003-8

3

(A4800/PC529)

AUTO-TUNE CONNECTIONS

TB701

XA703-E,XA705-H

XA703-9

1
2

E4001

R4001
6.8K

LOAD SENSE
M4003

uA

MANUAL-TUNE CONNECTIONS

TB701

1
2

NO
CONNECTIONS

XA705-W

A4002-1
S5001-2 NO

A3002-39

XA707-7
XA705-C

XA705-N

XA705-13

P912-U
XA705-B

P912-C
XA705-18

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

TO SH 4

A706E1

A706J1 P/O D.C.

P903 | A706J2

P904-S
P904-a
P904-Y
P904-X
P904-W
P904-V
P904-D
P904-N
P904-L
P904-K
P904-J
P904-H
XA705-U
P904-e
J706-A
XF3003
XF701

A B C D E F G H J K L M N P Q R S T

SEE APPROPRIATE SCHEMATIC DIAGRAM FOR FILTER USED.

FWD CR701
REFL CR702

CP701 P/O D.C.
CP702 P/O D.C.

P701
P702

E714
E715

C733 .1
C734 .1

L708 120
L709 120

E716
E717

C735 .1
C736 .1

XA705-S

XA705-20

A706E2

A708 (RF SENSE)

P703
E707

C740 5pf

R5, 1K
R4, 1K
R1 2.2K
CR1 IN914
C4 .01
C5 25UF, 50V
C1 .01
Q 2N1711
XA705-M
E3
L1 220 UF
C6 .1
C3 4UF, 50V
R2, 1K
C7 18 PF
CR2 IN914
C2 .1UF
R3, 4.7K
E2
E5
E4
A3001-40
PC7e-A5742

C741 18pf

AUTO-TUNE CONNECTIONS

XA707 A707 ALDC

TB703-1
P907-m, XA705-1
P912-a, A3001-26
XDS5002
TB702
XA705-3
XA705-4
TB902-1
TB902-2

C742 .1
C743 .1
C744 .1
C745 .1
C746 .1
C747 .1

7 8 2 1 4 6 3 5

SEE CK1850 (A4856)

MANUAL-TUNE CONNECTIONS

XA707 A707

C742 .1
C743 .1
C744 .1
C745 .1
C746 .1
C747 .1

1 2 3 4 TB702

7 8 2 1 4 6 3 5

SEE CK1850 (A4856)

P912-b
TB904-1
A3002-9
TB701-1,A
XA701-E
TB905-7
TB905-6
A708-2
TB703-4
A3002-4
E717
TB902-6
A3002-2
A4003-9
XA707-8
A3002-10
TB702-1
TB702-2
A3002-1
A3002-9
TB904-12
TB905-4
TB905-5
A3002-6
A3002-7
A3002-8
TB703-5
A3002-3
A3002-2
A3002-1
A3002-2
TB703-8
P907-5
E716
A3001-4
A801TB1-
A3002-
XF3001
XF3002

TO SH 4

NOTE 1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATION PREFIX THE PART DESIGNATION WITH THE SUB ASSEMBLY DESIGNATION.

NOTE 2. <> IS A REFERENCE INDICATOR FOR THE +24V REGULATED DC SUPPLY.

NOTE 3. UNLESS OTHERWISE SPECIFIED:
ALL RESISTANCE VALUES IN OHMS 1/2 WATT.
ALL CAPACITANCE VALUES IN MICROFARADS.
ALL INDUCTANCE VALUES IN MICROHENRIES.

J704-A J704-B J704-C J704-D J704-E J704-F J704-G
E1 E2 E3 E4 E5 E6 E7

PC 732/A5

ALDC CONT

P912-E
TB904-14
A3002-9
TB701-1, A5626-10
XA701-E, A5626-11
TB905-7
TB905-6
A708-2, A5626-8
TB703-4
A3002-4
E717
TB902-8, P903-P
A3002-25
A4003-9
XA707-8, A5626-9
A3002-10
TB702-1
TB702-2
A3002-11
A3002-5
TB904-12
TB905-4
TB905-5
A3002-6
A3002-7
A3002-8
TB703-5
A3002-3
A3002-2
A3002-1
A3002-23
TB703-6
P907-S
E716
A3001-40

FOR AUTO-TUNE:
SEE CK1645

FOR MANUAL-TUNE:
SEE CK1947

* SHIELDS OF PINS C & 20 TIED TOGETHER.
(AX5173)

HEAT OVLD
TB901 S701
A801TB1-2
A3002-31

TOP FAN
B701
MOT
GRN-BLU
RED
YEL
VIO-BRN
P704
J706
A B C D
XF3001, P903-R
XF3002, P903-T
C750
4
600V
TOP FAN
F701
1/2 A

J704-E E5
J704-F E6
J704-G E7
J705-M E8
XA705-L E9
XA705-H E10
XA705-J E11

732/A5626
DC CONTROL (A4103)

A4001
CR803
A4002-1
2
4
1
R2
1.2K
Q1
2N1595
OVLD
IND
C3
.1
R1
120
R3
1K
DS1
DS2
DS3
C1
50
15V
5
C2
.1
CR1
IN2484
A4002-3, S904-NC
3
(A4800/PC529)

PLATE CURRENT
M4002
A
A4002
C807
A4001-1, A4003-10
A4001-3, A4003-8

AUTO-TUNE CONNECTIONS
LOAD SENSE
M4003
TB701
E4001
R4001
6.8K
XA703-E, XA705-H
XA703-9
1
2
uA

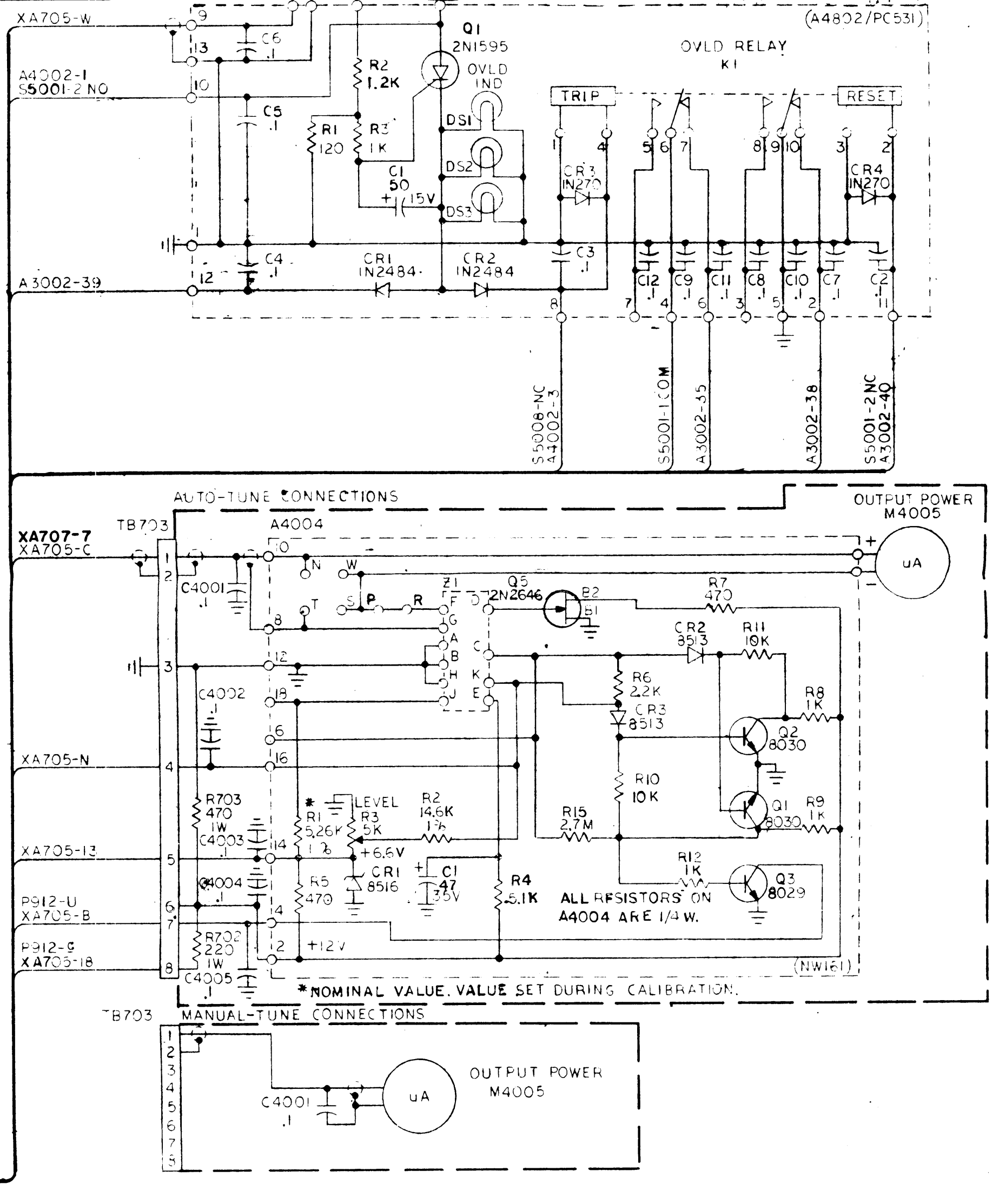
MANUAL-TUNE CONNECTIONS
TB701
1
2
NO
CONNECTIONS

A4002	
LAST SYM	MISS SYM
A4004	
C4005	
F4001	
M4005	

A4001-A4002	
LAST SYM	MISS SYM
C3	
CR1	
DS3	
E5	
Q1	
xDS3	

A4103	
LAST SYM	MISS SYM
C12	
CR4	
DS3	
E13	
K1	
Q1	
R3	
xDS3	
xK1	

A4004	
LAST SYM	MISS SYM
C1	
CR3	E1,3,5,7,
E18	9,11,13,15,17
Q5	Q4
R15	R13,14
Z1	



A4004

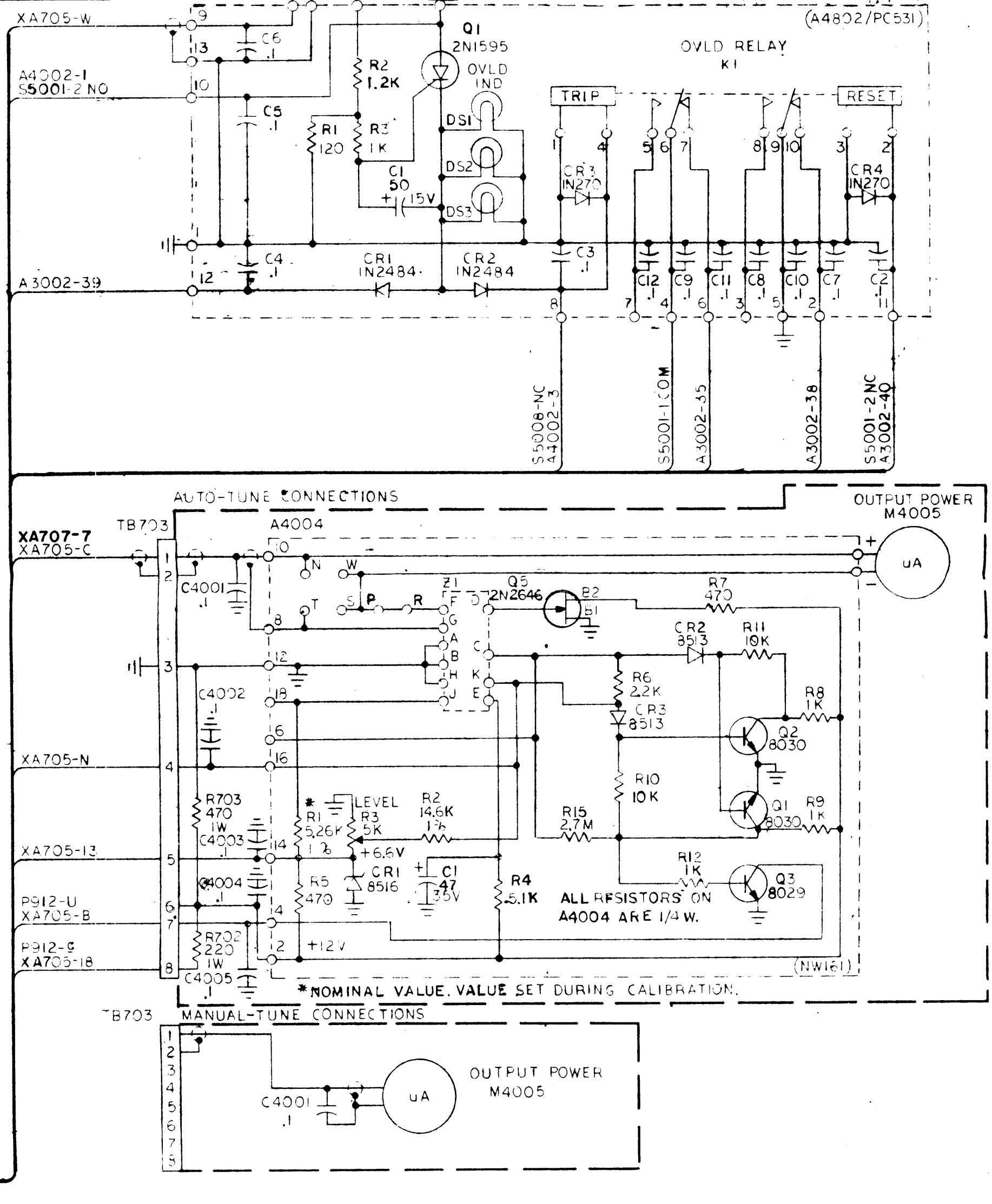
LAST SYM	MISS SYM
C1	
CR3	E1,3,5,7,
E18	9,11,13,15,17
Q5	Q4
R15	R13,14
Z1	

QTY REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL

Figure 7-1. Schematic Diagram, HFL( )-10K
(Sheet 5 of 5)

7-11/7-12

CK2177-0



A4004

LAST SYM	MISS SYM
C1	
CR3	E1,3,5,7,
E18	9,11,13,15,17
Q5	Q4
R15	R13,14
Z1	

QTY REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL

Figure 7-1. Schematic Diagram, HFL( )-10K
(Sheet 5 of 5)

7-11/7-12

CK2177-0