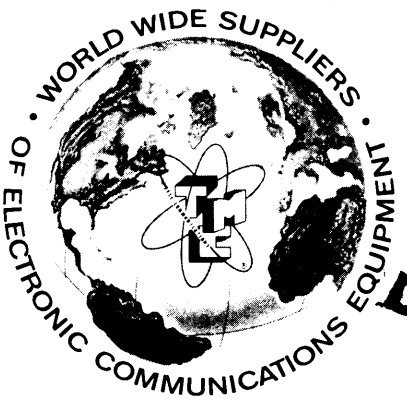

TECHNICAL MANUAL

FOR

FTM-1KJ2B
HIGH FREQUENCY TRANSMITTER

PUBLICATION NUMBER

120-2116-002

ISSUE DATE

March 31, 1980

THE TECHNICAL MATERIEL CORPORATION

CABLE: TEPEI 700 FENIMORE ROAD, MAMARONECK, NY 10543 U.S.A. TLX: 137-358
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TMC (CANADA) LIMITED **TMC INTERNATIONAL**
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001		The following pages have been up-graded		
		1-2, 2-11, 4-2, 2-7, 2-1, 4-1, 6-1, 2-10	21933	RU
		Appendix "B" see 001 Revision		
002		APPENDIX "B" PAGES 6-3, 7-3 HAVE BEEN UP-GRADED	21998	RU

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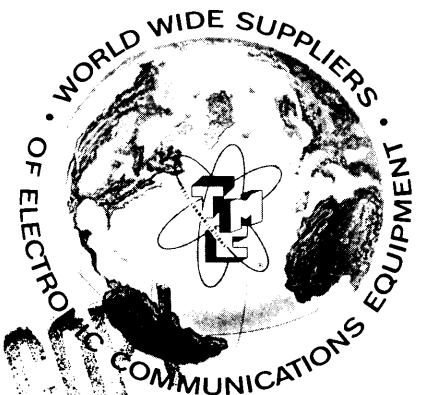

TECHNICAL MANUAL

FOR

HFTM-1KJ2B
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001		The following pages have been up-graded		
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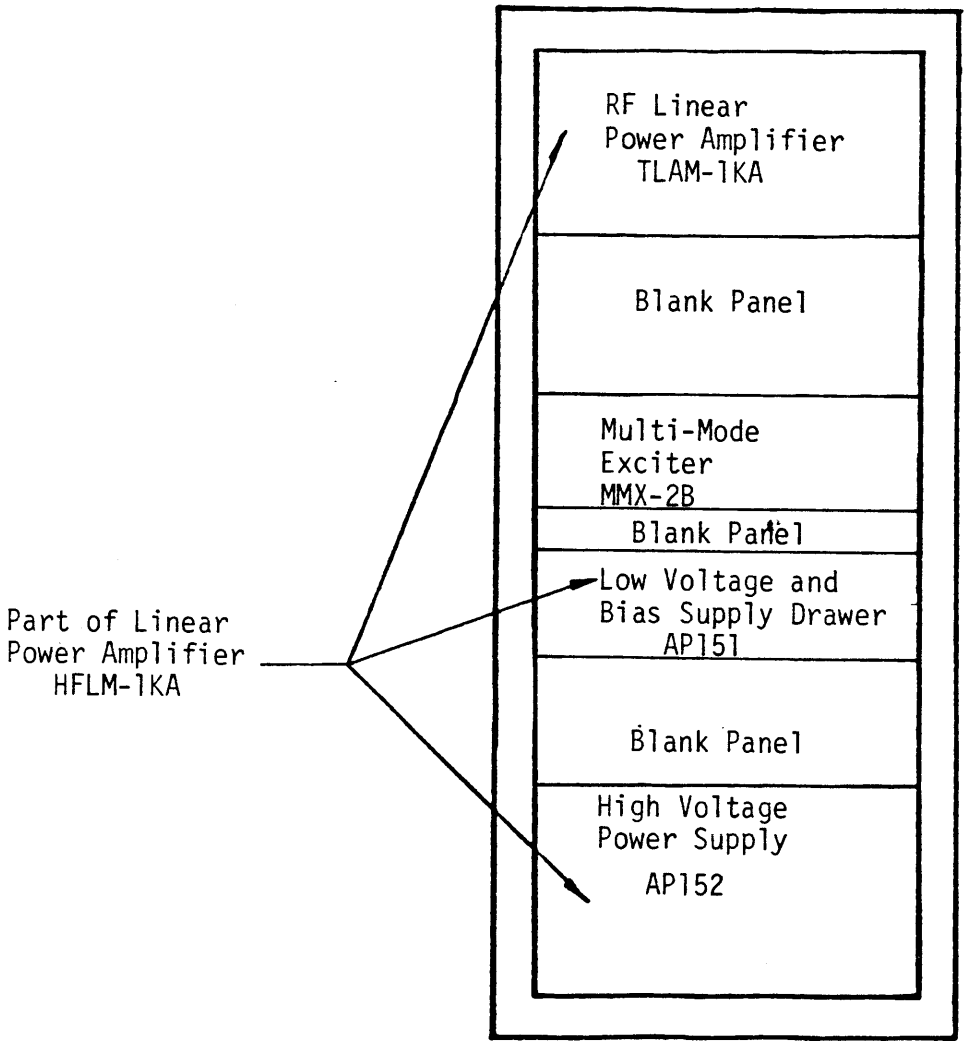
		Appendix "B" see 001 Revision		

NOTE: Please file Technical Newsletters at back of manual for permanent record.

TABLE 1-1. COMPONENTS OF HIGH FREQUENCY TRANSMITTER HFTM-1KJ2B

NOMENCLATURE	COMMON NAME
MMX-2B	MULTI-MODE EXCITER
HFLM-1KA consisting of: TLAM-1KA AP-151 AP-152	LINEAR POWER AMPLIFIER RF LINEAR POWER AMPLIFIER LOW VOLTAGE AND BIAS SUPPLY HIGH VOLTAGE POWER SUPPLY



*NOTE
Blank Panel arrangement may vary depending upon equipment requirements.

Figure 1-2. Physical Configuration of HFTM-1KJ2B

SECTION 2

INSTALLATION

2-1. INITIAL UNPACKING AND INSPECTION.

The HFTM-1KJ2B transmitter was assembled, calibrated and tested at the factory before shipment. Inspect all packages for possible damage during transit. With respect to damage to the equipment for which the carrier is liable, The Technical Materiel Corporation will assist in describing methods of repair and furnishing of replacement parts. Carefully unpack each crate as indicated by the packing list provided with the transmitter shipment. Inspect all packing materials for parts that may have been shipped as loose items (cabinet hardware, connectors, technical manuals, etc.) Refer to figure 2-1 for typical preparation for shipments.

2-2. POWER REQUIREMENTS.

The transmitter requires a single phase source of 115/230 vac, 50/60 hz at appromimately 3.75 kilowatts.

2-3. INSTALLATION.

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

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

b. Equipment Cabinet Installation. Remove equipment cabinet from crate and positive upright (mounting holes and primary power input connections are located on the bottom portion of the equipment cabinet). Position the equipment cabinet in the desired location, allowing a minimum clearance of two feet on the top and all sides for maintenance and installation purposes. It is of particular importance that a minimum clearance of two feet be allowed in the rear of the cabinet for door removal and external cable connections.

Using mounting hardware and the holes located in the base of the cabinet, secure the equipment cabinet in position.

h. RF Output Connection. The rf output terminal jack J10 is located on the interface panel. Connect a 50 ohm transmission line to J10, using the r f connector plug UG59/U. The transmission line must be terminated into a 50 ohm dummy load or antenna.

i. Primary Power Connection. The transmitter leaves the factory wired for 115 vac or 230 vac operation (as per customer requirements). Transmitter power requirements are 115/230 vac, 50/60 hz at approximately 3.75 kw. The power input connection is J2001 or TB2001 either of which is located in the bottom rear of the equipment cabinet (refer to figure 2-6).

WARNING

BEFORE CONNECTING PRIMARY POWER INPUT LINES TO THE TRANSMITTER, INSURE THAT THE EXTERNAL PRIMARY POWER IS OFF AND TAGGED.

If primary power input lines require J2001, use the ac connector plug PL190-NG which is supplied as a loose item. If primary power input lines connect to TB2001, use (3) lugs TE141-3 supplied as a loose item.

NOTE

The transmitter cabinet is equipped with two safety interlock switches, S2001 and S2002 (refer to figure 2-6), which must be closed before operating the transmitter. The rear door interlock S2001 is closed when the rear door is mounted and fastened on the equipment cabinet; the high voltage power supply interlock S2002 is closed when the AP152 power supply drawer is mounted and fastened with panel locks in the equipment cabinet.

8 7 6

D C B

LIN AMP
TLAM-1K

J1006 RF OUT
P3001 INTFC J10

J1005 ALDC
P2005 INTFC J2

J1004 RF IN
P2004 INTFC J1

J1003
P2003

A	API51 J301-U
B	S2001-COM
C	INTFC J7-D
D	API51 J301-m
E	INTFC J7-Y
F	INTFC J8-a
G	INTFC J8-c
H	API51 J301-2
I	API51 J301-W
J	
K	API51 J301-X
L	
M	
N	API51 J301-Y
O	GND
P	API51 J301-Z, a
R	API51 J301-b, c
S	API51 J301-d, e
T	API51 J301-f, g
U	API52 J101-I
V	API51 J301-h
W	API51 J301-j
X	API51 J301-k
Y	API52 J101-J
Z	API52 J101-K
a	API52 J101-K
b	
c	
d	API52 J101-L
e	
f	
g	
h	
j	
k	

J1002 2 KV
P2002 API52 A103-E1

J1001 4 KV
P2001 API52 R102

INTERFACE

EXCITER CONTROL J6

EXCITER-XMTR INTERCONNECT J5

API52 J101-A		A	AC
GND		B	GND
API52 J101-B		C	AC
API51 J301-A	INTFC J7-A	D	+24 VDC
API51 J301-P	INTFC J7-T	R	XMTR PT
GND		S	GND
GND		U	GND

EXT 1 MHz J4

RF MON J3

ALDC J2
TLA J1003

RF IN J1
TLA J1004

CA 180-36-XX

INTERFACE

EXCITER CONTROL J6

ITER XMTR ERCONNECT J5

	A	AC
	B	GND
	C	AC
FC J7-A	D	+24 VDC
FC J7-T	R	XMTR PTT
	S	GND
	U	GND

EXT 1MHz J4

RF MON J3

ALDC J2

RF IN J1

6-XX

RF OUT J10 P3002

TLA J1006

XMTR READBACK J8

INTFC J7-A	A	+24 VDC
API51 J301-P	B	NO] RECEIVER (1)
API51 J301-r	C	COM] MUTE
API51 J301-S	D	NC]
API51 J301-X	E	NC] OVERLOAD (2)
API51 J301-Y	F	NO] INDICATOR
API51 J301-C	H	+] HV ON (3)
API51 J301-B	P	] INDICATOR
GND	R	GND
TLA J1003-F	S	FWD PWR
TLA J1003-G	T	REFL PWR
GND	U	GND

XMTR CONTROL J7

INTFC J5-D, INTFC J8-A	A	+24 VDC
S2002-NO	B	COM] EXTERNAL (4)
API51 J301-n	C	NO] INTERLOCKS
API51 J301-V, TLA J1003-C	D	NC]
API51 J301-D	E	COM] OVERLOAD (5)
API51 J301-Q	F	NO] RESET
API51 J301-Z	G	NC]
API51 J301-J	K	AUTO RESET RECYCLE
GND	Q	GND
API51 J301-3	R	HV ON
GND	S	GND
INTFC J5-R	T	XMTR PTT
GND	U	GND
GND	X	GND
TLA J1003-E	Y	OUTPUT METER CONT
GND	Z	GND

IF EXTERNAL CONTROLS ARE NOT USED JUMP J7 PINS AS SHOWN.

XMTR PTT IS CONTROLLED BY J5-R OR J7

					REVISI
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION
	1			-	ORIGINAL RELEASE FOR PRODUC
[illegible]	[illegible]	[illegible]		A	[illegible]
21934	[illegible]			B	AC T.DRGTS REVISED

LV PWR SPLY
AP151

J301

P2006

A	INTFC J5-D
B	INTFC J8-R
C	INTFC J8-P, AP151 J301-2
D	INTFC J7-E, AP152 J101-F
E	AP152 J101-H
F	AP152 J101-M
G	AP152 J101-N
H	
J	
K	
L	
M	
N	
P	INTFC J5-R
Q	INTFC J7-F
R	AP152 J101-G
S	
T	
U	TLA J1003-A
V	INTFC J7-D, S2001-NC
W	TLA J1003-I
X	TLA J1003-K
Y	TLA J1003-N
Z	TLA J1003-P
a	TLA J1003-P
b	TLA J1003-R
c	TLA J1003-R
d	TLA J1003-S
e	TLA J1003-S
f	TLA J1003-T
g	TLA J1003-T
h	TLA J1003-V
J	TLA J1003-W
k	TLA J1003-X
L	
m	TLA J1003-D
n	INTFC J7-C
p	INTFC J8-B
r	INTFC J8-C
s	INTFC J8-D
t	
u	INTFC J7-K
V	
W	
x	INTFC J8-G
y	INTFC J8-H
z	INTFC J7-G
2	TLA J1003-H, AP151 J301-C
3	INTFC J7-R
4	
5	
6	GND

A	+24 VDC	
B	NO	RECEIVER MUTE (1)
C	COM	
D	NC	
G	NC	OVERLOAD INDICATOR (2)
H	NO	
P	+	HV ON INDICATOR (3)
R		
Z	GND	
a	FWD PWR	
b	REFL PWR	
c	GND	

A	+24 VDC	
B	COM	EXTERNAL INTERLOCKS (4)
C	NO	
D	NC	
E	COM	OVERLOAD RESET (5)
F	NO	
G	NC	
K	AUTO RESET RECYCLE	
Q	GND	
R	HV ON	
S	GND	
T	XMTR PTT	
U	GND	
X	GND	
Y	OUTPUT METER CONTROL	
Z	GND	

HV PWR SPLY
AP152

R102
4 KV

A103-E2
2 KV

J101

CONTROLS ARE NOT USED AS SHOWN.

E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED
					ORIGINAL RELEASE FOR PRODUCTION		
21652				A	[illegible]	5/29/73	
21933				B	AC INPUTS REVISED	3-31-82	

SPLY

HV PWR SPLY
AP152

J301

P2006

A	INTFC J5-D
B	INTFC J8-R
C	INTFC J8-P, AP151 J301-2
D	INTFC J7-E, AP152 J101-F
E	AP152 J101-H
F	AP152 J101-M
G	AP152 J101-N
H	
J	
K	
L	
M	
N	INTFC J5-R
P	INTFC J7-F
Q	AP152 J101-G
R	
S	
T	TLA J1003-A
U	INTFC J7-D, S2001-NC
V	TLA J1003-I
W	TLA J1003-K
X	TLA J1003-N
Y	TLA J1003-P
Z	TLA J1003-P
a	TLA J1003-R
b	TLA J1003-R
c	TLA J1003-S
d	TLA J1003-S
e	TLA J1003-T
f	TLA J1003-T
g	TLA J1003-V
h	TLA J1003-W
J	TLA J1003-X
k	
L	TLA J1003-D
m	INTFC J7-C
n	INTFC J8-B
p	INTFC J8-C
r	INTFC J8-D
s	
t	INTFC J7-K
u	
v	
w	INTFC J8-G
x	INTFC J8-H
y	INTFC J7-G
z	TLA J1003-H, AP151 J301-C
2	INTFC J7-R
3	
4	
5	
6	GND

R102
4 KV — TLA J1001

A103-E2
2 KV — TLA J1002

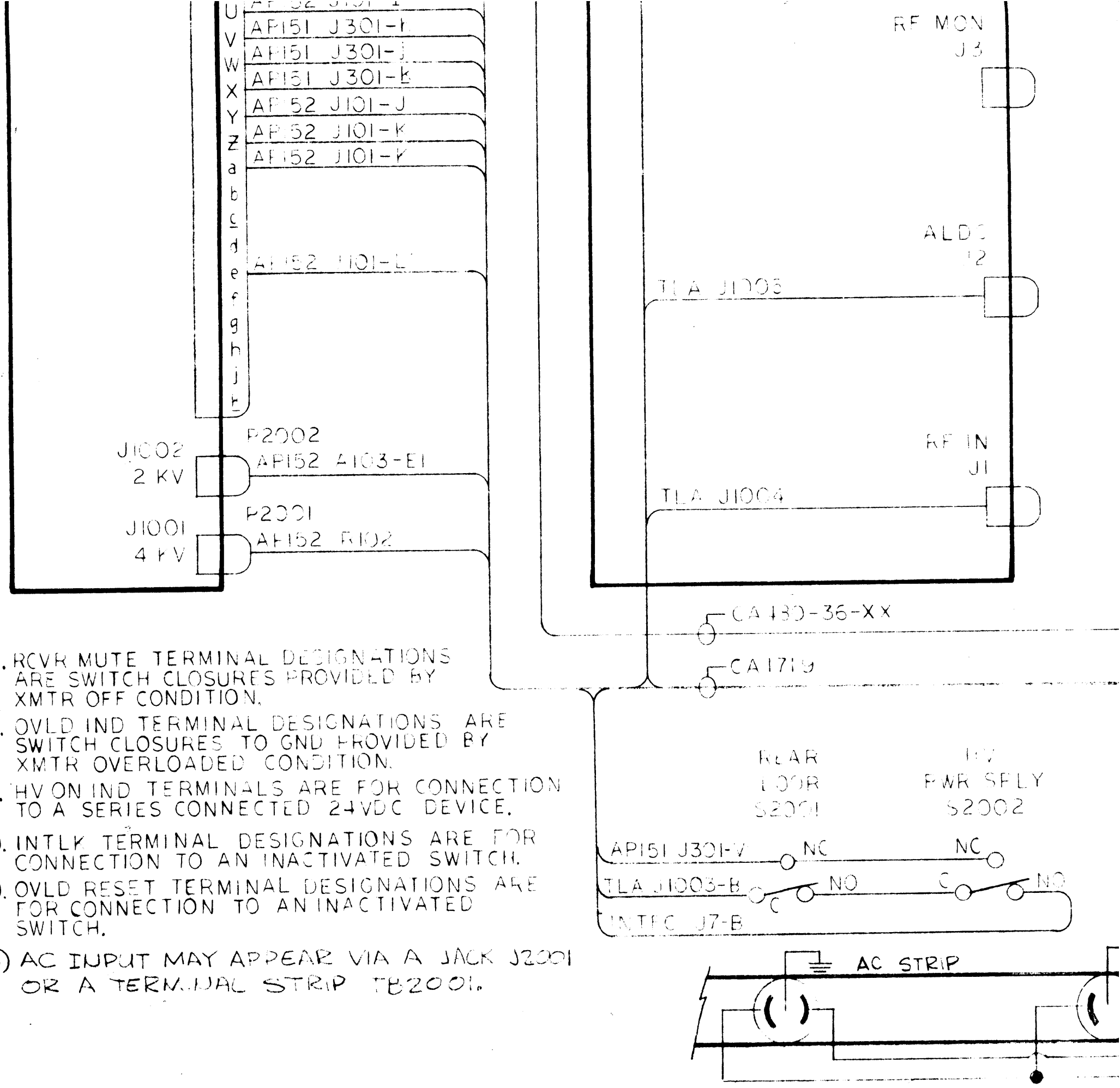
J101

P2007

A	J2001, INTFC J5-A
B	J2001, INTFC J5-C
C	GND
D	
E	AP151 J301-D
F	AP151 J301-R
G	AP151 J301-E
H	TLA J1003-U
I	TLA J1003-Y
J	TLA J1003-Z, a
K	TLA J1003-e
L	AP151 J301-F
M	AP151 J301-G
N	

D
C
B
A

CK1943



(1). RCVR MUTE TERMINAL DESIGNATIONS ARE SWITCH CLOSURES PROVIDED BY XMTR OFF CONDITION.

(2). OVLD IND TERMINAL DESIGNATIONS ARE SWITCH CLOSURES TO GND PROVIDED BY XMTR OVERLOADED CONDITION.

(3). HV ON IND TERMINALS ARE FOR CONNECTION TO A SERIES CONNECTED 24VDC DEVICE.

(4). INTLK TERMINAL DESIGNATIONS ARE FOR CONNECTION TO AN INACTIVATED SWITCH.

(5). OVLD RESET TERMINAL DESIGNATIONS ARE FOR CONNECTION TO AN INACTIVATED SWITCH.

(6) AC INPUT MAY APPEAR VIA A JACK J2001 OR A TERMINAL STRIP TB2001.

RF MON
J3

ALDC
J2

RF IN
J1

XX

XMTR
CONTROL
J7

INTFC J5-D, INTFC J8-A	A	+24 VDC
S2002-NO	B	COM
AP151 J301-n	C	NO
AP151 J301-V, TLA J1003-C	D	NC
AP151 J301-D	E	COM
AP151 J301-Q	F	NO
AP151 J301-Z	G	NC
AP151 J301-d	K	AUTO RESET RECYCLE
GND	Q	GND
AP151 J301-3	R	HV ON
GND	S	GND
INTFC J5-R	T	XMTR PTT
GND	U	GND
GND	X	GND
TLA J1003-E	Y	OUTPUT METER CONTRO
GND	Z	GND

EXTERNAL (4) INTERLOCKS

OVERLOAD (5) RESET

IF EXTERNAL CONTROLS ARE NOT USED JUMP J7 PINS AS SHOWN.

XMTR PTT IS CONTROLLED BY J5-R OR J7-T.

GND

G
E W

AP152 J101-
AP152 J101-

PWR
SPLY
S2002

NC
C
NO

C STRIP

PWR
INPUT
TB2001

GND
AP152 J101-A
AP152 J101-B

1
2
3

AC

	HFLM-1K/REV A
QTY / UNIT	MODEL USED ON
APPLICATION	
	CODE

6 5 4

A	+24 VDC	
B	COM	EXTERNAL (4) INTERLOCKS
C	NO	
D	NC	
E	COM	OVERLOAD (5) RESET
F	NO	
G	NC	
K	AUTO RESET RECYCLE	
Q	GND	
R	HV ON	
S	GND	
T	/MTR PTT	
U	GND	
X	GND	
Y	OUTPUT METER CONTROL	
Z	GND	

h	TLA J1003-V	
J	TLA J1003-W	
K	TLA J1003-X	
L		
m	TLA J1003-D	
n	INTFC J7-C	
p	INTFC J8-B	
r	INTFC J8-C	
s	INTFC J8-D	
t		
u	INTFC J7-K	
v		
w		
x	INTFC J8-G	
y	INTFC J8-H	
z	INTFC J7-G	
2	TLA J1003-H, AP151 J3 01-C	
3	INTFC J7-R	
4		
5		
6	GND	

J101

ONTROLS ARE NOT USED
AS SHOWN.

CONTROLLED BY J8-R OR J7-T.

GND

PWR INPUT J2001

G
E W

AP152 J101-A
AP152 J101-B

	HFLM-1K/REV A	RAK139
QTY / UNIT	MODEL USED ON	ASS'Y NO.

APPLICATION

CODE

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

TOLERANCES ON

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

MATERIAL

FINISH

QTY. REQ.	ITEM	PART NO.

LIST OF MA

FINAL APPROVAL		DATE 21AUG72
MECH. DES.		DATE
ELECT. DES.		DATE 21AUG72
CHECKED		DATE
DRAWN		DATE 10AUG72

THE T

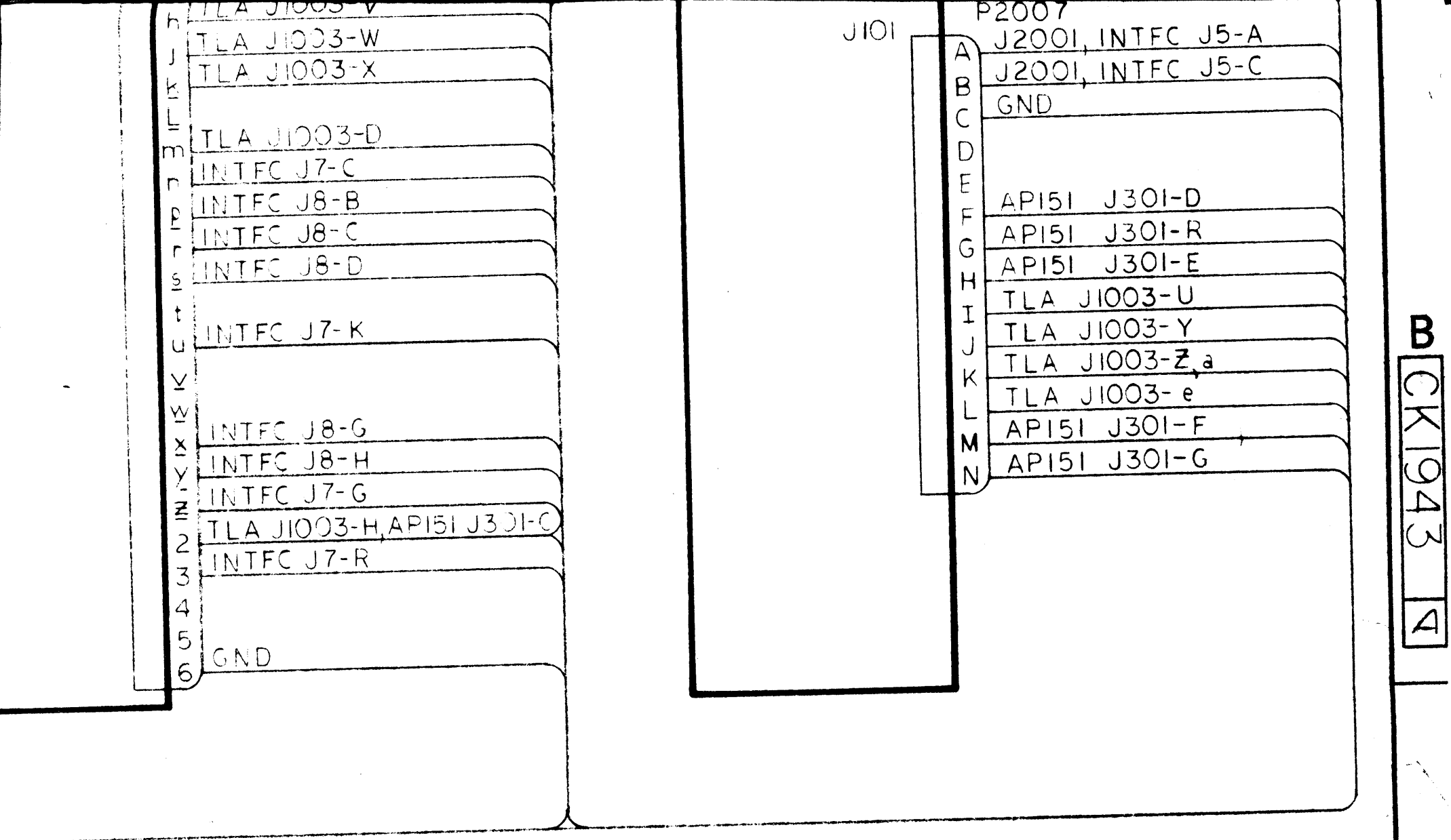
DIAGRA

RAK 13

SIZE	CODE IDENT
D	82679

SCALE

4 3 2



B CK1943 A

QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL

LIST OF MATERIAL

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

TOLERANCES ON

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

MATERIAL

FINISH

		DATE
FINAL APPROVAL		2/14/67
MECH. DES.		DATE
ELECT. DES.		DATE 2/14/67
CHECKED		DATE
DRAWN		DATE 1/31/67

THE TECHNICAL MATERIEL CORP.
MAMARONECK, NEW YORK

DIAGRAM, WIRING

RAK 139

SIZE	CODE IDENT NO.	DWG NO.	ISSUE
D	82679	CK1943	B

SCALE | SHEET OF

A

3 2 1

TABLE 2-2. CONNECTORS SUPPLIED AS LOOSE ITEMS

TMC PART NUMBER	FUNCTION
UG88/U (optional)	Connection to interface panel jacks J1 and J2
MS3106B24-28P (optional)	Connection to interface panel jack J5
MS3106B24-28P	Connection to interface panel jack J6
MS3106B24-28P	Connection to interface panel jack J7
MS3106B28-21P (optional)	Connection to interface panel jack J8
UG59/U	Connection to interface panel jack J10
PL190-NG (ac connections or optional)	Connection to ac power input jack J2001
TE141-3	Connection to ac power input terminal strip TB2001 (3 REQ)
PJ055B	Connection to exciter KEY input jack
PJ068B	Connection to exciter MIKE input jack

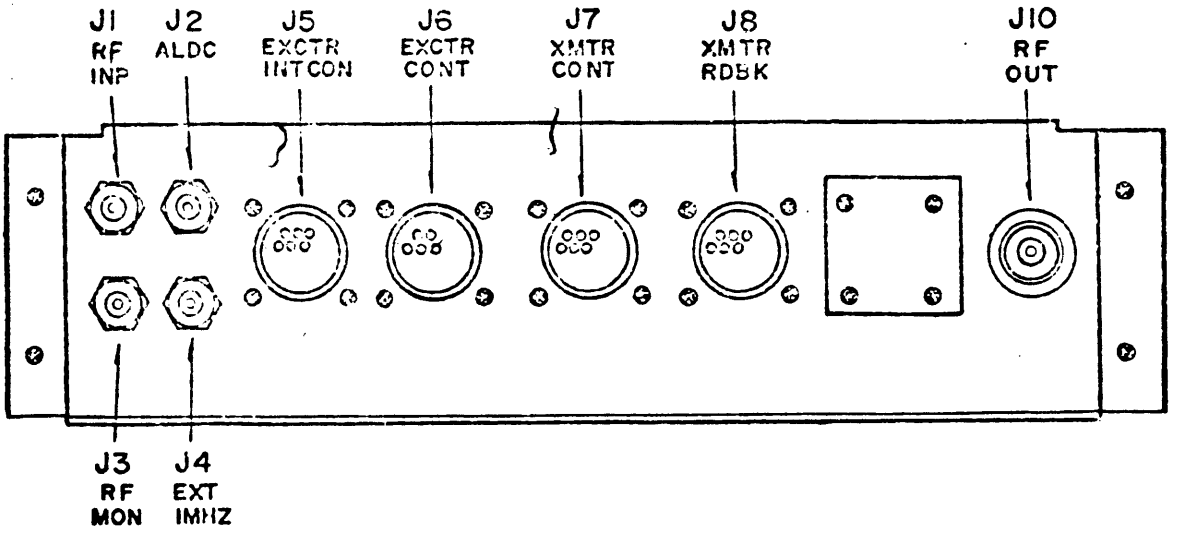


Figure 2-5. Interface Panel

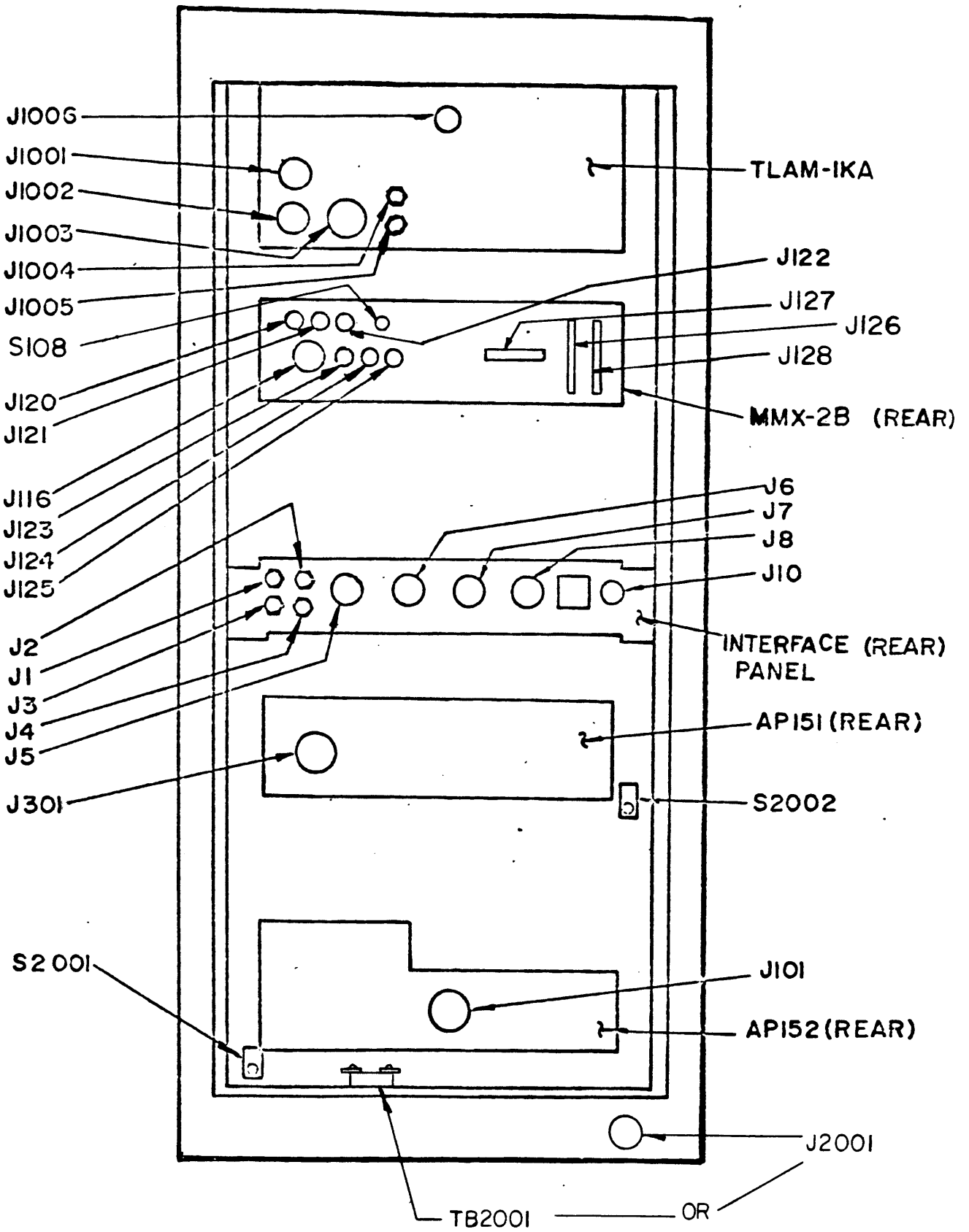


Figure 2-6. HFTM-1KJ2B Component Locations, Rear View

SECTION 4

THEORY OF OPERATION

4-1. OVERALL BLOCK DIAGRAM ANALYSIS.

Figure 4-1 is an overall block diagram of the HFTM-1KJ2B transmitter. Power input of 115/230 vac, 50/60 hz is applied via J2001 or TB2001 to the AP152 high voltage power supply and to the MMX-2B exciter.

Intelligence inputs to the transmitter are applied via the interface panel to the exciter; these inputs include line audio (for both upper and lower sidebands), frequency shift keying, facsimile, and exciter PTT control. A CW keyline input also appears on the interface panel and is routed to the exciter. The test key switch provides CW keyline closure for tuning and test purposes.

Transmitter control inputs to the HFTM-1KJ2B are also applied via the interface panel; these inputs include control lines for high voltage on circuitry, transmitter PTT, overload reset, and external interlocks. External control of the transmitter is optional; however, if the external control imputs are not utilized, jumper connections must be made at the interface panel to complete transmitter circuitry.

The MMX-2B provides an rf output (J124) of at least 100 milliwatts (250 millivolts) within the frequency range of 2.0 to 30 mhz in any of the following modes; AM, USB, LSB, ISB including AME, CW, FSK or FAX. The exciter output is applied via J1004 to the chain of amplifiers within the TLAM-1KA linear power amplifier. The AP151 low voltage and bias supply and AP152 high voltage supply provide the dc operating potentials for the linear amplifier chain.

The rf output of the TLAM-1KA is one killowatt PEP and average throughout the frequency range of the transmitter. This output is applied via J1006 to J10 on the interface panel. The antenna connection is made at J10.

The TLAM-1KA provides an ALDC (automatic load and drive control) feedback voltage to the MMX-2B exciter, which prevents the rf output of the transmitter from exceeding a preset level. The ALDC circuit in the exciter automatically compensates for high modulation peaks and load changes, providing a relatively constant output level, in addition to limiting distortion and improving linearity.

4-2. FUNCITONAL ASSEMBLY SECTIONS.

Refer to Appendix A and B for detailed theory of operation for the Multi-Mode Exciter and the High Frequency Linear Power Amplifier.

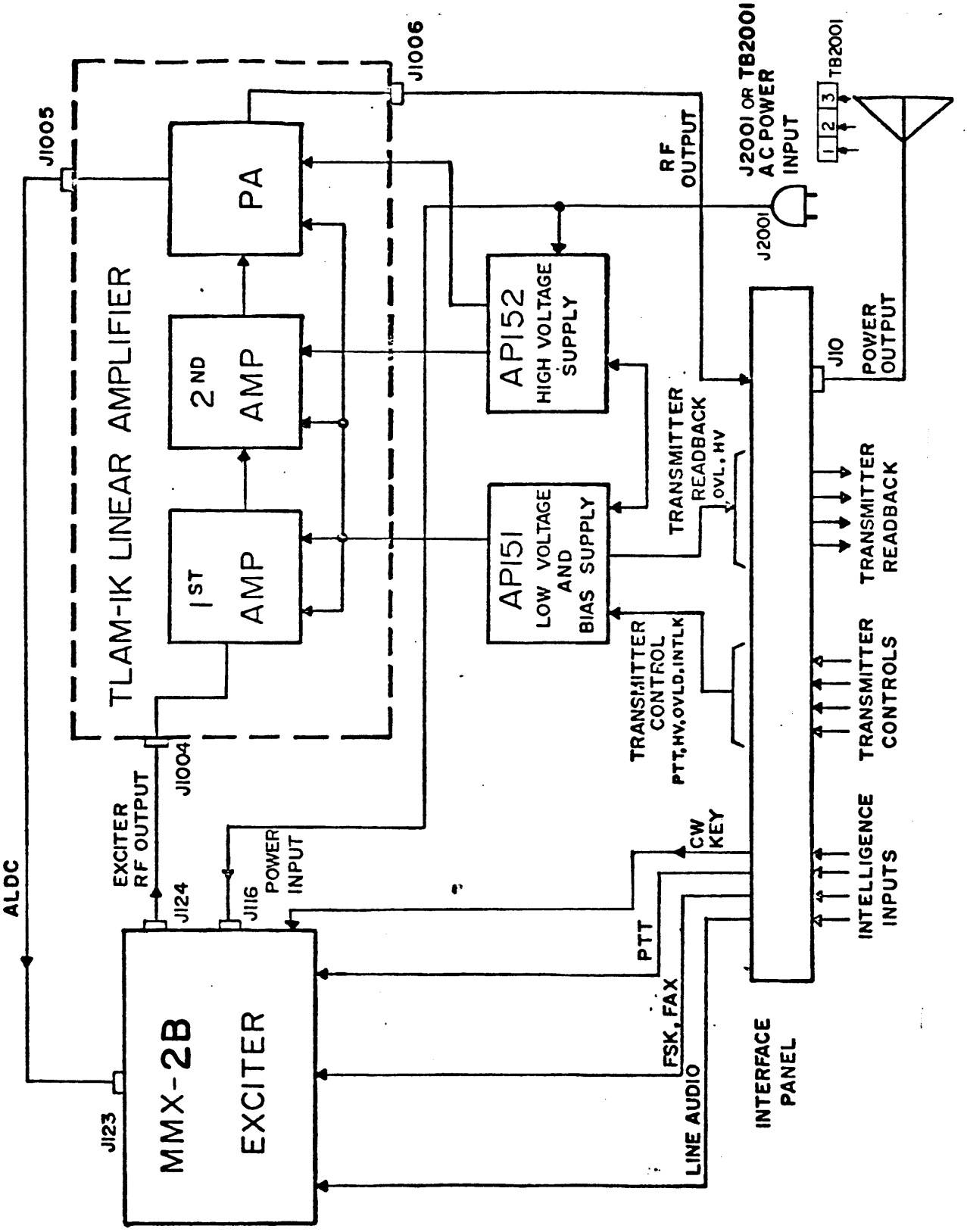


Figure 4-1. HFTM-1KJ2B Overall Block Diagram

SECTION 6

PARTS LIST

6-1. INTRODUCTION.

The HFTM-1KJ2B transmitter consists of the MMX-2B exciter, and HFLM-1KA linear power amplifier. The parts lists for the MMX-2B exciter and HFLM-1KA linear power amplifier are contained in their respective Appendixs.

6-2. GENERAL.

Reference designations have been assigned to identify all Subassembly/ PC Card parts of the equipment. They are used for marking the equipment and are included on drawings, diagrams, and in the parts list. The letters of a reference designation indicate the kind of part (generic group), such as resistor, capacitor, unit, subassembly, PC card, transistor, integrated circuit, electron tube, etc. The number differentiates between parts of the same generic group. Sockets associated with a particular plug-in device, such as electron tubes or lamps, are identified with a reference desigantion which includes the reference designation of the plug-in device.

TABLE 6-1. PARTS LIST FOR EQUIPMENT CABINET (RAK)

REFERENCE SYMBOL	DESCRIPTION	TMC PART NO.
TB2001 or J2001	Terminal Strip Connector, Receptacle	TM120-3 JJ297-1
S2001	Switch, Interlock	SW230
S2002	Same as S2001	
As req.	2 Input AC Strip Spring Retractor	As req. SP137-2

TECHNICAL MANUAL

FOR

HFTM-1KJ2B
HIGH FREQUENCY TRANSMITTER

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THE TECHNICAL MATERIEL CORPORATION

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RECORD OF REVISIONS

NO.	ISSUED	DESCRIPTION	ENTERED	BY
001				
002				
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008				
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NOTE: Please file Technical Newsletters at back of manual for permanent record.

PREFACE

This technical manual discusses the information you will require to install, operate and maintain the HFTM-1KJ2B High Frequency Transmitter. This manual is intended for operators and technicians who will be responsible for the proper functioning of the equipment.

This text is compiled in three parts:

HFTM-1KJ2B	Transmitter System	Part I
MMX-2B	Multi-Mode Exciter	Appendix A
HFLM-1KA	High Gain Linear Power Amplifier	Appendix B

You should read this manual in sequence, section by section, to become totally familiar with the transmitter. After completing this manual, you should be able to install, operate, and depending on your level of technical training, perform maintenance to the component level.

Changes are periodically made to this manual through publication of TECHNICAL NEWSLETTERS that are distributed to users of the equipment. The REGISTRATION CARD located at the front of this manual should be completed and sent to:

THE TECHNICAL MATERIEL CORPORATION
700 Fenimore Road
Mamaroneck, New York 10543 U.S.A.

Attention: Technical Data Group

Your name and address will be entered on permanent TMC records and applicable publications automatically mailed to you. Requests for related publications should be made to your TMC representative, to a TMC field office in your area, or to TMC at the above address.

Forms are provided at the back of this manual for your use. Included are the following: READER'S COMMENTS; REQUEST FOR SPARE PARTS; REQUEST FOR FIELD SERVICE; REQUEST FOR PUBLICATIONS; REQUEST FOR TRAINING; NOTES; and TMC LOCATION MAP.

To facilitate the maintenance of accurate records on the operation of the equipment, a SERVICE LOG and FIELD REPORT are also included.

TABLE OF CONTENTS

PART I

LIST OF ILLUSTRATIONS

LIST OF TABLES

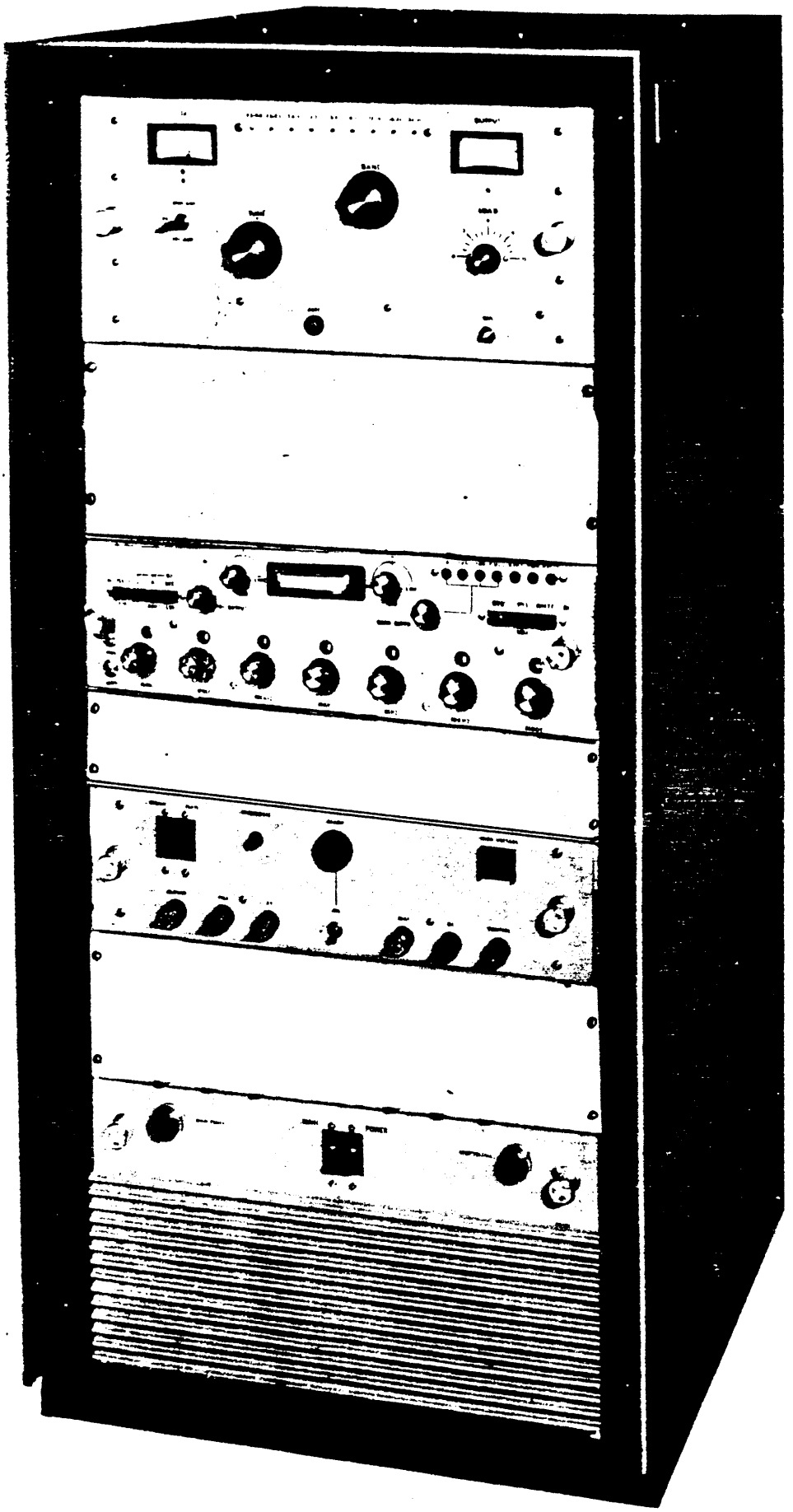


Figure 1-1. High Frequency Linear Power Amplifier HFTM-1KJ2B

SECTION 1

GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION.

This manual presents operating and maintenance instructions for the High Frequency Transmitter, Model HFTM-1KJ2B, designed and manufactured by the Technical Materiel Corporation, Mamaroneck, New York. This manual includes a general description of the equipment; installation and operating procedures; principles of operation; maintenance and troubleshooting data; and a parts list.

High Frequency Transmitter, Model HFTM-1KJ2B (shown in figure 1-1), hereinafter referred to as the HFTM-1KJ2B or the transmitter, consists of a solid state, multi-mode, exciter MMX-2B, used in conjunction with a high frequency linear power amplifier, HFLM-1KA. The exciter is capable of providing CW (Continuous wave), AM (amplitude modulation), SSB (single sideband) including AME (amplitude modulated equivalent) full carrier, FSK (frequency shift keying), FAX (facsimile) and optional ISB (independent sideband) modes of operation. The high frequency linear power amplifier amplifies the exciter output to provide 1 kilowatt PEP (peak envelope power) and average throughout the frequency range of 2.0 to 30 mhz. The transmitter is readily adaptable for shipboard, aircraft, and land installations.

1-2. PHYSICAL DESCRIPTION.

As shown in figure 1-1, the transmitter consists of a single equipment cabinet, which houses the MMX-2B exciter, and all units which comprise the HFLM-1KA linear power amplifier. The HFLM-1KA consists of two-stage broadband linear amplifier, power amplifier and associated power supplies and control circuits. Table 1-1 lists the transmitter components; Figure 1-2 shows the physical location of transmitter components.

TABLE 1-1. COMPONENTS OF HIGH FREQUENCY TRANSMITTER HFTM-1KJ2B

NOMENCLATURE	COMMON NAME
MMX-2B	MULTI-MODE EXCITER
HFLM-1KA consisting of: TLAM-1KA AP-151 AP-152	LINEAR POWER AMPLIFIER RF LINEAR POWER AMPLIFIER LOW VOLTAGE AND BIAS SUPPLY HIGH VOLTAGE POWER SUPPLY

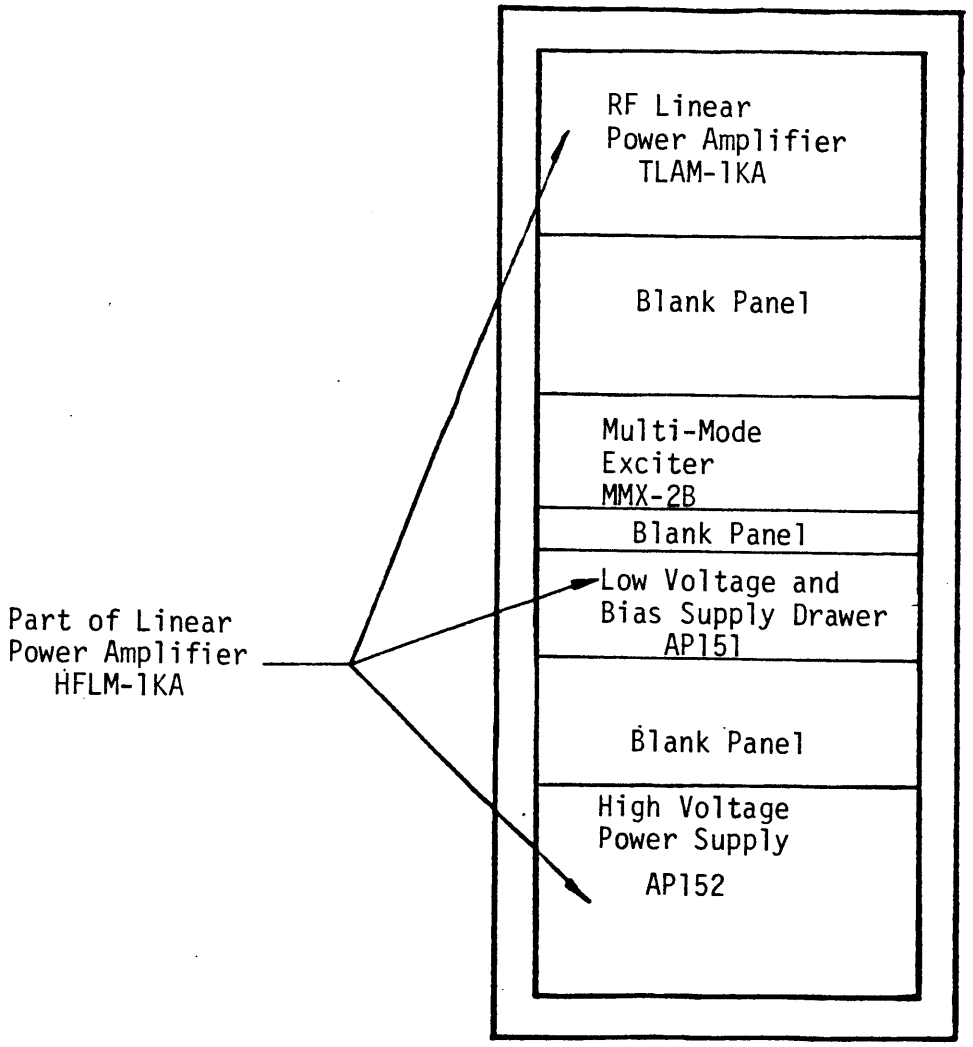


Figure 1-2. Physical Configuration of HFTM-1KJ2B

Primary power connection to the transmitter is made at the bottom rear of the equipment cabinet; external input and output connections are made through either of two access holes in the bottom rear and side of the equipment cabinet. RF output power is routed through a directional coupler mounted in the HFLM-1KA to the output connector (J10) located on the interface panel in the rear of the transmitter.

1-3. REFERENCE DATA.

Table 1-2 lists the technical specifications of the transmitter. Table 1-3 lists the power tube complement of the transmitter.

TABLE 1-2. TECHNICAL SPECIFICATIONS

Frequency Information Range	2 to 30 mhz is Standard; 1.6 to 30 MHz is Optional
Stability Synthesized	One part in 10^8 per day is Standard
Operational	
Modes	CW(A1), AM(A3), AME(A3H), USB(A3A), LSB, two-channel ISB(A3B, FSK(F1, A7J) and FAX(F4, A7J) capability is available
Carrier Suppression	Front panel selectable: full carrier, -6db, -16 db or fully suppressed (greater than -55 db)
Power Output	1000 watts PEP and AVERAGE (CW) continuous, key-down service
Output Impendance	50 ohms nominal unbalanced; 70 ohms nominal Optional
VSWR	Maximum of 2:1 without degrading performance
Tuning	Manual
ALDC	Manual Load and Drive Control to improve linearity, limit distortion, and maintain a relatively constant output level during high modulation peaks and load changes. Front panel control allows adjustment of the level at which the ALDC takes effect.

TABLE 1-2. TECHNICAL SPECIFICATIONS (CONT)

Power Distortion and Noise Ratings	
Spurious Signals	At least 50 db down from full PEP output
Noise Level	At least 50 db down from full PEP output
Unwanted Sideband	Better than 50 db rejection referenced to full PEP output
Intermodulation	Distortion products are at least 35 db below either tone of a standard two-tone test at full rated PEP
Audio	
Sideband Response	±1.5 db, 250-3040 Hz or 250-6080 Hz
Input	1) Two independent 600-ohm channels, balanced or unbalanced. -20 dbm to +5 dbm input will permit full power output. 2) Built-in microphone preamplifier for low level dynamic microphone. Front panel selection and jack. Mike input -55 db into 47K ohms with front panel jack.
Keying Information	
CW	Key jack on front panel and terminals on rear apron allow up to 300 WPM carrier keying, dry contact.
FSK	50 to 100 band with neutral or polar keying
FAX	+1 to +10 VDC will provide a linear shift of 800 Hz
Installation and Environmental Data	
Environmental	Operates 0 to +50°C with up to 90% relative humidity
Cooling	High capacity, filtered, forced air
Primary Power	115/230 VAC, 50/60 Hz, Single Phase at 3.75 killowatts

TABLE 1-3. TRANSMITTER POWER TUBE COMPLEMENT

REFERENCE DESIGNATION	PART NUMBER OR TYPE	FUNCTION
V1201	8233	1st RF Amplifier
V1202	4CX350A	2nd RF Amplifier
V1301	8576	Power Amplifier

SECTION 2

INSTALLATION

2-1. INITIAL UNPACKING AND INSPECTION.

The HFTM-1KJ2B transmitter was assembled, calibrated and tested at the factory before shipment. Inspect all packages for possible damage during transit. With respect to damage to the equipment for which the carrier is liable, The Technical Materiel Corporation will assist in describing methods of repair and furnishing of replacement parts. Carefully unpack each crate as indicated by the packing list provided with the transmitter shipment. Inspect all packing materials for parts that may have been shipped as loose items (cabinet hardware, connectors, technical manuals, etc.) Refer to figure 2-1 for typical preparation for shipments.

2-2. POWER REQUIREMENTS.

The transmitter requires a single phase source of 115/230 vac, 50/60 hz at appromimately 3.75 kilowatts.

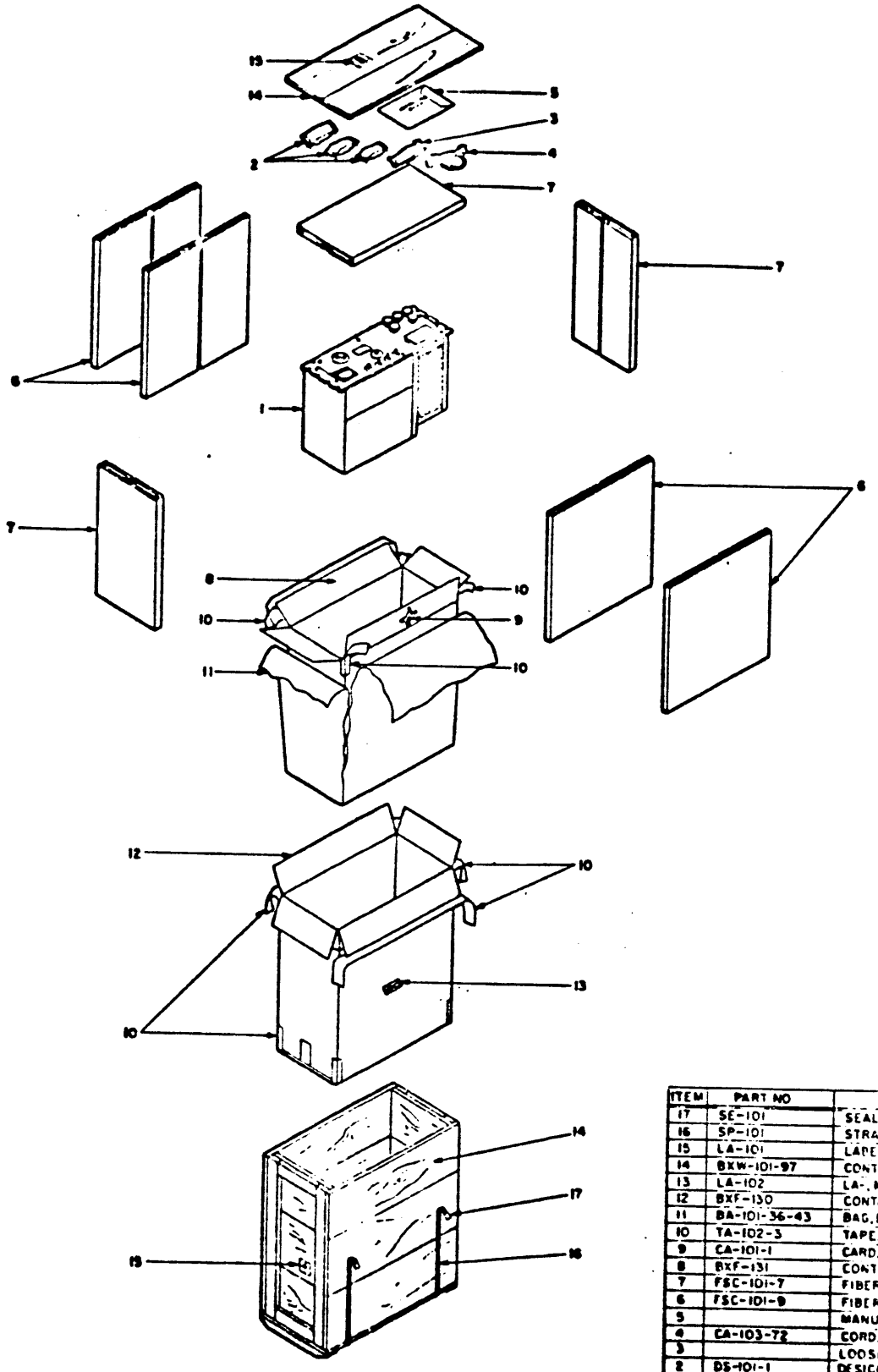
2-3. INSTALLATION.

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

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

b. Equipment Cabinet Installation. Remove equipment cabinet from crate and positive upright (mounting holes and primary power input jack are located on the bottom portion of the equipment cabinet). Position the equipment cabinet in the desired location, allowing a minimum clearance of two feet on the top and all sides for maintenance and installation purposes. It is of particular importance that a minimum clearance of two feet be allowed in the rear of the cabinet for door removal and external cable connections.

Using mounting hardware and the holes located in the base of the cabinet, secure the equipment cabinet in position.



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

Figure 2-1. Modular Units, Typical Preparation for Shipment

c. Modular Unit Installation. The component location for modular unit installation in the HFTM-1KJ2B transmitter is shown in figure 2-2. All transmitter units are slide mounted. The modular units of the HFLM-1KA should be installed into the equipment cabinet by referring to the detailed installation procedural steps in Appendix B for Linear Power Amplifier HFLM-1KA. The exciter unit should be installed in the same manner, refer to Appendix A.

WARNING

BEFORE MAKING EXTERNAL CONNECTIONS TO THE TRANSMITTER, INSURE THAT THE EXTERNAL PRIMARY POWER IS OFF AND TAGGED.

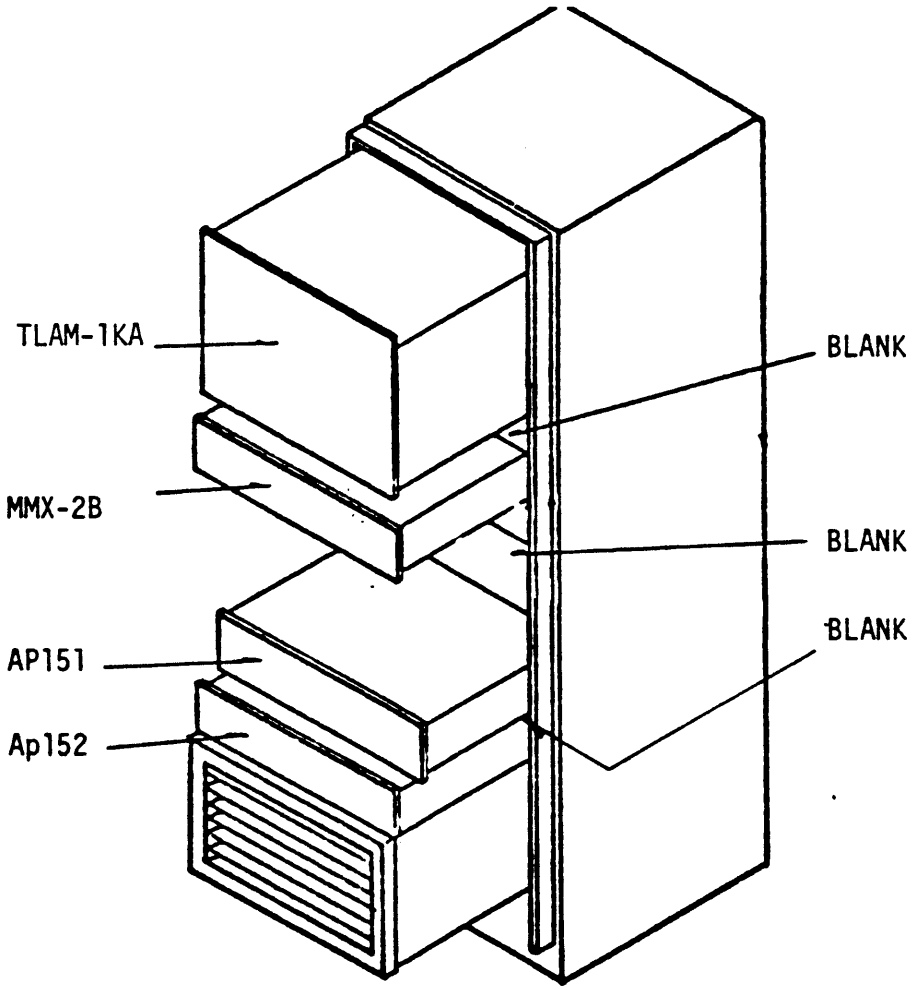


Figure 2-2. HFTM-1KJ2B Modular Unit Installation

d. Electrical Interconnections. Once the modular units have been installed in the equipment cabinet, connect all plugs to their respective jacks (refer to figures, 2-3, 2-4 for interconnect wiring and to figure 2-6 for connector locations). All interconnect cables are marked with their respective J reference numbers (jacks) and mating P reference numbers (plugs) for ease of installation.

e. External Connections. External input and output connections are made to the transmitter at the interface panel, located in the rear of the equipment cabinet. As shown in figure 2-5, the interface panel consists of nine terminal jacks which provide a termination point for intelligence inputs, external transmitter control inputs, and transmitter status indicator outputs. If external transmitter control lines are not provided and connected to J7 on the interface panel, jumper connections must be added at terminal jack J7 to complete circuits within the transmitter, enabling operation. Refer to figure 2-3 and Table 2-1 for information pertaining to external connections and/or control jumpers. Figure 2-3 is the interconnect wiring diagram; Table 2-1 lists the external interface panel connections and their functions.

TABLE 2-1. EXTERNAL CONNECTIONS TO INTERFACE PANEL

EXCITER CONTROL JACK J6	
DESIGNATION	FUNCTION/CONNECTION
USB	600 ohm audio input lines; connect to pins A,B and C. Use a shielded pair.
LSB	600 ohm audio input lines; connect to pins E,F and G. Use a shielded pair.
FSK	Frequency shift keying line; connect (+) to pin L and (-) to pin K.
FAX	Facsimile input line; connect across pins N and Q. Pin Q is ground.
FSK CONTACT KEY	Frequency shift contact keyer; connect across pins P and Q. Pin Q is ground.
CW KEY	Continuous wave keyer; connect across pins R and S. Pin S is ground.
PTT	Push-to-talk device; connect across pins T and U. Pin U is ground.

TABLE 2-1. EXTERNAL CONNECTIONS TO INTERFACE PANEL (CONT)

TRANSMITTER CONTROL JACK J7	
DESIGNATION	FUNCTION/CONNECTION
+24 VDC	+24 vdc output is available between pin A and ground when the transmitter main power is on.
EXTERNAL INTERLOCKS	A closure must be provided to enable transmitter operation; connect external interlock device lines or jumper across pins B and C.
OVERLOAD RESET	A closure must be provided across the COM and NC contacts by an external in-activated switch or jumper; connect jumper or external overload reset switch lines across pins E and G.
AUTO RESET RECYCLE	When the option of Transmitter Automatic Reset Circuit is utilized, the connection of this option is made at pin K.
HV ON	A closure must be provided to enable transmitter high voltage; connect jumper or external high voltage on device lines across pins R and S. Pin S is ground.
XMTR PTT	Push-to-talk device lines which must provide a closure to bias on transmitter; connect external transmitter push-to-talk device or jumper across pins T and U. Pin U is ground.
OUTPUT METER CONTROL	Input line for activating signal outputs to external forward and reflected power meters; provide a ground on pin Y when and if signal outputs are desired for external monitoring of forward and reflected power.

TABLE 2-1. EXTERNAL CONNECTIONS TO INTERFACE PANEL (CONT)

TRANSMITTER READBACK JACK J8	
DESIGNATION	FUNCTION/CONNECTION
+24 VDC	+24 vdc output is available between pin A and ground when the transmitter main power is on.
RECEIVER MUTE	Receiver mute terminals provide switch closure in transmitter off condition; connect receiver mute lines across pins B,C and D. C is common; B is normally open; and D is normally closed.
OVERLOAD INDICATOR	Overload indicator terminals are switch closures to ground provided by a transmitter overload condition; connect overload indicating device lines to terminals G and H. G is normally closed; H is normally open.
HV ON INDICATOR	High voltage on indicator lines are for connection in series of a 24 vdc indicating device; connect high voltage indicating device lines across pins P and R. Pin P is (+).
FORWARD POWER REFLECTED POWER	Output terminals for connection of external forward and reflected power meter; connect forward power meter lines across pins a and b; connect reflected power meter lines across pins c and d.

f. RF Monitor Connection. The rf monitor output terminal jack J3 is located on the interface panel and provides a low level rf sample of the exciter output for external monitoring. If external monitoring is desired, connect the monitor line to J3 using the rf connectors UG88/U.

g. External Standard Connection. All output frequencies of the HFTM-1KJ2B transmitter are referenced to the 1 mhz internal standard of the MMX-2B exciter. This internal standard has a stability of 1 part in 10^8 per day for ambient change of $15^{o}C$. Higher stability is available by use of an external station standard. The external standard input line connection should be made at J4 of the interface panel using the rf connectors UG88/U.

NOTE

When using an external standard set the EXT/INT switch on the rear of the MMX-2B exciter to the EXT position.

h. RF Output Connection. The rf output terminal jack J10 is located on the interface panel. Connect a 50 ohm transmission line to J10, using the rf connector plug UG59/U. The transmission line must be terminated into a 50 ohm dummy load or antenna.

i. Primary Power Connection. The transmitter leaves the factory wired for 115 vac or 230 vac operation (as per customer requirements). Transmitter power requirements are 115/230 vac, 50/60 hz at approximately 3.75 kw. The power input jack is J2001 which is located in the bottom rear of the equipment cabinet (refer to figure 2-6).

WARNING

BEFORE CONNECTING PRIMARY POWER INPUT LINES TO THE TRANSMITTER, INSURE THAT THE EXTERNAL PRIMARY POWER IS OFF AND TAGGED.

Connect primary power input lines to J2001, using the ac connector plug PL190-NG which is supplied as a loose item.

NOTE

The transmitter cabinet is equipped with two safety interlock switches, S2001 and S2002 (refer to figure 2-6), which must be closed before operating the transmitter. The rear door interlock S2001 is closed when the rear door is mounted and fastened on the equipment cabinet; the high voltage power supply interlock S2002 is closed when the AP152 power supply drawer is mounted and fastened with panel locks in the equipment cabinet.

8 | 7 | 6

D

C

B

LIN AMP
TLAM-1K

J1006 RF OUT — P3001 INTFC J10

J1005 ALDC — P2005 INTFC J2

J1004 RF IN — P2004 INTFC J1

J1003 — P2003

A	AP151 J301-U
B	S2001-COM
C	INTFC J7-D
D	AP151 J301-m
E	INTFC J7-Y
F	INTFC J8-a
G	INTFC J8-c
H	AP151 J301-2
I	AP151 J301-W
J	
K	AP151 J301-X
L	
M	
N	AP151 J301-Y
O	GND
P	AP151 J301-Z, a
R	AP151 J301-b, c
S	AP151 J301-d, e
T	AP151 J301-f, g
U	AP152 J101-I
V	AP151 J301-h
W	AP151 J301-j
X	AP151 J301-k
Y	AP152 J101-J
Z	AP152 J101-K
a	AP152 J101-K
b	
c	
d	
e	AP152 J101-L
f	
g	
h	
j	
k	

J1002 2KV — P2002 AP152 A103-E1

J1001 4KV — P2001 AP152, R102

INTERFACE

EXCITER CONTROL J6

EXCITER-XMTR INTERCONNECT J5

AP152 J101-A	A	AC
GND	B	GND
AP152 J101-B	C	AC
AP151 J301-A, INTFC J7-A	D	+24 VDC
AP151 J301-P, INTFC J7-T	R	XMTR PT
GND	S	GND
GND	U	GND

EXT 1 MHz J4

RF MON J3

ALDC J2

TLA J1005

RF IN J1

TLA J1004

CA48[illegible]-36-XX

6 5 4

E

EXCITER
CONTROL
J6

EXCITER-XMTR
INTERCONNECT
J5

A
B
INTFC J7-A
INTFC J7-T

A	AC
B	GND
C	AC
D	+24VDC
R	XMTR PTT
S	GND
U	GND

EXT 1MHz
J4

RF MON
J3

ALDC
J2

J1
J1

INTERFACE

RF OUT
J10
P3002
TLA J1006

XMTR
READBACK
J8

INTFC J7-A	A	+24 VDC
API51 J301-P	B	NO / COM / NC — RECEIVER MUTE (1)
API51 J301-r	C	
API51 J301-s	D	
API51 J301-x	G	NC / NO — OVERLOAD INDICATOR (2)
API51 J301-Y	H	
API51 J301-C	P	+ — HV ON INDICATOR (3)
API51 J301-B	R	
GND	N	GND
TLA J1003-F	a	FWD PWR
TLA J1003-G	c	REFL PWR
GND	s	GND

XMTR
CONTROL
J7

INTFC J5-D, INTFC J8-A	A	+24 VDC
S2002-NO	B	COM / NO / NC — EXTERNAL INTERLOCKS
API51 J301-n	C	
API51 J301-V, TLA J1003-C	D	
API51 J301-D	E	COM / NO / NC — OVERLOAD RESET
API51 J301-Q	F	
API51 J301-Z	G	
API51 J301-u	K	AUTO RESET REC
GND	Q	GND
API51 J301-3	R	HV ON
GND	S	GND
INTFC J5-R	T	XMTR PTT
	U	GND
	X	GND
TLA J1003-E	Y	OUTPUT METER
		GND

IF EXTERNAL CONTROLS ARE NOT USE
JUMP J7 PINS AS SHOWN.

6-36-XX

4	3	2

E.M.N.NO	DRAFT	CHKD	ZONE	LTR	
	Q			Ø	ORIGINAL RELEAS
21080	GE	EJ		A	J2001-B JSS.

LV PWR SPLY
AP151

J301

P2006

A	INTFC J5-D
B	INTFC J8-R
C	INTFC J8-P, AP151 J301-2
D	INTFC J7-E, AP152 J101-F
E	AP152 J101-H
F	AP152 J101-M
G	AP152 J101-N
H	
J	
K	
L	
M	
N	INTFC J5-R
P	INTFC J7-F
Q	AP152 J101-G
R	
S	
T	
U	TLA J1003-A
V	INTFC J7-D, S2001-NC
W	TLA J1003-I
X	TLA J1003-K
Y	TLA J1003-N
Z	TLA J1003-P
a	TLA J1003-P
b	TLA J1003-R
c	TLA J1003-R
d	TLA J1003-S
e	TLA J1003-S
f	TLA J1003-T
g	TLA J1003-T
h	TLA J1003-V
j	TLA J1003-W
k	TLA J1003-X
L	
m	TLA J1003-D
n	INTFC J7-C
p	INTFC J8-B
r	INTFC J8-C
s	INTFC J8-D
t	
u	INTFC J7-K
v	
w	
x	INTFC J8-G
y	INTFC J8-H
z	INTFC J7-G
2	TLA J1003-H, AP151 J301-C
3	INTFC J7-R
4	
5	
6	GND

HV PW
AP15

RF OUT
J10
P3002

XMTR
FEADBACK
J8

A	+24 VDC	
B	NO	RECEIVER MUTE (1)
C	COM	
D	NC	
G	NC	OVERLOAD INDICATOR (2)
H	NO	
P	+	HV ON INDICATOR (3)
R		
Z	GND	
a	FWD PWR	
b	REFL PWR	
c	GND	

XMTR
CONTROL
J7

J8-A		
A	+24 VDC	
B	COM	EXTERNAL INTERLOCKS (4)
C	NO	
D	NC	
A J1003-C		
E	COM	OVERLOAD RESET (5)
F	NO	
G	NC	
K	AUTO RESET RECYCLE	
Q	GND	
R	HV ON	
S	GND	
T	XMTR PTT	
U	GND	
X	GND	
Y	OUTPUT METER CONTROL	
Z	GND	

RNAL CONTROLS ARE NOT USED
T PINS AS SHOWN.

REVISIONS							
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED
	a			0	ORIGINAL RELEASE FOR PRODUCTION	8/31/72	
21080	GE	EJ		A	U2001-B ISS. WAS AP151 J301 TO AP152	5/29/73	EJ

SPLY

1

J301

P2006

A	INTFC J5-D
B	INTFC J8-R
C	INTFC J8-P, AP151 J301-2
D	INTFC J7-E, AP152 J101-F
E	AP152 J101-H
F	AP152 J101-M
G	AP152 J101-N
H	
J	
K	
L	
M	
N	
P	INTFC J5-R
Q	INTFC J7-F
R	AP152 J101-G
S	
T	
U	TLA J1003-A
V	INTFC J7-D, S2001-NC
W	TLA J1003-I
X	TLA J1003-K
Y	TLA J1003-N
Z	TLA J1003-P
a	TLA J1003-P
b	TLA J1003-R
c	TLA J1003-R
d	TLA J1003-S
e	TLA J1003-S
f	TLA J1003-T
g	TLA J1003-T
h	TLA J1003-V
j	TLA J1003-W
k	TLA J1003-X
L	
m	TLA J1003-D
n	INTFC J7-C
p	INTFC J8-B
r	INTFC J8-C
s	INTFC J8-D
t	
u	INTFC J7-K
v	
w	
x	INTFC J8-G
y	INTFC J8-H
z	INTFC J7-G
2	TLA J1003-H, AP151 J301-C
3	INTFC J7-R
4	
5	
6	GND

HV PWR SPLY

AP152

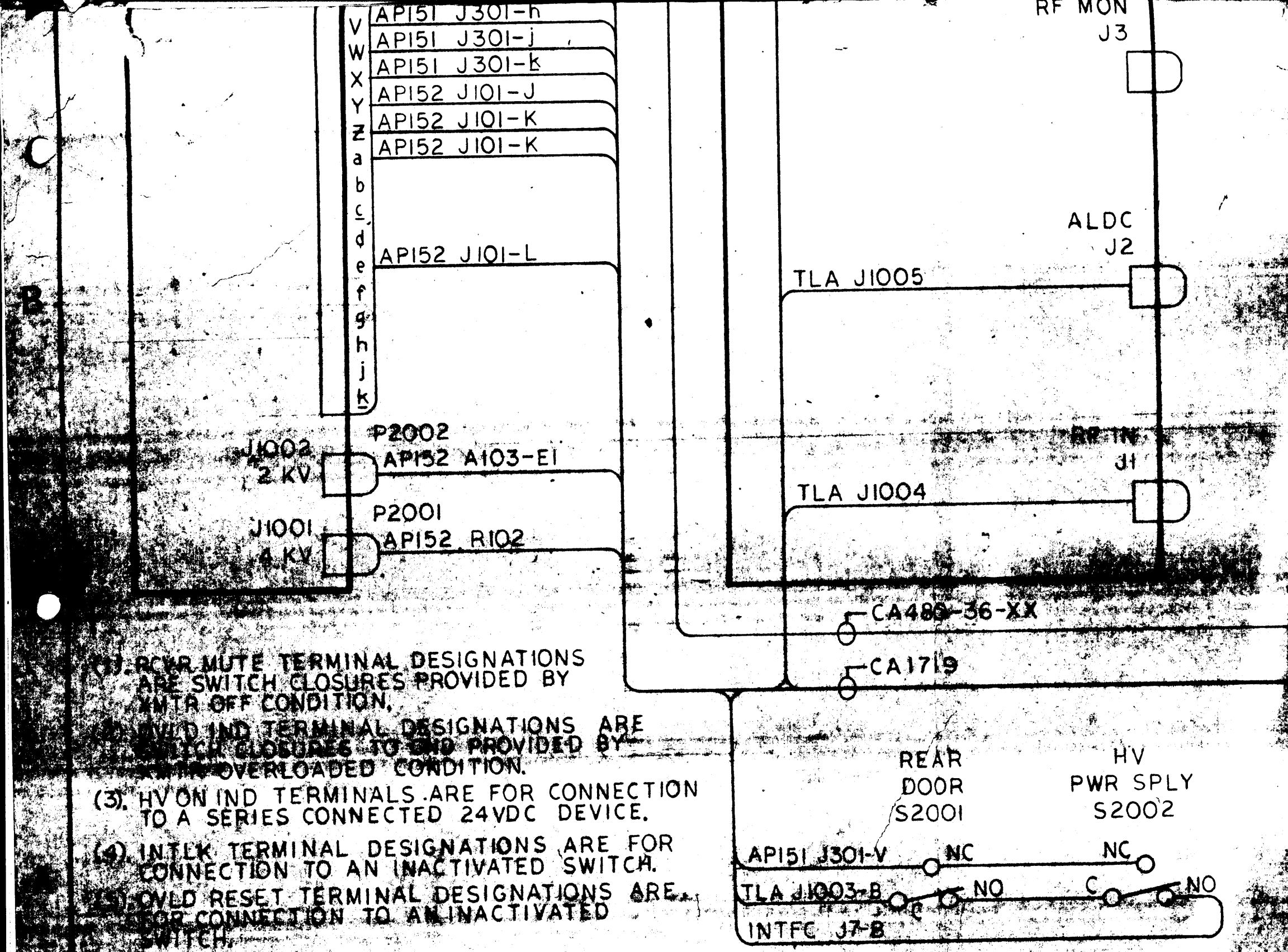
R102
4 KV — TLA J1001

A103-E2
2 KV — TLA J1002

J101

P2007

A	J2001, INTFC J5-A
B	J2001, INTFC J5-C
C	GND
D	
E	
F	AP151 J301-D
G	AP151 J301-R
H	AP151 J301-E
I	TLA J1003-U
J	TLA J1003-Y
K	TLA J1003-Z
L	TLA J1003-e
M	AP151 J301-F
N	AP151 J301-G



(1). RCVR MUTE TERMINAL DESIGNATIONS ARE SWITCH CLOSURES PROVIDED BY XMTR OFF CONDITION.

(2). OVLD IND TERMINAL DESIGNATIONS ARE SWITCH CLOSURES TO END PROVIDED BY XMTR OVERLOADED CONDITION.

(3). HV ON IND TERMINALS ARE FOR CONNECTION TO A SERIES CONNECTED 24VDC DEVICE.

(4). INTLK TERMINAL DESIGNATIONS ARE FOR CONNECTION TO AN INACTIVATED SWITCH.

(5). OVLD RESET TERMINAL DESIGNATIONS ARE FOR CONNECTION TO AN INACTIVATED SWITCH.

8 7 6

RF MON
J3

ALDC
J2

RF IN
J1

XMTR
CONTROL
J7

INTFC J5-D, INTFC J8-A	A	+24 VDC
S2002-NO	B	COM — EXTERNAL (4) INTERLOCKS
AP151 J301-n	C	NO — EXTERNAL (4) INTERLOCKS
AP151 J301-V, TLA J1003-C	D	NC — EXTERNAL (4) INTERLOCKS
AP151 J301-D	E	COM — OVERLOAD (5) RESET
AP151 J301-Q	F	NO — OVERLOAD (5) RESET
AP151 J301-Z	G	NC — OVERLOAD (5) RESET
AP151 J301-u	K	AUTO RESET RECYCLE
GND	Q	GND
AP151 J301-3	R	HV ON
GND	S	GND
INTFC J5-R	T	XMTR PTT
GND	U	GND
GND	X	GND
TLA J1003-E	Y	OUTPUT METER CONTROL
GND	Z	GND

IF EXTERNAL CONTROLS ARE NOT USED JUMP J7 PINS AS SHOWN.

XMTR PTT IS CONTROLLED BY J5-R OR J7-T.

HV
PWR SPLY
S2002

NC
C
NO

PWR
INPUT
J2001

GND
AP152 J101-A
AP152 J101-B

	HFLM-1K/REV A	R
QTY / UNIT	MODEL USED ON	
	APPLICATION	
	CODE	

6 5 4

+24 VDC

COM
NO
NC — EXTERNAL (4) INTERLOCKS

COM
NO
NC — OVERLOAD (5) RESET

AUTO RESET RECYCLE

GND

HV ON

GND

XMTR PTT

GND

GND

OUTPUT METER CONTROL

GND

LS ARE NOT USED
WN.

OLLED BY J5-R OR J7-T.

h	TLA J1003-W
j	TLA J1003-X
k	
L	
m	TLA J1003-D
n	INTFC J7-C
p	INTFC J8-B
r	INTFC J8-C
s	INTFC J8-D
t	
u	INTFC J7-K
v	
w	
x	
y	INTFC J8-G
z	INTFC J8-H
1	INTFC J7-G
2	TLA J1003-H, AP151 J301-C
3	INTFC J7-R
4	
5	
6	GND

J101

A B C D E F G H I J K L M N

QTY. REQ.	ITEM	PART NO.

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

TOLERANCES ON

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

MATERIAL

FINISH

FINAL APPROVAL	DATE 21AUG72
MECH. DES.	DATE
ELECT. DES.	DATE 21AUG72
CHECKED	DATE
DRAWN	DATE 15AUG72

HFLM-IK/REV A — MODEL USED ON

RAK139 — ASS'Y NO.

APPLICATION

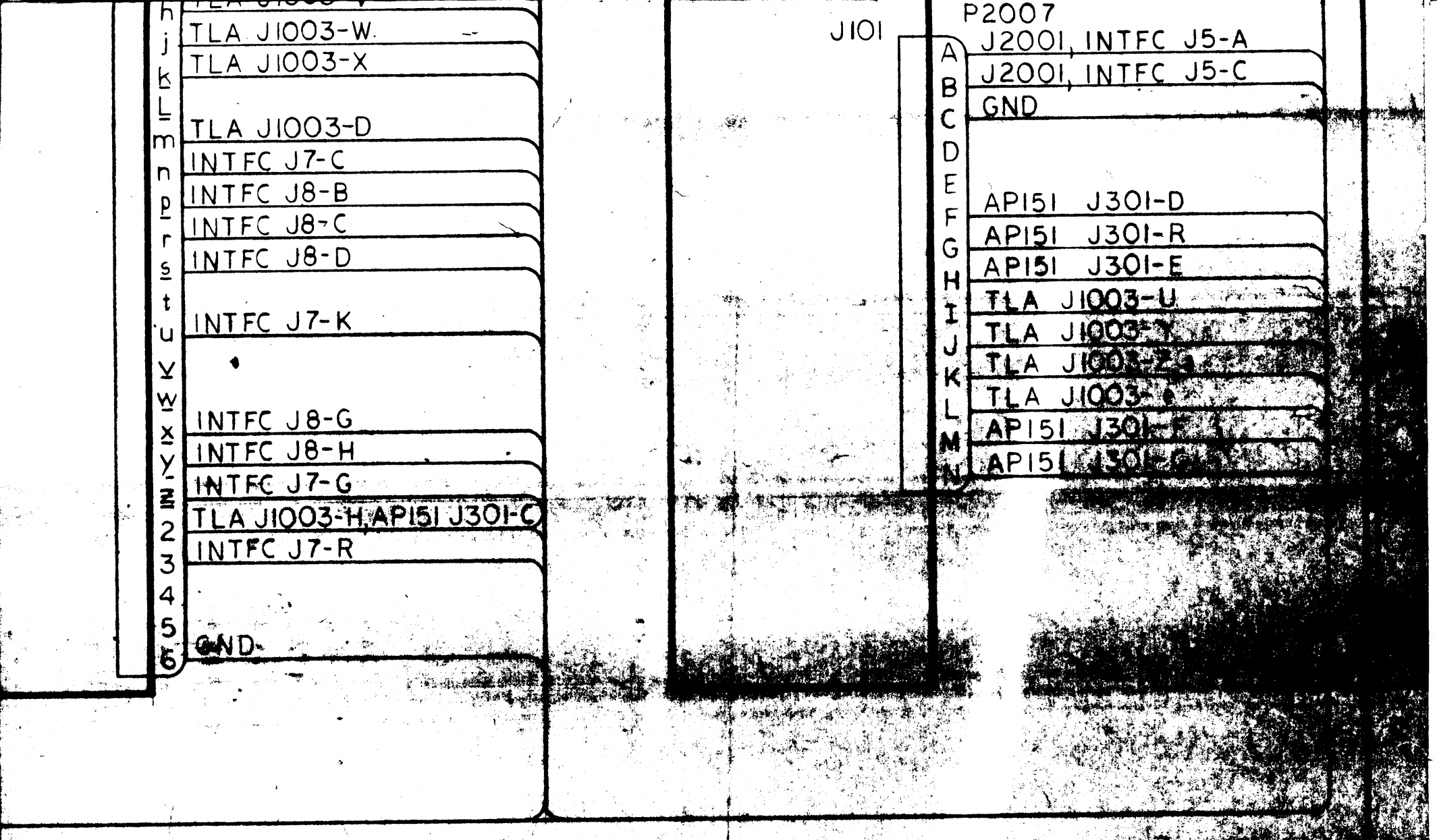
CODE

Fi

INTERCONNE

CK1943-A

4 3 2



QTY. REQ.	ITEM	PART NO.

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

TOLERANCES ON

DECIMALS
X ± .05
XX ± .01
XXX ± .005

FRACTIONS
± 1/64

ANGLES
± 0° 30'

ATERIAL

ISH

FINAL APPROVAL		DATE 21AUG72
MECH. DES.		DATE
ELECT. DES.		DATE 21AUG72
CHECKED		DATE
DRAWN		DATE 15AUG72

Figure 2-3

INTERCONNECT WIRING DIAGRAM

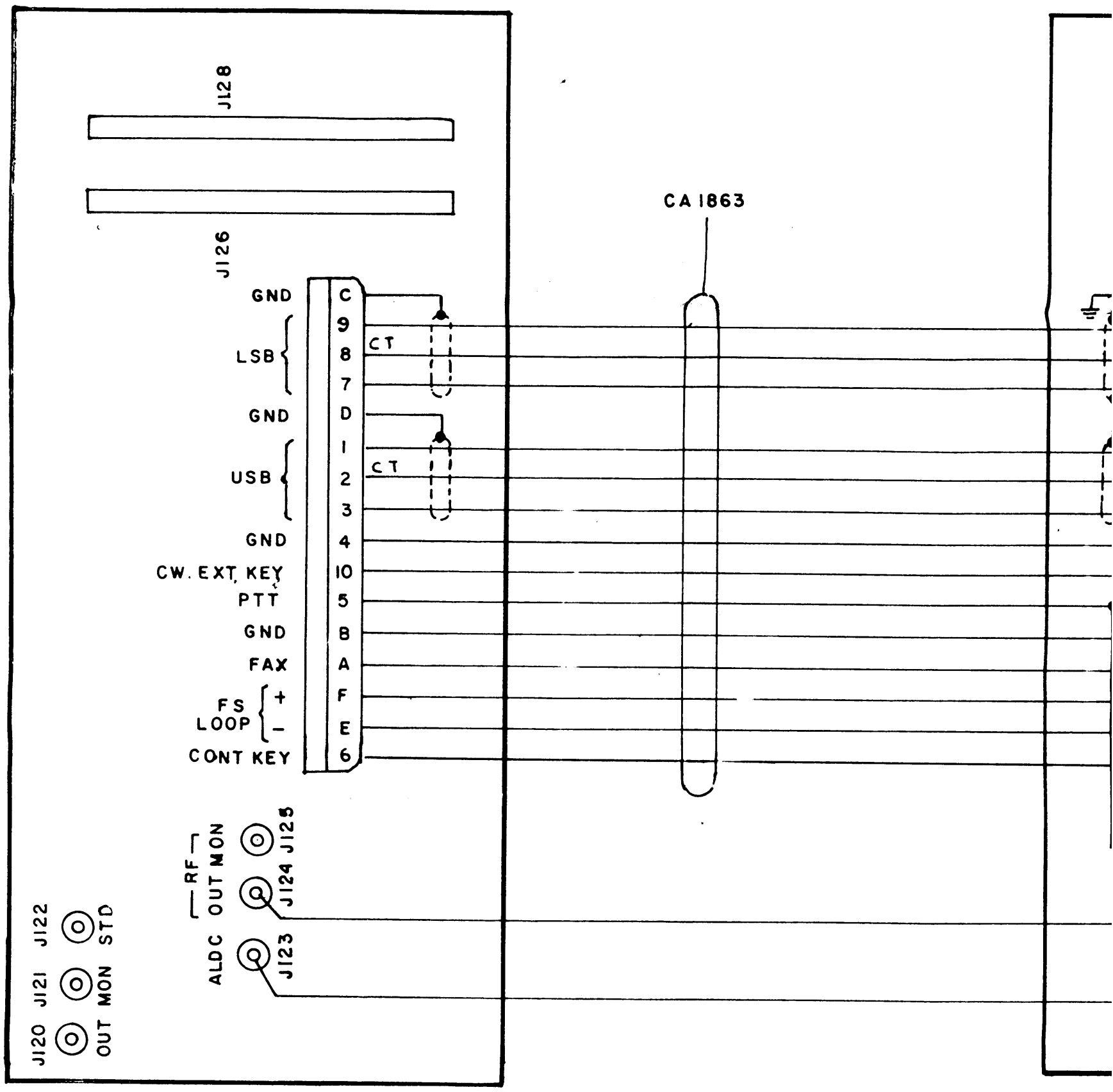
CK1943-A

3 2 1 1

4 3

D C B A

MMX-2B



	HFT-IKA/J	
QTY / UNIT	MODEL USED ON	ASS'Y NO.
APPLICATION		
	CODE	

UNLESS OTHER
DIMENSIONS
AND INCLUDE CH
OR PLATE

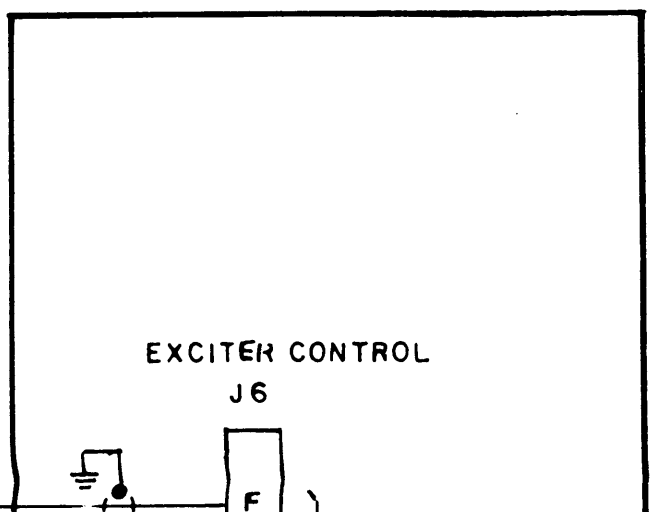
TOLERA

DECIMALS
X ± 05
.XX ± 01
.XXX ± .005

MATERIAL

FINISH

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



QTY REQ.	ITEM	PART NO.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES	FINAL APPROVAL	DATE
	MECH DES	DATE
TOLERANCES ON DECIMALS: X ± .05, XX ± .01, XXX ± .005 FRACTIONS: ± 1/64 ANGLES: ± 0° 30'	ELECT DES	DATE
	CHECKED	DATE
	DRAWN G. Lemmi	DATE 7-10-79
MATERIAL		
FINISH		

Figure 2-4

INTERCONNECT WIRING DIAGRAM

CK2222-Ø

TABLE 2-2. CONNECTORS SUPPLIED AS LOOSE ITEMS

TMC PART NUMBER	FUNCTION
UG88/U	Connection to interface panel jacks J1 and J2
MS3106B24-28S	Connection to interface panel jack J5
MS3106B24-28S	Connection to interface panel jack J6
MS3106B24-28S	Connection to interface panel jack J7
MS3106B28-21P	Connection to interface panel jack J8
UG59/U	Connection to interface panel jack J10
PL190-NG	Connection to ac power input jack J2001
PJ055B	Connection to exciter KEY input jack
PJ068B	Connection to exciter MIKE input jack

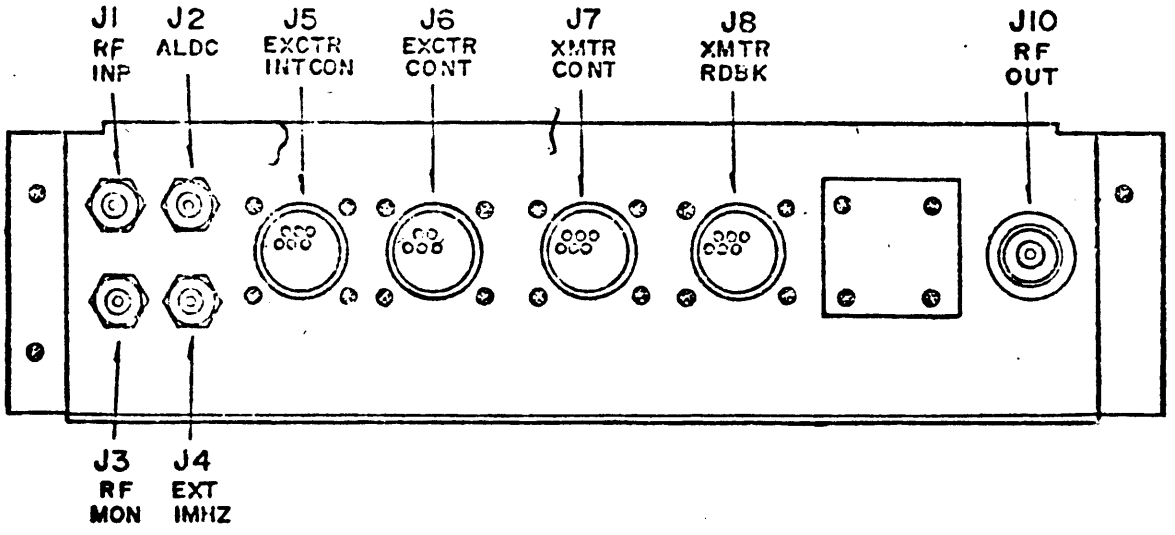


Figure 2-5. Interface Panel

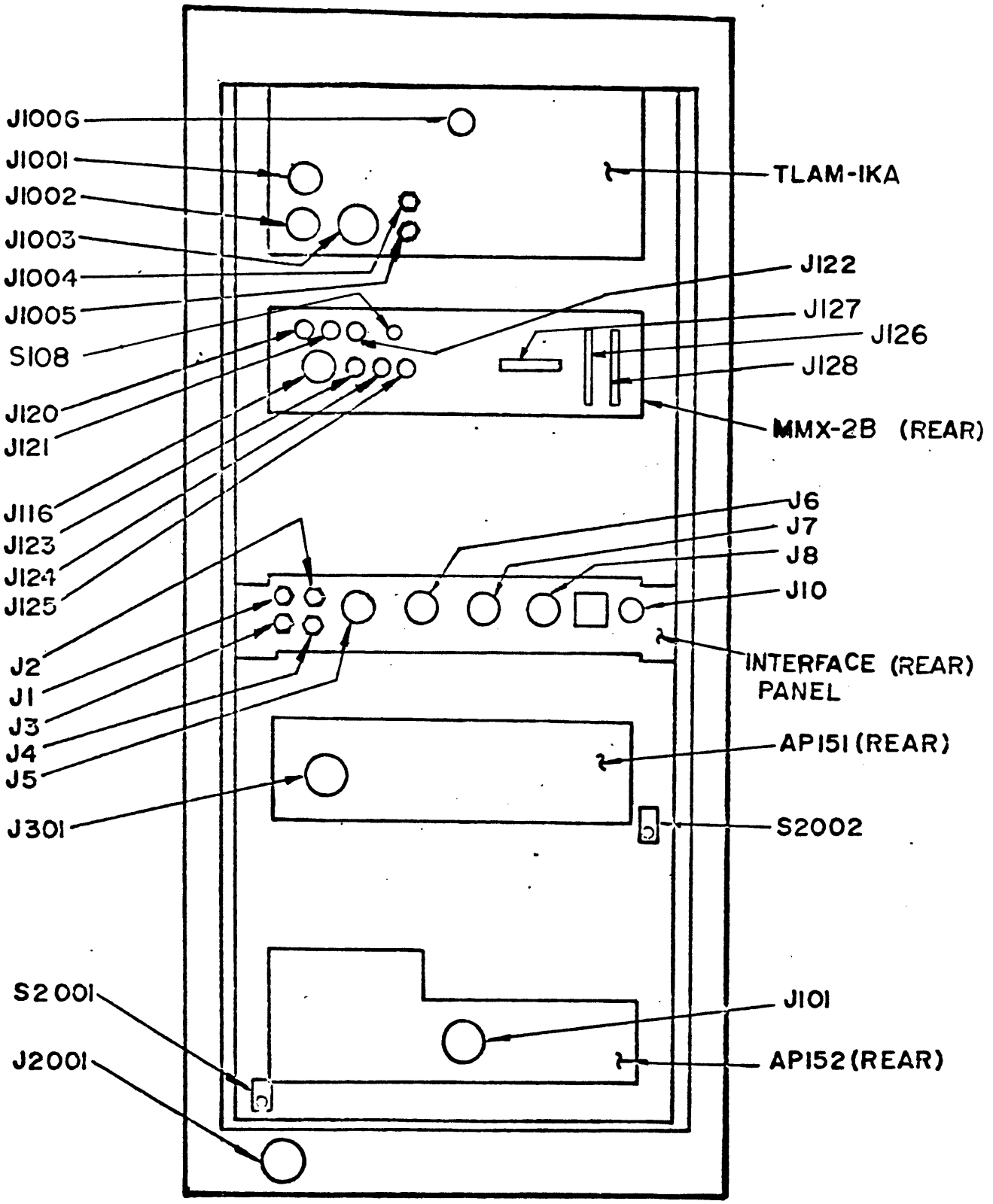


Figure 2-6. HFTM-1KJ2B Component Locations, Rear View

SECTION 3

OPERATOR'S SECTION

3-1. SCOPE.

This section gives detailed operating instructions for the HFTM-1KJ2B transmitter.

3-2. GENERAL.

Although an extensive interlock and overload system is designed into the HFTM-1KJ2B transmitter, a single incorrect control setting might still overload certain components, inviting early failure and consequently transmitter "down-time", not to mention improper and illegal emission.

Prior to operation of the transmitter, the operator should become thoroughly familiar with the location and function of all transmitter controls and indicators. When operating the transmitter, a definite operating sequence (as outlined by the operating instructions) should be strictly followed; the operator should establish a procedural pattern, thus ensuring consistent operation.

3-3. CONSIDERATIONS IN TRANSMITTER TUNING.

a. GENERAL. Before the HFTM-1KJ2B is tuned for any specified mode of operation, it should be initially tuned and loaded on a carrier frequency.

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

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

Example 1 For an upper sideband transmission, with the carrier completely suppressed and with a total rf band-pass extending from 300 hz above Fc to 3 khz, the assigned frequency is 1650 hz above the non-existent carrier frequency.

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

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

When two tones of equal amplitude are applied to a SSB system, the ratio of PEP to Average Power is .405 x PEP. This relationship is valid for two tones only. When the HFTM-1KJ2B's OUTPUT meter indicates 500 watts with two tones of equal amplitude applied to the transmitter, peak envelope power (PEP) will be 1000 watts under that condition only. A graphical representation of peak and average power ratio as a function of the number of tones is shown in figure 3-1.

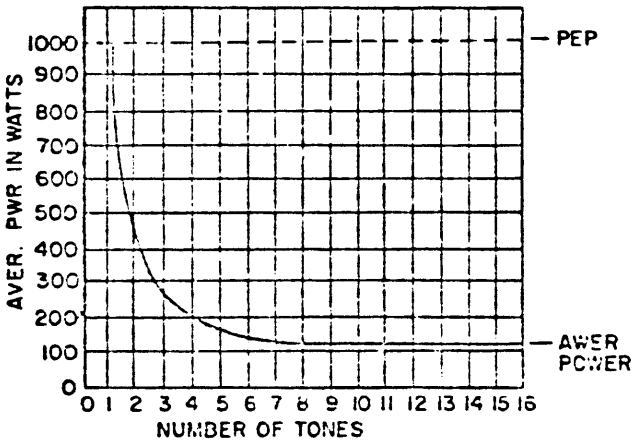


Figure 3-1. Ratio Average Power and PEP as a Function of Tones

3-4. OPERATING CONTROLS AND INDICATORS.

Control and indicator chart, table 3-1 has been prepared in conjunction with control and indicator location drawing, figure 3-2, to assist in the location and operation of all controls and indicators required for tuning and operating the HFTM-1KJ2B transmitter.

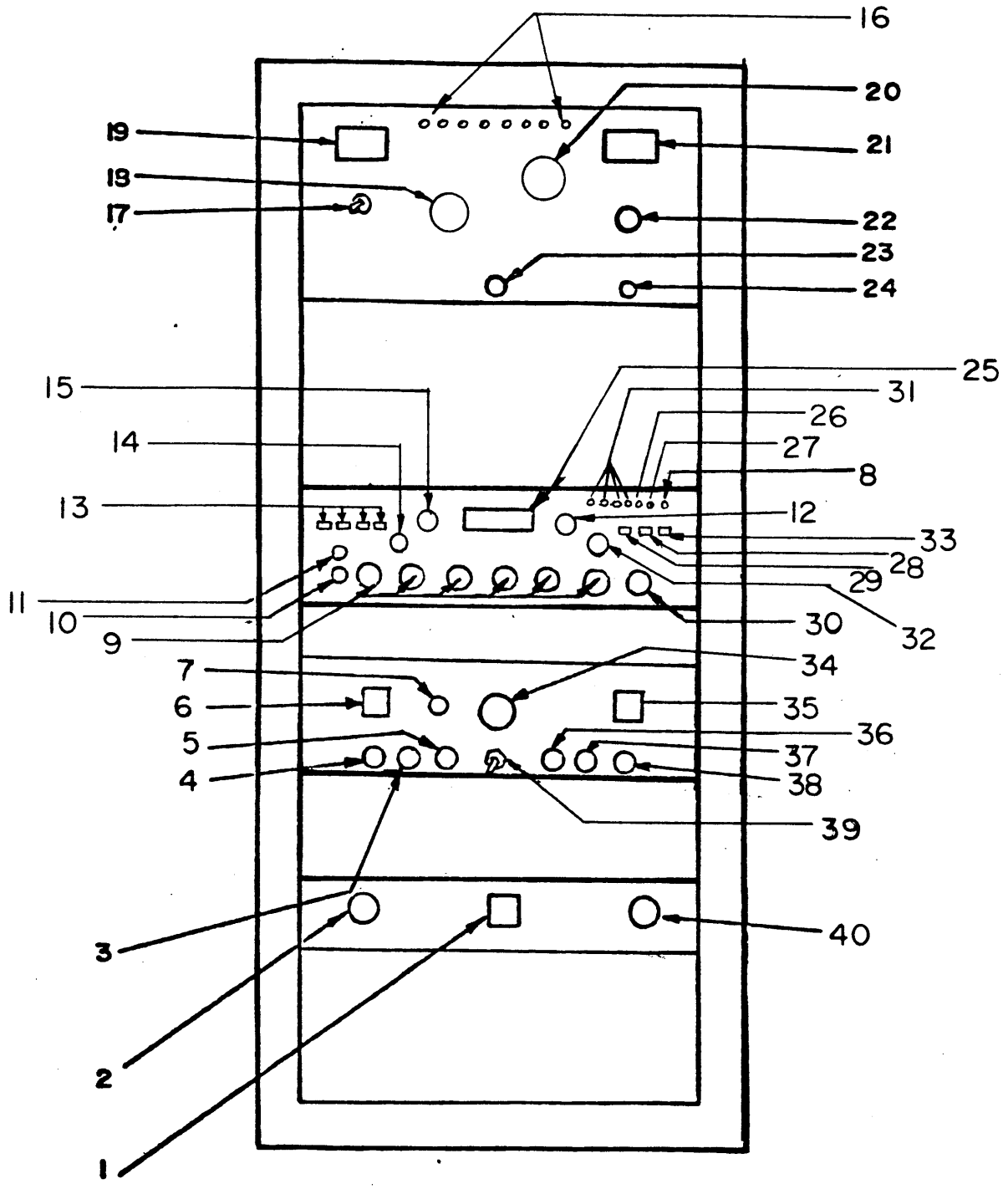


Figure 3-2. HFTM-1KJ2B Controls and Indicators

TABLE 3-1. CONTROLS AND INDICATORS

ITEM NO.	PANEL DESIGNATION	FUNCTION
1	MAIN POWER circuit breaker	When placed in the ON position, applies ac power to the transmitter.
2	MAIN POWER indicator lamp	When illuminated, indicates that ac power is applied to the transmitter.
3	FILA indicator fuse	Protective fuse for filament and bias transformer; when illuminated, indicates open fuse.
4	BLOWER indicator fuse	Protective fuse for blower; when illuminated, indicates open fuse.
5	LV indicator fuse	Protective fuse for primary ac input to low voltage transformer; when illuminated indicates open fuse.
6	SCREEN and PLATE circuit breakers	In ON position, applies screen and plate voltages to the rf amplifier tubes.
7	INTERLOCKS indicator	When illuminated, indicates that all interlocks are closed and the interlock circuit is complete.
8	REMOTE RMTE indicator	When illuminated indicater exciter is remotely controlled.
9	10MHZ, 1MHZ, 100KHZ, 10KHZ, 1KHZ, 100HZ selector switches	Frequency selector switches used to set desired operating frequency.
10	KEY jack	Front panel key jack for dry contact keyer connection in CW mode of operations.
11	MIKE jack	Front panel mike jack for 47,000 ohm impedance microphone input.
12	USB MIKE/LINE	Adjust level of USB input.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

ITEM NO.	PANEL DESIGNATION	FUNCTION
13	METER selector switchs	Four-position pushbutton switch for selecting internal circuits to be monitored on front panel meter. See Appendix A for detailed description.
14	RF OUTPUT control	Adjusts the level of rf output signal from the exciter.
15	LSB MIKE/LINE	Adjusts level of LSB input
16	BAND indicators	Illuminates when desired band is positioned.
17	PLATE meter switch (marked 2nd AMP, IPA and 1st AMP)	Selects plate current circuit to be monitored on the PLATE current meter.
18	TUNE control	Adjusts the variable tune capacitor.
19	PLATE meter	Indicates plate currents of the 1st rf amplifier, 2nd rf amplifier and IPA as selected by the meter switch.
20	BAND selector switch	Selects frequency band of operation from 2.0 mhz to 30 mhz (1.5 - 2.0, 2.0 - 2.6 - 3.0, 3-5, 5-8, 8-12, 12-16, 16-24, 24-30).
21	OUTPUT meter	Indicates output and reflected powers in killowatts.
22	LOAD control	Adjusts the variable load capacitor.
23	ALDC control	Adjusts the level of automatic load and drive control feedback voltage from the amplifier to the exciter.
24	REFL pushbutton switch	When pressed, activates OUTPUT meter to monitor reflected power; otherwise, the OUTPUT meter monitors output power.
25	MONITOR meter	Monitors exciter circuits selected by METER switch.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

ITEM NO.	PANEL DESIGNATION	FUNCTION
26	STANDBY indicator	When illuminated, indicates that ac power is applied to the exciter crystal ovens and power supplies and that dc potentials are not applied to the exciter circuitry; illuminated when the ON/STANDBY switch is in the STANDBY position.
27	POWER indicator	When illuminated, indicates that dc potentials are applied to the exciter circuitry; illuminated when the ON/STANDBY switch is in the ON position.
28	PTT/VOX switch	Controls Push to Talk (PTT) circuits to key exciter and transmitter. Controls used in Voice Operated Relay circuits to key exciter with voice operation.
29	STANDBY STBY switch	Controls application of power to all operating circuits. STANDBY (In) condition applies power to 1 mhz frequency standard only while the OPERATE (Out) position applies power throughout exciter. STBY LED indicator displays for STANDBY condition and PWR indicator for an OPERATE condition.
30	MODE selector switch	Selects the mode of transmitter operation: i.e. AM (amplitude modulation), USB (upper sideband), LSB (lower sideband), ISB (independent sideband), CW (continuous wave), FSK (frequency shift keying), or FAX (facsimile).
31	CARR SUPPR indicators	Indicates the degree of carrier suppression.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

ITEM NO.	PANEL DESIGNATION	FUNCTION
32	CARR SUPPR	Establishes the amount of carrier used by setting suppression levels (see Appendix A for a detailed description.)
33	REMOTE (RMTE) switch	Controls local/remote feature of exciter. Exciter control is local with switch "Out"; remote with switch "In".
34	ALARM indicator	Audible alarm which sounds to indicate the failure and loss of high voltage.
35	HIGH VOLTAGE indicator switch	A pushbutton switch which controls the application of high voltage to the rf amplifier; illuminates to indicate that high voltage is applied.
36	BIAS indicator fuse	Protective fuse in dc return of bias supply; when illuminated, indicates open fuse.
37	DC indicator fuse	Protective fuse for 24 vdc supply; when illuminated, indicates open fuse.
38	CONTROL indicator fuse	Protective fuse for low voltage and filament transformer: when illuminated, indicates open fuse.
39	ALARM ON/OFF switch	Switch to control the alarm circuitry; in the off position the alarm circuitry is inoperative; in the ON position the alarm sounds when high voltage fails or is removed from the rf amplifier.
40	HIGH VOLTAGE indicator	When illuminated, indicates that high voltage is applied to the rf amplifier.

3-5. OPERATING PROCEDURES.

a. Introduction. The operation of the HFTM-1KJ2B transmitter is detailed in the paragraphs which follow. Paragraph 3-5b. Preliminary Operation gives detailed instructions for control settings prior to operation, for application of main power and high voltage, and for bias checks and adjustments. Paragraph 3-5c. General Operation gives detailed instructions for transmitter tuning on carrier and for transmitter operation in the various intelligence modes.

CAUTION

Do not attempt to operate transmitter unless it has been determined that the rf output connection of the transmitter is properly terminated in an antenna or dummy load.

b. Preliminary Operation. Prior to initial application of power to the transmitter, the HFTM-1KJ2B controls should be set as outlined in Table 3-2.

TABLE 3-2. STARTING CONTROL SETTINGS

CONTROL DESIGNATION	LOCATION	SETTING
1) Primary Power circuit breaker	external to the transmitter	OFF position
2) MAIN POWER circuit	AP152 front panel	OFF (down) position
3) SCREEN and PLATE circuit breakers (6)	AP151 front panel	OFF (down) position
4) ALARM ON switch (39)	AP151 front panel	OFF (down) position
5) PA, 1st AMP and 2nd AMP bias controls	within AP151 drawer	fully clockwise (maximum bias)
6) RF OUTPUT control (14)	MMX-2B front panel	fully CCW
7) LSB MIKE/LINE (15) and USB MIKE/LINE (12)	MMX-2B front panel	mid-range (0)
8) STANDBY switch (29)	MMX-2B front panel	STANDBY position
9) EXCITER VOX/PTT switch (28)	MMX-2B front panel	VOX position
10) ALDC control (23)	TLAM-1KA front panel	fully CCW
11) LOAD control (22)	TLAM-1KA front panel	CCW to first indicator line on left
12) Plate current overload adjust screw	TLAM-1KA front panel below PLATE meter	screw adjusted so that overload indicator (red) on PLATE meter is set at 800 ma.

Once the transmitter controls have been set to their starting control settings, the HFTM-1KJ2B is ready for initial application of main power and high voltage and for bias adjustment. These procedures are detailed in Table 3-3.

NOTE

Before High Voltage is applied MMX RF Control Knob must be at minimum (ccw).

TABLE 3-3. PRELIMINARY OPERATING PROCEDURE

STEP	OPERATION	NORMAL INDICATION
1	Set Primary Power circuit breaker to the ON position.	Primary Power indicator (if any) external to transmitter illuminates.
2	Set MAIN POWER circuit breaker (1) to the ON position.	PA blower operates and MAIN POWER indicator (2) on AP152 illuminates. INTERLOCKS indicator (7) on the AP151 illuminates (all safety interlocks must be closed and the time delay cycle must be completed).
3	Set SCREEN and PLATE circuit breakers (6) to ON position.	No indication.
4	Unfasten the panel locks on the AP151 and pull drawer out to expose the PA, 1st AMP and 2nd AMP BIAS controls.	No indication.
5	Press the HIGH VOLTAGE switch/ indicator (35) on the AP151 to illuminate indicator (it may be necessary to press the HIGH VOLTAGE switch twice).	HIGH VOLTAGE indicators (35) and (40) on the AP151 and AP152 must illuminate.
6	With the PLATE meter switch (17) on the TLAM-1KA in its neutral (IPA) position, adjust the PA BIAS control in the AP151 drawer for 200 to 210 ma quiescent current.	PLATE meter (19) on TLAM-1KA indicates 200 to 210 ma.
7	Hold the PLATE meter switch (17) on the TLAM-1KA in the up (2nd AMP) position, and adjust the 2nd AMP BIAS control in the AP151 drawer for 200 to 210 ma of quiescent current.	PLATE meter (19) on TLAM-1KA indicates 200 to 210 ma.
8	Hold the PLATE meter switch (17) on the TLAM-1KA in the down (1st AMP) position, and adjust the 1st AMP BIAS control in the AP151 drawer for 40 to 50ma of quiescent current.	PLATE meter (19) on TLAM-1KA indicates 40 to 50 ma.

c. General Operation. Prior to operating the HFTM-1KJ2B transmitter in any of its intelligence modes, the transmitter must be initially tuned on carrier. Table 3-4 details the procedure for transmitter tuning on carrier.

TABLE 3-4. TRANSMITTER TUNING PROCEDURE (CARRIER ONLY)

STEP	OPERATION	NORMAL INDICATION
1	Perform steps 1 thru 5 in Table 3-3 to apply main power and high voltage to the transmitter	Indications are the same as Table 3-3.
2	With the PLATE meter switch (17) on the TLAM-1KA in its neutral position, observe the PLATE meter (19) on the TLAM-1KA	PLATE meter (19) on the TLAM-1KA indicates 200 to 210 ma (if not, perform step 6 in Table 3-3).
3	Hold the PLATE meter switch (17) on the TLAM-1KA in the Up (2nd AMP) position.	PLATE meter (19) on the TLAM-1KA indicates 200 to 210 ma (if not, perform step 7 in Table 3-3).
4	Hold the PLATE meter switch (17) on the TLAM-1KA in the down (1st AMP) position.	PLATE meter (19) on the TLAM-1KA indicates 40 to 50 ma (if not, perform step 8 in Table 3-3).
5	RF OUTPUT control must be fully CCW on the MMX-2B. PTT line must be closed via MMX-2B or interface panel. Press the HIGH VOLTAGE switch/indicator (35) on the AP151 to illuminate indicator (it may be necessary to press the HIGH VOLTAGE switch twice).	HIGH VOLTAGE indicators (35) and (40) on the AP151 and AP152 must illuminate.
6	Set the BAND selector switch (20) on the TLAM-1KA to a band which covers the desired operating frequency.	Light will illuminate when desired band is reached (16).
7	Set controls on the MMX-2B as follows: METER switch (13) to RF position, STANDBY switch (29) to ON position, VOX/PTT switch (28) to PPT position, and MODE switch (30) to CW position.	The POWER indicator (27) on the MMX-2B illuminates.

TABLE 3-4. TRANSMITTER TUNING PROCEDURE (CONT)
(CARRIER ONLY)

STEP	OPERATION	NORMAL INDICATION
8	Insert a shorting plugs in the MMX-2B Key (10), MIKE (11).	MONITOR meter (25) on the MMX-2B reads approximately 2.
9	Adjust RF OUTPUT (14) on the MMX-2B clockwise slightly to cause an increase in PA plate current.	PLATE meter (19) on the TLAM-1KA indicates an increase in PA plate current (not to exceed 300 ma).
10	Adjust TUNE control (18) on the TLAM-1KA for a noticeable resonant dip in PA plate current.	PLATE meter (19) on the TLAM-1KA indicates a resonant dip and OUTPUT meter (21) on the TLAM-1KA indicates simultaneously an increase in output power.
11	Adjust the LOAD control (22) on the TLAM-1KA as required to produce maximum output power.	The OUTPUT meter (21) on the TLAM-1KA indicates a further increase in output power during loading process.
12	Readjust the TUNE control (18) on the TLAM-1KA to insure that the transmitter is at resonance. Repeat steps 10 and 11 as necessary.	The OUTPUT meter (21) on the TLAM-1KA indicates highest value when the transmitter is properly tuned into an antenna or dummy load.
13	Rotate the RF OUTPUT control (14) on the MMX-2B clockwise to increase output power to the desired level. (Refer to the Maintenance Section of Appendix B, and Appendix A for ALDC Adjustment.)	The OUTPUT meter (21) on the TLAM-1KA indicates the average power output lever.
14	Remove the shorting plug in the MMX-2B Key (10)	The OUTPUT meter (21) on the TLAM-1KA indicates zero.

Once the transmitter has been tuned on carrier as per Table 3-4, it is ready for operation in an intelligence mode. Exciter control positions for the various intelligence modes of operation are outlined in Appendix A.

SECTION 4

THEORY OF OPERATION

4-1. OVERALL BLOCK DIAGRAM ANALYSIS.

Figure 4-1 is an overall block diagram of the HFTM-1KJ2B transmitter. Power input of 115/230 vac, 50/60 hz is applied via J2001 to the AP152 high voltage power supply and to the MMX-2B exciter.

Intelligence inputs to the transmitter are applied via the interface panel to the exciter; these inputs include line audio (for both upper and lower sidebands), frequency shift keying, facsimile, and exciter PTT control. A CW keyline input also appears on the interface panel and is routed to the exciter. The test key switch provides CW keyline closure for tuning and test purposes.

Transmitter control inputs to the HFTM-1KJ2B are also applied via the interface panel; these inputs include control lines for high voltage on circuitry, transmitter PTT, overload reset, and external interlocks. External control of the transmitter is optional; however, if the external control imputs are not utilized, jumper connections must be made at the interface panel to complete transmitter circuitry.

The MMX-2B provides an rf output (J124) of at least 100 milliwatts (250 millivolts) within the frequency range of 2.0 to 30 mhz in any of the following modes; AM, USB, LSB, ISB including AME, CW, FSK or FAX. The exciter output is applied via J1004 to the chain of amplifiers within the TLAM-1KA linear power amplifier. The AP151 low voltage and bias supply and AP152 high voltage supply provide the dc operating potentials for the linear amplifier chain.

The rf output of the TLAM-1KA is one killowatt PEP and average throughout the frequency range of the transmitter. This output is applied via J1006 to J10 on the interface panel. The antenna connection is made at J10.

The TLAM-1KA provides an ALDC (automatic load and drive control) feedback voltage to the MMX-2B exciter, which prevents the rf output of the transmitter from exceeding a preset level. The ALDC circuit in the exciter automatically compensates for high modulation peaks and load changes, providing a relatively constant output level, in addition to limiting distortion and improving linearity.

4-2. FUNCITONAL ASSEMBLY SECTIONS.

Refer to Appendix A and B for detailed theory of operation for the Multi-Mode Exciter and the High Frequency Linear Power Amplifier.

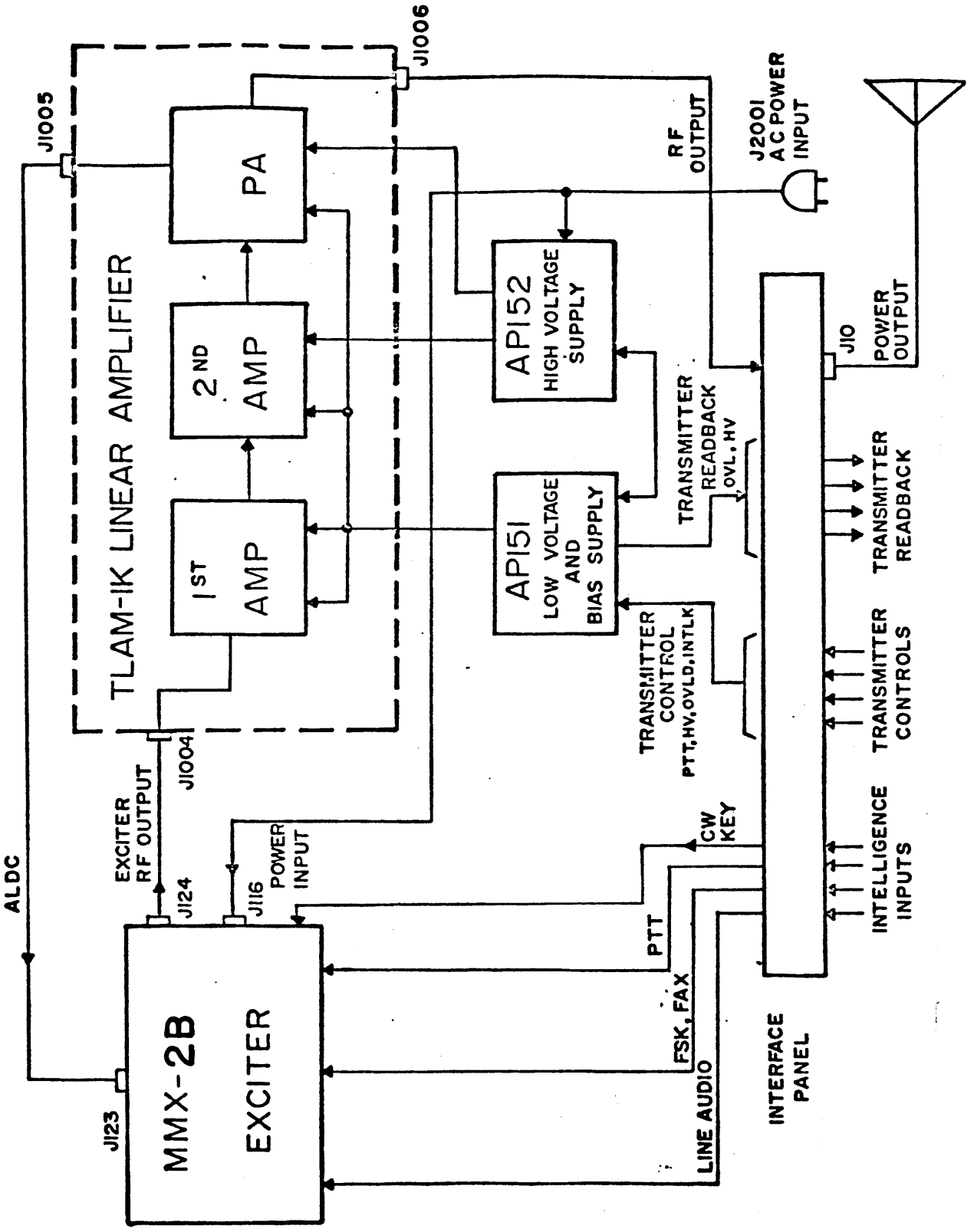


Figure 4-1. HFTM-1KJ2B Overall Block Diagram

SECTION 5

MAINTENANCE AND TROUBLESHOOTING

5-1. INTRODUCTION.

The HFTM-1KJ2B transmitter has been designed for long term, trouble-free operation. When it becomes necessary to perform alignment and/or adjustments to the equipment, it is recommended that technicians perform the necessary operations outlined in the associated HFLM-1KA and MMX-2B Appendixes. The following maintenance aids are provided for troubleshooting and replacement of parts:

a. Overall block diagram (Section 4, figure 4-1)

b. Interconnect wiring diagram (Section 2, figure 2-3, 2-4).

5-2. TEST EQUIPMENT REQUIRED.

Table 5-1 lists the test equipment required for maintaining and troubleshooting the transmitter. Refer to Appendix A and B for additional equipment required to maintain and troubleshoot these two components.

TABLE 5-1. TEST EQUIPMENT REQUIRED

EQUIPMENT	TYPE
Singal Generator	Hewlett-Packard Model 606A, or equivalent
VTVM	Hewlett-Packard Model 410B, or equivalent
Multimeter	Simpson Model 260, or equivalent
Oscilloscope	Tektronix, Model 541A, or equivalent

5-3. OPERATOR'S MAINTENANCE PROCEDURE.

a. Refer to transmitter operating procedures (Tables 3-2, 3-3, and 3-4).

b. Refer to troubleshooting (paragraph 5-5).

c. Refer to maintenance procedures described in Appendix A and B

5-4. PREVENTIVE MAINTENANCE.

In order to prevent equipment failure due to dust, dirt or other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to. At periodic intervals, the equipment should be pulled out on its slides for internal cleaning and inspection. The wiring and all components should be inspected for dirt, dust, corrosion, grease or other harmful conditions. Remove dust with a soft brush or vacuum cleaner. Remove dirt or grease with any suitable cleaning solvent, Use of carbon tetrachloride should be avoided due to its highly toxic effects. Trichlorethylene or Methyl Chloroform may be used, providing the necessary precautions are observed. For detailed preventive maintenance procedures, refer to Appendix A and B.

WARNING

WHEN USING TOXIC SOLVENTS, MAKE CERTAIN THAT ADEQUATE VENTILATION EXISTS. AVOID PROLONGED OR REPEATED BREATHING OF THE VAPOR. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. FLAMMABLE SOLVENTS SHALL NOT BE USED ON ENERGIZED EQUIPMENT OR NEAR ANY EQUIPMENT FROM WHICH A SPARK MAY BE RECEIVED. SMOKING, "HOT-WORK", ETC. IS PROHIBITED IN THE IMMEDIATE AREA.

CAUTION

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

5-5 TROUBLESHOOTING.

Troubleshooting the HFTM-1KJ2B consists of isolating faults to either the MMX-2B exciter or the HFLM-1KA power amplifier. Refer to the associated appendixes for detailed troubleshooting information.

a. Disconnect the MMX-2B rf output from the HFLM-1KA and connect the MMX-2B to a 50 ohm, 1 watt, non-inductive dummy load. Use an oscilloscope to monitor the exciter output, referring to the Appendix A for normal indications.

b. Use an ohmmeter to check for continuity of interconnect cabling between the MMX-2B and HFLM-1KA. (Refer to figure 2-4.)

c. Disconnect the MMX-2B and connect a signal generator to the HFLM-1KA input. Operate the HFLM-1KA into a dummy load (if available) and monitor the HFLM-1KA meters for proper operation. (Refer to Table 3-4 and Appendix B for normal indications.)

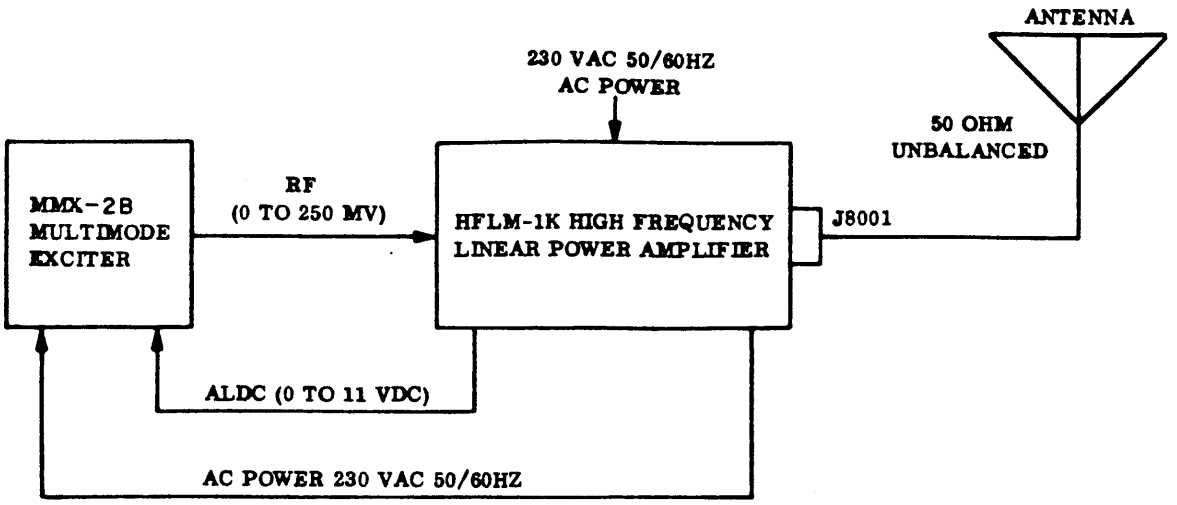


Figure 5-1. HFTM-1KJ2B Overall Block Diagram

5-6. TROUBLESHOOTING CHARTS A,B,C,D

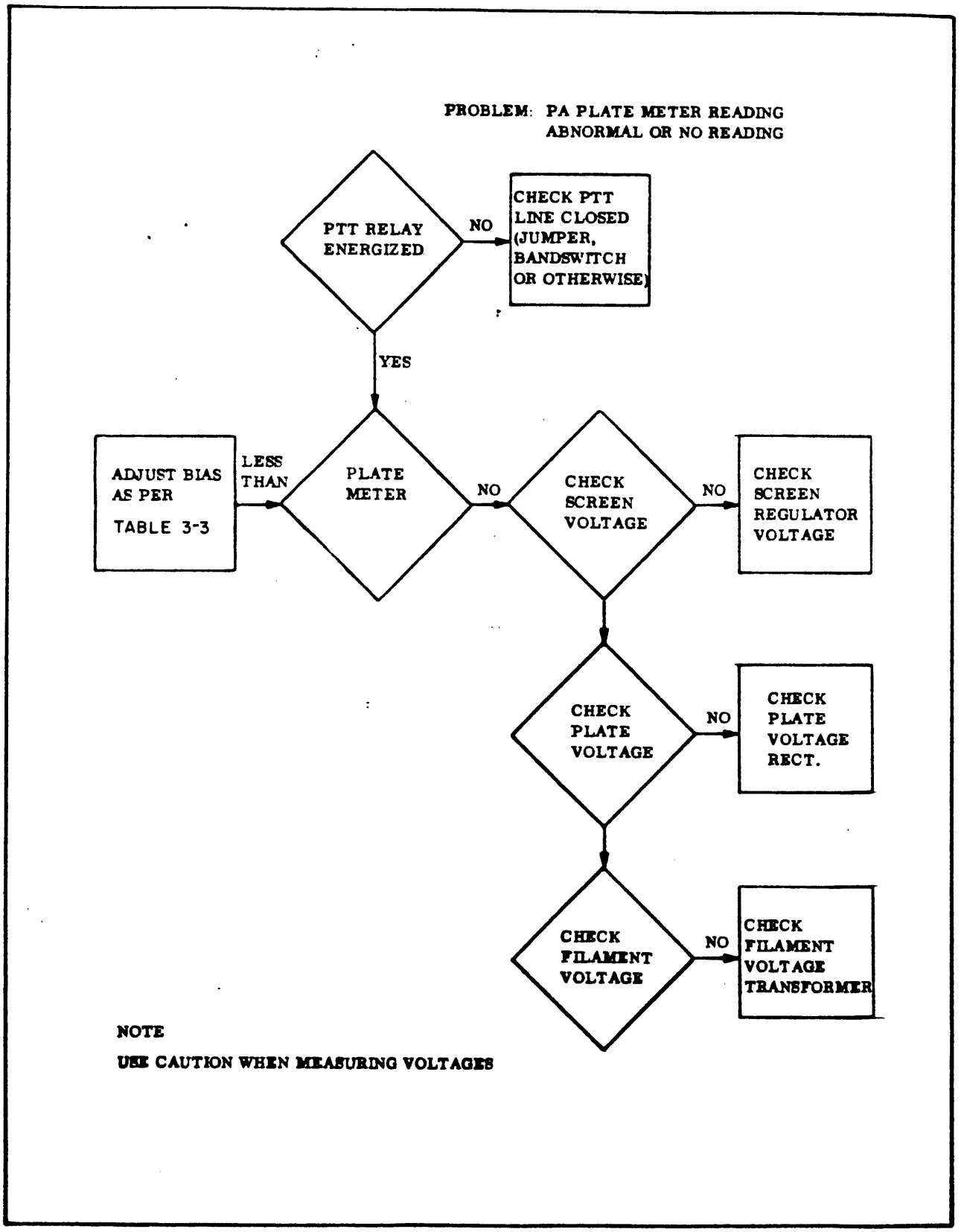
The maintenance programs listed are for the purpose of assisting in troubleshooting and maintenance of the transmitter. These charts or programs do not list all possible difficulties; however, they can be used as a starting point to isolate a particular malfunction. To use the charts, follow these instructions.

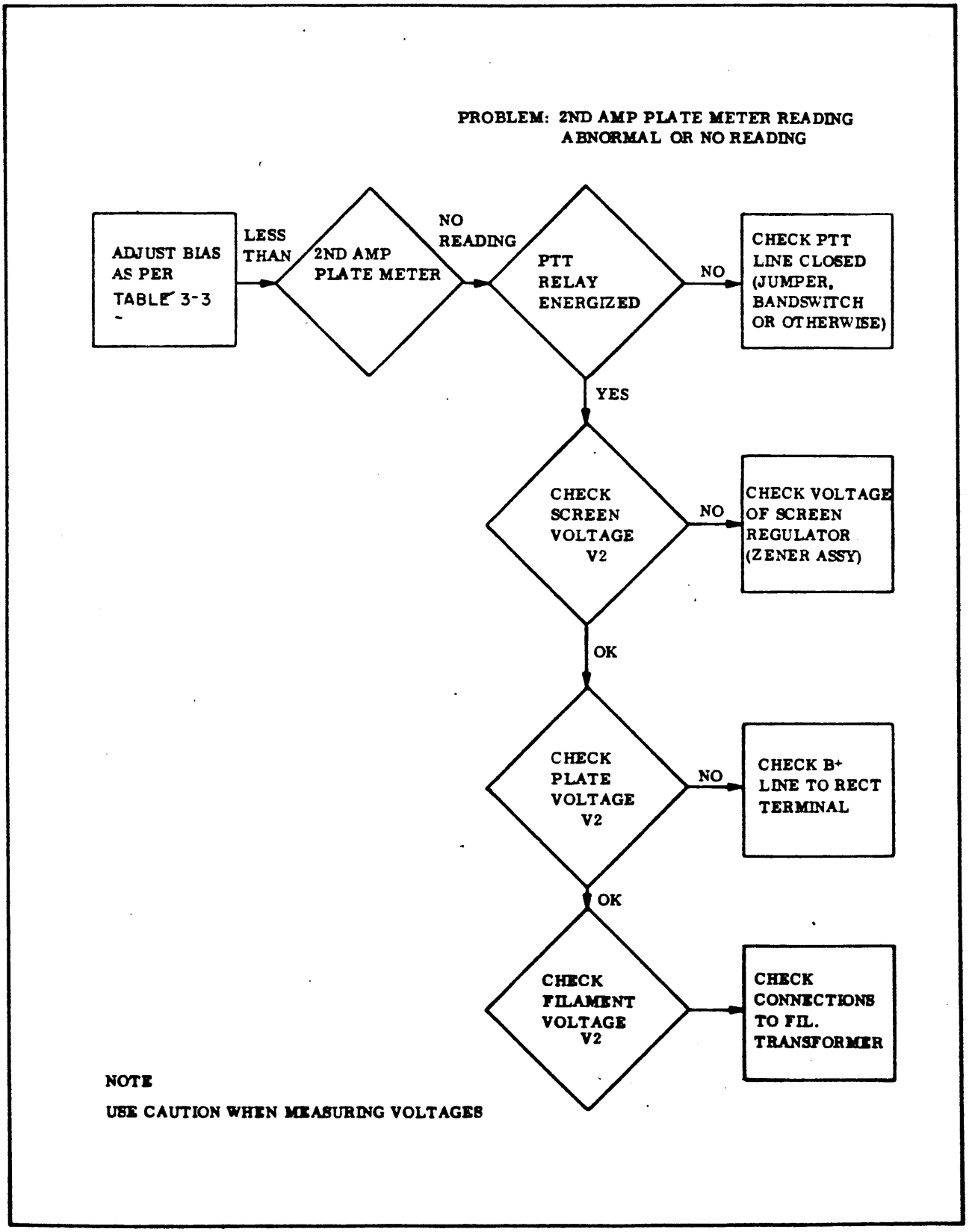
1. Determine the nature of the trouble.
2. Find the programs which described it most completely (refer to program list).
3. Follow the arrow from that block to the first suggested fault - INVESTIGATE.
4. If no trouble can be found, follow the arrow to the next fault suggested - INVESTIGATE.
5. If trouble is only partially corrected, find the block which most nearly describes the remaining trouble - INVESTIGATE.
6. Proceed as in line 3 above.

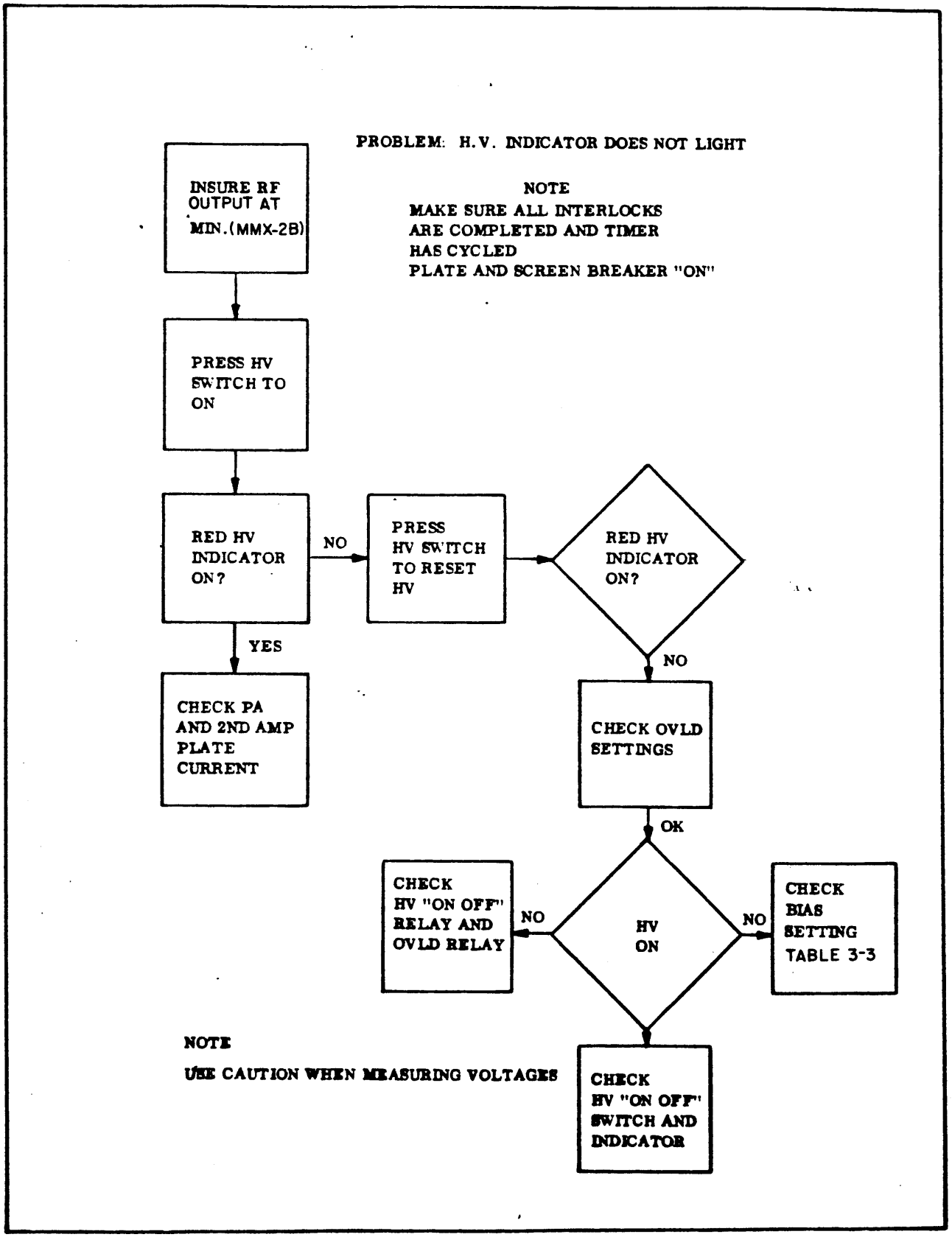
MAINTENANCE PROGRAM LIST

Maintenance program "A"	PA PLATE meter reading abnormal
Maintenance program "B"	2ND AMP PLATE meter reading abnormal
Maintenance promram "C"	No high voltage
Maintenance program "D"	Main Blower does not operate, interlock indicator light is out

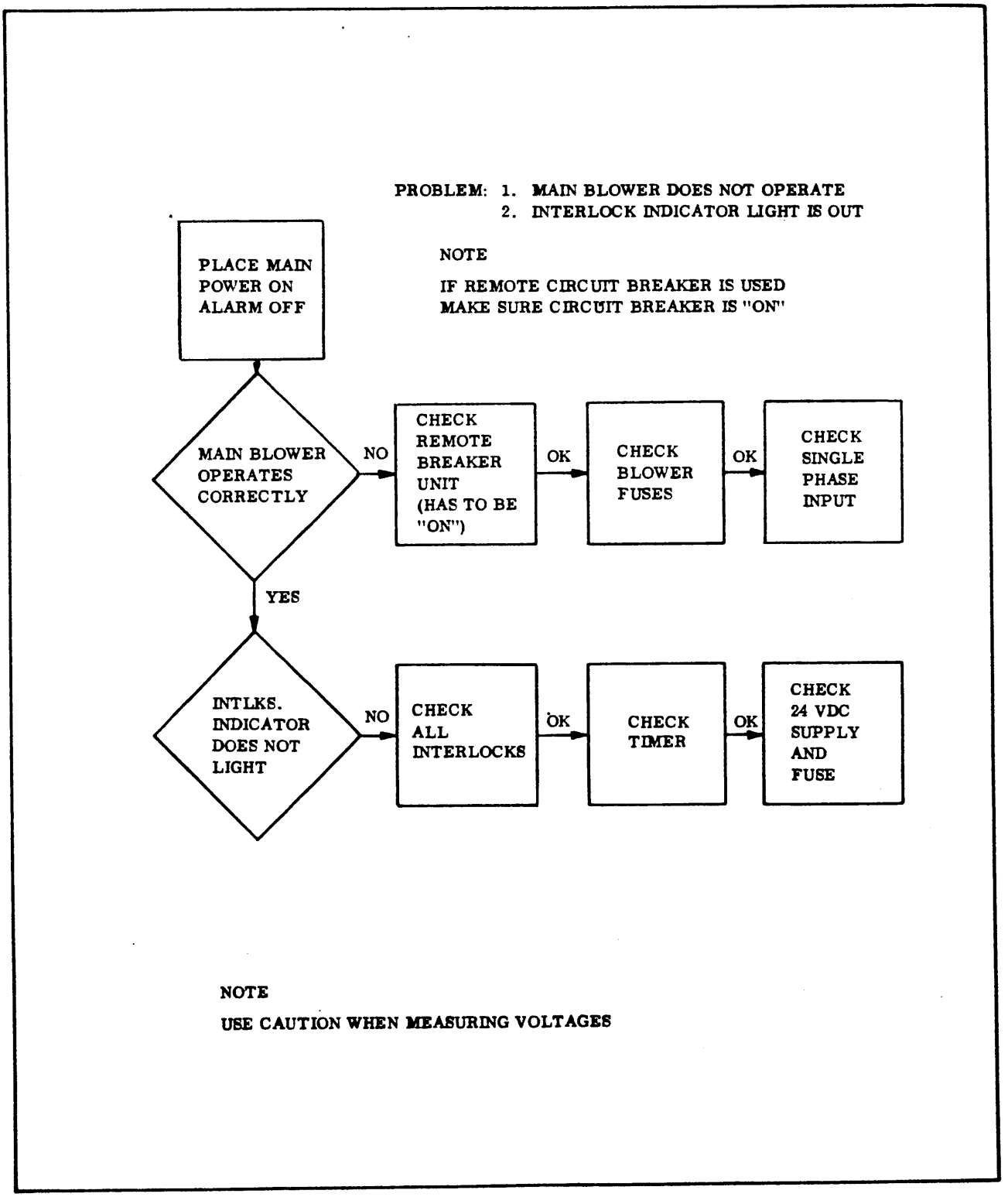
TROUBLESHOOTING "PROGRAM A"




PROBLEM: 2ND AMP PLATE METER READING ABNORMAL OR NO READING
ADJUST BIAS AS PER TABLE 3-3
LESS THAN
2ND AMP PLATE METER
NO READING
PTT RELAY ENERGIZED
NO
CHECK PTT LINE CLOSED (JUMPER, BANDSWITCH OR OTHERWISE)
YES
CHECK SCREEN VOLTAGE V2
NO
CHECK VOLTAGE OF SCREEN REGULATOR (ZENER ASSY)
OK
CHECK PLATE VOLTAGE V2
NO
CHECK B+ LINE TO RECT TERMINAL
OK
CHECK FILAMENT VOLTAGE V2
CHECK CONNECTIONS TO FIL. TRANSFORMER
NOTE
USE CAUTION WHEN MEASURING VOLTAGES


PROBLEM: H.V. INDICATOR DOES NOT LIGHT
NOTE
MAKE SURE ALL INTERLOCKS ARE COMPLETED AND TIMER HAS CYCLED
PLATE AND SCREEN BREAKER "ON"
INSURE RF OUTPUT AT MIN.(MMX-2B)
PRESS HV SWITCH TO ON
RED HV INDICATOR ON?
NO
PRESS HV SWITCH TO RESET HV
RED HV INDICATOR ON?
YES
NO
CHECK PA AND 2ND AMP PLATE CURRENT
CHECK OVLD SETTINGS
OK
CHECK HV "ON OFF" RELAY AND OVLD RELAY
NO
HV ON
NO
CHECK BIAS SETTING TABLE 3-3
NOTE
USE CAUTION WHEN MEASURING VOLTAGES
CHECK HV "ON OFF" SWITCH AND INDICATOR

TROUBLESHOOTING "PROGRAM D"



SECTION 6

PARTS LIST

6-1. INTRODUCTION.

The HFTM-1KJ2B transmitter consists of the MMX-2B exciter, and HFLM-1KA linear power amplifier. The parts lists for the MMX-2B exciter and HFLM-1KA linear power amplifier are contained in their respective Appendixs.

6-2. GENERAL.

Reference designations have been assigned to identify all Subassembly/ PC Card parts of the equipment. They are used for marking the equipment and are included on drawings, diagrams, and in the parts list. The letters of a reference designation indicate the kind of part (generic group), such as resistor, capacitor, unit, subassembly, PC card, transistor, integrated circuit, electron tube, etc. The number differentiates between parts of the same generic group. Sockets associated with a particular plug-in device, such as electron tubes or lamps, are identified with a reference desigantion which includes the reference designation of the plug-in device.

TABLE 6-1. PARTS LIST FOR EQUIPMENT CABINET

REFERENCE SYMBOL	DESCRIPTION	TMC PART NO.
J2001	Connector, Receptacle	JJ297-1
S2001	Switch, Interlock	SW230
S2002	Same as S2001	