TECHNICAL MANUAL

FOR

AX-789 MFT

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120-001

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DO NOT DESTROY

THE TECHNICAL MATERIEL CORPORATION

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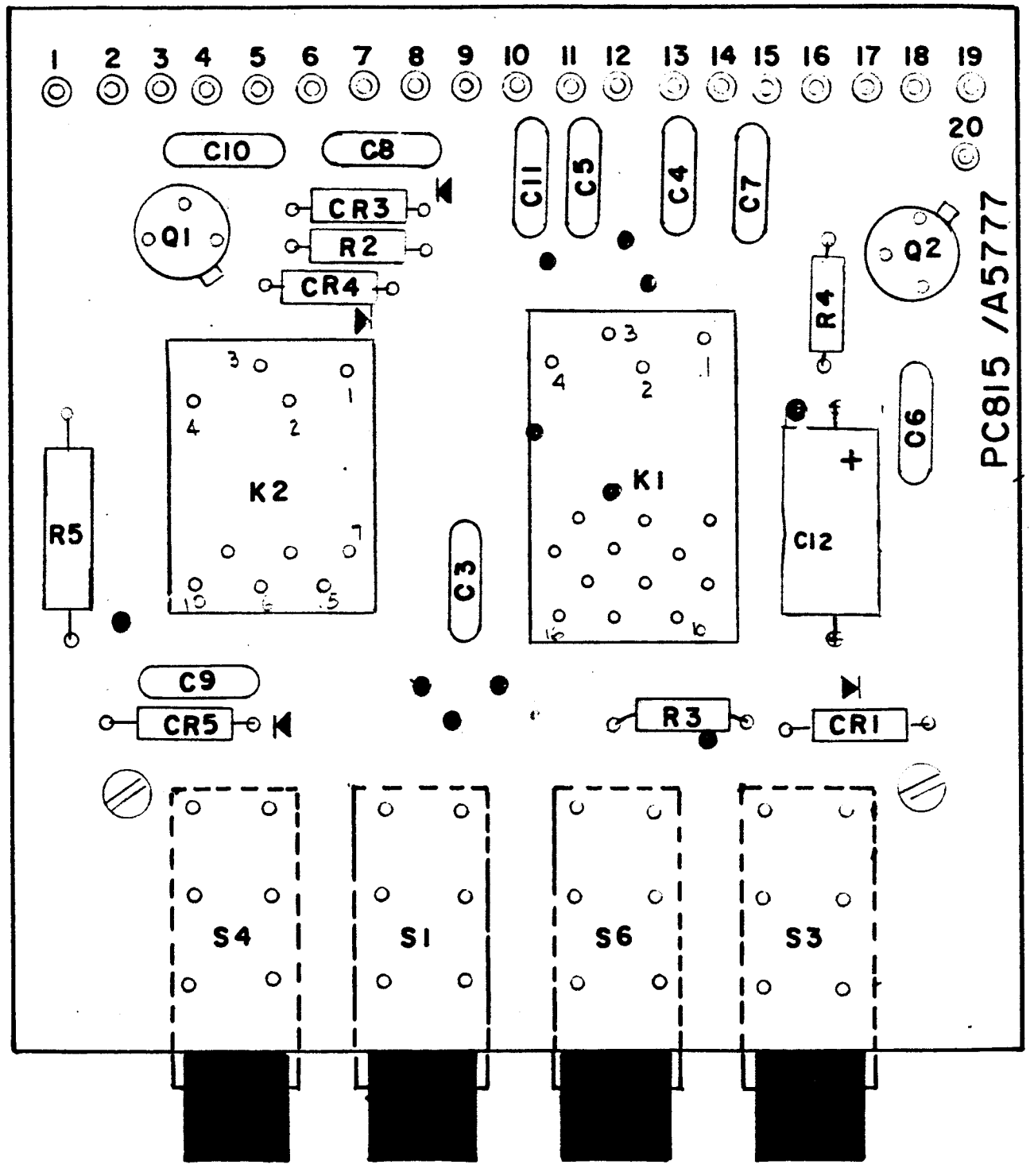
TMC (CANADA) LIMITED **TMC INTERNATIONAL**
RR No. 5, Ottawa K1G 3N3 Ontario CANADA
TEL. 613-521-2050 TLX: 053-4146

NOTICE

RECORD OF REVISIONS

NO.	ISSUED	DESCRIPTION	ENTERED	BY
001	7-7-82	REVISED PG 2-3,2-4	EMN 21972	
002				
003				
004				
005				
006				
007				
008				
009				
010				

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



Part Number	Description	Used On	Qty	Symbol Number
CC100-28	CAP, FXD, CER	A5777	9	C3,C4,C5,C6,C7,C8,C9, C10,C11
RC07GF102J	RES, FXD	A5777	1	R2
RC07GF332J	RES, FXD	A5777	1	R3
RC32GF102J	RES, FXD	A5777	1	R5
RC07GF473J	RES, FXD	A5777	1	R4
RL156-10	REL ARM	A5777	1	K1
RL156-19	REL ARM	A5777	1	K2
SW559-N-1	SW PB	A5777	2	S3,S6
SW559-P-1	SW PB	A5777	2	S1,S4
TS171-4	SKT, RELAY	A5777	1	XK1
TS171-5	SKT, RELAY	A5777	1	XK2
1N645	DIODE	A5777	4	CR1,CR3,CR4,CR5
2N1595	TRANSISTOR	A5777	1	Q1
2N1711	TRANSISTOR	A5777	1	Q2
CE105-5-50	CAP, FIX, ELEC	A5777	1	C12

CONTROL ASSEMBLY
A5757(Z101)

REVISIONS							
ZONE	LTR	DESCRIPTION	DATE	E.M.N.NO	DRAFT	CHKD	APPD
	Ø	ORIGINAL RELEASE FOR PRODUCTION	9-6-79	—	MAC		
	A	changed PC803-10 DC815 & A5757 to A5777	3-11-81	21871	LAS		
	B	C12 Added, A5777 PWB 20 Revised, LA2DS revised	7-682	21971			

PC802/A5756

Z102

PWR DS1 R1 3.3K 1/2W C1 .1

FAULT DS2 R2 3.3K 1/2W C2 .1

RDY DS3 R3 3.3K 1/2W C3 .1

SWR DS4 R4 3.3K 1/2W C4

Z101

PC815

A5777

CR3 IN645

R2 1K

C10 .1

Q1 2N1595

REM S4

REM LOCAL

R5 1K 1W

M/C

OVLD RESET S6

R3 3.3K

TUNE

C6 .1

CR1 IN645

C7 .1

C8 .1

C9 .1

C11 .1

CR5 IN645

C5 .1

C12 5uf 50V

CR4 IN645

K2

Q2 2N1711

R4 47K

C3 .1

C4 .1

(P/O M101)

M101

REFL

C103 .1

C104 .1

C105 .1

M102 FWD

C106 .1

S101

NOTE: 1K(CCW) S101 IS OFF

1K (P/O S101)

S102

HV

DS101

HV ON/OFF

LAMP (P/O S102)

C109 .1

C107 .1

C108 .1

TB101

9	FAULT
2	READY
16	REM. METER CONT
15	REFL. PWR METER (XMITTER)
19	OVLD RES.
10	OVLD RESET
21	
22	HV ON/OFF
1	TUNE
11	HV ON
20	OVLD RESET
12	RF GAIN OUT M/C
3	RF GAIN IN M/C
17	ANT. SWTC
13	REMOTE GAIN(MMX)
4	FWD PWR METER (XMITTER)
18	GND
7	HV ON/OFF
8	
5	HV IND
6	+24V IN

CK2218 B

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 .X ± .05, .XX ± .01, .XXX ± .005

FRACTIONS ± 1/64

ANGLES ± 0° 30'

MATERIAL

FINISH

FINAL APPROVAL	DATE
MECH. DES.	DATE
ELECT. DES.	DATE
CHECKED	DATE
DRAWN GDL	DATE 1-31-79

THE TECHNICAL MATERIEL CORP.
MAMARONECK, NEW YORK

DIAGRAM, SCHEMATIC
REMOTE (MFTA)

SIZE	CODE IDENT.NO.	DWG NO.	ISSUE
C	82679	CK2218	B

SCALE — SHEET — OF

QTY / UNIT	MODEL USED ON	ASS'Y NO.
	MFTA-10K/J	AX789-MFT

APPLICATION — CODE

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

Warranty

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

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

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

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

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

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

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

*Electron tubes also include semi-conductor devices.

TABLE OF CONTENTS

GENERAL INFORMATION

1-1. DESCRIPTION

The AX789 remote unit is used to control certain critical functions of the MFT-10K/J Transmitter. Maximum location away from the transmitter should not exceed 100 feet. AX789 input information is connected at TB101, located at the rear of the unit (see figure 2). All inputs are wire connections. A +24 volt power source is supplied by the transmitter at Terminal 6 of TB101.

1-2. PHYSICAL DESCRIPTION

The AX789 remote unit is approximately 19 inches long, 4 inches deep and stands 5 inches high. The unit weight is approximately 4 and ½ pounds.

1-3. FUNCTIONAL DESCRIPTION

The following functions of the transmitter are controlled by the AX789 Remote Unit (see figure 1)

1. HIGH VOLTAGE ON
2. HIGH VOLTAGE OFF
3. TUNE
4. OVERLOAD RESET
5. SWR OVERLOAD ADJUSTMENT
6. RF GAIN

The following Readback functions are monitored on the front panel of the AX789 Remote Unit.

7. FAULT
8. READY
9. SWR OVERLOAD
10. HV ON
11. FOWARD POWER LEVEL
12. REFLECTED POWER LEVEL

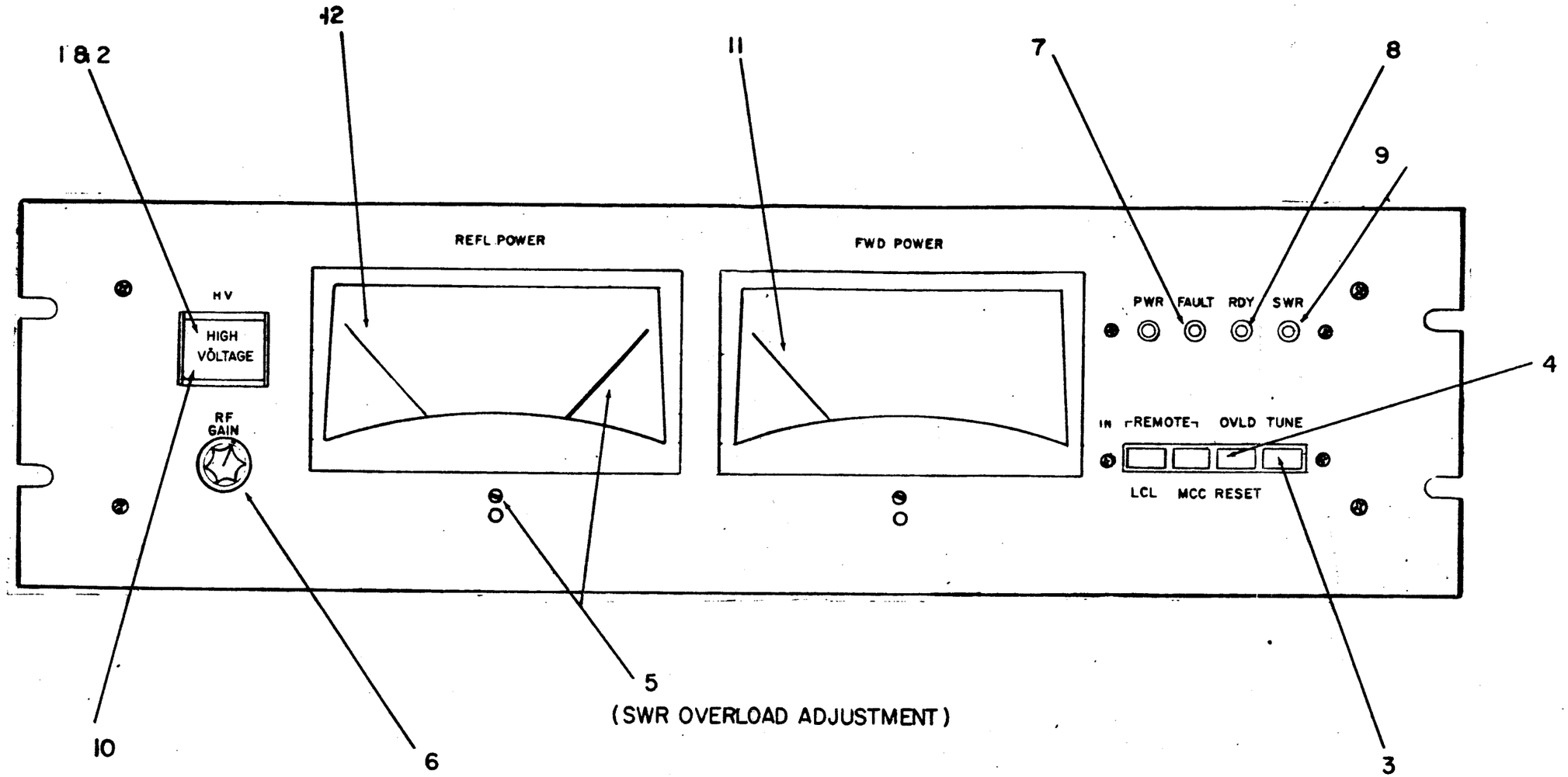


FIGURE 1

CONTROLS and INDICATORS

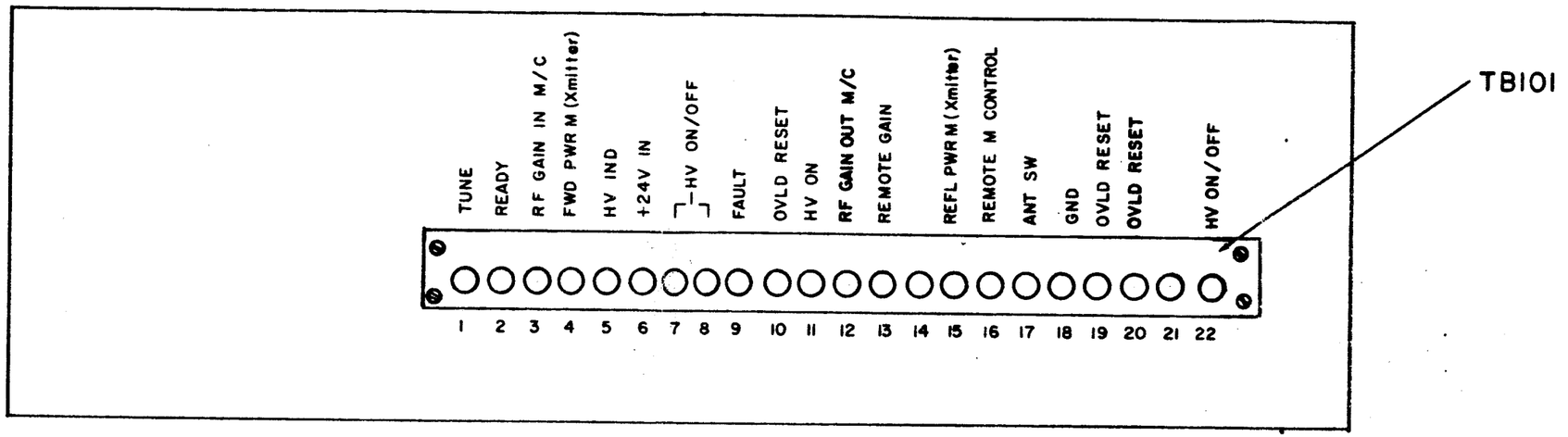
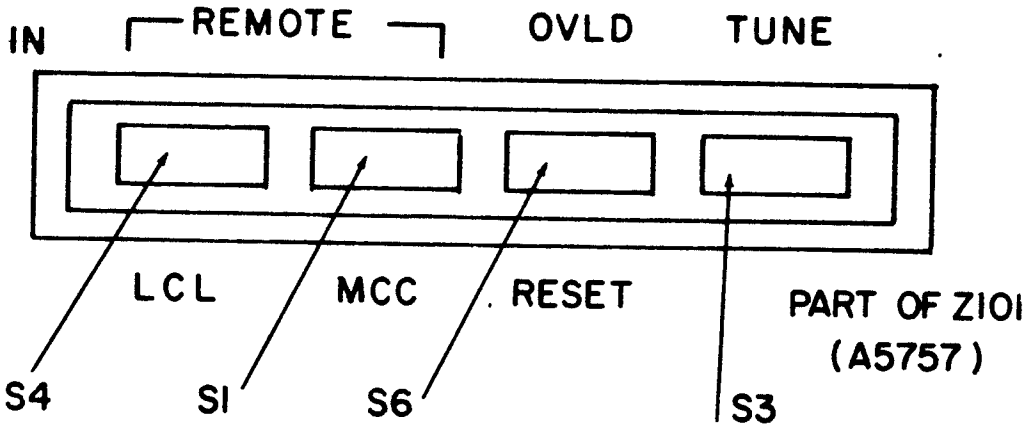


FIGURE 2

REAR PANEL IDENTIFICATION

1-4. OPERATIONAL DESCRIPTIONS

Symbol references used in the paragraphs to follow refer directly to figure 3 (Schematic diagram).



S4, REMOTE, LOCAL SWITCH

When normal, (outposition) control of the transmitter is at the transmitter site. When S4 is depressed control of the transmitter is transfered to the AX789 remote unit. NOTE: To accomplish this S1 must be depressed and the transmitter's High Voltage button must also be depressed. Now control is fully given to the AX789 remote unit.

S1, REMOTE, MISSION CONTROL SWITCH

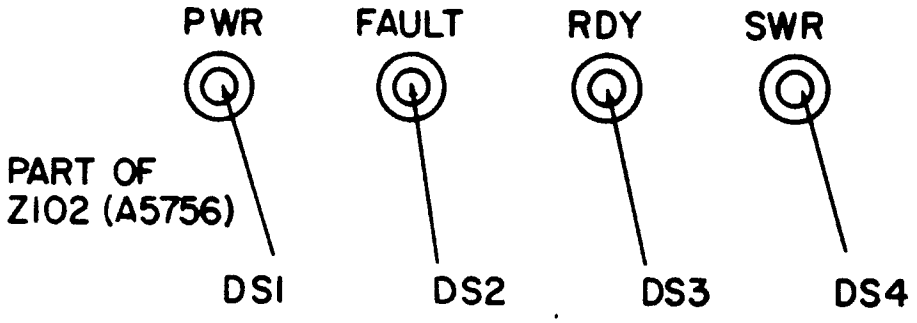
This switch is used in conjunction with the mission control panel. It allows RF Gain Operation to be switched from the Remote unit AX789 to the mission control panel. This is accomplished by putting S1 in the normal position or out position.

S6, OVERLOAD RESET SWITCH

Depress approximately one second. This will facilatate a momentary closure. This in turn will reset any normal overload at the transmitter site. It will also reset SWR overload circuit on the AX789 Remote unit.

S3, TUNE SWITCH

Depress approximately one second. This will facilatate a momentary closure that will retune transmitter for automatic tuning.



DS1 POWER LIGHT (PWR)

Led (Light Emitting Diode) will be lite when +24V is received from the transmitter.

DS2 FAULT LIGHT

Led will light when a fault in the transmitter's automatic tuning cycle occurs. (operates in automatic only)

DS3 READY LIGHT (RDY)

Led will light when the transmitter has completed it's automatic tuning cycle.

DS4 SWR OVERLOAD LIGHT

Led will light when SWR level exceeds red pointer meter adjustment. This overload is reset by depressing overload reset button.

S102 HIGH VOLTAGE ON/OFF SWITCH

The High Voltage button at the transmitter site must be depressed or (IN). The S102 switch at the AX789 remote unit will now control High Voltage ON or OFF.

When used in conjunction with the mission control panel S102 is operated as a 3 way switch. Therefore, HV ON/OFF can be controlled by either AX789 or mission control. If mission control panel is NOT used, it is necessary to Ground (GND) pin 7 of TB101.

S101 RF GAIN INTERLOCK SWITCH

This switch is used to switch A5757-K1 relay. The transmitter must be tuned and in the ready condition, before switching S101. When K1 Relay is initiated it will control Foward Meter (M102) and reflected meter M101 and also RF Gain functions, (see figure 3 and operation section).

SWR OVERLOAD ADJUSTMENT (p/o M101) see figure 1

This adjustment is made with a small flat head screwdriver at the M101 Reflected Power Meter face. Two holes are located below M101. The top hole is the adjustment. An adjustable set of contacts control the setting (red needle). This setting is normally made to trip at a SWR of 3:1.

M102 FOWARD POWER METER

After the automatic tuning cycle of the transmitter is complete, the M102 meter will moniter the foward power.

M101 REFLECTED POWER METER

After the automatic tuning cycle of the transmitter is complete, the M101 meter will monitor Reflected Power and SWR Overload.

OPERATION

2-1. SEQUENCE OF OPERATION

To operate the AX789 Remote unit, it will be necessary to have initiated the following control settings:

A. At the Transmitter site, the Automatic-Manual switch turned to Automatic. The High Voltage Switch turned ON.

B. At the AX789 unit, the Remote switch LCL(S4) depressed. The Remote switch MCC(S1) depressed. The RF Gain knob (S101) turned clockwise. Note it is important that S101 be turned counter-clockwise, but not switched OFF. If this is not done the AX789 remote unit will not function.

2-2. TUNING

After the desired exciter frequency is set, the High Voltage switch (S102) should be turned ON, now we are ready for tuning. Carefully drive transmitter from 1 amp IDLE current to 2 amps (tune level). Plate current is monitored at remote, with external plate current meter. After transmitter tunes and goes to RDY, S101 is adjusted fully counter-clockwise to engage OFF switch. This will then switch over meters M101 and M102 for remote monitoring. RF gain is now adjusted for proper output level for tuning of antenna tuner. Depress the tune switch (S3), the transmitter should start tuning automatically and go to a ready condition. Note that the meters M101 and M102 will not be reading during the tuning up of the transmitter, but the meters at the transmitter will read.

2-3. READY

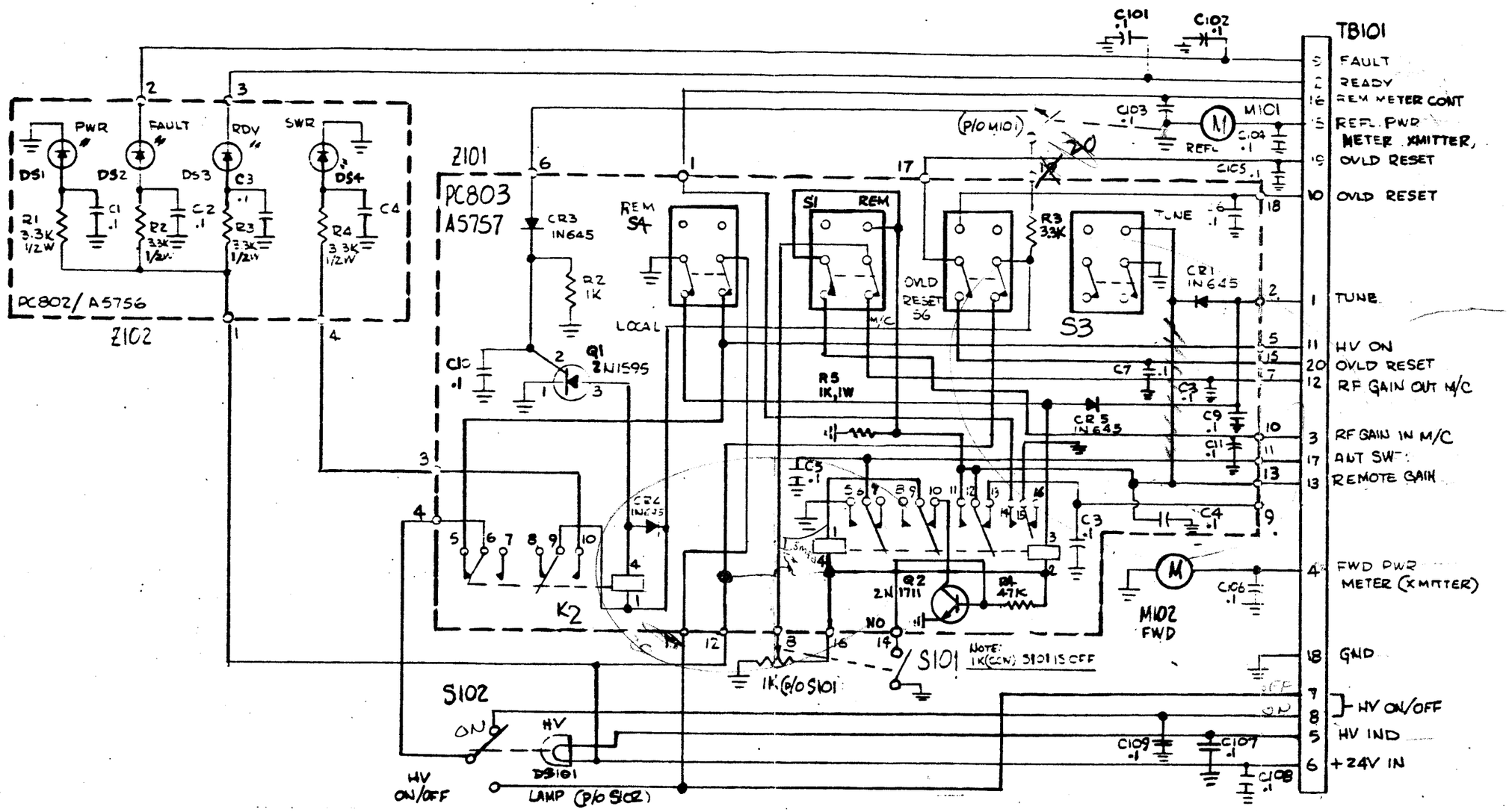
The transmitter should now be in a ready condition and be putting out 2-3 KW RF into a dummy load. RF is now ready to be switched to an Antenna Tuner. This is accomplished by rotating the RF GAIN knob (S101) fully counter-clockwise or OFF. Turning (S101) fully counter-clockwise will initiate A5757-K1 relay. This will switch in Meters M101,M102, and the RF Gain Control. A5757-K1 relay will also ground (GND) pin 17 of TB101, which will activate the antenna tuner.

2-4. RF CORRECTION

The transmitter can now be manually driven up to correct tuning at the 1-2 KW level, for final antenna tuner set-up (min SWR).

When the antenna tuner has been properly tuned, the transmitter can be driven up to full RF OUTPUT POWER. The control of the RF Gain now can be switched from the AX789 Remote unit mission control by releasing remote switch MCC(S1).

Part Number	Description	Used On	Qty	Symbol Number
A5756	ASSY, PC BD IND	AX789	1	Z102
A5777	ASSY, PC BD SW	AX789	1	Z101
BI110-7	LAMP, INCAN	AX789	1	DS101
CC100-28	CAP, FXD, CER	AX789	9	C101,C102,C103,C104, C105,C106,C107,C108, C109
MR239	METER, KW OUTPUT	AX789	1	M102
MR238	METER, REF PWR	AX789	1	M101
RV4NBYSC102B	RESISTOR, VAR, SW	AX789	1	S101
SW522-1	SWITCH, PUSH	AX789	1	S102
TM100-22	TERMINAL STRIP	AX789	1	TB101

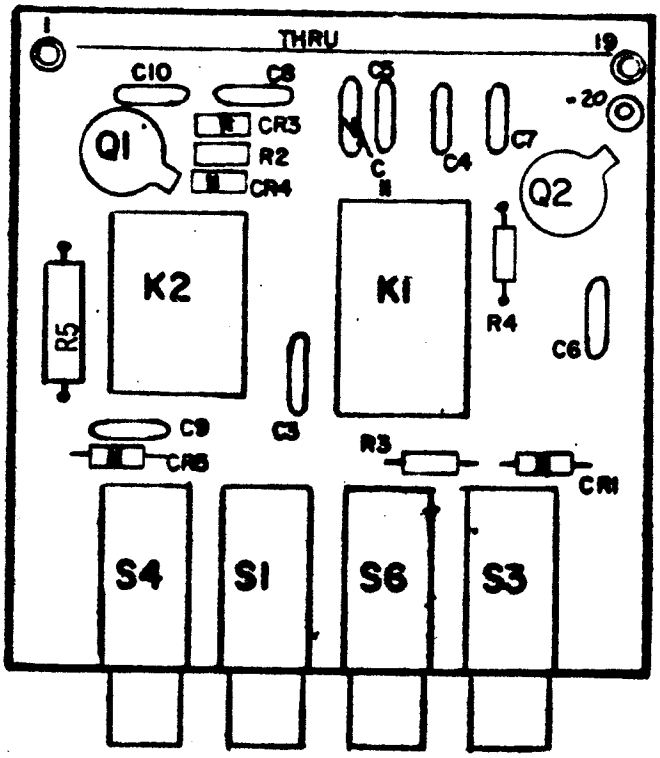


CK2218-ø

FIGURE 3

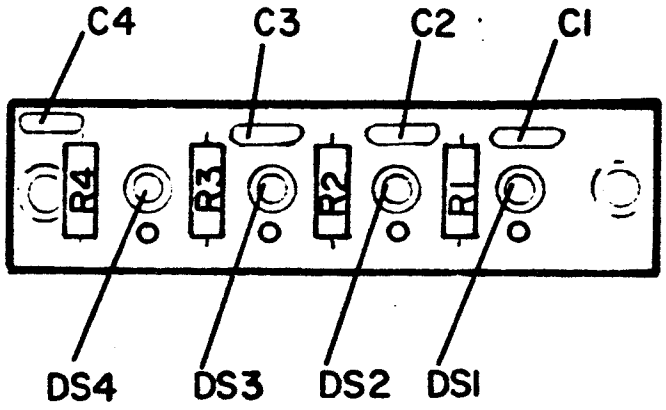
OVERALL SCHEMATIC DIAGRAM

Part Number	Description	Used On	Qty	Symbol Number
CC100-28	CAP, FXD, CER	A5777	9	C3,C4,C5,C6,C7,C8,C9, C10,C11
RC07GF102J	RES, FXD	A5777	1	R2
RC07GF332J	RES, FXD	A5777	1	R3
RC32GF102J	RES, FXD	A5777	1	R5
RC07GF473J	RES, FXD	A5777	1	R4
RL156-10	REL ARM	A5777	1	K1
RL156-19	REL ARM	A5777	1	K2
SW559-N-1	SW PB	A5777	2	S3,S6
SW559-P-1	SW PB	A5777	2	S1,S4
TS171-4	SKT, RELAY	A5777	1	XK1
TS171-5	SKT, RELAY	A5777	1	XK2
1N645	DIODE	A5777	4	CR1,CR3,CR4,CR5
2N1595	TRANSISTOR	A5777	1	Q1
2N1711	TRANSISTOR	A5777	1	Q2



CONTROL ASSEMBLY
A5757(Z101)

PART NUMBER	DESCRIPTION	USED ON ASSEMBLY	QTY PER UNIT	REFERENCE SYMBOLS
BI132	LED	A5756	4	DS1,DS2,DS3,DS4
CC100-28	CAP, FXD, CER	A5756	4	C1,C2,C3,C4
RC20GF332	RES, FXD, COMP	A5756	4	R1,R2,R3,R4



INDICATOR ASSEMBLY
A5756 (Z102)

MAC	Ø	ORIGINAL RELEASE FOR PRODUCTION	9-6-79					

REVISIONS						
E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE	APPROVED
	GDL			X1	CONNECT TO J1000 ON INTF ADD.	10-17-78	
				X2	ON J1000 PIN F DEM CLARIF.	12-20-78	
	GDL		X3		J1000-A GND WAS TO TB1-11 MOVED T TB1-18. J1000 PIN F WAS TO TB1-6 MOVED TO TO LFE J110M - J1000 P LWAS GND NOW +24V MOVED TO TB1-6 - ADD JUMPER TB1-10 TO TB1-21 ADD NEW LINE FROM TB1-22 TO MISSION CONTROL TB2-10	12-28-78	
	GDL		X4		CONNECTIONS AT PIN 14 OF TB1 TO METER ADD	1-31-79	

100MA METER

10Ω

REMOTE

TB1

TUNE	1	INTF P1000-C
READY	2	INTF P1000-D
RF GAIN	3	
FWD PWR METER (XMTR)	4	INTF P1000-G
HV IND	5	INTF P1002-L
+24 IN	6	INTF P1000-L
HV ON/OFF	7	
REMOTE CONTROL	8	
FAULT	9	INTF P1000-E
OVLD RESET	10	INTF-P1002-M
HV ON/OFF	11	INTF P1002-J
RF GAIN	12	
REMOTE GAIN	13	LFE P119-N
IP METER	14	INTF P1002-S
REFL METER	15	INTF P1000-H
REMOTE METER CONT,	16	INTF P1000-J
ANT RELAY SWITCHING	17	S101 ANT REL.
⏚	18	INTF P1000-A
	19	
OVLD IND	20	INTF P1002-P
OVLD RESET	21	INTF P1002-N
HV ON/OFF	22	INTF P1002-K

LFE

(MS3106A24-28P) P119

INTF P1002-A		
INTF P1002-B		
INTF P1002-C		
INTF P1002-D		
INTF P1002-E		
INTF P1002-F		
INTF P1002-G		
INTF P1002-H		
INTF P1000-K		
INTF P1000-F		
REMOTE TB1-13		
INTF P1000-U		
INTF P1000-L		
INTF P1002-R		
REMOTE TB1-18		

(MS3102A-24-28S) J119

A	400-600	
B	600-800	
C	800-1000	
D	1000-1200	
E	1200-1400	
F	1400-1700	
G	1700-1800	
H	1800-2000	
J		
K		
L	PTT	
M	COM.	
N	0 TO 24V REM GAIN	
P	XMTR	
R	GND	
S	TUNE CARR	
T	GND	

(TM100-6) TB103

USB	CT	1
		2
		3
GND		4
PTT		5
		6

(TM100-6) TB104

		7
LSB	CT	8
		9
GND		10
KEY		11
GND		12

(TM100-6) TB105

FSK	~	13
	+	14
FAX		15
		16
CONT		17
GND		18

RF ALDC

(UG625/U) JJ124 (UG625/U) J123

(TM105-19)

MISSION CONTROL

1	
2	READY
3	RF GAIN IN
4	
5	HV ON IND
6	+24 V
7	HV ON/OFF
8	REMOTE CONTROL
9	FAULT
10	COM HV ON/OFF
11	
12	RF GAIN OUT
13	
14	
15	
16	
17	
18	GND
19	

T82

INTERFACE (MFTA-10K)

(MS3106A20-29P) P1002

J1002 (MS3102A20-29S)

LFE P119-A	A	400-600
LFE P119-B	B	600-800
LFE P119-C	C	800-1000
LFE P119-D	D	1000-1200
LFE P119-E	E	1200-1400
LFE P119-F	F	1400-1700
LFE P119-G	G	1700-1800
LFE P119-H	H	1800-2000
REMOTE TB1-11	J	HV
REMOTE TB1-22	K	ON/OFF
REMOTE TB1-5	L	HV IND
REMOTE TB1-10	M	OVLD
REMOTE TB1-21	N	RESET
REMOTE TB1-20	P	OVLD IND.
LFE P119-S	R	CARRIER ON TUNE
REMOTE TB1-14	S	PA PLATE CURRENT REM METER

MS3106A20-27P P1000

J1000 (MS3102A20-27S)

REMOTE TB1-18	A	GND
LFE P119-P	B	XMTR
LFE P119-S	C	TUNE
REMOTE TB1-2	D	READY
REMOTE TB1-9	E	FAULT
LFE J119-M	F	COM. (PA BAND SW)
REMOTE TB1-4	G	FWD PWR METER
REMOTE TB1-15	H	REFLECTED PWR METER
REMOTE TB1-16	J	REMOTE METER RELAY
LFE P119-L	K	PTT
REMOTE TBI-6	L	+24V

(MS3106A16S-1P) P1001

J1001 (MS3102A16S-1S)

TO EXT. INTIKS	A	EXT
TO EXT INTIKS	B	NO
TO EXT INTIKS	C	NC
	D	
	E	
	F	
	G	

ALDC J130 RFIN J131

RF OUT

DUMMY LOAD 10KW 50Ω

TO ANT TUNER RF

S101 RF ANT SW

TO REMOTE TB1 PIN 17

TO INTF P1001

TO INTF P1001-B EXT. INTERLOCKS

TO INTF P1001-C

TO INTF P1001-A

QTY. REQ.	ITEM	PART NO.	DESCRIPTION	SYMBOL

LIST OF MATERIAL

FINAL APPROVAL GDR	DATE
MECH. DES.	DATE
ELECT. DES.	DATE
CHECKED	DATE
DRAWN G.D.L	DATE 9-8-78

THE TECHNICAL MATERIEL CORP.
MAMARONECK, NEW YORK

INTERCONNECT WIRING DIAGRAM MF SYSTEM

SIZE	CODE IDENT NO.	DWG NO.	ISSUE
D	82679	CK2208	Ø

SCALE SHEET OF

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

LOCKEED

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

CK2208 Ø