TECHNICAL MANUAL

for

GENERAL PURPOSE TRANSMITTER

MODEL GPTA-2.5JE

SYSTEM

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, ONTARIO

Printed in U.S.A.

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FOREWORD

All variations of the Technical Manual GPTA-2.5K transmitters employ the PALA-2.5K linear amplifier as a building block. The GPTA-2.5JE consists of the following components:

PALA-2.5K Linear Amplifier (manual supplied)

MMX(A)-2 Multimode Exciter (manual supplied)

AX-5047 Voice Control and PTT Unit

AX-5052 Electronic TR Switch

RAK110-2JE Equipment Cabinet

Technical information on the AX-5047, AX-5052 and RAK110-2JE are contained in this system manual.

The purpose of this system manual is to provide the operator with information pertaining to the operation of the transmitter as a system as well as basic functioning. More detailed information on the operation of the Linear Amplifier and Exciter are contained in the associated manuals, PALA-2.5K and MMX( )-2.

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SECTION I

GENERAL INFORMATION

1-1. PURPOSE OF EQUIPMENT.

Radio Transmitter, Model GPTA 2.5JE is a general purpose, self-tunable transmitter system providing 2500 watts peak envelope power (PEP) through the 2 to 30 MHZ frequency range.

Operating modes include single-sideband (SSB), amplitude modulation equivalent (AME), continuous wave (CW), modulated continuous wave (MCW), facscimile (FAX), and frequency shift keying (FSK).

1-2. EQUIPMENT MAKE UP.

The transmitter major components are listed in table 1-1 on Page 1-6. See figure 1-1 for physical component mounting locations and paragraph 1-3 for component descriptions.

1-3. DESCRIPTION OF EQUIPMENT.

a. RF Control and Indicator, SWCA-3K.

The SWCA contains the d-c controlled rotary solenoids for bandswitching. The unit also contains a power output meter that is calibrated in kilowatts; this meter also contains a second scale for measuring transmission line SWR. An SWR switch is associated with the dual purpose output meter. The transmission line SWR is continuously monitored by a sensitive d-c relay that will de-energize the transmitter should the SWR exceed a 2:1 or 3:1 ratio as selected by a switch mounted on the rear. The SWCA 3K also contains a "Fault" circuit that will de-energize the servo amplifiers if the transmitter has not tuned up within 60 seconds.

b. Linear Amplifier, TLAA 2.5K.

The linear amplifier serves as a 40 DB power amplifier between the

exciter and the antenna. The TLAA contains the tune, loading, bandswitching circuits and all r-f amplifier parts. The final tube of the 3-stage amplifier is convection air cooled by a self-contained blower.

c. Low Voltage Power Supply AP-128A.

The low voltage power supply provides operating voltage to the linear amplifier. This unit also contains the overload circuit controls to adjust the overload relay sensitivity settings. The AP-128A provides bias, screen and filament voltages to the linear amplifier plus voltage to the interlock and control circuits. The front panel contains filament and plate time meters, fuses, a low voltage circuit breaker and 1st, 2nd, and PA bias adjustments.

d. High Voltage Power Supply, AP-129.

The 5 KV high voltage power supply, mounted at the bottom of the equipment cabinet, contains the high voltage solid state rectifier stacks, filtering and the delta-wye step up transformer.

This unit generates 5000 volts D.C. for the plate of the 2.5 KW power amplifier tube. An automatic 60-second time delay circuit in series with the interlock chain prevents application of drive to the amplifier circuits with insufficient warm-up time.

e. Servo Amplifier Assembly, TCSA-1.

The TCSA houses three servo amplifier units. These units, when controlled by the sense circuits of the linear amplifier, automatically tune and load the 2nd amplifier and PA portions of the transmitter.

f. Multi-Mode Exciter, MMXA-2.

The MMXA-2 is a solid state Exciter used to control the output frequency of the transmitter in amplitude modulated (AM) single sideband SSB, including amplitude-modulated equivalent (AME) full carrier, or optional independent sideband (ISB) intelligence on an rf carrier frequency between 1.6 and 29.9999 MHZ. (In this configuration usable from 2 MZ to 29.9999 MHZ). The carrier frequency is selectable in discrete 100 HZ increments by means of six

frequency selector switches. The Exciter also features built-in frequency stability of 1 part in 10^8/day, and provides a continuously adjustable 250 MV output in AM, SSB, AME and optional ISB modes of operation: In addition, the Exciter provides an output of up to one watt for CW, FSK, and FAX modes of operation.

g. Local Control Panel, TCP-1.

The TCP controls the application of primary a-c power to the cabinet and plate voltage to the 2.5 KW power amplifier section. A front panel control permits monitoring of the interlock circuits. Also included is an overload reset push-button associated with the plate, screen and SWR overload relays.

h. Alarm Panel, AX633.

The AX633 is an alarm and monitor unit providing connector receptacle for monitoring the Exciter, PA output and sense voltages to the servo amplifiers. An audio alarm in association with an on/off toggle switch is activated when the transmitters high voltage is removed. An audio input jack is provided on the front panel for insertion of a two tone test signal for testing the exciter unit.

i. VOX Control, AX5047. with AP-146 POWER SUPPLY.

The AX5047 in association with the AP-146 power supply provide automatic voice control keying of the PTT circuit in the transmitter. A front panel switch supplies control in either the USB or LSB.

j. Cabinet, Electrical Equipment, RAK1102JE.

The RAK houses all the components comprising the transmitter. Rear and side access doors permit ease of maintenance. The r-f output is fed to the directional coupler mounted on the rear portion of the cabinet. Heavy power supply components are bolted at the bottom where the primary power connections are also made. A harmonic filter AF107 (used to reject all frequencies above 32 MHZ) is mounted below the directional coupler.

k. Electronic Transfer Switch, AX5052.

The AX5052 is mounted on the rear of the RAK. It provides instantaneous and automatic transfer of an antenna from receiver to transmitter, electronically. The AX5052 has no power loss on transmitting, does not alter the antenna SWR, and actually provides a gain of from 2 to 6 DB minimum on receiving depending on frequency.

1-4. TECHNICAL CHARACTERISTICS.

Frequency Range:	2 to 29.9999 megacycles (MHz), bandswitched.
Output Power:	2500 watts PEP.
Operating Modes:	SSB, AM, ISB, CW, FAX, FSK.
Tuning:	All tuning, loading, and bandswitching controls on front panel.
Relative Humidity:	Up to 90%.
Ambient Temp. Range:	0° to 50°C.
Metering:	Front panel meters monitor operation of all critical circuits.
ALDC:	ALDC (automatic load and drive control) circuit provide improved linearity, limit distortion, and deliver a relatively constant output during high modulation peak load changes. Front panel control allows adjustment of ALDC attack point or circuit disabling.
Voice Control PTT and Squelch:	Automatic Voice Operation with a signal .025 V or lower including adjustable gain and squelch.
Output Impedance:	50 ohms, unbalanced.
Harmonic Suppression:	Second harmonics at least 50 db below full PEP when measured with standard two-tone test; all other harmonics down at least 55 db.
Signal/Distortion Ratio:	Distortion products are at least 35 db below either tone of a standard two-tone test at full PEP output.

Hum and Noise Level:	Hum at least 50 db below full PEP; all other noise down at least 70 db.
Cooling:	Forced Air.
Operating Temperature:	Designed to operate in a 0° to 50°C ambient with relative humidity of up to 90%.
Power Input:	195/208/220/230/380/440 volts a-c, 50/60 cps, 3-phase.
Heat Dissipation:	5,000 watts.
Air Intake:	500 CFM.
Weight:	1,000 lbs., (approx).

TABLE 1-1. MAJOR COMPONENTS

TMC DESIGNATION
Cabinet, Electrical Equipment, RAK 110-2JE
Multimode Exciter, Model MMXA-2
Linear Amplifier, Model TLAA-2.5K
Servo Amplifier, Model TCSA-1
RF Control and Indicator, Model SWCA-3K
Linear Amplifier Control Panel, Model TCP-1A
Low Voltage Power Supply, AP-128A
High Voltage Power Supply, AP-129
Alarm Panel, AX633
Voice Control Unit, AX-5047 (with AP-146 Power Supply)
Electronic TR Switch, AX-5052

SECTION 2

INSTALLATION

2-1. GENERAL.

The transmitter is tested at the factory and is carefully packaged to prevent damage during shipment. When it is delivered at the operating site, inspect the packing case and its content for damage that might have occurred during transit. Unpack the equipment carefully and inspect all packaging material for parts that may have been shipped as loose items. 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.

2-2. ASSEMBLY.

a. Refer to figure 2-3, outlined dimensional drawing for transmitter location.

b. Install the transmitter components into the rack as shown in figure 1-1.

c. Intracomponent cabling is shipped pre-installed in the transmitter rack, refer to figure 2-2, 2-3, 2-4 (CK1558), 2-5 (CK1559) and 2-6 (CK1587) for cable connections; follow outlined installation procedure in PALA-2.5K instruction manual (paragraphs 2-3 and 2-4).

NOTE

After the GPTA has been installed as per the installation sections of the PALA-2.5K Technical Manual, it is recommended a pre-operational exciter and system check be performed to ascertain transmitter operation prior to actual "on the air" transmissions.

2-3. OPERATIONAL CHECK-OUT - GENERAL.

Before operationally checking the transmitter, the technician should thoroughly familiarize himself with the controls and indicators illustrated in Section 3, figure 3-1 and described in table 3-1. Refer to Section I of this manual for technical information regarding the transmitter modular units. Table 3-2 provides typical tuning information Table 3-3 and 3-4 are guides for servo adjustments.

2-4. OPERATIONAL CHECK-OUT.

Upon completion of installation, the transmitter should be checked out using manual tuning prior to servo tuning the transmitter.

a. Preliminary. - With AC power disconnected to transmitter and Main Power circuit breaker set at "OFF" check for shorts to ground:

1. The 3 power input phased should read not less than 1 megohm.
2. The positive side of the high voltage circuit should read not less than 100K ohms, with the shorting relay open and zero with the shorting relay closed.
3. Set 1st, 2nd, and PA BIAS adjust pots to full clockwise position (maximum bias).
4. Set SSB/CW switch on AP128A to SSB.
5. Set LO LIMIT Pointer on Power output meter on SWCA to 2.5KW and HI LIMIT at 3KW.

Warning

Be certain that 3-phase source is "OFF" prior to connection to line filter board at rear of transmitter.

b. Manual Tuning Check-out.

1. Set Main Power circuit breaker to "ON" and allow approximately 1 minute for the Time Delay Relay to cycle.

2. Verify that all interlock indicators are lit using Interlock Indicator switch.
3. Close the Low Voltage circuit breaker on the AP128-A (shorting relay should be heard to energize).
4. Set the Multimeter Switch on the TLAA 2.5K to 1st AMP IP.
5. Adjust 1st AMP BIAS control on AP128-A for an indication of "10" on the Multimeter.
6. Set the Multimeter Switch on the TLAA to 2nd AMP IP.
7. Adjust 2nd AMP BIAS control for an indication of "12" on the Multimeter.
8. Set MMX RF Output control to minimum.
9. Set Xmtr Tuning Auto/Manual to Manual and Servo On/Off switch on TCP to "OFF"
10. Set MMX ON/Standby and Exciter ON/PTT to "ON" positions.
11. Select frequency output using frequency selector controls on the MMXA-2.
12. Set Xmtr Tuning Auto/Manual switch to Auto (verify that frequency band selections on the SWC( )3K and TLAA correspond to frequency set on the MMX).
13. Return Xmtr Tuning Auto/Manual switch to Manual position.
14. Set Mode switch on MMX to CW position.
15. Advance Carrier control on MMX to approximately mid-position.
16. Place Meter Selector switch to RF position.
17. Rotate RF Output control to obtain a mid-scale reading on the Monitor Meter.
18. Place Multimeter selector switch on TLAA to 2nd Amp EP position.
19. Advance RF Gain Control on SWC( )3K and tune 2nd Ampl. Tuning capacitor for peak indication on the Multimeter.

20. Return RF Gain control to counter clockwise position.
21. Place High Voltage switch "ON".
22. Adjust PA Bias Adjust for a reading of 350 MA on Plate Current meter on TLAA.
23. Slowly increase RF Gain Control setting to a point where PA Plate Current has increased to 450 MA.
24. Rotate the PA Tune capacitor in the direction of decreasing numbers (decreasing capacity) until a resonant peak appears on the Output Power meter on the SWC( )3K.
25. Adjust PA LOAD capacitor and redip PA Tune capacitor to a point where an increase of drive from the RF Gain control on the SWC( )3K will produce at least 2.5KW on the Output Power Meter. (Plate Current Meter should read less than 1A).
26. Reduce drive so that Output Power Meter indicates 1KW.
27. Place a zero centered VTVM on the +1V scale at the Sense jack on the AX633.
28. Set the Sense switch to the Load position.
29. VTVM should read approximately zero (center scale).
30. Set the Sense switch to the PA Plate position.
31. VTVM should read approximately -.5V.
32. Place the Sense switch to the PA Tune position.
33. VTVM should read zero. (center scale).
34. Place the Sense switch to the IPA Plate position.
35. VTVM should read a positive voltage off scale.
36. Place the Sense switch to the IPA tune position.
37. VTVM should read zero (center scale).
38. Place the Sense switch to the 100 MW position.

39. VTVM should read +.5V or less (+.5V at this point is equivalent to a 100 MW input from the MMX).

40. Place the Alarm On/Off switch to the "ON" position on the AX633. The alarm should not sound.

41. Increase the RF Gain Control on the SWC( )3K to read 2.5KW on the Power Output Meter.

42. Depress the KW/REFL. switch on the SWC( )3K and determine the value of SWR. Should the SWR be excessive, check the transmission line or the antenna for proper termination with the H.V. off. Release switch.

43. An attempt to increase the output beyond the 2.5KW level should be prevented by the action of the ALDC circuits in the transmitter.

NOTE

If the output does increase beyond the 2.5KW (or desired) output level follow instructions in step 44 below adjust ALDC circuit.

44. Increase RF Gain control to obtain a reading of 2.7KW on Power Output Meter, or approximately 200 watts above desired output level. With ALDC control on the TLAA 2.5K set to mid-position, adjust the appropriate ALDC pot on the SWC( )3K to reduce output to 2.5KW (or desired level) (Refer to Table 3-4 and Figure 3-2).

45. Decrease RF Gain control on SWC( )3K to minimum.

46. Place High Voltage switch to "OFF".

47. Alarm should sound, place Alarm switch to "OFF".

NOTE

The transmitter at this point should have fulfilled all the

NOTE (CONT.)

requirements of the Manual Tuning Check-Out. If not, perform necessary correction before tuning transmitter in the AUTO mode. (Refer to TMC Technical Manual PALA 2.5 for service and maintenance information).

c. Auto Tuning Check-Out.

1. Place Xmtr Tuning Auto/Manual and Servo On/Off to AUTO and "ON" respectively.
2. Decrease RF Output control on MMX to minimum.
3. Depress Tune button on TCP.
4. Place High voltage switch "ON".
5. "AC ON" lamps of the 3 Servo amplifiers should be lit.
6. Increase RF Output control on the MMX until green Search lamp lights on the 2nd Amplifier servo amplifier.
7. The 2nd Amp. Tuning capacitor should be searching for resonance in a counter clockwise direction as the RF Gain Control on the SWC( )3K intermittently drives up.
8. The 2nd Amp. Plate Trigger should stop the 2nd Amp. Tuning Capacitor at resonance and place the 2nd Amp. servo in the Operate mode as the 2nd Amp. Operate lamp ignites.
9. The RF Gain or Drive-up control should continue driving up until the plate current of the PA tube reaches 300 MA.

NOTE

The adjustment of the RFPO (R.F. Power on) control on the PA Tune servo has been adjusted to put the PA Tune servo into the Search mode once 300 ma of plate current is attained.

10. The PA Tune capacitor will search in the direction of decreasing numbers until a resonant peak is reached.

11. A sample of this PA plate voltage is sent to the PA Tune servo to stop the PA Tune Capacitor from searching and places it in the Operate or Fine Tune mode.

12. When the PA Tune servo goes into the Operate mode it in turn switches the Load servo into the Search mode in the direction of decreasing numbers.

13. The Load capacitor will stop searching when the load sense voltage becomes zero (as can be seen on the VTVM in the LOAD SENSE position).

14. Five seconds after the Load Servo has gone into Operate the, servos turn off and the PA bias returns to normal.

15. The RF Gain control on the SWCA will drive down then drive back up to the Lo Limit Pointer on the Output Power Meter on the SWC( )3K (ALDC should be effective at this point).

16. The Ready light on the Rak should light indicating the transmitter is tuned up and ready for operation or insertion of intelligence.

NOTE

Should Fault light come on before transmitter has fully tuned, depress tune button again to re-cycle the servo system. Continued failure of the transmitter to tune within the specified time (approximately 60 seconds) is an indication of some failure in the servo system. Recheck sense voltage readings indicated in Section 2-4 or refer to TMC Technical Manual PALA 2.5K.

CAUTION

Rated output of transmitter should not be exceeded except for short intervals during check-out.

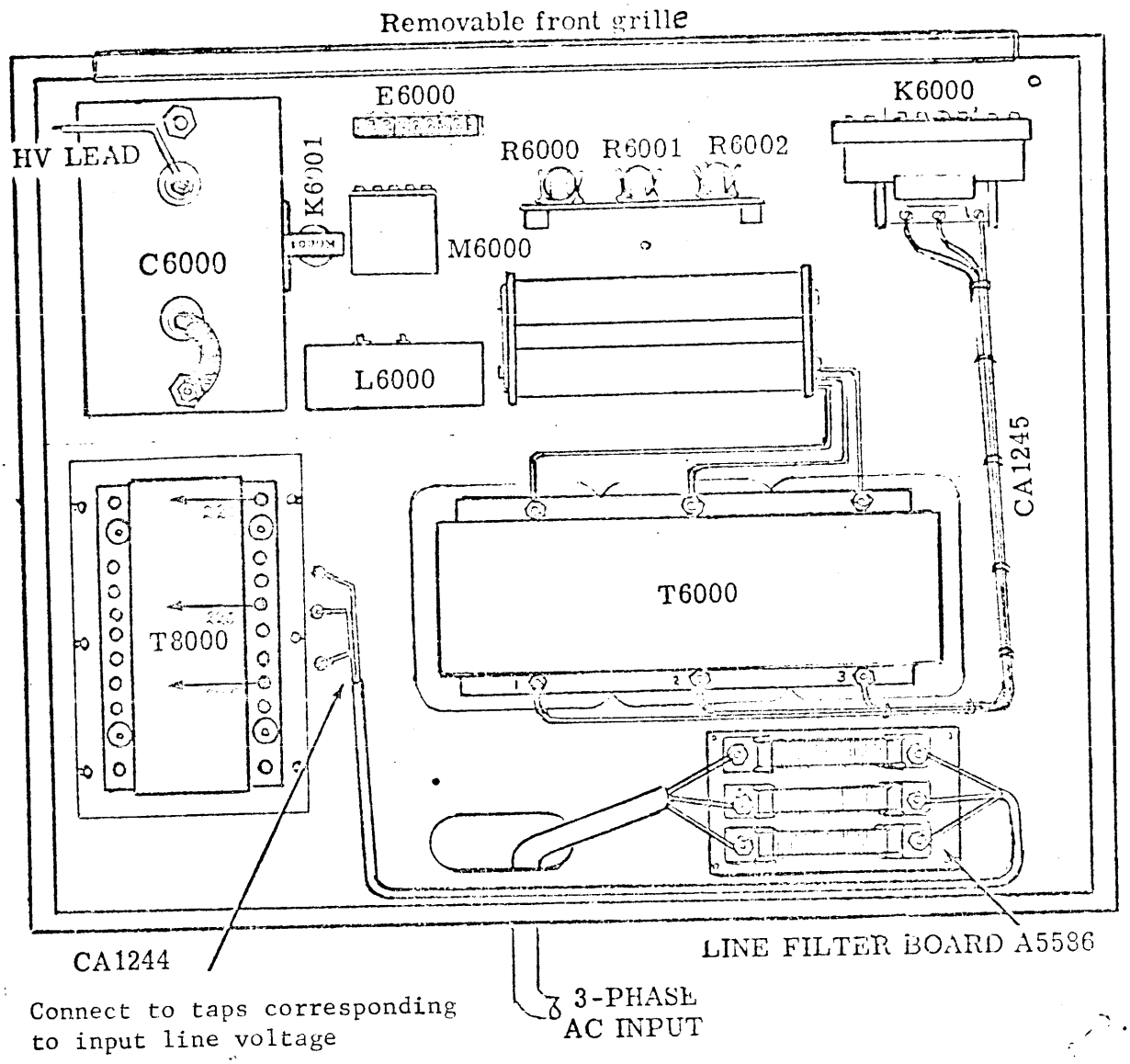


Figure 2-1 Input Component Locations

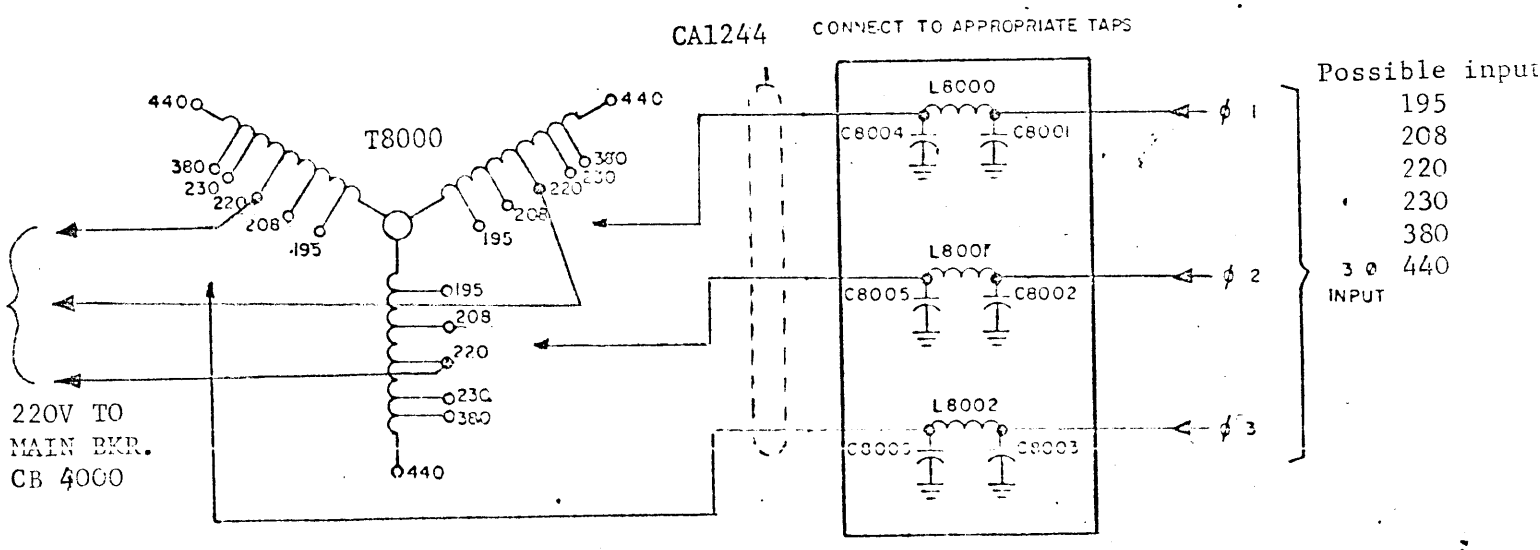


Figure 2-2. Input Power Connections,

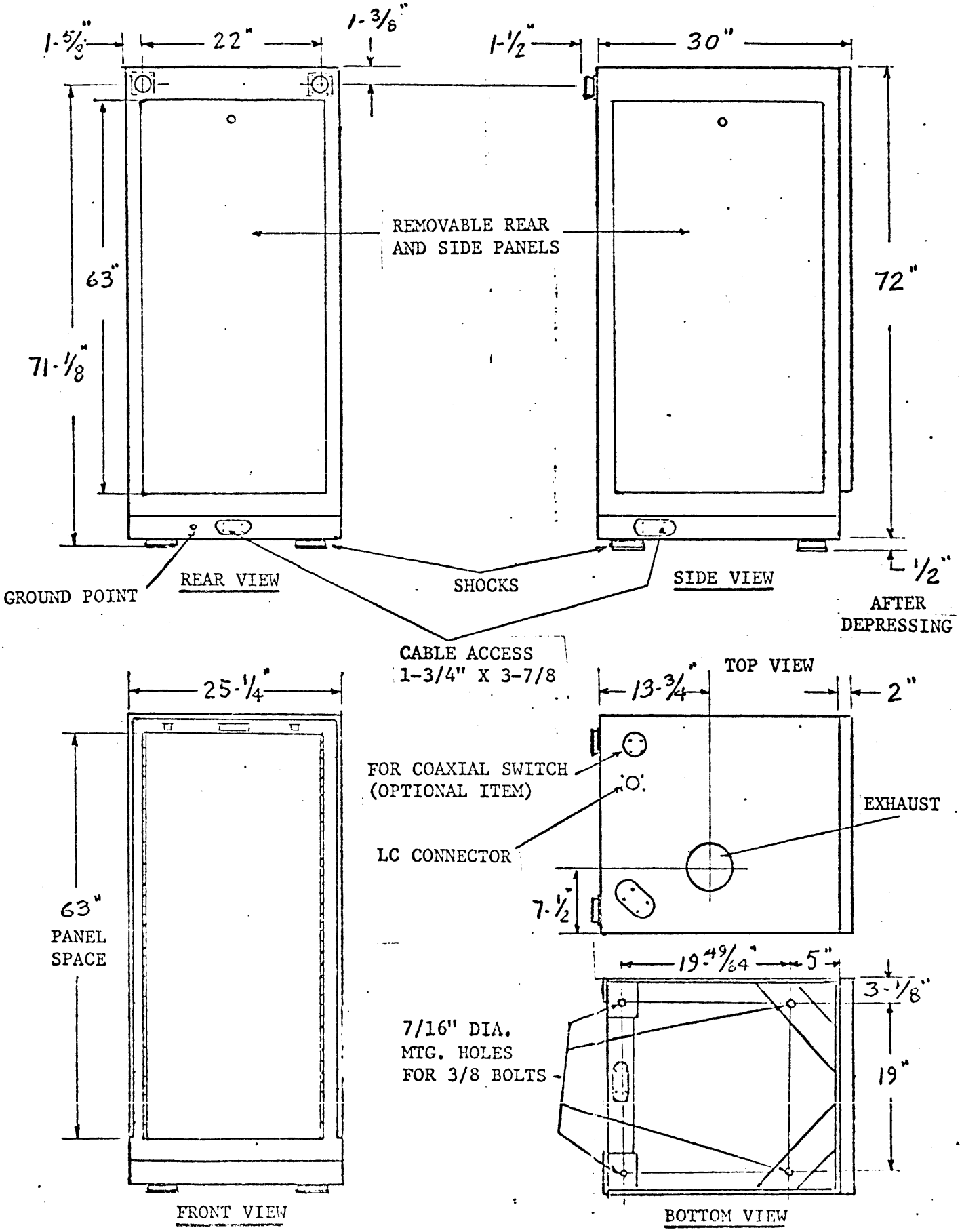


Figure 2-3. Outline Dimensional Diagram.

ILLUSTRATIONS

All of the above illustrations may be found at the back of this book.

AS REQ { AX633, AX646, AX647 } ALARM

E9000

76 (98)	1
109 (7)	2
110 (2)	3
115 (94)	4
116 (913)	5
229 (96)	6
9 (1)	7
113 (5)	8
114 (6)	9
149 (4)	10
143 (0)	11
111 (1)	12
	13
112 (2)	14

EXC. MON
P8016-J9001

152

PA MON
P8015-J9002

151

E9001

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

TCP-( )

P8000-J4000

2 (9)	A
3 (8)	B
4 (7)	C
5 (9)	D
6 (8)	E
7 (7)	F

P8003-J400

76 (98)	A
77 (6)	B
78 (1)	C
79 (96)	D
80 (900)	E
81 (916)	F
82 (917)	G
20 (92)	H
39 (914)	J
83 (918)	K
84 (922)	L
85 (925)	M
12 (2)	N
13 (3)	P
86 (926)	Q
14 (4)	R
[illegible]	S
88 (932)	T
89 (942)	U
90 (946)	V
91 (954)	W
92,93 (3)	X
94 (955)	Y
144 (0)	Z
95 (8)	a
96 (812)	b
97 (834)	c
98 (98)	d
16 (5)	e
22 (93)	f
30 (94)	g
29 (7)	h
23 (4)	j
36 (913)	k
35 (90)	l
40 (915)	m
32 (95)	n
34 (0)	p
224 (964)	r
233 (9)	s
234 (845)	t
236 (853)	u

234,233

-( )

0-J4000

A B C D E F

3-J4001

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

TLA( )-2.5K

RF IN
J2000

RF OUT
J2009

RF MON
P8010-J2010

151

ALDC
P8011-J2011

150

H.V.
P8012-J2012

1

P8007-J2001

99(97)	A
42(9)	B
43(1)	C
44(2)	D
45(3)	E
46(4)	F
47(4)	G
56(91)	H
55(1)	J
57(91)	K
58(2)	L
59(92)	M
60(92)	N
50(5)	P
51(91)	R
52(92)	S
53(93)	T
61(95)	U
145(0)	V
62(96)	W
63(90)	X
65(917)	Z
66(918)	a
100(1)	b
68(922)	c
64(916)	d
101(2)	e
54(94)	f
48(5)	g
49(6)	h
102(3)	j
103(4)	k
104(90)	m
105(91)	n
106(93)	p
107(95)	r
108(96)	s

J2003

151,150
145,108,107,106
105,104,103,102

E8004

91(954)	1
126(6)	2
	3

J8000-P8013

99(97)	A
75(9)	B
	C
41(7)	D

C8000 4 μFD

94,124(955) NO
133(926)
93,136,137(3) NC

133,86(926) NO
132(946)
137,138(3) NC

90,132(946) NO
131(918)
138,139(3) N

131,83(918) NO
130(96)
139,140(3) N

E8009

(96	1
(94	2
(3)	3

FILTER DR

S8002

130,79(96) NO
129(942)
140(3) N

129,89(942) NO
128(932)
135(3) N

128,88(932) NO
87,127(944)
134,135(3) N

3	2	1

REVISIONS							
ZONE	LTR	DESCRIPTION	DATE	E.M.N.NO	DRAFT	CHKD	APPD
	X	EXP. RELEASE	5/13/68		HG		DHS
	Ø	ORIGINAL RELEASE FOR PRODUCTION	12-10-68	Ø	RG		JHS

HEAT OVLD S8008

E8004

1
2
3

P8000-P8013

A
B
C
D

B8000

NO RIGHT SIDE S8006
NC

NO LEFT SIDE S8005
NC

NO REAR S8004
NC

NO PA DRAWER S8003
NC

E8009

1
2
3

CA409-32
2.00

INTERLOCK WIRING WITHOUT FILTER

FILTER DRAWER

S8002
NO
NC

INTERLOCK WIRING WITH FILTER

NO PS DRAWER S8001
NC

NO PS GRILLE S8000
NC

READY - H.V. DS8000

147(0)

231(5)

(SEE NOTE NO.1) SHEET NO.2

POWER ON DS8001 DS8002

E8003

95(8)

1

119(7)

2

R8000
68Ω
2W

DS8003 H.V. ON

147,146(0)

230(4)

CA1266

CK 155

9(1)
113(5)
114(6)
149(4)
143(0)
111(1)
112(2)

6
7
8
9
10
11
12
13
14

EXC. MON
P8016-J9001

152

PA MON
P8015-J9002

151

E9001

1
2
3
4
5
6
7
8
9
10

P8003-J4001

76(98)	A
77(6)	B
78(1)	C
79(96)	D
80(900)	E
81(916)	F
82(917)	G
20(92)	H
39(914)	J
83(918)	K
84(922)	L
85(925)	M
12(2)	N
13(3)	P
86(926)	Q
14(4)	R
87(944)	S
88(932)	T
89(942)	U
90(946)	V
91(954)	W
92,93(3)	X
94(955)	Y
144(0)	Z
95(8)	a
96(812)	b
97(834)	c
98(98)	d
16(5)	e
22(93)	f
30(94)	g
29(7)	h
23(4)	j
36(913)	k
35(90)	l
40(915)	m
32(95)	n
34(0)	p
224(964)	r
233(9)	s
234(845)	t
236(853)	u

229,152,149,116
115,114,113,112
111,110,109,9

76,143,151

236,234,233
224,98,97,96,92,85,84
82,81,80,78,77,76,40,39
36,35,34,32,30,29,23,22
20,16,14,13,12,7,6,5,4,3,2

93,94,95,144
88,89,90,91
79,83,86,87

148,144,143,142

TO
SHEET 2

CA1266

WIRE COLOR CODE

167 (942)

WIRE IDENTIFICATION NUMBER

COLOR CODE

ECI-10-170 (10-68)

8 7 6

-J4001

150

H.V.
P8012-J2012

1

P8007-J2001

99(97)	A
42(9)	B
43(1)	C
44(2)	D
45(3)	E
46(4)	F
47(4)	G
56(91)	H
55(1)	J
57(91)	K
58(2)	L
59(92)	M
60(92)	N
50(5)	P
51(91)	R
52(92)	S
53(93)	T
61(95)	U
145(0)	V
62(96)	W
63(90)	X
65(917)	Z
66(918)	a
100(1)	b
68(922)	c
64(916)	d
101(2)	e
54(94)	f
48(5)	g
49(6)	h
102(3)	j
103(4)	k
104(90)	m
105(91)	n
106(93)	p
107(95)	r
108(96)	s

J2003

94,124(955) NO
133(926) NC
93,136,137(3)

133,86(926) NO
132(946) NC
137,138(3)

90,132(946) NO
131(918) NC
138,139(3)

131,83(918) NO
130(96) NC
139,140(3)

E8009

(96) 1
(942) 2
(3) 3

FILTER DRA

S8002

130,79(96) NO
129(942) NC
140(3)

129,89(942) NO
128(932) NC
135(3)

128,88(932) NO
87,127(944) NC
134,135(3)

151,150
145,108,107,106
105,104,103,102
101,100,68,66,65
64,63,62,61,60,59
58,57,56,55,54,53
52,51,50,49,48,47
46,45,44,43,42,1

99

136,134,127,126,124,99,94,93
91,90,89,88,87,86,83,79,75,41

4,143,142 145,146

	GPT RAK110-2JE	
QTY / UNIT	MODEL USED ON	ASS'Y NO.
APPLICATION		
	CODE	

UNLESS
DIMENS
AND INCLU
OR

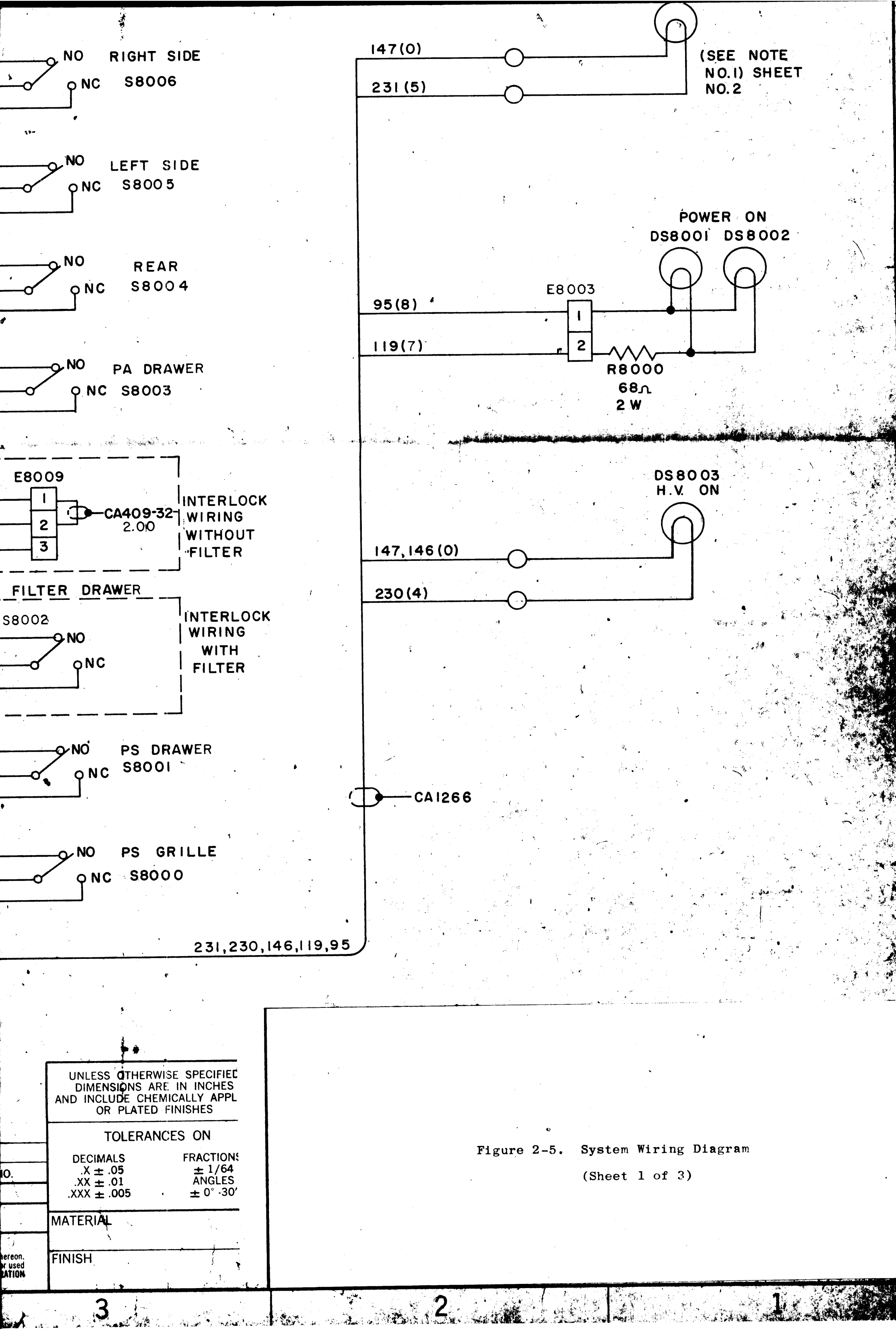
TO

DECIMAL
.X ± .0
.XX ± .0
.XXX ± .0

MATERIAL

FINISH

5 4 3



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

TOLERANCES ON

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

MATERIAL

FINISH

Figure 2-5. System Wiring Diagram

(Sheet 1 of 3)

8 7 6

D C B

J8001

225(97)	A	Ø3 TO TCSA
11(97)	B	Ø3 TO TLAA
117(8)	C	Ø2 TO TLAA AND TCSA
226(8)	D	Ø2 TO SWCA
120(7)	E	Ø3 TO SWCA
153(94)	F	60VDC OR 24 VDC METER RELAY
70 (912)	G	26VDC TO SWCA
21,203(92)	H	SERVO ON
38 (914)	J	SERVO MANUAL
67 (5)	K	BAND SW CONT. WAFER
81,189(916)	L	TUNE SW
84 (922)	M	OVLD RESET
96,209(812)	N	OVLD IND.
100(1)	P	OVLD LINE BAND 1-9
102(3)	Q	
103(4)	R	
104(90)	S	
105(91)	T	
106(93)	U	
107(95)	V	
108(96)	W	
101(2)	X	
154(6)	Y	CARRIER ON CONT.
125,217(5)	Z	READY IND.
121(3)	a	AUX. CONT. TO TCSA
122(93)	b	AUX. CONT. TO TLAA
155(1)	c	TUNE CONTACT CLOSED
156(2)	d	TUNE-OPER CONTACT COM.
157(90)	e	OPER CONTACT CLOSED
158(914)	f	EXC. CHAN 1-9
159(915)	g	
160(916)	h	
161(917)	j	
162(918)	k	
163(922)	l	
164(925)	m	
165(926)	n	
113(5)	p	ANT. SW 1
114(6)		
115(94)	s	ANT. 1 IND.
116(913)	t	ANT. 2 IND.
149(4)	u	26 VDC ANT. SW
166(932)	v	FAULT IND.
167(942)	w	METER RELAY CONT.
169	x	FWD. PWR
	y	
170	z	REFL. PWR
	2	
168(0)	3	GRD
233(9)	4	ALDC DISABLE
234(845)	5	ANT SW DISABLE
236(853)	6	LOAD SW
153(94)		
10,235(1)	1	XXXXX
33,229(96)	2	SEE NOTE NO.2
74 (6)	3	
204(93)	4	
207(96)	5	SEE NOTE NO. 1
126,208(6)	6	
123,230(4)	7	
125(5)	8	XXXXXX
71 (944)	9	
232(926)	10	SEE NOTE NO.3

E8007

NO	FUNCTION
1	26VDC
2	5VAC
3	26VDC TO FILTER
4	60VDC FR, LRCA 24 VDC TO LRCF
5	OVLD LINE
6	OVLD LINE
7	H.V. LIGHT
8	READY LIGHT
9	PTT LINE
10	PTT LINE

5,26,227,228(9)

6,25,117,118(8)

7,24,109,119,120(7)

27(5)

28(95)

123(4)

31(94)

121(3)

122(93)

15(9)

227(9)

110(2)

228(9)

98(98)

141(0)

124(955)

18,77(6)

17(9)

118(8)

8(97)

37(9)

2(9)

440

0380

4(7)

TO AX5052 SEE CK1567

AP129 H.V.

C6000 H.V.

L1

L2

L3

AUX. NO.1

AUX. NO.2

AUX. NO.3

AUX. NO.4

K6000

GRD

CA409-216-2.00

E6000

1
2
3
4
5
6
7
8

28(9)

8(8)

9,120(7)

2

3

3Ø INPUT
C8001-6 1000μμF 5KV
L8000-2 15μH

Ø1

Ø2

Ø3

L8000

L8001

L8002

C8001

C8002

C8003

C8004

C8005

C8006

A5586 LINE FILTER

CA1244 — 4
CONNECT TO APPROPRIATE TAPS

P8001-J500

8(97)	A
9,10(1)	B
11(97)	G
12(2)	D
13(3)	E
14(4)	F
141(0)	G
15(9)	H
16(5)	I
17(9)	J
18(6)	K
19(91)	L
20,21(92)	M
22(93)	N
23(4)	O
24(7)	P
25(8)	R
26(9)	S
27(5)	T
28(95)	U
9(7)	
31(94)	W
(95)	X
(96)	Y
(0)	Z
35(90)	a
36(913)	b
37(9)	c
38,39(914)	d
40(915)	e
92,134(3)	f

32,34,35,36,39,40
9,12,13,14,16,20,22,23,29,30

T8000

440

380

230

220

208

195

N

195

208

220

230

380

440

TO
AX5052
SEE
CK1587

Ø1 TO J116

Ø2 MMX( )

3	2	1

REVISIONS							
ZONE	LTR	DESCRIPTION	DATE	E.M.N.NO	DRAFT	CHKD	APPD
	X	EXP. RELEASE	5/13/68		HY.		
	Ø	[illegible] TION	12-10-68	Ø-	KTz		

AP-128 L.V.

J5001-P8002	J5001-J5000
A	41(7)
B	42,75(9)
C	43(1)
D	44(2)
E	45(3)
F	46(4)
G	47(4)
H	48(5)
I	49(6)
J	50(5)
K	51(91)
L	52(92)
M	53(93)
N	54(94)
P	55(1)
R	57,56(91)
S	58(2)
T	59,60(92)
U	61(95)
V	142(0)
W	62(96)
X	63(90)
Y	64(916)
Z	65(917)
a	66(918)
b	67(5)
c	68(922)
d	69(925)
e	70(912)
f	71(944)
h	72(932)
j	73(942)
k	74(6)

NOTES:

1. MANUAL TRANSMITTER DS8000 IS H.V. ON IND. IT. 231 CONNECTED TO E8007-7 SERVO TUNED TRANSMITTER DS8000 IS READY IND IT. 231 CONN TO E8007-8
2. IT 153 CONN TO E8007-1 FOR LOCAL OR SHORT WIRE REMOTE OPERATION. CONN TO E8007-4 WHEN USING LRCA.
3. ADD JUMPER FOR MANUAL TRANSMITTER ONLY.

WIRE COLOR CODE

167 (942)

167 — WIRE IDENTIFICATION NUMBER

(942) — COLOR CODE

CA1266

74
73,72,71,70,69,67

61,62,63,64 65,66,68,75,142
51,52,53,54,55,56,57,58,59,60
41,42,43,44,45,46,47,48,49,50,

TO SHEET 1

0
2,23,29,30

D

C

B

CK 1539 10

106 (93)	T	OVLD LINE BAND 1-9
107 (95)	U	
108 (96)	V	
101 (2)	W	
154 (6)	X	
125,217 (5)	Y	CARRIER ON CONT.
121 (3)	Z	READY IND.
122 (93)	a	AUX. CONT. TO TSA
155 (1)	b	AUX. CONT. TO TSA
156 (2)	c	TUNE CONTACT CLOSED
157 (90)	d	TUNE-OPER CONTACT COM.
158 (914)	e	OPER CONTACT CLOSED
159 (915)	f	
160 (916)	g	
161 (917)	h	
162 (918)	j	EXC. CHAN 1-8
163 (922)	k	
164 (925)	l	
165 (926)	m	
113 (5)	n	
114 (6)	p	ANT. SW 1
115 (94)	r	ANT. SW 2
116 (913)	s	ANT. 1 IND.
149 (4)	t	ANT. 2 IND.
166 (932)	u	26 VDC ANT SW
167 (942)	v	FAULT IND.
169	w	METER RELAY CONT.
170	x	FWD. PWR
168 (0)	y	
233 (9)	z	REFL. PWR
234 (845)	2	
236 (853)	3	GRD
153 (94)	4	ALDC DISABLE
10,235 (1)	5	ANT SW DISABLE
33,229 (96)	6	LOAD SW
74 (6)	1	XXXXXX
204 (93)	2	SEE NOTE NO.2
207 (96)	3	
126,208 (6)	4	
123,230 (4)	5	
125 (5)	6	SEE NOTE NO. 1
71 (944)	7	
232 (926)	8	XXXXXX
	9	
	10	SEE NOTE NO.3
231 (5)	E8007	

E8007	
NO	FUNCTION
1	26 VDC
2	5 VAC
3	26 VDC TO FILTER
4	60 VDC FR. LRCA 24 VDC TO LRCF
5	OVLD LINE
6	OVLD LINE
7	HV. LIGHT
8	READY LIGHT
9	PTT LINE
10	PTT LINE

123 (4)		
31 (94)		
121 (3)		
122 (93)		
15 (9)		
227 (9)		
110 (2)		
228 (9)		
98 (98)		
141 (0)		
124 (955)		
18,77 (6)		
17 (9)		
118 (8)		
8 (97)		
37 (9)		
2 (9)		
4 (7)		

440

380

230

TO AX5052 SEE CK1587

CA409-32-2.00

TO SHEET 3

235,232,217
209,208,207,204,203
189,170,169,168,167,166
165,164,163,162,161,160
159,158,157,156,155,154

233,234,236
116,117,120,121,122,123,126,149,229,230,231
102,103,104,105,106,107,108,113,114,115
10,11,21,33,38,67,70,71,74,81,84,96,100,101

123,122
121,120,117

110,119,124, 141
26,27,28,31,37,77, 98
1,2,4,5,6,7,8,15,17,18,24,25

AUX. NO.1

AUX. NO.2

AUX. NO.3

AUX. NO.4

K6000

GRD

CA409-216-2.00

E6000

1
2
3
4
5
6
7
8

T8000

440 380 230 220 208 195 N 195 208 220 230 380 440

TO AX5052 SEE CK1587

195
208
220
230
380
440

Ø1 TO J116

Ø2 MMX( )

24, 141
31,37,77, 98,109
7,8,15,17,18,24,25

3(8)

92,134
141,38,37,33,31,28,27,26
25,24,21,19,18,17,15,11,10,8

CA1266

01 02 03

L8000 C8001 C8004
L8001 C8002 C8005
L8002 C8003 C8006

A5586 LINE FILTER

CA1244 — CONNECT TO APPROPRIATE TAPS

9,10(1)	A
11(97)	B
12(2)	C
13(3)	D
14(4)	E
141(0)	F
15(9)	G
16(5)	H
17(9)	I
18(6)	J
19(91)	K
20,21(92)	L
22(93)	M
23(4)	N
24(7)	O
25(8)	P
26(9)	R
27(5)	S
28(95)	T
29(7)	U
30,31(94)	V
32(95)	W
33(96)	X
34(0)	Y
35(90)	Z
36(913)	a
37(9)	b
38,39(914)	c
40(915)	d
92,134(3)	e
	f

32,34,35,36,39,40
9,12,13,14,16,20,22,23,29,3

AN

MA

FIN

QTY / UNIT	MODEL USED ON	ASS'Y NO.
	RAK110-2JE	

APPLICATION

CODE

A	41(7)
B	42,75(9)
C	43(1)
D	44(2)
E	45(3)
F	46(4)
G	47(4)
H	48(5)
I	49(6)
J	50(5)
K	51(91)
L	52(92)
M	53(93)
N	54(94)
P	55(1)
R	57,56(91)
S	58(2)
T	59,60(92)
U	61(95)
V	142(0)
W	62(96)
X	63(90)
Y	64(916)
Z	65(917)
a	66(918)
b	67(5)
c	68(922)
d	69(925)
e	70(912)
f	71(944)
h	72(932)
j	73(942)
k	74(6)

NOTES:

1. MANUAL TRANSMITTER DS8000 IS H.V. ON IND. IT. 231 CONNECTED TO E8007-7 SERVO TUNED TRANSMITTER DS8000 IS READY IND IT. 231 CONN TO E8007-8
2. IT 153 CONN TO E8007-1 FOR LOCAL OR SHORT WIRE REMOTE OPERATION. CONN TO E8007-4 WHEN USING LRCA.
3. ADD JUMPER FOR MANUAL TRANSMITTER ONLY.

WIRE COLOR CODE

167 (942)

WIRE IDENTIFICATION NUMBER — COLOR CODE

CA1266

9,40
22,23,29,30

74
73,72,71,70,69,67

61,62,63,64 65,66,68,75,142
51,52,53,54,55,56,57,58,59,60
41,42,43,44,45,46,47,48,49,50,

TO SHEET 1

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

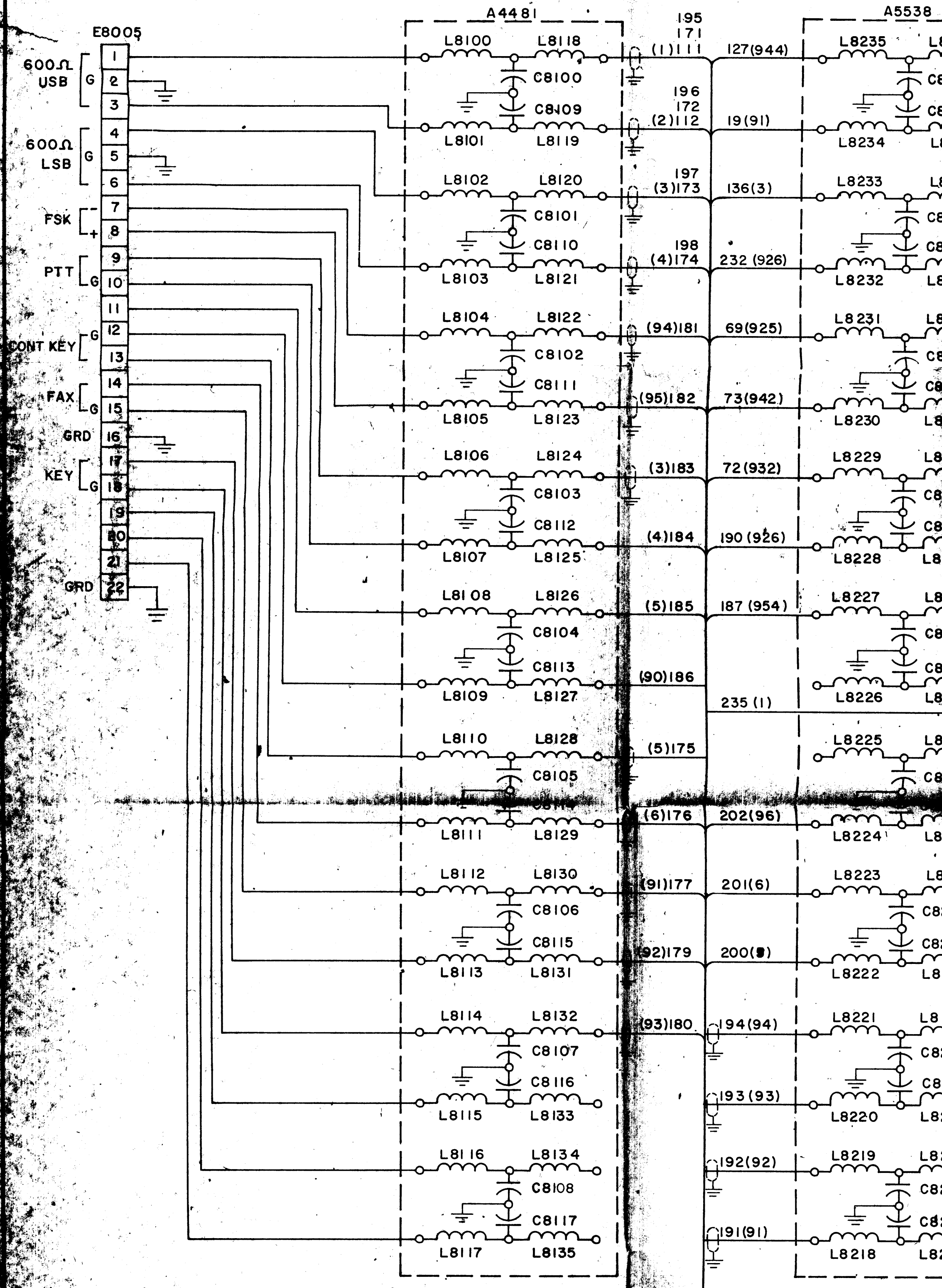
NO.

ed hereon.
ed or used
RATION

CK7536-10

Figure 2-5. System Wiring Diagram

(Sheet 2 of 3)


E8005
600Ω USB
G
1
2
3
600Ω LSB
4
5
6
FSK
7
8
PTT
9
10
CONT KEY
11
12
13
FAX
14
15
GRD
16
KEY
17
18
19
20
21
GRD
22
A4481
L8100
L8118
C8100
C8109
L8101
L8119
L8102
L8120
C8101
C8110
L8103
L8121
L8104
L8122
C8102
C8111
L8105
L8123
L8106
L8124
C8103
C8112
L8107
L8125
L8108
L8126
C8104
C8113
L8109
L8127
L8110
L8128
C8105
C8114
L8111
L8129
L8112
L8130
C8106
C8115
L8113
L8131
L8114
L8132
C8107
C8116
L8115
L8133
L8116
L8134
C8108
C8117
L8117
L8135
195
171
(1)111
196
172
(2)112
197
(3)173
198
(4)174
(94)181
(95)182
(3)183
(4)184
(5)185
(90)186
(5)175
(6)176
(91)177
(92)179
(93)180
127(944)
19(91)
136(3)
232 (926)
69(925)
73(942)
72(932)
190 (926)
187 (954)
235 (1)
202(96)
201(6)
200(8)
194(94)
193(93)
192(92)
191(91)
A5538
L8235
L8234
L8233
L8232
L8231
L8230
L8229
L8228
L8227
L8226
L8225
L8224
L8223
L8222
L8221
L8220
L8219
L8218

5 4

REVISIONS

ZONE	LTR	DESCRIPTION

A5538

E8006

1	NO	EXT	
2	C		
3	NC	INT	
4		XMTR	→ CA409-32-4.00
5	G	PTT	
6	NO	RCVR	
7	C	ON-OFF	
8	NC		
9		XMTR	
10		ON-OFF	
11	-24 VDC		
12			
13	+	KEY	
14	−		
15	FAX		
16	GRD		
17			
18	G	LINE 2	TIS
19			
20			
21	G	LINE 1	
22			

235 L8217 C8217 C8208 234 L8216
233 L8215 C8216 C8207 232 L8214
231 L8213 C8215 C8206 230 L8212
229 L8211 C8214 C8205 8228 L8210
227 L8209 C8213 C8204 8226 L8208
8225 L8207 C8212 C8203 8224 L8206
8223 L8205 C8211 C8202 8222 L8204
8221 L8203 C8210 C8201 8220 L8202
8219 L8201 C8209 C8200 8218 L8200

LSCA - REMOTE
J8005

169	A	FWD. POWER METER
	B	
170	C	REFL POWER METER
	D	
80(900)	E	MAIN POWER ON IND
209(812)	F	OVLD IND
210(834)	G	H.V. ON IND.
167(942)	H	METER RELAY CONT
205(94)	J	ON AIR IND
206(95)	K	FAULT IND
166(932)	L	SWCA FAULT IND
211(3)	M	READY IND
212(4)	N	BIT 1
213(5)	P	BIT 2
214(91)	Q	BIT 3
215(845)	R	BIT 4
216(0)	X	GRD
217(5)	Y	SWCA READY IND

215,217
218,215,214,213,212,211

3 | 2 | 1

VISIONS
N | DATE | BY | NO | DRAFT | CHKD | APPD

REVISIONS								
ZONE	LTR	DESCRIPTION	DATE	E.M.N.NO	DRAFT	CHKD	APPD
	X	EXP. RELEASE					
	Ø	ORIGINAL RELEASE FOR PRODUCTION	12-1-66	Ø	RG		

LRCA-REMOTE J8004

78(1)	A	
188-189(916)	B	TUNE SWITCH
82(917)	C	OVLD RESET
203(92)	D	SERVO ON-OFF
155(1)	E	TUNE CONTACT CLOSED
156(2)	F	TUNE OPER. CONTACT COMM.
157(90)	G	OPER CONT CLOSED
204(93)	H	60VDC FROM LRCA-24VDC TD
205(94)	J	ON AIR IND.
206(95)	K	FAULT IND
207(96)	L	H.V. ON-OF
208(6)	M	H.V. ON-OFF
85(925)	N	H.V. OFF IND
97-210(834)	P	H.V. ON IND
211(3)	Q	READY IND
212(4)	R	BIT 1
213(5)	S	BIT 2
214(91)	T	BIT 3
215(845)	U	BIT 4
218(0)	V	GRD-COMM
219(932)	W	EXC CONT 1
220(942)	X	EXC CONT 2
221(944)	Y	EXC CONT 3
222(946)	Z	EXC CONT 4

TIS J8007

191(91)	A	LINE 1
	B	
192(92)	C	LINE 1
193(93)	D	LINE 2
	E	
194(94)	F	LINE 2
199(0)	K	GRD
200(5)	L	FAX
195(1)	M	CH 1
196(2)	N	CH 1
197(3)	P	CH 2
198(4)	R	CH 2
201(6)	S	KEY LINE (-)
202(96)	T	KEY LINE (+)

EXCITER J8003

171(1)	A	600Ω USB
	B	
172(2)	C	
173(3)	D	600Ω LSB
	E	
174(4)	F	
175(5)	G	CONT KEY
176(6)	H	FAX
177(91)	J	FAX
178(0)	K	GRD
179(92)	L	KEY LINE
180(93)	M	KEY LINE
181(94)	N	FSK
182(95)	P	FSK
183(3)	R	PTT
184(4)	S	PTT
185(5)	T	
186(90)	U	CONT KEY
190(926)	V	XMTR ON-OFF
187(954)	W	XMTR ON-OFF
188(916)	X	TUNE SWITCH
154(6)	Z	CARRIER ON CONT
224(964)	a	CARRIER ON RETURN
158(914)	b	BAND 1
159(915)	c	BAND 2
160(916)	d	BAND 3
161(917)	e	BAND 4 } SWCA
162(918)	f	BAND 5
163(922)	g	BAND 6
164(925)	h	BAND 7
165(926)	j	BAND 8
223(0)	k	CONT WAFER COMM.
219(932)	m	BIT 1
220(942)	n	BIT 2
221(944)	p	BIT 3
222(946)	r	BIT 4

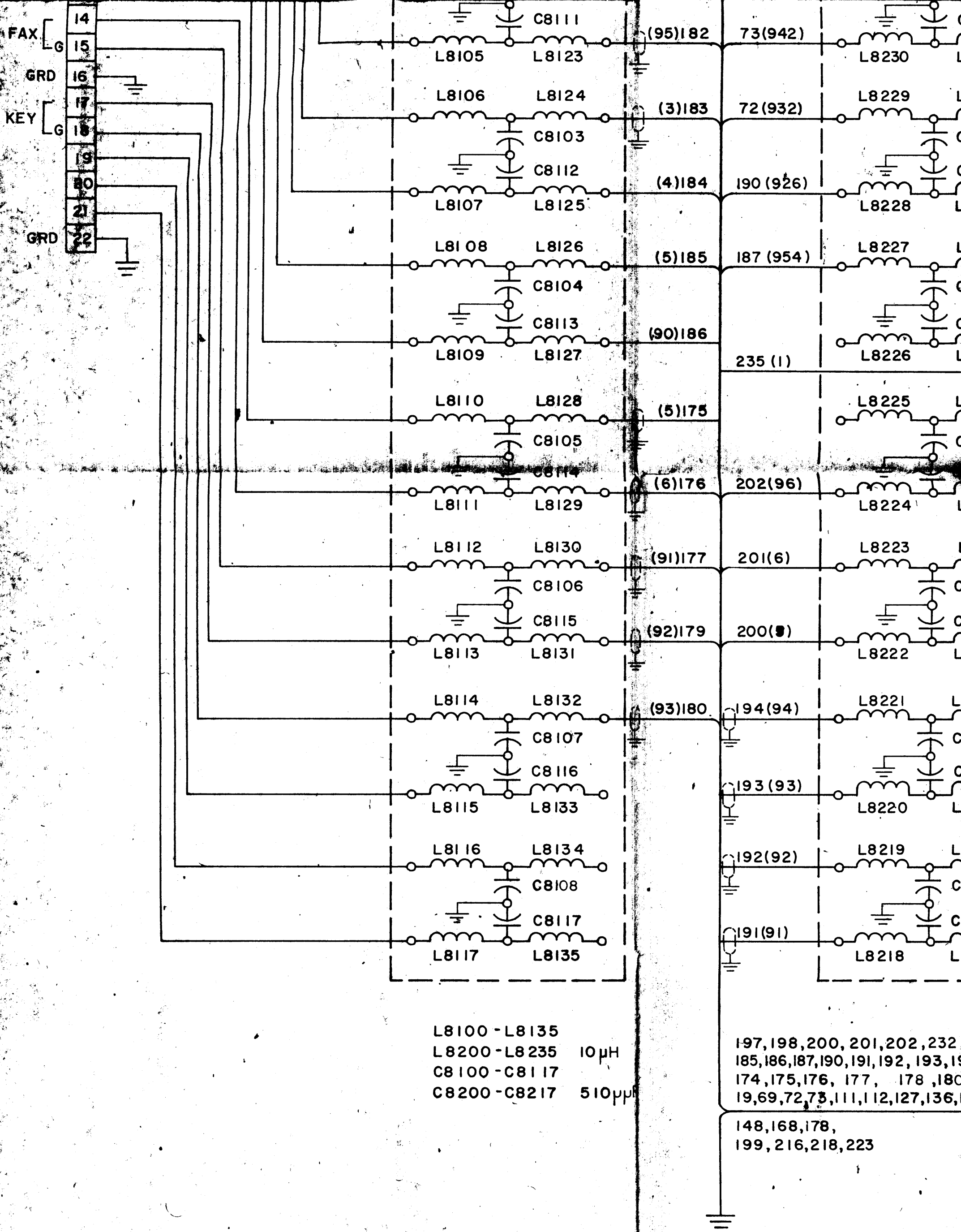
CA480-133-5.00

	J8008	VMO IN
	J8009	VMO OUT
152	J8010	EXC. MON IN
150	J8012	TLA ( ) ALDC

213,212,211 221,222 223,222,221,220,219,190

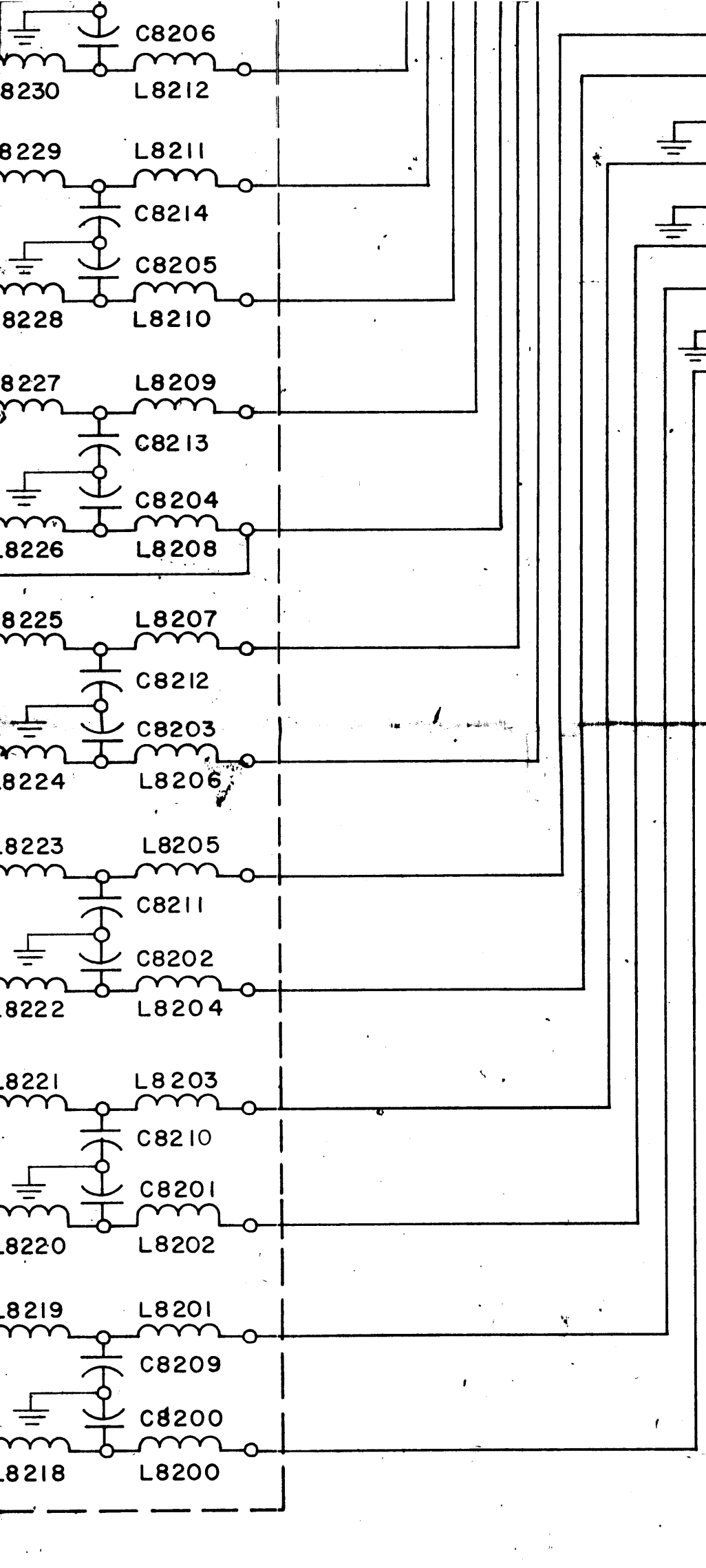
D C B

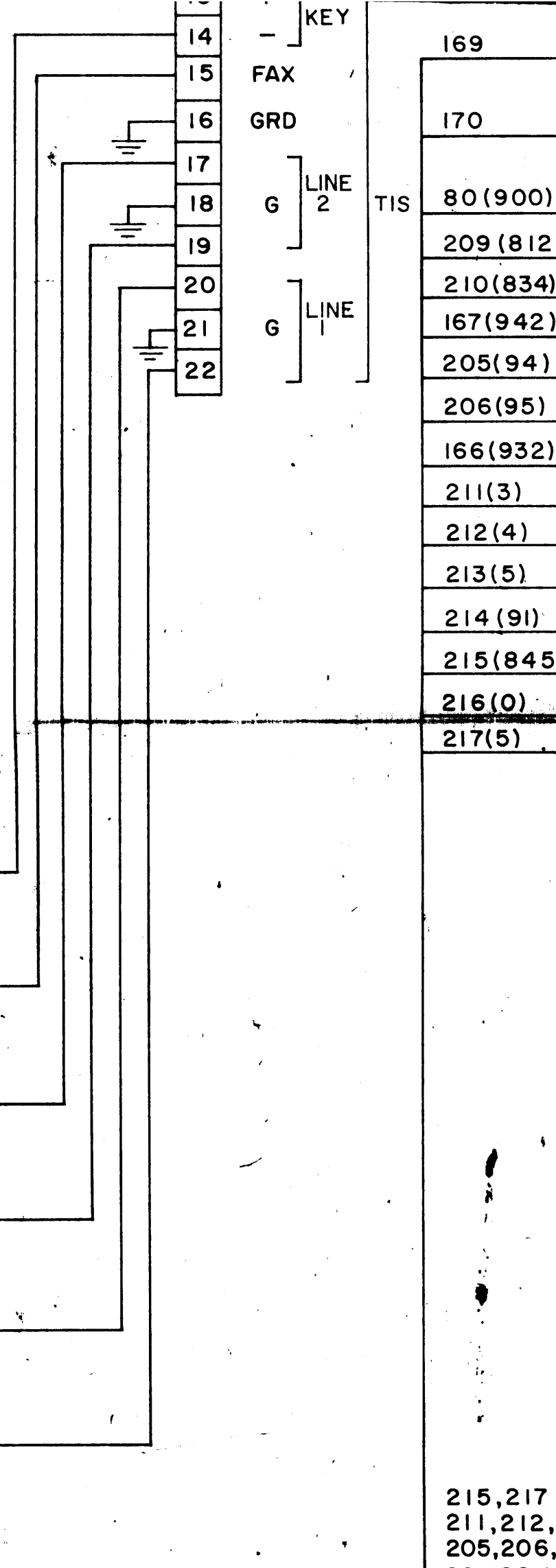
CK 1559

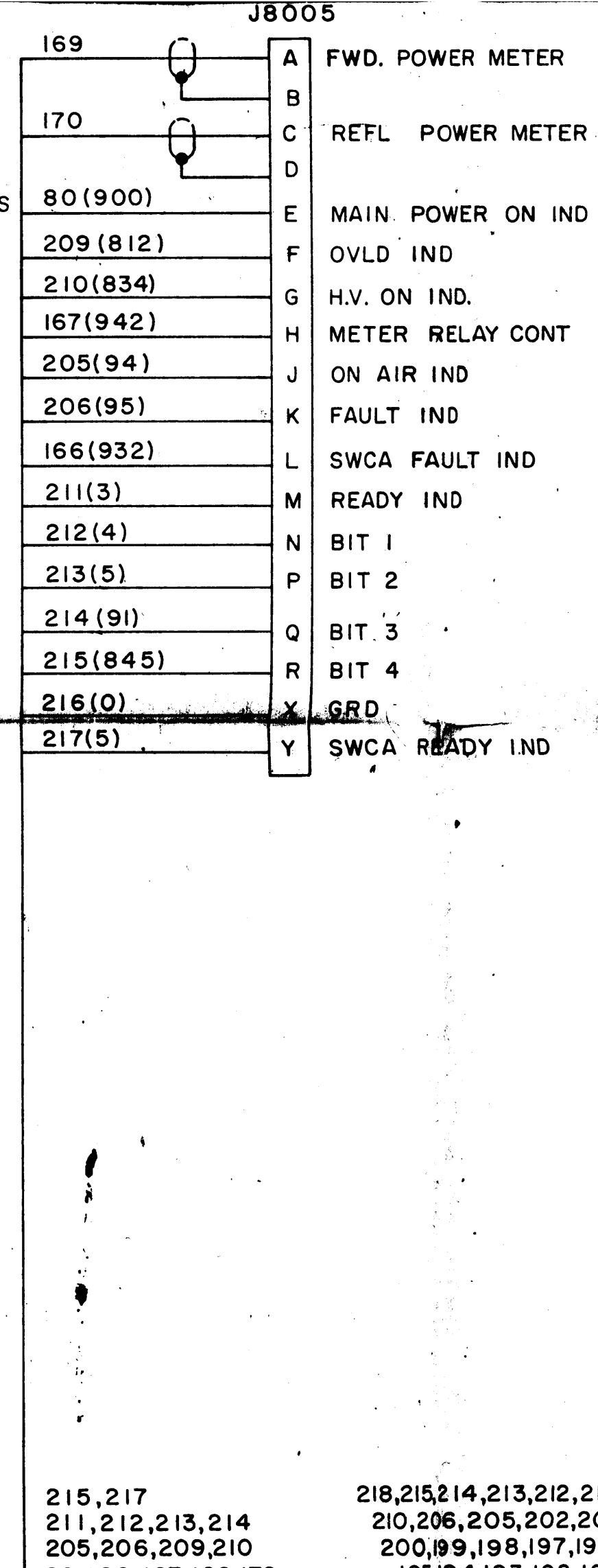


FCI-10-17 (10-66)

8 7 6







216

215,217
211,212,213,214
205,206,209,210
80,166,167,169,170

218,215,214,213,212,211
210,206,205,202,201
200,199,198,197,196
195,194,193,192,191

01,202,232,235
91,192,193,194,195,196
7, 178,180,181,182,183,184
,112,127,136,171,172,173

23

1	GPTA-2CJE., RAK110-2JE	
QTY / UNIT	MODEL USED ON	ASS'Y NO.
APPLICATION		
	CODE	

AN

MA

FIN

5 4

207(96)	K	FAULT IND
208(6)	L	H.V. ON-OF
85(925)	M	H.V. ON-OFF
97-210(834)	N	H.V. OFF IND
211(3)	P	H.V. ON IND
212(4)	Q	READY IND
213(5)	R	BIT 1
214(91)	S	BIT 2
215(845)	T	BIT 3
218(0)	U	BIT 4
219(932)	V	GRD-COMM
220(942)	W	EXC CONT 1
221(944)	X	EXC CONT 2
222(946)	Y	EXC CONT 3
	Z	EXC CONT 4

TIS
J8007

191(91)	A	LINE 1
	B	
192(92)	C	LINE 1
193(93)	D	LINE 2
	E	
194(94)	F	LINE 2
199(0)	K	GRD
200(5)	L	FAX
195(1)	M	CH 1
196(2)	N	CH 1
197(3)	P	CH 2
198(4)	R	CH 2
201(6)	S	KEY LINE (-)
202(96)	T	KEY LINE (+)

179(92)	L	KEY LINE
180(93)	M	KEY LINE
181(94)	N	FSK
182(95)	P	FSK
183(3)	R	PTT
184(4)	S	PTT
185(5)	T	
186(90)	U	CONT KEY
190(926)	V	XMTR ON-OFF
187(954)	W	XMTR ON-OFF
188(916)	X	TUNE SWITCH
154(6)	Z	CARRIER ON CONT
224(964)	a	CARRIER ON RETURN
158(914)	b	BAND 1
159(915)	c	BAND 2
160(916)	d	BAND 3
161(917)	e	BAND 4
162(918)	f	BAND 5
163(922)	g	BAND 6
164(925)	h	BAND 7
165(926)	j	BAND 8
223(0)	k	CONT WAFER COMM.
219(932)	m	BIT 1
220(942)	n	BIT 2
221(944)	p	BIT 3
222(946)	r	BIT 4

SWCA

CA480-133-5.00

J8008 VMO IN

J8009 VMO OUT

152 — J8010 EXC. MON IN

150 — J8012 TLA ( ) ALDC

212,211	221, 222	223,222,221,220,219,190
202,201	207,208,219,220,	188,187,186,185,184,183
97,196	157,188,189,203,204	182,181,180,179,178,177
92,191	78,82,85,97,155,156	176,175,174,173,172,171

165,224
160,161,162,163,164
150,152,154,158,159

TO SHEET 2

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

Figure 2-5. System Wiring Diagram

(Sheet 3 of 3)

RF DRIVE
J8011

106

TLA(A)ALDC
J8012-38025

SEE CK1559

67

SWC(A)ALDC
J8013

68

PREPOSITION
J8006

(1)	A	
(2)	B	
(3)	C	
(4)	D	
(5)	E	
(6)	F	
(7)	G	
(9)	H	
(9)	J	
(90)	K	
(91)	L	
(92)	M	
(93)	N	
(94)	P	
(95)	Q	
(96)	R	
(97)	S	
(98)	T	
(8)	U	TUNE SWITCH
(0)	V	GRD
(6)	W	FAULT IND (SWCA)
(90)	X	READY IND (SWCA)

PREPOSITION
BANDS
1-18

FILTER
J8002

37	(1)	A	BAND 1
38	(2)	B	BAND 2
39	(3)	C	BAND 3
41	(5)	D	BAND 4
42	(6)	E	BAND 5
43	(7)	F	BAND 6
44	(9)	G	BAND 7
45	(90)	H	BAND 1
46	(91)	J	BAND 2
47	(92)	K	BAND 3
48	(93)	L	BAND 4
49	(94)	M	BAND 5
50	(95)	N	BAND 6
51	(96)	P	BAND 7
16	(1)	Q	COMM
16	(2)	R	26VDC
162	(3)	S	5VAC
163	(0)	T	GRD

CONT

INTERLOCK

163
50,51,160,161,162,
44,45,46,47,48,49,
37,38,39,41,42,43

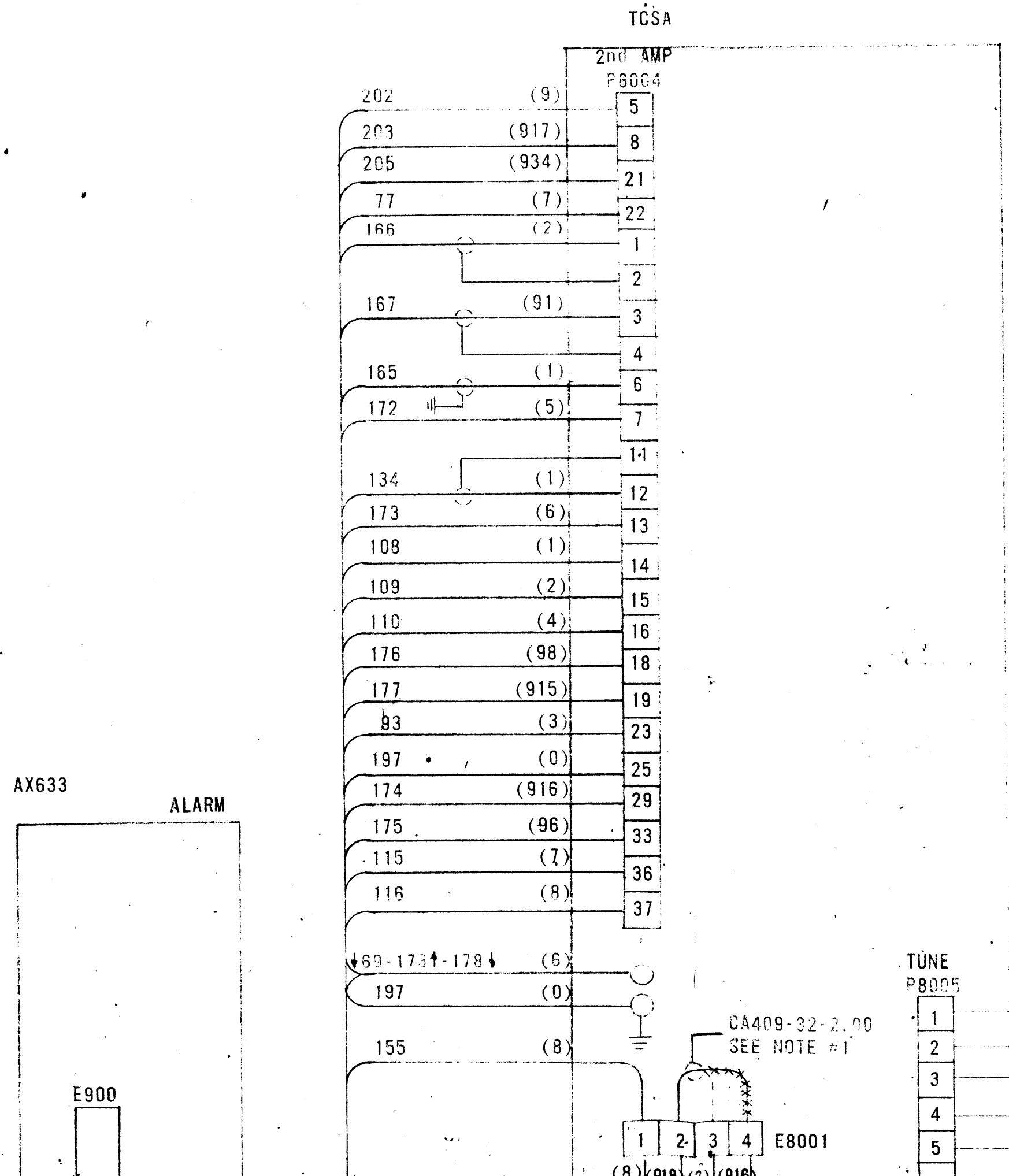
68,106

67

50,51,160,161,162,
44,45,46,47,48,49,
37,38,39,41,42,43

68,106

67



E900

J9001

J9002

E9001

101-165 (1) 1

2

(2)

1 2 3 4 E8001

(8) (918) (2) (916)

193
179,189,185,186, 186-193 185 179 190

CA409-32-2.00
SEE NOTE #1

154 (97)

1 2 3 4 E8000

(97) (90) (91) (1)

194
187,190,191,192 194
187 192 191 190

LOAD
P8006

170 (9) 1

2

190 (1) 3

191 (91) 4

139 (96) 5

63 (1) 6

7

61 (2) 8

131 (3) 9

92 (2) 10

11

138 (95) 12

189 (96) 13

126 (95) 14

127 (96) 15

128 (97) 16

192 (90) 17

193 (8) 18

194 (97) 19

204 (932) 21

182 (7) 26

3

4

5 (4) 137

6 (3) 64

7 (5) 172

8 (4) 62

9 (94) 124

10 (96) 191

11

12 (93) 136

13 (6) 178

14 (9) 117

15 (90) 118

16 (91) 119

17 (918) 185

18 (8) 186

19 (97) 187

21 (8) 169

22 (2) 179

23 (916) 180

24 (915) 177

25 (98) 176

29 (925) 199

30 (7) 182

31 (917) 183

32 (922) 184

34 (0) 188

35 (0) 188

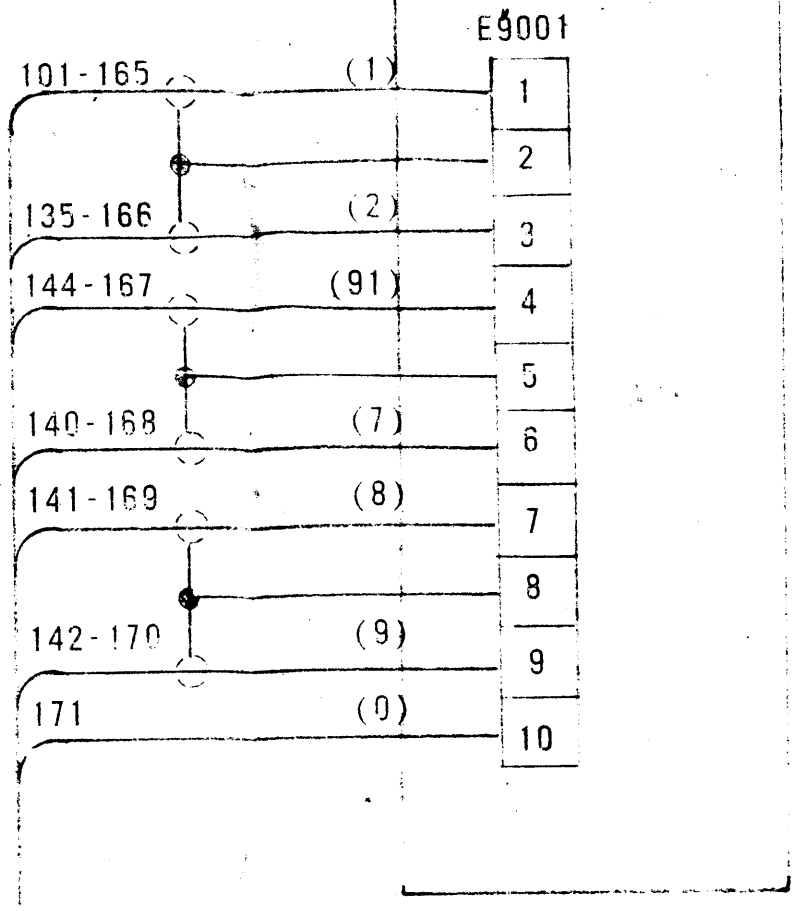
36 (92) 122

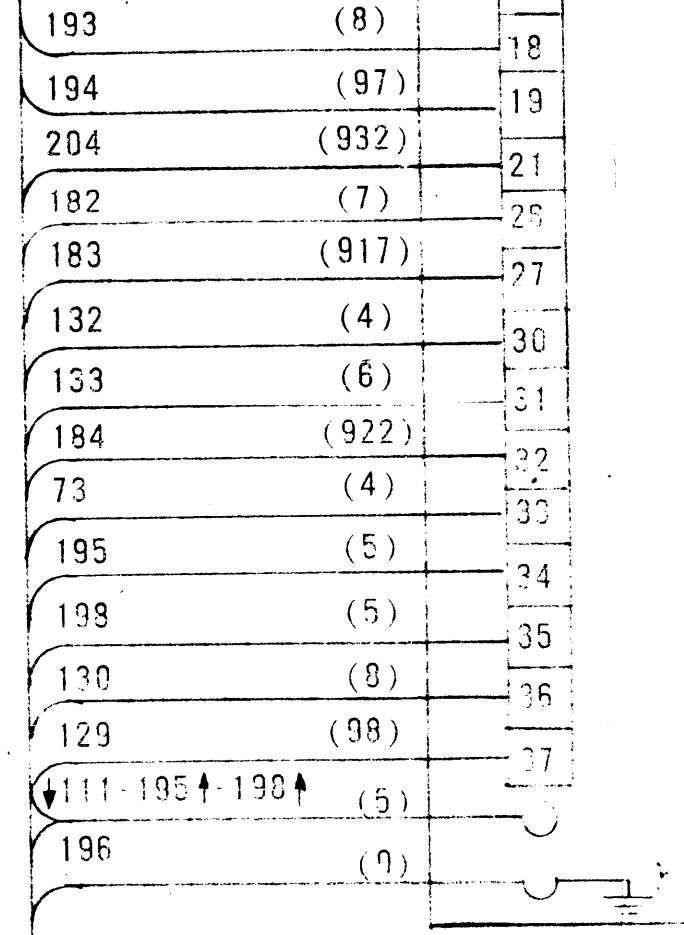
37 (93) 123

28 (932) 204

33 (934) 205

(96) 189 181 175





206,207
199,200,201,203,
154,155,159,174
149,150,151,153,
105,112,120,147,
97,98,99,100,104,
89,90,91,94,95,96,
81,84,85,86,87,88
72,74,75,78,79,80
60 34,35,36,40,70,71,
56 28,29,30,31,32,33

171
165,166,167,168,169 170
101,135,140,141,142,144

203,174,170,167
166,165,155,154

202,204,205
183,184,185,186,187,196,
176,177,178,179,180,182,
133,134,138,139,172,175,
127,128,129,130,131,132,
109 110,111,115,116,126,
61,63,69,73,77,92,93,108

163,159,171,164,
196,205,204,199,189
187,186,185,184,183
182,180,179,178,177
176,175,172,169,168

62,64,117,118,119,
122,123,124,136,137,
143,159,163,164,171
196

TO SHEET

97,98,99,100,104,
89,90,91,94,95,96,
81,84,85,86,87,88
72,74,75,78,79,80
160 34,35,36,40,70,71,
156 28,29,30,31,32,33

171
165,166,167,168,169 170
101,135,140,141,142,144

203,174,170,167
166,165,155,154

183,184,185,186,187,188,
176,177,178,179,180,182,
133,134,138,139,172,175,
127,128,129,130,131,132,
109 110,111,115,116,126,
61,63,69,73,77,92,93,108

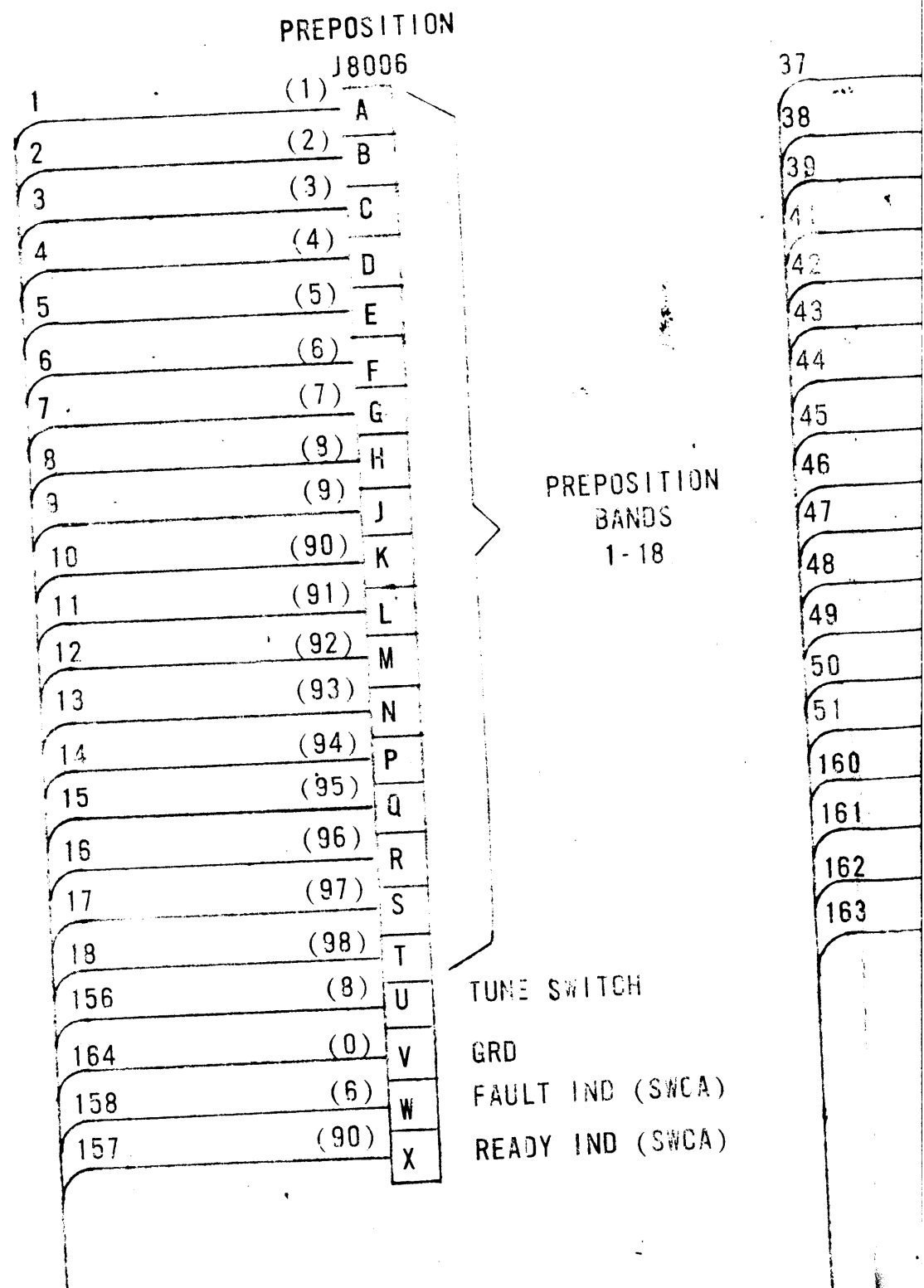
163,159,171,164,
196,205,204,199,189
187,186,185,184,183
182,180,179,178,177
176,175,172,169,168

62,64,117,118,119,
122,123,124,136,137,
143,159,163,164,171
196

TO SHEET 2

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	E.M.N.NO	DRAFT	CHKD	APPD
	X	EXP. RELEASE	12/9/68		KH	—	DCB
			12-10-68		R.G.		


PREPOSITION
J8006
1
(1)
A
2
(2)
B
3
(3)
C
4
(4)
D
5
(5)
E
6
(6)
F
7
(7)
G
8
(9)
H
9
(9)
J
10
(90)
K
11
(91)
L
12
(92)
M
13
(93)
N
14
(94)
P
15
(95)
Q
16
(96)
R
17
(97)
S
18
(98)
T
156
(8)
U
164
(0)
V
158
(6)
W
157
(90)
X
PREPOSITION
BANDS
1-18
TUNE SWITCH
GRD
FAULT IND (SWCA)
READY IND (SWCA)
37
38
39
42
43
44
45
46
47
48
49
50
51
160
161
162
163
163

158		W
157	(90)	X

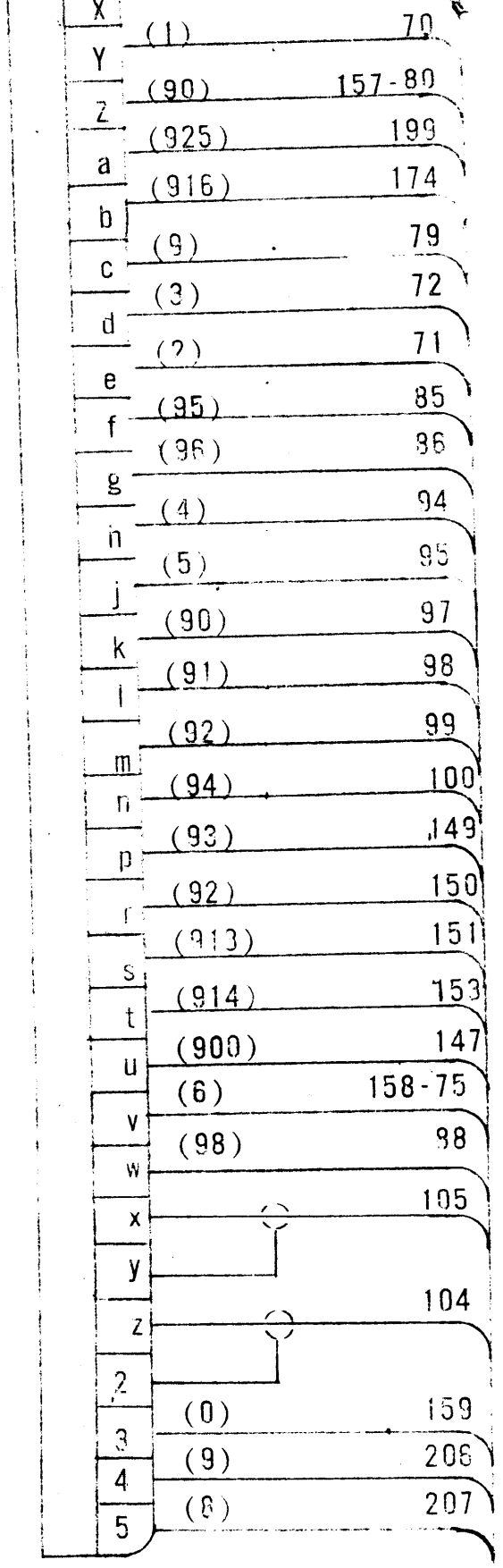
READY IND (SWCA)

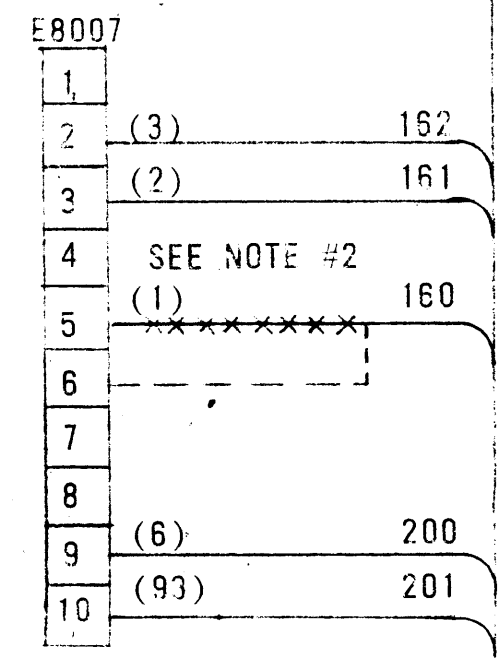
163
50,51,160,161,162,
44,45,46,47,48,49,
37,38,39,41,42,43

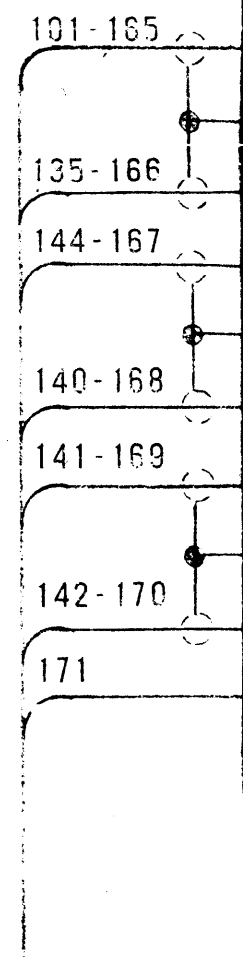
159,164
16,17,18,156,157,
10,11,12,13,14,15,
1,2,3,4,5,6,7,8,9,

J8001-J8024

A	(97)	154
B	(97)	112
C	(8)	155-120
D	(8)	96
E	(7)	91
F	(1)	89
G	(917)	203-90
H	(3)	74
J	(91)	81
K	(4)	40
L	(8)	156-78
M	(94)	84
N	(97)	87
P	(90)	28
Q	(91)	29
R	(92)	30
S	(93)	31
T	(94)	32
U	(95)	33
V	(96)	34
W	(97)	35
X	(98)	36
Y	(1)	70
Z	(90)	157-80
	(925)	199


X
(1) 70
Y
(90) 157-80
Z
(925) 199
a
(916) 174
b
(9) 79
c
(3) 72
d
(2) 71
e
(95) 85
f
(96) 86
g
(4) 94
h
(5) 95
j
(90) 97
k
(91) 98
l
(92) 99
m
(94) 100
n
(93) 149
p
(92) 150
r
(913) 151
s
(914) 153
t
(900) 147
u
(6) 158-75
v
(98) 98
w
105
x
y
104
z
2
(0) 159
3
(9) 208
4
(8) 207
5





/	RAK-110-2JE GPTA 2.5KJE
QTY	USED ON
	MODEL

	206,207	
	199,200,201,203,	
	154,155,159,174	
	149,150,151,153,	
	105,112,120,147,	
	97,98,99,100,104,	
	89,90,91,94,95,96,	
	81,84,85,86,87,88	
	72,74,75,78,79,80	171
162,161,160	34,35,36,40,70,71,	165,166,167
158,157,156	28,29,30,31,32,33	101,135,140

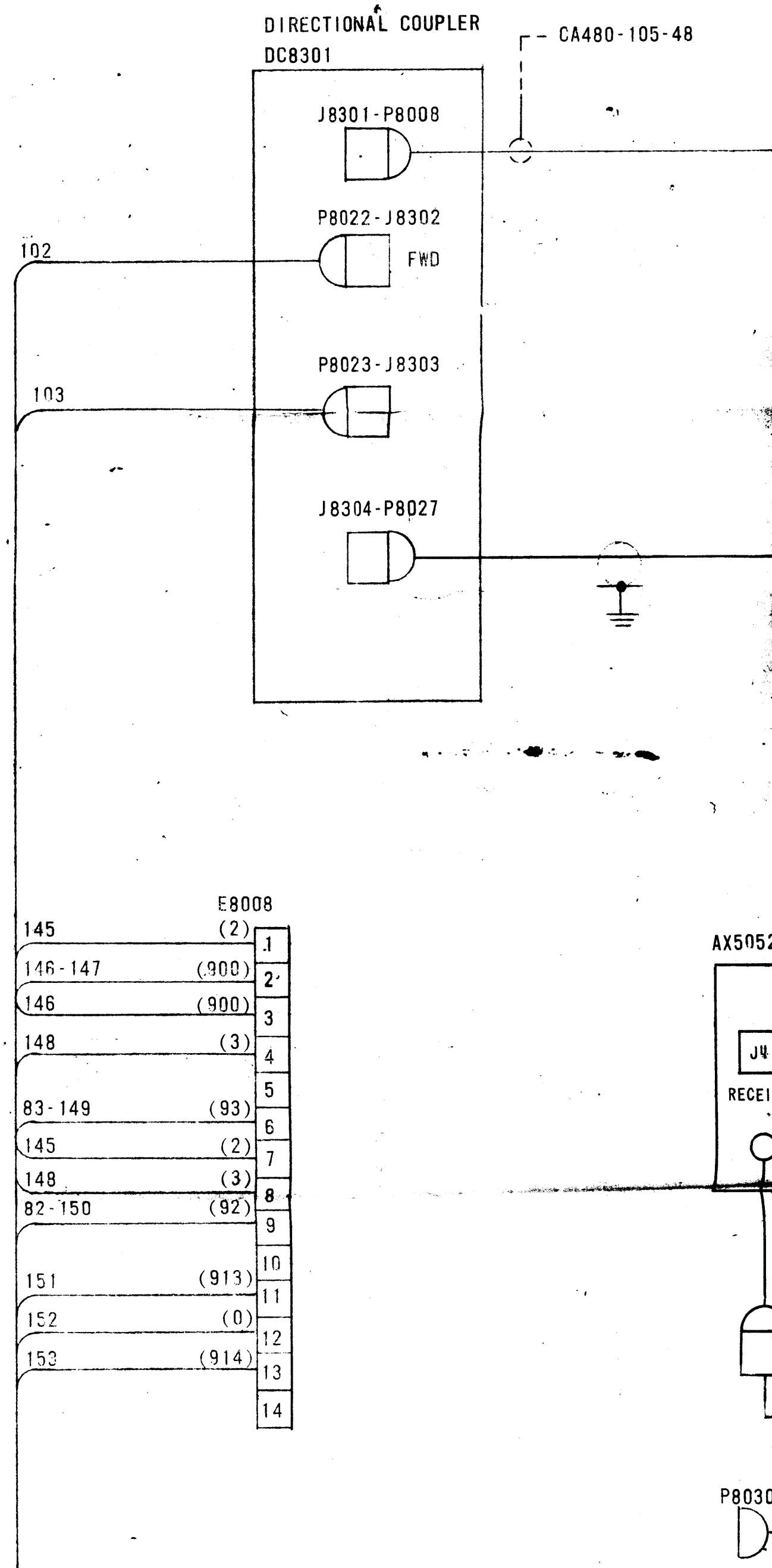
81,84,85,86,87,88
72,74,75,78,79,80,171
162,161,160 34,35,35,40,70,71,165,166,16
158,157,156 28,29,30,31,32,33,101,135,14

RAK-110-2JE	GPTA 2.5KJE
USED ON	MODEL

Figure 2-6. RF Control Wiring Diagram

(Sheet 1 of 2)

(IF AF107 FXD, FILTER IS USED DC8301 IS PART OF FILTER)



ER)

48

CA480-138-18

AX5052

P8028

P8029

J4

J3

J2

RECEIVER

XMTR

ANTENNA

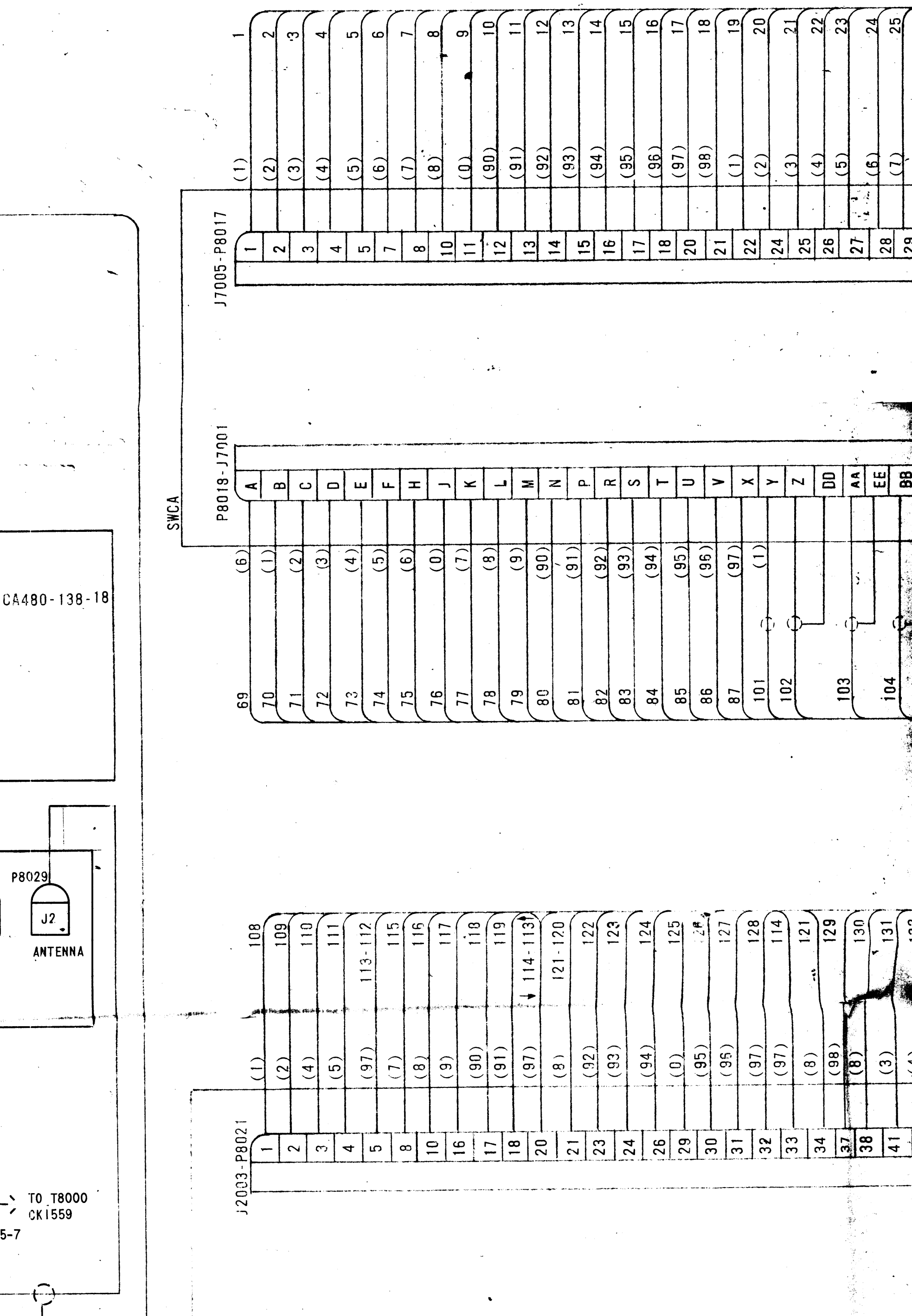
P8031

P8032

TO T8000
CK1559

CA605-7

P8030



37	(8)	130
38		
41	(3)	131
43	(4)	132
45	(6)	133
51	(1)	19
	(2)	20
57	(3)	21
58	(4)	22
59	(5)	23
60	(6)	24
62	(7)	25
63	(8)	26
64	(9)	27
65	(90)	52
70	(91)	53
71	(92)	54
72	(93)	55
73	(94)	56
74	(95)	57
76	(96)	58
77	(97)	59
79	(98)	60
80	(1)	134
7		
11	(2)	135
12		
13	(93)	136
22		
25	(4)	137
27		
28	(95)	138
35		
36	(96)	139
40		
39	(7)	140
44		
46	(6)	66
47		
48		

103		AA
		EE
104		BB
		FF
105		CC
		HH
88	(98)	JJ
89	(1)	KK
90	(917)	LL
91	(7)	MM
92	(2)	NN
93	(3)	PP
94	(4)	RR
95	(5)	SS
96	(8)	TT
97	(90)	UU
98	(91)	VV
99	(92)	WW
100	(94)	XX
201	(93)	W

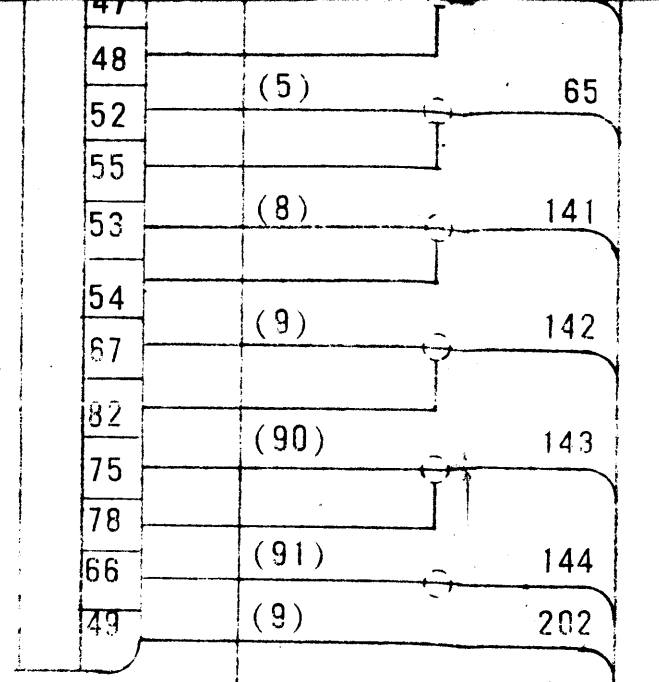
P8019-J7003

106

P8020-J7004

107

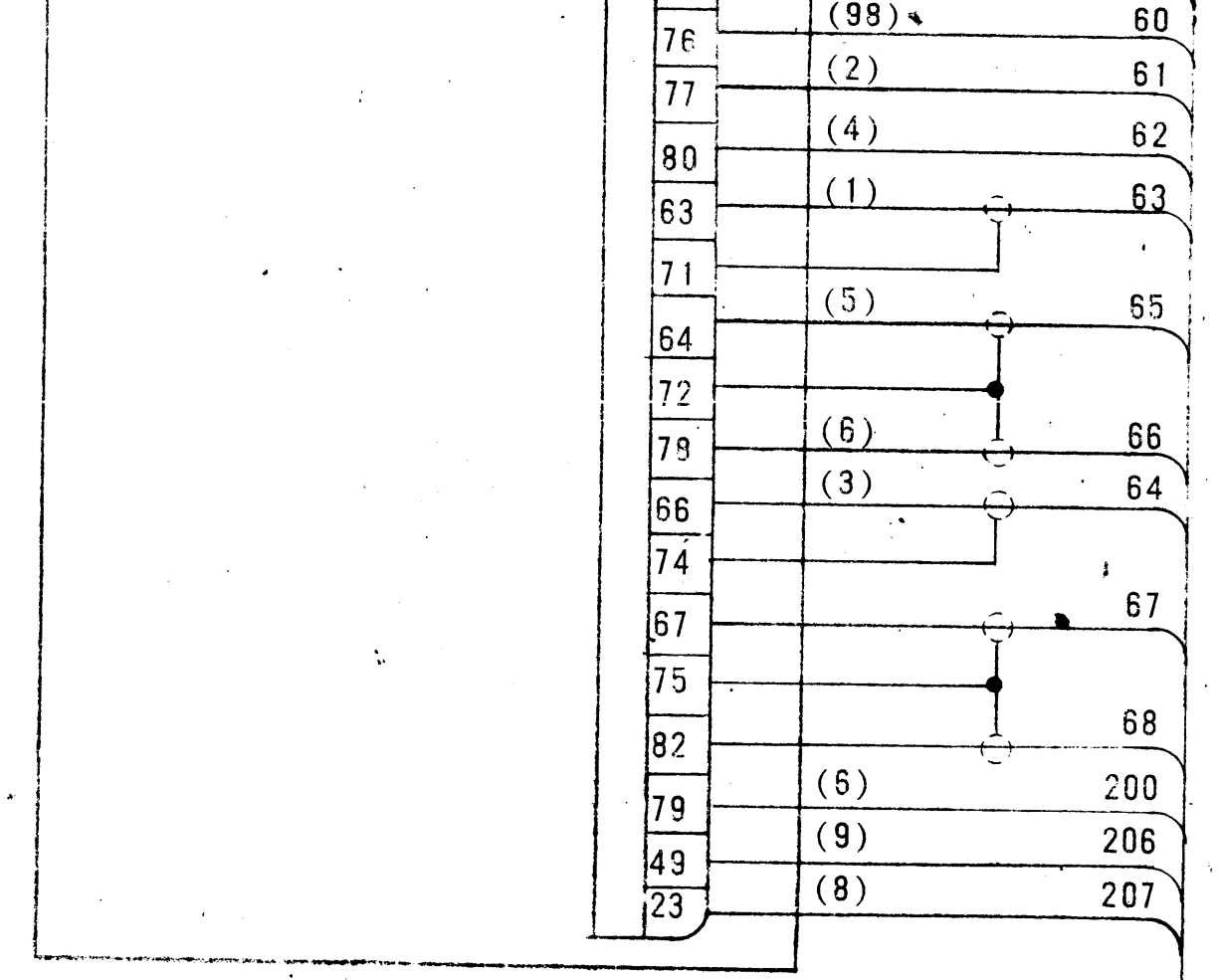
27	(5)	23
	(6)	24
28	(7)	25
29	(8)	26
30	(9)	27
31	(90)	28
32	(91)	29
33	(92)	30
34	(93)	31
35	(94)	32
36	(95)	33
37	(96)	34
38	(97)	35
39	(98)	36
40	(1)	37
41	(2)	38
42	(3)	39
43	(4)	40
44	(5)	41
45	(6)	42
46	(7)	43
47	(8)	44
48	(90)	45
50	(91)	46
51	(92)	47
52	(93)	48
53	(94)	49
54	(95)	50
55	(96)	51
56	(90)	52
57	(91)	53
58	(92)	54
59	(93)	55
60	(94)	56
62	(95)	57
65	(96)	58
70	(97)	59
73	(98)	60
76	(2)	61
77		



201 107
106,105,104,103,
102,101,100,99
98,97,96,95,94,
93,92,91,90,89,
88,87,86,85,84,
83,82,81,80,79,
78,77,76,75,74,
73,72,71,70,69

202,144,143,142,
141,140,139,138,137,
136,135,134,133,132,
131,130,129,128,127,
126,125,124,123,122,
120,119,118,117,116,
115,112,111,110,109,108

65,66
55,56,57,58,59,60,
25,26,27,52,53,54,
19,20,21,22,23,24



207,206,200,68,67,
66,65,64,63,62,61,60,
59,58,57,56,55,54,53,
52,51,50,49,48,47,46,
45,44,43,42,41,40 39,
38,37,36,35,34,33,32,
31,30,29,28,27,26,25,
24,23,22,21,20,19,18,
17,16,15,14,13,12,11,
10,9,8,7,6,5,4,3,2,1

NOTES:

1. NUMBER
2. CONNEC
3. CONNEC
4. CONNEC
5. CONNEC

REVISIONS							
ZONE	LTR	DESCRIPTION	DATE	E.M.N.NO	DRAFT	CHKD	APPD
	X	EXP. RELEASE	12/10/68		L.H.		D.B.
	Ø	[illegible]	12/16/68		P.G.		

52,51,50,49,48,47,46,
45,44,43,42,41,40,39,
38,37,36,35,34,33,32,
31,30,29,28,27,26,25,
24,23,22,21,20,19,18,
17,16,15,14,13,12,11,
10,9,8,7,6,5,4,3,2,1

NOTES:

1. NUMBERS IN PARENTHESIS ARE COLORS.
2. CONNECT AS SHOWN ---FOR 50 Hz.
3. CONNECT AS SHOWN ~~***~~ FOR 60 Hz.
4. CONNECT AS SHOWN ~~****~~ FOR REMOTE OPERATION.
5. CONNECT AS SHOWN ------ FOR LOCAL OPERATION.

58,59,60,
52,53,54,
22,23,24

202,144,143,142,
141,140,139,138,137,
136,135,134,133,132,
131,130,129,128,127,
126,125,124,123,122,
121,120,119,118,117,116,
115,114,113,112,111,110,109,108

65,66
55,56,57,58,59,60,
25,26,27,52,53,54,
19,20,21,22,23,24

148 (3)
82-150 (92)
151 (913)
152 (0)
153 (914)

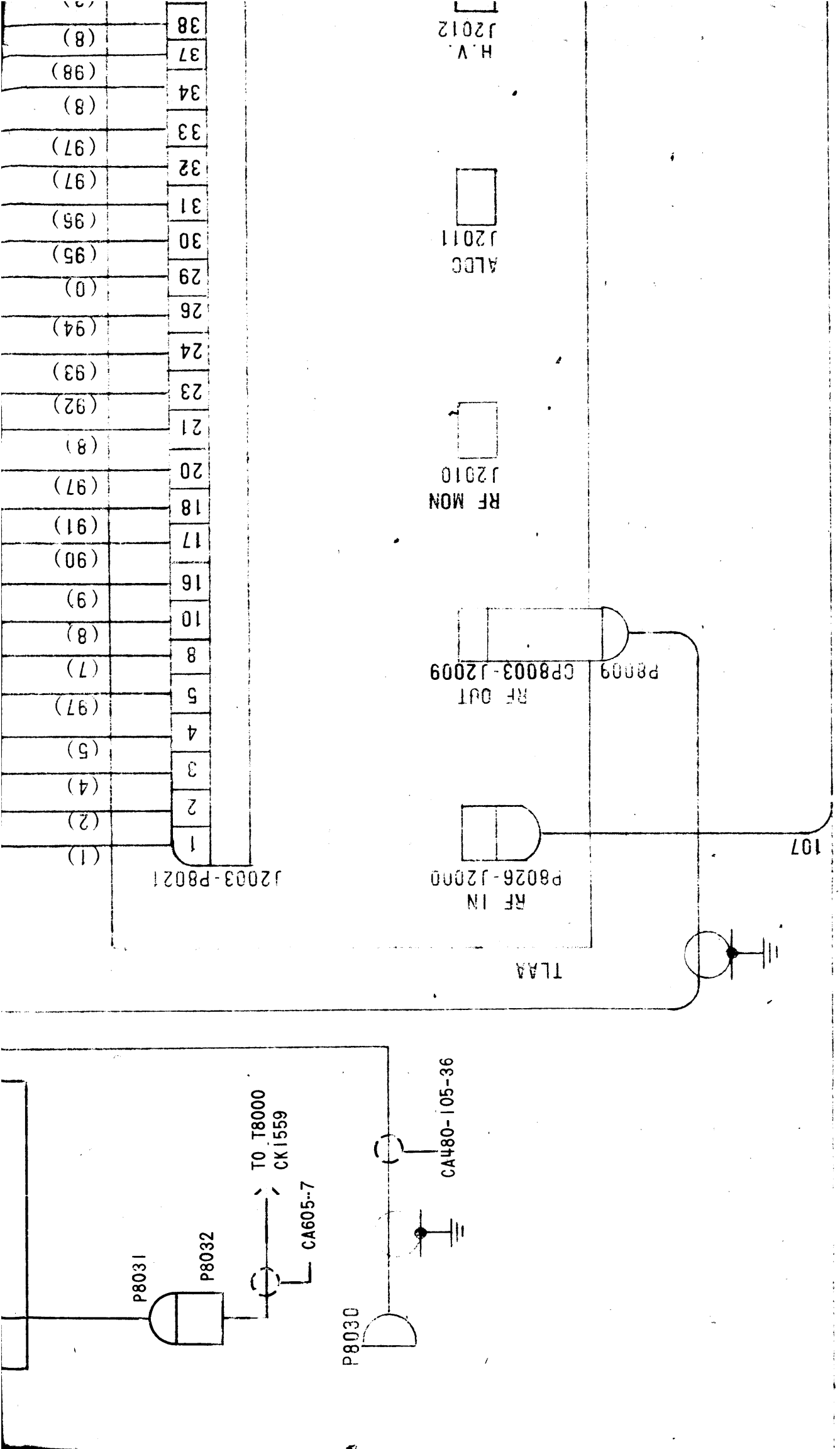
8
9
10
11
12
13
14

P8030

153, 152, 151
150, 149, 147,
76, 125, 152

82, 83, 102, 103

TO SHEET 1


TLAA
J2003-P8021
P8026-J2000
RF IN
J2012
H.V.
J2011
ALCC
J2010
RF MON
P8009
CP8003-J2009
RF OUT
107
P8031
P8032
TO T8000
CK1559
CA605-7
P8030
CA480-105-36

H.V.
J2012

J2001

37	(98)
38	(8)
41	(3)
43	(4)
45	(6)
51	(1)
57	(2)
58	(3)
59	(4)
60	(5)
62	(6)
63	(7)
64	(8)
65	(9)
70	(90)
71	(91)
72	(92)
73	(93)
74	(94)
76	(95)
77	(96)
79	(97)
80	(98)
7	(1)
11	
12	(2)
13	
22	(93)
25	
27	(4)
28	
35	(95)
36	
40	(96)
39	
44	(7)
46	
47	(6)
48	

48	(6)
47	
48	(5)
52	
55	(8)
53	
54	(9)
67	
82	(90)
75	
78	(91)
66	(9)
49	

202, 144, 143
141, 140, 139, 138
136, 135, 134, 133
131, 130, 129, 128
126, 125, 124, 123
120, 119, 118, 117
115, 112, 111, 110

QTY	1
USED ON	RAK-110-2JE
MODEL	GPTA 2.5 KJE

RAK-110-2JE	GPTA 25KJE
USED ON	MODEL

Figure 2-6. RF Control Wiring Diagram
(Sheet 2 of 2)

SECTION 3

OPERATOR'S SECTION

3-1. GENERAL.

This section has been prepared for technicians having experience on similar or related equipment. Before operating the transmitter, the operator should familiarize himself with the controls and indicators illustrated in figure 3-1 and described in table 3-1. Refer to Section 1 of this manual for detailed technical information regarding the transmitter modular units. Table 3-2 provides typical tuning information. Insure that the necessary interface connections have been made to the rear panel of the GPTA.

3-2. TUNEUP PROCEDURE FOR GPTA-2.5(JE) (MANUAL OPERATION)

STEP	OPERATION	NORMAL INDICATIONS
1	Set main power circuit breaker (43) to the "ON" position.	The Technimatic light (1) must come on, PA blower and top fan must start running.
2	Set Auto/Manual switch (45) to Manual and Servo On/Off switch to "OFF" (49).	NO INDICATIONS.
3	Place exciter/PTT and Power ON/Standby switches to "ON" (36) (37).	Monitor meter must light on exciter, power lamp and exciter lamp must be lit.
4	Select the desired exciter operating frequency (30, 31, 32, 42, 41, 40) Place RF output control (26) to its' extreme counter-clockwise position.	NO INDICATIONS.
5	Set Servo On/Off switch to "ON".	SWCA master control switch on SWCA, 2nd Amp. and PA Bandswitches should automatically position to corresponding frequency selected.
6	Place the Low Voltage breaker (73) (located on the AP-128 Low Voltage Power Supply) to the "ON" position.	NO INDICATIONS
7	Place SSB/CW-FSK Switch (71) to SSB position.	

NOTE

At this time it is advisable to check the plate currents of the 1st and 2nd RF amplifier tubes. They should be checked in the following manner:

(1) Place the multimeter switch (17) to the 1st Amp Ip position and observe a reading of "10" on multimeter (12). Should the meter reading indicate some other value, adjust the 1st Amp bias adjust (77) located on the Low Voltage Power Supply, for "10" on multimeter.

(2) Place the multimeter switch (17) to the 2nd Amp Ip position and observe a reading of "12" on the multimeter (12). Should the meter reading indicate some other value, adjust the 2nd Amp bias adjust located on the Low Voltage Power Supply, for "12" on the multimeter.

STEP	OPERATION	NORMAL INDICATIONS
8	Set Exciter controls as follows Carrier-control (35)- Adjust for full carrier. Mode switch (39) - USB Meter switch (25) - RF USB and LSB (27) (38) - "0" RF output control (26) adjust to 100 milliwatts. (approximately "2" on Multimeter).	Meter on Exciter will read "FULL" when meter switch is in carrier position. When in "RF" position meter will read between 1 and 2.
9	On TLA( ), place multimeter switch (17) to the 2nd Amp Ep position.	No indications at this time. (However when excitation from exciter is applied to RF input of P.A. multimeter will indicate RF drive).
10	Advance Gain control (11) on SWC( )-3K clockwise for a slight indication on the multimeter (12).	Indication will be noted on multimeter as RF Gain control (11) has been advanced.
11	Adjust 2nd Ampl. tuning control (15) for a peak indication on multimeter (14).	Peak indication will be noted on multimeter (12).
12	Reduce RF output (rotate RF Gain Control on SWC (11) to its extreme counterclockwise position).	Indication on multimeter should indicate zero.

STEP	OPERATION	NORMAL INDICATIONS
13	Place High Voltage Breaker (47) to "ON" position.	High Voltage Lamp (3) must light, PA Plate current meter (18) should indicate 450 ma. (Should some other value be noted, adjust the PA bias adjust (75) located on the Low Voltage Power Supply for a reading of 450 ma on the PA Plate Current meter.
14	Advance the RF Gain Control on the SWC( )3K to a point where the PA plate current increases.	PA Plate Current meter indication increases from original reading.
15	Adjust the PA tuning control (16) until a resonant dip is obtained on the PA Plate current meter (18).	Observe resonant dip in PA Plate current.
16	Adjust the PA load control (22) until PA is properly loaded. After each change in loading the PA Tune control must be returned to resonance.	Proper loading will occur when maximum output is obtained on Output meter (8). At a power level of 2.5 kilowatt the PA Plate current should be between .6 and 1 Amp. depending on the frequency.
17	Advance RF Gain control on SWC( )-3K (11) until output meter reaches pre-determined power level.	PA Output meter will indicate desired power output level.
18	Reduce Power output by turning the RF Gain control on the SWC( )-3K (11) to its extreme counterclockwise position.	Power output indicates zero.
19	Place H.V. breaker to the "OFF" position (47).	High Voltage lamps will go out PA Plate current meter will indicate zero.

The transmitter at this time has been initially tuned up on a carrier frequency. The desired mode of operation will be determined by control settings of the exciter.

3-3. SERVO TUNING PROCEDURE

STEP	OPERATION	NORMAL INDICATIONS
1	Set Main power circuit breaker (43) to the "ON" position.	The technimatic light (1) must come on. PA blower and top fan must start running.

STEP	OPERATION	NORMAL INDICATIONS
2	Set Auto/Manual switch (45) to Auto and Servo On/Off switch to "ON". (49).	Prepares transmitter circuits for servo tuning.
3	Place MMX Exciter/PTT and power ON/ Standby switches to "ON". (36) (37).	Monitor meter and power lamp must light on MMX.
4	Select desired MMX operating frequency and place RF output control (26) to its extreme counterclockwise position.	Sets pre-positioning information for automatic bandswitching and Automatic tune and load controls presetting.
5	Place Power level indicator on SWC( )3K to the desired power level.	No indications (power level control Operates to control transmitter RF output in the servo-tune mode of operation).
6	Press Tune button (48).	Activates servo circuitry to cause automatic bandswitching, tune and load pre-positioning to take place.
7	Set MMX controls as follows: Meter Switch (25) - RF Mode Switch (39) - USB Carrier Control (35) USB and LSB Gain Controls (27) (38) - "0" RF Output control (26) - 100 mw (approximately "2" on Monitor meter).	With the controls set in this manner, the RF output will be monitored at the end of transmitters tuning cycle.
8	Place low voltage breaker on. Place High Voltage Breaker on. Press Tune button.	High Voltage indicator lamp will light. Transmitter will servo tune automatically. The tuning sequence is as follows: a. 2nd Amplifier tuning control will rotate and stop. (Indications are green search and operate lamps come on). b. PA Tune capacitor will rotate and stop (indications are green search and operate lamps will come on). c. PA load capacitor will rotate stop. (Indications are green search and operate lamps will come on).

STEP	OPERATION	NORMAL INDICATIONS
8 cont.		d. Transmitter will then automatically drive-up to preset output level and decrease its output to zero. The "READY" lamp will then come on. This indicates the transmitter has been initially tuned on a pilot carrier, at the desired frequency, to a preset power output level. Mode of operation at this point be determined by the exciter controls.

NOTE

(1) Automatic Transmitter Operation

All inital exciter control adjustments should be performed with High Voltage "OFF". Once the desired mode of emission has been determined and exciter controls adjusted accordingly, press tune button then place high voltage breaker "ON" transmitter will automatically tune to the desired frequency; mode of operation and output level.

(2) Manual Operation

The transmitter must first be tuned manually to the desired frequency and output level as per paragraph 3-2. Exciter controls must be adjusted for the desired mode of emission (paragraph 3-4 thru 3-9). The RF Gain Control (located on SWC-3K) must be adjusted for desired output level.

3-4. INDEPENDENT SIDEBAND WITH ANY DEGREE OF CARRIER.

1. Set ON/Standby Switch (37) on MMX to "ON".
2. Set Exciter Switch (36) to "ON" when using either the USB or LSB 600 ohm line (external signal source) input. Set Exciter Switch to PTT position when using Mike input (28).
3. Set Power ON/OFF Switch (68) on AX5047 to "OFF".
4. Set USB and LSB (27,28) controls to zero.
5. Select ISB position on MMX Mode Switch (39).
6. Select desired operating frequency with frequency selection controls on MMX (Verify correct band settings).
7. Turn Meter Switch on MMX (25) to LSB position.
8. Adjust the LSB Gain (27) for a Monitor Meter (24) indication not to exceed the red region on the meter.
9. Turn Meter Selector Switch (25) to USB position.
10. Adjust USB Gain Control (38) for a Monitor Meter (24) indication not to exceed the red region.
11. Turn Meter Switch (25) to the Carr position.
12. Adjust Carrier Control (35) to full or the desired level as indicated on Monitor Meter (24).
13. Turn Meter Switch (25) to the RF position and adjust RF Output Control (26) for 100 milliwatts indicated by approximately "2" on Monitor Meter.

3-5. CONVENTIONAL AM OPERATION

1. Set ON/Standby Switch (37) on MMX to "ON".
2. Set Exciter Switch (36) to "ON" position when using either USB or LSB 600 ohm line (external signal source) input. Set Exciter Switch to PTT position when using Mike input. (28)

NOTE

If automatic VOX control is desired place Power On/Off Switch (68) on AX5047 to "ON" and Sideband Selector Switch (69) to desired sideband. Place Exciter ON/PTT to PTT position. If VOX Control is not desired place Power On/Off Switch (68) to "OFF".

3. Set Mode Switch (39) to AM.

4. Connect a Mike to the front panel jack (28) if used.

5. Adjust the Mike/LINE controls (27,38) of sideband used to appropriate level as indicated on Monitor Meter (24).

NOTE

DO NOT ENTER RED REGION. When mike input is used, adjust level so as not to exceed red region with highest input from microphone.

6. Turn Meter Switch (25) to RF position and adjust RF Output control (26) for 100 milliwatts indicated by approximately "2" on the Monitor Meter.

3-6. FREQUENCY SHIFT TELEGRAPH OPERATION.

1. Set ON/Standby Switch (37) on MMX to "ON".

2. Set Exciter Switch (36) on MMX to "ON".

3. Turn Mode Switch (39) to FSK position.

4. Select appropriate FSK operation by setting switches S110 and S111 at rear of MMX (Refer to figure 2-2 in Technical Manual for MMX).

5. Place Sense Switch, S109 (refer to figure 2-2) to desired sense (+) or (-).

6. Place Meter Switch (25) to the RF position. Adjust RF Output control for 100 milliwatts. (approximately "2" on Monitor Meter).

3-7. FACSIMILE (FAX) OPERATION.

1. Set ON/Standby Switch (37) to "ON".

2. Set Exciter Switch (36) to "ON".

3. Turn Mode Switch (39) to FAX.

4. Place Meter Switch (25) to RF position. Adjust RF Output Control for 100 milliwatts. (approximately "2" on Monitor Meter).

3-8. CW TELEGRAPH OPERATION.

1. Set ON/Standby Switch (37) to "ON".

2. Set Exciter/PTT Switch (36) to "ON".

3. Set Mode Switch (39) to CW position.

4. Connect key to key input (29) or connect to GPTA junction box (terminals 17, 18 of E8005).

5. Place Meter Switch (25) to RF position. Close key and adjust RF Output Control for 100 milliwatts (approximately "2" on Monitor Meter).

3-9. SINGLE SIDEBAND WITH ANY DEGREE OF CARRIER INSERTION INCLUDING AME FULL CARRIER.

1. Set ON/Standby Switch (37) to "ON".

2. Set Exciter Switch (36) to "ON" position where using either USB or LSB 600 ohm line (enternal signal source) inputs. Set Exciter Switch to PTT position when using Mike input (28).

NOTE

If automatic VOX control is desired place Power On/Off switch (68) on AX5047 to "ON" and Sideband selector switch to selected sideband being used. Place Exciter ON/PTT to PTT position. If VOX control is not desired place Power On/Off Switch (68) to "OFF".

3. Select desired sideband with Mode Switch (39).

4. Turn Meter Switch (25) to selected sideband.

5. Connect a Mike to the front panel Mike jack (28) if used.

6. Adjust the Mike/Line control of selected sideband used to appropriate level as indicated on Monitor Meter (24).

NOTE

DO NOT ENTER RED REGION. When mike input is used, adjust level so as not to exceed red region with highest input from microphone.

7. Turn Meter Switch (25) to Carr position. Adjust Carrier Control (35) to the desired level as incicated on Monitor Meter (24).

8. Turn Meter Switch (25) to RF position. Adjust RF Output Control (26) for RF output level of 100 milliwatts on Monitor Meter (approximately "2" on Monitor Meter).

TABLE 3-1. CONTROLS & INDICATORS

MODULAR UNIT	ITEM NO. FIG. 3-1.	DESIGNATION	FUNCTION
RAK	1	TECHNIMATIC LAMP	Indicates when main power ckt. brk. (44) is "ON".
	2	READY LAMP	Indicates that transmitter is tuned and ready for operation.
	3	HIGH VOLTAGE LAMP	Indicates when high voltage switch (47) is "ON".
SWCA	4	FREQUENCY POSITION SELECTOR SWITCH	Selects preposition settings of PA tune and load capacitors, also controls band changing.
	5	SWR OLVD LAMP	Lights when SWR has exceeded 2:1 or 3:1 ratio as determined by switch selection.
	6	KW/REFL. SWITCH	Normally indicates forward power, reads refl. power when depressed.
	7	FAULT LAMP	Lights to indicate transmitter failed to tune within 60 sec.
	8	POWER METER	Indicates forward and reflected power (KW).
	9	LO LIMIT CONTROL	Adjusts lo limit pointer for desired power output.
	10	HI LIMIT CONTROL	Adjusts hi limit pointer to drive output back to lo limit pointer when lo limit is exceeded.
	11	RF GAIN CONTROL	Adjusts drive level to TLAA.
TLAA	13	2ND AMP. BANDSWITCH	Selects 2-30 MHz range in 9 increments.
	14	INDICATOR	Veeder indicator for tune capacitor (16).
	15	2ND AMP. TUNING CONTROL	Adjusts resonance of 2ND amp.
	16	TUNE CAPACITOR	Adjusts resonance of PA tune capacitor.

TABLE 3-1. CONTROLS & INDICATORS (CONT.)

MODULAR UNIT	ITEM NO. FIG. 3-1.	DESIGNATION	FUNCTION
TLAA CONT.	17	MULTIMETER SWITCH	Selects circuit for multimeter (12).
	18	PA PLATE CURRENT METER	Indicates PA plate current.
	19	ALDC ADJ. CONTROL	Adjusts TLAA level of negative feedback to exciter.
	20	PA BANDSWITCH	Selects 2 to 30 MHZ in 9 increments.
	21	INDICATOR	Veeder indicator for load capacitor.
	22	LOAD CAPACITOR	Adjusts loading of the PA.
	23	RF TRIGGER	Adjusts amount of RF voltage fed back to tune servo to stop search of PA tune capacitor.
MMXA-2	24	MONITOR METER	Monitors circuit function selected by meter switch.
	25	METER SWITCH	Selects circuit in MMX to be monitored by monitor meter.
	26	RF OUTPUT CONTROL	Adjusts RF output level.
	27	LSB MIKE/LINE CONTROL	Adjusts level of LSB input.
	28	MIKE JACK	Accepts a 47K impedance microphone input.
	29	KEY JACK	Accepts dry contact keyer input used for CW mode of operation.
	30	10 MHZ SELECTOR	Used to establish desired output frequency.
	31	1 MHZ SELECTOR	Used to establish desired output frequency.
	32	100 KHZ SELECTOR	Used to establish desired output frequency.
	33	STANDBY INDICATOR	Illuminates when On/Standby switch is positioned to Standby.
	34	POWER INDICATOR	Illuminates when On/Standby switch is positioned to "ON".

TABLE 3-1. CONTROLS & INDICATORS (CONT.)

MODULAR UNIT	ITEM NO. FIG. 3-1.	DESIGNATION	FUNCTION
	35	CARRIER CONTROL	Establishes the amount of carrier used.
	36	EXCITER ON/PTT SWITCH	Set to "ON" position for all operating modes using inputs other than mike. Set to PTT when using mike input.
	37	ON/STANDBY SWITCH	When positioned to "ON", applies 12 and 24 VDC to modules and illuminates red power indicator.
	38	USB MIKE/LINE CONTROL	Adjusts level of USB input.
	39	MODE SWITCH	Establishes operating mode: AM, USB, LSB, ISB, CW, FSK, and FAX.
	40	100 HZ SELECTOR	Used to establish desired output frequency.
	41	1 KHZ SELECTOR	Used to establish desired output frequency.
	42	10 KHZ SELECTOR	Used to establish desired output frequency.
TCP	43	MAIN POWER CIRCUIT BREAKER	Controls application of power to all units of the transmitter excluding MMX.
	44	OVERLOAD RESET BUTTON	Resets overload relays.
	45	XMTR TUNING AUTO/MANUAL SWITCH	Selects automatic or manual operation of transmitter.
	46	INTERLOCK INDI-DICATOR LAMP	Indicates closed interlock when lit.
	47	HIGH VOLTAGE SWITCH	Controls application of AC power to High Voltage Power Supply, AP129.
	48	TUNE SWITCH	Initiates automatic tuning when depressed.
	49	SERVO ON/OFF SWITCH	When set at "ON", enables activation of automatic bandswitching and tuning circuits.
	50	INTERLOCK SWITCH	Used to locate open interlock as indicated by indicator lamp.

TABLE 3-1. CONTROLS & INDICATORS (CONT.)

MODULAR UNIT	ITEM NO. FIG. 3-1.	DESIGNATION	FUNCTION
TCP CONT.	51	AC ON LAMP	Lights with ac power applied with servo On/Off switch in "ON" position.
	52	SEARCH LAMP	Lights when 2ND amplifier is tuning.
	53	OPERATE LAMP	Lights when 2ND amplifier completes tuning.
	54	AC ON LAMP	Same as item (51).
	55	SEARCH LAMP	Lights when PA stage is tuning.
	56	OPERATE LAMP	Lights when PA stage has completed tuning.
	57	AC ON LAMP	Same as item (51).
	58	SEARCH LAMP	Lights when PA stage is being loaded.
	59	OPERATE LAMP	Lights when PA stage has completed loading.
AX633	60	RFPO	RF power "ON". Adjusted to set PA tune into search when 300 MA of PA plate current is attained.
	61	ALARM DEVICE	Alarm sounds if primary power to high voltage power supply is interrupted.
	62	ALARM ON/OFF SWITCH	Activates alarm circuit when set to "ON" position.
	63	SENSE SWITCH	Provides for the selection of circuits (as marked) for test purposes.
	64	SENSE JACK	Provides monitoring outlet for the sense positions of sense switch (63).
	65	EXCITER MONITOR JACK	Provides exciter monitoring outlet.
	66	PA MONITOR JACK	Provides PA monitoring outlet.
	67	AUDIO IN JACK	Provides for audio test signal to be applied during maintenance procedures.

TABLE 3-1. CONTROLS & INDICATORS (CONT.)

MODULAR UNIT	ITEM NO. FIG. 3-1.	DESIGNATION	FUNCTION
AX5047	68	POWER ON-OFF SWITCH	Applies AC power to AX5047.
	69	VOX MODE USB-LSB	Selects VOX control to USB or LSB.
A128A	70	PA PLATE OVLD ADJ.	Sets plate overload relay.
	71	SSB/CW SWITCH	Determines bias voltage to PA tube.
	72	FILAMENT TIME	Register filament operation time
	73	LOW VOLTAGE CIRCUIT BREAKER	Applies plate and screen voltages to 1ST and 2ND AMP. stages - must be closed to apply high voltage.
	74	PA BIAS OVLD LAMP	Indicates absence of bias voltage when lit.
	75	PA BIAS ADJUST	Adjusts bias level to PA tube.
	76	2ND AMP BIAS ADJ.	Adjusts bias level to 2ND AMP tube.
	77	1ST AMP BIAS ADJ.	Adjusts bias level to 1ST AMP tube.
	78	PLATE TIME METER	Registers PA plate operation time.
	79	SCREEN OVLD LAMP	Indicates when screen ovld relay has energized.
	80	PA PLATE OVLD	Indicates when PA plate ovld relay has energized as determined by setting of PA plate ovld adjust.

TABLE 3-2. SAMPLE TUNING CHART

	CONTROL SETTINGS			INDICATOR READINGS		
FREQ. OUT mc	PA BAND	PA TUNE	PA LOAD	PA IP ma	P out KW PEP	DIST. dB
2.0	2-2.5	142	168	700	2.5	43
2.5	2-2.5	109	072	780	2.5	42
2.5	2.5-3.0	118	138	750	2.5	41
3.0	2.5-3.0	101	077	840	2.5	43
3.0	3.0-5.0	110	137	720	2.5	39
5.0	3.0-5.0	084	046	780	2.5	40
5.0	5.0-7.0	091	075	750	2.5	45
7.0	5.0-7.0	077	043	750	2.5	37
7.0	7.0-11.0	091	074	750	2.5	37
11.0	7.0-11.0	074	038	660	2.5	37
11.0	11.0-15.0	084	065	720	2.5	36
15.0	11.0-15.0	075	039	750	2.5	35
15.0	15.0-19.0	078	061	750	2.5	35
19.0	15.0-19.0	069	045	630	2.5	45
19.0	19.0-24.0	075	050	660	2.5	43
24.0	19.0-24.0	039	043	660	2.5	46
24.0	24.0-30.0	075	056	660	2.5	43
30.0	24.0-30.0	061	039	720	2.5	41

TABLE 3-3 LOAD PRE-POSITION ADJUSTMENTS

POTENTIOMETERS	PRE-POSITION BANDS	COUNTER READING
	2 - 1.5	180
1	2.5 - 3	180
	3 - 4	180
	4 - 5	100
2	5 - 6	115
	6 - 7	80
	19 - 22	80
3	22 - 24	80
	24 - 26	80
	7 - 9	96
4	11 - 13	96
	15 - 17	96
	9 - 11	65
	17 - 19	65
5	28 - 29	65
	29 - 30	65
	13 - 15	70
6	26 - 28	70
7	22 - 24	55

TABLE 3-4

ALDC & LOAD SENSE ADJUSTMENTS

POT	FREQ. RANGE	SWCA STEPPING SWITCH POSITIONS
1	2-5 MHZ	1 THRU 4
2	5-19 MHZ	1 THRU 12
3	19-30 MHZ	13 THRU 18

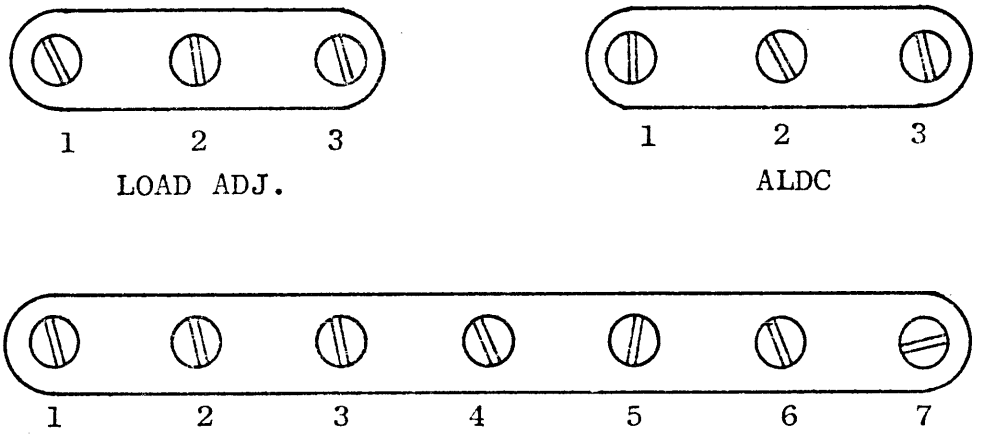


FIGURE 3-2

LOCATION OF ADJUSTMENT POTENTIOMETERS, SWC( )3K.

SECTION IV

PRINCIPLES OF OPERATION

4-1. GENERAL.

The GPTA transmitter system comprises two major sections; the exciter section and the linear amplifier section.

The exciter section accepts up to two separate inputs of audio intelligence. The selected intelligence output from the exciter is applied to the linear amplifier section within the frequency range of 2 to 29.9999 MHZ.

The linear amplifier amplifies this signal up to a 2500 watts (PEP) level. This power amplified output is then routed through a directional coupler and a TR switch before application to the antenna.

4-2. OVERALL FUNCTIONAL ANALYSIS (REFER TO FIGURE 4-1 and 4-2).

a. Exciter Section.

The intelligence is sent to VOX Control Assembly, AX5047 and the MMX(A)2 audio inputs simultaneously.

The application of a signal as low as -20 DBM to the AX5047 will energize K1 in the assembly automatically closing the PTT circuit in the transmitter. The AX5047 provides automatic voice keying for either the USB or LSB.

b. Linear Amplifier Section.

The stabilized rf output in the range of 2 to 29.9999 MHZ from the exciter containing the input intelligence is then routed through the RF Gain Control in the RF and Control Indicator, SWC( )3K before application to the linear power amplifier. The linear power amplifier section is used to accept the Exciter's output, amplify it (up to 2.5 KW), and apply it to the associated antenna for transmission. Low level input signals applied to the linear power amplifier (TLAA) are routed through a broad band amplifier, a tuned second amplifier a tuned final amplifier to the r-f output jack at the rear of the TLAA. The

second and final amplifier bandswitches are automatically pre-positioned to the correct bands by the frequency selection in the MMX(A)2 which controls the master control switch in the SWC( )3K. Front panel meters provide the required indications for tuning and loading the amplifier stages. Operating power for the linear amplifier is furnished by Low Voltage Power Supply, AP128A and High Voltage Power Supply, AP129. The linear amplifier output is coupled to the antenna via Harmonic Filter/Directional Coupler, AF107 and TR switch, AX5052.

When the Manual/Auto switch on the TCP Control Panel is set to AUTO, contacts of a relay in the AP-128A supply voltage required to activate the stepping switches attached to the TLAA second and final PA bandswitches.

The SWC( )3K master control switch routes the pre-position reference signal to the linear amplifier TLAA bandswitch control circuitry. The Low Voltage Power Supply, AP128A provides filament voltage and bias for all amplifier stages in the transmitter plate and screen voltage for the first two amplifier stages, screen voltage for the PA stage and 24 VDC for the interlock circuits.

Overload relays located in the TCP open the interlock circuit cutting off voltage to the PA stage when preset overload levels are exceeded.

The High Voltage Power Supply, AP129 supplies the 5000 VDC for the operation of the final power amplifier. The AP129 receives its operating power from a high voltage contactor that is energized by phase-two voltage supplied by the interlock relay and phase-three voltage that is supplied by the HV Switch on the TCP.

4-3. TECHNIMATIC CIRCUIT ANALYSIS.

Refer to PALA 2.5K Technical Manual for detailed technimatic circuit analysis.

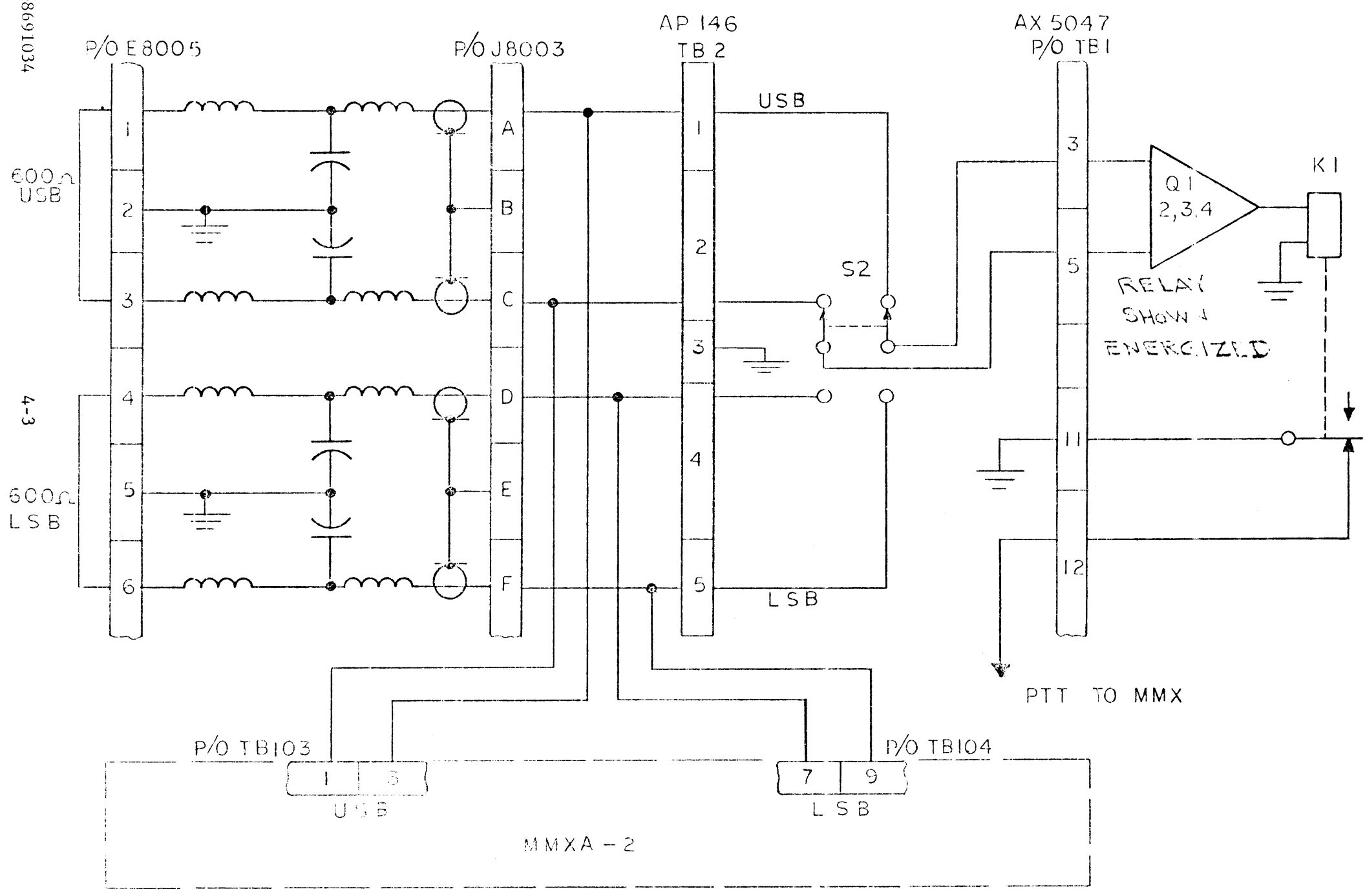


FIGURE 4-1 AUDIO SIGNAL FLOW, CRTA 2-5JF

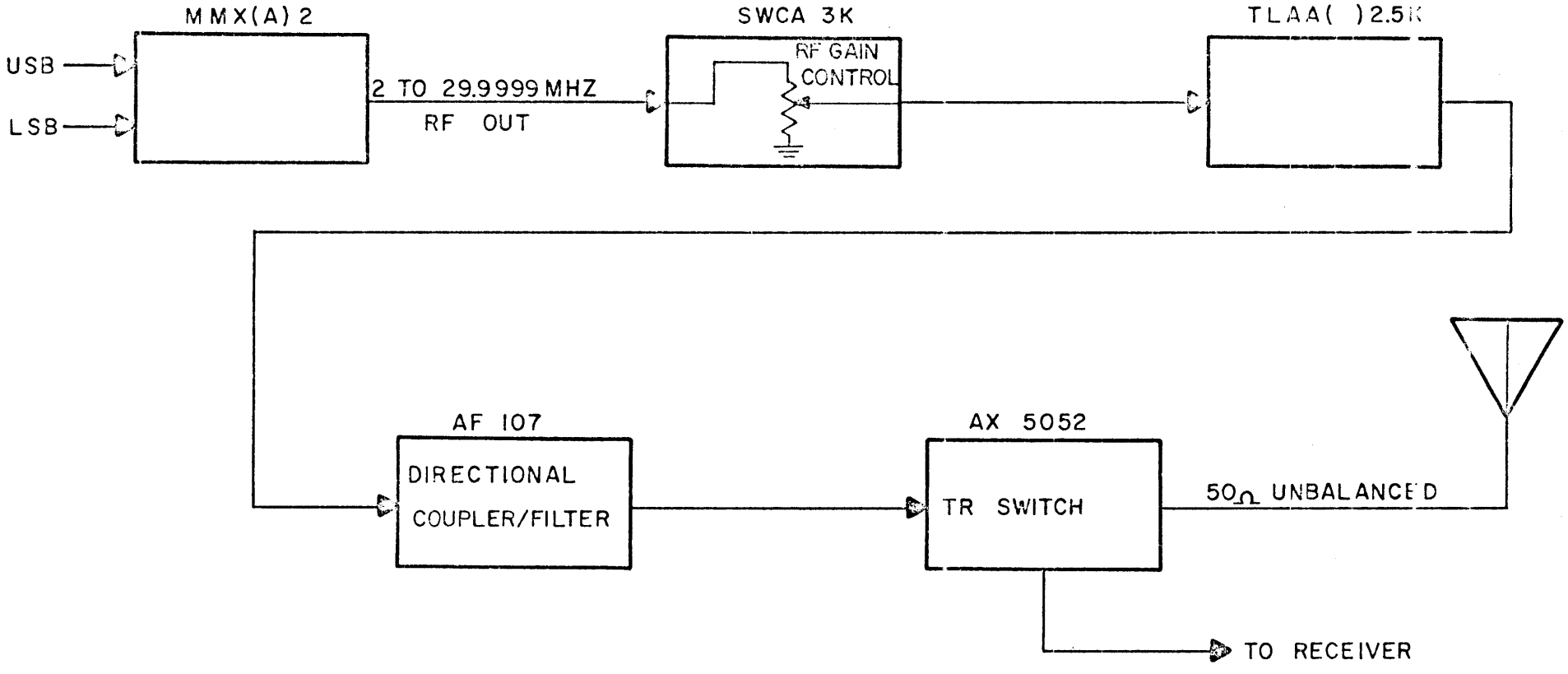


FIGURE 4-2. FUNCTIONAL BLOCK DIAGRAM, GPTA 2.5JE

SECTION 5

MAINTENANCE

5-1. 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 removed from its mounting for 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 methylchloroform may be used, providing the necessary precautions are observed.

WARNING

When using toxic solvents, make certain that adequate ventilation exists. Avoid prolonged or repeated contact with skin. Flammable solvents shall not be used on energized 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.

NOTE

Once a fault has been isolated, refer to manual covering the specific module for detailed maintenance prodedures.

5-2. CHECK OUT PROCEDURE FOR VOICE CONTROL UNIT, AX5047.

1. Ground pin 9 of TB1, relay K1 should energize, Remove ground.
2. Connect signal generator to terminals 3 and 5 of TB1 with terminal 5 grounded to chassis.
3. Adjust gain controls on Voice Control unit and audio generator fully counter-clockwise.
4. Turn signal generator "ON" and adjust for .025 volts at 100 cps.
5. Adjust the VOX Gain Control until relay, K1 energizes.
6. Set the VOX Release fully counter-clockwise.
7. Turn off signal generator and note that relay, K1 immediately de-energizes.
8. Turn on signal generator and restore level to .025 volts, relay, K1 should energize.
9. Turn VOX Release fully clockwise.
10. Turn signal generator "OFF" and note that K1 holds for approximately one second before de-energizing.
11. Adjust squelch control fully clockwise.
12. Insert a signal of .775 volts at terminal 6 and 7 at 1000 cps. from a second signal generator.
13. Set level of first signal generator to .25 Volts at 1000 cps.
14. Turn Squelch Level counter-clockwise until relay, K1 energizes.
15. Turn down level of first signal generator until relay, K1 de-energizes, and then turn Squelch Level slightly clockwise.
16. Restore level of first signal generator to .025 volts.
17. Relay should not energize.
18. Remove "Squelch Input" (second signal generator).
19. Relay should energize.

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

PARTS LIST

for

RACK, ELECTRICAL EQUIPMENT, RAK-100-2JE

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
T8000	TRANSFORMER	TF-342
S8008	SWITCH, THERMOSTATIC	SS-104-2
B8000	BLOWER	BL-117
C8000	CAPACITOR	CP41B1EF405K
S8001 thru S8006	SWITCH	SW-230
XDS8001,8002	LAMP HOLDER	TS-186
DS8001,8002	LAMP	B1-105-1
R8000	RESISTOR	RC42GF680J
XDS8000,8003	LAMP HOLDER	TS-184
S8000	SWITCH	SW-260

PARTS LIST

for

AX-5047

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
AP-146	POWER SUPPLY FOR AX-5047	AP-146
KIT-155	VOICE CONTROL UNIT	KIT-155

PARTS LIST

AP-146 (P/O AX-5047)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
S2	SWITCH ROTARY	SW-121
C1,C2	CAPACITOR, DISC .01MMF	CC100-16
XF1	FUSE HOLDER	FH 104-3
F1	FUSE, FAST BLOW .062A	FU-100-.062
CR1	BRIDGE RECTIFIER	DD-144-2
C3	CAPACITOR, ELECTROLYTIC	CE105-500-50
S1	SWITCH TOGGLE	ST22K
T1	TRANSFORMER, POWER	TF282
TB2	TERMINAL STRIP	TM100-5

PARTS LIST

KIT 155 (P/O AX5047)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A-3078-4	PC BD, FINAL ASSY.	A-3078-4
C7	CAPACITOR, FXD. ELECT.	CE105-100-15
C1, C2	CAPACITOR, FXD. ELECT.	CE105-125-15
C5, C6, C8, C9	CAPACITOR, FXD. ELECT.	CE105-3-15
C3, C4	CAPACITOR, FXD. ELECT.	CE105-30-15
R2, R7, R13, R11	RESISTOR, FXD. COMP.	RC20GF103J
R3, R8, R14	RESISTOR, FXD. COMP.	RC20GF223J
R6	RESISTOR, FXD. COMP.	RC20GF273J
R4	RESISTOR, FXD. COMP.	RC20GF472J
R10	RESISTOR, RXD. COMP.	RC20GF473J
K1	RELAY, ARM.-DPDT.	RL151
R5, R12	RESISTOR, VAR, COMP.	RV106UX8B102A
R9	RESISTOR, FXD. COMP.	RV106UX8B503A
R1	RESISTOR, FXD. W.W.	RW109-32
T1	TRANSFORMER, A.F.	TF0246-13Z
Q1, Q3, Q4	TRANSISTOR	TX108
CR5, CR6	DIODE	1N1524
CR1,2,3,4	DIODE	1N34A
Q2	TRANSISTOR	2N213A