MIDLAND LMR
LAND MOBILE RADIO

SYNTECH™-II
SERVICE MANUAL

PART THREE (TX/RX UNIT)

70-0520A/B/C VHF LOW-BAND 110 WATT

70-052000
09-0520SM-2/90-2M

SYN-TECH II service information is published in three parts.

Part One contains general servicing and installation information that is common to the entire SYN-TECH II line.

Part Two contains technical data and drawings for the SYN-TECH II Control Heads. Two versions of this part exist: one for the the Deluxe Control head, and one for the Standard and Small-Remote Control Heads.

Part Three contains technical data and drawings for SYN-TECH II TX/RX Units.

This service manual is Part Three, and contains specific technical data and drawings for the 70-0520A/B/C SYN-TECH II TX/RX Units.

As necessary, user's manual supplements will be published and distributed on the following forms:

Manual Addition (MA) ..... For supplemental information useful in product service or improvement. Printed on BLUE paper.

Change Notice (CN) ..... For details about changes made during software upgrades by model and serial number. Printed on YELLOW paper.

Manual Correction (MC) ..... For correcting literature errors not related to software upgrades. Printed on GREEN paper.

Technical Bulletin (TB) ..... For solutions to field problems and tips for performance improvement. Printed on PINK paper.

Comments or suggestions concerning areas of manual improvement are welcome.

IMPORTANT NOTE

The 70-0520 is identical to the 70-0500, except for the Power Amplifier. For this reason, only information relating to the Power Amplifier has been covered in this manual. All other information can be found in the 70-0500A/B/C service manual (manual number 70-050000).

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SECTION 1

GENERAL INFORMATION

NOTES

DESCRIPTION

The 70-0520 TX/RX Units are RF packages for the SYN-TECH II VHF Low Band FM Mobile transceivers. The 70-0520A (A-Band) operates any channel frequency from 30 to 36 MHz; the 70-0520B (B-Band) operates any channel frequency from 36 to 42 MHz; the 70-0520C (C-Band) operates any channel frequency from 42 to 50 MHz.

The SYN-TECH II is comprised of two parts: A TX/RX Unit, which is the major portion of the radio; and a detachable Control Head. SYN-TECH II radios are compact and can be mounted under a vehicle dashboard, or, if available space is limited, the bulk of the radio may be mounted under a seat or in the trunk. The under-dash configuration is shipped with the Control Panel attached to it. The trunk-mount configuration has a cable-interface board and handle assembly mounted in place of the Control Head, and a cable-interface board and a rear cover are added to the Control head. The two units must be connected together with a multi-conductor cable when installed. The chassis of the SYN-TECH II TX/RX Unit is constructed of cast aluminum with sectional cavities that house three major printed circuit boards. The RF Board contains the transmitter, receiver, and synthesizer circuitry and is located on the underside of the radio. The Logic Board contains the microcomputer and interface circuitry and is mounted on the top side of the radio. Another unused cavity is located on the radio topside to accommodate option circuit boards. The third PC board, the PA board, is located inside the rear heat sink. You may access the PA board by removing the heat sink top cover.

APPLICABLE SYN-TECH II MODELS

Model number 70-0520 identifies a TX/RX Unit. This is a SYN-TECH II subassembly – not the entire transceiver.

MIDLAND models 70-052x and 70-056x are complete SYN-TECH II transceivers consisting of two major components: the 70-0520 TX/RX Unit and a Control Head (MIDLAND model number 70-0001, 70-0002, or 70-0007). Two of the Control Heads can be mounted directly onto the TX/RX Unit front, which completes the under-dash configuration that is identified by the 70-052x model numbers. The trunk-mount configuration separates the two components with a Control Cable, and is identified with 70-056x model numbers.

Model numbers of SYN-TECH II packages that contain the 70-0520 TX/RX Unit are defined in Table 1-1.

TABLE 1-1 – SYN-TECH II MODELS COMPRISED OF 70-0520 TX/RX UNITS

MODEL NUMBER	MOUNTING	RF OUTPUT POWER	CONTROL HEAD	FREQUENCY BAND (MHz)	TX/RX UNIT
70-0521A	UD	110 WATTS	STANDARD	30–36	70-0520A
70-0521B	UD	110 WATTS	STANDARD	36–42	70-0520B
70-0521C	UD	110 WATTS	STANDARD	42–50	70-0520C
70-0522A	UD	110 WATTS	DELUXE	30–36	70-0520A
70-0522B	UD	110 WATTS	DELUXE	36–42	70-0520B
70-0522C	UD	110 WATTS	DELUXE	42–50	70-0520C
70-0561A	TM	110 WATTS	STANDARD	30–36	70-0520A
70-0561B	TM	110 WATTS	STANDARD	36–42	70-0520B
70-0561C	TM	110 WATTS	STANDARD	42–50	70-0520C
70-0562A	TM	110 WATTS	DELUXE	30–36	70-0520A
70-0562B	TM	110 WATTS	DELUXE	36–42	70-0520B
70-0562C	TM	110 WATTS	DELUXE	42–50	70-0520C
70-0567A	TM	110 WATTS	SMALL	30–36	70-0520A
70-0567B	TM	110 WATTS	SMALL	36–42	70-0520B
70-0567C	TM	110 WATTS	SMALL	42–50	70-0520C

UD = Under-Dash TM = Trunk-Mount

SPECIFICATIONS

Refer to DOC RSS-119 Issue 3, EIA-152C and EIA/TIA-204D for standard of performance and method of measurement.

GENERAL

OPERATING VOLTAGE:
Nominal: 13.4 V DC, negative ground
Range: 10.9 to 16.3 V DC

TEMPERATURE RANGE: –30° C to +60° C

ANTENNA IMPEDANCE: 50 Ω, unbalanced

FREQUENCY CONTROL: Phase-Lock-Loop synthesized

FREQUENCIES OF OPERATION:
A-Band Models: 30 to 36 MHz
B-Band Models: 36 to 42 MHz
C-Band Models: 42 to 50 MHz

CHANNEL CAPACITY: Up to 320 transmit and 320 receive

CHANNEL SPREAD (Both TX and RX):
A-Band: 6 MHz
B-Band: 6 MHz
C-Band: 8 MHz

FREQUENCY TOLERANCE AND STABILITY: ±5.0 ppm both TX and RX; ±2.0 ppm optional

DUTY CYCLE: Intermittent; 1 min TX, 4 min RX (per EIA-152C)

HIGH HUMIDITY: 95% at 50° C per EIA-152C , sec 13

VIBRATION STABILITY: Per EIA-152C and applicable portions of MIL810C/D

SHOCK STABILITY: Per EIA-152C and applicable portions of MIL810C/D

CURRENT DRAIN (at 13.6 VDC):

Standby:	Varies with option; 0.3 A typical
Receive (at full rated audio):	2.0 A
Transmit (full power):	10.0 A, 55 W; 25.0 A, 110 W

DIMENSIONS (H x W x D):

Basic TX/RX Units:	57 x 185 x 305 mm (2.25 x 7.28 x 12.20 in)
Trunk-Mount Control Units only:	57 x 185 x 75 mm (2.25 x 7.28 x 2.95 in)
Small Remote Control Head:	57 x 120 x 75 mm (2.25 x 4.72 x 2.95 in)
Remote Speaker:	121 x 121 x 72 mm (4.75 x 4.75 x 2.87 in)

Under-dash configuration adds 40 mm (1.57) depth; trunk-mount front cap adds 60 mm (2.36 in) depth.

WEIGHT:

Basic TX/RX Units:	2.87 kg (6.33 lb)
Trunk-Mount Control Units only:	0.36 kg (0.80 lb)
Small Remote Control Head:	0.23 kg (0.50 lb)
Remote Speaker:	0.63 kg (1.38 lb)

Under-dash configuration adds 0.23 kg (0.50 lb); trunk-mount front cap adds 0.28 kg (0.62 lb).

TRANSMITTER

CARRIER POWER OUTPUT: 55 – 110 W

MODULATION SYSTEM (Direct FM): 16K0F3E, 5 kHz maximum

AUDIO FREQUENCY RESPONSE: per EIA and DOC specifications

AUDIO DISTORTION (AT 60% deviation): 3% or less at 1000 Hz

HUM AND NOISE: –50 dB

SPURIOUS AND HARMONICS: –80 dB

OUPUT PROTECTION: Shall withstand without damage 5 minutes of operation into a 20:1 load mismatch with any standing wave variance.

OUTPUT STABLITIY: Shall not exceed spurious emission limits herein while operating into a 5:1 load mismatch with full standing-wave variance.

RECEIVER

SENSITIVITY (at 12 dB SINAD):	0.35 μV
SQUELCH SENSITIVITY:	0.18 μV maximum
SELECTIVITY:	−90 dB at ±30 kHz
ACCEPTABLE RF DISPLACEMENT:	±2.0 kHz minimum
SPURIOUS REJECTION:	−90 dB
INTERMODULATION:	−75 dB
AUDIO POWER OUTPUT (max):	12 W at 3% distortion or less
AUDIO FREQUENCY RESPONSE:	Per EIA and DOC specifications
INTERMEDIATE FREQUENCIES:	10.7 MHz (1st) and 455 kHz (2nd)
INPUT IMPEDANCE:	50 Ω

— All specifications subject to change without notice. —

SECTION 2

PREPARATION

NOTES

The 70-0520 VHF Low-Band SYN-TECH II TX/RX Units are capable of operating across a channel frequency spread of 6 MHz (A-Band or B-Band), or 8 MHz (C-Band). They do not require optimizing alignment, even when reprogrammed with new customer frequencies. Only general transmitter performance should be checked. Complete realignment may be needed after a component that affects transceiver tuning has been replaced. Realignment requires transceiver operation on special frequencies; either the transceiver must be reprogrammed specifically for alignment, or the Remote-Control mode of the 70-1080A Programmer must be used. Alignment instructions for the RF and Logic Boards can be found in the 70-0500 manual; the 110 W PA is discussed below.

PRE-INSTALLATION CHECK

- **Setup**

1. Remove the four securing screws and the bottom cover.
2. If not already in place, connect the proper Control Head to the TX/RX Unit.
3. Connect a resistive, 50 Ω RF load (with a wattmeter) to Antenna Connector J502.
4. Connect 13.4 V DC power to J506. Connect [+] to pin 2 and [−] to pin 1.
5. Turn the radio on, turn Scan and Priority Sampling off, turn MON on, turn selective signaling options off.

- **RF Output Power**

6. Initiate transmit on any channel. Measure power of RF output at 50 Ω Antenna Connector J502 and, if needed, adjust RV501 to obtain 110 W.

110-WATT PA MODULE REALIGNMENT

The following procedure detail entire transceiver realignment, and is needed only if a component that affects alignment has been replaced. RADIO RE-PROGRAMMING (see Programming in Part One) WITH TEST FREQUENCIES IS NEEDED.

SETUP

1. Remove the top and bottom covers. Loosen the two securing screws on the PA module cover.
2. If not already in place, connect the proper Control Head to the TX/RX Unit.
3. Connect a resistive, 50 Ω RF load and a wattmeter to Antenna Connector J502.
4. Connect 13.4 V DC power to transceiver J506. Connect [+] to pin 2 and [−] to pin 1.
5. Connect a 4 Ω, 20 W resistor to pins 4 and 6 of the Accessory Plug. The jumper between pins 5 and 6 must be temporarily disconnect to make this connection. The resistor serves as a constant load to replace the speaker's inconsistencies.

   CAUTION: Both speaker terminals are LIVE! Never ground either one. Connect grounded receiver audio measuring equipment to only one side of the speaker, and chassis ground. Normally, voltage measurements will be half of true values.

6. Turn the radio on, set the Volume control to mid-position, and set the Squelch control fully counter-clockwise.

7. Connect the 70-1080A Programmer to Programming Port J909. Upload the radio programming Data-Packet into the Programmer and initiate its Remote Control Mode. Refer to the 70-1080A Operator's Manual for instructions.

8. Set the TX test Frequency to 36.00 MHz for A-Band, 42.00 MHz for B-Band, or 50.00 MHz for C-Band.

9. Set PWR RV501 to maximum (full clockwise).

10. Activate transmit mode, then adjust RV501 to obtain 110 W power at J502.

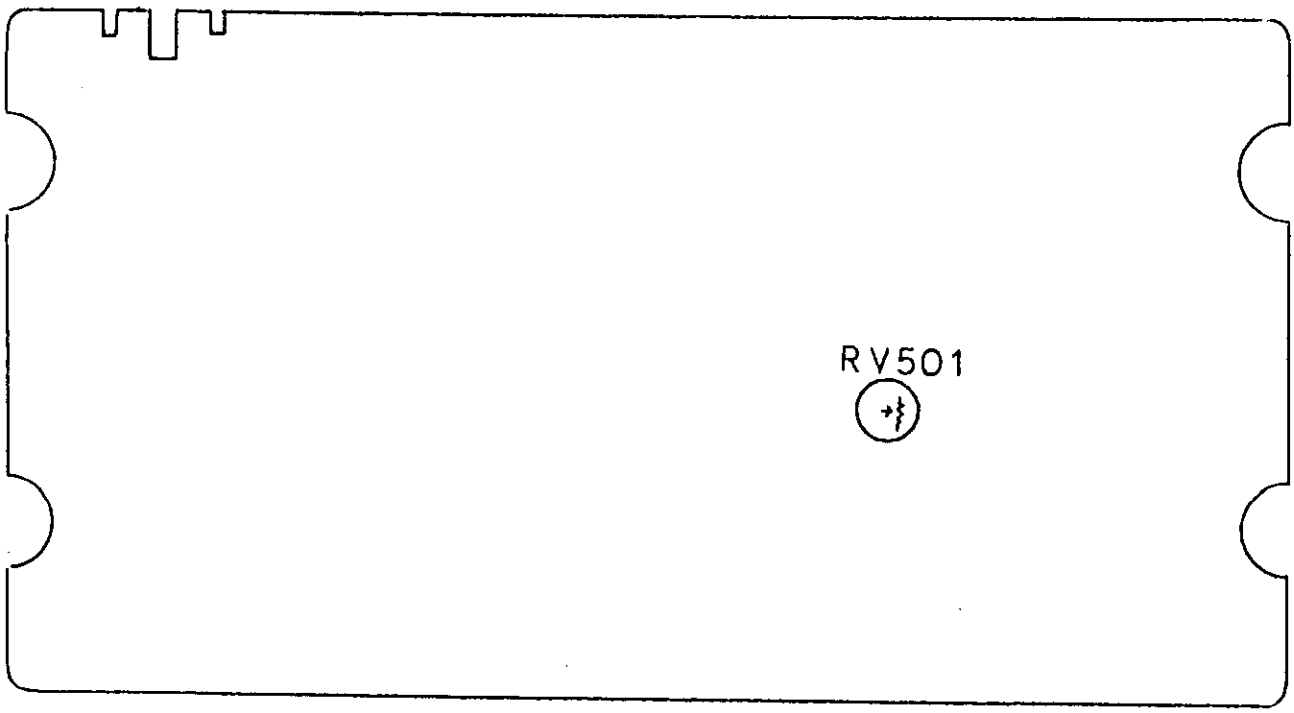


Figure 2 - 1 Adjustment Locations – 110 Watt PA Module

SECTION 3

CIRCUIT DESCRIPTIONS

NOTES

The 70-0520 SYN-TECH II radio unit is comprised of three major PC boards: The RF Board, which contains a frequency synthesizer, transmit modulator, receiver, and receive audio amplifier circuits; the Logic Board, which contains a microcomputer and its peripheral interface circuits; and the 110 W PA module, which contains the transmitter RF power amplifier. Circuit descriptions for the RF and Logic Boards can be found in the 70-0500 manual; the 110 W PA is discussed below.

110-WATT PA MODULE

The 110-Watt Power Amplifier is the rear portion of the TX/RX Unit. It contains RF circuitry that is accessible by removing its cover.

- **Rf Power Amplifier**

The TX RF preamplifier output is connected to 50 Ω coaxial cable at J501. A PC-Board stripline is used to couple class-B/C biased Q501 to class-C biased pre-driver Q502. Another PC stripline matches Q502-collector to driver class-C biased Q503. Transformer T1 split driver output feeds twin finals Q504 and Q505. Final-stage outputs are combined by Transformer T2. In transmit mode, K501 connects this RF signal to the harmonic filter consisting of L512-L514 that purifies the signal before emssion by the antenna connected to J502. R520 and R521 drain static and other DC potential from the antenna.

- **Antenna Relay**

Relay K501 is used to switch the high RF power output of Q504 and Q505 to the antenna in transmit mode. In receive mode, the normally-closed contacts of K501 connect the antenna to the receiver input through J503. K501 is energized when Q509 is biased on by the TX 8V line from the RF Board. D505 absorbs magnetically induced back-voltage while the relay is de-energized.

- **Automatic Power Control**

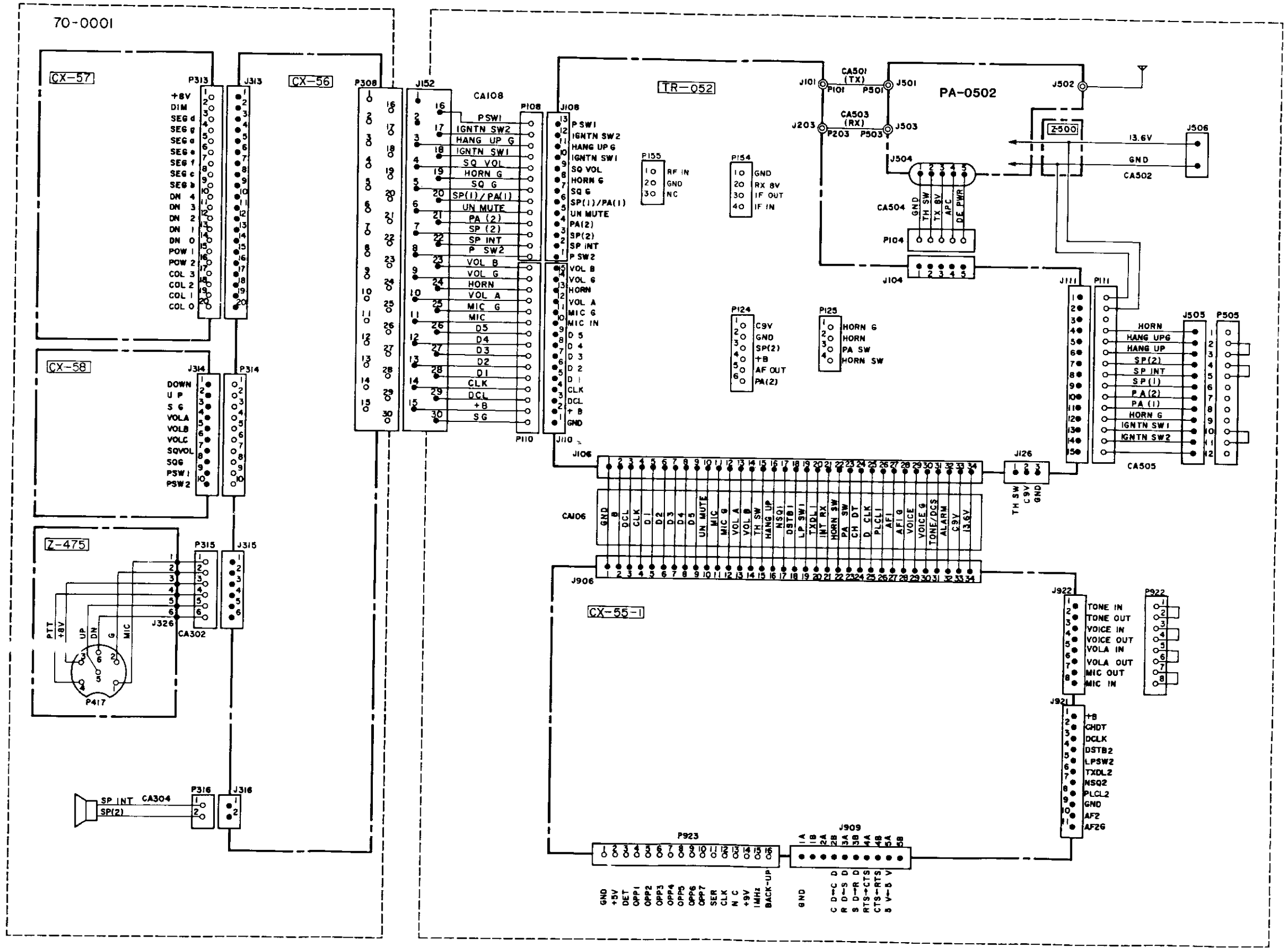
Transformer T3, ahead of the harmonic filter, serves as a directional coupler. D502 rectifies a small RF sample that is developed across the transformer, producing a DC voltage that increases with RF power travelling forward into the antenna. This power-level sensing voltage is the inverting input of a differential amplifier comprised of Q507 and Q508. The non-inverting input is a DC voltage produced by PWR adjustment RV501. Differential amplifier output drives current source Q506, which feeds primary DC to the collector circuit of first pre-driver Q501. The feedback loop from transformer T3 to Q506 holds RF output power at the constant level determined by RV501.

NOTES

SECTION 4

DIAGRAMS

NOTES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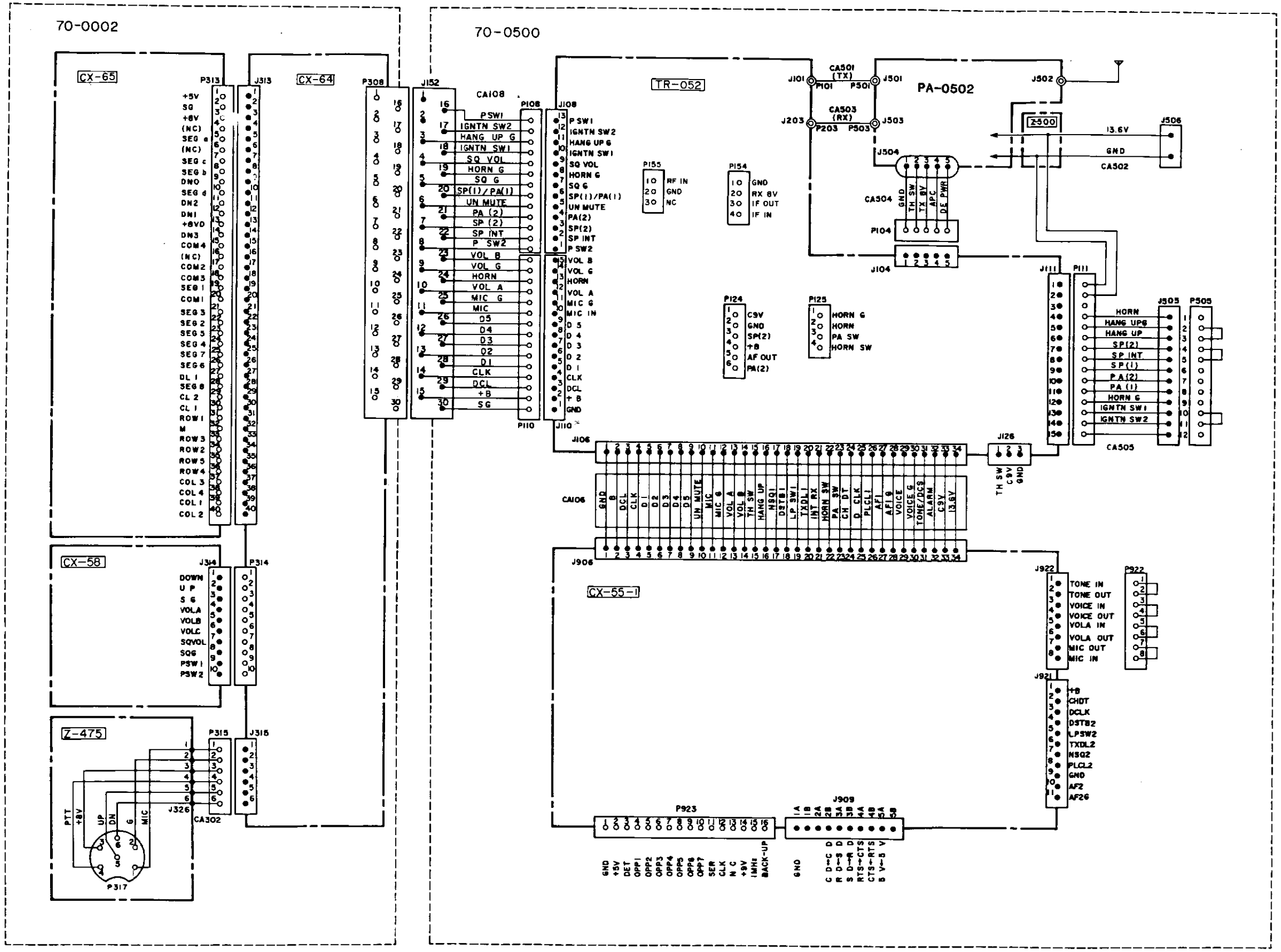
P313
J313
+8V
DIM
SEG d
SEG g
SEG a
SEG e
SEG f
SEG c
SEG b
DN 4
DN 3
DN 2
DN 1
DN 0
POW 1
POW 2
COL 3
COL 2
COL 1
COL 0
CX-56
P308
J152
CA108
P108
PSWI
IGNTN SW2
HANG UP G
IGNTN SW1
SQ VOL
HORN G
SQ G
SP(1)/PA(1)
UN MUTE
PA (2)
SP (2)
SP INT
P SW2
VOL B
VOL G
HORN
VOL A
MIC G
MIC
D5
D4
D3
D2
D1
CLK
DCL
+B
SG
P110
CX-58
P314
J314
DOWN
UP
S G
VOLA
VOLB
VOLC
SQVOL
SQG
PSW1
PSW2
Z-475
P315
J315
PTT
+8V
UP
DN
G
MIC
J326
CA302
P417
SP INT
SP(2)
CA304
P316
J316
TR-052
J108
P SW1
IGNTN SW2
HANG UP G
IGNTN SW1
SQ VOL
HORN G
SQ G
SP(1)/PA(1)
UN MUTE
PA(2)
SP(2)
SP INT
P SW2
VOL B
VOL G
HORN
VOL A
MIC G
MIC IN
D 5
D 4
D 3
D 2
D 1
CLK
DCL
+ B
GND
J110
J106
P155
RF IN
GND
NC
P154
GND
RX 8V
IF OUT
IF IN
P124
C9V
GND
SP(2)
+B
AF OUT
PA(2)
P125
HORN G
HORN
PA SW
HORN SW
J101
CA501 (TX)
P101
P501
J501
J203
CA503 (RX)
P203
P503
J503
PA-0502
J502
Z-500
13.6V
GND
J506
CA502
J504
GND
TH SW
TX 8V
APC
DE PWR
CA504
P104
J104
J111
P111
HORN
HANG UPG
HANG UP
SP(2)
SP INT
SP(1)
PA(2)
PA (1)
HORN G
IGNTN SW1
IGNTN SW2
J505
P505
CA505
J126
TH SW
C9V
GND
CA106
GND
B
DCL
CLK
D1
D2
D3
D4
D5
UN MUTE
MIC G
VOL A
VOL B
TH SW
HANG UP
NSQ1
DSTB1
LP SW1
TXDL1
INT RX
HORN SW
PA SW
CH DT
D CLK
PLCL1
AF1
AF1 G
VOICE
VOICE G
TONE/DCS
ALARM
C9V
13.6V
J906
CX-55-1
J922
TONE IN
TONE OUT
VOICE IN
VOICE OUT
VOLA IN
VOLA OUT
MIC OUT
MIC IN
P922
J921
+B
GHDT
DCLK
DSTB2
LPSW2
TXDL2
NSQ2
PLCL2
GND
AF2
AF2G
P923
GND
+5V
DET
OPP1
OPP2
OPP3
OPP4
OPP5
OPP6
OPP7
SER
CLK
N C
+9V
1MHz
BACK-UP
J909
GND
C D-C D
R D-S D
S D-R D
RTS-CTS
CTS-RTS
8 V-8 V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J313
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J152
CA108
P108
J108
P110
J110
P155
P154
J101
CA501 (TX)
P101
P501
J501
J203
CA503 (RX)
P203
P503
J503
J502
2500
13.6V
GND
CA502
J506
J504
CA504
P104
J104
J111
P111
J505
P505
HORN
HANG UP6
HANG UP
SP(2)
SP INT
SP(1)
PA(2)
PA(1)
HORN G
IGNTN SW1
IGNTN SW2
CA505
P124
P125
J106
J126
CA106
J906
J922
P922
J921
P923
J909
P314
J314
P315
J315
J326
CA302
P317
PSW1
IGNTN SW2
HANG UP G
IGNTN SW1
SQ VOL
HORN G
SQ G
SP(1)/PA(1)
UN MUTE
PA (2)
SP (2)
SP INT
P SW2
VOL B
VOL G
HORN
VOL A
MIC G
MIC
D5
D4
D3
D2
D1
CLK
DCL
+B
SG
RF IN
GND
NC
GND
RX 8V
IF OUT
IF IN
C3V
GND
SP(2)
+8
AF OUT
PA(2)
HORN G
HORN
PA SW
HORN SW
TONE IN
TONE OUT
VOICE IN
VOICE OUT
VOLA IN
VOLA OUT
MIC OUT
MIC IN
+B
CHDT
DCLK
DSTB2
LPSW2
TXDL2
NSQ2
PLCL2
GND
AF2
AF26
DOWN
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VOLB
VOLC
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SQG
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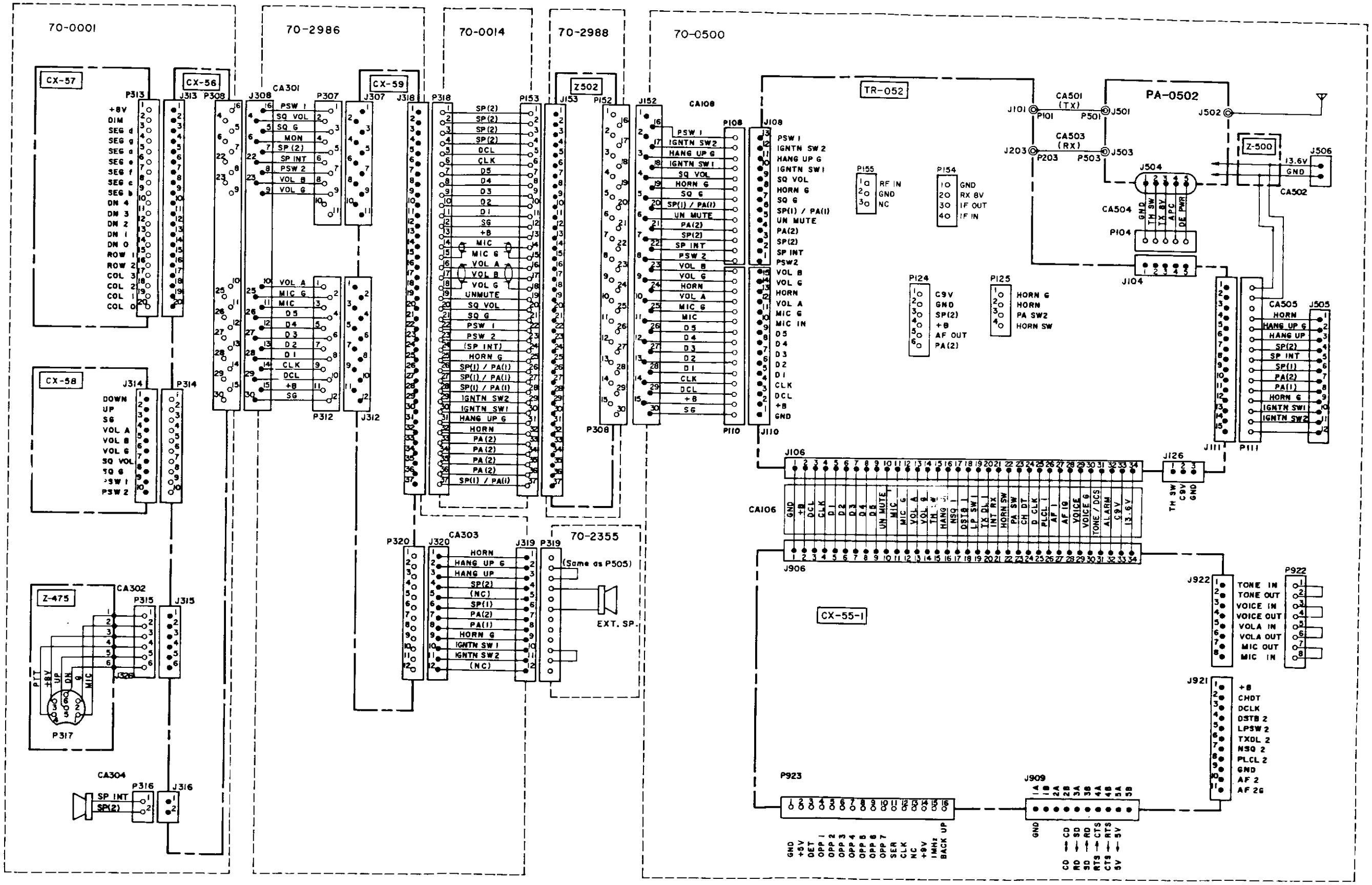
PSW2
PTT
+8V
UP
DN
G
MIC

70-0520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Z502
TR-052
PA-0502
CA501 (TX)
CA503 (RX)
Z-500
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CA504
CA505
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(Same as P505)
EXT. SP
CX-55-1
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P315
P316
P317
P318
P319
P320
P307
P308
P310
P312
P111
P124
P125
P154
P155
J313
J314
J315
J316
J318
J319
J320
J307
J312
J152
J153
J108
J110
J106
J126
J906
J922
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J909
J111
J501
J503
J504
J505
J506
J101
J203
J104
P101
P203
P501
P503
P104
P922
TONE IN
TONE OUT
VOICE IN
VOICE OUT
VOLA IN
VOLA OUT
MIC OUT
MIC IN
HORN
HANG UP G
HANG UP
SP(2)
SP INT
SP(1)
PA(2)
PA(1)
HORN G
IGNTN SW1
IGNTN SW2
PSW 1
IGNTN SW 2
HANG UP G
IGNTN SW1
SQ VOL
HORN G
SQ G
SP(1) / PA(1)
UN MUTE
PA(2)
SP(2)
SP INT
PSW 2
VOL B
VOL G
VOL A
MIC G
MIC IN
D5
D4
D3
D2
D1
CLK
DCL
+B
SG
GND
RF IN
GND
NC
GND
RX 8V
IF OUT
IF IN
C9V
GND
SP(2)
+B
AF OUT
PA(2)
HORN G
HORN
PA SW2
HORN SW
13.6V
GND
GND
TH SW
TX 8V
APC
DE PWR
+8
CHDT
DCLK
DSTB 2
LPSW 2
TXDL 2
NSQ 2
PLCL 2
GND
AF 2
AF 26
TH SW
C9V
GND
GND
+5V
DET
OPP 1
OPP 2
OPP 3
OPP 4
OPP 5
OPP 6
OPP 7
SER
CLK
NC
+8V
IMHz
BACK UP
GND
CD
SD
RD
RTS
CTS
5V
DOWN
UP
SG
VOL A
VOL B
VOL G
SQ VOL
SQ G
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PSW 2
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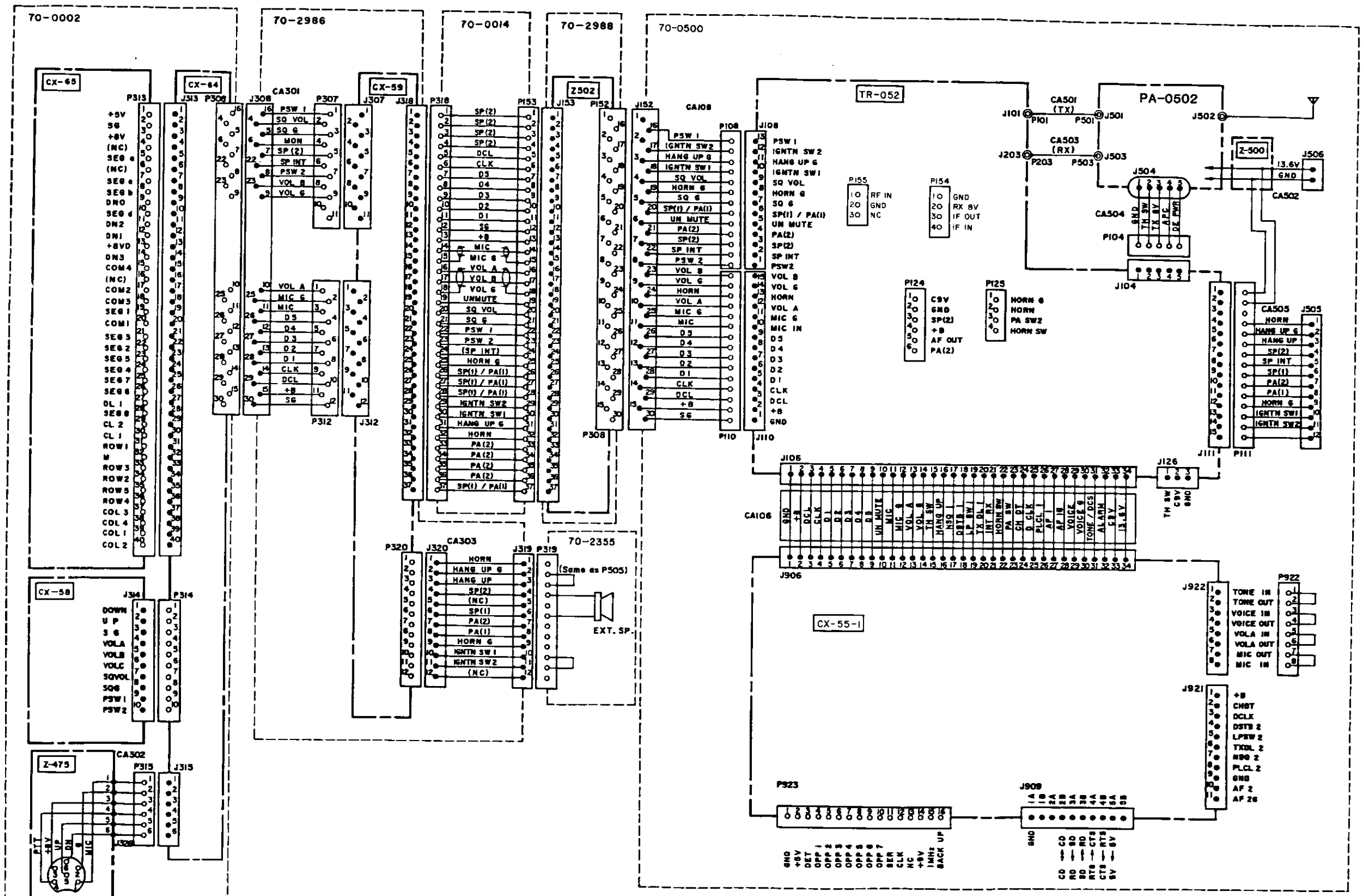
SP(2)
PTT
+8V
UP
DOWN
SG
MIC

70-0562 WIRING DIAGRAM

70-0520



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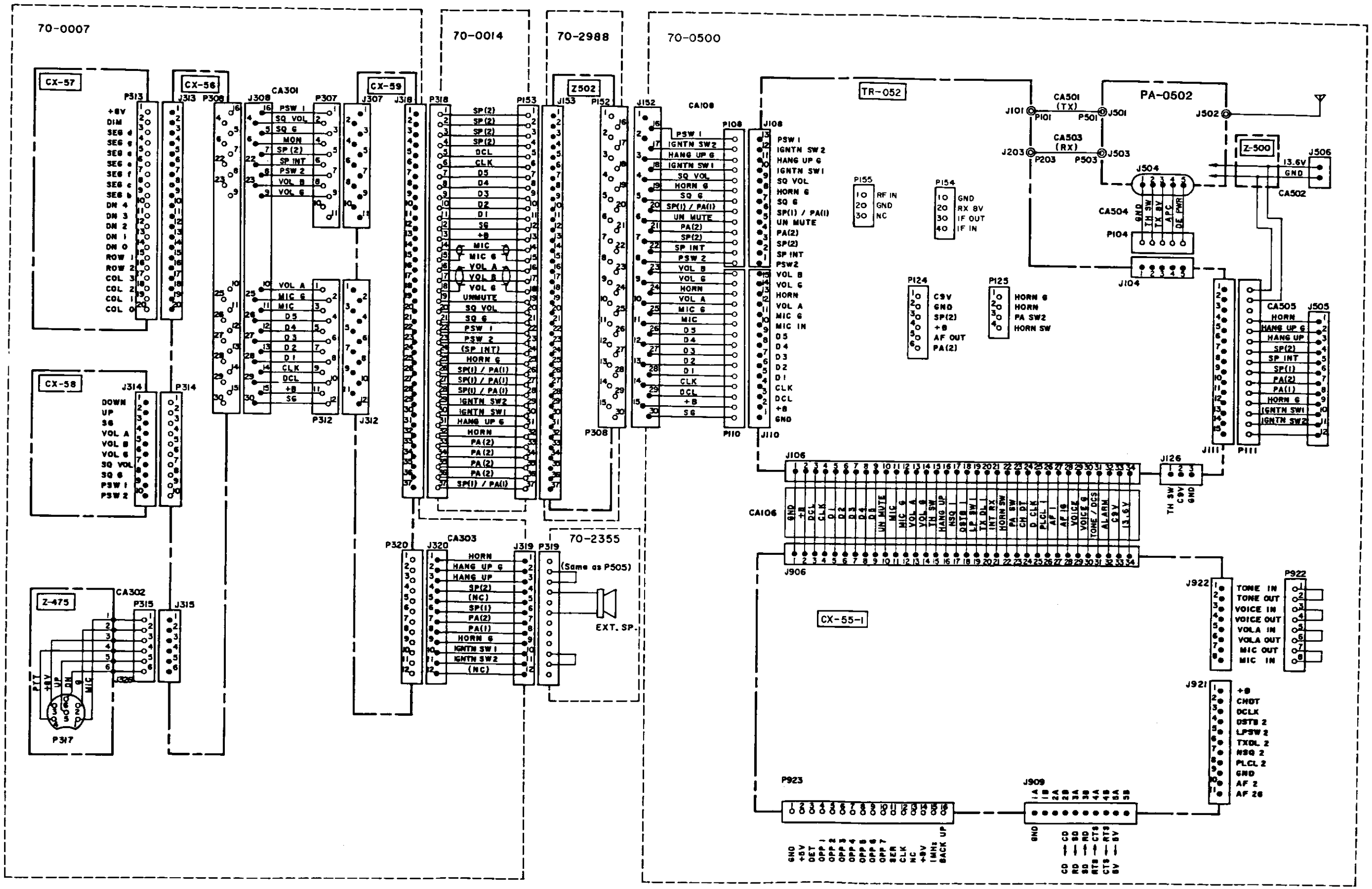
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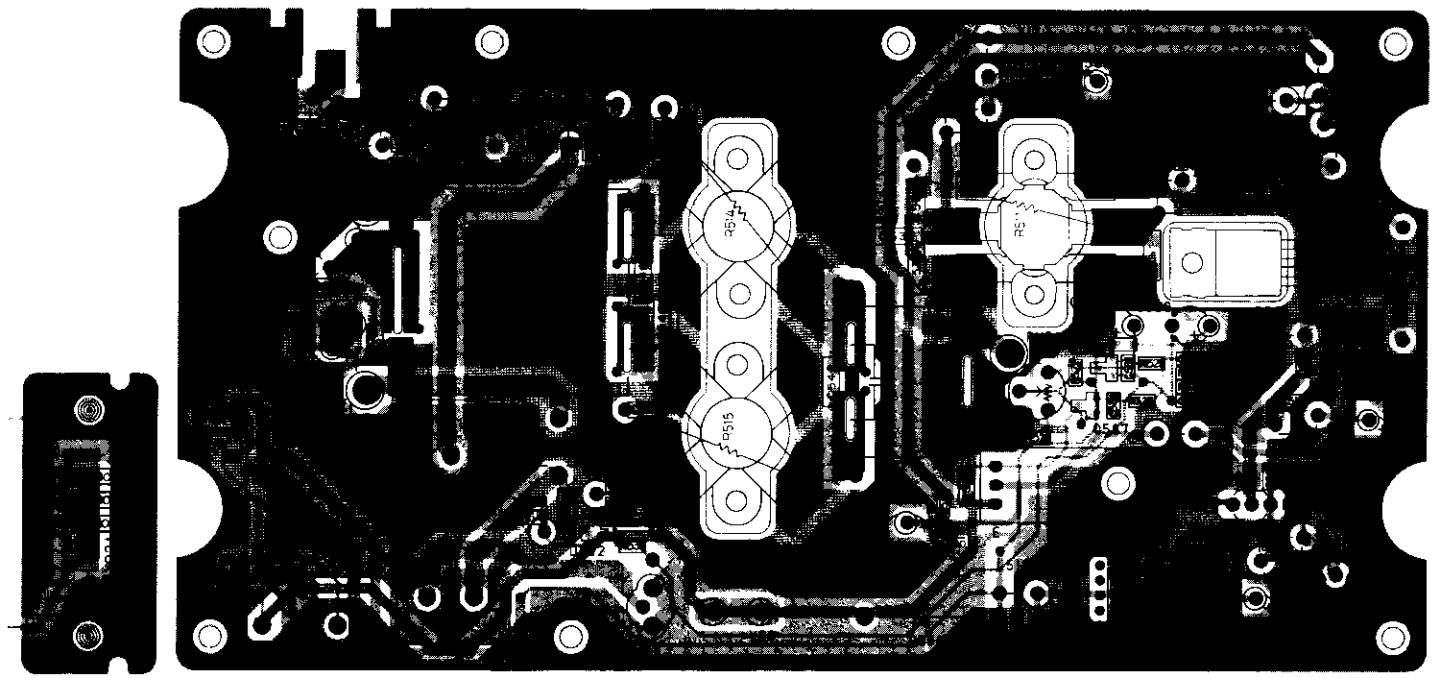
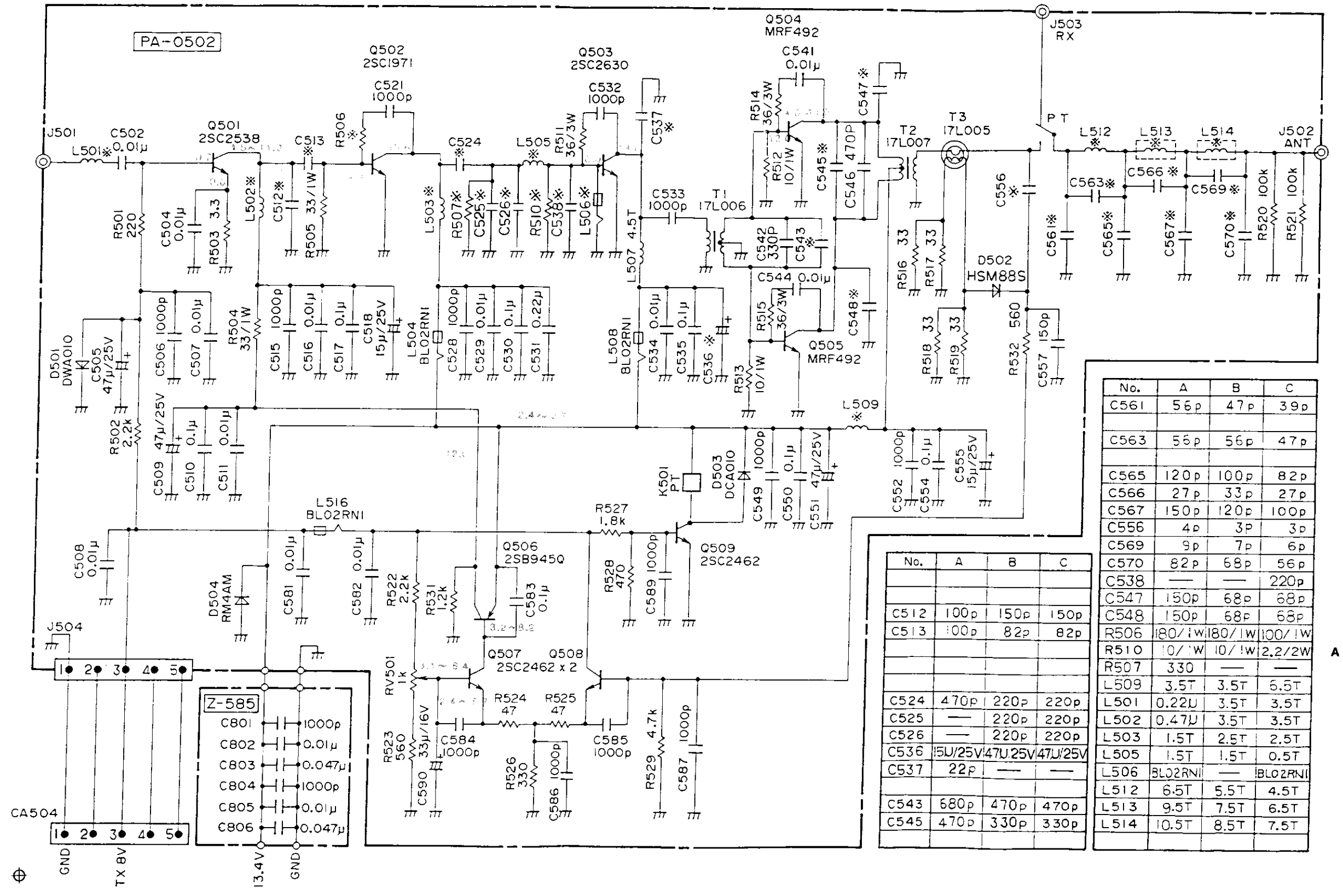
PA-0502
CA301
CA302
CA303
CA108
CA501 (TX)
CA503 (RX)
CA504
CA505
CA506
CA502
J313 P313
J308
J307 J318
J314 P314
J312 P312
J315 P315
J320 P320
J319 P319
J153 P153
J152 P152
P308
J108 P108
J110 P110
J101 P101
J501 P501
J503 P503
J203 P203
J504 P104
J104
J111 P111
J505
J506
J106
J126
CA106
J906
CX-55-1
J922 P922
J921
J923
J909
70-2355
(Same as P505)
EXT. SP.
P317
PSW 1
SQ VOL
SQ G
MON
SP (2)
SP INT
PSW 2
VOL B
VOL G
VOL A
MIC G
D5
D4
D3
D2
D1
CLK
DCL
+B
SG
MIC
UNMUTE
(SP INT)
HORN G
SP(1) / PA(1)
IGNTN SW2
IGNTN SW1
HANG UP G
HORN
PA(2)
SP(2)
SP(1)
PA(1)
(NC)
IGNTN SW 1
IGNTN SW 2
+8V
DIM
SEG d
SEG g
SEG a
SEG e
SEG f
SEG c
SEG b
DN 4
DN 3
DN 2
DN 1
DN 0
ROW 1
ROW 2
COL 3
COL 2
COL 1
COL 0
DOWN
UP
SG
VOL A
VOL B
VOL G
SQ VOL
SQ G
PSW 1
PSW 2
IGNTN SW1
IGNTN SW2
HANG UP G
HANG UP
SP(2)
SP INT
SP(1)
PA(2)
PA(1)
HORN G
IGNTN SW1
IGNTN SW2
HORN SW
PA SW
CH DT
D CLK
PLCL 1
AF 1
AF 16
VOICE
VOICE G
TONE / DCS
ALARM
C9V
13.6V
TH SW
HANG UP
NSQ 1
DSTB 1
LP SW 1
TX DL 1
INT RX
GND
RF IN
NC
RX 8V
IF OUT
IF IN
C9V
AF OUT
HORN G
PA SW2
HORN SW
TONE IN
TONE OUT
VOICE IN
VOICE OUT
VOLA IN
VOLA OUT
MIC OUT
MIC IN
CHDT
DCLK
DSTB 2
LPSW 2
TXDL 2
NSQ 2
PLCL 2
AF 2
AF 26
BACK UP
PTT
AV
UP
DN
MIC



VISIBLE PLATING

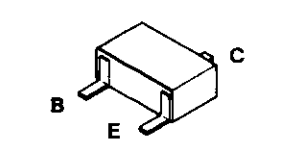
UNDERSIDE PLATING

70-0520

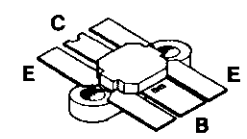


No.	A	B	C
C561	56p	47p	39p
C563	56p	56p	47p
C565	120p	100p	82p
C566	27p	33p	27p
C567	150p	120p	100p
C556	4p	3p	3p
C569	9p	7p	6p
C570	82p	68p	56p
C538	—	—	220p
C547	150p	68p	68p
C548	150p	68p	68p
R506	180/1W	180/1W	100/1W
R510	10/1W	10/1W	2.2/2W
R507	330	—	—
L509	3.5T	3.5T	6.5T
L501	0.22µ	3.5T	3.5T
L502	0.47µ	3.5T	3.5T
L503	1.5T	2.5T	2.5T
L505	1.5T	1.5T	0.5T
L506	BL02RN1	—	BL02RN1
L512	6.5T	5.5T	4.5T
L513	9.5T	7.5T	6.5T
L514	10.5T	8.5T	7.5T

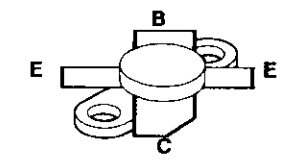
No.	A	B	C
C512	100p	150p	150p
C513	100p	82p	82p
C524	470p	220p	220p
C525	—	220p	220p
C526	—	220p	220p
C536	15U/25V	47U/25V	47U/25V
C537	22p	—	—
C543	680p	470p	470p
C545	470p	330p	330p



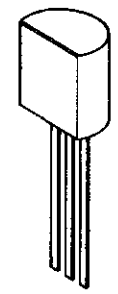
Q506, Q507, Q508, Q509



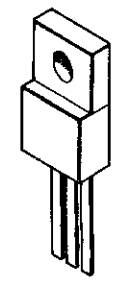
Q503



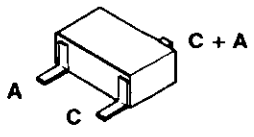
Q504, Q505



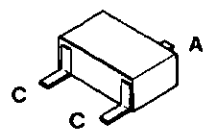
Q501



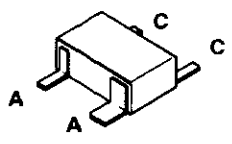
Q502



D502



D503

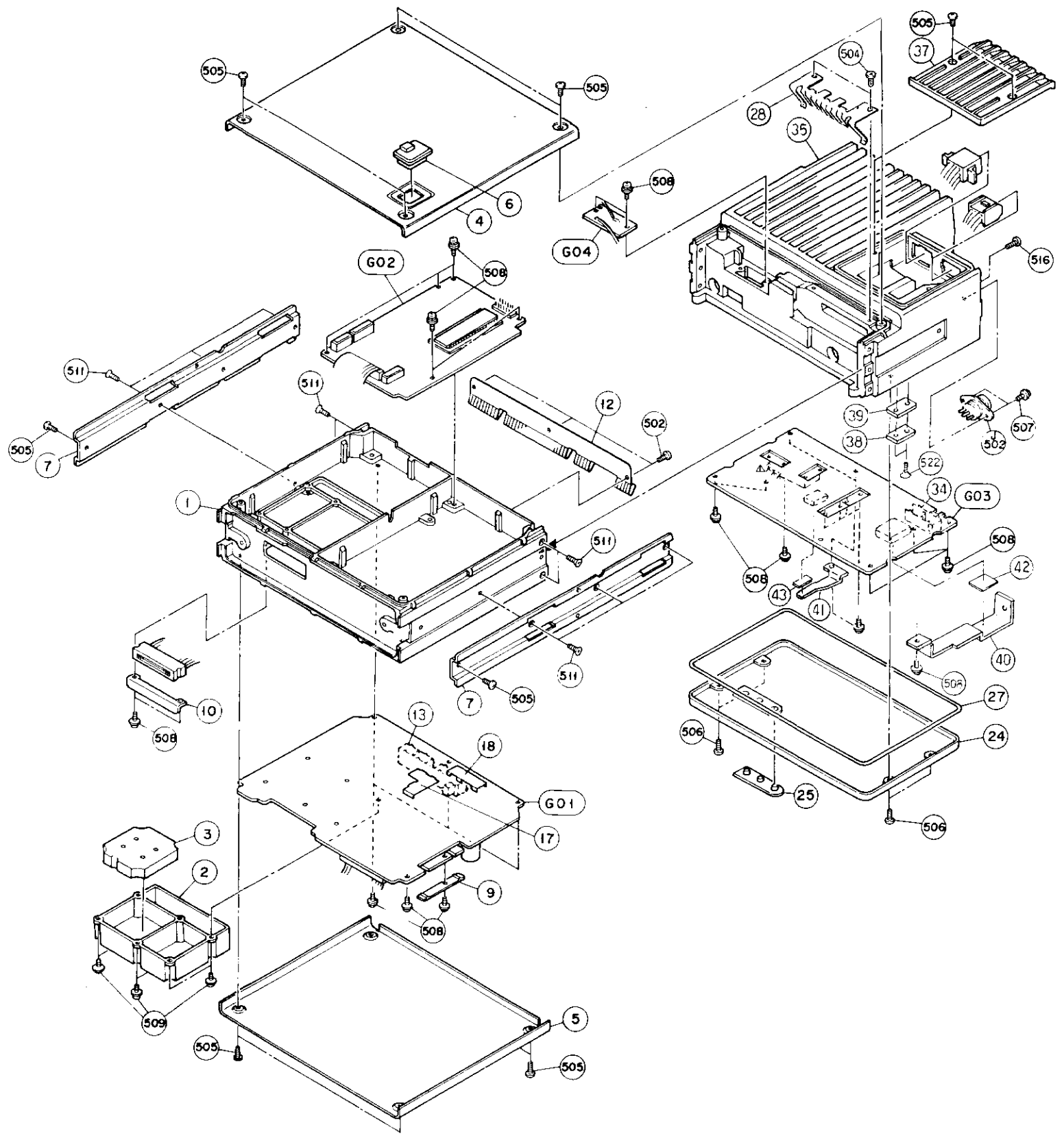


D501

TX/RX EXPLODED VIEW

70-0520

REF NO.	DESCRIPTION	PART NO.
1	CHASSIS	70-015043
2	VCO CASE	70-010184
3	RUBBER PAD	70-157307
4	TOP COVER	70-010190
5	BOTTOM COVER	70-010191
6	PROGRAMMER PORT COVER	70-010192
7	SIDE RAIL	70-010193
9	IC BRACKET	70-158252
10	CONNECTOR BRACKET	70-158254
12	GROUND SPRING	70-152095
13	GROUND SPRING	70-152107
17	IF PATTERN SHIELD	70-089308
18	RF SHIELD	70-089309
24	PA COVER	70-010187
25	PA PACKING	70-157270
27	SHIELD TUBE	70-034330
28	SP GROUND SPRING	70-152094
34	LPF SHIELD	70-089363
35	PA HEAT SINK (H)	70-089360
37	CONNECTOR COVER	70-010188
38	SPACER	70-150186
39	SPACER	70-150187
40	HEAT SINK PLATE	70-089361
41	HEAT SINK PLATE (2)	70-089362
42	SHEET	70-157406
43	SHEET	70-157407
502	SCREW BIND HD M3 x 6	70-151616
504	SCREW BIND HD M3 x 8	70-151356
505	SCREW BIND HD M3 x 8	70-151972
506	SCREW BIND HD M3 x 12	70-151839
507	SCREW SEMS HD M3 x 8	70-151899
508	SCREW SEMS M3 x 10	70-151905
509	SCREW SEMS M3 x 12	70-151955
511	SCREW FLAT HD M3 x 4	70-151804
516	SCREW BIND HD M3 x 10	70-151413
522	SCREW FLAT HD M3 x 10	70-150188
G01	TX/RX BOARD	TR-052
G02	LOGIC BOARD	CX-55
G03	HIGH POWER PA	PA-0502
G04	POWER SUPPLY	Z-585



SECTION 5

PARTS

NOTES

MECHANICAL PARTS

REF NO.	DESCRIPTION	PART NO.
1	CHASSIS	70-015051
2	VCO CASE	70-010184
3	RUBBER PAD	70-157307
4	TOP COVER	70-010190
5	BOTTOM COVER	70-010191
6	PROGRAMMER PORT COVER	70-010192
7	SIDE RAIL	70-010193
9	IC BRACKET	70-158253
10	CONNECTOR BRACKET	70-158254
12	GROUND SPRING	70-152095
13	GROUND SPRING	70-152107
17	IF PATTERN SHIELD	70-089308
18	RF SHIELD	70-089309
24	PA COVER	70-010187
25	PA PACKING	70-157270
27	SHIELD TUBE	70-034330
28	SP GROUND SPRING	70-152094
34	LPF SHIELD	70-089363
35	PA HEAT SINK (H)	70-089360
37	CONNECTOR COVER	70-010188
38	SPACER	70-150186
39	SPACER	70-150187
40	HEAT SINK PLATE	70-089361
41	HEAT SINK PLATE (2)	70-089362
42	SHEET	70-157406
43	SHEET	70-157407
502	SCREW BIND HD M3 x 6	70-151616
504	SCREW BIND HD M3 x 8	70-151356
505	SCREW BIND HD M3 x 8	70-151972
506	SCREW BIND HD M3 x 12	70-151839
507	SCREW SEMS HD M3 x 8	70-151899
508	SCREW SEMS M3 x 10	70-151905
509	SCREW SEMS M3 x 12	70-151955
511	SCREW FLAT HD M3 x 4	70-151804
516	SCREW BIND HD M3 x 10	70-151413
522	SCREW FLAT HD M3 x 10	70-150188
P505B	CABLE ASSEMBLY FOR SPEAKER	70-034565
G01	TX/RX BOARD	TR-052
G02	LOGIC BOARD	CX-58
G03	HIGH POWER PA	PA-0502
G04	POWER SUPPLY	Z-585

PA-0502 POWER AMPLIFIER

70-0520 A-Band	USE "A"
70-0520 B-Band	USE "B"
70-0520 C-Band	USE "C"

REF NO.	DESCRIPTION	PART NO.
	CAPACITORS	
C502	0.01 µF, 50 V, CER	70-138270
C504	0.01 µF, 50 V, CER	70-138270
C505	47 µF, 25 V AL, ELYC	70-135055
C506	1000 µF, 50 V, CER	70-138170
C507	0.01 µF, 50 V, CER	70-138270
C508	0.01 µF, 50 V, CER	70-138270
C509	47 µF, 25 V AL, ELYC	70-135055
C510	0.1 µF, 50 V, CER	70-138249
C511	0.01 µF, 50 V, CER	70-138270
C512 A	100 pF, 50 V, CER	70-138174
C512 B	150 pF, 50 V, CER	70-138231
C512 C	150 pF, 50 V, CER	70-138231
C513 A	100 pF, 50 V, CER	70-138174
C513 B	82 pF, 50 V, CER	70-138250
C513 C	82 pF, 50 V, CER	70-138250
C515	1000 µF, 50 V, CER	70-138170
C516	0.01 µF, 50 V, CER	70-138270
C517	0.1 µF, 50 V, CER	70-138249
C518	15 µF, 25 V, AL, ELYC	70-135154
C521	1000 pF, 50 V, CER	70-138170
C524 A	470 pF, 50 V, CER	70-138195
C524 B	220 pF, 50 V, CER	70-138176
C524 C	220 pF, 50 V, CER	70-138176
C525 B	220 pF, 50 V, CER	70-138176
C525 C	220 pF, 50 V, CER	70-138176
C526 B	220 pF, 50 V, CER	70-138176
C526 C	220 pF, 50 V, CER	70-138176
C528	1000 pF, 50 V, CER	70-138170
C529	0.01 µF, 50 V, CER	70-138270
C530	0.1 µF, 50 V, CER	70-138249
C531	0.22 µF, 50 V, PLAS	70-138160
C532	1000 µF, 100 V, CER	70-138239
C533	1000 µF, 100 V, CER	70-138239
C534	0.01 µF, 50 V, CER	70-138270
C535	0.1 µF, 50 V, CER	70-138249
C536 A	15 µF, 25 V, AL, ELYC	70-135154
C536 B	47 µF, 25 V, AL, ELYC	70-135055
C536 C	47 µF, 25 V, AL, ELYC	70-135055
C537 A	22 pF, 500 V, MICA	70-138107
C538 C	220 pF, 100 V, CER	70-138261
C541	0.01 µF, 50 V, CER	70-131297
C542	330 pF, 100 V, CER	70-138320
C543 A	680 pF, 300 V, MICA	70-137103
C543 B	680 pF, 300 V, MICA	70-137103
C543 C	470 pF, 300 V, MICA	70-137104
C544	0.01 µF, 50 V, CER	70-131297
C545 A	470 pF, 300 V, MICA	70-137104
C545 B	330 pF, 300 V, MICA	70-137105
C545 C	330 pF, 300 V, MICA	70-137105
C546	470 pF, 100 V, CER	70-138238
C547 A	150 pF, 100 V, MICA	70-138111
C547 B	91 pF, 500 V, MICA	70-138110
C547 C	68 pF, 500 V, MICA	70-138141
C548 A	150 pF, 100 V, MICA	70-138111
C548 B	91 pF, 500 V, MICA	70-138110
C548 C	68 pF, 500 V, MICA	70-138141
C549	1000 pF, 100 V, CER	70-138239
C550	0.1 µF, 50 V, CER	70-138249
C551	47 µF, 25 V, AL, ELYC	70-135055
C552	1000 pF, 100 V, CER	70-138239
C554	0.1 µF, 50 V, CER	70-138249
C555	15 µF, 25 V, AL, ELYC	70-135154
C556 A	4 pF, 500 V, CER	70-138328
C556 B	3 pF, 500 V, CER	70-138311
C556 C	3 pF, 500 V, CER	70-138311
C557	150 pF, 100 V, CER	70-138258
C561 A	56 pF, 500V, CER	70-138285
C561 B	47 pF, 500 V, CER	70-138268
C561 C	C39 pF, 500 V, CER	70-138286
C563 A	56 pF, 500 V, CER	70-138285
C563 B	56 pF, 500 V, CER	70-138285

REF NO.	DESCRIPTION	PART NO.
	CAPACITORS (CONTINUED)	
C563 C	C47 pF, 500 V, CER	70-138268
C565 A	120 pF, 500 V, CER	70-138306
C565 B	100 pF, 500 V, CER	70-138264
C565 C	C82 pF, 500 V, CER	70-138259
C566 A	27 pF, 500 V, CER	70-138305
C566 B	33 pF, 500 V, CER	70-138262
C566 C	27 pF, 500 V, CER	70-138306
C567 A	150 pF, 100 V, CER	70-138258
C567 B	120 pF, 500 V, CER	70-138306
C567 C	100 pF, 500 V, CER	70-138264
C569 A	9 pF, 500 V, CER	70-138313
C569 B	7 pF, 500 V, CER	70-138310
C569 C	6 pF, 500 V, CER	70-138329
C570 A	82 pF, 500 V, CER	70-138259
C570 B	68 pF, 500 V, CER	70-138268
C570 C	56 pF, 500 V, CER	70-138285
C581	0.01 µF, 50 V, CER	70-138270
C582	0.01 µF, 50 V, CER	70-138270
C583	0.1 µF, 50 V, CER	70-138249
C584	1000 pF, 50 V, CER	70-138170
C585	1000 pF, 50 V, CER	70-138170
C586	1000 pF, 50 V, CER	70-138170
C587	1000 pF, 50 V, CER	70-138170
C589	1000 pF, 50 V, CER	70-138170
C590	33 µF, 16 V, TA, ELYC	70-135261
	DIODES	
D501	DWA010	70-085246
D502	HSM88S	70-085154
D503	DCA010	70-085250
D504	RM4AM LF-JB	70-085269
	JACKS	
J501	JACK V	70-159089
J502	MR-DS2505-01	70-159427
J503	JACK V	70-159089
	CABLE ASSEMBLIES	
CA501	L = 100	70-034325
CA502	1-350345-0 (A = 200)	70-034332
CA503	L = 100	70-034325
CA504	IL-T-5P-IL-S-5S	70-034320
CA505	1625-12R-15S (A = 185)	70-034333
	TRANSISTORS	
Q501	2SC2538	70-080108
Q502	2SC1971	70-080054
Q503	2SC2630	70-080091
Q504	MRF492	70-085342
Q505	MRF492	70-085342
Q506	2SB943Q/P	70-080214
Q507	2SC2462LC	70-080160
Q508	2SC2462LC	70-080160
Q509	2SC2462LC	70-080160
	COILS AND CONDUCTORS	
L501 A	ELE-Y R22MA	70-090374
L501 B	Z0.8C5D 3.5T	70-090099
L501 C	Z0.8C5D 3.5T	70-090099
L502 A	ELE-Y R47MA	70-090200
L502 B	Z0.8C5D 3.5T	70-090099

PA-0502 POWER AMPLIFIER (CONTINUED)

REF NO.	DESCRIPTION	PART NO.
	COILS AND CONDUCTORS (CONTINUED)	
L502 C	Z0.8C5D 3.5T	70-090099
L503 A	Z0.8C5D 1.5 T	70-090097
L503 B	Z0.8C5D 2.5 T	70-090098
L503 C	Z0.8C5D 2.5 T	70-090098
L504	BL02RN1-R62	70-090122
L505 A	Z0.8C5D 1.5T	70-090097
L505 B	Z0.8C5D 1.5T	70-090097
L505 C	Z0.8C3D 0.5T	70-090164
L506 A	BLO2RN1-R62	70-090022
L506 C	BLO2RN1-R62	70-090022
L507	Z0.8C5D 4.5T	70-090129
L508	BLO2RN1-R62	70-090122
L509 A	Z0.8C5D 3.5T	70-090526
L509 B	Z0.8C5D 3.5T	70-090526
L509 C	Z0.8C5D 6.5T	70-090131
L512 A	Z1.0C5D 6.5T	70-090527
L512 B	Z1.0C5D 5.5T	70-090528
L512 C	Z1.0C5D 4.5T	70-090212
L513 A	Z1.0C5D 9.5T	70-090529
L513 B	Z1.0C5D 7.5T	70-090530
L513 C	Z1.0C5D 6.5T	70-090214
L514 A	Z1.0C5D 10.5T	70-090531
L514 B	Z1.0C5D 8.5T	70-090532
L514 C	Z1.0C5D 7.5T	70-090215
L516	BLO2RN1-R62	70-090122
T1	17L006	70-090524
T2	17L007	70-090525
T3	17L005	70-090399
	RESISTORS	
R501	220 Ω, 1/10 W, MET	70-144194
R502	2.2 kΩ, 1/10 W, MET	70-144113
R503	3.3 Ω, 1/10 W, MET	70-144198
R504	33 Ω, 1 W, MET	70-142028
R505	33 Ω, 1 W, MET	70-142028
R506 A	180 Ω, 1 W, MET	70-144131
R504	33 Ω, 1 W, MET	70-142028

REF NO.	DESCRIPTION	PART NO.
	RESISTORS (CONTINUED)	
R505	33 Ω, 1 W, MET	70-142028
R506 A	180 Ω, 1 W, MET	70-144131
R506 B	180 Ω, 1 W, MET	70-144131
R506 C	100 Ω, 1 W, MET	70-144299
R507 A	330 Ω, 1/10 W, MET	70-144164
R510 A	10 Ω, 1 W, MET	70-144082
R510 B	10 Ω, 1 W, MET	70-144082
R510 C	2.2 Ω, 2 W, MET	70-144200
R511	36 Ω, 3 W, MET	70-144314
R512	10 Ω, 1 W, MET	70-144082
R513	10 Ω, 1 W, MET	70-144082
R514	36 Ω, 3 W, MET	70-144314
R515	36 Ω, 3 W, MET	70-144314
R516	33 Ω, 1/10 W, MET	70-144320
R517	33 Ω, 1/10 W, MET	70-144320
R518	33 Ω, 1/10 W, MET	70-144320
R519	33 Ω, 1/10 W, MET	70-144320
R520	100 kΩ, 1/10 W, MET	70-144128
R521	100 kΩ, 1/10 W, MET	70-144128
R522	2.2 kΩ, 1/10 W, MET	70-144113
R523	560 Ω, 1/10 W, MET	70-144130
R524	47 Ω, 1/10 W, MET	70-145130
R525	47 Ω, 1/10 W, MET	70-145130
R526	330 Ω, 1/10 W, MET	70-144164
R527	1.8 kΩ, 1/10 W, MET	70-144154
R528	470 Ω, 1/10 W, MET	70-146107
R529	4.7 kΩ, 1/10 W, MET	70-144123
R531	1.2 kΩ, 1/10 W, MET	70-144187
R532	560 Ω, 1/10 W, MET	70-144130
	VARIABLE RESISTORS	
RV501	EVN-39C00YB 13 (1K)	70-184040
	MISCELLANEOUS	
K501	RELAY CX-220P	70-105014

REPLACEMENT PARTS ORDERING

To speed delivery and avoid errors, have the following information ready when ordering replacement parts:

1. Identification of the part. The best identification is the Midland Part Number. Otherwise, you will need to know the Model and Serial numbers of equipment in which the part is used, with a Part Description and Schematic reference designator. You may also need to return the old part as a sample.

2. Quantity Desired.

3. Ship-to address, and billing address (if different).

Mail or fax your order to:

Parts Department
Midland USA
1690 North Topping Avenue
Kansas City, MO 64120
Fax: (816) 920-1144
Phone: (816) 241-8400

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