



SERVICE MANUAL

MARINE PLOTTER

VP-21

DANGER! HIGH VOLTAGE

HIGH VOLTAGE WARNING

High voltages of up to hundreds of thousands of volts are used in this unit. BEWARE of high voltage when removing the outer cover of the unit. When working on the interior, avoid direct contact with the high voltage circuitry especially on the CRT unit.

Electric shock of 1000 volts or more may cause electrocution and death; and, even an electric shock of only 100 volts may be fatal.

FIRST AID IN CASE OF ELECTRIC SHOCK

A stable foothold is essential to prevent more extensive or additional injuries. When injured by electric shock, disinfect the burn completely and begin first aid as soon as possible. To avoid electric shock, all adjustments should be made using an insulated turning tool.

ORDERING PARTS

Be sure to include the following four points when ordering replacement parts:

1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

<SAMPLE ORDER>

1130005050	IC	TC51832SPL-10	VP-21	LOGIC UNIT	5 pieces
8810001040	Screw	PH B0 M2.6 x 6	VP-21	FRONT UNIT	10 pieces

Addresses are provided on the inside back cover for your convenience.

REPAIR NOTE

1. Make sure a problem is internal before disassembling the unit.
2. **DO NOT** open the unit until the unit is disconnected from the power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated turning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the unit is defective.
6. **READ** the instructions of the test equipment thoroughly before connecting equipment to the unit.

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SECTION 1 SPECIFICATIONS

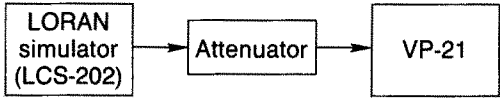
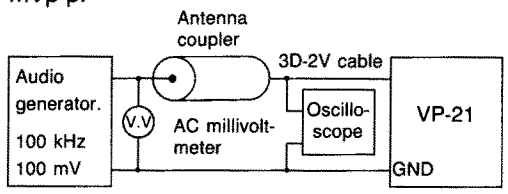
- Display : 8-inch color CRT display
- Chart scale : 7 levels
- Plotting intervals : 5 sec. ~60 min. or 0.01 nm ~9.99 nm
(selectable)
- Number of track points : 600 + 600
(temporary + memory)
- Number of waypoints : 100
- Number of event marks : 200 (in 3 colors)
- Navigating function : Destination, Route, External
- Alarm functions : Course-off, Course-in, Arrival, Anchor
- Input data format : NMEA0182 or NMEA0183
- Output data format : NMEA0183
- NMEA0183 sentence format : Input
**GLL, **WPL, **XTE
(* means a wild card.)

Output
LCGLL, LCXTE, LCAAM, LCVTG, LCBOD, LCWPL
- Power supply requirement : 11 ~ 40 V DC
- Power consumption : 40 W
- Usable temperature range : 0°C ~ +50°C; +32°F ~ +122°F
- Weight : 8.0 kg; 17.6 lb
- Dimensions : 250(W) × 250(H) × 276(D) mm; 9.8(W) × 9.8(H) × 10.9(D) in
(Projection not included)

All stated specifications are subject to change without notice and obligation.

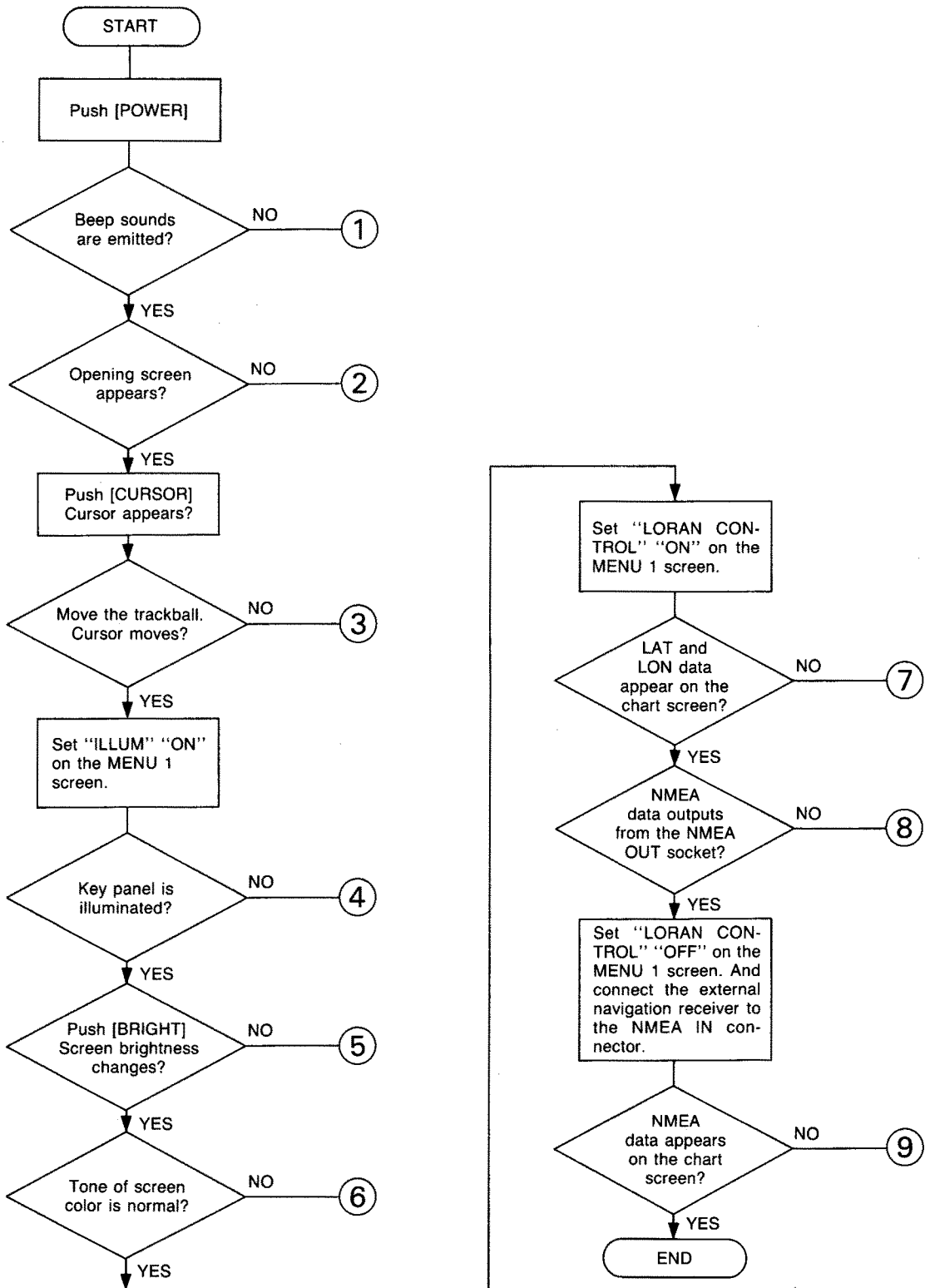
SECTION 2 FUNCTION CHECKLIST

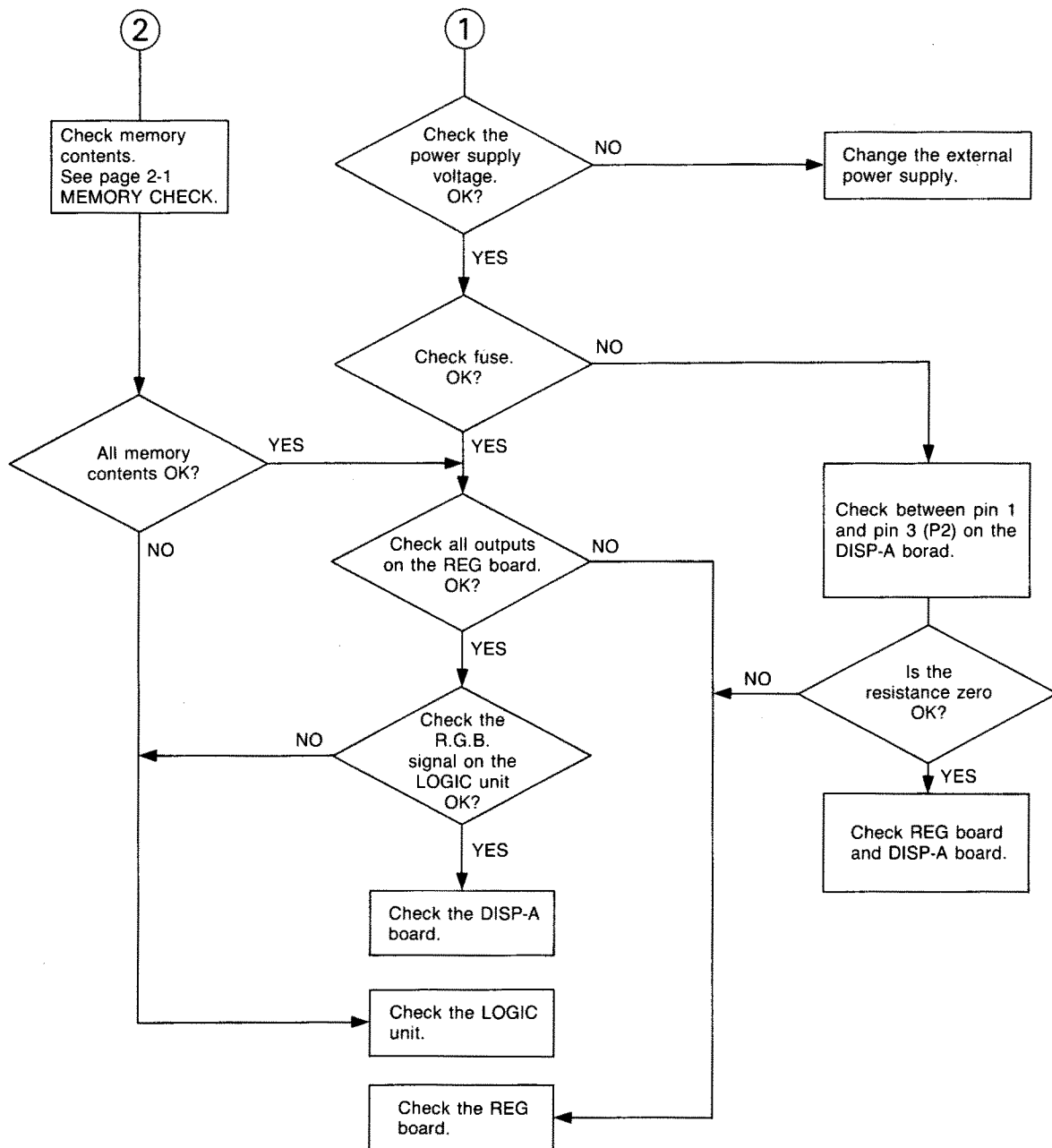
FUNCTION	OPERATION		CONFIRMATION	
POWER ON/OFF	1	Push [POWER] once.	1	Beep sound is emitted, and "ICOM" appears.
	2	Push and hold [POWER].	2	The unit is turned OFF.
MEMORY CHECK	1	Push and hold [ZOOM IN], [ZOOM OUT], [BRIGHT], [SET] and then push [POWER].	1	"VRAM 1 OK," "VRAM 2 OK," "VRAM 3 OK," "ROM OK" and "RAM OK" appear.
CARD SLOTS AND FRONT KEYBOARD CHECK	1	Insert the ROM/RAM CARD into slot A or insert RAM CARD into slot A and ROM card slot B.	1	<ul style="list-style-type: none"> •The chart screen can be selected. •Zoom up or zoom in can be selected.
	2	Push [CURSOR].	2	The cursor appears.
	3	Scroll the track ball.	3	The cursor moves to the desired point.
	4	Push [CENTER].	4	The cursor moves to the center.
	5	Push [EVENT], then push [SET].	5	The event mark "□" appears on the cursor position.
	6	Push [WAYPOINT], then push [SET].	6	The waypoint mark "◆" appears on the cursor position.
	7	Push [BRIGHT] several times.	7	Brightness varies among 5 levels.
	8	Push and hold [CLR] until a low beep tone is emitted 8 times.	8	All programmed data is erased.
	9	Push [SELECT].	9	The most magnified chart screen appears.
	10	When inserting ROM CARD into slot B, select the MENU 2 screen.	10	The MENU 2 screen appears.
	11	Select the other chart and display the chart screen	11	Selected screen appears.
TRACK	1	Display the green track if it is memorized into the memory card.	1	The green track appears.
	2	Set the cursor to the final position of the green track (green square) using the trackball. Push [TRACK], then push [CLR].	2	"WAIT" appears in the lower left-hand corner screen. After few seconds, "WAIT" and the green track disappear.
NMEA IN	1	Select the LORAN monitor screen.	1	The LORAN monitor screen appears.
	2	Connect the external navigation receiver to the NMEA IN connector.	2	The latitude and longitude data appear.

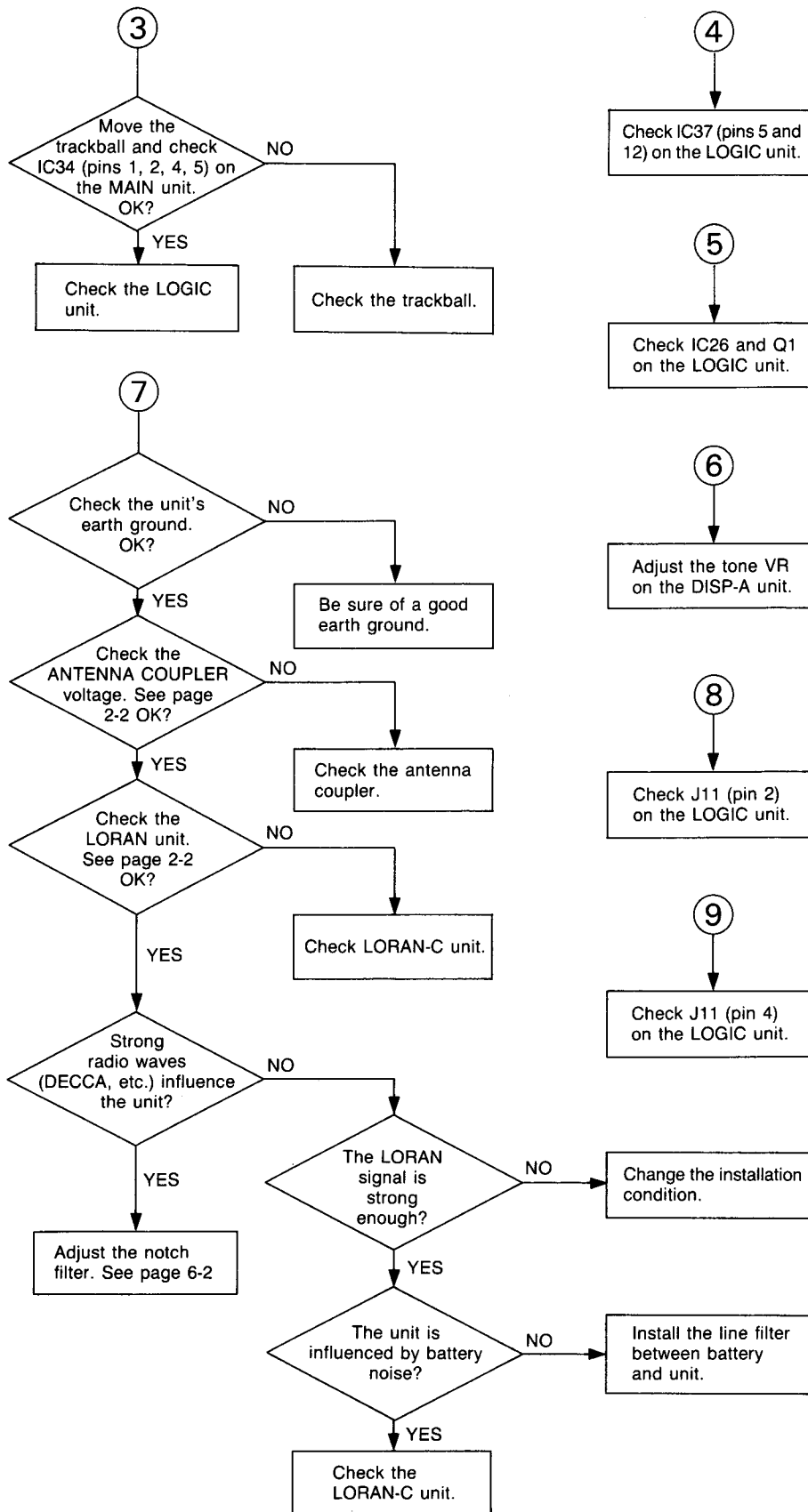
FUNCTION	OPERATION		CONFIRMATION	
LORAN	1	<ul style="list-style-type: none"> • Connect the LORAN simulator to the ANT connector through the attenuator. • Select the MENU 1 screen and turn ON the LORAN CONTROL. • The LORAN.SETUP data is set up the same as the LORAN simulator. • Set the LORAN output level : -80 dBm 	1	<p>The latitude and longitude data appear on the LORAN-C STATION READOUT shows the LORAN-C station position within 30 seconds.</p> 
NMEA OUT	1	Connect the FF-88 or MR-40 to the NMEA OUT connector.	1	The display (FF-88 or MR-40) shows the latitude and longitude data.
ALARM	1	<ul style="list-style-type: none"> • Connect the simulator [EX-780] to the NMEA IN connector. • Set the LORAN CONTROL OFF, the ZONE ALARM ON and destination or desired route on the MENU 1 screen. • Set the destination (waypoint) on the chart screen. • Set the watching range on the MONITOR screen (0.1 ~ 0.5 NM). 	1	<ul style="list-style-type: none"> • When the ship route meets the alarm condition, the alarm sounds. • The alarm terminal is connected.
ANTENNA COUPLER	1	Connect the audio generator as follows. Frequency : 100 kHz Output : 100mV	1	<p>The antenna coupler outputs more than 430 mVp-p.</p> 
CPU RESET	1	Turn power OFF.	1	The unit is turned OFF.
	2	Push and hold [ZOOM IN] and [CLR], then push [POWER].	2	All setting are initialized.

SECTION 3 TROUBLESHOOTING FLOW CHART

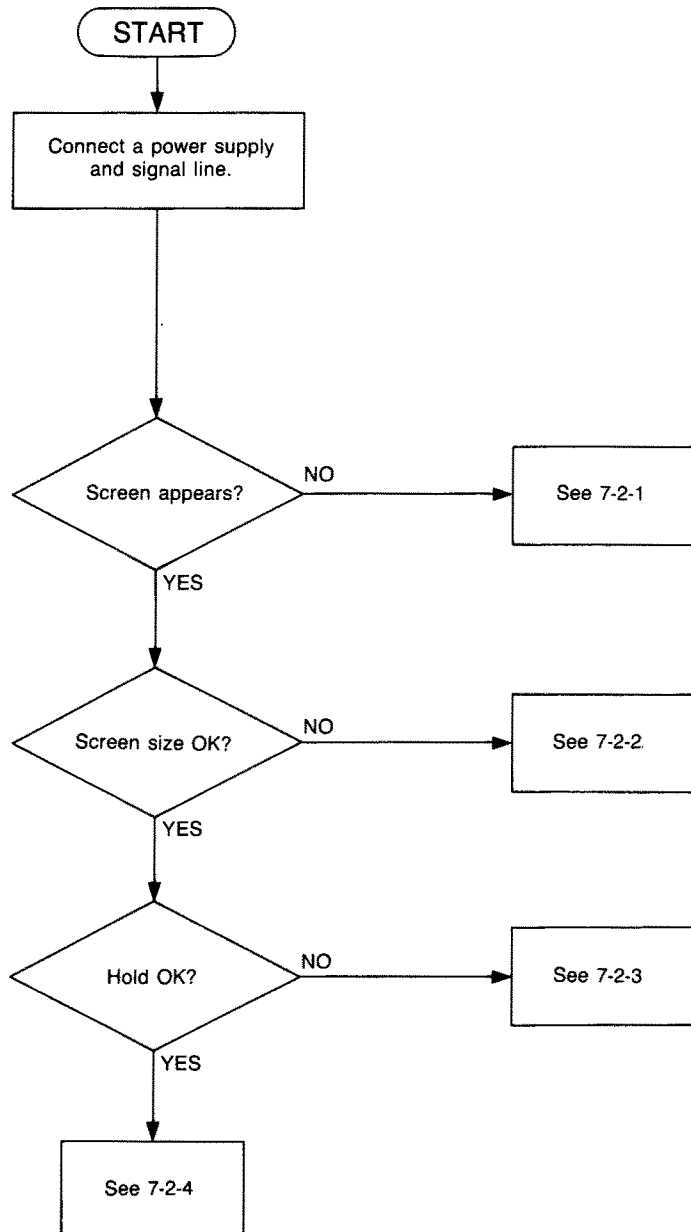
3-1 TROUBLESHOOTING CHART FOR MAIN UNIT





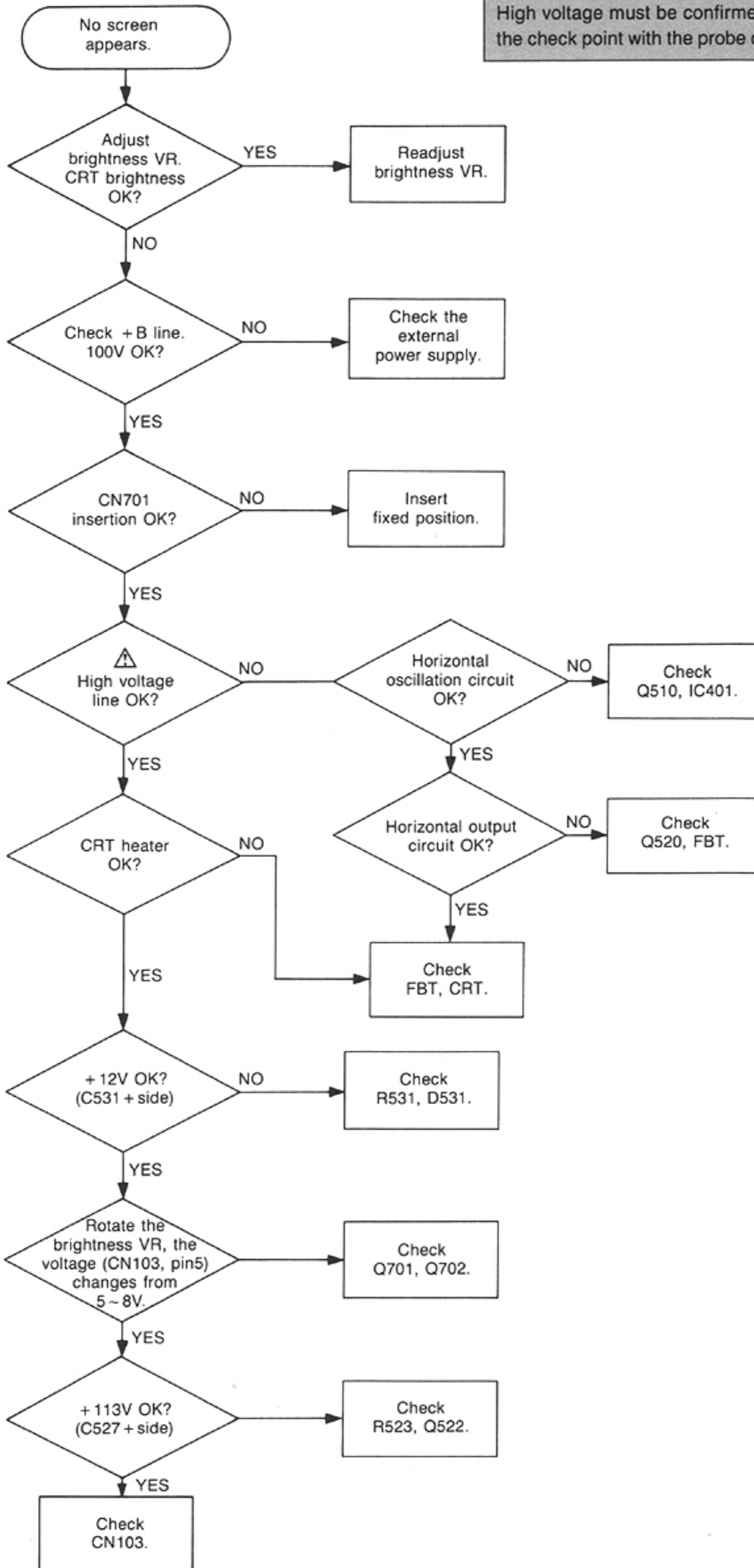


3-2 TROUBLESHOOTING CHART FOR CRT UNIT

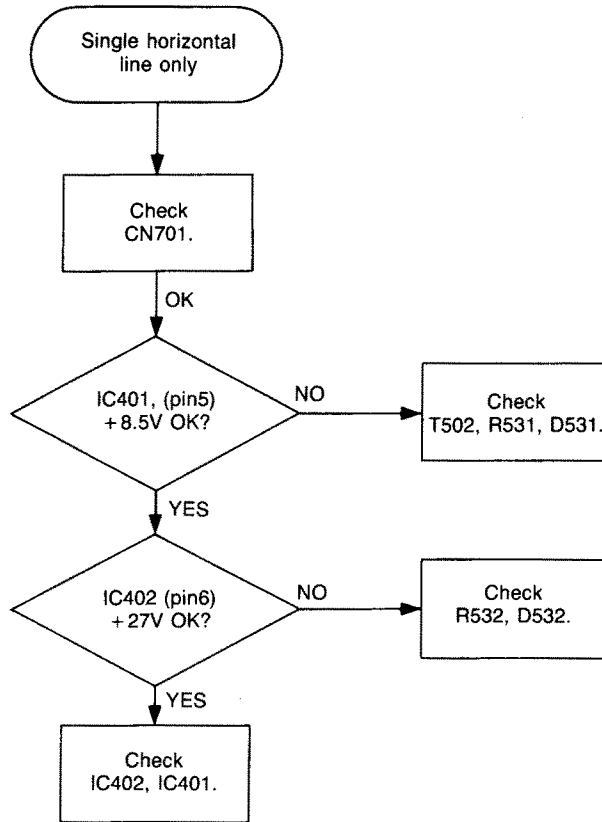


3-2-1 WHEN NO DISPLAY APPEARS.

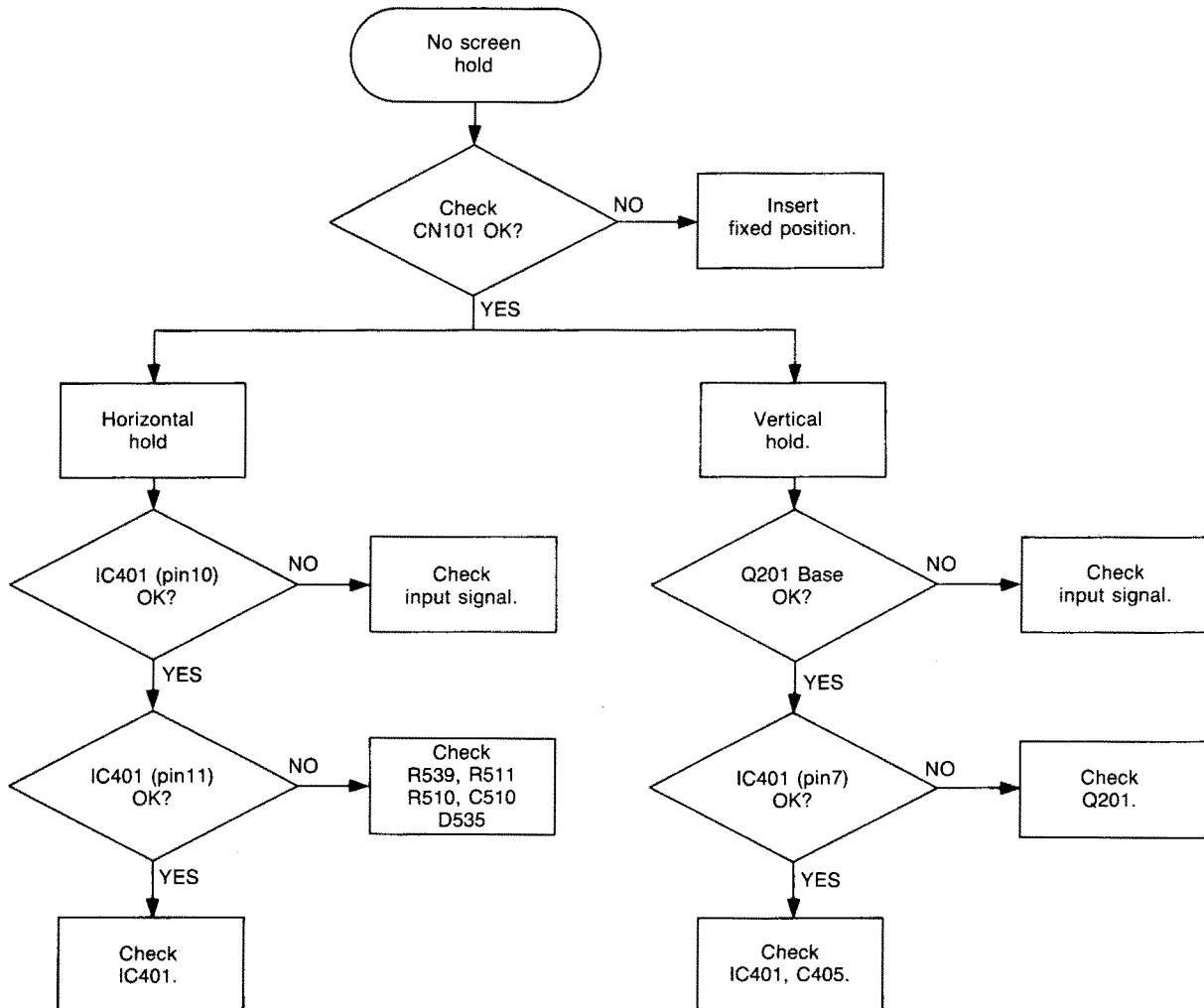
⚠ WARNING: NEVER allow measuring equipment to touch the high voltage check point. High voltage must be confirmed by approaching the check point with the probe of an oscilloscope.



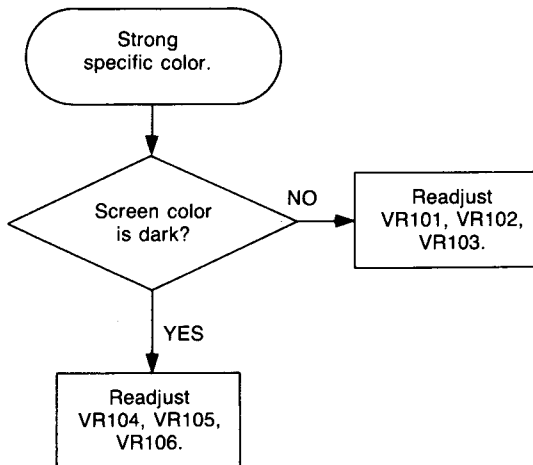
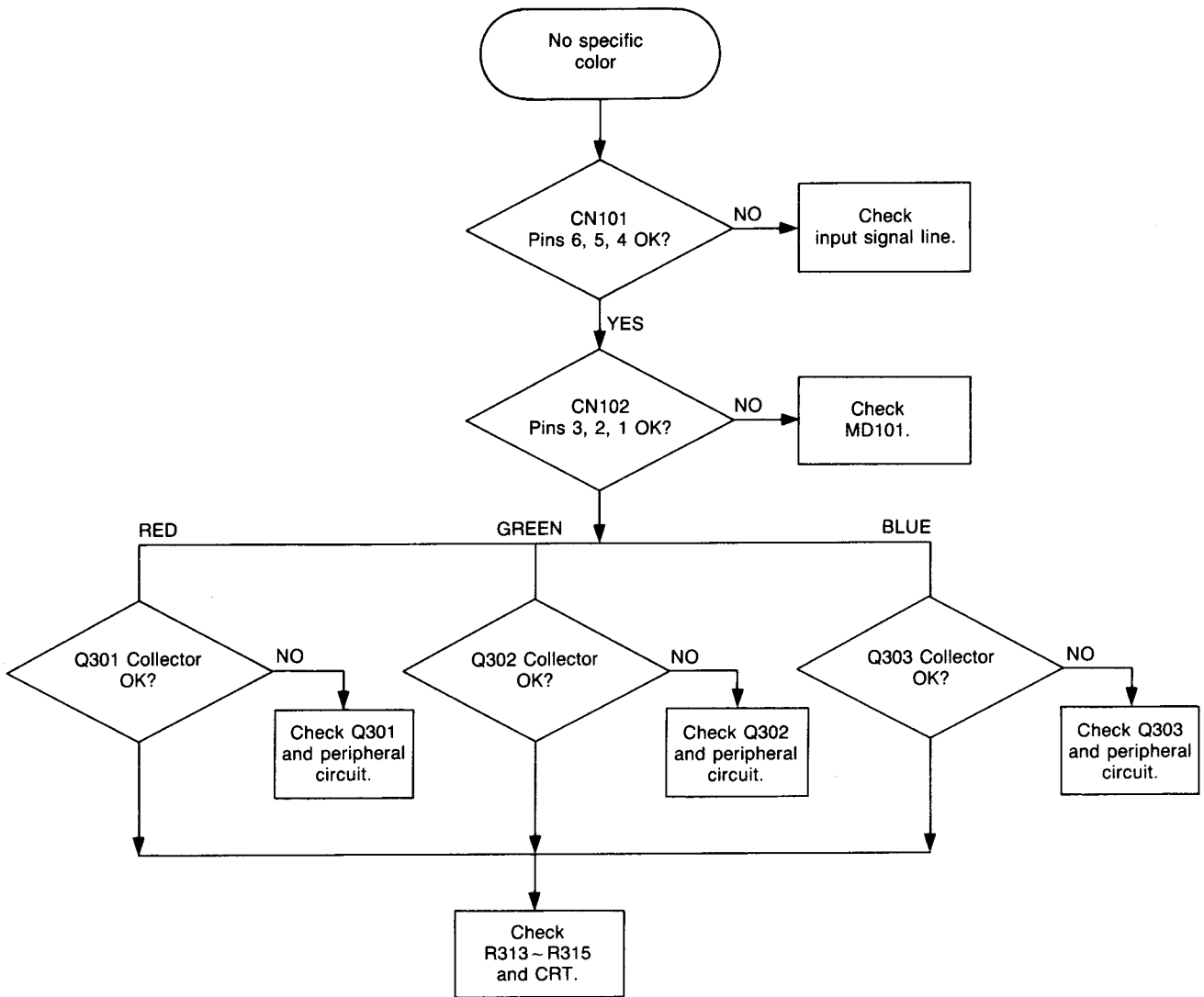
3-2-2 WHEN SCREEN SIZE IS INCORRECT.



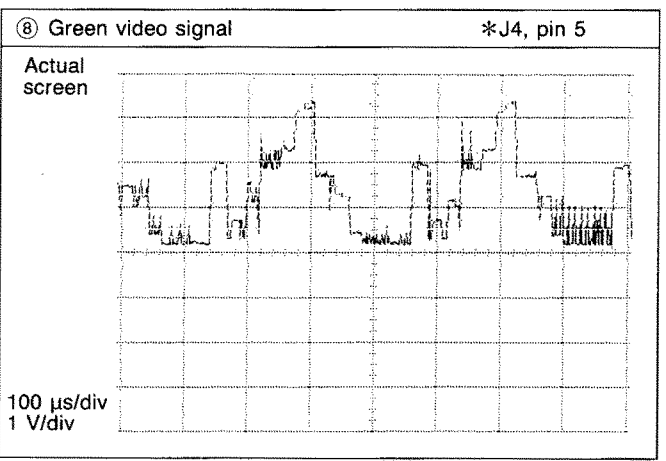
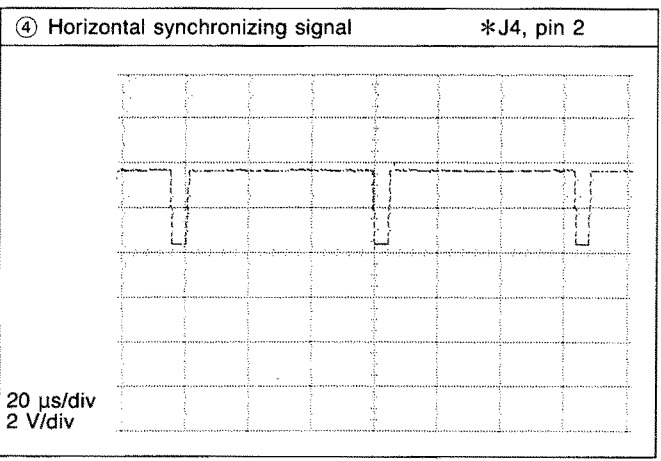
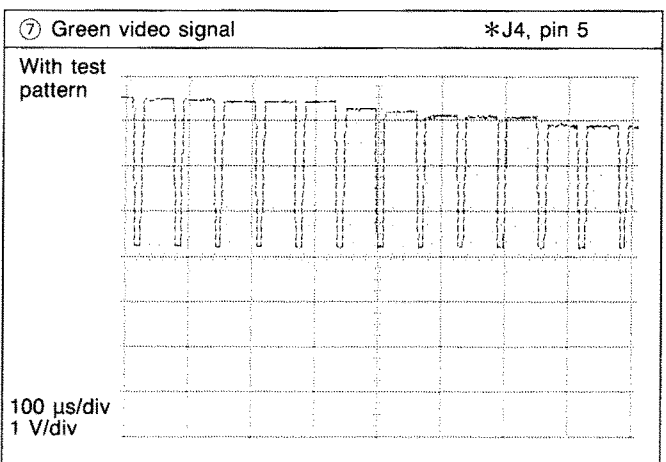
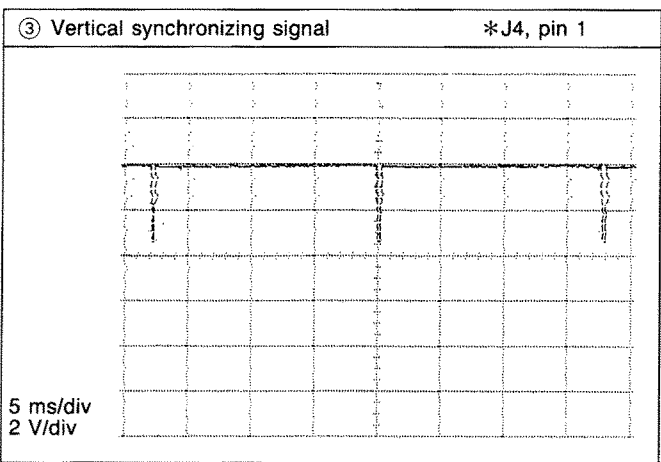
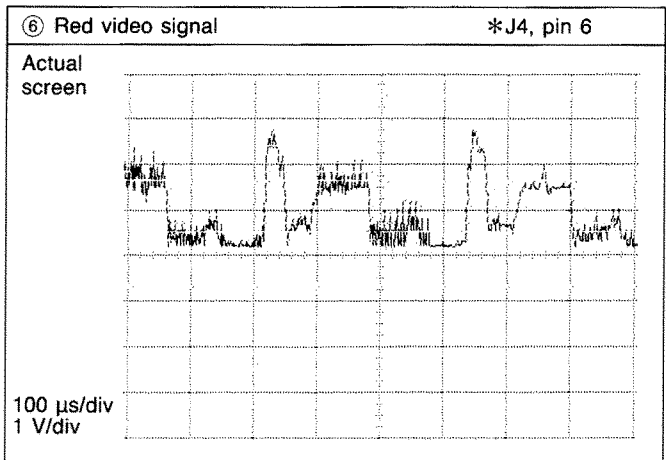
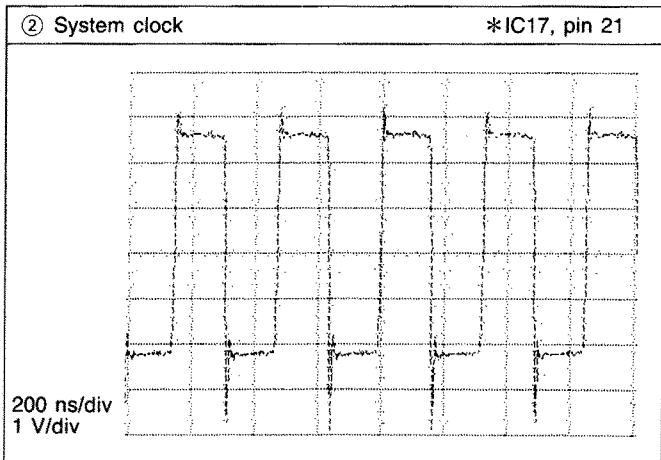
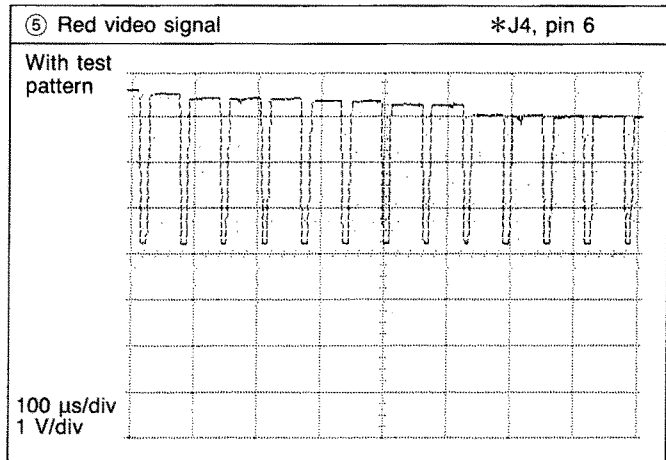
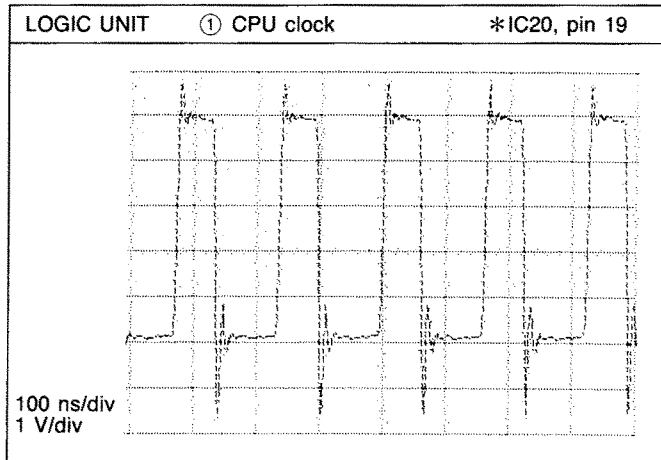
3-2-3 WHEN SCREEN DISPLAY IS NOT HOLDING.

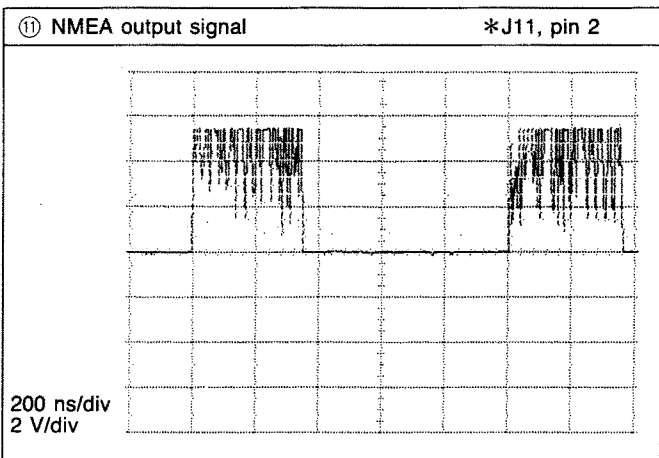
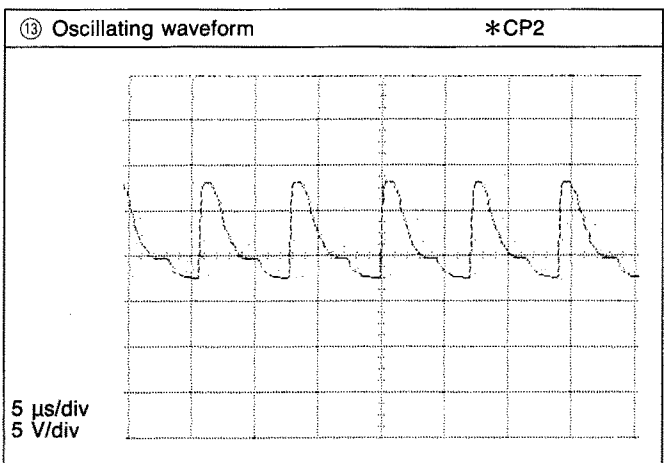
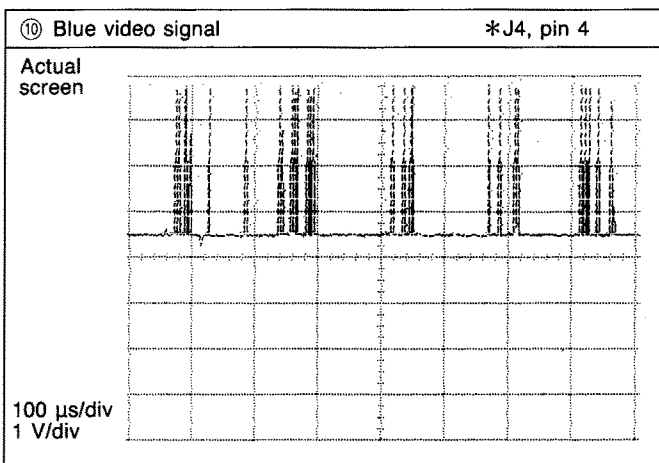
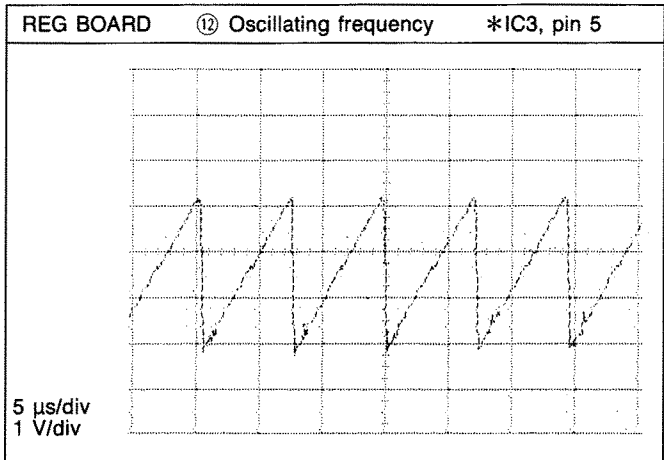
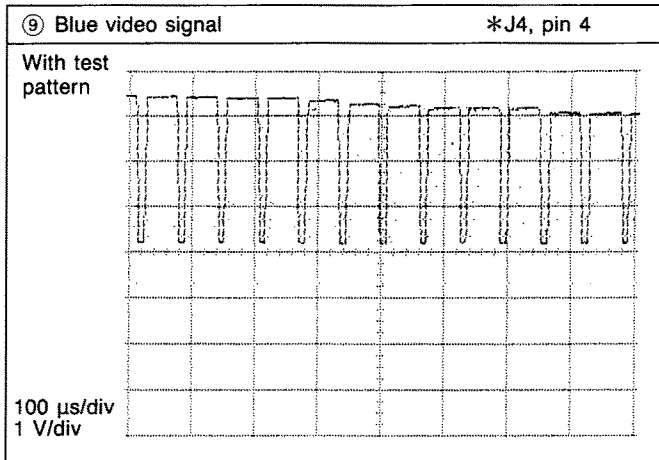


3-2-4 WHEN COLOR IS INCORRECT.



SECTION 4 SIGNAL DESCRIPTIONS



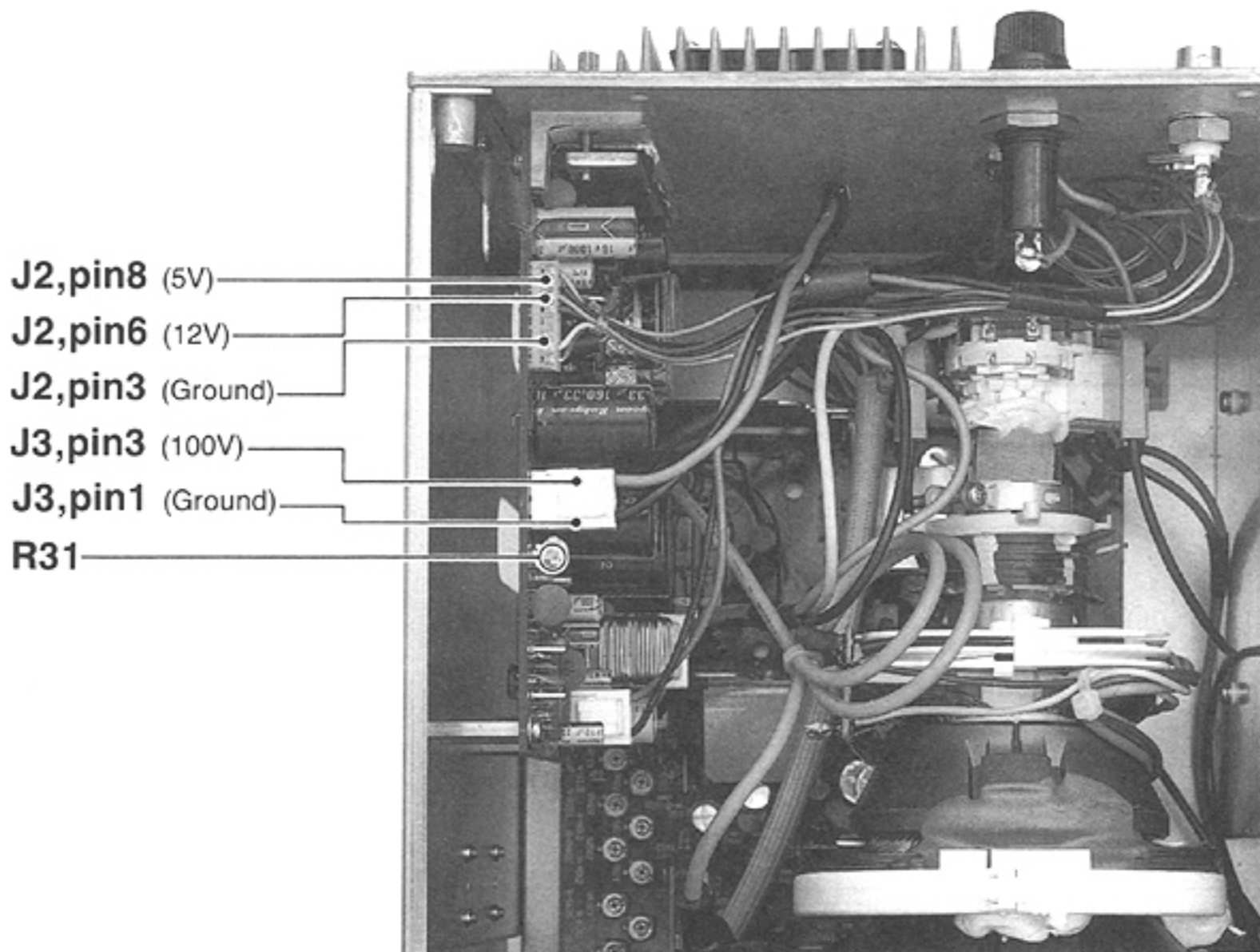


SECTION 5 ADJUSTMENT PROCEDURES

REG UNIT ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT		
		UNIT	LOCATION		UNIT	ADJUST	
OUTPUT VOLTAGE	1	REG	• Power switch : ON • Connect the DC voltmeter to J3 on the REG unit.	Pin3 : + Pin1 :-	100V	REG	R31
	2		• Connect the DC votmeter to J2 on the REG unit.	Pin8 :+ Pin3 :-	5 V \pm 0.5 V (pin 8)		Verify
				Pin6 :+ Pin3 :-	12 V \pm 1.0 V (pin 6)		Verify

Voltage check points



SECTION 6 RX-826 OPTION INSTALLATION

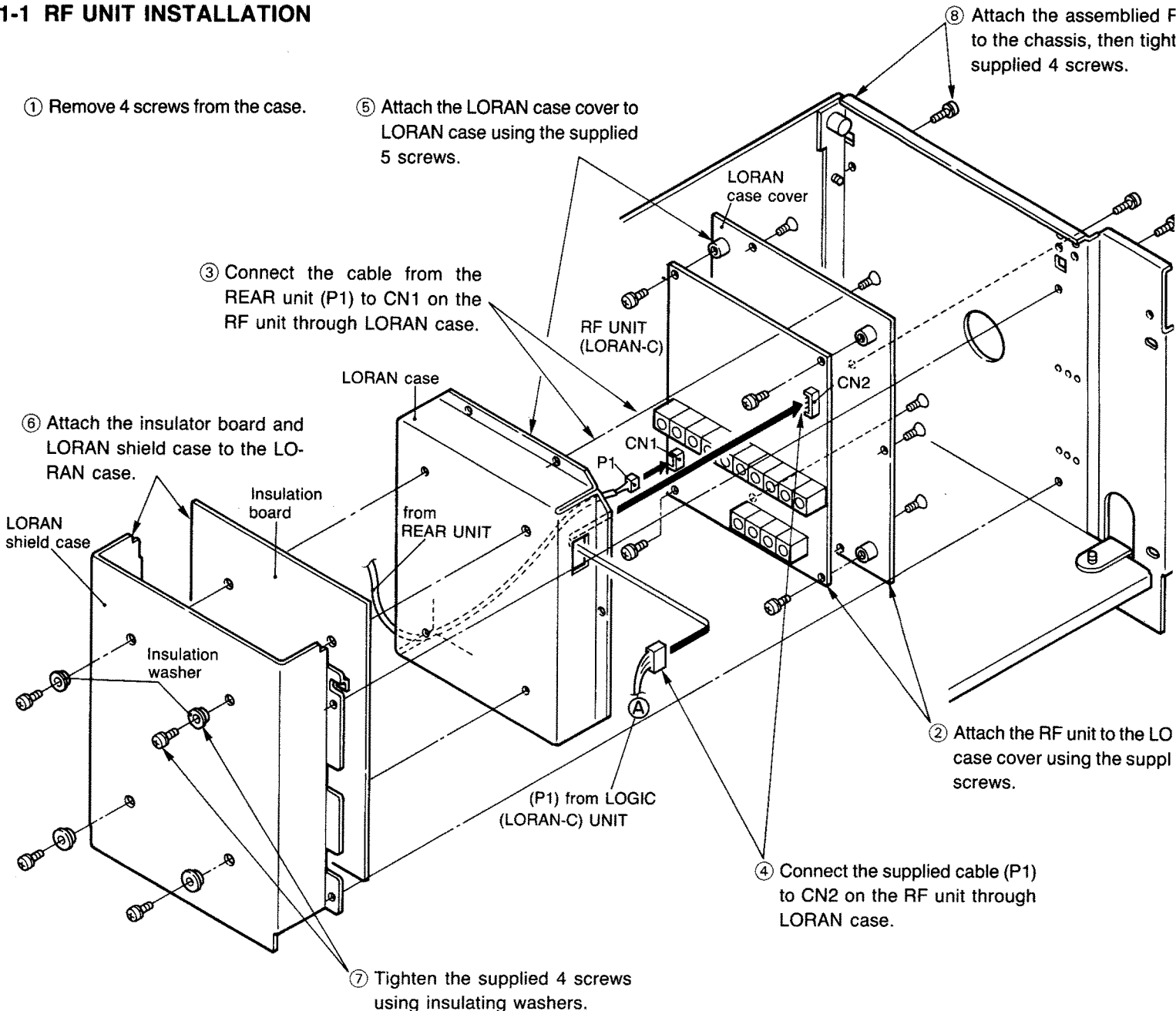
6-1 INSTALLATION

Some versions are equipped with this unit prior to sale.

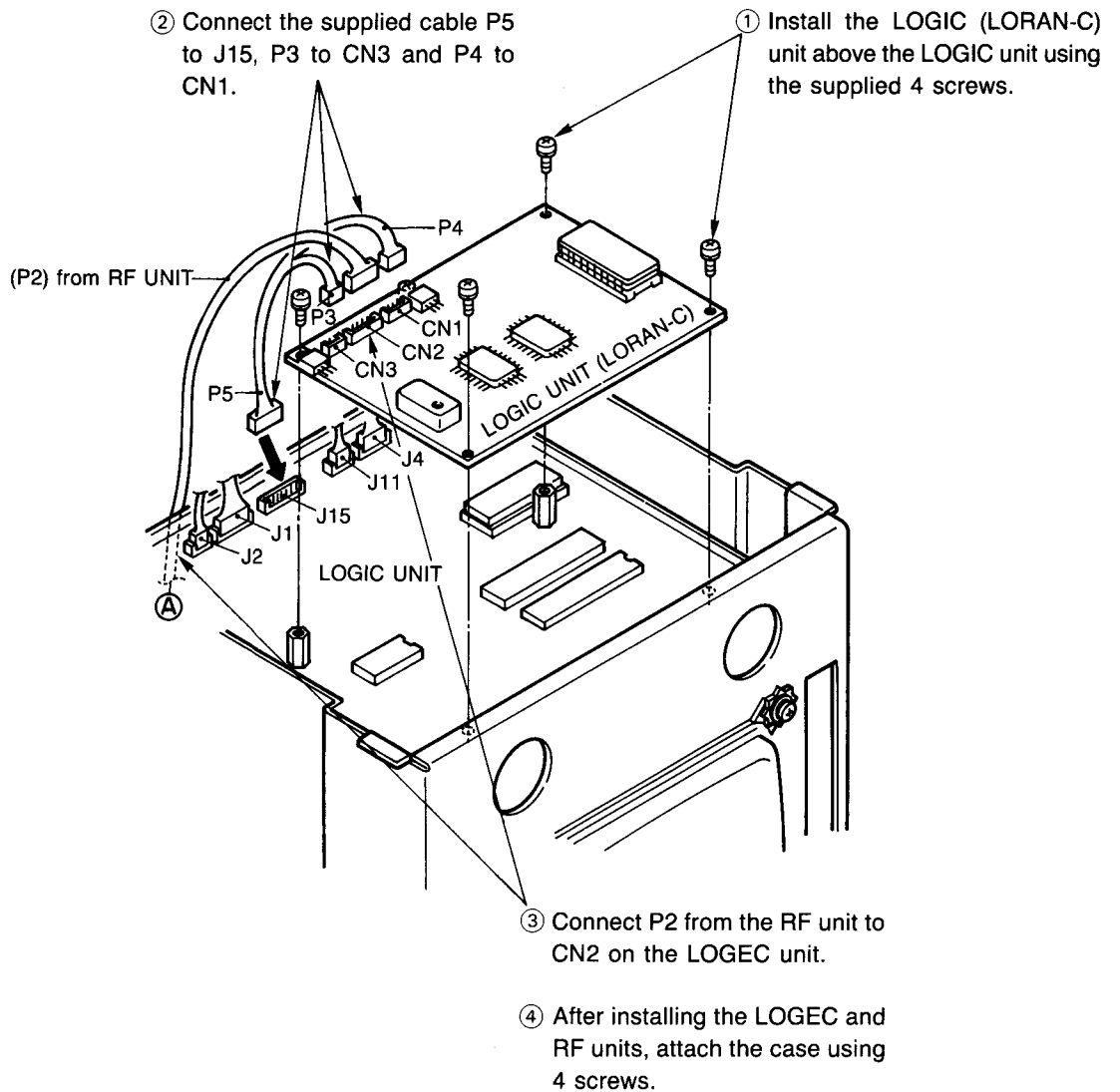
• SUPPLIED ACCESSORIES

①	Insulation board	1	⑦	Connector A	1
②	LORAN case cover	1	⑧	Connector B	1
③	LORAN shield case	1	⑨	Insulation washer	4
④	LORAN case	1	⑩	RF unit	1
⑤	Setscrew A M3 x 6	16	⑪	LOGIC unit	1
⑥	Screw PH M3 x 6	5	⑫	Connection cable	2

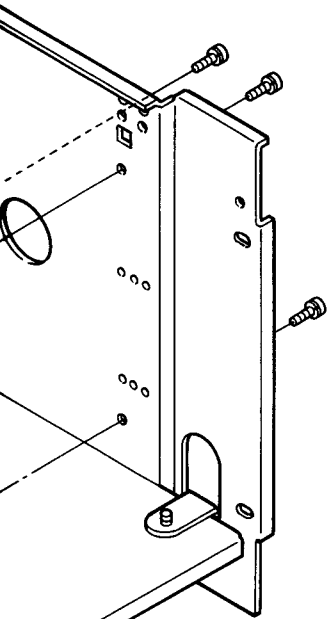
6-1-1 RF UNIT INSTALLATION



6-1-2 LOGIC UNIT INSTALLATION



Attach the assembled RF unit to the chassis, then tighten the supplied 4 screws.



Attach the RF unit to the LORAN case cover using the supplied 4 screws.

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t through

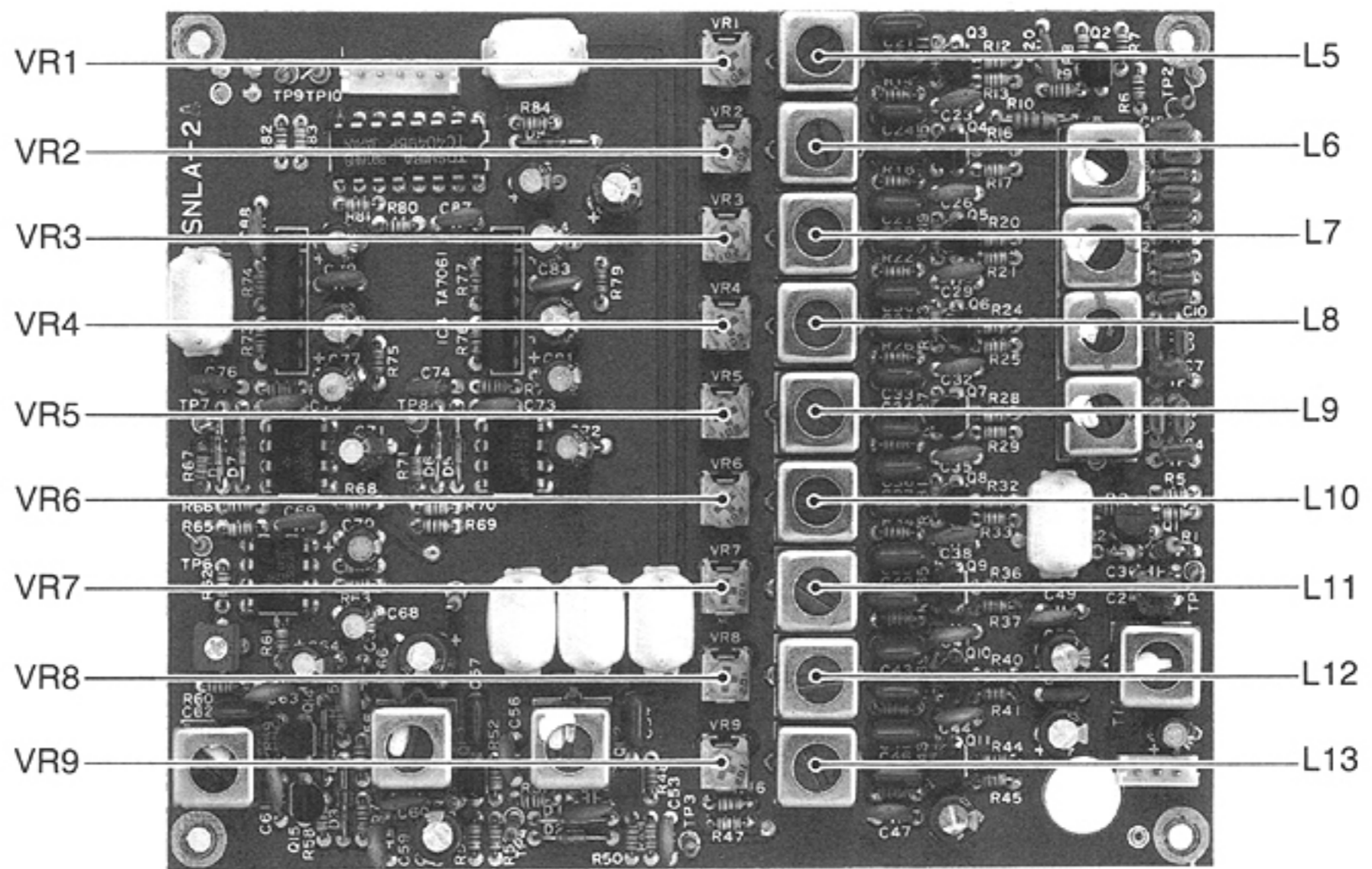
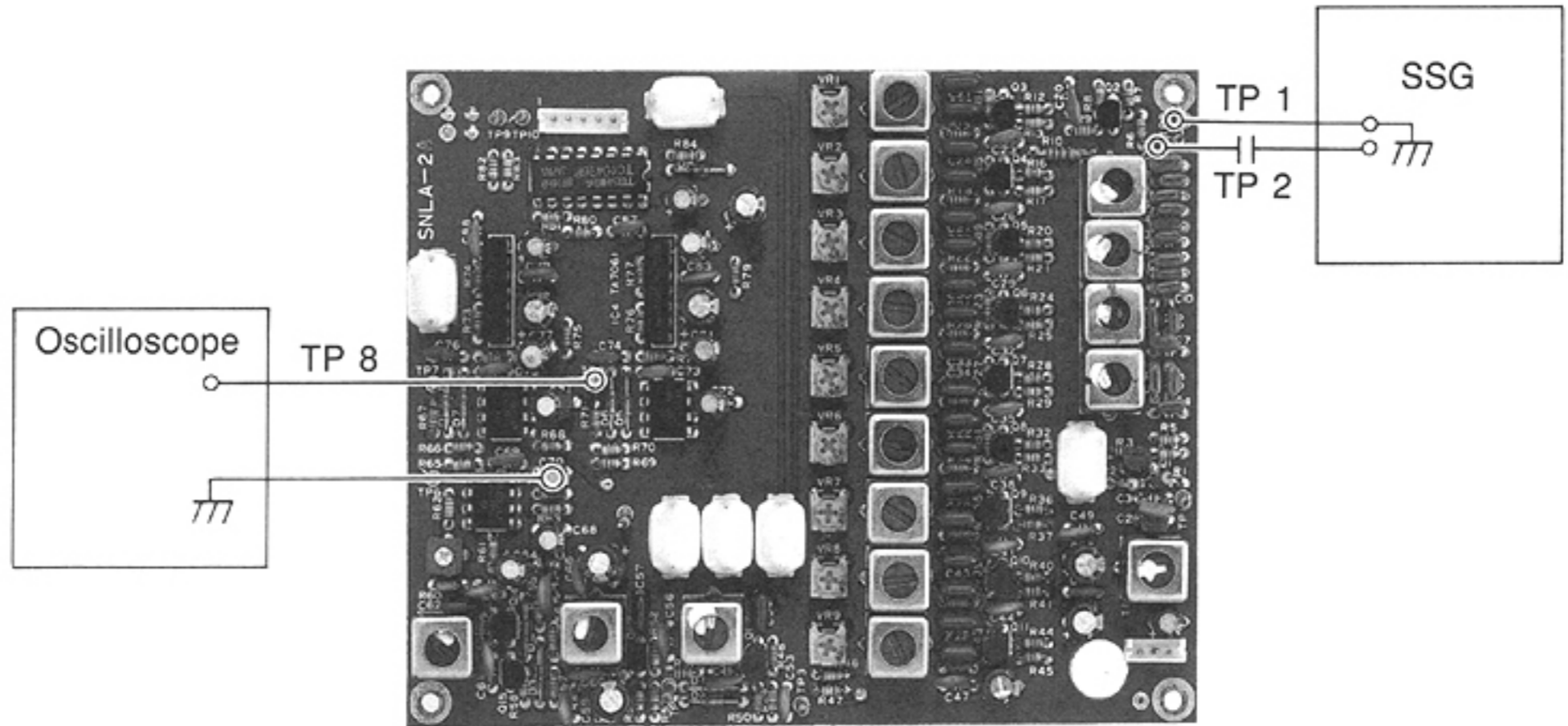
6-1-3 ANTENNA COUPLER MOUNTING

- ① Connect the antenna coupler connector to the ANTENNA CONNECTOR on the rear panel.
- ② For antenna coupler mounting, see the instruction manual [ANTENNA MOUNT].

6-2 NOTCH FILTER ADJUSTMENT (RF UNIT)

ADJUSTMENT	ADJUSTMENT CONDITIONS		UNIT	VALUE	ADJUSTMENT POINT	
					UNIT	ADJUST
NOTCH FILTER	1	<ul style="list-style-type: none"> • Connect the signal generator to TP1 and TP2 through the condenser (0.1 μF). • Connect the oscilloscope to TP8 and ground. 	RF	Adjust the voltage waveform minimum.		
	2	<ul style="list-style-type: none"> • Set the signal generator; 112.5 kHz (EUR) 113.2 kHz (USA) 			RF	VR1, L5
	3	<ul style="list-style-type: none"> • Set the signal generator; 127.5 kHz (EUR) 122.5 kHz (USA) 				VR2, L6
	4	<ul style="list-style-type: none"> • Set the signal generator; 71.0 kHz (EUR) 73.6 kHz (USA) 				VR3, L7
	5	<ul style="list-style-type: none"> • Set the signal generator; 113.2 kHz (EUR) 114.3 kHz (USA) 				VR4, L8
	6	<ul style="list-style-type: none"> • Set the signal generator; 84.2 kHz (EUR) 76.4 kHz (USA) 				VR5, L9
	7	<ul style="list-style-type: none"> • Set the signal generator; 114.0 kHz (EUR) 115.3 kHz (USA) 				VR6, L10
	8	<ul style="list-style-type: none"> • Set the signal generator; 85.0 kHz (EUR) 88.0 kHz (USA) 				VR7, L11
	9	<ul style="list-style-type: none"> • Set the signal generator; 114.5 kHz (EUR) 119.8 kHz (USA) 				VR8, L12
	10	<ul style="list-style-type: none"> • Set the signal generator; 85.5 kHz (EUR) 85.4 kHz (USA) 				VR9, L13
					NOTE: Adjust the signal generator output level constantly to show the oscilloscope waveform.	

● RF UNIT



SECTION 7 PARTS LIST

[ACC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
F1	5210000060	Fuse	FGB 5A
W1	8900002810	OPC-Cable	OPC-275

[DISP-A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
DS1	5070000021	CRT	MC-818DM2

[FRONT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
EP1	6910005000	Track ball	TRA-101B
EP2	6910000630	Bead core	FSOH070RN

[SW UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
D1	1710000160	Diode	1SS133
D2	1710000160	Diode	1SS133
D3	1710000160	Diode	1SS133
D4	1710000160	Diode	1SS133
R1	7010004170	Resistor	R20J 680Ω
R2	7010004170	Resistor	R20J 680Ω
R3	7010004170	Resistor	R20J 680Ω
R4	7010004170	Resistor	R20J 680Ω
R5	7010004170	Resistor	R20J 680Ω
R6	7010004170	Resistor	R20J 680Ω
R7	7010004170	Resistor	R20J 680Ω
R8	7010004170	Resistor	R20J 680Ω
DS1	5040000820	LED	SLN-210MC
DS2	5040000820	LED	SLN-210MC
DS3	5040000820	LED	SLN-210MC
DS4	5040000820	LED	SLN-210MC
DS5	5040000820	LED	SLN-210MC
DS6	5040000820	LED	SLN-210MC
DS7	5040000820	LED	SLN-210MC
DS8	5040000820	LED	SLN-210MC
S1	2260000720	Switch	SKHKAA064A
S2	2260000720	Switch	SKHKAA064A
S3	2260000720	Switch	SKHKAA064A
S4	2260000720	Switch	SKHKAA064A
S5	2260000720	Switch	SKHKAA064A
S6	2260000720	Switch	SKHKAA064A
S7	2260000720	Switch	SKHKAA064A
S8	2260000720	Switch	SKHKAA064A
S9	2260000720	Switch	SKHKAA064A
S10	2260000720	Switch	SKHKAA064A
S11	2260000720	Switch	SKHKAA064A
S12	2260000720	Switch	SKHKAA064A
S13	2260000720	Switch	SKHKAA064A
S14	2260000720	Switch	SKHKAA064A
SP1	2520000060	Piezo buzzer	EFBRD24C01B
EP2	6910000640	Bead core	FSOH090RN
EP3	6910000630	Bead core	FSOH070RN

[CARD UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7410000180	Array	RMX-8 103K
R2	7410000180	Array	RMX-8 103K
R3	7410000180	Array	RMX-8 103K
R4	7410000180	Array	RMX-8 103K
C1	4040000260	Barrier Layer	UZE 08X 104M
C2	4510002730	Electrolytic	10 SS 100μF
C3	4040000260	Barrier Layer	UZE 08X 104M
C4	4510002730	Electrolytic	10 SS 100μF
J5	2610000270	Crystal Socket	MCH38S-L
J6	2610000270	Crystal Socket	MCH38S-L

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130005050	IC	TC51832SPL-10
IC2	1130005050	IC	TC51832SPL-10
IC3	1130005050	IC	TC51832SPL-10
IC4	1120001850	IC	M74LS640-1P
IC5	1120001850	IC	M74LS640-1P
IC6	1120001850	IC	M74LS640-1P
IC9	1120001840	IC	M74LS166AP
IC10	1120001840	IC	M74LS166AP
IC11	1120001800	IC	M74ALS157P
IC12	1120001870	IC	RTC-62421A
IC13	1130005001	IC	μPD27C1000AD
IC14	1130005520	IC	HM62256LP12SLE
IC16	1120001820	IC	M74LS14P
IC17	1130005030	IC	HD6445P4
IC18	1130005530	IC	EPL16RP4BP
IC20	1140001550	IC	μPD70108C-8
IC21	1130004960	IC	CXD1500Q
IC23	1110002280	IC	MB89371APF-G-BND
IC24	1120001840	IC	M74LS166AP
IC25	1120001800	IC	M74ALS157P
IC26	1120001830	IC	M74LS38P
IC27	1130005610	IC	EPL16P8BP
IC28	1130005610	IC	EPL16P8BP
IC29	1110002270	IC	TL7705CP-B
IC30	1170000160	IC	TLP521-2
IC32	1120001800	IC	M74ALS157P
IC33	1120001800	IC	M74ALS157P
IC34	1130004970	IC	μPD4701AC
IC35	1120001620	IC	M74ALS74AP
IC37	1120001860	IC	M54578P
IC39	1120001770	IC	M74ALS02P
IC44	1120001810	IC	M74ALS373P
IC45	1120001790	IC	M74ALS138P
IC46	1120001780	IC	M74ALS137P
Q1	1530000040	Transistor	2SC1815-Y
Q2	1530000040	Transistor	2SC1815-Y
Q4	1510000070	Transistor	2SA1048-Y
Q5	1530000040	Transistor	2SC1815-Y
Q6	1510000070	Transistor	2SA1048-Y
D1	1160000010	Diode array	DAN401
D2	1710000540	Diode	1S1588
D3	1710000540	Diode	1S1588
D5	1730000550	Zener	RD3.6E B2
D6	1730000070	Zener	RD3.9E B2
D8	1710000540	Diode	1S1588
D15	1710000540	Diode	1S1588
D16	1710000540	Diode	1S1588
D17	1710000540	Diode	1S1588
D18	1710000540	Diode	1S1588

[REG UNIT]

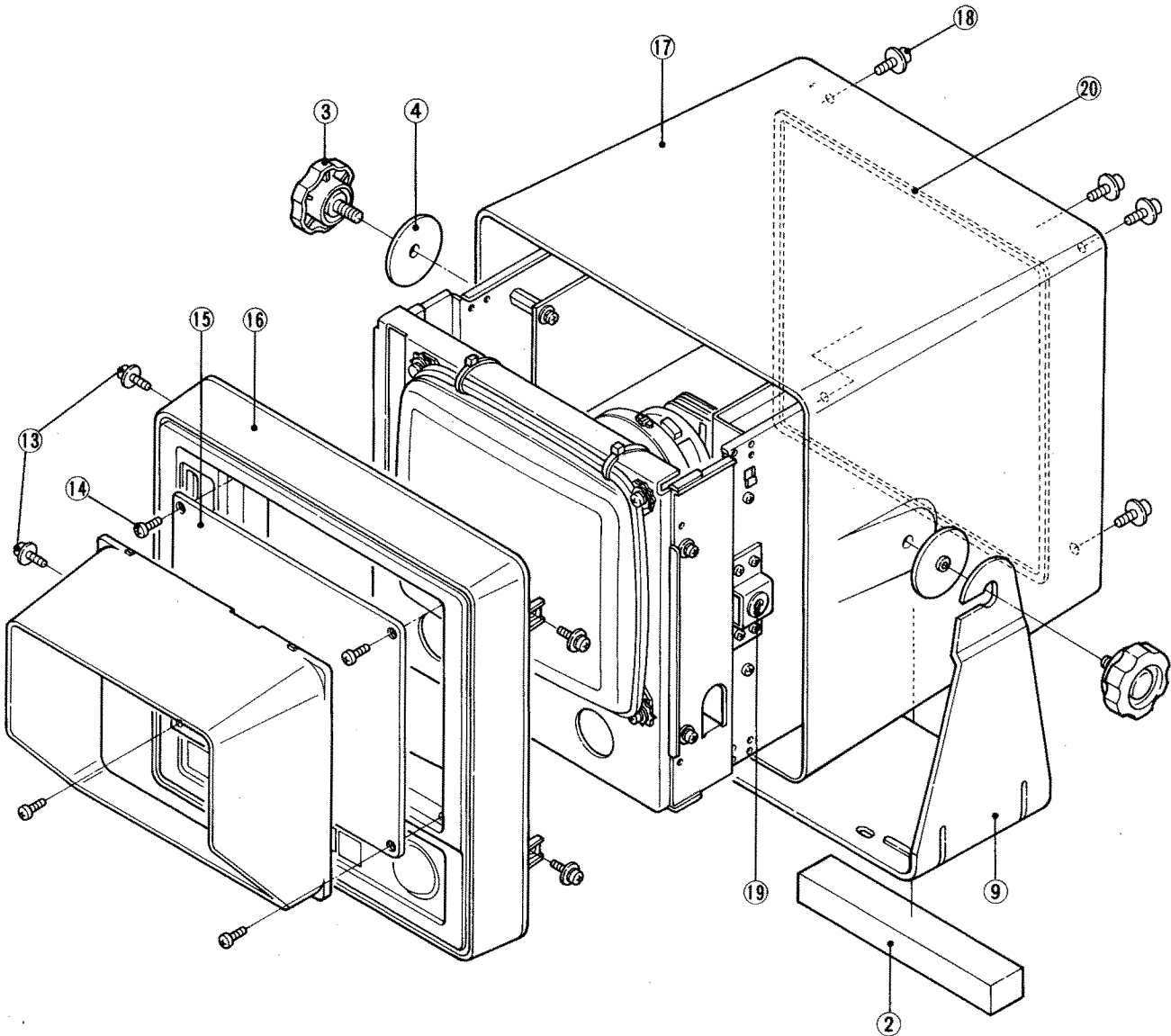
REF. NO.	ORDER NO.	DESCRIPTION	
Q9	1560000580	FET	2SK811
D1	1730000240	Zener	RD11E B2
D2	1710000160	Diode	1SS133
D3	1730000240	Zener	RD11E B2
D4	1710000160	Diode	1SS133
D5	1790000880	Diode	31DQ05
D6	1790000770	Diode	RG-2Z
D8	1790000760	Diode	RG-2A
D9	1710000010	Diode	15CD11
D11	1790000760	Diode	RG-2A
L1	6190000640	Coil	TF2528S-102Y5R0-01
L2	6170000110	Coil	LW-12A
L4	6170000110	Coil	LW-12A
T1	5920000370	Transformer	TO-23
R1	7010003620	Resistor	ELR20J 47k Ω
R2	7010003530	Resistor	ELR20J 10k Ω
R3	7010003660	Resistor	ELR20J 100k Ω
R4	7010003530	Resistor	ELR20J 10k Ω
R5	7010003530	Resistor	ELR20J 10k Ω
R6	7010004320	Resistor	R20J 10k Ω
R7	7010003530	Resistor	ELR20J 10k Ω
R8	7010003490	Resistor	ELR20J 5.6k Ω
R9	7010003580	Resistor	ELR20J 22k Ω
R10	7010003600	Resistor	ELR20J 33k Ω
R11	7010003530	Resistor	ELR20J 10k Ω
R12	7010003580	Resistor	ELR20J 22k Ω
R13	7010003530	Resistor	ELR20J 10k Ω
R14	7010003530	Resistor	ELR20J 10k Ω
R15	7010003580	Resistor	ELR20J 22k Ω
R16	7010003450	Resistor	ELR20J 2.7k Ω
R17	7010003490	Resistor	ELR20J 5.6k Ω
R18	7010003530	Resistor	ELR20J 10k Ω
R19	7010003360	Resistor	ELR20J 470 Ω
R20	7010003480	Resistor	ELR20J 4.7k Ω
R21	7010003590	Resistor	ELR20J 27k Ω
R22	7010003400	Resistor	ELR20J 1k Ω
R23	7010003630	Resistor	ELR20J 56k Ω
R24	7010003510	Resistor	ELR20J 6.8k Ω
R25	7010003420	Resistor	ELR20J 1.5k Ω
R26	7010004220	Resistor	R20J 1.8k Ω
R27	7010004220	Resistor	R20J 1.8k Ω
R28	7010003980	Resistor	R20J 18 Ω
R29	7010003980	Resistor	R20J 18 Ω
R31	7310003350	Trimmer	RV-179(RH0652CJ3J)222
R32	7010003650	Resistor	ELR20J 82k Ω
R34	7010004280	Resistor	R20J 5.6k Ω
R35	7540000060	Surge Absorber	ERZC05DK560
C2	4510004390	Electrolytic	50 SS 330 μ F
C3	4550000340	Tantalum	DN 1C 100M
C4	4510002810	Electrolytic	16 SS 47 μ F
C5	4510002840	Electrolytic	25 SS 10 μ F
C6	4560000010	Capacitor	D55X5T 1H 104M
C7	4510004390	Electrolytic	50 SS 330 μ F
C8	4560000010	Capacitor	D55X5T 1H 104M
C9	4560000010	Capacitor	D55X5T 1H 104M
C10	4510003030	Electrolytic	50 SS 1000 μ F
C11	4510002810	Electrolytic	16 SS 47 μ F
C12	4510003040	Electrolytic	16 SS 100 μ F
C13	4010000530	Ceramic	DD112 B 103K 50V
C14	4010004120	Ceramic	DD07 B 102K 500V
C15	4310000010	Mylar	F2D 50V 102K
C16	4310000020	Mylar	F2D 50V 103K
C17	4510004190	Electrolytic	160 MXP 270 M A25
C18	4510002820	Electrolytic	16 SS 1000 μ F
C19	4510004280	Electrolytic	25 GXB 1000 μ F
C20	4510004270	Electrolytic	25 GXB 220 μ F
C21	4510003040	Electrolytic	16 SS 100 μ F
C24	4510004200	Electrolytic	160 TWSH 33 μ F
C25	4510004200	Electrolytic	160 TWSH 33 μ F
C26	4040000260	Barrier Layer	UZE 08X 104M

[REG UNIT]

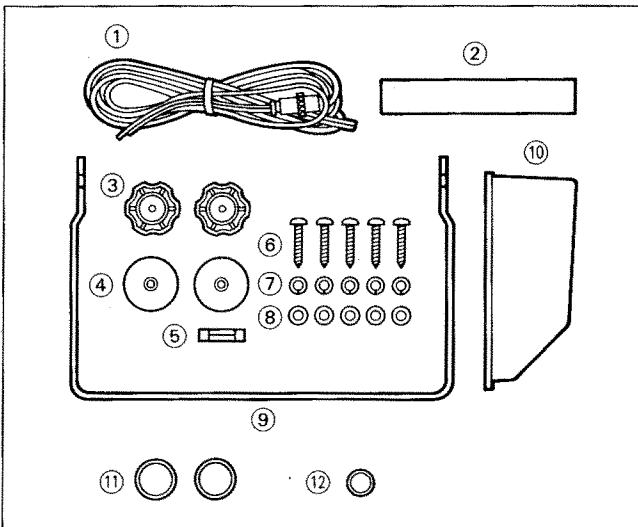
REF. NO.	ORDER NO.	DESCRIPTION	
C27	4040000260	Barrier Layer	UZE 08X 104M
C28	4040000260	Barrier Layer	UZE 08X 104M
C29	4010000520	Ceramic	DD108 B 472K 50V
C30	4010000520	Ceramic	DD108 B 472K 50V
C31	4010000520	Ceramic	DD108 B 472K 50V
C32	4010000500	Ceramic	DD104 B 102K 50V
C33	4010000500	Ceramic	DD104 B 102K 50V
C34	4010000520	Ceramic	DD108 B 472K 50V
C35	4010000500	Ceramic	DD104 B 102K 50V
J1	6510011440	Connector	B4P-VH
J3	6510011430	Connector	B3P-VH
CP1	6510003100	Check Point	RT01T-1.3B
CP2	6510003100	Check Point	RT01T-1.3B

SECTION 8 MECHANICAL PARTS DISASSEMBLY

8-1 DISASSEMBLY FOR FRONT PANEL AND CASE



• SUPPLIED ACCESORIES

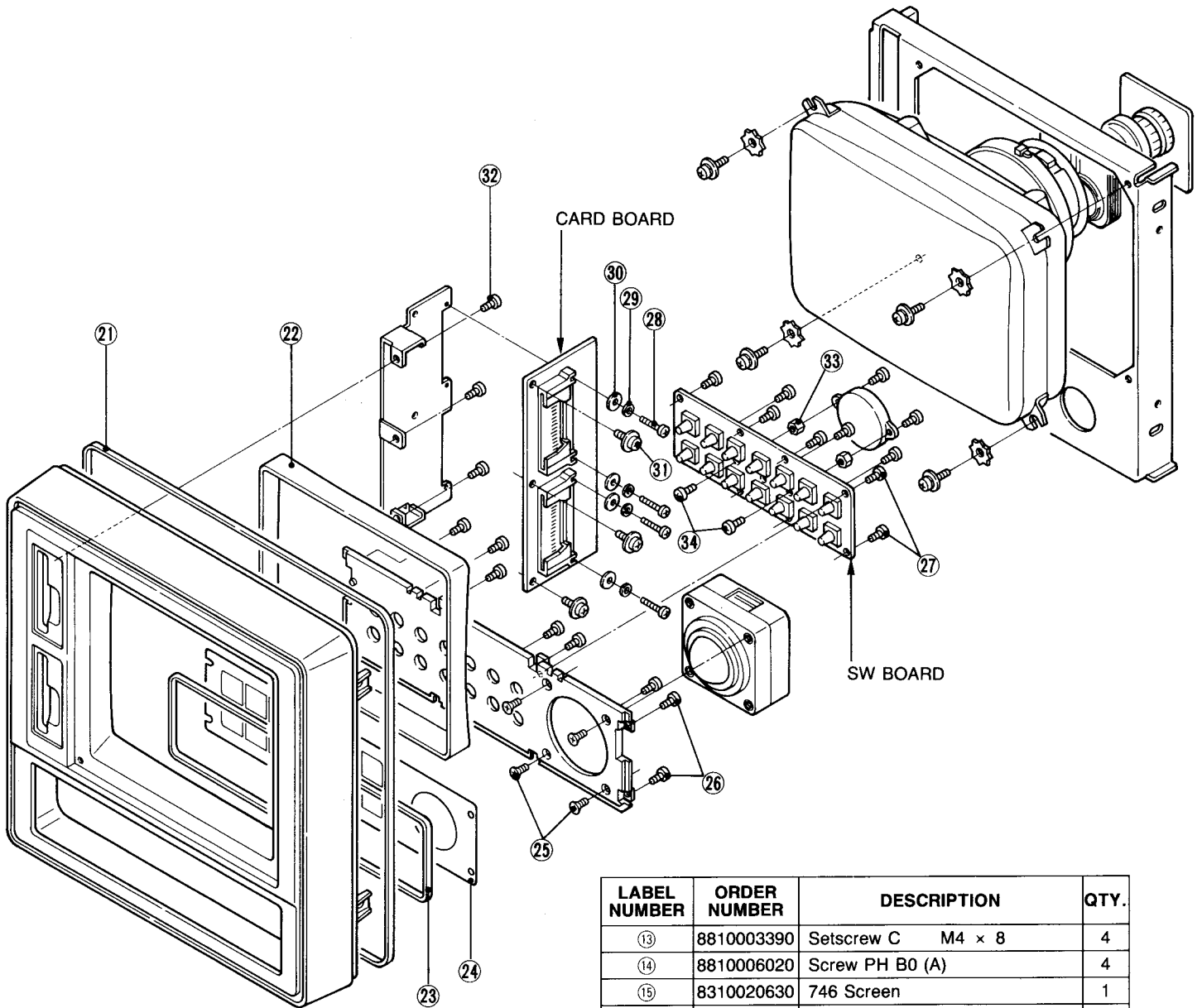


LABEL NUMBER	ORDER NUMBER	DESCRIPTION	QTY.
①	Option	OPC-275 DC power cable	1
②	8930019690	Sponge (CK)	1
③	8820000610	Mounting screw knob G2-6-20	2
④	8930015280	Bracket rubber	2
⑤	5210000060	Fuse FGB 5A	1
⑥	8810001500	Screw A M6 × 30 SUS	5
⑦	8850000510	Spring washer M6 SUS	5
⑧	8850000190	Flat washer M6 (6X13X1.0) SUS	5
⑨	8010010390	Bracket	1
⑩	8010010580	746 hood	1
⑪	8930010000	Connector cover	2
⑫	8930019500	BNC-R connector cover	1

SCREW ABBREVIATIONS

PH : Pan head FH : Flat head B0 : Self-tapping screw
 SUS : Stainless NI : Nickel BS : Brass

8-2 DISASSEMBLY FOR SWITCH AND VOLUME

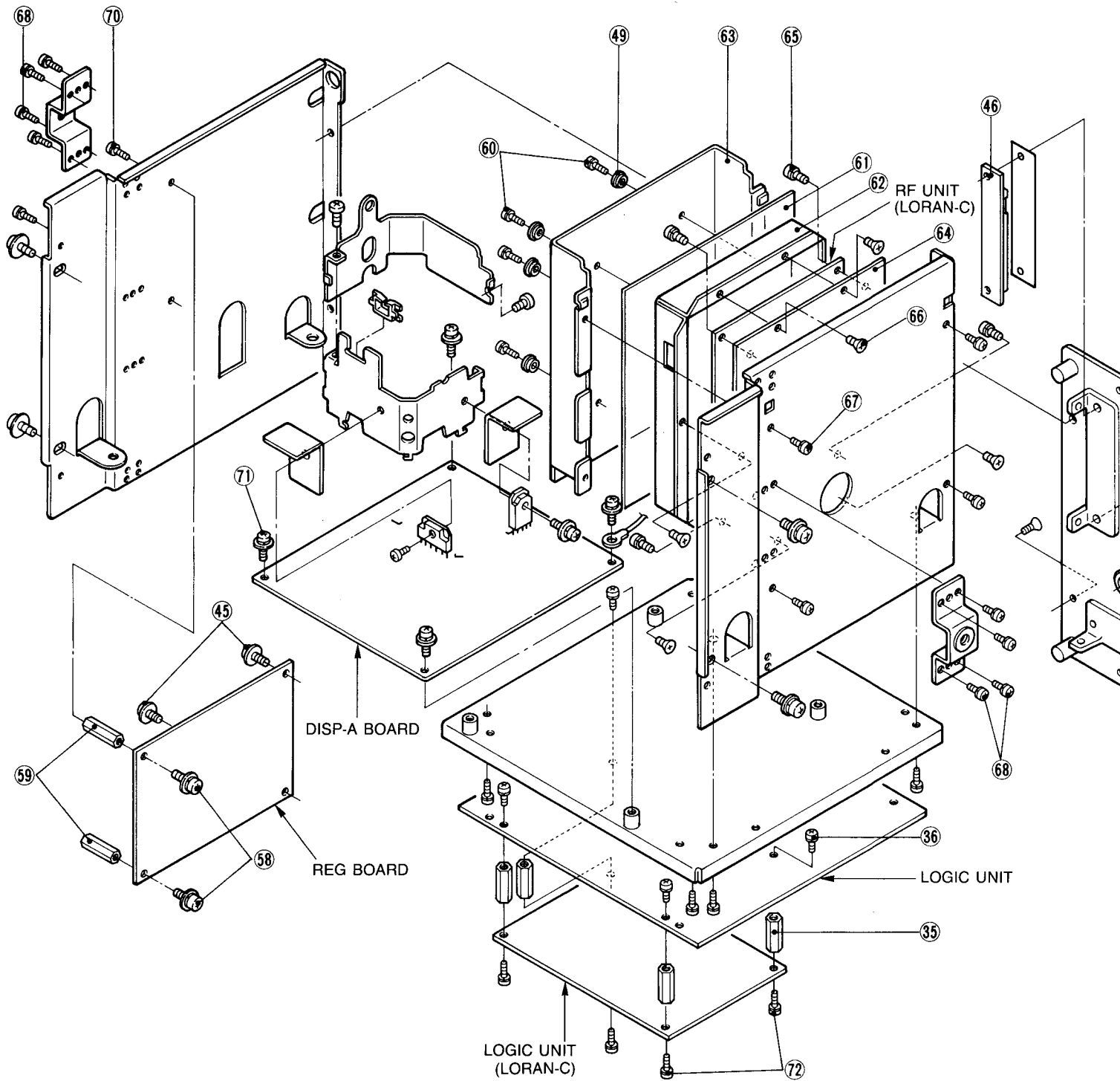


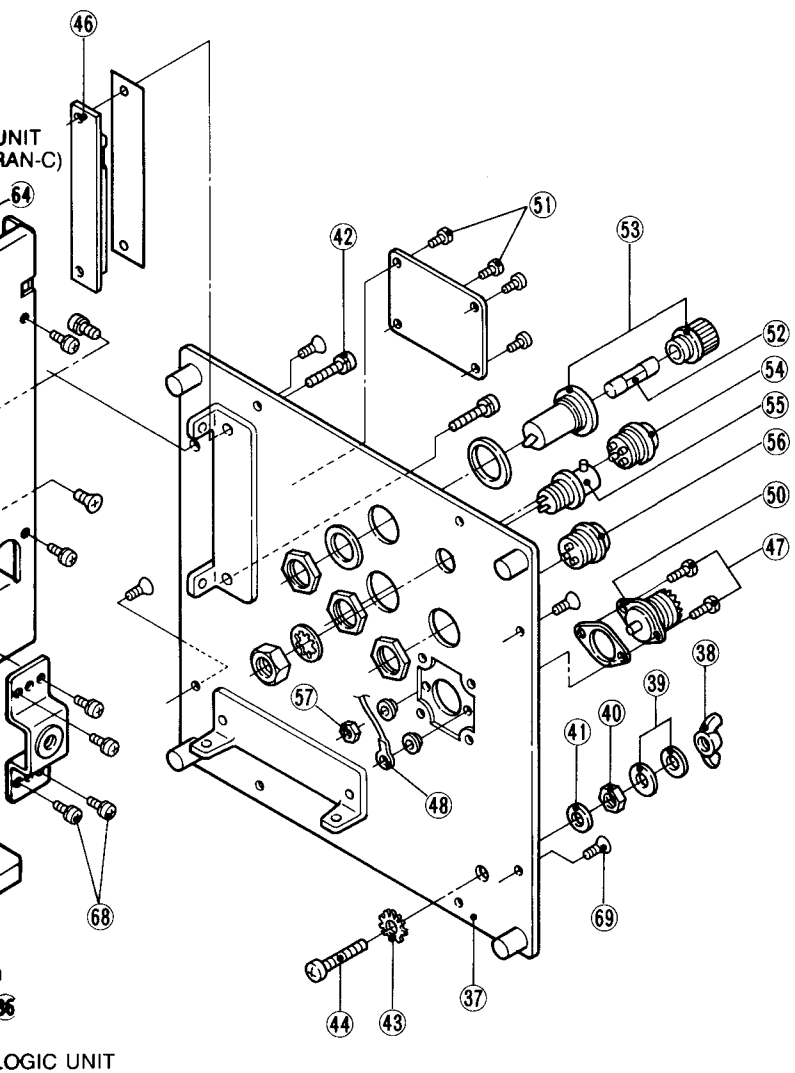
LABEL NUMBER	ORDER NUMBER	DESCRIPTION	QTY.
13	8810003390	Setscrew C M4 × 8	4
14	8810006020	Screw PH B0 (A)	4
15	8310020630	746 Screen	1
16	8210005990	746 Front panel	1
17	8010010610	749 Case	1
18	8810006320	Setscrew C M4 × 10 SUS	4
19	8930019380	746 Bracket holder	2
20	8930019200	Back panel rubber seal	1
21	8930019210	Front rubber seal	1
22	8010010620	746 Inside panel	1
23	8930019240	Keyboard rubber seal	1
24	2260001380	746 Switch board	1
25	8810002180	Screw FH M3 × 8	4
26	8810001290	Screw PH B1 M2.6 × 8	8
27	8810001290	Screw PH B1 M2.6 × 8	8
28	8810000060	Screw PH M2 × 12	4
29	8850000400	Spring washer M2 NI	4
30	8850000110	Flat washer M2 NI BS	4
31	8810003160	Setscrew A M3 × 6	3
32	8810001110	Screw PH B0 M3 × 6	3
33	8930000560	Thread spacer (F)	2
34	8810000010	Screw PH M2 × 4	4

SCREW ABBREVIATIONS

PH : Pan head FH : Flat head B0 : Self-tapping screw
 SUS : Stainless NI : Nickel BS : Brass

8-3 DISASSEMBLY FOR INSIDE PARTS



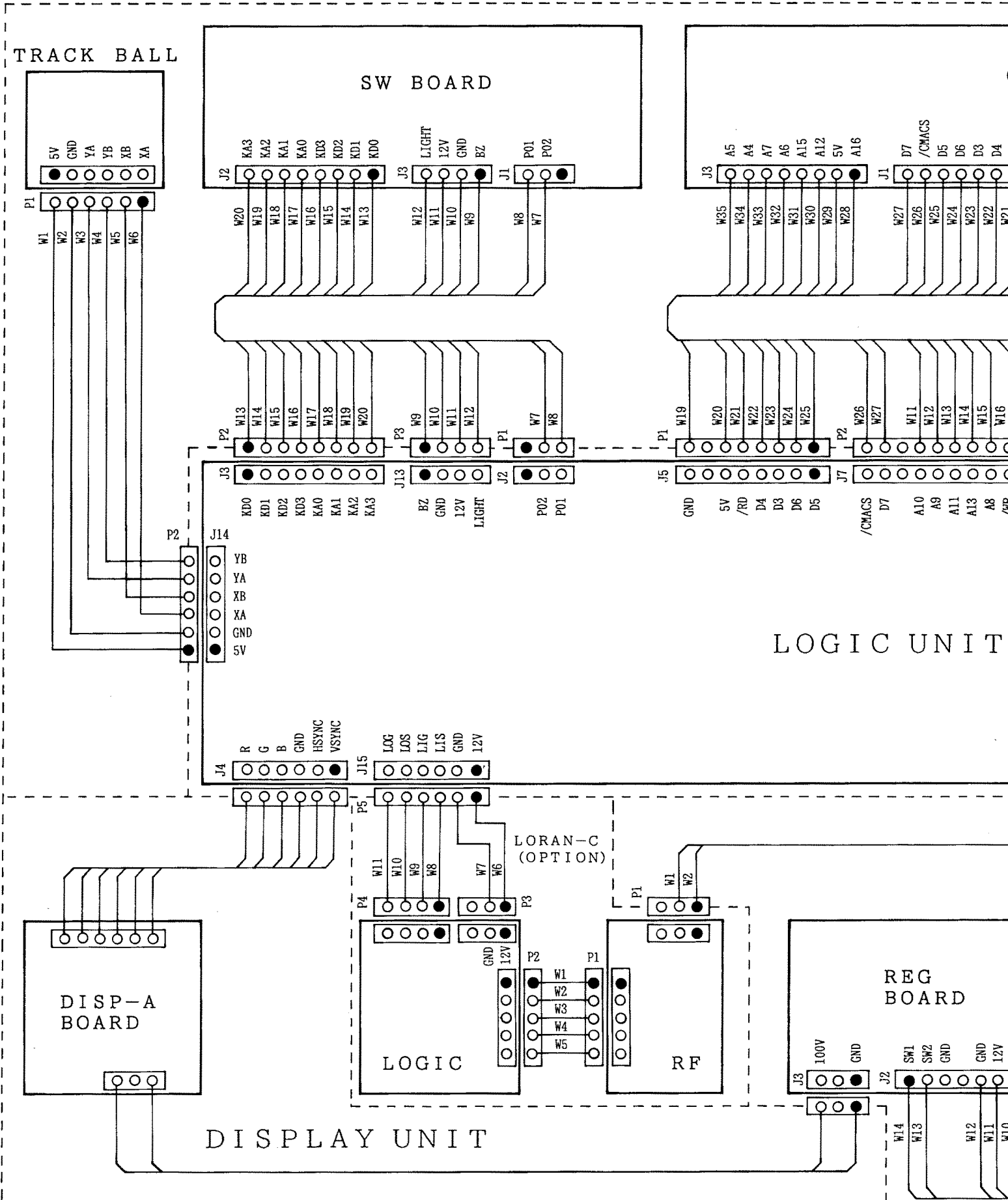


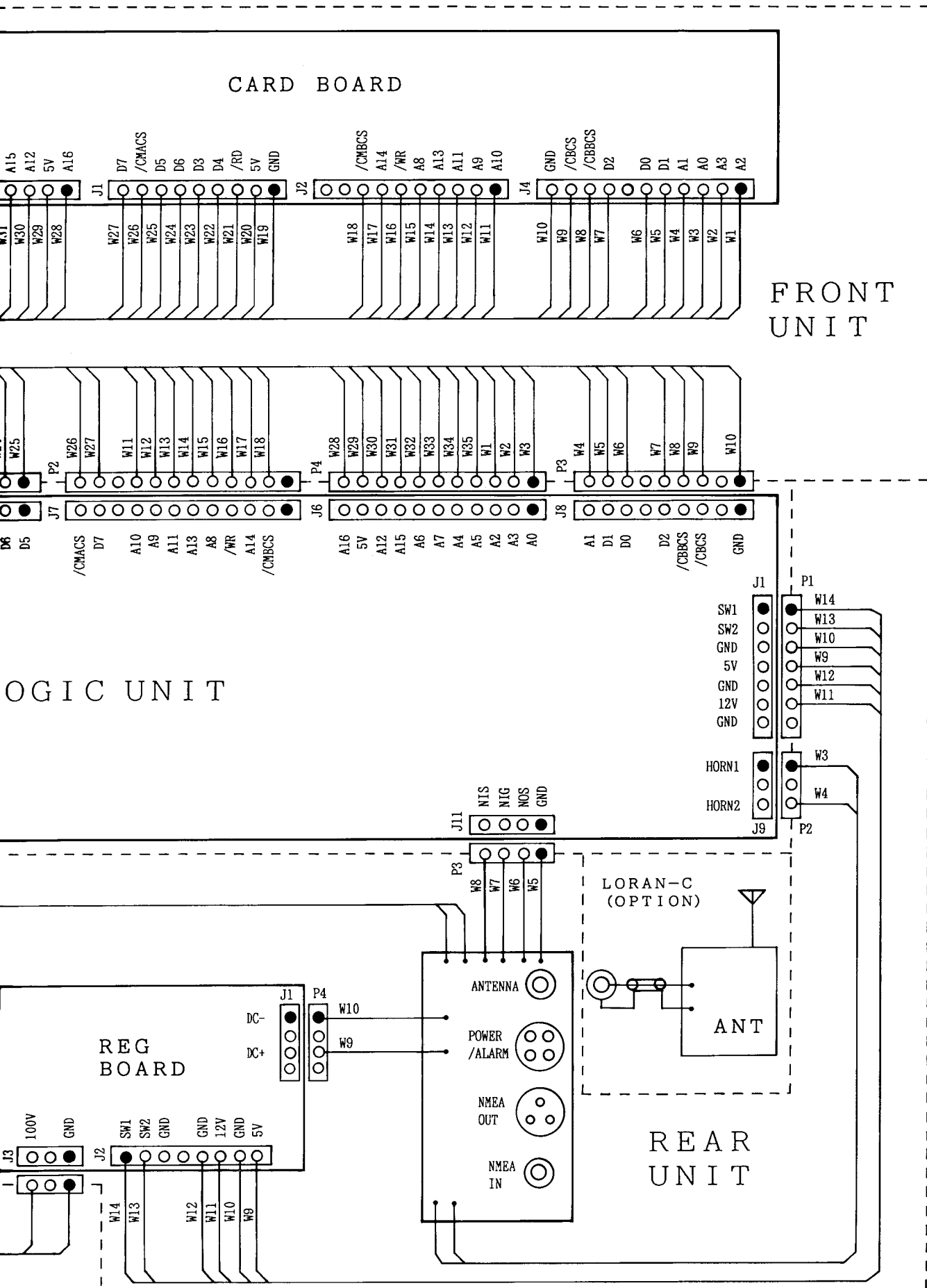
LABEL NUMBER	ORDER NUMBER	DESCRIPTION	QTY.
35	8930000670	Thread spacer (Q)	4
36	8810003160	Setscrew A M3 x 6	4
37	8010010160	746 Back panel	1
38	8830000370	Wing nut M5 SUS	1
39	8850000180	Flat washer M5 SUS	2
40	8830000250	Nut M5 SUS	1
41	8850000500	Spring washer M5 SUS	1
42	8810006350	Setscrew A M3 x 20 SUS	2
43	8850000600	Star washer M5 SUS	1
44	8810000700	Screw PH M5 x 20 SUS	1
45	8810003370	Setscrew C M3 x 8	2
46	8930019390	FET plate	1
47	8810000600	Screw PH M3 x 10 SUS	2
48	8860000580	Screw lug M3	1
49	6910000280	Insulation washer	2
50	6510000370	Antenna connector MR-DS	1
51	8810006260	Screw PH M3 x 5 SUS	4
52	5210000060	Fuse FGB 5A	1
53	5220000140	Fuse holder FH-042	1
54	6510007560	Power/alarm connector FM14-4S	1
55	6510011420	NMEA IN connector 31-10	1
56	6510012850	NMEA OUT connector NS1503 3S	1
57	8830000100	Nut M3	1
58	8810003360	Setscrew C M3 x 6	2
59	8930000520	Thread spacer (B)	2
60	8810003160	Setscrew M3 x 6	4
61	8930019320	Insulation board	1
62	8010010370	LORAN unit case	1
63	8010010360	LORAN unit shield case	1
64	8510006800	LORAN unit case cover	1
65	8810003160	Setscrew A M3 x 6	4
66	8810002170	Screw FH M3 x 6	5
67	8810003160	Setscrew A M3 x 6	4
68	8810003160	Setscrew A M3 x 6	8
69	8810002510	Screw FH M3 x 6 SUS	4
70	8810003160	Setscrew A M3 x 6	2
71	8810003360	Setscrew C M3 x 6	4
72	8810003160	Setscrew A M3 x 6	4

SCREW ABBREVIATIONS

PH : Pan head FH : Flat head B0 : Sel-tapping screw
 SUS : Stainless NI : Nickel BS : Brass

SECTION 9 CONNECTOR ASSEMBLY

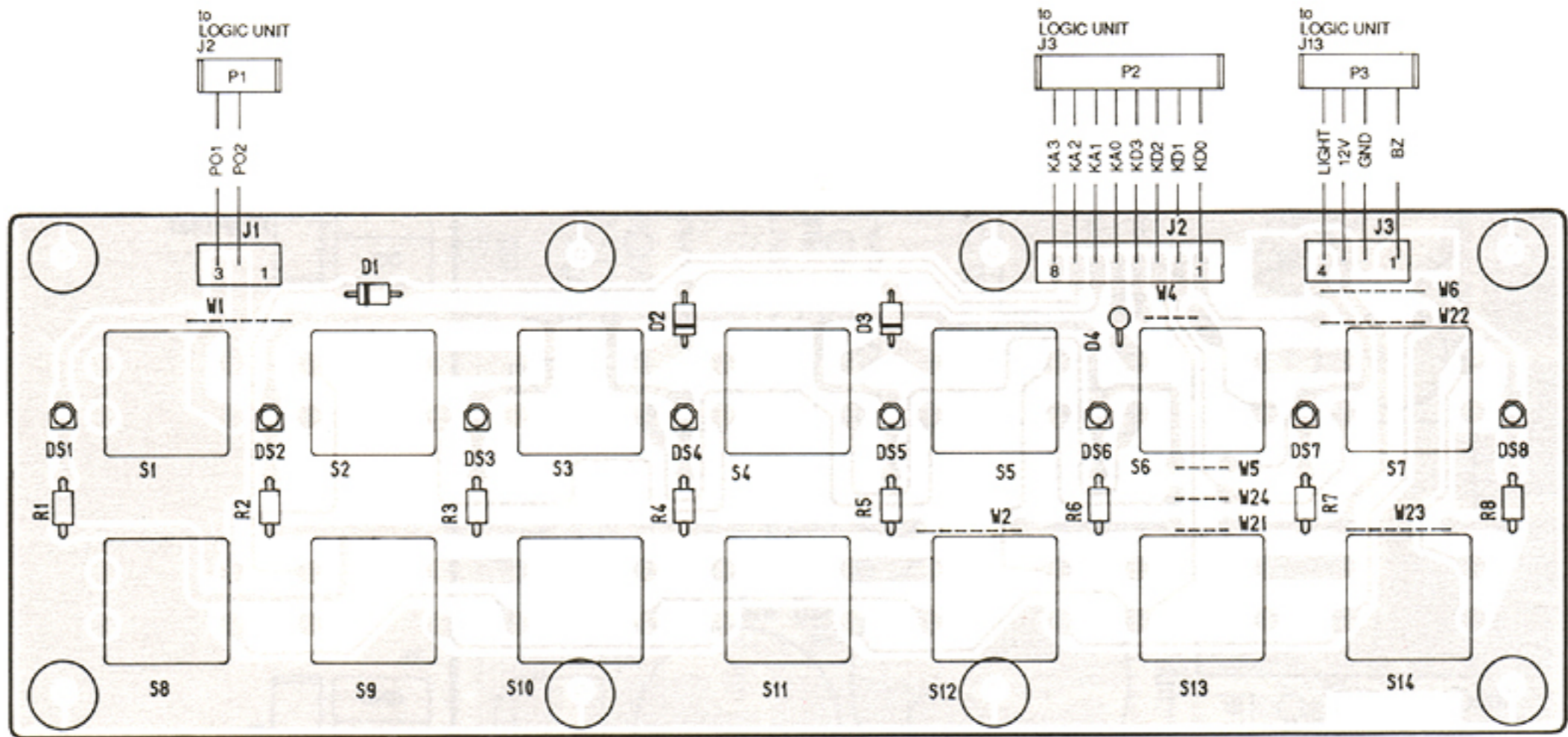




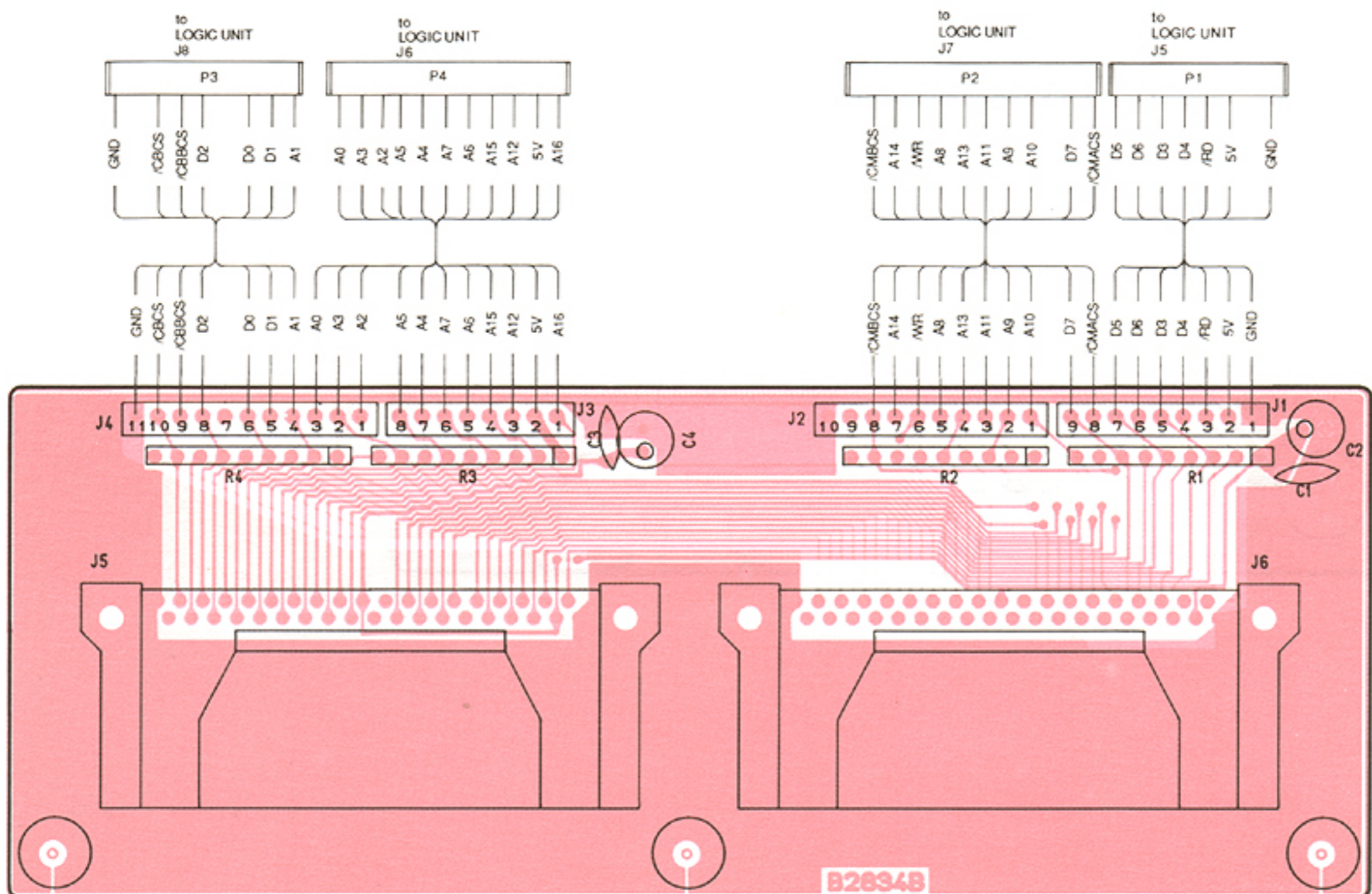
SECTION 10 BOARD LAYOUTS

10-1 SW AND CARD UNITS

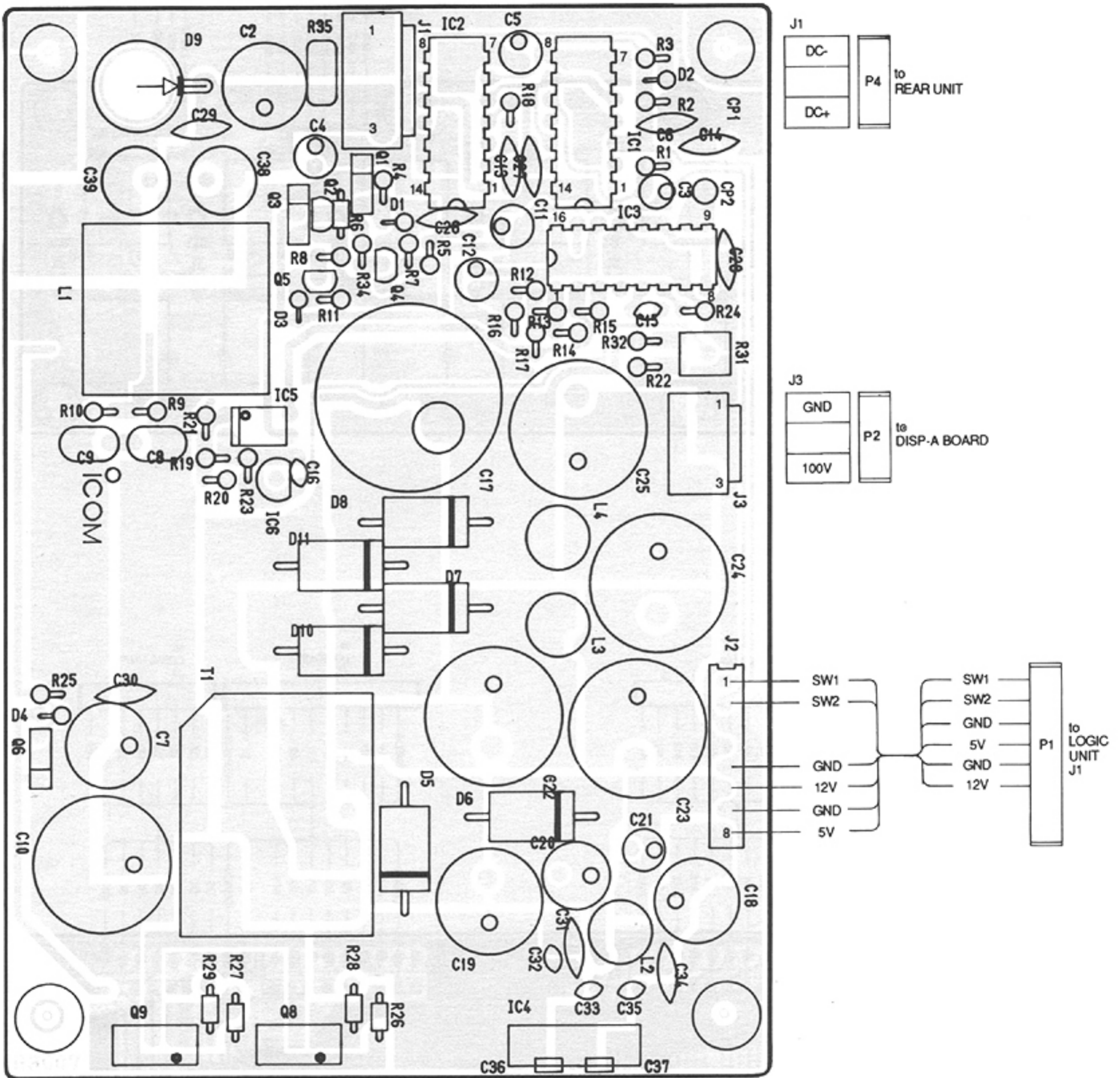
• SW UNIT



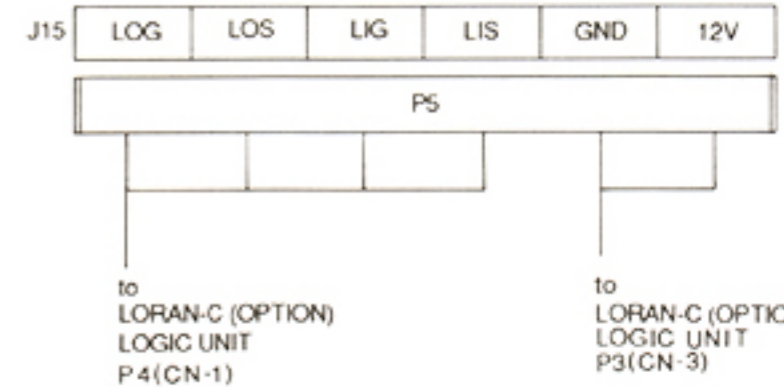
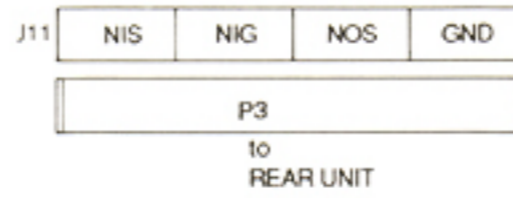
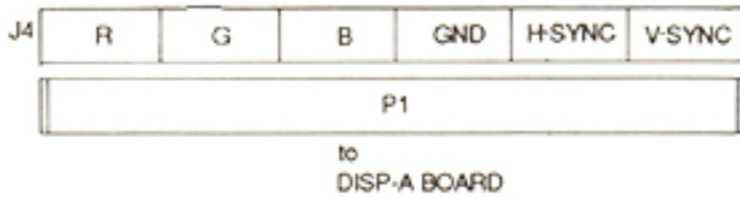
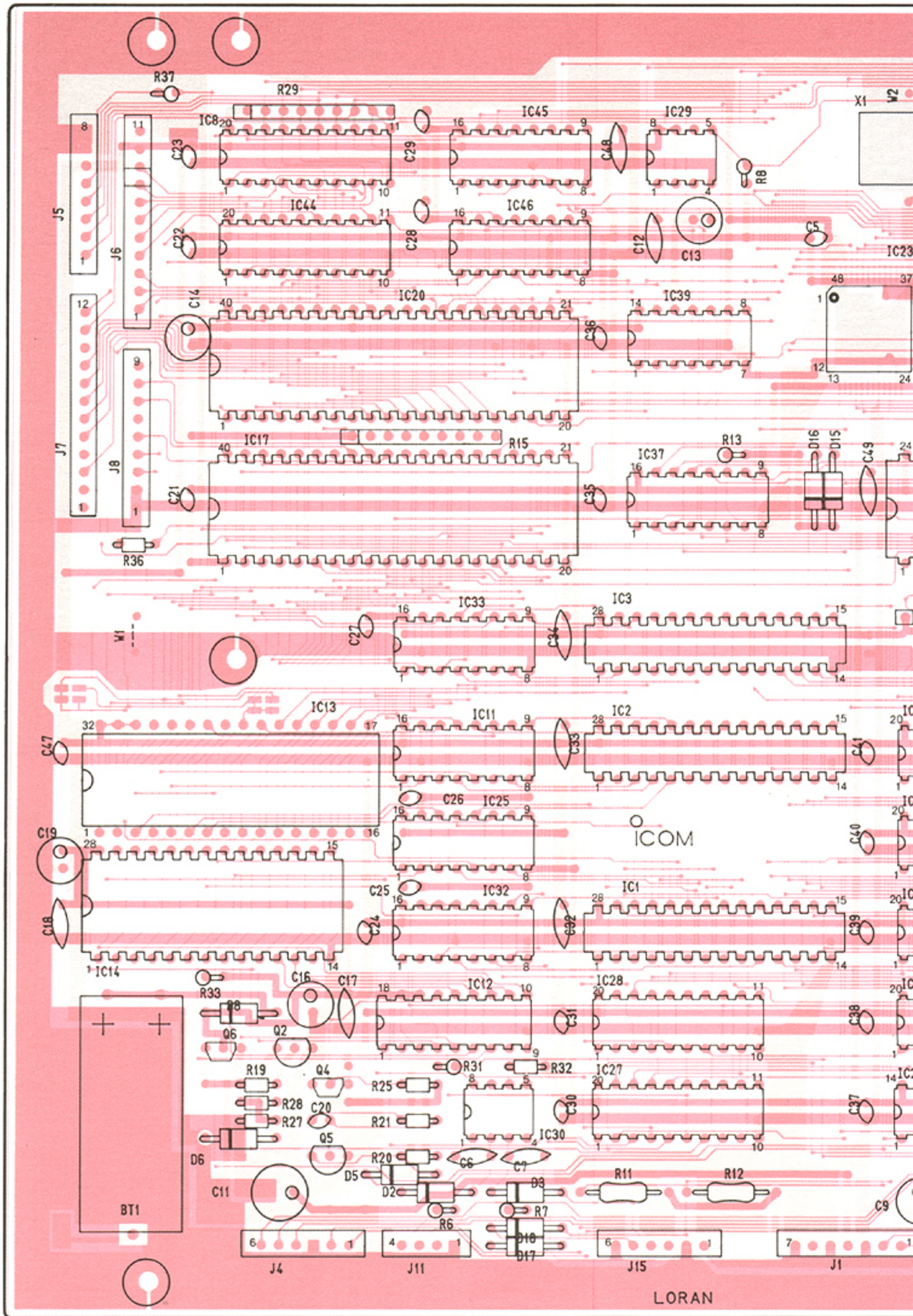
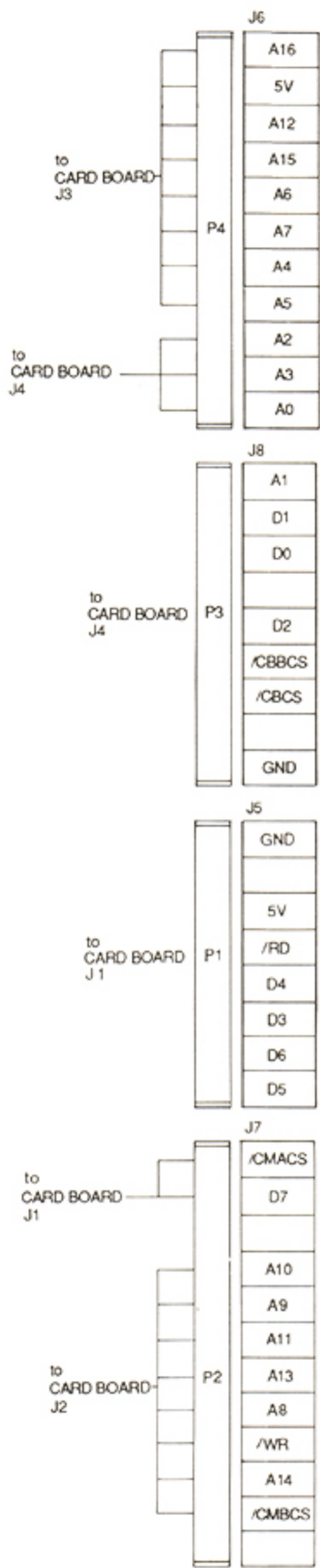
• CARD UNIT

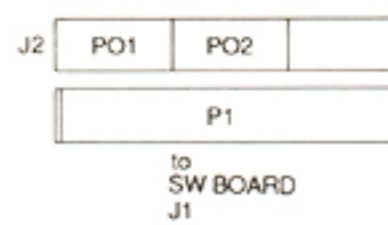
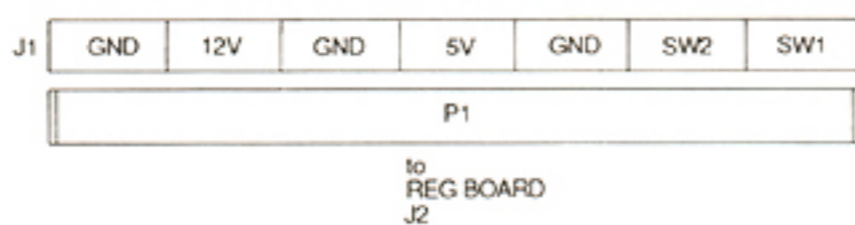
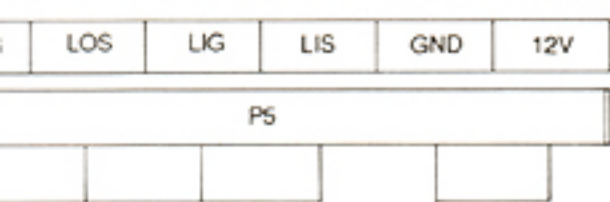
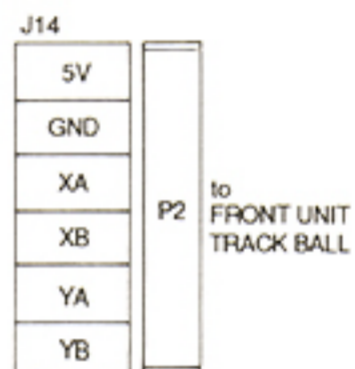
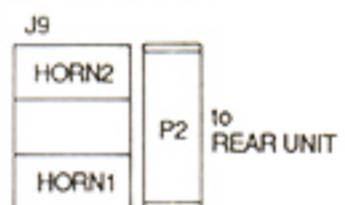
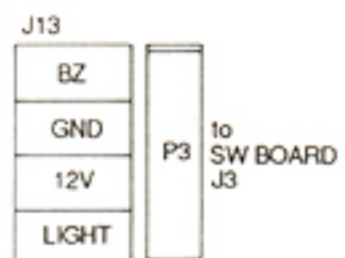
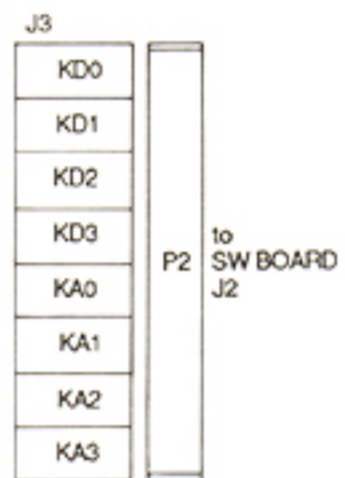
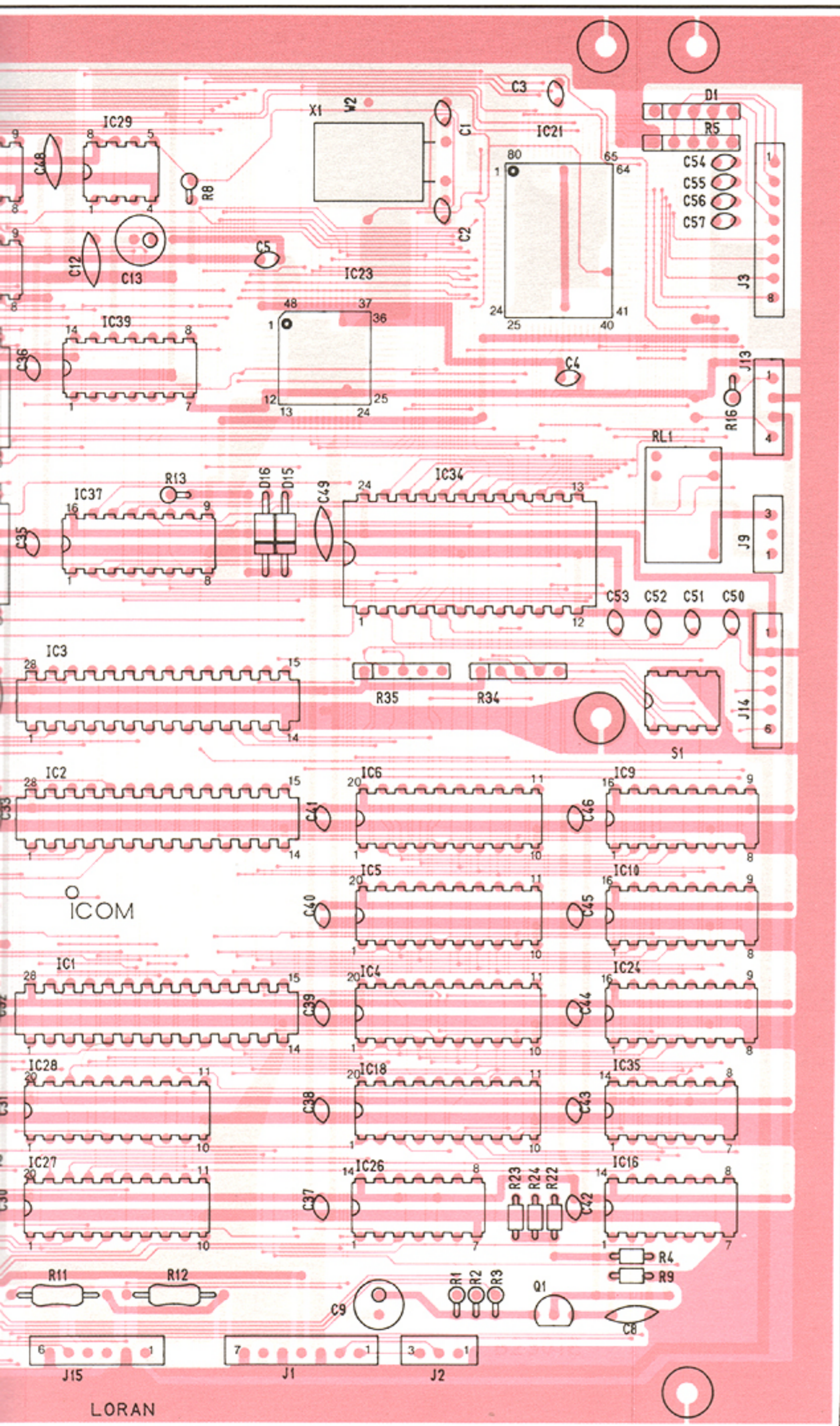


10-2 REG UNIT



10-3 LOGIC UNIT

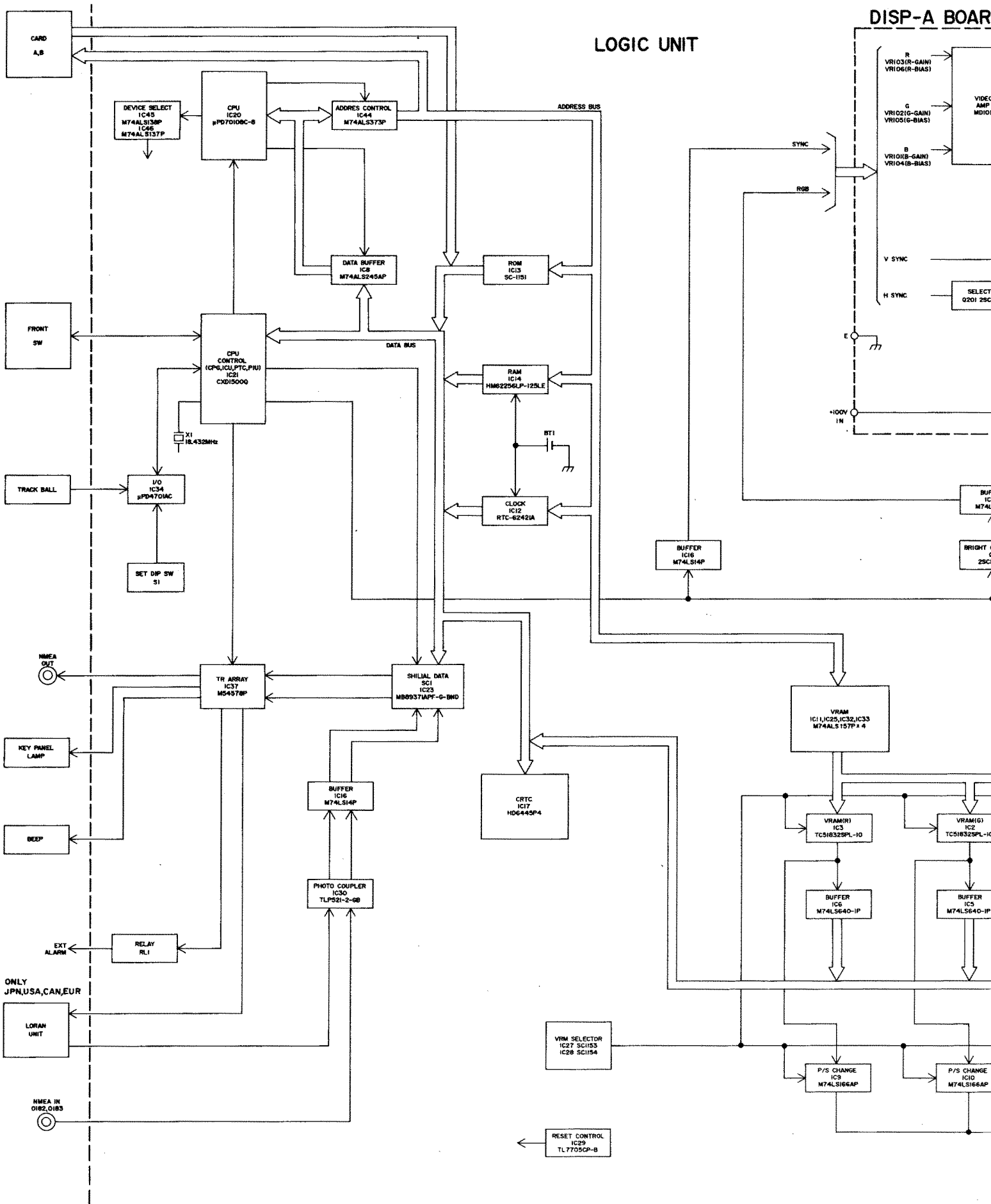




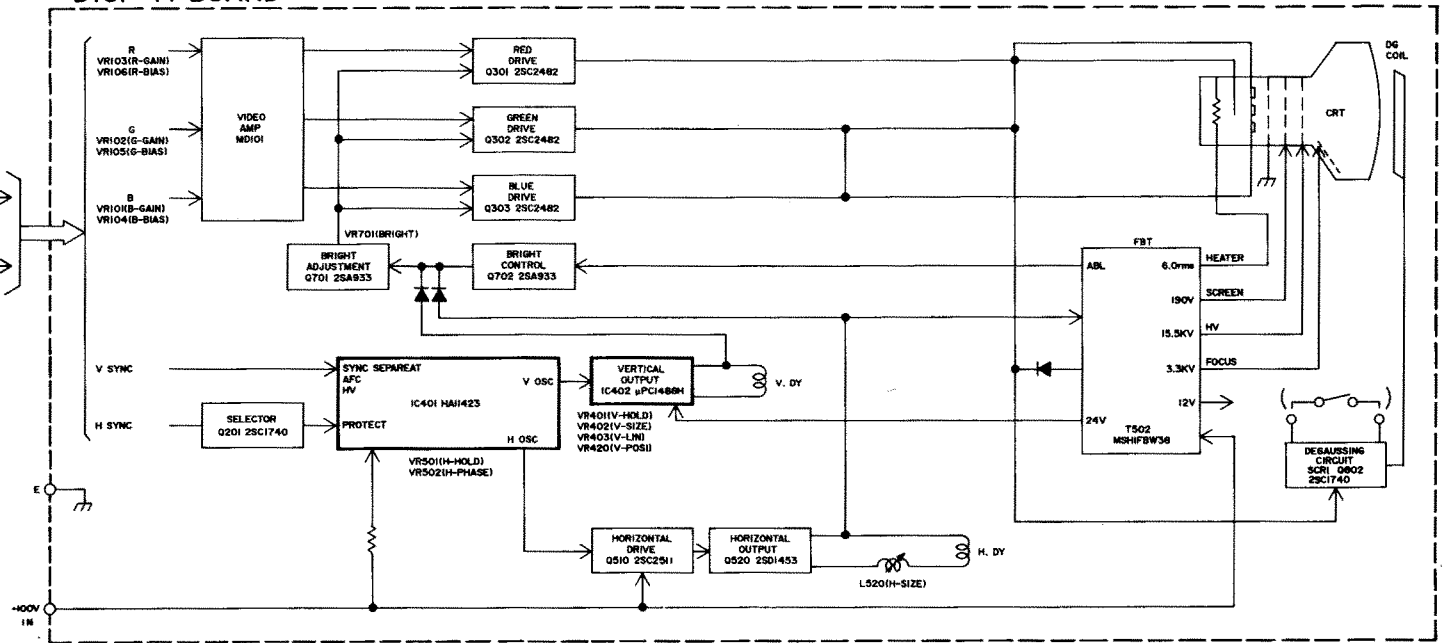
LORAN-C (OPTION)
LOGIC UNIT
CN-1)

to LORAN-C (OPTION)
LOGIC UNIT
P3(CN-3)

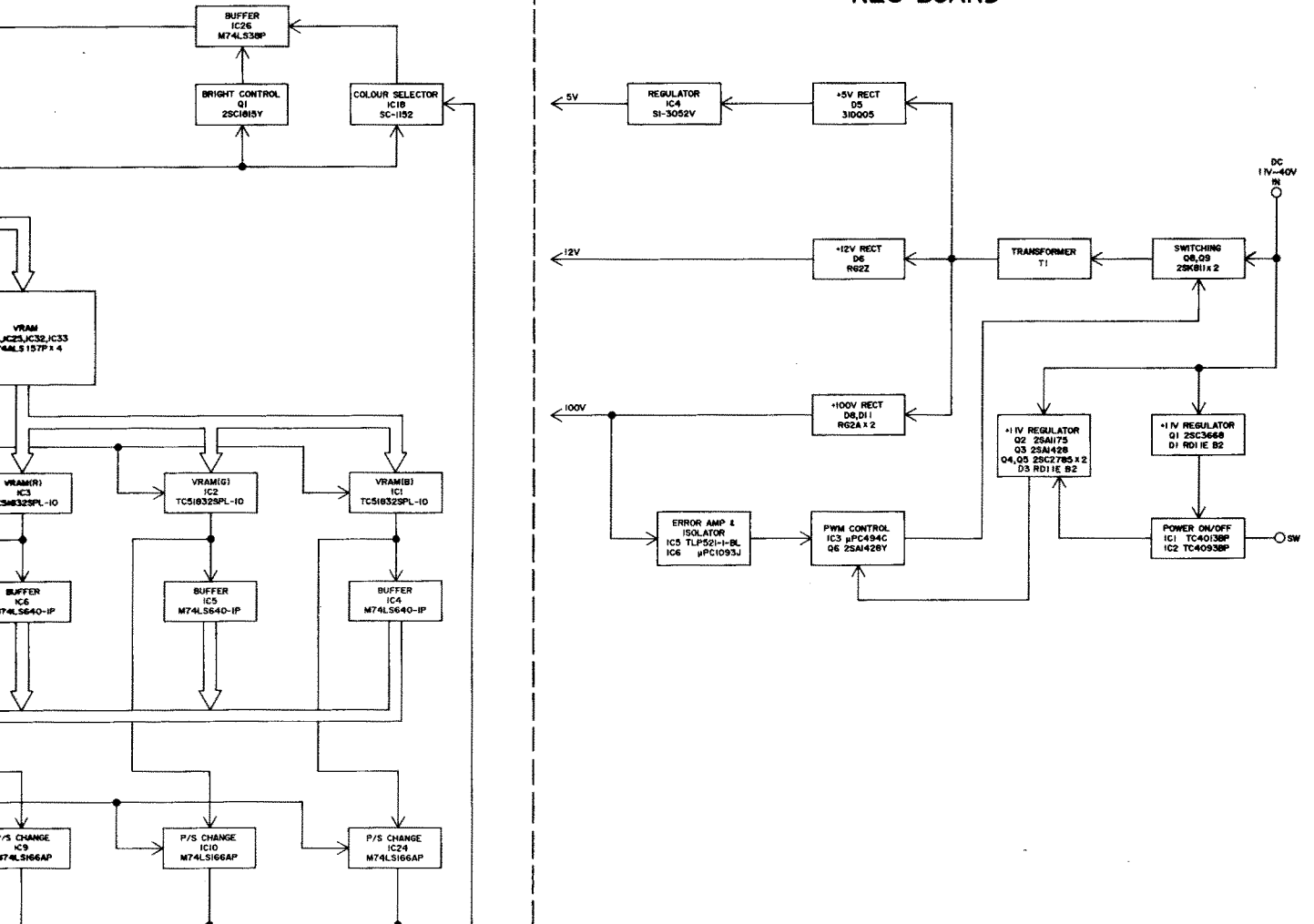
SECTION 11 BLOCK DIAGRAM



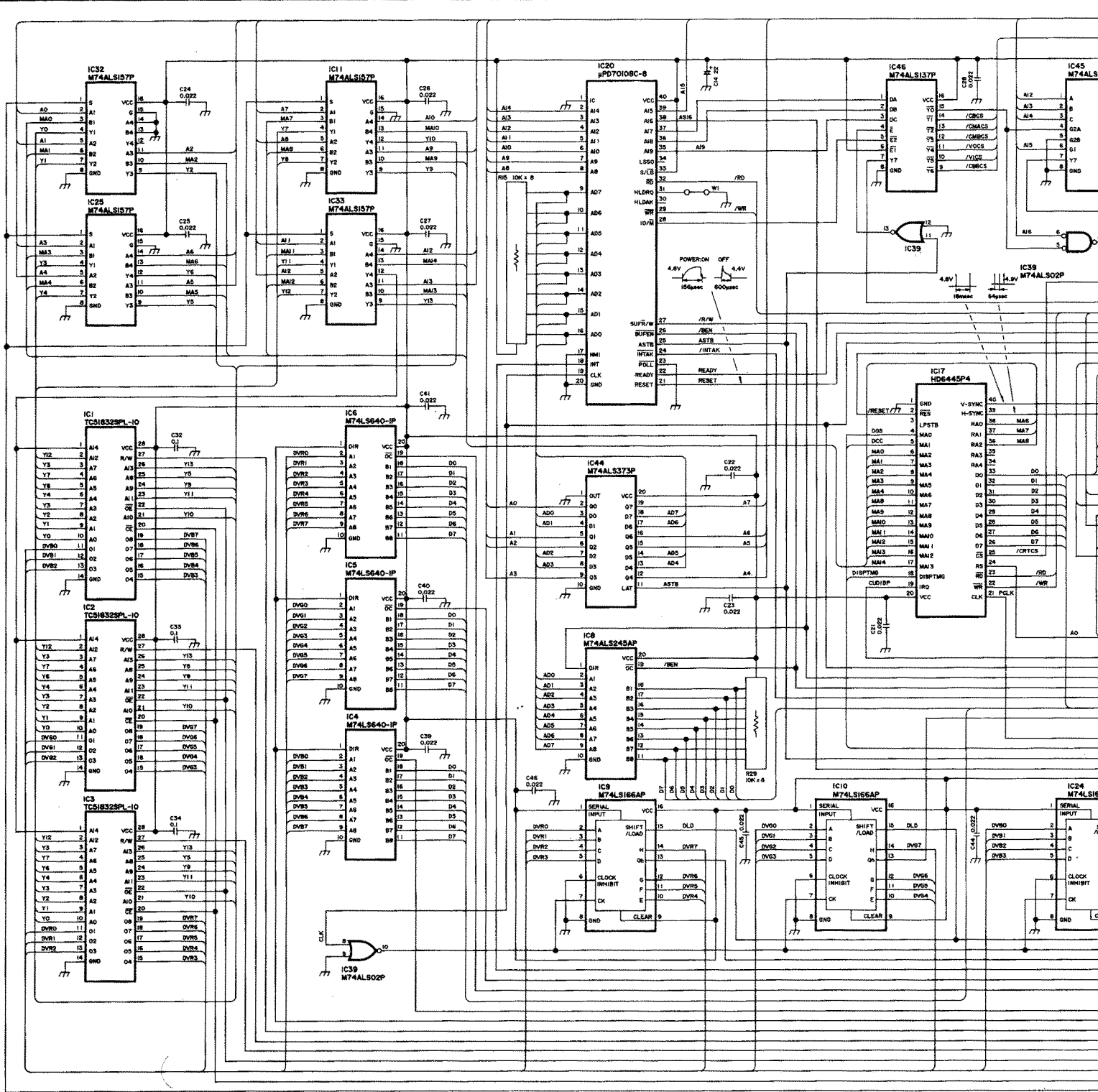
DISP-A BOARD

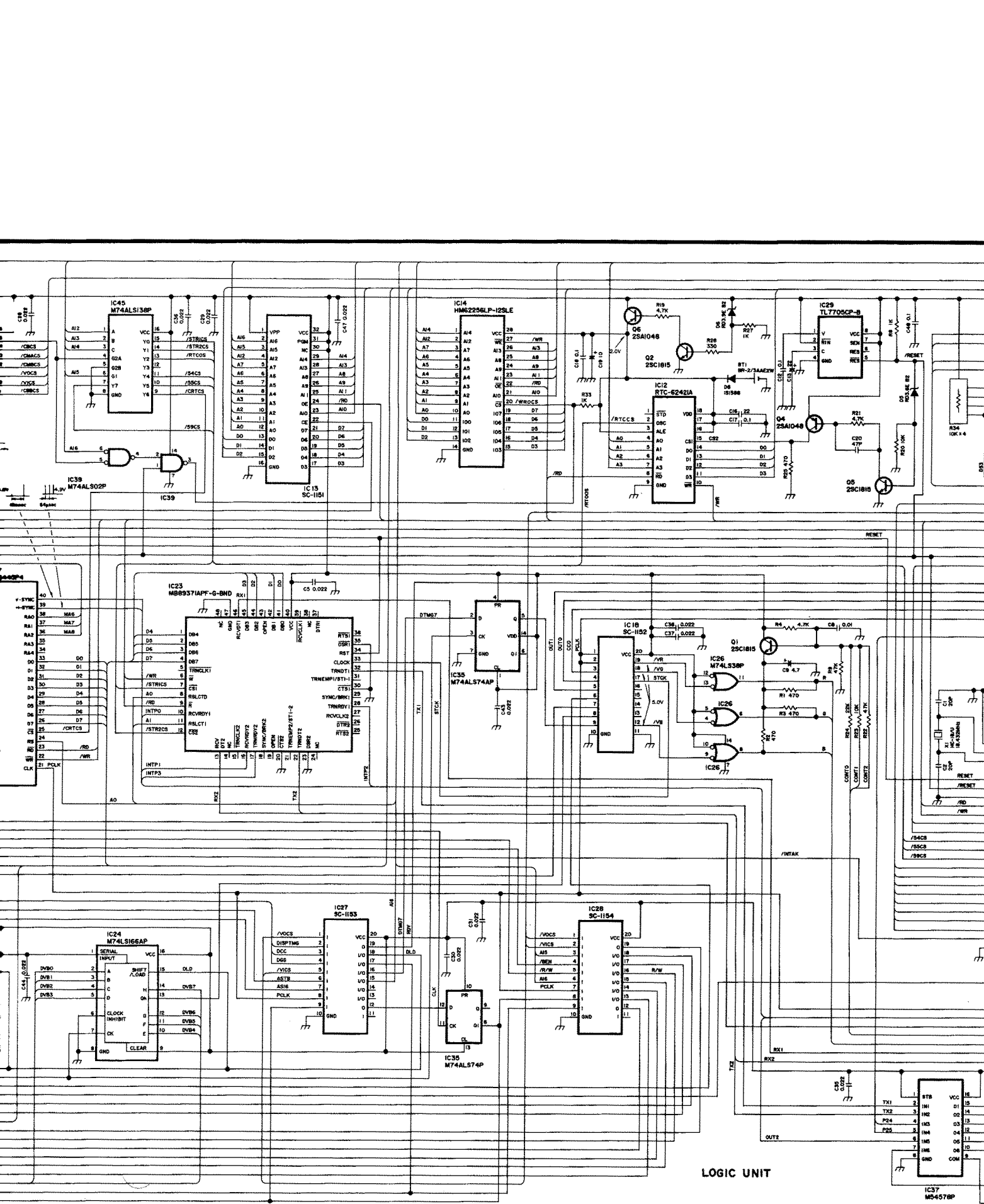


REG BOARD

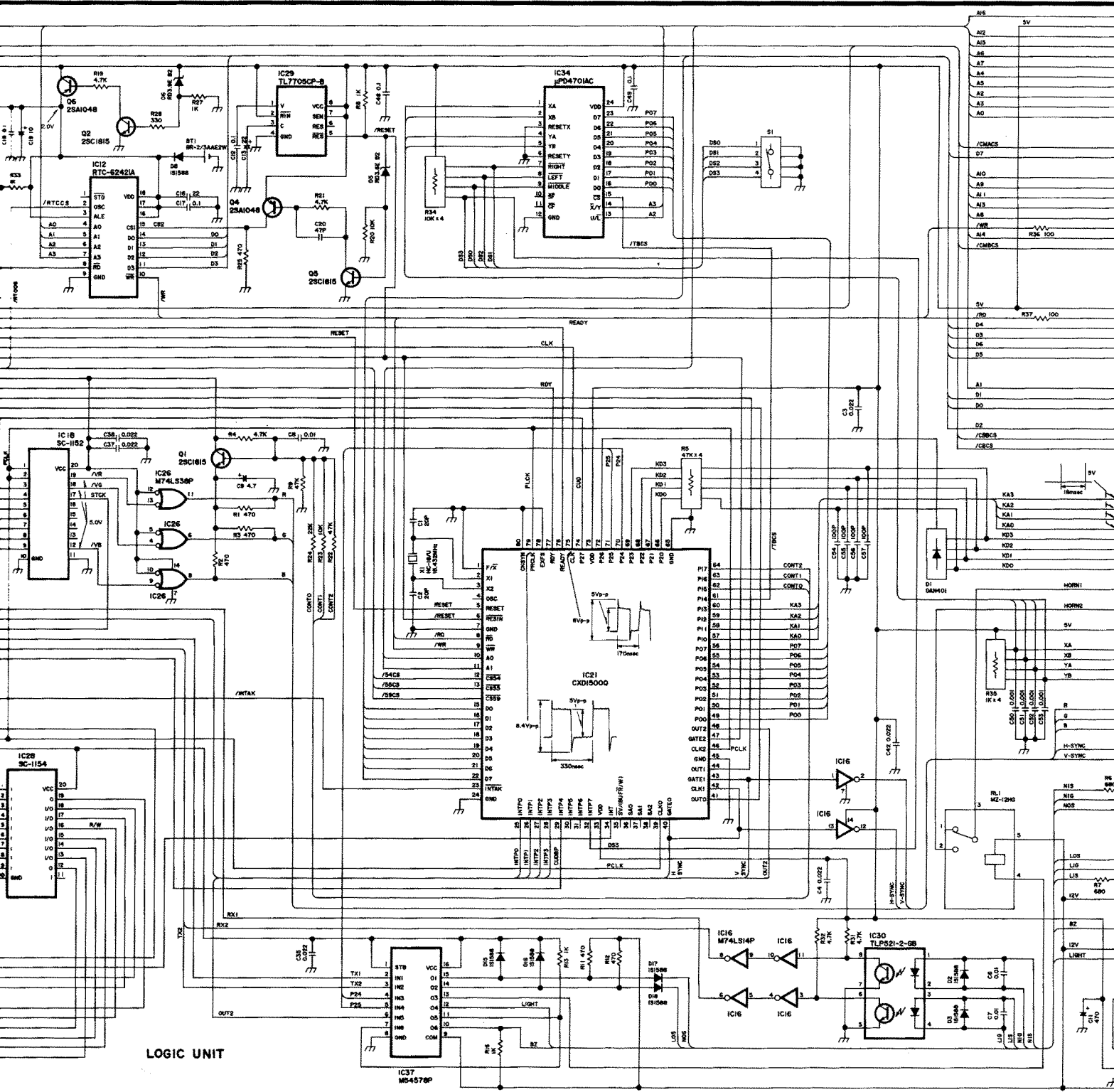


SECTION 12 VOLTAGE DIAGRAM



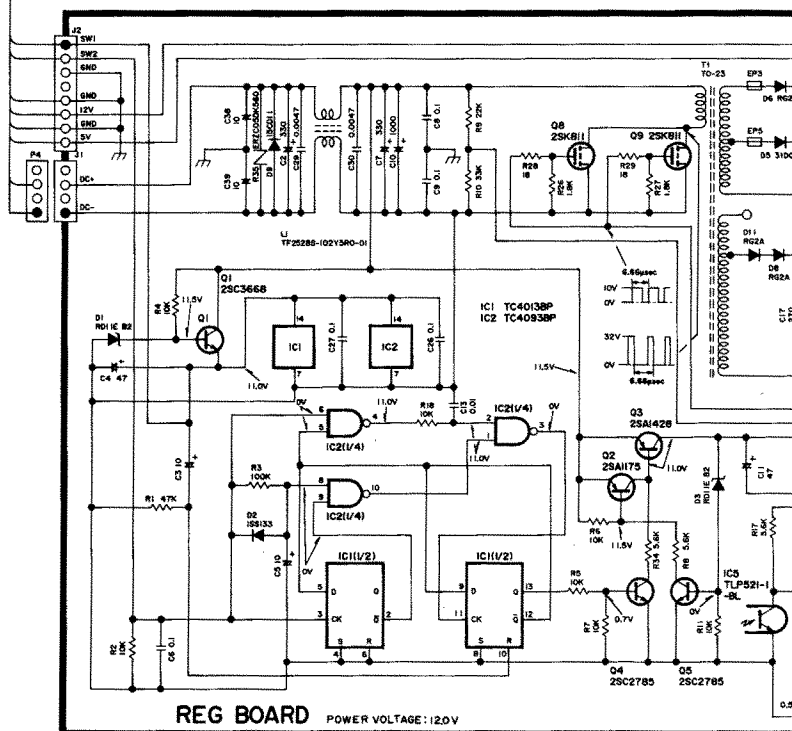
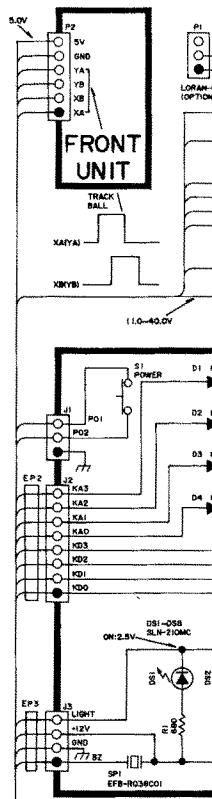
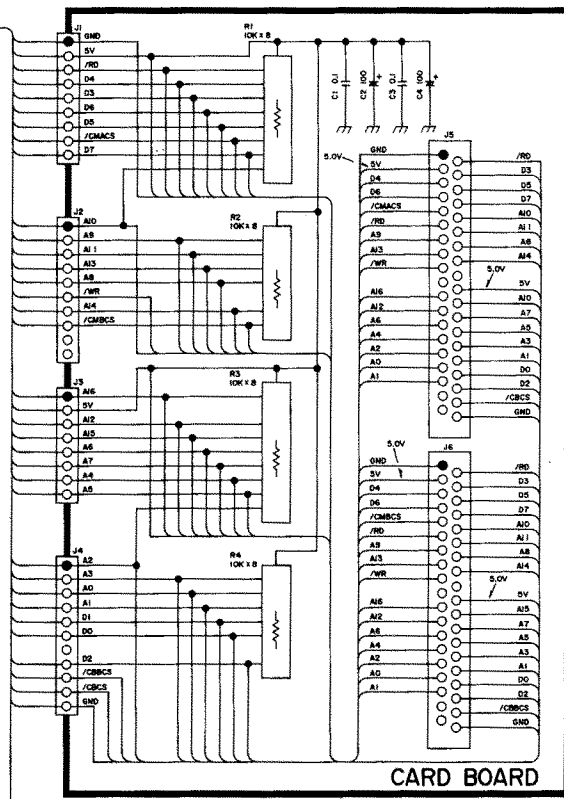
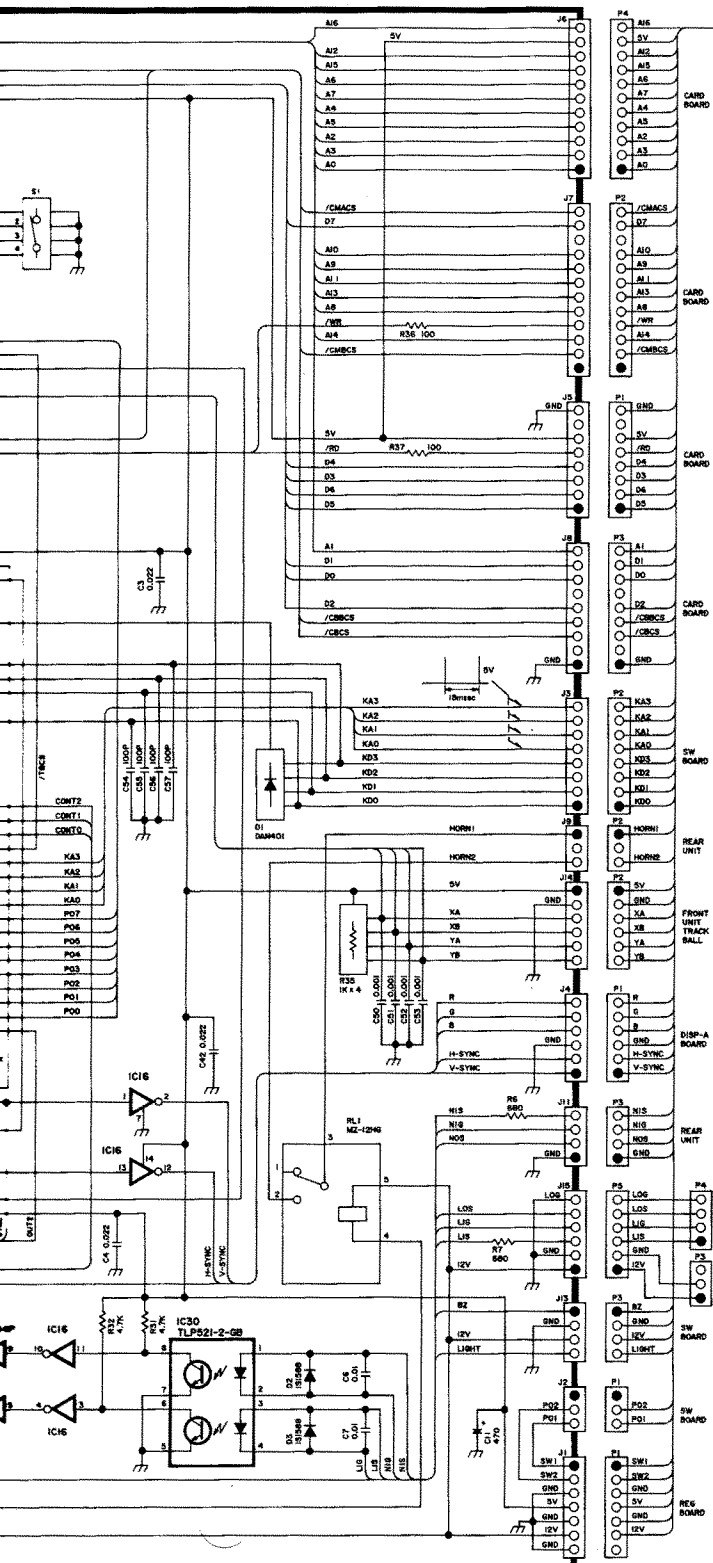


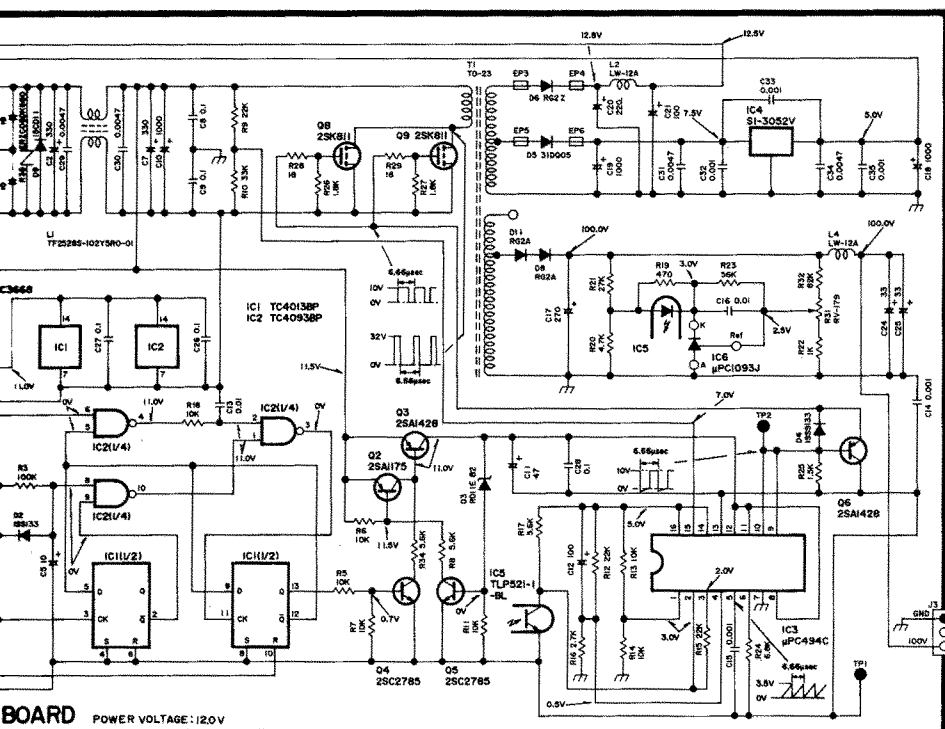
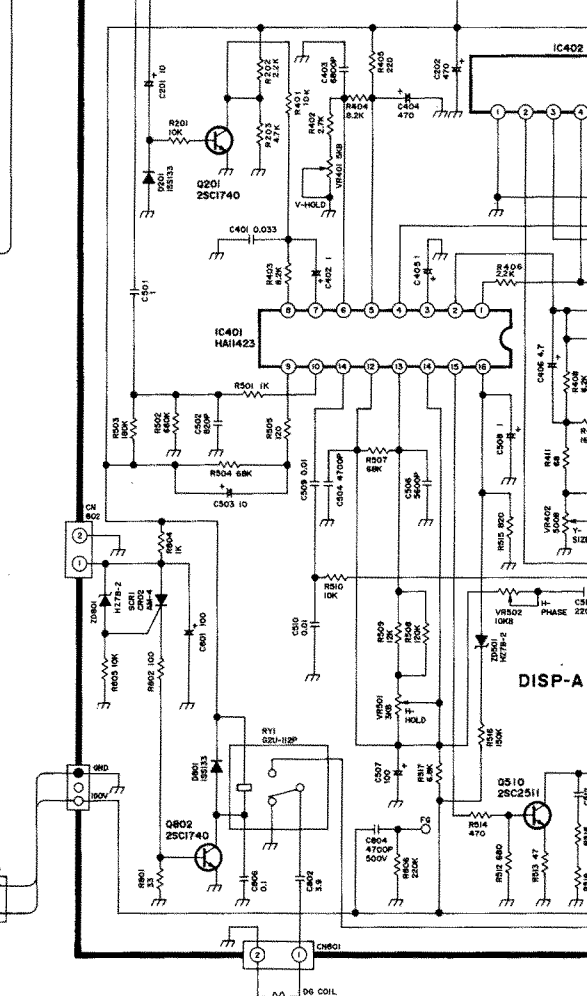
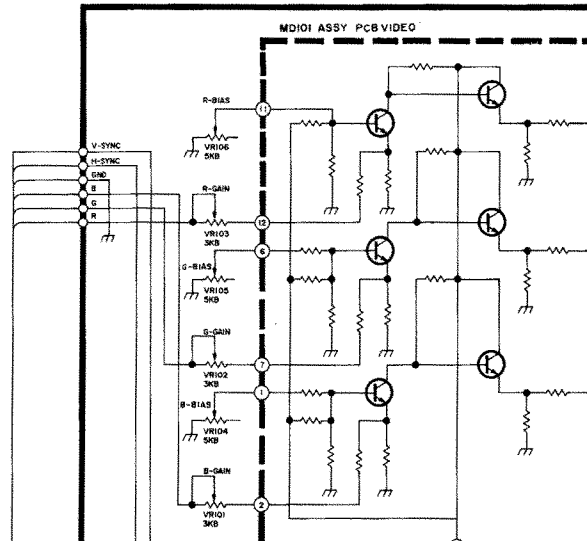
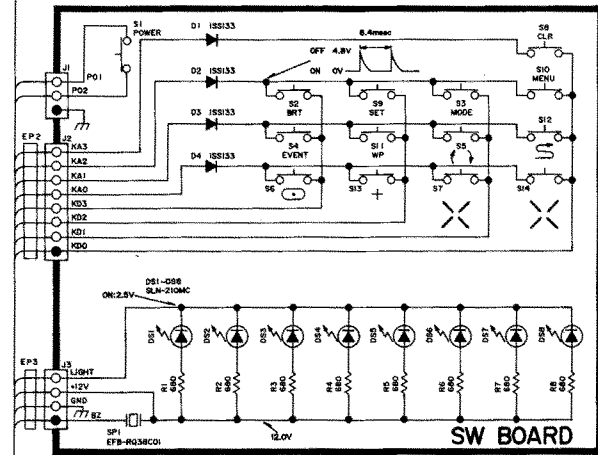
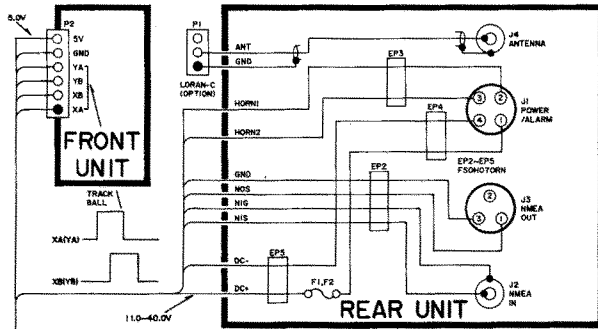
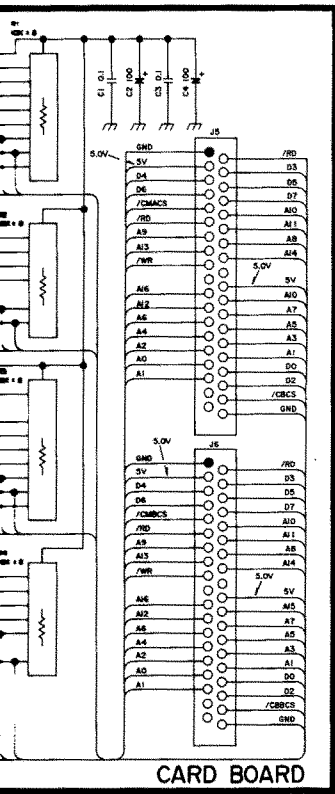
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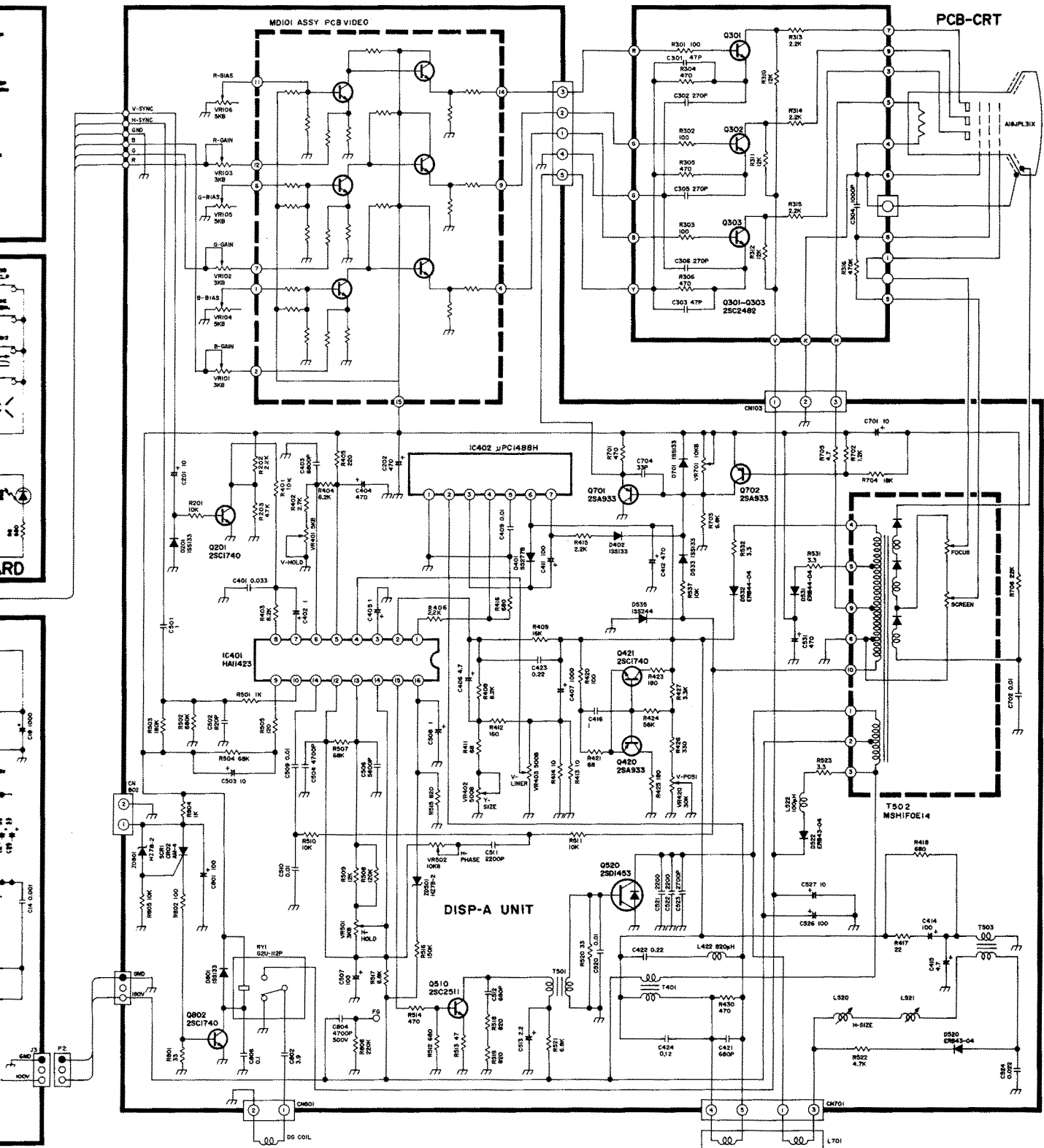


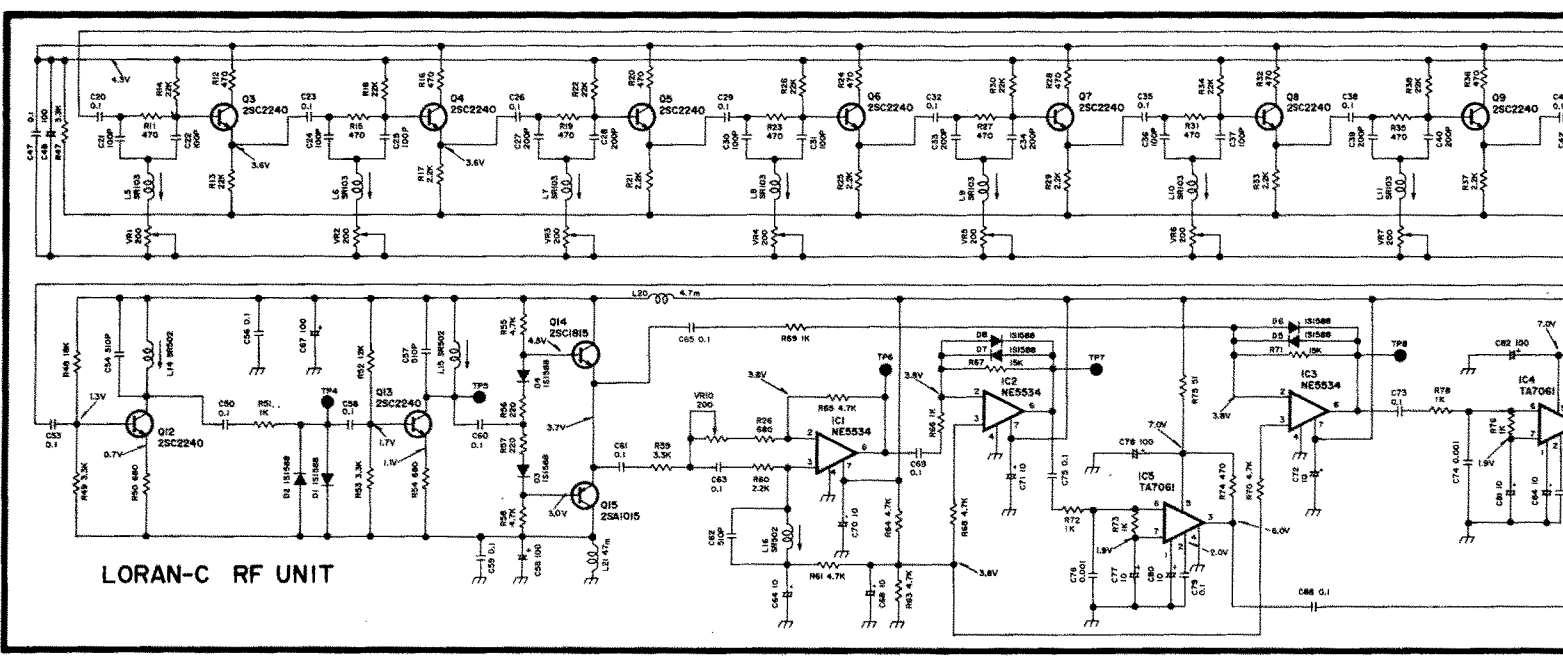
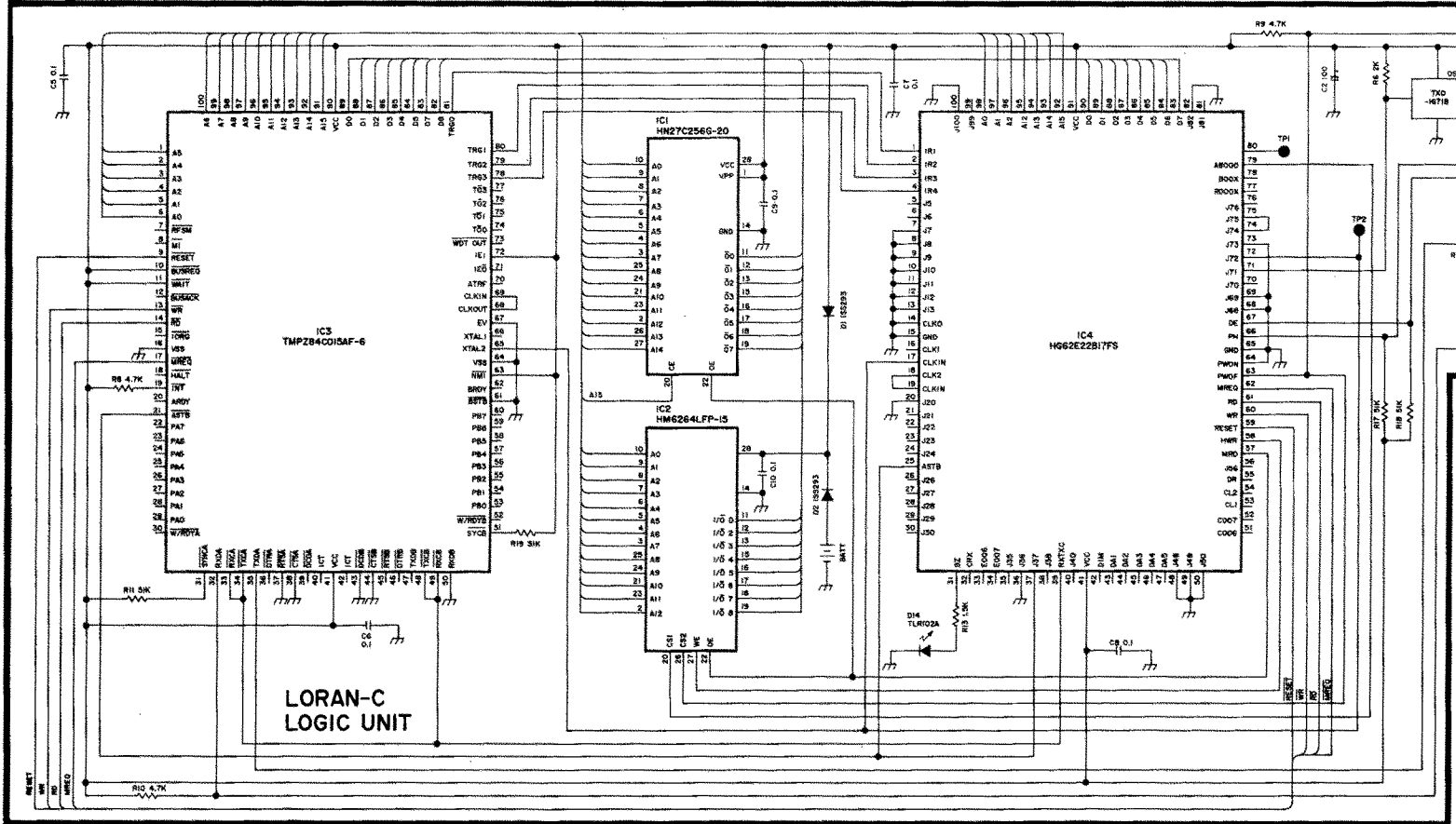
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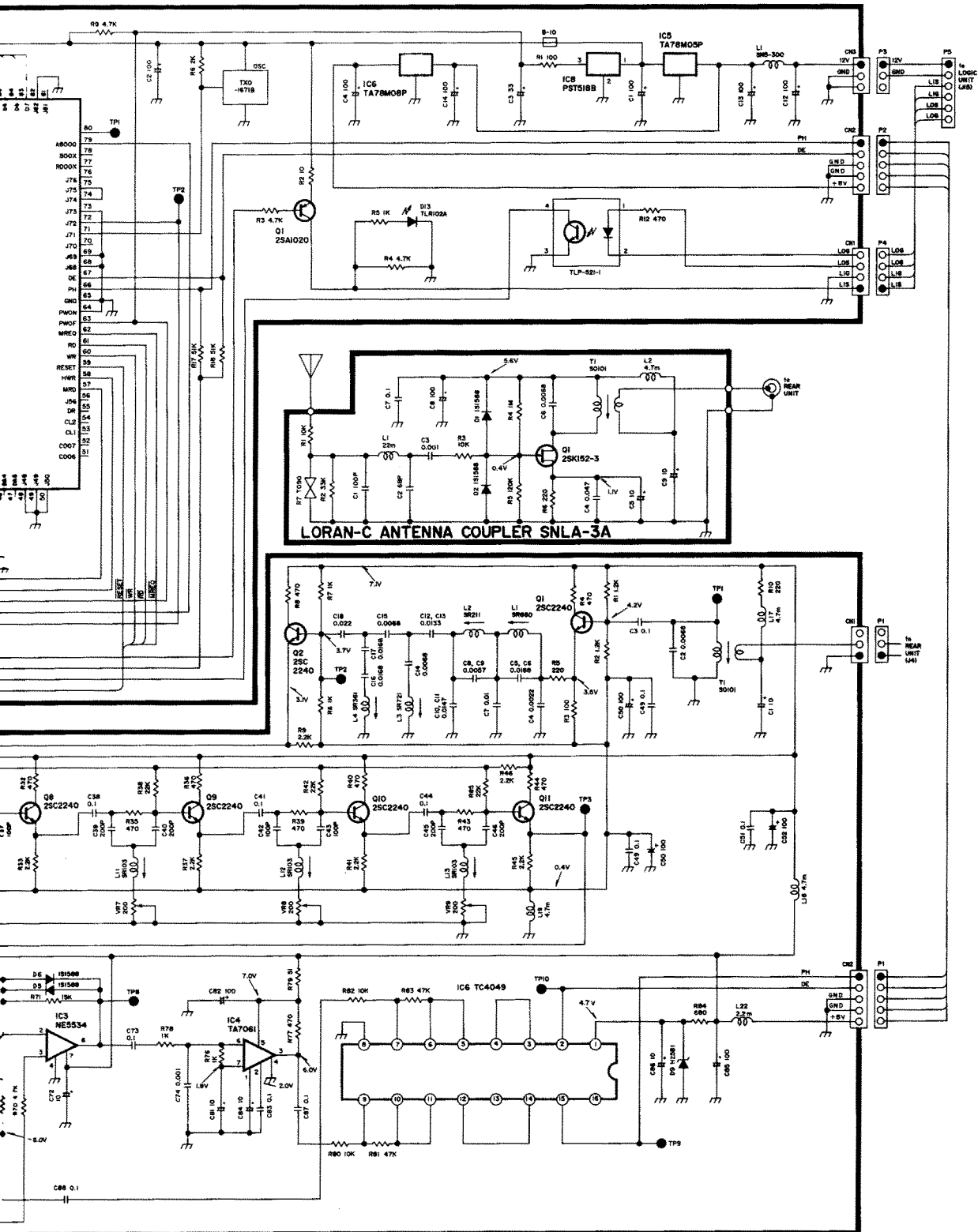
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