



SERVICE MANUAL

VHF MARINE TRANSCEIVER

IC-M423
IC-M424

S-14905XZ-C1
May. 2012

Icom Inc.

INTRODUCTION

This service manual describes the latest technical information for the **IC-M423/IC-M424** VHF MARINE TRANSCEIVER, at the time of publication.

MODEL	VERSION	COLOR
IC-M424	USA	Black
	USA-01	Super white
IC-M423	UK	Black
	EUR	
	HOL	
	FRG	
	CHN	
	AUS	
	UK-01	Super white
	EUR-01	
	HOL-01	
	FRG-01	
	CHN-01	
	AUS-01	

CAUTION

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than the specified voltage. This will ruin the transceiver.

DO NOT reverse the polarities of the power supply when connecting the transceiver.

DO NOT apply an RF signal of more than 20 dBm (100 mW) to the antenna connector. This could damage the transceiver's front-end.

To upgrade quality, any electrical or mechanical parts and internal circuits are subject to change without notice or obligation.



ORDERING PARTS

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

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

<ORDER EXAMPLE>

1110003491	S.IC	TA31136FNG	IC-M423	MAIN UNIT	5 pieces
8820001210	Screw	2438 screw	IC-M424	Top cover	10 pieces

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

REPAIR NOTES

1. Make sure that the problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its 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 tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a Standard Signal Generator or a Sweep Generator.
7. **ALWAYS** connect a 50 dB to 60 dB attenuator between the transceiver and a Deviation Meter or Spectrum Analyzer, when using such test equipment.
8. **READ** the instructions of the test equipment thoroughly before connecting it to the transceiver.

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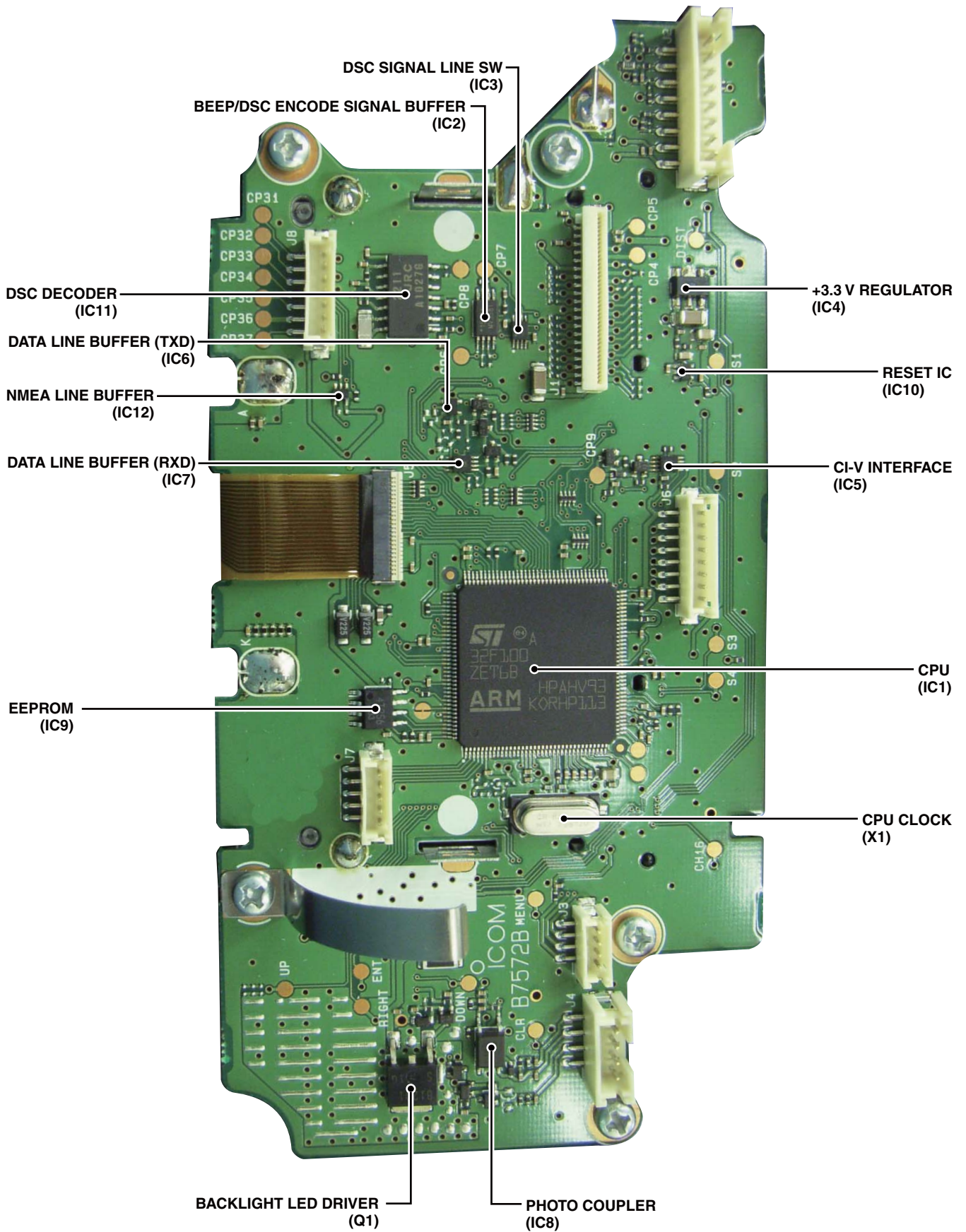
SECTION 1

SPECIFICATIONS

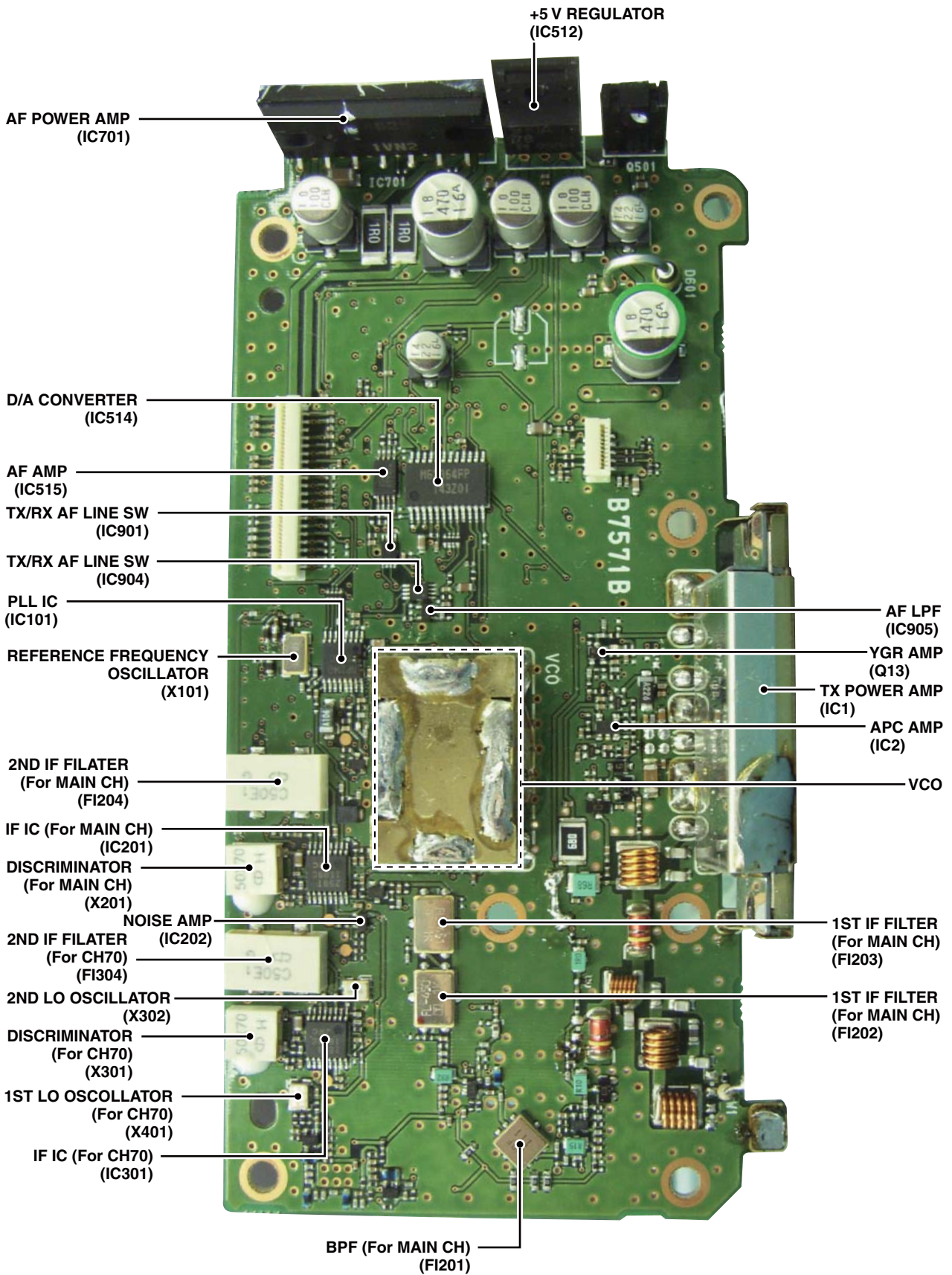
		[UK], [UK-01], [EUR], [EUR-01], [HOL], [HOL-01], [FRG], [FRG-01]	[USA], [USA-01], [CHN], [CHN-01], [AUS], [AUS-01]	
GENERAL	• Frequency coverage	TX	156.000–161.450 MHz	156.025–157.425 MHz
		RX	156.000–163.425 MHz	156.050–163.275 MHz [USA], [USA-01], [AUS], [AUS-01] 156.050–162.025 MHz [CHN], [CHN-01]
			156.525 MHz (CH70)	
	• Mode		FM (16K0G3E), DSC (16K0G2B)	
	• Operating temperature range		–20°C to +60°C; –4°F to 140°F	
	• Current drain (at 12.0 V)		TX high 5.5 A maximum Maximum audio 5.0 A maximum	
	• Power supply requirement (negative ground)		13.8 V DC (10.8–15.6 V DC) nominal	13.8 V DC (11.7–15.9 V DC) nominal
	• Frequency stability		±1.5 kHz (–20°C to +60°C; –4°F to 140°F)	±10 ppm
	• Antenna impedance		50 Ω nominal	
	• Dimensions (approximately)		180(W) × 82(H) × 119.9(D) mm; 7.1(W) × 3.2(H) × 4.7(D) in	
• Weight (approximately)		1.2 kg; 2.6 lb		
TRANSMITTER	• Output power		25 W/1 W	
	• Modulation system		Variable reactance frequency modulation	
	• Maximum frequency deviation		±5.0 kHz	
	• Spurious emissions		Less than 0.25 μW	Less than –70 dBc (High power) Less than –56 dBc (Low power)
	• Adjacent channel power		More than 70 dB	
	• Audio harmonic distortion		Less than 10% (at 60% deviation)	
	• Residual modulation		More than 40 dB	
	• Audio frequency response		+1 dB to –3 dB of 6 dB octave from 300–3000 Hz	
	• Microphone impedance		2 kΩ	
	RECEIVER (Main channels)	• Receive system		Double conversion superheterodyne
• Sensitivity		–5 dBμ emf (typical) (20 dB SINAD)	–13 dBμ (typical) (12 dB SINAD)	
• Squelch sensitivity		Less than –2 dBμ emf		
• Intermediate frequency		1st 21.7 MHz, 2nd 450 kHz		
• Intermodulation rejection ratio		More than 68 dB	More than 70 dB	
• Spurious response rejection ratio		More than 70 dB		
• Adjacent channel selectivity		More than 70 dB		
• Hum and noise		More than 40 dB		
• Audio frequency response		+1 dB to –3 dB of –6 dB octave from 300–3000 Hz		
• Audio output power (at 10% distortion with a 4 Ω load)		More than 10 W	10 W (typical)	
RECEIVER (CH70)	• Sensitivity (1% BER)		–4 dBμ emf (typical)	–5 dBμ emf (typical)
	• Intermediate frequency		1st 30.875 MHz, 2nd 450 kHz	
	• Intermodulation rejection ratio		More than 68 dB (1% BER)	
	• Spurious response rejection ratio		More than 73 dB (1% BER)	
	• Adjacent channel selectivity		More than 73 dB (1% BER)	

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

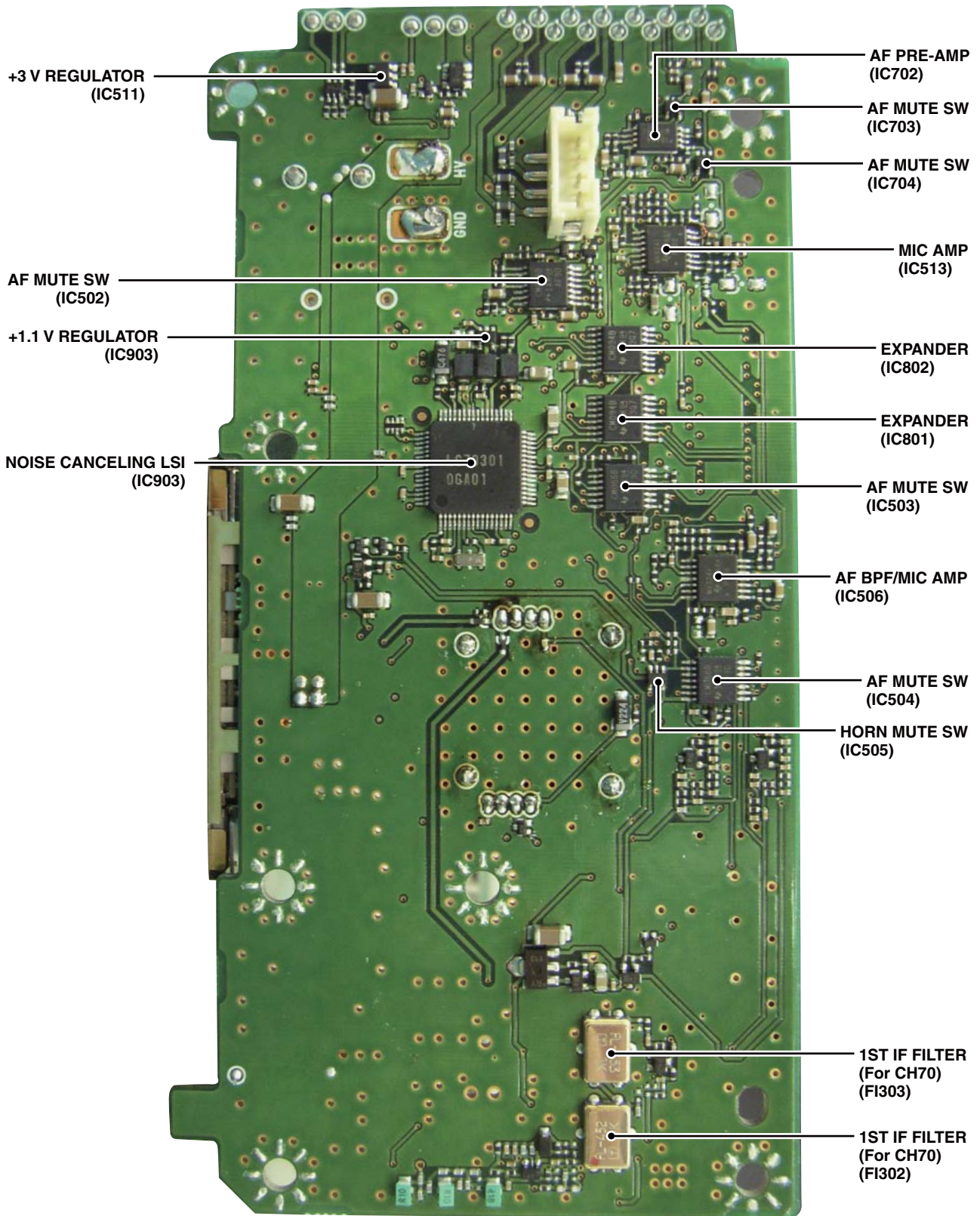
• LOGIC UNIT



• MAIN UNIT
(TOP VIEW)



• MAIN UNIT
(BOTTOM VIEW)

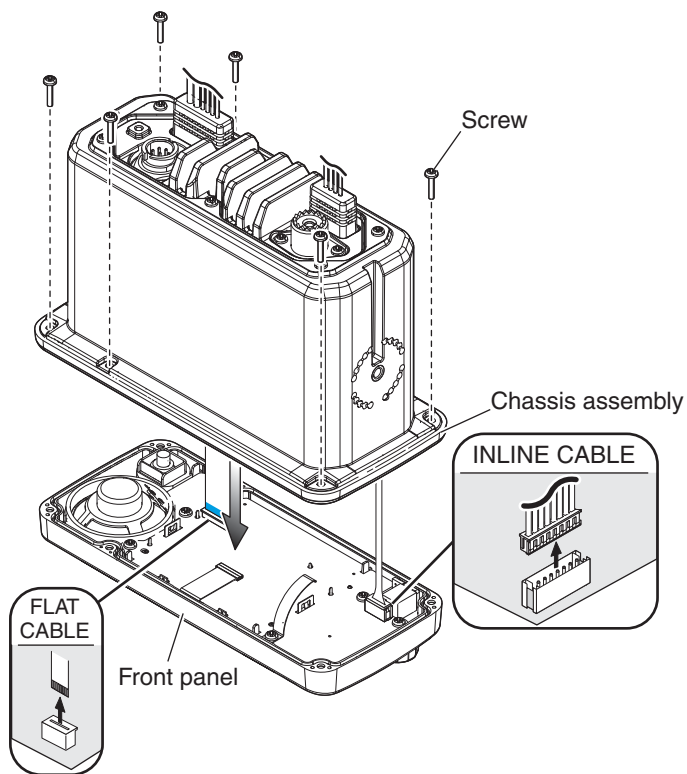


SECTION 3 DISASSEMBLY INSTRUCTION

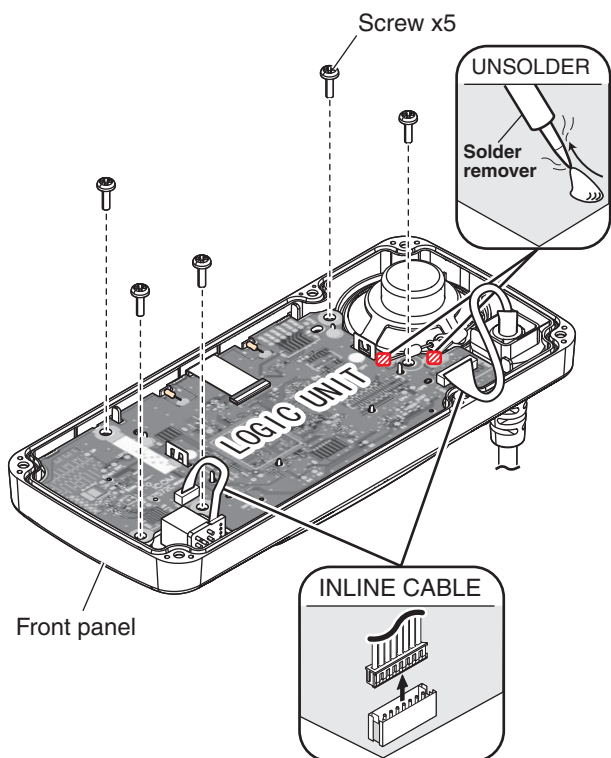
1. Removing the FRONT UNIT

- 1) Remove 6 screws from the rear.
- 2) Disconnect the flat cable and inline cable from the LOGIC UNIT.
- 3) Separate the front panel from the chassis assembly.

BE CAREFUL about the flat cable and connector when separating the front panel from the chassis assembly.

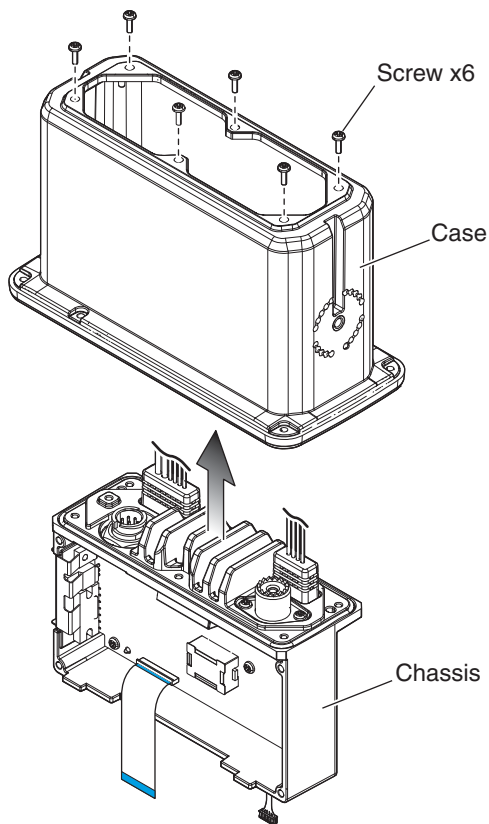


- 4) Remove 5 screws from the LOGIC UNIT.
- 5) Unsolder 2 points at the speaker.
- 6) Remove the LOGIC UNIT.

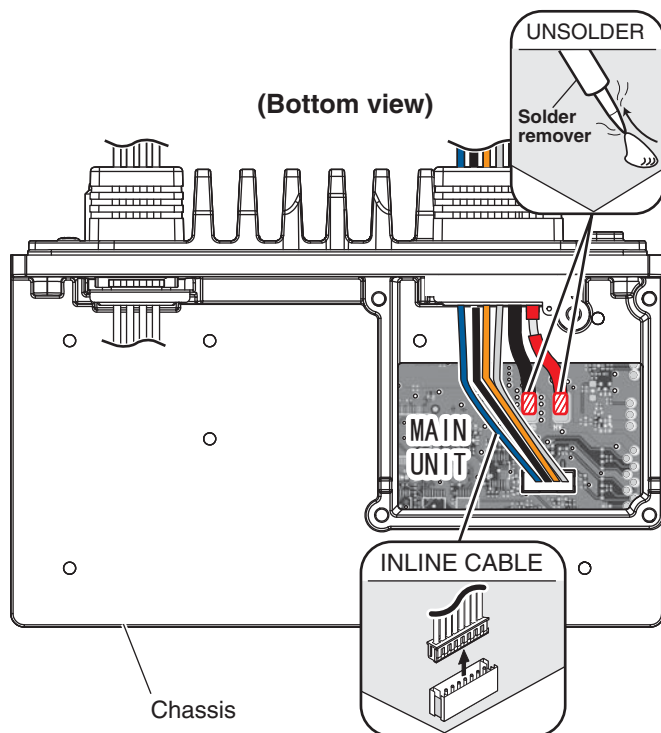


2. Removing the MAIN UNIT

- 1) Remove 6 screws from the rear.
- 2) Remove the case from the chassis.



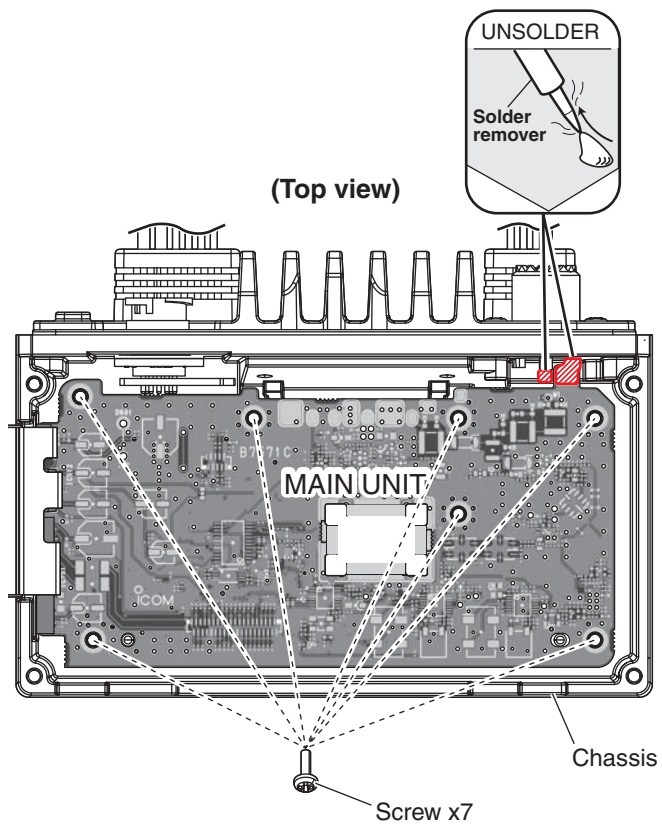
- 3) Disconnect the inline cable from the bottom of MAIN UNIT.
- 4) Unsolder 2 points at the power supply cable.



(Continued on next page.)

2. Removing the MAIN UNIT (Continued)

- 5) Remove 7 screws from the top of MAIN UNIT.
- 6) Unsolder 2 points at the antenna connector.
- 7) Remove the MAIN UNIT from the chassis.



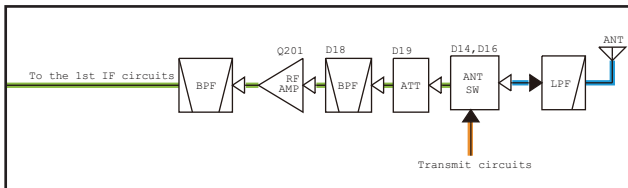
4-1 RECEIVE CIRCUITS

RF CIRCUITS (MAIN UNIT)

The RX signal from the antenna is passed through the LPF (L21, L22, and C114–C116), ANT SW (D16), attenuator (D19, R96) and BPF (L201, C201 and C202), and then applied to the RF AMP (Q201).

The amplified signal is divided and applied to the 1st IF circuits for MAIN CH or CH70, through another BPF (FI201: for MAIN CH; L301–L303 and C301–C308: for CH70).

• RF CIRCUITS

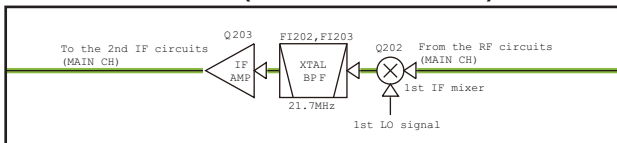


1ST IF CIRCUITS FOR MAIN CHANNELS (MAIN UNIT)

The RX signal from the RF circuits is applied to the 1st IF mixer (Q202), and mixed with the 1st LO signal from the VCO (Q3, Q4 and D1–D3), resulting in a 21.7 MHz 1st IF signal.

The 1st IF signal is filtered by the 1st IF filter (FI202 and FI203), and then applied to the 1st IF AMP (Q203). The amplified signal is applied to the 2nd IF circuits.

• 1ST IF CIRCUITS (For main channels)



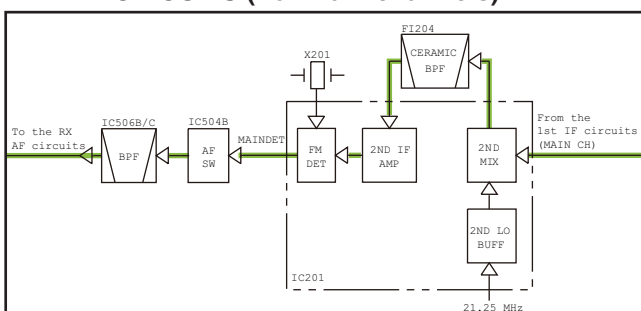
2ND IF CIRCUITS FOR MAIN CHANNELS (MAIN UNIT)

The 1st IF signal from the 1st IF circuits is applied to the IF IC (IC201, pin 16). The IF IC contains the 2nd IF mixer, 2nd IF AMP, detector, and so on, in its package.

The 1st IF signal is mixed with the 21.25 MHz 2nd LO signal from the reference frequency oscillator (TCXO: X101), resulting in a 450 kHz 2nd IF signal. The 2nd IF signal is passed through the 2nd IF filter (FI204) to remove sideband noise. The filtered signal is amplified by the 2nd IF AMP, and demodulated by the quadrature detector with discriminator (X201).

The demodulated AF signal is applied to the RX AF circuits, through the AF SW (IC504B, pins 4, 3).

• 2ND IF CIRCUITS (For main channels)

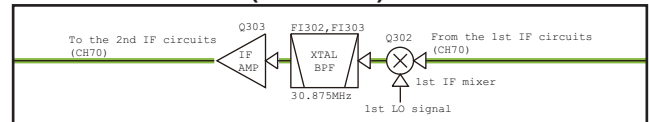


1ST IF CIRCUITS FOR CH70 (MAIN UNIT)

The RX signal from the RF circuits is applied to the 1st IF mixer (Q302), and mixed with the 125.649 MHz 1st LO signal which is generated by the TCXO (X401) and tripled by the BPF (L402, L403 and C412–C416), resulting in a 30.875 MHz 1st IF signal.

The 1st IF signal is filtered by the 1st IF filters (FI302 and FI303), and then applied to the 1st IF AMP (Q303). The amplified signal is applied to the 2nd IF circuits.

• 1ST IF CIRCUITS (For CH70)



2ND IF CIRCUITS FOR CH70 (MAIN UNIT)

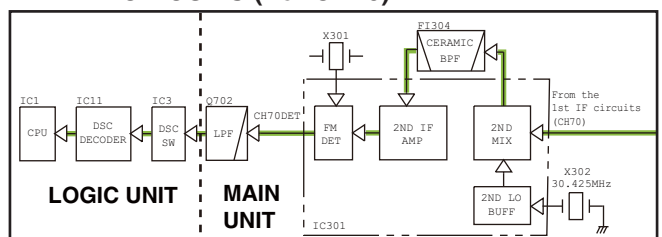
The 1st IF signal from the 1st IF circuits is applied to the IF IC (IC301, pin 16). The IF IC contains the 2nd IF mixer, 2nd IF AMP, detector, and so on, in its package.

The 1st IF signal is mixed with the 30.425 MHz 2nd LO signal which is generated by 2nd LO oscillator (X302), resulting in a 450 kHz 2nd IF signal. The 2nd IF signal is passed through the 2nd IF filter (FI304) to remove sideband noise. The filtered signal is amplified by the 2nd IF AMP, and demodulated by the quadrature detector with discriminator (X301).

The demodulated AF (FSK; Frequency Shift Keying) signal is applied to the DSC decoder (LOGIC UNIT: IC11, pin 2) which converts the sub audible tone signal into serial data, through the LPF (Q702) and DSC SW (LOGIC UNIT: IC3, pins 7, 1).

The serial data is applied to the CPU (LOGIC UNIT: IC1, pin 103) to control the transceiver (emergency alarm, DSC indication and so on.).

• 2ND IF CIRCUITS (For CH70)



RX AF CIRCUITS (MAIN UNIT)

The demodulated AF signal from the AF SW (IC504B) is passed through the BPF (IC506B, IC506C) and AF SW (IC901, pins 7, 1), and then applied to the noise canceller IC (IC902).

The processed AF signal is passed through the LPF (IC905, pins 1, 4) and AF SW (IC904, pins 1, 7).

• When the AF signal is output to the front panel or HM-196

The RX AF signal from the AF SW (IC904, pins 1, 7) is passed through the AF MUTE SW (IC503B, pins 3, 4) and amplified by the AF AMP (IC515B). The amplified signal is applied to the D/A converter (IC514, pins 1, 2) to be adjusted in level.

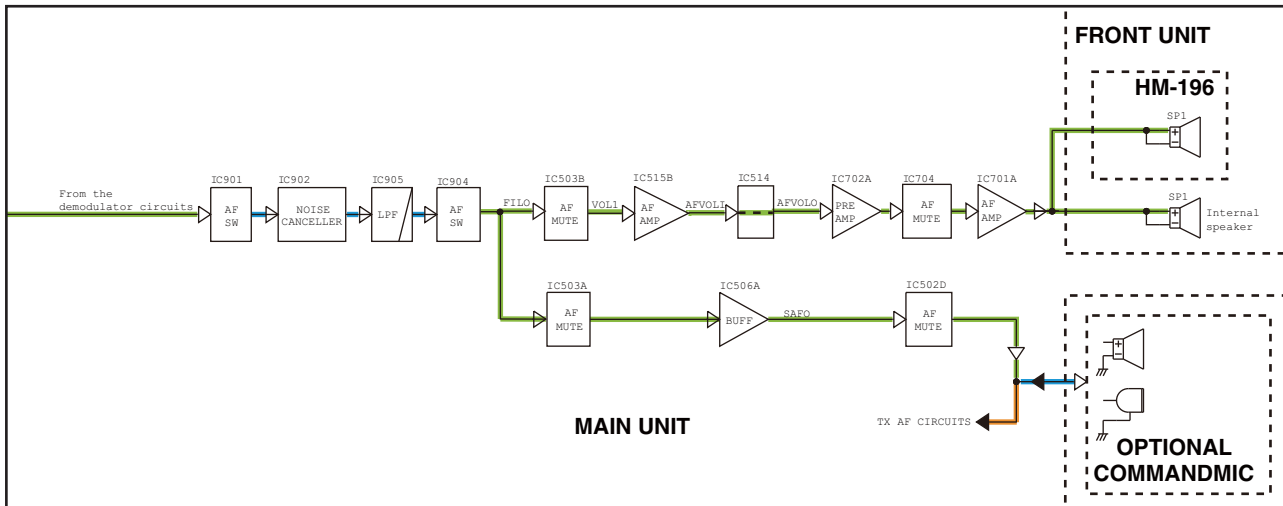
The level-adjusted AF signal is amplified by the AF AMP (IC702A), and then applied to the AF power AMP (IC701A, pin 1), through the AF mute SW (IC704, pins 3, 1).

The amplified signal is output to the internal speaker (CHASSIS: SP1) or HM-196, through the LOGIC UNIT.

• When the AF signal is output to the optional COMMANDMIC™

The RX AF signal from the AF SW (IC904, pins 1, 7) is passed through the AF MUTE SW (IC503A, pins 2, 1) and amplified by the buffer (IC506A), and then output to the COMMANDMIC™, through the AF mute SW (IC502D, 11, 10).

• RX AF CIRCUITS



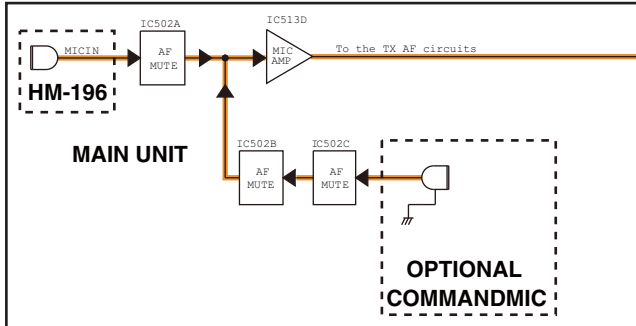
4-2 TRANSMIT CIRCUITS

TX AF CIRCUITS (MAIN UNIT)

The AF signal from the microphone (MIC signal) is passed through the MIC mute SW (IC502A, pins 1, 2), and then applied to the MIC AMP (IC513D).

The MIC signal from the COMMANDMICIV™ is passed through the MIC mute SWs (IC502C, pins 9, 8 and IC502B, pins 4, 3), and then applied to the MIC AMP (IC513D).

• MIC AMP CIRCUITS



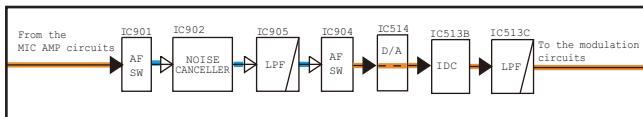
TX AF CIRCUITS (MAIN UNIT)

The amplified AF signal is passed through the AF SW (IC901, pins 6, 1) and applied to the noise canceller IC (IC902, pin 36).

The processed AF signal is passed through the LPF (IC905, pins 1, 4) and AF SW (IC904, pins 1, 6), and then applied to the D/A converter (IC514, pins 13, 14) to be adjusted in level.

The level-adjusted AF signal is applied to the IDC AMP (IC513B) which limits the amplitude of MIC signal to prevent over deviation. The amplitude-limited signal is passed through the LPF (IC513C), and then applied to the modulation circuits.

• TX AF CIRCUITS

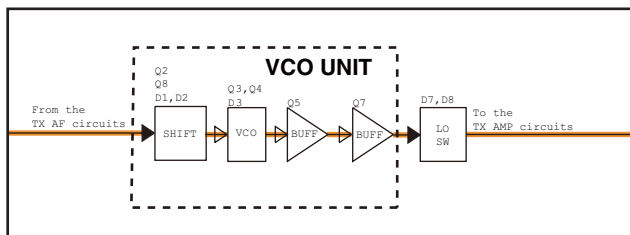


MODULATION CIRCUITS (MAIN UNIT)

The MIC signal from the TX AF circuits is applied to the VCO (Q3, Q4 and D1–D3). The modulation signal is applied to D2, to obtain Frequency Modulation.

The modulated VCO output signal is passed through the buffers (Q5 and Q7), and then applied to the TX AMP circuits as a TX signal, through the LO SW (D7).

• MODULATION CIRCUITS



TX AMP CIRCUITS (MAIN UNIT)

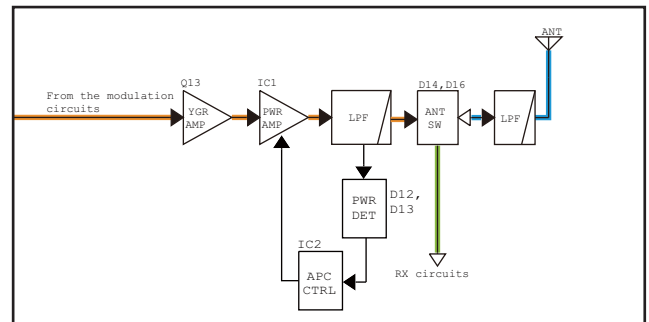
The TX signal is amplified by the YGR (Q13) and power AMP (IC1), and then passed through the LPF (L2, C111 and C112), TX output power detector (D12 and D13), ANT SW (D14), and two LPF (L21, L22, and C114–C116), before being sent to the antenna.

APC CIRCUITS (MAIN UNIT)

The voltage produced at the LPF (L20, C111, and C112) is rectified by D12 and D13, and is used as the TX power sensing voltage.

The voltage is applied to the APC AMP (IC2, pin 3), and the output voltage controls the gate bias voltage of power AMP (IC1) to keep the TX output power constant.

• TX AMP CIRCUITS



4-3 FREQUENCY SYNTHESIZER (MAIN UNIT)

• VCO

The VCO (Q3, Q4, and D1–D3) generates both 1st LO signal for MAIN channels and the TX signal. The output of buffer (Q7) is used as the TX or RX LO signal.

While receiving, the LO signal is applied to the 1st IF mixer for MAIN channels (Q202), through the LO SW (D8) and LPF (L206 and L207).

While transmitting, the LO signal is applied to the TX AMP circuits, through the LO SW (D7).

• PLL

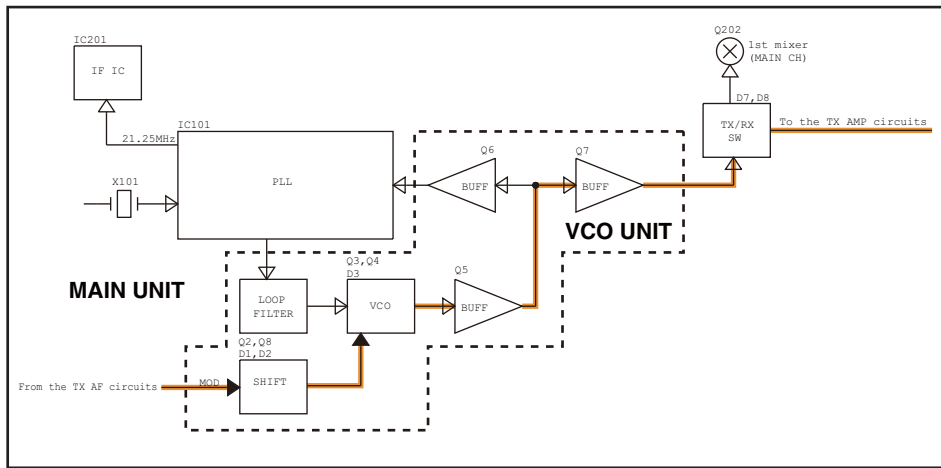
A portion of VCO output signal is passed through two buffers (Q5 and Q6), and then fed back to the PLL IC (IC101, pin 16).

The PLL IC (IC101) phase-compares the outputs of the reference frequency oscillator (TCXO; X101) and VCO, and the phase-difference is output as the charge pump current.

The current is passed through the loop filter (R1–R3, C1–C3, and C10) to be converted into the lock voltage, which controls the oscillating frequency of VCO.

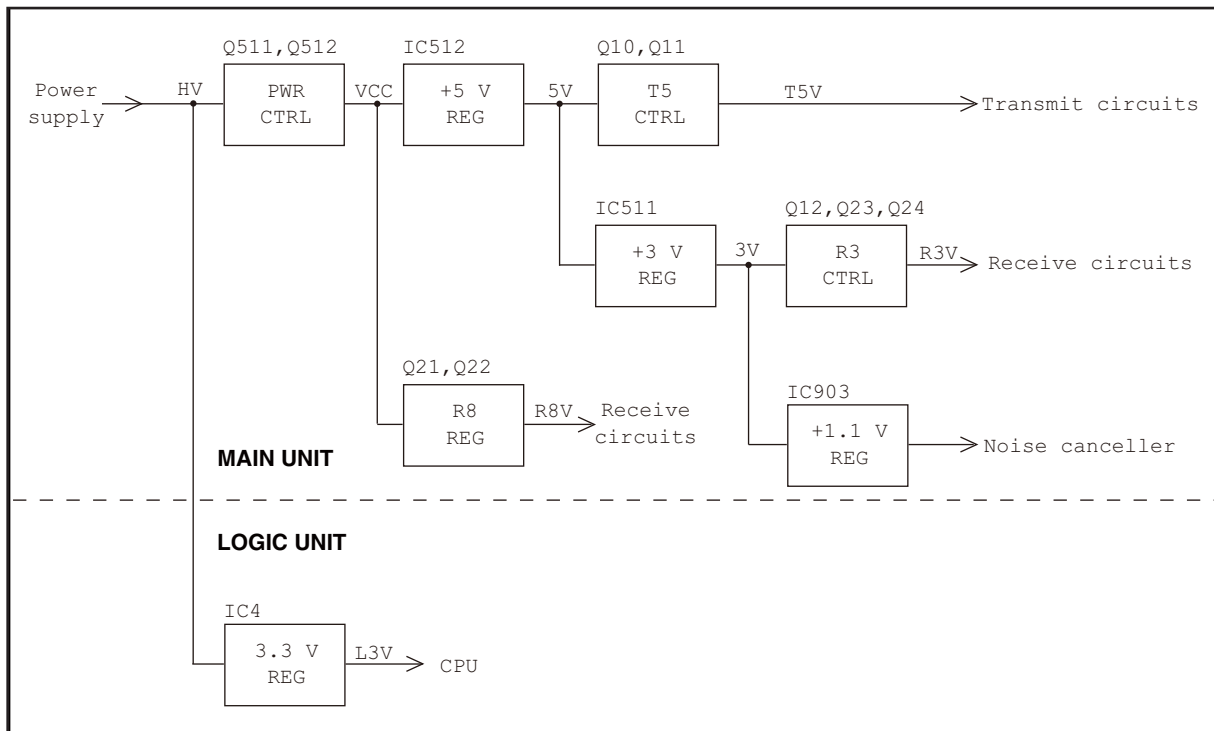
When the oscillation frequency drifts, its phase changes from that of the reference frequency, causing a lock voltage change to compensate for the drift in the VCO oscillating frequency.

• FREQUENCY SYNTHESIZER CIRCUITS



4-4 VOLTAGE BLOCK DIAGRAM

Voltage from the power supply is routed throughout the transceiver, through regulators and switches.



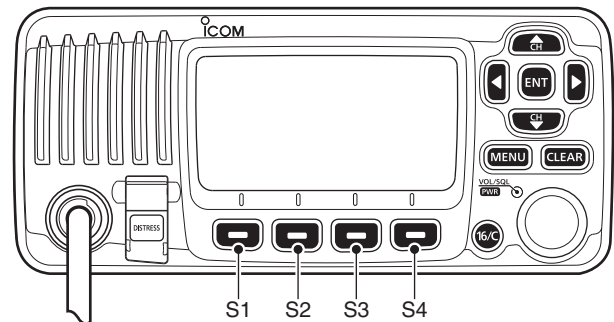
4-5 PORT ALLOCATIONS

• CPU (LOGIC UNIT: IC1)

PIN No.	LINE NAME	DESCRIPTION	I/O
10	UP	[▲] key input. L=Pushed.	I
11	DN	[▼] key input. L=Pushed.	I
12	LEFT	[◀] key input. L=Pushed.	I
13	RIGHT	[▶] key input. L=Pushed.	I
14	ENT	[ENT] key input. L=Pushed.	I
15	CLR	[CLEAR] key input. L=Pushed.	I
18	MENU	[MENU] key input. L=Pushed.	I
19	CH16	[16/C] key input. L=Pushed.	I
20	DIST	[DISTRESS] key input. L=Pushed.	I
21	S1	Soft key (LOGIC UNIT: S1*) input. L=Pushed.	I
22	S2	Soft key (LOGIC UNIT: S2*) input. L=Pushed.	I
26	TEMPV	Temperature sensing voltage.	I
27	TDETV	Transmit output power sensing voltage.	I
28	LOINV	Lock voltage input.	I
29	WDECV	Weather alert signal detect.	I
34	POW	Power switch input. L=Pushed.	I
40	DSCOUT	DSC signal encoding output.	O
41	BEEP	Beep audio. (Square waves)	O
43	KEYV	[▲] and [▼] (HM-196) key input.	I
44	NOISEV	Noise level detect.	I
46	LBAT	Power supply voltage.	I
49	S3	Soft key (LOGIC UNIT: S3*) input. L=Pushed.	I
50	S4	Soft key (LOGIC UNIT: S4*) input. L=Pushed.	I
53	PTTIN	[PTT] (HM-196) input. L=Pushed.	I
56	DB0	LCD driver control signal.	I/O
57	DB1		
58	SDATA	Common serial data.	I
59	SCK	Common serial clock.	I
63	DASTB	D/A converter (MAIN UNIT: IC514) strobe.	I
64	PLSTB	PLL (MAIN UNIT: IC101) strobe.	I
65	IOSTB	Expander (MAIN UNIT: IC801 and IC802) strobe.	I
69	COM1TXD	Serial data to the COMMANDMICIV™.	O
70	COM1RXD	Serial data from the COMMANDMICIV™.	I
77	REXTM	RX AF mute switch (MAIN UNIT: IC504) control. (For COMMANDMICIV™) L=AF mute.	O
78	RXSPM	RX AF mute switch (MAIN UNIT: IC504) control. (For HM-196) L=AF mute.	O

PIN No.	LINE NAME	DESCRIPTION	I/O
87-92	DB2-DB7	LCD driver (LOGIC UNIT: DS1) control signal.	O
93	WR0	LCD driver (LOGIC UNIT: DS1) write mode switch.	O
96	DIALA	Rotary encoder pulse input (phase-A).	I
97	DIALB	Rotary encoder pulse input (phase-B).	I
101	NM1TXD	NMEA output.	O
102	NM1RXD	NMEA input.	I
103	DSCIN	Decoded DSC signal input.	I
113	CLOTXD	Cloning data.	O
114	DTEST	DSC loop back testing signal.	O
116	CLORXD	Cloning data.	I
117	PON	Power supply line VCC control. L=While transceiver's power is ON.	O
125	CS	LCD driver (LOGIC UNIT: DS1) chip select.	O
126	RESETB	LCD driver (LOGIC UNIT: DS1) reset signal. L=The LCD driver is reset.	O
135	UNLKI	PLL unlock detect. L=Unlocked.	I
136	DIMM	LCD brightness control.	O
141	ECK	EEPROM (LOGIC UNIT: IC9) serial clock.	O
142	EDATA	EEPROM (LOGIC UNIT: IC9) serial data.	I/O

*; Soft key location



• D/A CONVERTER (MAIN UNIT: IC514)

PIN No.	LINE NAME	DESCRIPTION
2	AFVOLO	AF output level adjustment. (RX signal)
3	FCON	Reference frequency adjustment.
11	SQL	Noise squelch level adjustment.
14	MSENS	MIC sensitivity adjustment.
15	PCON	TX output power adjustment.
23	PAVOLO	AF output level adjustment. (Public address signal)

[MAIN UNIT]

Table with columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Contains rows R116 to R533 with various part numbers and descriptions like S.ARR EXB28V471JX, S.RES ERJ2GEJ 103 X (10K), etc.

Eqv.= This component is equivalent to the REF No. component listed above, and may be substituted on parts orders and repairs.

[MAIN UNIT]

Table with columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Contains rows R534 to R758 with various part numbers and descriptions like S.RES ERJ2GEJ 272 X (2.7K), S.RES ERJ2GEJ 104 X (100K), etc.

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side) S.=Surface mount

[MAIN UNIT]

Table with 5 columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Contains 335 rows of part specifications.

Eqv.= This component is equivalent to the REF No. component listed above, and may be substituted on parts orders and repairs.

[MAIN UNIT]

Table with 5 columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Contains 100 rows of part specifications.

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side) S.=Surface mount

[LOGIC UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
J2	6510018921	S.CON B8B-PH-SM4-TB(LF)(SN)	B	10.7/9.5
J3	6510015541	S.CON B4B-ZR-SM4-TF(LF)(SN)	B	114.0/23.5
J4	6510018971	S.CON B4B-PH-SM4-TB(LF)(SN)	B	127.0/22.5
J5	6510028220	S.CON AYF532265	B	62.0/48.5
DS1	5030003500	LCD 8803L21012 <SKD>		
DS2	5040003310	S.LED L-C191KYCT <KOU>	T	130.3/52.0
DS3	5040003310	S.LED L-C191KYCT <KOU>	T	114.0/60.3
DS4	5040003310	S.LED L-C191KYCT <KOU>	T	135.5/37.2
DS5	5040003310	S.LED L-C191KYCT <KOU>	T	111.6/37.2
DS6	5040003310	S.LED L-C191KYCT <KOU>	T	102.6/11.0
DS7	5040003310	S.LED L-C191KYCT <KOU>	T	79.3/7.8
DS8	5040003310	S.LED L-C191KYCT <KOU>	T	44.5/7.8
DS9	5040003310	S.LED L-C191KYCT <KOU>	T	9.0/2.2
S1	2260002740	S.SWI LS8J2M-T	T	35.8/7.0
S2	2260002740	S.SWI LS8J2M-T	T	53.2/7.0
S3	2260002740	S.SWI LS8J2M-T	T	70.6/7.0
S4	2260002740	S.SWI LS8J2M-T	T	88.0/7.0
S5	2260002740	S.SWI LS8J2M-T	T	131.9/29.9
S6	2260002740	S.SWI LS8J2M-T	T	115.1/29.9
S7	2260002740	S.SWI LS8J2M-T	T	109.1/6.8
S8	2260002740	S.SWI LS8J2M-T	T	9.0/9.2
S9	2260002740	S.SWI LS8J2M-T	T	123.5/63.6
S10	2260002740	S.SWI LS8J2M-T	T	111.7/52.0
S11	2260002740	S.SWI LS8J2M-T	T	123.5/52.0
S12	2260002740	S.SWI LS8J2M-T	T	135.3/52.0
S13	2260002740	S.SWI LS8J2M-T	T	123.5/40.4
W1	7030012290	JUM RDS2T0R0		
W2	7030012290	JUM RDS2T0R0		
W3	8900014871	CAB OPC-1332A-1(P0.5N40L100)		
EP11	6910016330	S.BEA MMZ1005S 601CT-S	B	129.6/31.0
EP12	6910016330	S.BEA MMZ1005S 601CT-S	B	11.7/15.7

[DIAL UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
S1	2250000730	ENC TP90N245AE20PY-14.5F-3338		
W1	8900020410	CAB OPC-2217 <TJM>		

Eqv.= This component is equivalent to the REF No. component listed above, and may be substituted on parts orders and repairs.

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

[CONNECT UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C1	4030016790	S.CER C1005 JB 1E 103K-T	B	2.1/11.9
J1	6510022440	CON LTW-8MP-C NUTGASKET <LIA>		
J2	6510025142	S.CON 10FLT-SM2-TB(LF)(SN)(M)	B	4.3/15.0
EP2	6910019100	S.BEA MPZ1608S101AT	B	4.5/19.1

[VCO UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
Q2	1590004070	S.TRA LDTC144EET1G <SLVJ>	T	13.4/9.3
Q3	1530002921	S.TRA 2SC4226-T1 Y25 (R25)	T	11.9/2.8
Q4	1530002921	S.TRA 2SC4226-T1 Y25 (R25)	T	18.6/2.3
Q5	1530003950	S.TRA KTC4080 Y-RTK/P	T	7.1/6.9
Q6	1530003950	S.TRA KTC4080 Y-RTK/P	T	4.9/2.6
Q7	1530003950	S.TRA KTC4080 Y-RTK/P	T	5.4/11.3
Q8	1590004050	S.TRA LDTA144EET1G <SLVJ>	T	11.4/12.5
D1	1750001700	S.DIO HSC277TRF-E	T	11.5/10.0
D2	1750001700	S.DIO HSC277TRF-E	T	13.3/7.7
D3	1750001780	S.VAR HVB350BYPTL-E	T	14.4/5.6
L1	6200003711	S.COI NLV25T-2R7J	T	18.2/9.2
L2	6200011410	S.COI C2520C-82NG-A	T	17.9/5.9
L3	6200013750	S.COI MLK1005SR10JT	T	5.7/8.3
L4	6200013750	S.COI MLK1005SR10JT	T	3.5/4.0
L5	6200013750	S.COI MLK1005SR10JT	T	4.0/12.7
R6	7030009320	S.RES ERJ2GEJ 4R7 X (4.7)	T	7.5/10.8
R7	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	16.4/11.0
R8	7030005240	S.RES ERJ2GEJ 473 X (47K)	T	16.2/9.8
R9	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	16.2/8.9
R11	7030005000	S.RES ERJ2GEJ 471 X (470)	T	10.0/12.0
R12	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	18.5/13.7
R13	7030007340	S.RES ERJ2GEJ 153 X (15K)	T	15.5/13.3
R14	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	18.5/12.8
R15	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	13.4/12.8
R16	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	9.4/13.2
R21	7030008010	S.RES ERJ2GEJ 123 X (12K)	T	9.9/1.4
R22	7030008010	S.RES ERJ2GEJ 123 X (12K)	T	20.7/1.7
R23	7030009160	S.RES ERJ2GEJ 181 X (180)	T	15.6/2.2
R25	7030005000	S.RES ERJ2GEJ 471 X (470)	T	9.9/3.2
R26	7030005010	S.RES ERJ2GEJ 681 X (680)	T	6.9/9.6
R27	7030005070	S.RES ERJ2GEJ 683 X (68K)	T	7.6/5.1
R31	7030005000	S.RES ERJ2GEJ 471 X (470)	T	4.3/5.6
R32	7030005070	S.RES ERJ2GEJ 683 X (68K)	T	6.8/1.7
R33	7030007270	S.RES ERJ2GEJ 151 X (150)	T	2.9/5.3
R34	7030009200	S.RES ERJ2GEJ 390 X (39)	T	1.8/4.4
R41	7030005000	S.RES ERJ2GEJ 471 X (470)	T	3.5/9.5
R42	7030007350	S.RES ERJ2GEJ 393 X (39K)	T	5.1/9.5
R43	7030003860	S.RES ERJ3GE JPW V	T	16.1/3.7
C4	4030017460	S.CER C1005 JB 1H 102K-T	T	18.3/11.3
C6	4030016790	S.CER C1005 JB 1E 103K-T	T	3.5/7.5
C8	4030017460	S.CER C1005 JB 1H 102K-T	T	15.2/10.8
C9	4030017460	S.CER C1005 JB 1H 102K-T	T	15.0/9.5
C11	4030017460	S.CER C1005 JB 1H 102K-T	T	12.8/10.8
C12	4030017460	S.CER C1005 JB 1H 102K-T	T	14.0/11.3
C13	4030018860	S.CER C1005 JB 0J 105K-T	T	13.4/13.7
C14	4030017460	S.CER C1005 JB 1H 102K-T	T	14.6/13.3
C15	4030017460	S.CER C1005 JB 1H 102K-T	T	17.3/13.3
C16	4030011810	S.CER C1608 JB 1A 224K-T	T	10.3/9.9
C21	4030018010	S.CER C1005 CH 1H 360J-T	T	16.2/8.0
C22	4030017670	S.CER C1005 CH 1H 390J-T	T	15.0/7.6
C24	4030017760	S.CER C1005 JB 1H 222K-T	T	11.6/7.0
C31	4030017350	S.CER C1005 CH 1H 020B-T	T	12.2/4.7
C32	4030017550	S.CER C1005 CH 1H 1R5B-T	T	20.4/3.3
C33	4030017440	S.CER C1005 CH 1H 221J-T	T	15.6/1.3
C34	4030017460	S.CER C1005 JB 1H 102K-T	T	9.9/4.1
C35	4030006860	S.CER C1608 JB 1H 102K-T	T	14.1/2.7
C36	4030017340	S.CER C1005 CH 1H 010B-T	T	9.9/2.3
C37	4030017460	S.CER C1005 JB 1H 102K-T	T	7.0/8.7
C41	4030017380	S.CER C1005 CH 1H 050B-T	T	6.8/3.3
C42	4030017460	S.CER C1005 JB 1H 102K-T	T	4.8/4.4
C43	4030017400	S.CER C1005 CH 1H 220J-T	T	2.5/3.1
C46	4030017630	S.CER C1005 CH 1H 120J-T	T	4.8/8.3
C47	4030017460	S.CER C1005 JB 1H 102K-T	T	3.5/8.4
C48	4030017460	S.CER C1005 JB 1H 102K-T	T	5.4/13.1
C49	4030017650	S.CER C1005 CH 1H 270J-T	T	3.3/11.3
J1	6910003831	CON IMSA-9230B-1-04Z003-PT1		
J2	6910003831	CON IMSA-9230B-1-04Z003-PT1		

Eqv.= This component is equivalent to the REF No. component listed above, and may be substituted on parts orders and repairs.

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side) S.=Surface mount

SECTION 6

MECHANICAL PARTS

[CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510004881	MR-DSE-01-1 <GA>	1
W1**	8900020380	OPC-2214	1
W2**	8900020390	OPC-2215	1
MP1	8510020530	3338 CASE ASS.Y (UD-45058) [Black]	1
	8510020570	3338 CASE (A)ASS.Y (UD45058) [Super white]	1
	8510020530	3338 CASE ASS.Y (UD-45058) [Black]	1
	8510020530	3338 CASE ASS.Y (UD-45058) [Black]	1
	8510020530	3338 CASE ASS.Y (UD-45058) [Black]	1
	8510020570	3338 CASE (A)ASS.Y (UD45058) [Super white]	1
	8510020570	3338 CASE (A)ASS.Y (UD45058) [Super white]	1
	8510020570	3338 CASE (A)ASS.Y (UD45058) [Super white]	1
	8510020570	3338 CASE (A)ASS.Y (UD45058) [Super white]	1
MP3	8930049040	INSULATION SHEETFQ	1
MP4	8930058780	2577 SHEET	1
MP5	8930083960	3338 R-PACKING	1
MP6	8930083920	3338 F-PACKING	1
MP7	8930083990	3338 R-BUSH PLATE	1
MP8	8930084000	3338 A-R-BUSH PLATE Y1260	1
MP9	8510020500	3338 A-MODULE PLATE	1
MP10	8930084010	3338 IC CLIP	1
MP11	8010022280	3338 CHASSIS	1
MP12	8930034300	1542 ANT SEAL <JST>	1
MP13	8810010610	PHB0 M3 X 8 SUS S (BT)	2
MP14	8810010021	PH BT M2.6X 8 NI-ZC3	2
MP15	8810008661	PHBT M3 X 8 NI-ZC3	7
MP16	8810010610	PHB0 M3 X 8 SUS S (BT)	6
MP17	8810010620	PHB0 M3 X12 SUS S	6
MP18	8510020340	3338 MODULE COVER [UK]	1
	8510020340	3338 MODULE COVER [EUR]	1
	8510020340	3338 MODULE COVER [HOL]	1
	8510020340	3338 MODULE COVER [FRG]	1
	8510020340	3338 MODULE COVER [UK-01]	1
	8510020340	3338 MODULE COVER [EUR-01]	1
	8510020340	3338 MODULE COVER [HOL-01]	1
	8510020340	3338 MODULE COVER [FRG-01]	1
MP32	8930055040	2438 CAP <JST>	1

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1*	6510025142	10FLT-SM2-TB (LF) (SN) (M)	1
J2*	6510022472	40FLT-SM2-TB (LF) (SN) (M)	1
J3*	6510018971	B4B-PH-SM4-TB (LF) (SN)	1
F1*	5210001160	ERBRE3R00V	1
W1*	7030012290	RDS2T0R0	1
W3**	8900020400	OPC-2216	1

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MC1	0800012850	HM-196B [Black]	1
	0800012860	HM-196SW [Super white]	1
	0800012850	HM-196B [Black]	1
	0800012850	HM-196B [Black]	1
	0800012850	HM-196B [Black]	1
	0800012850	HM-196B [Black]	1
	0800012860	HM-196SW [Super white]	1
	0800012860	HM-196SW [Super white]	1
	0800012860	HM-196SW [Super white]	1
	0800012860	HM-196SW [Super white]	1
SP1	2510001350	045P0806-7-1	1
W1*	7030012290	RDS2T0R0	1
MP1	8210027970	3338 FRONT PANEL WP+SN [USA]	1
	8210027980	3338 FRONT PANEL (A) WP+SN [USA-01]	1
	8310080220	3338 FRONT PANEL (B) WP+SN [UK]	1
	8310080220	3338 FRONT PANEL (B) WP+SN [EUR]	1
	8310080220	3338 FRONT PANEL (B) WP+SN [HOL]	1
	8310080220	3338 FRONT PANEL (B) WP+SN [FRG]	1
	8210027990	3338 FRONT PANEL (C) WP+SN [UK-01]	1
	8210027990	3338 FRONT PANEL (C) WP+SN [EUR-01]	1
	8210027990	3338 FRONT PANEL (C) WP+SN [HOL-01]	1
	8210027990	3338 FRONT PANEL (C) WP+SN [FRG-01]	1
MP4	8930085200	3338 A-7-KEY <YAM>	1
MP5	8930085190	3338 A-6-KEY <YAM>	1
MP6	8110010141	3338 D-COVER-1	1
MP7	8930084110	3338 SHAFT	1
MP8	8860000880	E-RING 1.2 STACK	1
MP9	8930084281	3338 SPRING-1	1
MP10	8930084290	3338 F-BUSH PLATE	1
MP12	8930084300	O-RING (CN)	1
MP15	8610014490	KNOB N402 ASS.Y (BLACK) [Black]	1
	8610014500	KNOB N402 (A) ASS.Y (SW) [Super white]	1
	8610014490	KNOB N402 ASS.Y (BLACK) [Black]	1
	8610014490	KNOB N402 ASS.Y (BLACK) [Black]	1
	8610014490	KNOB N402 ASS.Y (BLACK) [Black]	1
	8610014490	KNOB N402 ASS.Y (BLACK) [Black]	1
	8610014500	KNOB N402 (A) ASS.Y (SW) [Super white]	1
	8610014500	KNOB N402 (A) ASS.Y (SW) [Super white]	1
	8610014500	KNOB N402 (A) ASS.Y (SW) [Super white]	1
	8610014500	KNOB N402 (A) ASS.Y (SW) [Super white]	1
MP16	8810008661	PHBT M3 X 8 NI-ZC3	4
MP21	8930055841	2490 EARTH SPRING-1	1
MP22	8810008661	PHBT M3 X 8 NI-ZC3	1

[LOGIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1*	6510022472	40FLT-SM2-TB (LF) (SN) (M)	1
J2*	6510018921	B8B-PH-SM4-TB (LF) (SN)	1
J3*	6510015541	B4B-ZR-SM4-TF (LF) (SN)	1
J4*	6510018971	B4B-PH-SM4-TB (LF) (SN)	1
J5*	6510028220	AYF532265	1
DS1	5030003500	8803L21012 <SKD>	1
S1*	2260002740	LS8J2M-T	1
S2*	2260002740	LS8J2M-T	1
S3*	2260002740	LS8J2M-T	1
S4*	2260002740	LS8J2M-T	1
S5*	2260002740	LS8J2M-T	1
S6*	2260002740	LS8J2M-T	1
S7*	2260002740	LS8J2M-T	1
S8*	2260002740	LS8J2M-T	1
S9*	2260002740	LS8J2M-T	1
S10*	2260002740	LS8J2M-T	1
S11*	2260002740	LS8J2M-T	1
S12*	2260002740	LS8J2M-T	1
S13*	2260002740	LS8J2M-T	1
W1*	7030012290	RDS2T0R0	1
W2*	7030012290	RDS2T0R0	1
W3**	8900014871	OPC-1332A-1 (P0.5N40L100) TJM	1
MP1	8930085030	DOUBLE SIDE TAPE (BO)	2

*: Refer to "BOARD LAYOUTS" for the location.

** : Refer to "GENERAL WIRING" for the connection

Screw abbreviations A, B0, BT: Self-tapping PH: Pan head ZK: Black NI-ZU: Nickel-Zinc SUS: Stainless

[DIAL UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
S1	2250000730	TP90N245AE20PY-14.5F-3338	1
W1**	8900020410	OPC-2217	1

[CONNECT UNIT]

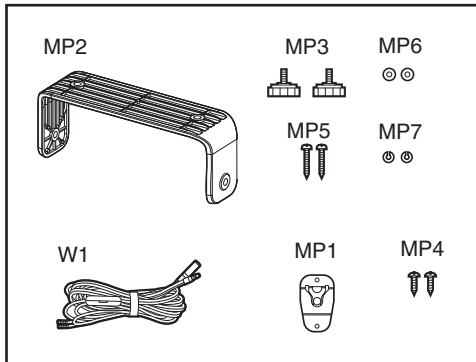
REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510022440	LTW-8MP-C NUTGASKET <LIA>	1
J2*	6510025142	10FLT-SM2-TB (LF) (SN) (M)	1

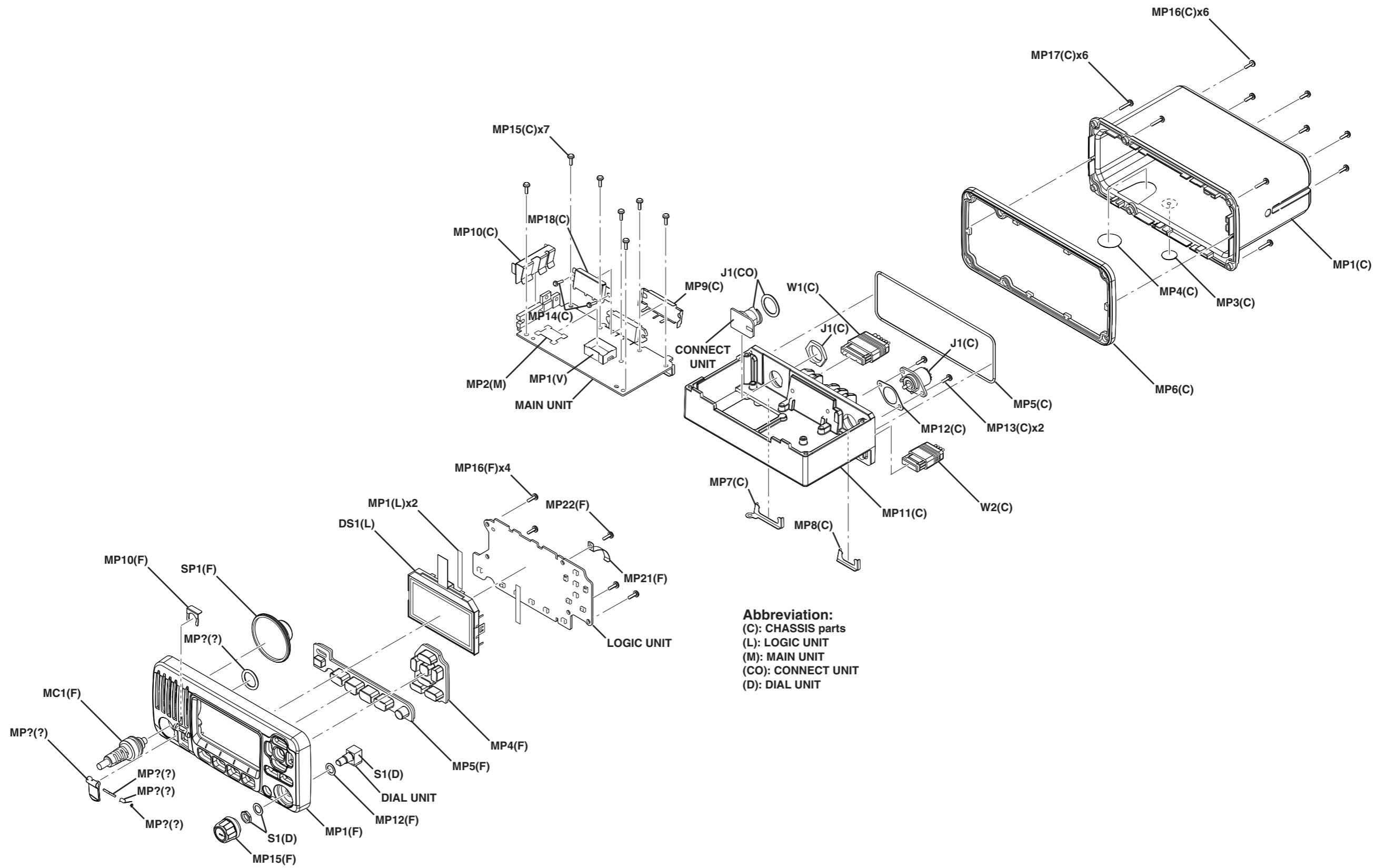
[VCO UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1*	6910003831	IMSA-9230B-1-04Z003-PT1	1
J2*	6910003831	IMSA-9230B-1-04Z003-PT1	1
MP1	8510020510	3338 VCO CASE Y1269	1
MP2	8510020520	3338 VCO COVER Y1270	1

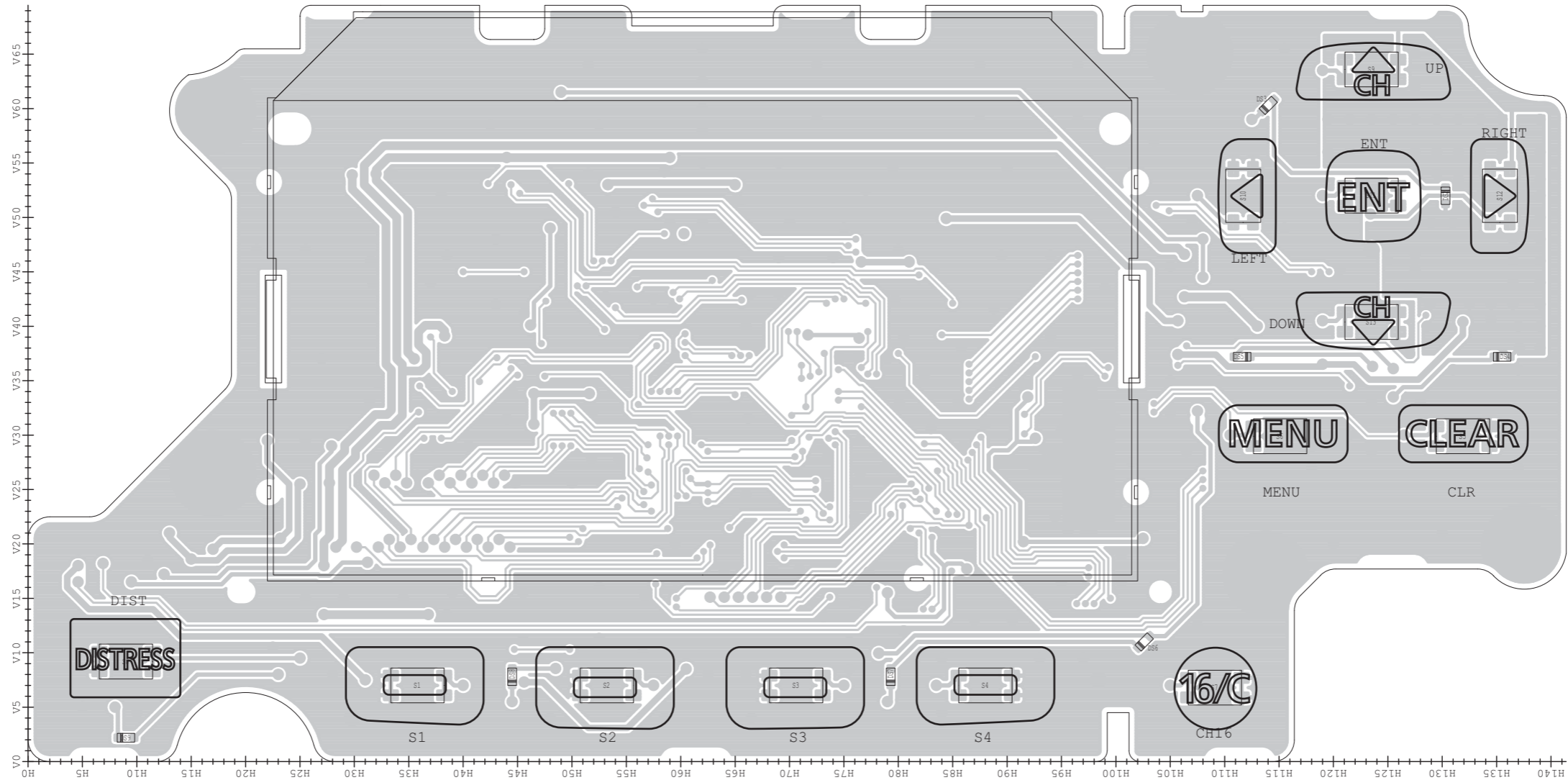
[ACCESSORIES]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
W1	8900009041	OPC-891A	1
MP1	8950007250	3054 MIC HANGER	1
MP2	8010022290	3338 MOBILE BRACKET (PE) [Black]	1
	8010022310	3338 MOBILE BRACKET (A) PE [Super white]	1
	8010022290	3338 MOBILE BRACKET (PE) [Black]	1
	8010022290	3338 MOBILE BRACKET (PE) [Black]	1
	8010022290	3338 MOBILE BRACKET (PE) [Black]	1
	8010022290	3338 MOBILE BRACKET (PE) [Black]	1
	8010022310	3338 MOBILE BRACKET (A) PE [Super white]	1
	8010022310	3338 MOBILE BRACKET (A) PE [Super white]	1
	8010022310	3338 MOBILE BRACKET (A) PE [Super white]	1
	8010022310	3338 MOBILE BRACKET (A) PE [Super white]	1
MP3	8820001460	3054 KNOB BOLT [Black]	2
	8820001500	3054 KNOB BOLT(A) [Super white]	2
	8820001460	3054 KNOB BOLT [Black]	2
	8820001460	3054 KNOB BOLT [Black]	2
	8820001460	3054 KNOB BOLT [Black]	2
	8820001460	3054 KNOB BOLT [Black]	2
	8820001500	3054 KNOB BOLT(A) [Super white]	2
	8820001500	3054 KNOB BOLT(A) [Super white]	2
	8820001500	3054 KNOB BOLT(A) [Super white]	2
	8820001500	3054 KNOB BOLT(A) [Super white]	2
MP4	8810010710	PHBT A0 3X16 SUS	2
MP5	8810010720	PHBT A0 5X20 SU	2
MP6	8850002850	PLAIN WASHER M5 SUS	2
MP7	8850002860	SPRING WASHER M5 SUS	2

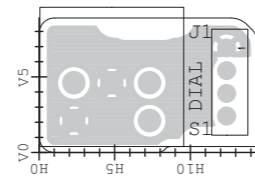




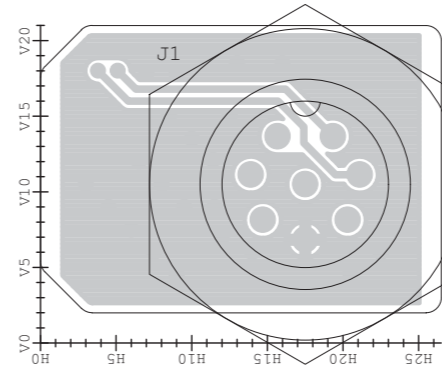
• LOGIC UNIT
(TOP VIEW)



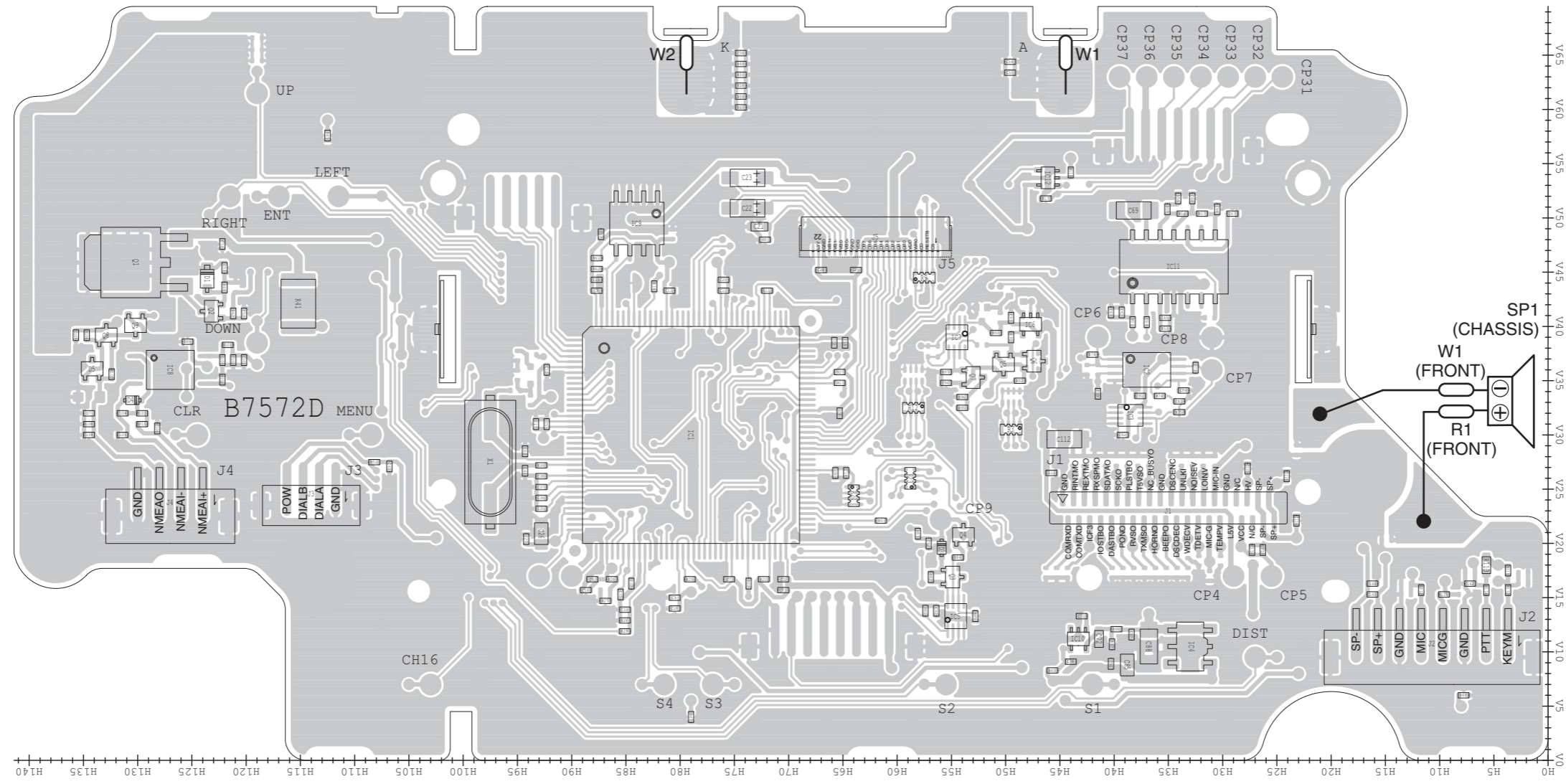
• DIAL UNIT
(TOP VIEW)



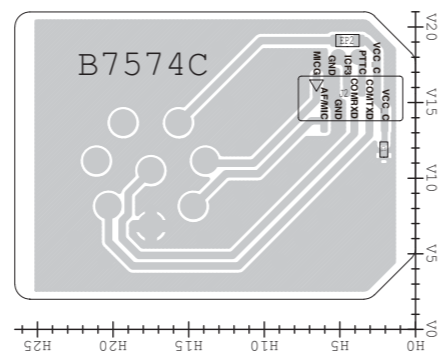
• CONNECT UNIT
(TOP VIEW)



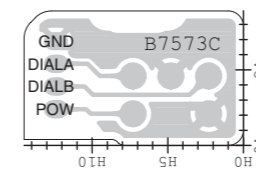
• LOGIC UNIT
(BOTTOM VIEW)



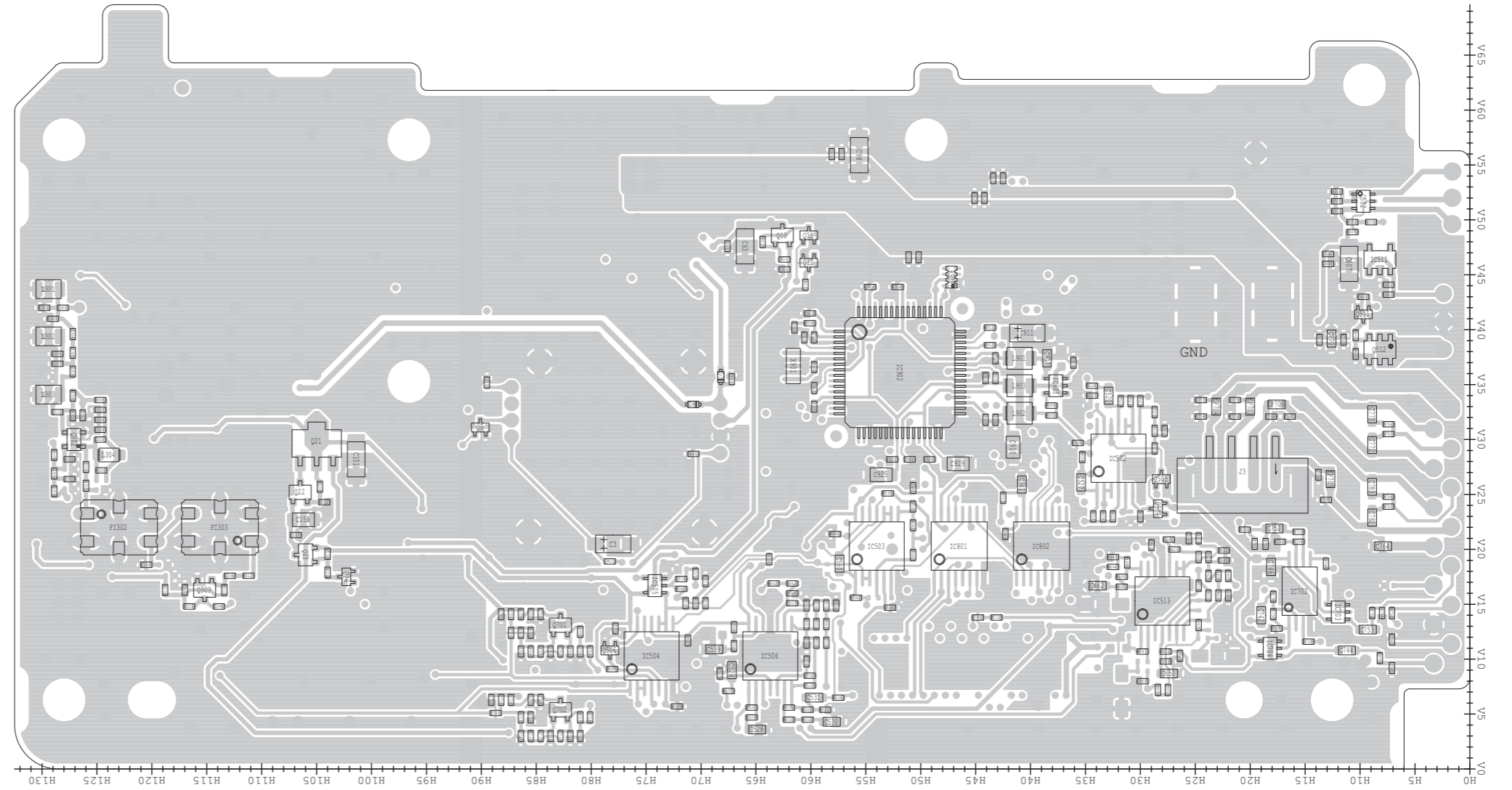
• CONNECT UNIT
(BOTTOM VIEW)



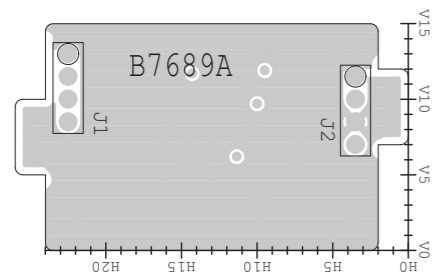
• DIAL UNIT
(BOTTOM VIEW)



• MAIN UNIT
(BOTTOM VIEW)

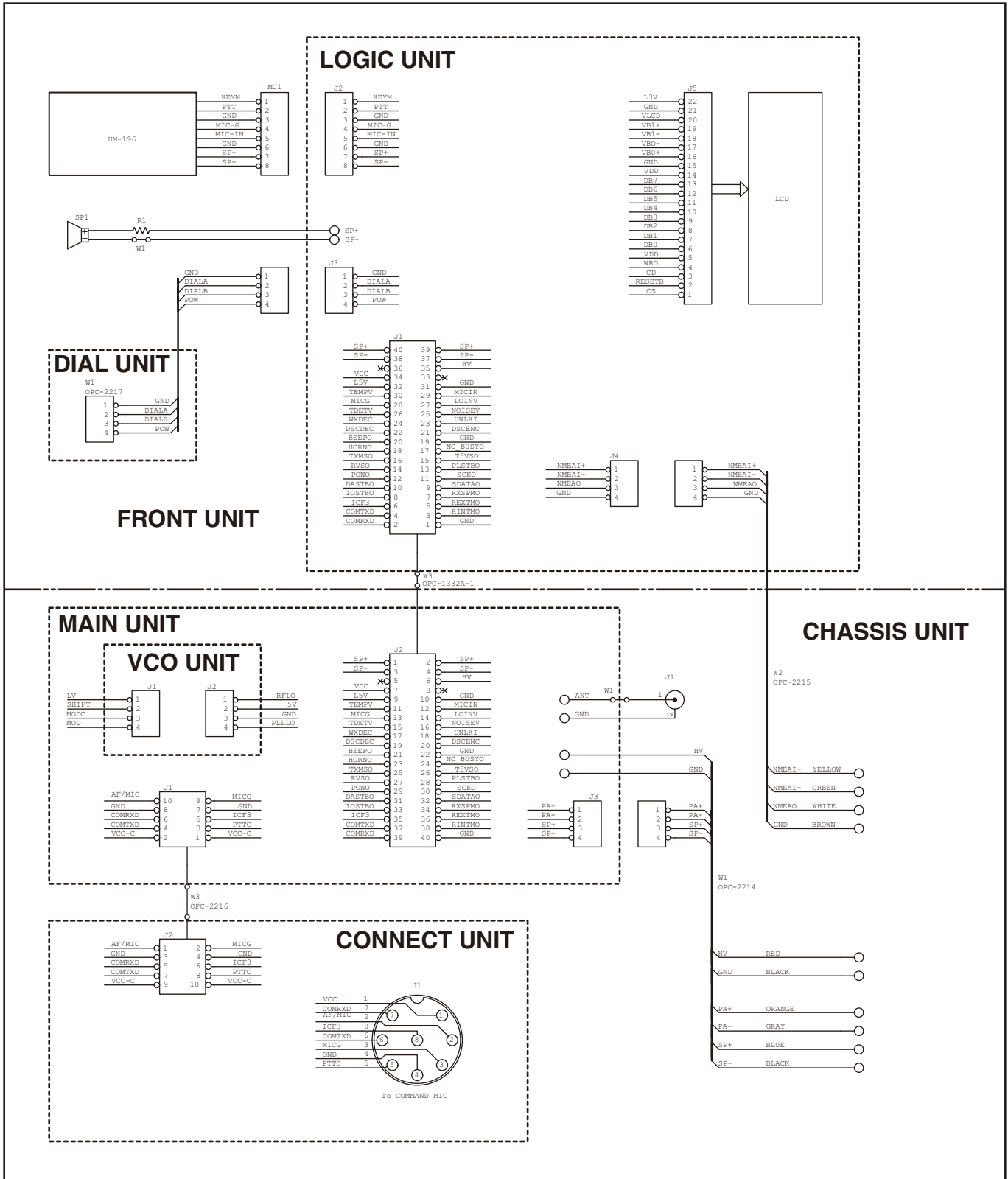


• VCO UNIT
(BOTTOM VIEW)



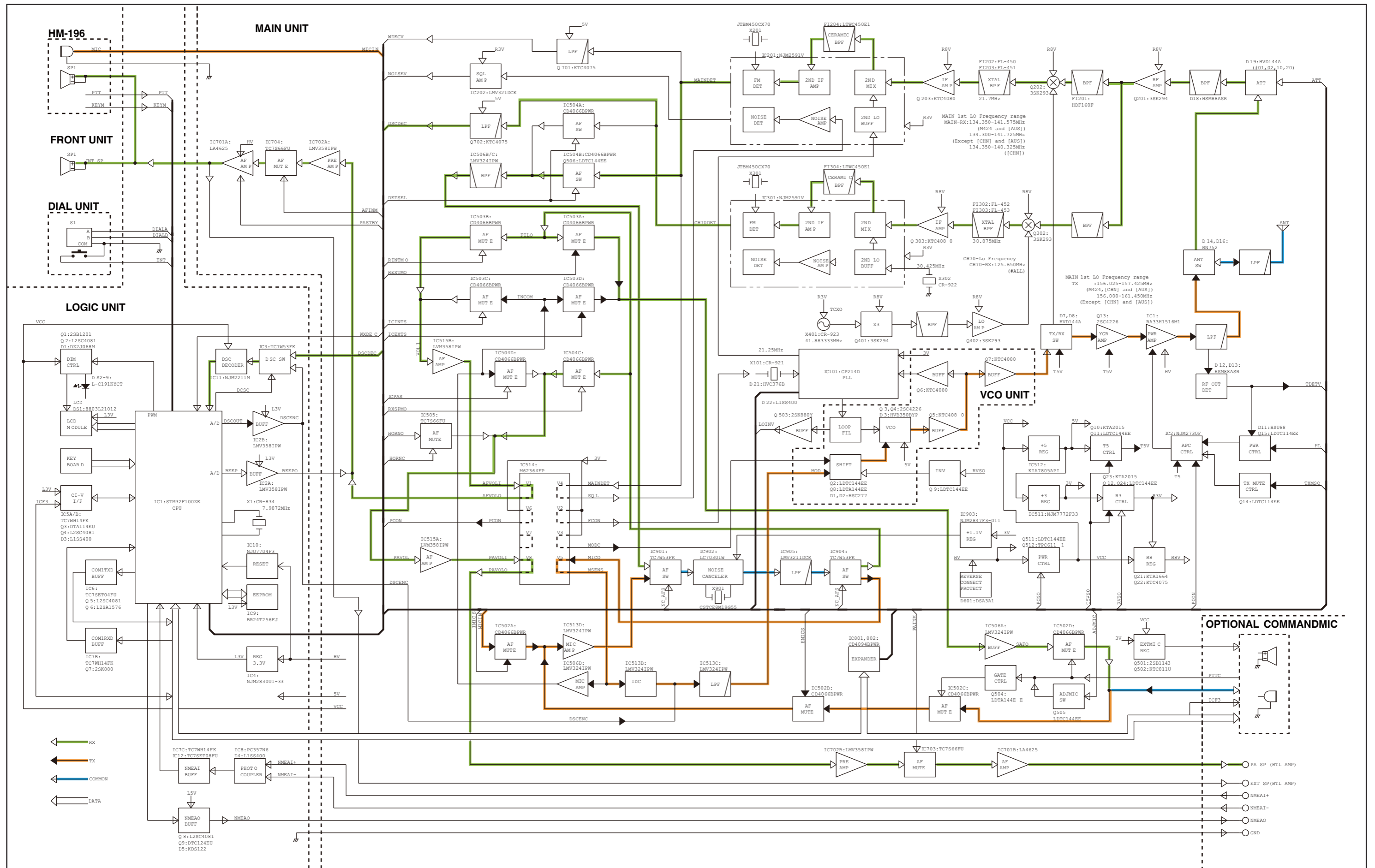
SECTION 8

GENERAL WIRING



SECTION 9

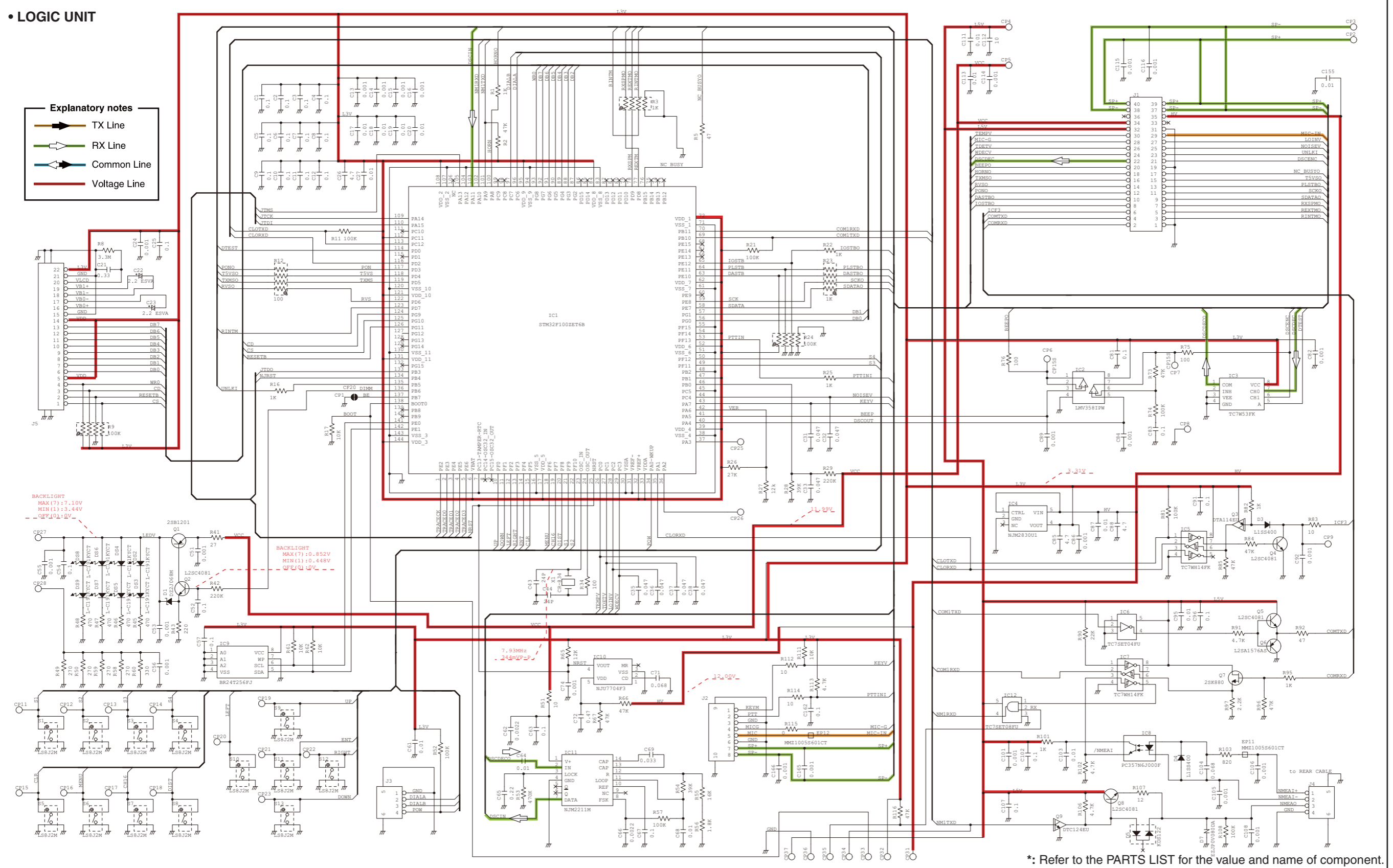
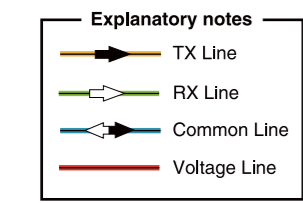
BLOCK DIAGRAM



SECTION 10

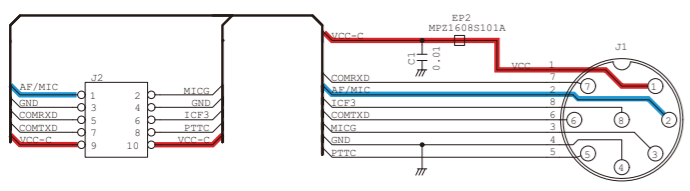
VOLTAGE DIAGRAM

• LOGIC UNIT

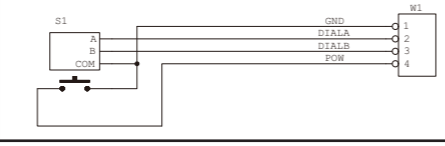


*: Refer to the PARTS LIST for the value and name of component.

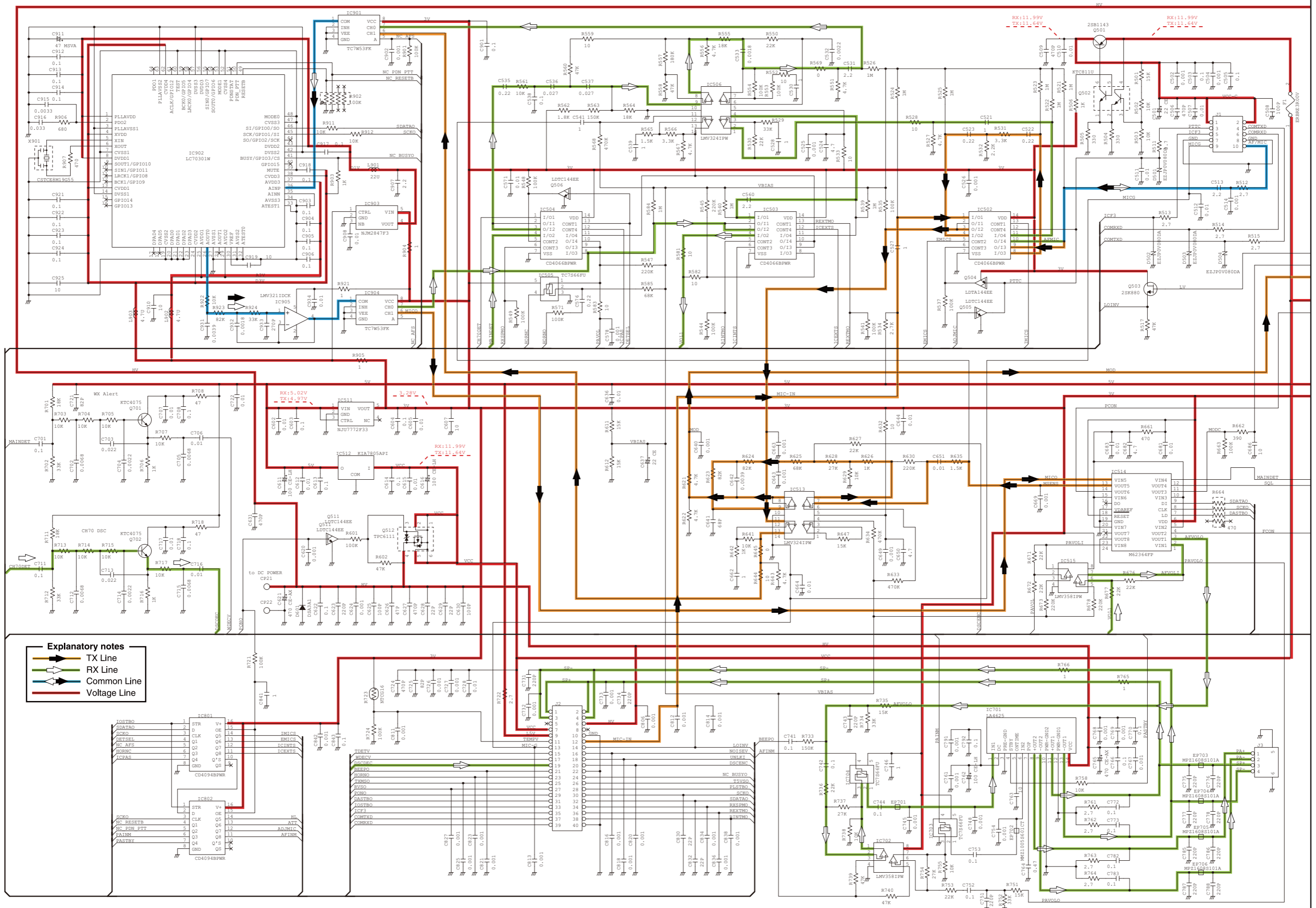
• CONNECT UNIT



• DIAL UNIT



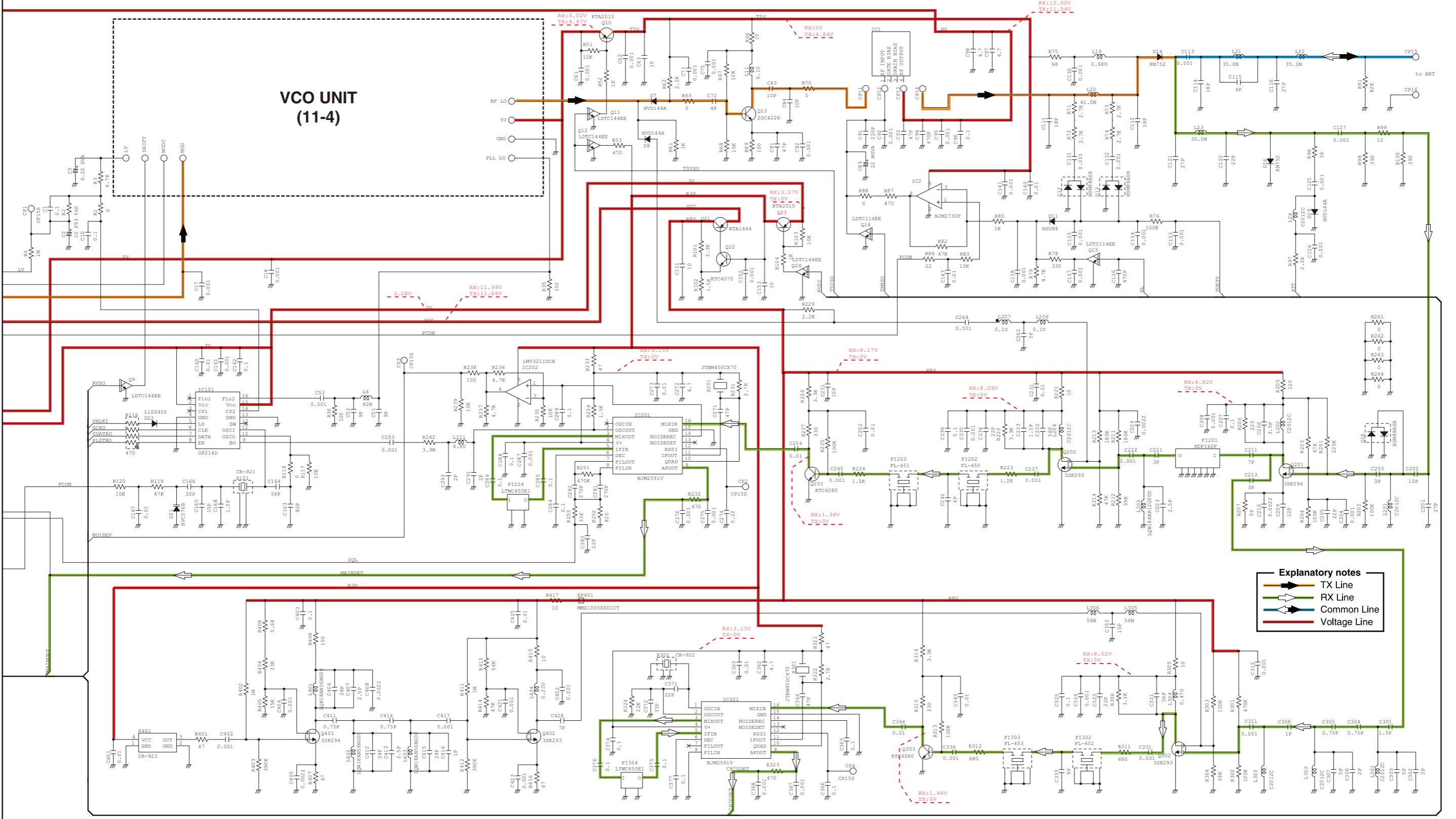
• MAIN UNIT (1/2)



- Explanatory notes**
- TX Line
 - RX Line
 - Common Line
 - Voltage Line

*: Refer to the PARTS LIST for the value and name of component.

VCO UNIT
(11-4)

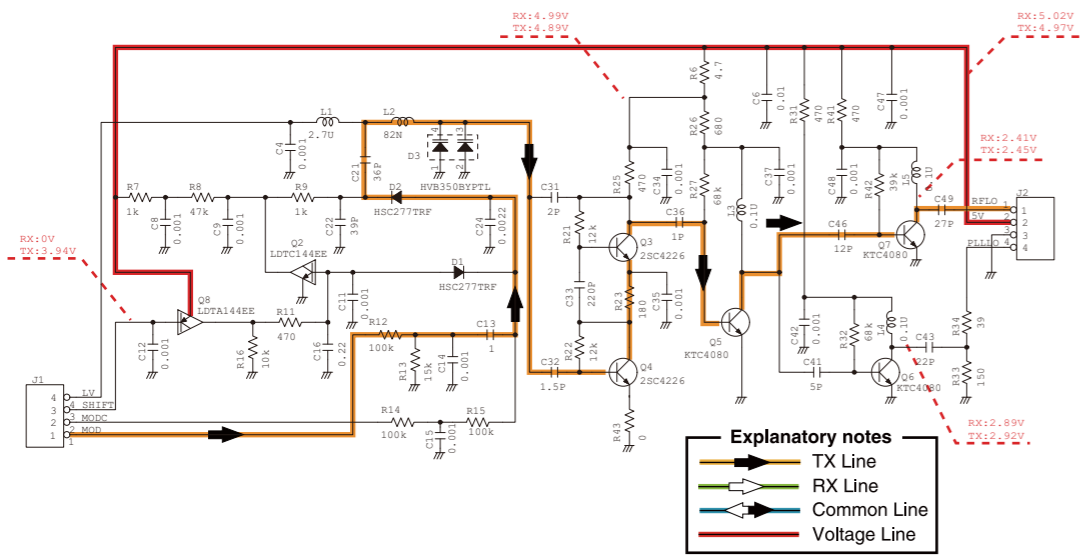


Explanatory notes

- TX Line
- RX Line
- Common Line
- Voltage Line

*: Refer to the PARTS LIST for the value and name of component.

• VCO UNIT



*: Refer to the PARTS LIST for the value and name of component.

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July 2012



SERVICE MANUAL ADDENDUM

IC-M423 IC-M424

CONTENTS

PARTS LIST	1
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VOLTAGE DIAGRAM	10

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C932	4030018080	S.CER C1005 JB 1H 182K-T	T	59.1/28.6
C933	4030020010	S.CER C1005 CH 1H 271J-T	T	60.3/28.1
C934	4030016790	S.CER C1005 JB 1E 103K-T	T	60.2/23.3
J1	6510025142	S.CON 10FLT-SM2-TB(LF)(SN)(M)	T	40.9/47.3
J2	6510022472	S.CON 40FLT-SM2-TB(LF)(SN)(M)	T	45.0/9.3
J3	6510018971	S.CON B4B-PH-SM4-TB(LF)(SN)	B	20.7/25.8
F1	5210001160	S.FUS ERBRE3R00V	T	3.8/48.8
W1	7030012290	JUM RDS2T0R0		
W3	8900020400	CAB OPC-2216 <TJM>		
EP401	6910016330	S.BEA MMZ1005S 601CT-S	T	123.7/21.0
EP701	6910016330	S.BEA MMZ1005S 601CT-S	B	8.2/10.1
EP702	6910016330	S.BEA MMZ1005S 601CT-S	B	8.9/14.2
EP703	6910019100	S.BEA MPZ1608S101AT	B	20.0/33.0
EP704	6910019100	S.BEA MPZ1608S101AT	B	23.1/33.0
EP705	6910019100	S.BEA MPZ1608S101AT	B	12.7/26.4
EP706	6910019100	S.BEA MPZ1608S101AT	B	17.6/33.2

[LOGIC UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
IC1	1140016241	S.IC STM32F100ZET6B(FX3338A1) AMSC [USA]	B	79.0/30.0
	1140016241	S.IC STM32F100ZET6B(FX33381) AMSC [USA-01]		
	1140016241	S.IC STM32F100ZET6B(FX33381) AMSC [UK]		
	1140016241	S.IC STM32F100ZET6B(FX33381) AMSC [EUR]		
	1140016241	S.IC STM32F100ZET6B(FX33381) AMSC [HOL]		
	1140016241	S.IC STM32F100ZET6B(FX33381) AMSC [FRG]		
	1140016242	S.IC STM32F100ZET6B(FX3338A2) <AMSC> [CHN]		
	1140016242	S.IC STM32F100ZET6B(FX3338A2) <AMSC> [AUS]		
	1140016241	S.IC STM32F100ZET6B(FX33381) AMSC [UK-01]		
	1140016241	S.IC STM32F100ZET6B(FX33381) AMSC [HOL-01]		
	1140016241	S.IC STM32F100ZET6B(FX33381) AMSC [FRG-01]		
	1140016242	S.IC STM32F100ZET6B(FX3338A2) <AMSC> [CHN-01]		
	1140016242	S.IC STM32F100ZET6B(FX3338A2) <AMSC> [AUS-01]		
IC2	1110006740	S.IC LMV3581PWR	B	37.0/36.0
IC3	1130009981	S.IC TC7W53FK(TE85LF)	B	38.5/31.8
IC4	1180003570	S.REG NJM2830U1-33-TE1-#ZZZB	B	33.0/10.5
IC5	1130016110	S.IC TC7WH14FK(TE85LF)	B	54.6/13.3
IC6	1130008711	S.IC TC7SET04FU(T5LJF)	B	47.7/40.2
IC7	1130016110	S.IC TC7WH14FK(TE85LF)	B	54.5/39.0
IC8	1170000352	S.IC PC357N6J000F	B	127.0/36.0
IC9	1130016310	S.IC BR24T256FJ-WE2	B	84.0/49.5
IC10	1110007620	S.IC NJU7704F3-42A-TE1-#ZZZB	B	43.3/11.2
IC11	1110003650	S.IC NJM2211M-TE1-#ZZZB	B	34.5/45.5
IC12	1130009301	S.IC TC7SET08FU(T5LJF)	B	46.1/53.7
Q1	1520000651	S.TRA 2SB1201S-TL-E	B	129.4/45.9
Q2	1530004140	S.TRA L2SC4081RT1G <SLVJ>	B	123.2/41.4
Q3	1590001330	S.TRA DTA114EUA T106	B	54.9/16.9
Q4	1530004140	S.TRA L2SC4081RT1G <SLVJ>	B	53.9/20.8
Q5	1530004140	S.TRA L2SC4081RT1G <SLVJ>	B	50.2/36.5
Q6	1510001151	S.TRA L2SA1576AST1G <SLVJ>	B	47.4/36.8
Q7	1560000541	S.FET 2SK880-Y(T5R1COMF)	B	53.0/35.3
Q8	1530004140	S.TRA L2SC4081RT1G <SLVJ>	B	132.9/39.2
Q9	1590000710	S.TRA DTC124EUA T106	B	130.2/40.1
D1	1750002030	S.ZEN DZ2J068M0L	B	123.6/44.4
D3	1750001810	S.DIO L1SS400T1G <SLVJ>	B	55.9/19.6
D4	1750001810	S.DIO L1SS400T1G <SLVJ>	B	130.5/33.2
D5	1750001180	S.DIO KDS122 RTK/P	B	134.2/36.1
D7	1790001990	S.VAR EZJP0V080DA	B	134.5/32.0
X1	6050012460	S.XTA CR-834(SMD-49/7.9872 MHz) <JJE>	B	97.5/27.5
R1	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	65.3/34.8
R2	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	65.3/35.8
R3	7410001130	S.ARR EXB28V102JX	B	49.5/30.5
R5	7030004970	S.RES ERJ2GEJ 470 X (47)	B	61.5/22.1
R8	7030012350	S.RES ERJ2GEJ 335 X (3.3M)	B	72.2/48.0
R9	7410001140	S.ARR EXB28V104JX	B	57.5/44.5
R11	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	72.0/43.3
R12	7410001230	S.ARR EXB28V101JX	B	58.5/32.5
R16	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	82.4/43.7
R17	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	46.3/51.8
R21	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	72.3/16.7
R22	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	73.7/16.3
R23	7410001130	S.ARR EXB28V102JX	B	58.8/26.0
R24	7410001140	S.ARR EXB28V104JX	B	64.0/24.4
R25	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	79.1/16.7
R26	7030005600	S.RES ERJ2GEJ 273 X (27K)	B	86.3/16.7
R27	7030007290	S.RES ERJ2GEJ 222 X (2.2K) [USA]	B	86.9/14.7
	7030007290	S.RES ERJ2GEJ 222 X (2.2K) [USA-01]		
	7030009290	S.RES ERJ2GEJ 562 X (5.6K) [UK]		
	7030008010	S.RES ERJ2GEJ 123 X (12K) [EUR]		
	7030009710	S.RES ERJ2GEJ 203 X (20K) [HOL]		
	7030005060	S.RES ERJ2GEJ 333 X (33K) [FRG]		
	7030005720	S.RES ERJ2GEJ 563 X (56K) [CHN]		
	7030005090	S.RES ERJ2GEJ 104 X (100K) [AUS]		
	7030009290	S.RES ERJ2GEJ 562 X (5.6K) [UK-01]		
	7030008010	S.RES ERJ2GEJ 123 X (12K) [EUR-01]		
	7030009710	S.RES ERJ2GEJ 203 X (20K) [HOL-01]		
	7030005060	S.RES ERJ2GEJ 333 X (33K) [FRG-01]		
	7030005720	S.RES ERJ2GEJ 563 X (56K) [CHN-01]		
	7030005090	S.RES ERJ2GEJ 104 X (100K) [AUS-01]		
R28	7030011670	S.RES ERJ2RKF 3902 (39K)	B	85.1/12.9
R29	7030012320	S.RES ERJ2RKF 2203X (220K)	B	85.1/11.9
R34	7030004980	S.RES ERJ2GEJ 101 X (100)	B	92.8/27.2
R41	7030007510	S.RES ERJ12YJ270U (27)	B	115.2/42.1
R42	7030005110	S.RES ERJ2GEJ 224 X (220K)	B	121.2/41.2
R43	7030004990	S.RES ERJ2GEJ 221 X (220)	B	122.0/43.6
R45	7030005000	S.RES ERJ2GEJ 471 X (470)	B	112.5/57.6
R46	7030005000	S.RES ERJ2GEJ 471 X (470)	B	125.4/38.6
R47	7030005000	S.RES ERJ2GEJ 471 X (470)	B	79.0/4.0
R48	7030005000	S.RES ERJ2GEJ 471 X (470)	B	7.8/6.0
R49	7030008280	S.RES ERJ2GEJ 271 X (270)	B	74.4/64.2
R50	7030008280	S.RES ERJ2GEJ 271 X (270)	B	74.4/63.2

Eqv.= This component is equivalent to the REF No. component listed above, and may be substituted on parts orders and repairs.

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side) S.=Surface mount

[CONNECT UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C1	4030016790	S.CER C1005 JB 1E 103K-T	B	2.1/11.9
J1	6510022440	CON LTW-8MP-C NUTGASKET <LIA>		
J2	6510025142	S.CON 10FLT-SM2-TB(LF)(SN)(M)	B	4.3/15.0
EP2	6910019100	S.BEA MPZ1608S101AT	B	4.5/19.1

[VCO UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
Q2	1590004070	S.TRA LDTC144EET1G <SLVJ>	T	13.4/9.3
Q3	1530002921	S.TRA 2SC4226-T1 Y25 (R25)	T	11.9/2.8
Q4	1530002921	S.TRA 2SC4226-T1 Y25 (R25)	T	18.6/2.3
Q5	1530003950	S.TRA KTC4080 Y-RTK/P	T	7.1/6.9
Q6	1530003950	S.TRA KTC4080 Y-RTK/P	T	4.9/2.6
Q7	1530003950	S.TRA KTC4080 Y-RTK/P	T	5.4/11.3
Q8	1590004050	S.TRA LDTA144EET1G <SLVJ>	T	11.4/12.5
D1	1750001700	S.DIO HSC277TRF-E	T	11.5/10.0
D2	1750001700	S.DIO HSC277TRF-E	T	13.3/7.7
D3	1750001780	S.VAR HVB350BYPTL-E	T	14.4/5.6
L1	6200003711	S.COI NLV25T-2R7J	T	18.2/9.2
L2	6200011410	S.COI C2520C-82NG-A	T	17.9/5.9
L3	6200013750	S.COI MLK1005SR10JT	T	5.7/8.3
L4	6200013750	S.COI MLK1005SR10JT	T	3.5/4.0
L5	6200013750	S.COI MLK1005SR10JT	T	4.0/12.7
R6	7030009320	S.RES ERJ2GEJ 4R7 X (4.7)	T	7.5/10.8
R7	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	16.4/11.0
R8	7030005240	S.RES ERJ2GEJ 473 X (47K)	T	16.2/9.8
R9	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	16.2/8.9
R11	7030005000	S.RES ERJ2GEJ 471 X (470)	T	10.0/12.0
R12	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	18.5/13.7
R13	7030007340	S.RES ERJ2GEJ 153 X (15K)	T	15.5/13.3
R14	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	18.5/12.8
R15	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	13.4/12.8
R16	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	9.4/13.2
R21	7030008010	S.RES ERJ2GEJ 123 X (12K)	T	9.9/1.4
R22	7030008010	S.RES ERJ2GEJ 123 X (12K)	T	20.7/1.7
R23	7030009160	S.RES ERJ2GEJ 181 X (180)	T	15.6/2.2
R25	7030005000	S.RES ERJ2GEJ 471 X (470)	T	9.9/3.2
R26	7030005010	S.RES ERJ2GEJ 681 X (680)	T	6.9/9.6
R27	7030005070	S.RES ERJ2GEJ 683 X (68K)	T	7.6/5.1
R31	7030005000	S.RES ERJ2GEJ 471 X (470)	T	4.3/5.6
R32	7030005070	S.RES ERJ2GEJ 683 X (68K)	T	6.8/1.7
R33	7030007270	S.RES ERJ2GEJ 151 X (150)	T	2.9/5.3
R34	7030009200	S.RES ERJ2GEJ 390 X (39)	T	1.8/4.4
R41	7030005000	S.RES ERJ2GEJ 471 X (470)	T	3.5/9.5
R42	7030007350	S.RES ERJ2GEJ 393 X (39K)	T	5.1/9.5
R43	7030003860	S.RES ERJ3GE JPW V	T	16.1/3.7
C4	4030017460	S.CER C1005 JB 1H 102K-T	T	18.3/11.3
C6	4030016790	S.CER C1005 JB 1E 103K-T	T	3.5/7.5
C8	4030017460	S.CER C1005 JB 1H 102K-T	T	15.2/10.8
C9	4030017460	S.CER C1005 JB 1H 102K-T	T	15.0/9.5
C11	4030017460	S.CER C1005 JB 1H 102K-T	T	12.8/10.8
C12	4030017460	S.CER C1005 JB 1H 102K-T	T	14.0/11.3
C13	4030018860	S.CER C1005 JB 0J 105K-T	T	13.4/13.7
C14	4030017460	S.CER C1005 JB 1H 102K-T	T	14.6/13.3
C15	4030017460	S.CER C1005 JB 1H 102K-T	T	17.3/13.3
C16	4030011810	S.CER C1608 JB 1A 224K-T	T	10.3/9.9
C21	4030018010	S.CER C1005 CH 1H 360J-T	T	16.2/8.0
C22	4030017670	S.CER C1005 CH 1H 390J-T	T	15.0/7.6
C24	4030017760	S.CER C1005 JB 1H 222K-T	T	11.6/7.0
C31	4030017350	S.CER C1005 CH 1H 020B-T	T	12.2/4.7
C32	4030017550	S.CER C1005 CH 1H 1R5B-T	T	20.4/3.3
C33	4030017440	S.CER C1005 CH 1H 221J-T	T	15.6/1.3
C34	4030017460	S.CER C1005 JB 1H 102K-T	T	9.9/4.1
C35	4030006860	S.CER C1608 JB 1H 102K-T	T	14.1/2.7
C36	4030017340	S.CER C1005 CH 1H 010B-T	T	9.9/2.3
C37	4030017460	S.CER C1005 JB 1H 102K-T	T	7.0/8.7
C41	4030017380	S.CER C1005 CH 1H 050B-T	T	6.8/3.3
C42	4030017460	S.CER C1005 JB 1H 102K-T	T	4.8/4.4
C43	4030017400	S.CER C1005 CH 1H 220J-T	T	2.5/3.1
C46	4030017630	S.CER C1005 CH 1H 120J-T	T	4.8/8.3
C47	4030017460	S.CER C1005 JB 1H 102K-T	T	3.5/8.4
C48	4030017460	S.CER C1005 JB 1H 102K-T	T	5.4/13.1
C49	4030017650	S.CER C1005 CH 1H 270J-T	T	3.3/11.3
J1	6910003831	CON IMSA-9230B-1-04Z003-PT1		
J2	6910003831	CON IMSA-9230B-1-04Z003-PT1		

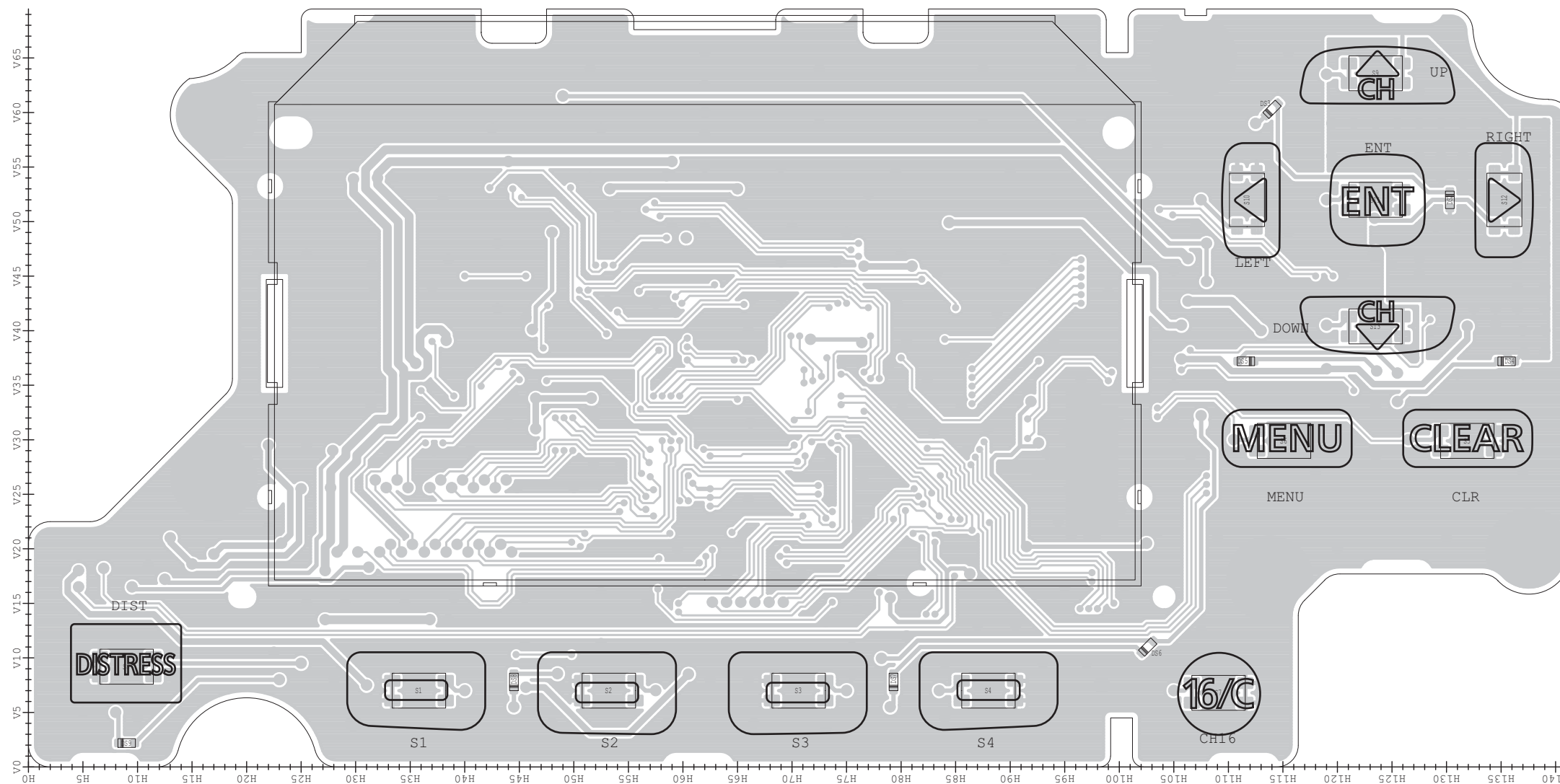
Eqv.= This component is equivalent to the REF No. component listed above, and may be substituted on parts orders and repairs.

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side) S.=Surface mount

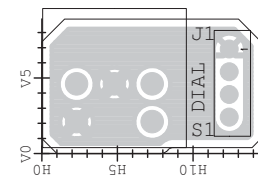
BOARD LAYOUTS

The combination of top side and bottom side of this page shows the actual configuration of P.C. board.

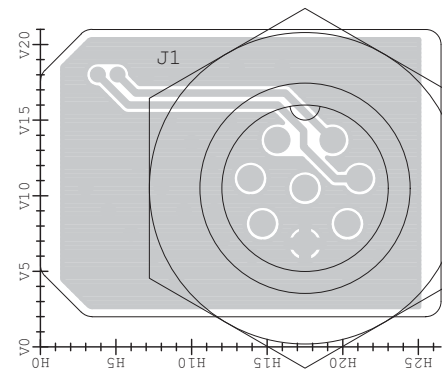
• LOGIC UNIT (TOP VIEW)



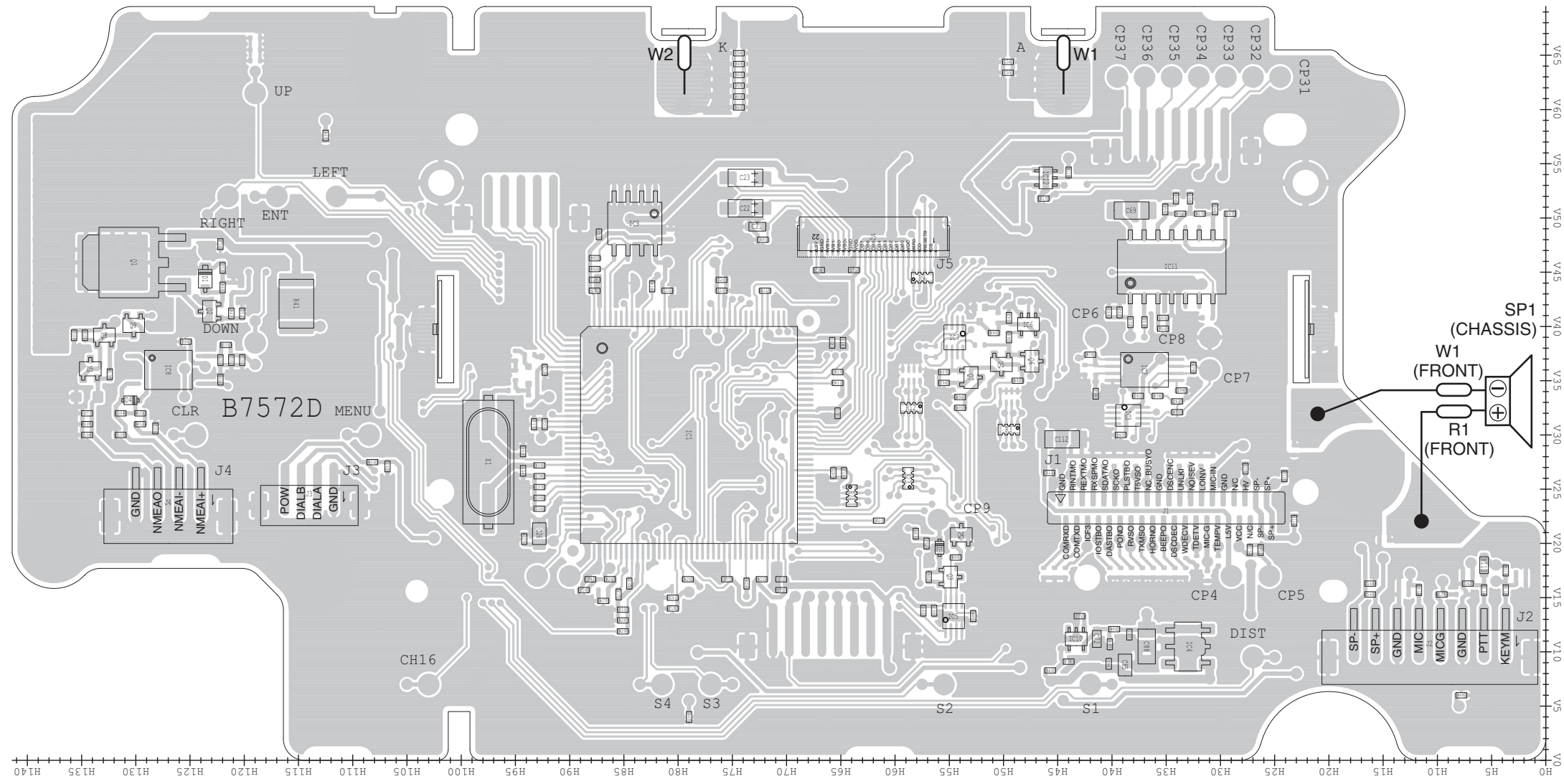
• DIAL UNIT (TOP VIEW)



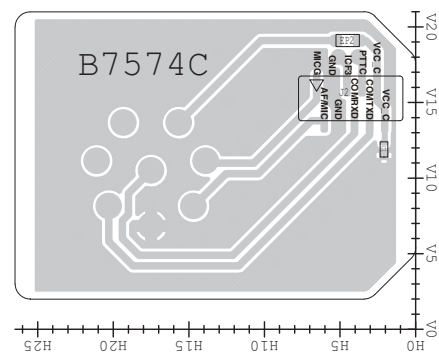
• CONNECT UNIT (TOP VIEW)



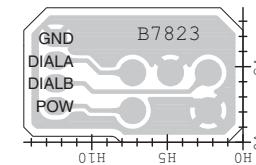
• LOGIC UNIT
(BOTTOM VIEW)



• CONNECT UNIT
(BOTTOM VIEW)

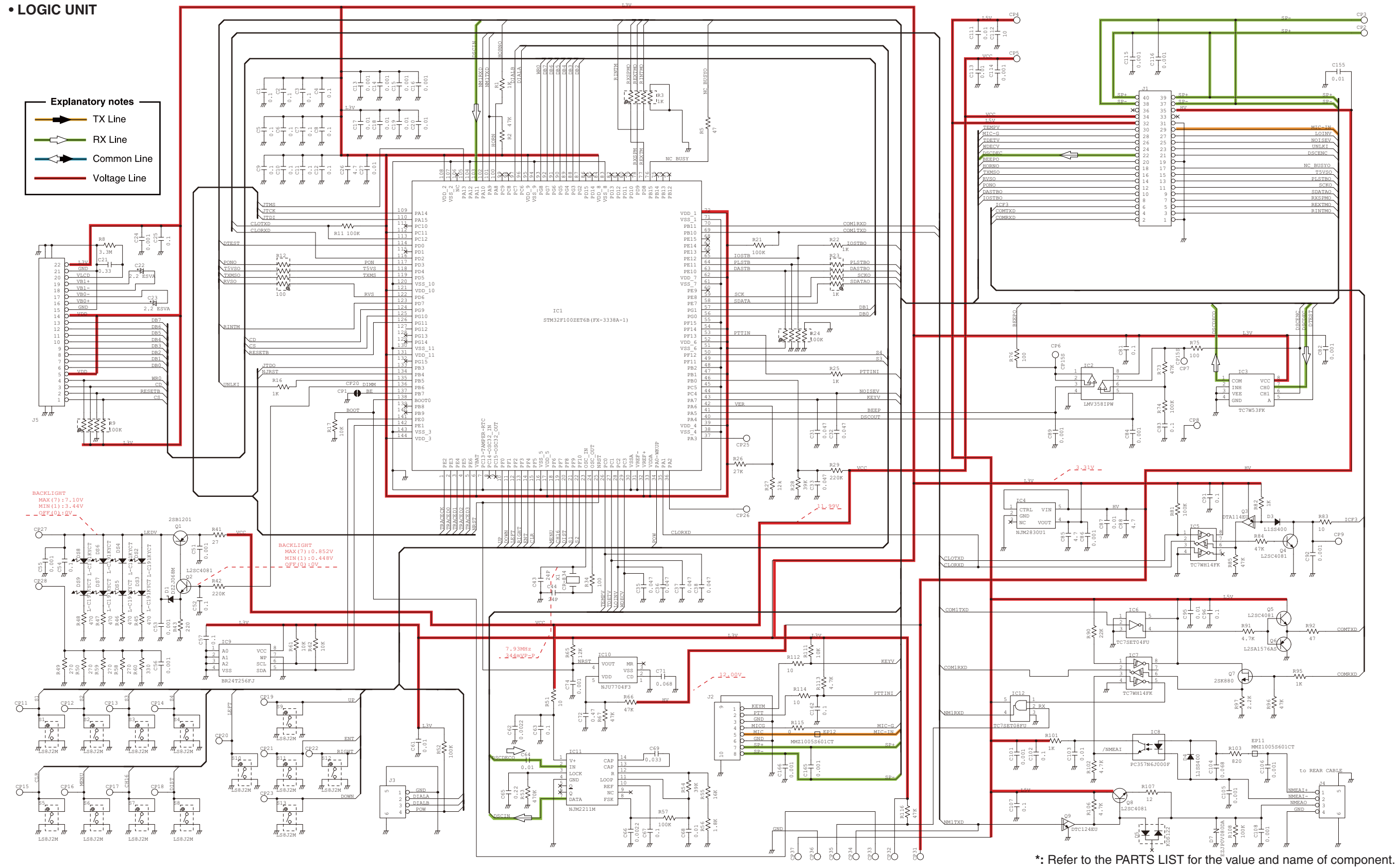
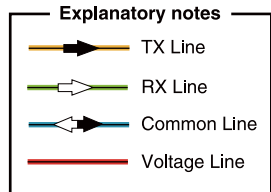


• DIAL UNIT
(BOTTOM VIEW)



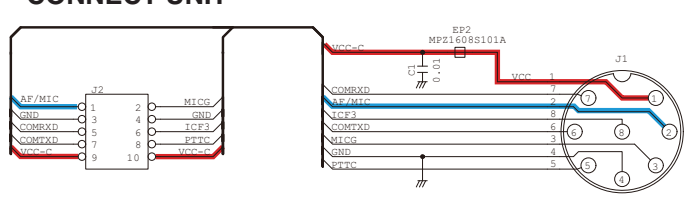
VOLTAGE DIAGRAM

• LOGIC UNIT



*: Refer to the PARTS LIST for the value and name of component.

• CONNECT UNIT



• DIAL UNIT

