

Jun. 2012



SERVICE MANUAL ADDENDUM

IC-F3011 IC-F3013

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SECTION 7

MECHANICAL PARTS

[CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6910021491	ANT CONNECTOR 106-1 <SSC>	1
J2	6910015860	IMSA-6277S-02A-G	1
SP1	2510001530	PSC-3650P-0806A2 <PRI>	1
W1	8900009640	OPC-963	1
MP1	8010019698	2775 CHASSIS-8 1X2T	1
MP2	8210024600	2775 A-FRONT PANEL ASSEMBLY	1
MP8	8210020551	2721 REAR PANEL-1	1
MP9	8930063351	2775 LENS-1	1
MP10	8610011930	KNOB N318	1
MP11	8610012130	KNOB N323	1
MP13	8930075190	2775 C-MAIN SEAL (TOP)	1
MP14	8930063061	2721 T-RUBBER-1 (TOT)	1
MP16	8930063400	2775 SIDE PLATE	1
MP17	8930063412	2775 B-TOP PLATE-2	1
MP20	8930043760	1923 MIC SEAL	1
MP21	8930059361	2600 RELEASE BUTTON-1	1
MP22	8930070363	2775 RELEASE PLATE (A)-3	1
MP25	8830003440	3285 ANT NUT	2
MP26	8810009221	PHB0 M2 X 8 NI-ZK3 BT	1
MP27	8810009561	PHBT M2 X 6 NI-ZK3	2
MP28	8810009511	PHBT M2 X 4 NI-ZC3 (3.6-4.0)	9
MP29	8810009511	PHBT M2 X 4 NI-ZC3 (3.6-4.0)	1
MP30	8810009511	PHBT M2 X 4 NI-ZC3 (3.6-4.0)	1
MP31	8810010430	TRUSS M3 X 5 SUS SSBC	1
MP32	8310072660	2775 OPT PLATE	1
MP33	8930042350	1922 MIC SHEET	1
MP34	8930056540	PUSH SPRING (AH)	2
MP35	8830001701	VR NUT (Q)-1	1
MP36	8830001701	VR NUT (Q)-1	1
MP42	8930074580	2775 NAME SHEET	1

[ANT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP601	8510016350	2721 ANT PLATE Y720	1

[CONNECT UNIT]

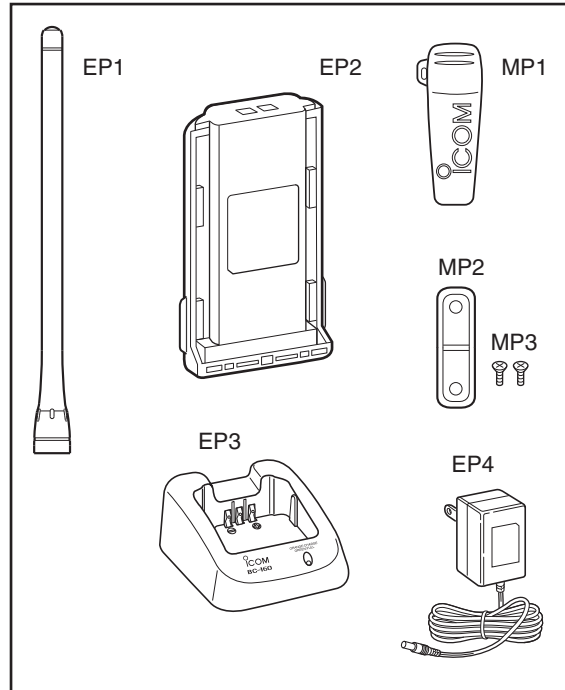
REF NO.	ORDER NO.	DESCRIPTION	QTY.
J501*	6910016390	IMSA-9230B-1-02Z145-PT1	1

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1*	6510021901	BM02B-ASRS-TF (LF) (SN)	1
J2	6450001680	HSJ1122-010010	1
J3	6450002250	HSJ1456-010320	1
F1*	5210001160	ERBRE3R00V	1
MC1	7700002750	EM9745P-38-G <HOR>	1
S1	2260001900	SW-149 (SKHLLD)	1
S2*	2260002800	SW-167 (SKQTLAE010)	1
S3*	2260002800	SW-167 (SKQTLAE010)	1
S4	2250000490	TP70TF5163-15.9F-2775	1
MP1*	8410002531	2681 PA HEATSINK-1	1
MP2*	8510016461	2775 VCO COVER-1	1
MP3*	8510016471	2775 VCO CASE-1	1
MP4	8510016580	2775 SHIELD PLATE Y738	1

[ACC UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	(Optional)	FA-SC55V-2	1
EP2	(Optional)	BP-232H	1
EP3	(Optional)	BC-160	1
EP4	(Optional)	BC-145SA [USA-01], [CSA-01]	1
	(Optional)	BC-145SE [CSA-02]	1
MP1	(Optional)	MB-94	1
MP2	8210022780	2927 JACK PANEL	1
MP3	8810004861	PH M2 X 6 ZK3	2



*: Refer to "BOARD LAYOUTS."

** : Optional product.

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

PARTS LIST

[CONNECT UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C501	4030017460	S.CER C1005 JB 1H 102K-T	T	8.3/5.3
C502	4030016930	S.CER C1005 JB 1A 104K-T	T	9.3/5.3
J501	6910016390	CON IMSA-9230B-1-02Z145-PT1		

[MAIN UNIT]

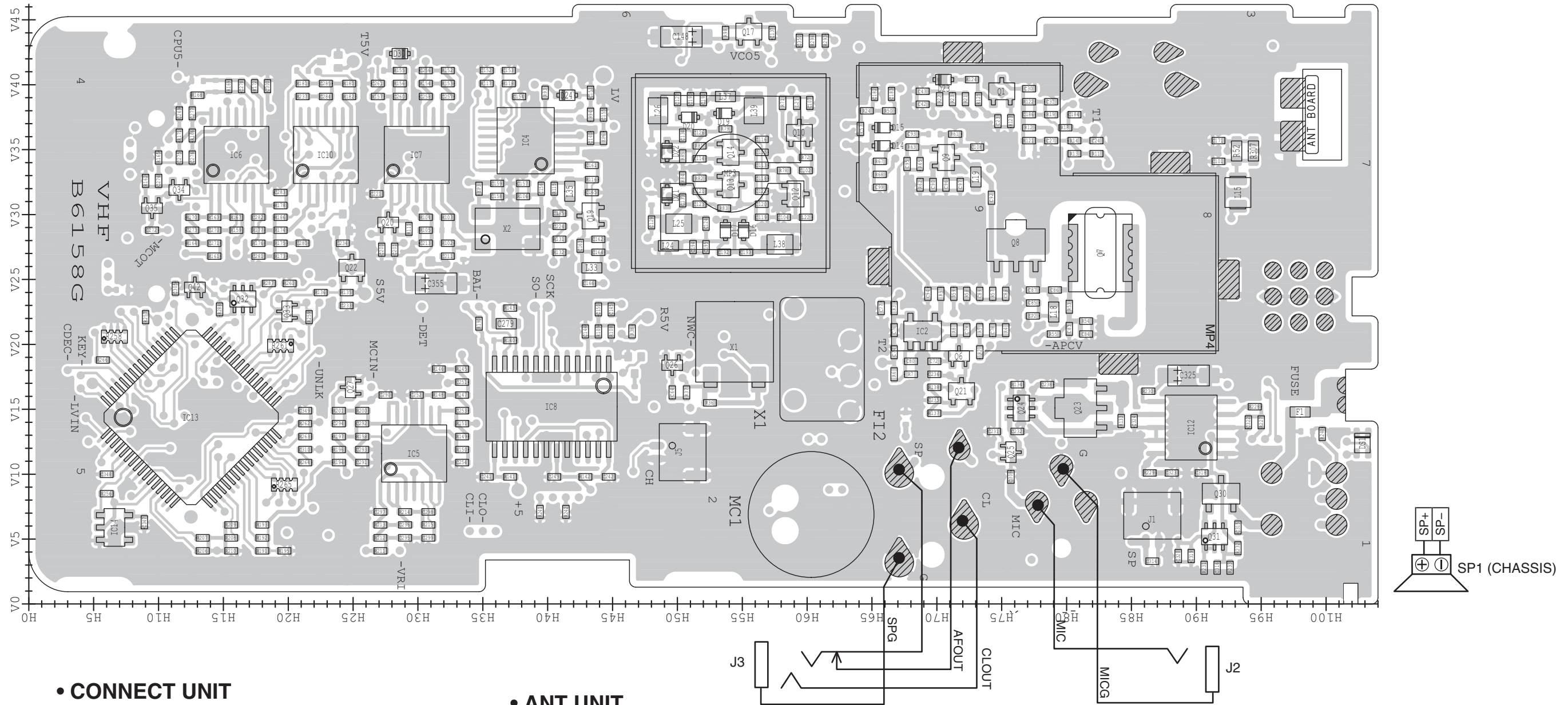
REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
IC2	1110002751	S.IC TA75S01F(TE85RF)	T	68.9/21.0
IC4	1140005991	S.IC MB15A02PFV1-G-BND-ERE1	T	38.3/35.7
IC5	1110005340	S.IC NJM12902V-TE1-#ZZZB	T	29.7/11.6
IC6	1110005320	S.IC NJM13403V-TE1-#ZZZB	T	16.0/34.6
IC7	1110005340	S.IC NJM12902V-TE1-#ZZZB	T	29.9/34.6
IC8	1190000350	S.IC M62363FP-650C	T	40.3/15.2
IC9	1110005350	S.IC NJM2870F05-TE1-#FZZB	B	84.2/14.2
IC10	1130011770	S.IC CD4066BPWR	T	22.9/34.6
IC12	1110007850	S.IC TA7368PL-R10-R <SLVJ>	T	89.6/13.6
IC13	1140012721	S.IC HD6433687C73FPV(FX-2775A-1)	T	12.5/14.4
IC14	1110006260	S.IC BD5242G-TR	T	6.6/5.9
IC15	1130011540	S.IC BR24L16FV-WE2	B	16.0/11.6
Q1	1560000841	S.FET 2SK1829(TE85RF)	T	75.0/39.5
Q2	1580000731	S.FET 3SK293(TE85LF)	B	77.8/37.9
Q3	1580000800	S.FET 3SK324UG-TL-E	B	66.2/37.9
Q4	1530003311	S.TRA 2SC5107-O(TE85RF)	B	51.4/23.1
Q6	1590004190	S.TRA DRA9144E0L	T	71.7/19.1
Q7	1560001232	S.FET RD07MVS2-T112	T	82.6/27.1
Q8	1560001241	S.FET RD01MUS1-T113	T	76.1/27.6
Q9	1530003421	S.TRA 2SC5110-O(TE85RF)	T	70.7/34.4
Q10	1530003311	S.TRA 2SC5107-O(TE85RF)	T	59.4/36.3
Q11	1530003311	S.TRA 2SC5107-O(TE85RF)	B	56.8/36.4
Q12	1530003311	S.TRA 2SC5107-O(TE85RF)	T	59.1/31.6
Q13	1530002921	S.TRA 2SC4226-T1 Y25 (R25)	T	54.1/32.3
Q14	1530002921	S.TRA 2SC4226-T1 Y25 (R25)	T	54.1/34.8
Q15	1590004500	S.TRA DMC561040R	B	56.5/32.6
Q16	1590004350	S.TRA DRC9144E0L	B	59.1/32.6
Q17	1530002851	S.TRA 2SC4116-BL(TE85RF)	T	55.5/44.1
Q18	1560000541	S.FET 2SK880-Y(T5RICOMF)	B	51.5/39.2
Q19	1530002851	S.TRA 2SC4116-BL(TE85RF)	T	43.3/29.9
Q20	1560001360	S.FET 2SK3019 TL	T	27.7/29.4
Eqv.	1560001840	S.FET 2SK3107-T1-AT		
Eqv.	1560001860	S.FET 2SK1824-T1-A		
Q21	1510000920	S.TRA 2SA1577 T106 Q	T	71.9/16.4
Q22	1510000920	S.TRA 2SA1577 T106 Q	T	24.9/25.9
Q23	1520000460	S.TRA 2SB1132 T100 R	T	81.1/15.1
Eqv.	1520000910	S.TRA 2SB1132L-R-AB3-R <SLVJ>		
Q24	1590004590	S.TRA DMC506010R	T	76.5/15.1
Q25	1590004190	S.TRA DRA9144E0L	T	75.7/11.7
Q26	1590004350	S.TRA DRC9144E0L	T	49.6/18.4
Q27	1590004350	S.TRA DRC9144E0L	T	24.8/16.7
Q28	1590004220	S.TRA DRA9123Y0L	B	63.8/10.8
Q29	1590004340	S.TRA DRC9144T0L	B	36.1/9.4
Q30	1510001080	S.TRA 2SA2048 TLR	T	91.9/8.5
Eqv.	1520000920	S.TRA 2SB1691WL-TL-E		
Q31	1590004590	S.TRA DMC506010R	T	91.4/5.2
Q32	1590004570	S.TRA DMC564060R	T	16.5/23.5
Q34	1560001360	S.FET 2SK3019 TL	T	11.6/31.9
Eqv.	1560001840	S.FET 2SK3107-T1-AT		
Eqv.	1560001860	S.FET 2SK1824-T1-A		
Q35	1560001360	S.FET 2SK3019 TL	T	9.5/30.5
Eqv.	1560001840	S.FET 2SK3107-T1-AT		
Eqv.	1560001860	S.FET 2SK1824-T1-A		
Q39	1530004140	S.TRA L2SC4081RT1G <SLVJ>	B	39.1/42.7
Q40	1510001151	S.TRA L2SA1576AST1G <SLVJ>	B	39.1/40.0
D1	1790001790	S.DIO RB876W TL	B	93.6/17.6
D2	1750000581	S.DIO 1SV307(TPH3F)	B	91.5/31.1
D4	1750000721	S.VAR HVC375BTRF-E	B	80.3/33.4
D5	1750000581	S.DIO 1SV307(TPH3F)	B	87.6/33.4
D6	1750002210	S.DIO DA2S00100L	B	86.7/35.9
D8	1750000721	S.VAR HVC375BTRF-E	B	83.0/33.4
D9	1750000711	S.VAR HVC350BTRF-E	B	73.6/37.7
D10	1750000711	S.VAR HVC350BTRF-E	B	72.3/37.7
D14	1750002210	S.DIO DA2S00100L	T	65.8/35.3
D15	1750002210	S.DIO DA2S00100L	T	65.8/36.7
D16	1750000771	S.VAR HVC376BTRF-E	T	55.1/28.8
D17	1750000771	S.VAR HVC376BTRF-E	T	53.7/28.8
D18	1720000471	S.VAR 1SV239(TPH3F)	B	49.6/28.2
D19	1750000771	S.VAR HVC376BTRF-E	T	53.6/37.8
D20	1750000771	S.VAR HVC376BTRF-E	T	50.9/37.5
D21	1750000721	S.VAR HVC375BTRF-E	T	49.2/31.5
D22	1750000721	S.VAR HVC375BTRF-E	T	49.2/34.9
D23	1750002020	S.DIO DA2S10100L	T	70.5/40.4
D24	1750002020	S.DIO DA2S10100L	T	41.5/39.2
D26	1790001790	S.DIO RB876W TL	B	36.1/7.3
D27	1750001850	S.DIO LDAN222T1G <SLVJ>	B	21.3/6.5
D28	1750002210	S.DIO DA2S00100L	B	8.5/11.2
D29	1750001810	S.DIO L1SS400T1G <SLVJ>	B	21.5/4.2
D30	1750002210	S.DIO DA2S00100L	T	28.6/42.4
F11	2030000150	S.MON DSF753SB 46.350 MHz (FL-335)	B	62.7/27.1
F12	2020002410	CER LTM450FW <JJE>		
X2	6050012050	S.XTA CR-794 TTS14VSB-A6 15.3 MHz	T	36.9/28.9
X3	6050011720	S.XTA CR-764 SMD-49TB 19.6608 MHz <KDS>	B	12.0/5.9
L1	6200012780	S.COI 0.30-1.4-6TL 27.2N <COMO>	B	94.9/40.3
L2	6200012470	S.COI 0.30-1.7-7TL 45.3N <COMO>	B	94.6/36.2
L3	6200012910	S.COI 0.35-1.6-8TL 45.5N <COMO>	B	94.6/31.9
L4	6200012470	S.COI 0.30-1.7-7TL 45.3N <COMO>	B	92.5/25.7

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

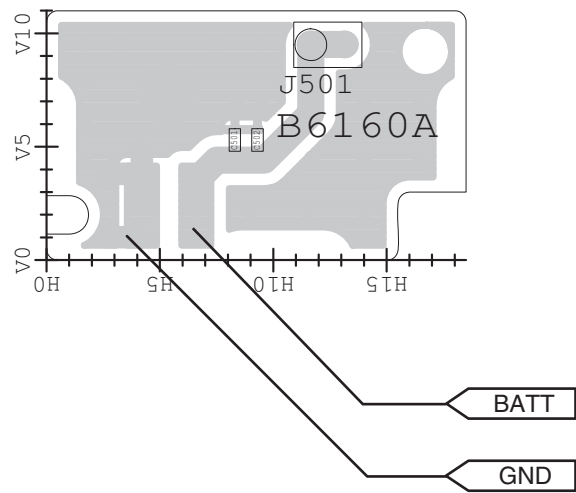
BOARD LAYOUTS

• MAIN UNIT (TOP VIEW)

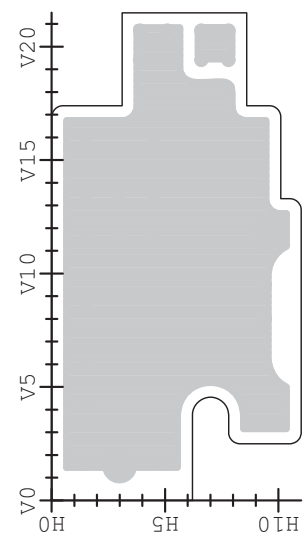


The combination of this side and the bottom side shows the board layout in the same configuration as the actual P.C.Board.

• CONNECT UNIT (TOP VIEW)

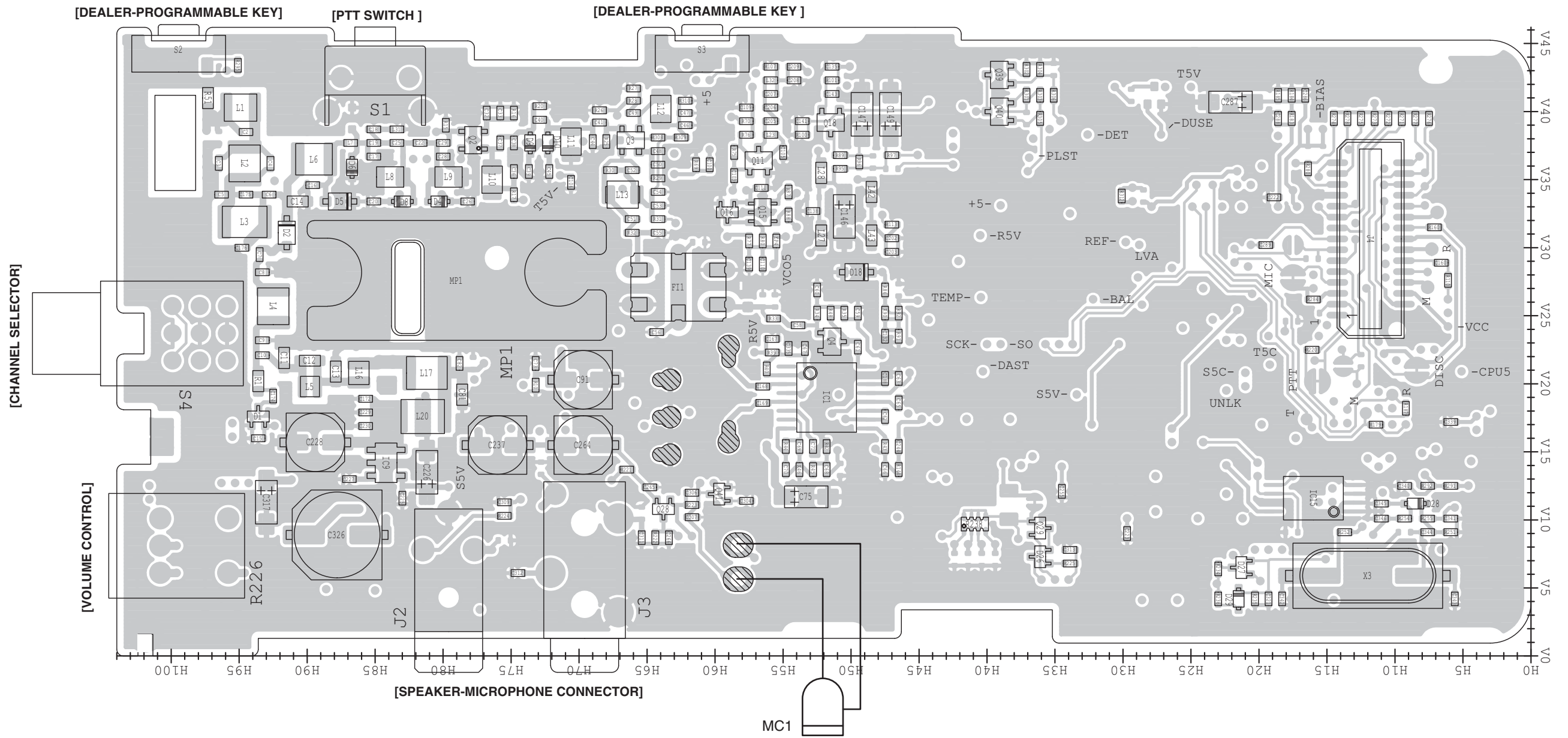


• ANT UNIT (TOP VIEW)

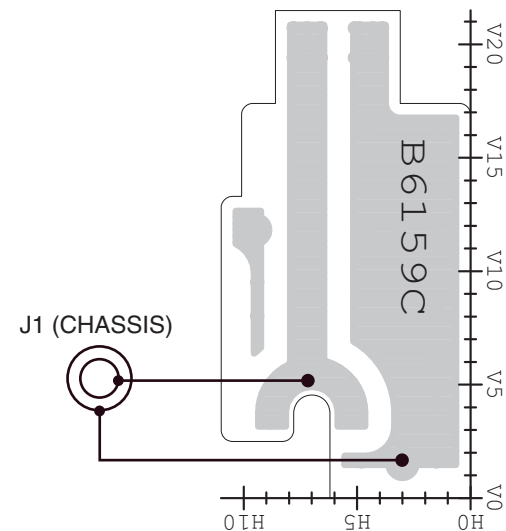


• MAIN UNIT
(BOTTOM VIEW)

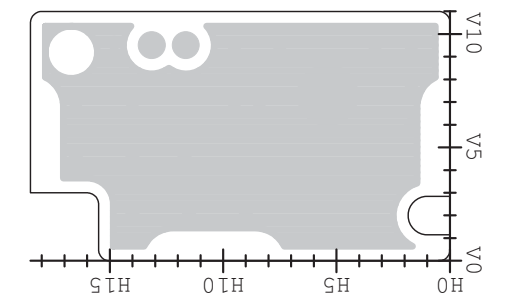
The combination of this side and the bottom side shows the board layout in the same configuration as the actual P.C.Board.



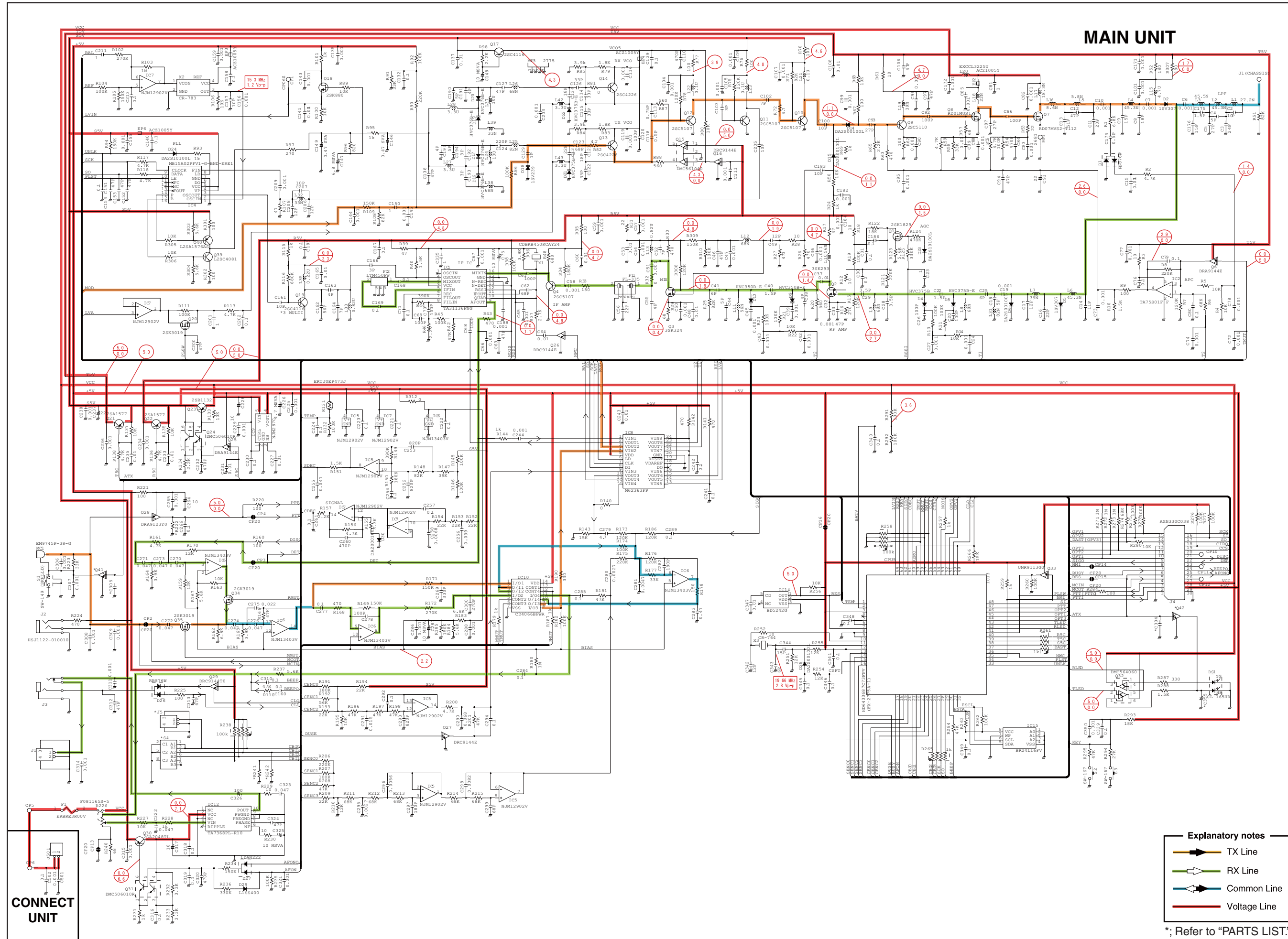
• ANT UNIT
(BOTTOM VIEW)



• CONNECT UNIT
(BOTTOM VIEW)



VOLTAGE DIAGRAM



MAIN UNIT

CONNECT UNIT

Explanatory notes

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

*; Refer to "PARTS LIST."



SERVICE MANUAL

VHF TRANSCEIVERS

IC-F3011

IC-F3013

S-14604XZ-C1
May. 2009

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-F3011/IC-F3013** VHF TRANSCEIVERS at the time of publication.

MODEL	VERSION	FREQUENCY RANGE	CHANNEL SPACING	CHANNELS
IC-F3011	USA-01	136–174 MHz	15.0/30.0 kHz	16CH
IC-F3013	CSA-01			
	CSA-02			

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

CAUTION

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

DO NOT expose the transceiver to rain, snow or any liquids.

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.



ORDERING PARTS

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

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

<ORDER EXAMPLE>

1110003491 S.IC TA31136FNG IC-F3011 MAIN UNIT 5 pieces
8820001210 Screw 2438 screw IC-F3013 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 test equipment thoroughly before connecting a test equipment to the transceiver.

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SECTION 1

SPECIFICATIONS

■ GENERAL

- Frequency coverage : 136–174 MHz
- Type of emission : 16K0F3E (25.0 kHz) for Wide
: 11K0F3E (12.5 kHz) for Narrow
- Channel spacing : 15.0/30.0 kHz
- Number of conventional channels : 16 ch
- Antenna impedance : 50 Ω
- Operating temperature range : –30°C to +60°C (–22°F to +140°F)
- Power supply requirement : Specified Icom's battery pack only (7.2 V DC nominal; negative ground)
- Current drain (at 7.2 V DC ; approx.) :

RECEIVING		TRANSMITTING	
Stand-by	Max. audio	High (at 5 W)	Low (at 1 W)
70 mA	300 mA	1.5 A	0.7 A

- Dimensions (projections not included) : 53.0 (W)×120.0 (H)×38.0 (D) mm; 2 3/32(W)×4 23/32(H)×1 1/2(D) in
- Weight (Including BP-231) : Approx. 260 g (9 3/16 oz)

■ TRANSMITTER

- Output power (at 7.2 V DC) : 5 W (Hi)/2 W (L2)/1 W (L1)
- Modulation : Variable reactance frequency modulation
- Maximum permissible deviation : ±5.0 kHz (Wide), ±2.5 kHz (Narrow)
- Frequency error : ±2.5 ppm
- Spurious emissions : 80 dB typ.
- Adjacent channel power : 70 dB min. (80 dB typ.) for Wide
60 dB min. (70 dB typ.) for Narrow
- Audio harmonic distortion : 3% typ. (at 1 kHz, 40% deviation)
- FM Hum and Noise (without CCITT filter) : 40 dB min. (46 dB typ.) for Wide
34 dB min. (40 dB typ.) for Narrow
- Limiting charact of modulator : 60–100% of maximum deviation
- Microphone impedance : 2.2 kΩ

■ RECEIVER

- Receive system : Double conversion superheterodyne system
- Intermediate frequencies : 1st IF: 46.35 MHz, 2nd IF: 450 kHz
- Sensitivity : 0.25 μV (–119 dBm) typ. at 12 dB SINAD
- Adjacent channel selectivity : 70 dB min. (75 dB typ.) for Wide
60 dB min. (65 dB typ.) for Narrow
- Spurious response : 70 dB min.
- Intermodulation rejection ratio : 70 dB min. (74 dB typ.)
- Hum and Noise (without CCITT filter) : 40 dB min. (50 dB typ.) for Wide
34 dB min. (45 dB typ.) for Narrow
- Audio output power : 0.5 W typ. (at 5% distortion with an 8 Ω load)
- Squelch sensitivity (at threshold) : 0.25 μV typ.
- Output impedance (audio) : 8 Ω

Specifications are measured in accordance with TIA-603.

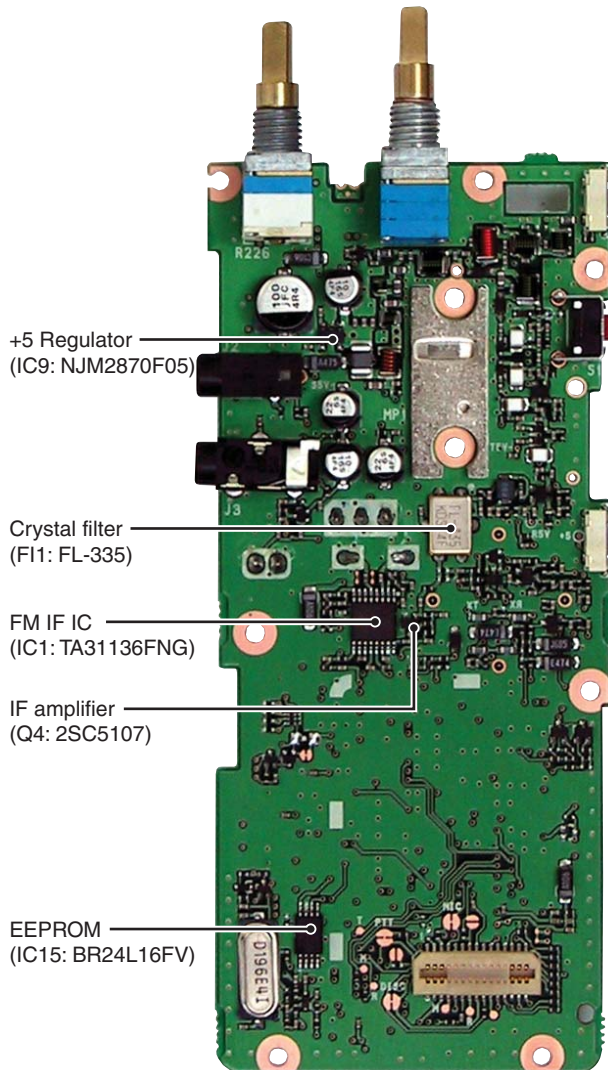
All stated specifications are subject to change without notice or obligation.

SECTION 2

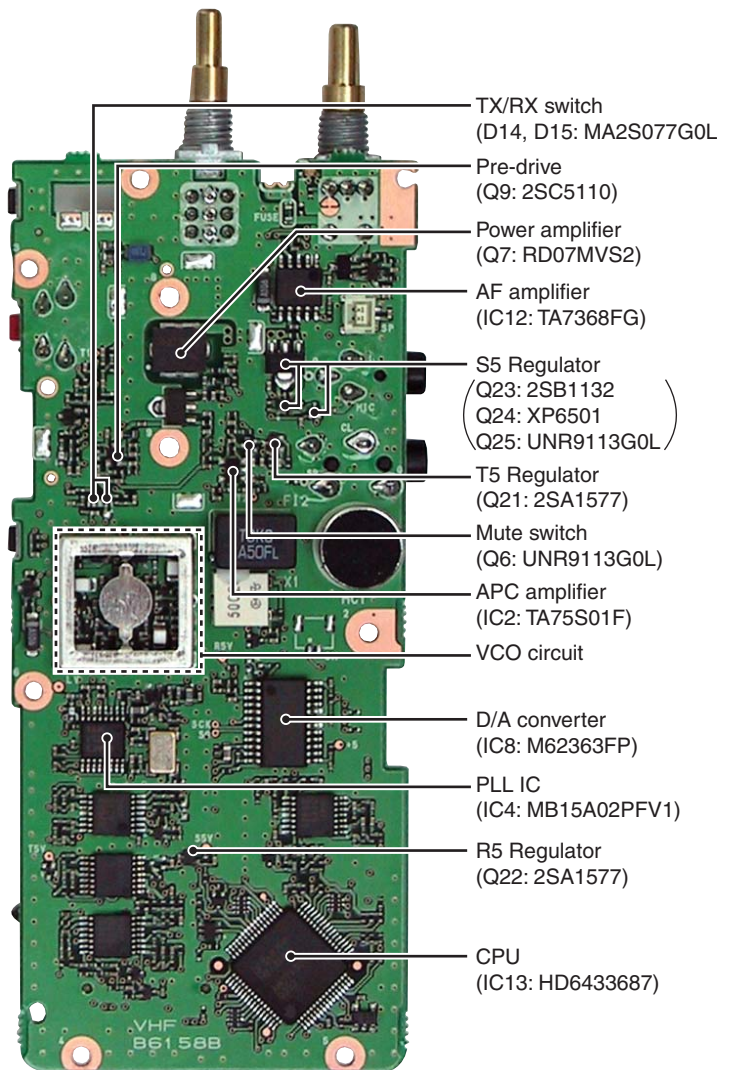
INSIDE VIEWS

• MAIN UNIT

TOP VIEW



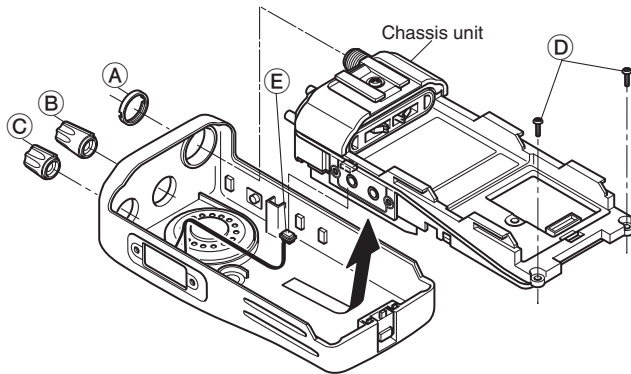
BOTTOM VIEW



SECTION 3 DISASSEMBLY INSTRUCTION

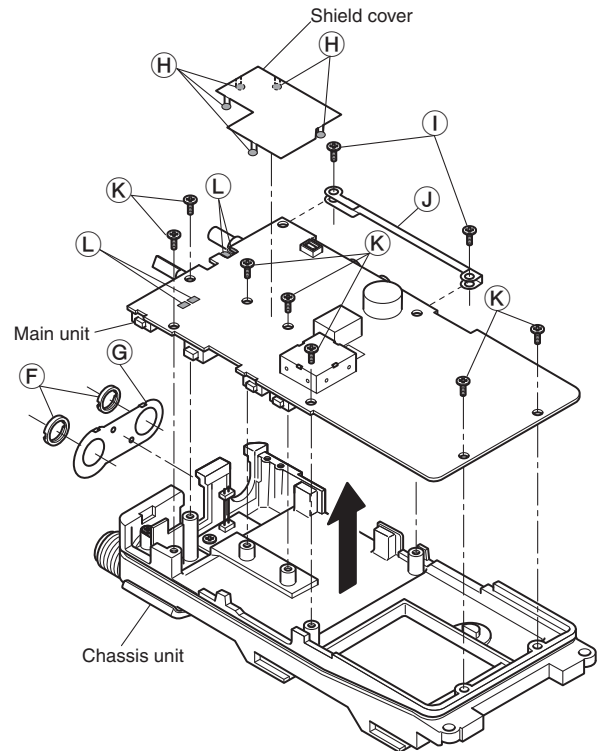
1. REMOVING THE CHASSIS UNIT

- ① Unscrew 1 nut (A), and remove 2 knobs (B), (C).
- ② Unscrew 2 screws (D).
- ③ Take off the chassis unit in the direction of the arrow.
- ④ Unplug the connector (E) from the chassis unit.



2. REMOVING THE MAIN UNIT

- ① Unscrew 2 nuts (F), and remove the top plate (G).
- ② Unsolder 5 points (H), and remove the shield cover.
- ③ Unscrew 2 screws (I), and remove the side plate (J).
- ④ Unscrew 7 screws (K).
- ⑤ Unsolder 4 points (L), and take off the main unit in the direction of the arrow.



4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT

The antenna switching circuit functions as a low-pass filter while receiving and a resonator circuit while transmitting. This circuit does not allow transmit signals to enter the receiver circuits.

Received signals enter the antenna connector (CHASSIS; J1) and pass through the low-pass filter (L1–L3, C2–C5, C175, C176). The filtered signals are passed through the $1/4\lambda$ type antenna switching circuit (D5, D6, L6, L7) and then applied to the RF circuit.

4-1-2 RF CIRCUIT

The RF circuit amplifies signals within the range of frequency coverage and filters out-of-band signals.

The signals from the antenna switching circuit pass through the bandpass filter (D4, D8, L8, L9). The filtered signals are amplified at the RF amplifier (Q2) and then passed through the another bandpass filter (D9, D10, L11) to suppress unwanted signals. The filtered signals are applied to the 1st mixer circuit.

D4, D8–D10 employ varactor diodes, that are controlled by the CPU via the D/A converter (IC8), to track the bandpass filter. These varactor diodes tune the center frequency of an RF passband for wide bandwidth receiving and good image response rejection.

4-1-3 1ST MIXER AND 1ST IF CIRCUITS

The 1st mixer circuit converts the received signal into fixed frequency of the 1st IF signal with the PLL output frequency. By changing the PLL frequency, only the desired frequency passes through a crystal filter at the next stage of the 1st mixer.

The RF signals from the bandpass filter are mixed with the 1st LO signals, where come from the RX VCO circuit via the attenuator (R26–R28), at the 1st mixer circuit (Q3) to produce a 46.35 MHz 1st IF signal. The 1st IF signal is passed through a monolithic filter (FI1) in order to obtain selection capability and to pass only the desired signal. The filtered signal is applied to the 2nd IF circuit after being amplified at the 1st IF amplifier (Q4).

4-1-4 2ND IF AND DEMODULATOR CIRCUITS

The 2nd mixer circuit converts the 1st IF signal into a 2nd IF signal. The double-conversion superheterodyne system (which convert receive signals twice) improves the image rejection ratio and obtains stable receiver gain.

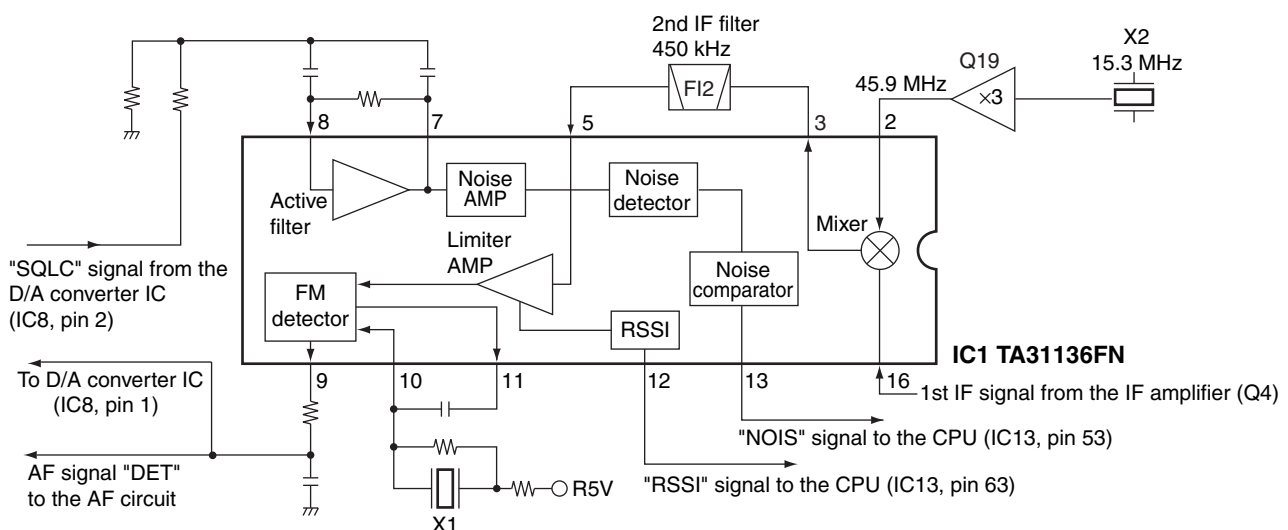
The 1st IF signal from the IF amplifier (Q4) is applied to the 2nd mixer section of the FM IF IC (IC1, pin 16), and is mixed with the 2nd LO signal to be converted into a 450 kHz 2nd IF signal.

The FM IF IC (IC1) contains the 2nd mixer, 2nd local oscillator, limiter amplifier, quadrature detector, active filter and noise amplifier circuits. A 2nd LO signal (45.9 MHz) is produced at the PLL circuit by tripling its reference frequency (15.3 MHz).

The 2nd IF signal from the 2nd mixer (IC1, pin 3) passes through the ceramic filter (FI2) to remove unwanted heterodyned frequencies. It is then amplified at the limiter amplifier section (IC1, pin 5) and applied to the quadrature detector section (IC1, pins 10, 11) to demodulate the 2nd IF signal into AF signals.

The demodulated AF signals are output from pin 9 (IC1) as "DET" signal, and are then applied to the AF circuit.

• 2ND IF AND DEMODULATOR CIRCUITS



4-1-5 AF AMPLIFIER CIRCUIT

The AF amplifier circuit amplifies the demodulated AF signals to drive a speaker.

The AF signals from the FM IF IC (IC1, pin 9) pass through the high-pass filter (IC6, pins 3 and 1) to suppress unwanted harmonic components. The signals pass through the RX mute switch (Q34) which is controlled by "RMUT" signal from the CPU (IC13, pin 56), and are then applied to another high-pass filter (IC6, pins 13 and 14). The filtered signals pass through the low-pass filter (IC6, pins 6 and 7) via the analog switch (IC10, pins 1 and 2). The signals are applied to the analog switch (IC10, pin 10) again, and are then applied to the AF power amplifier (IC12, pin 4) via the AF volume (R226). The amplified AF signals are output from pin 10, and are then applied to the internal speaker which is connected with J1 via the [SP] jack.

4-1-6 RECEIVE MUTE CIRCUITS

• NOISE SQUELCH

A squelch circuit cuts out AF signals when no RF signals are received. By detecting noise components in the AF signals, the squelch circuit switches the AF mute switch.

Some noise components in the AF signals from the FM IF IC (IC1, pin 9) are applied to the D/A converter (IC8, pin 1) as "DET" signal, and are then output from pin 2. The signals are applied to the active filter section in the FM IF IC (IC1, pin 8). The active filter section filters and amplifies noise components. The amplified signals are converted into the pulse-type signals at the noise detector section and output from pin 13 as "NOIS" signal.

The "NOIS" signal from the FM IF IC is applied to the CPU (IC13, pin 53). Then the CPU analyzes the noise condition and outputs the AF mute control signal from the CPU (IC13) as "RMUT" signal from pin 56. The signal is applied to the RX mute switch (Q34) to control the AF signal muting.

• CTCSS AND DTCS

The tone squelch circuit detects tone signals and opens the squelch only when receiving a signal containing a matched subaudible tone (CTCSS or DTCS). When the tone squelch is in use, and a signal with a mismatched or no subaudible tone is received, the tone squelch circuit mutes the AF signals even when noise squelch is open.

A portion of the "DET" signals from the FM IF IC (IC1, pin 9) passes through the low-pass filter (IC7, pins 10 and 8) to remove AF (voice) signals, and are then applied to the amplifier (IC7, pin 12). The amplified signals are applied to the CTCSS or DTCS decoder inside of the CPU (IC13, pin 60) as the "CDEC" signal. The CPU outputs AF mute control signal from pin 56, and is then applied to the RX mute switch (Q34) and analog switch (IC10, pins 12 and 13) to control AF signals muting as "RMUT" signal.

4-2 TRANSMITTER CIRCUITS

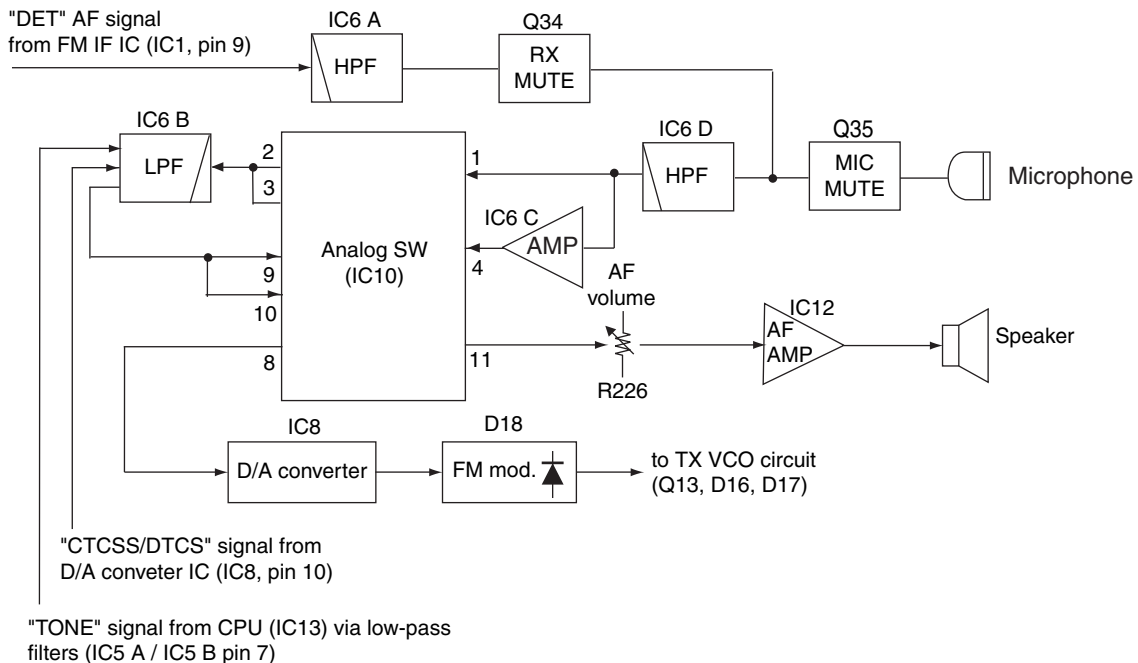
4-2-1 MICROPHONE AMPLIFIER CIRCUIT

The microphone amplifier circuit amplifies audio signals within +6 dB/octave pre-emphasis characteristics from the microphone to a level needed for the modulation circuit.

The AF signals from the microphone are passed through the microphone mute switch (Q35), and are then applied to the amplifier (IC6, pins 9 and 8) via the high-pass filter (IC6, pins 13 and 14). The amplified signals are applied to the analog switch (IC10, pin 4), and outputs from pin 3. The signals pass through the low-pass filter (IC6, pins 6 and 7), then applied to the analog switch (IC10, pin 9) again.

The signals are applied to the D/A converter (IC8, pin 4). The converted signals output from pin 3, and applied to the modulation circuit (D18) as "MOD" signal.

• ANALOG SWITCHING CIRCUITS



4-2-2 MODULATION CIRCUIT

The modulation circuit modulates the VCO oscillating signal (RF signal) using the microphone audio signals.

The AF signals from the D/A converter (IC8, pin 3) change the reactance of varactor diode (D18) to modulate the oscillated signal at the TX VCO circuit (Q13, D16, D17, D21).

The modulated VCO signal is amplified at the buffer amplifiers (Q12, Q10) and is then applied to the drive amplifier circuit via the T/R switch (D14).

The CTCSS/DTCS signals ("CENC0", "CENC1", "CENC2") from the CPU (IC13, pins 23–25) pass through the low-pass filter (IC5, pins 12 and 14) via 3 registers (R191–R193) to change its waveform. Then the signals are applied to the D/A converter (IC8, pin 9). The output signals from the D/A converter (IC8, pin 10) pass through the low-pass filter (IC6, pins 6 and 7) to be mixed with "MOD" signal, and are then applied to the D/A converter again (IC8, pin 4).

4-2-3 DRIVE/POWER AMPLIFIER CIRCUITS

The drive/power amplifier circuits amplify the VCO oscillating signal to an output power level.

The modulated RF signal from the TX VCO circuit passes through the T/R switch (D14), and is amplified at the pre-drive (Q9), drive (Q8) and power (Q7) amplifiers to obtain 5 W (max.) of RF power (at 7.2 V DC).

The amplified signal passes through the power detector (D1), antenna switch (D2) and low-pass filter (L1–L3, C2–C5, C175, C176), and is then applied to the antenna connector (CHASSIS unit; J1).

The bias current of the pre-drive (Q9), drive (Q8) and power (Q7) amplifiers are controlled by the APC circuit.

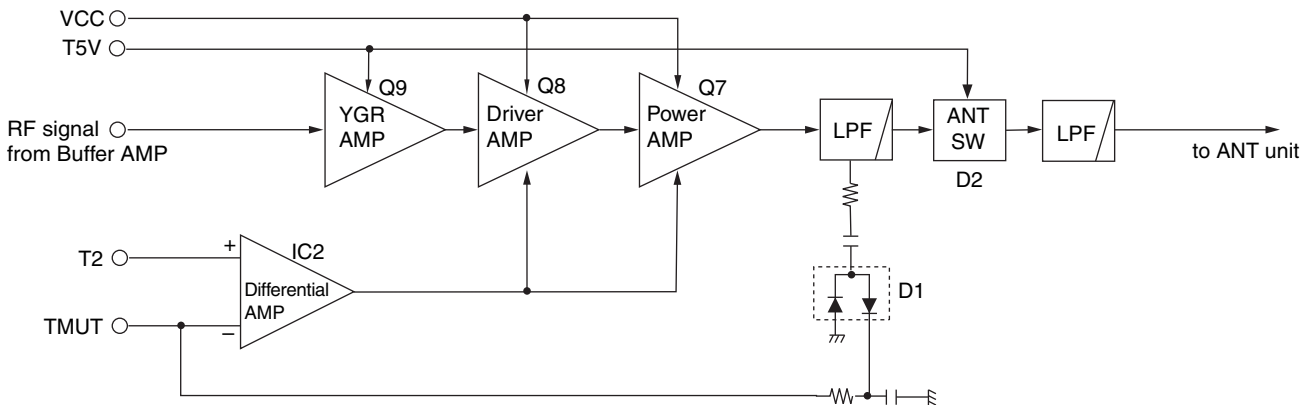
4-2-4 APC CIRCUITS

The APC circuit (IC2, D1) protects drive and power amplifiers from the reflected signal, and selects output power of HIGH, LOW2 or LOW1.

The power detector (D1) detects transmit output power and converts it into DC voltage. The DC voltage is at a minimum level when the antenna impedance is matched to 50 Ω, and increased when mismatched.

The detected voltage is applied to the differential amplifier (IC2, pin 3), and the "T2" signal from the D/A converter (IC8, pin 23), controlled by the CPU (IC13), is applied to the another input port as the reference. When the antenna impedance is mismatched, the detected voltage exceeds the power setting voltage. Then the output voltage of the differential amplifier (IC2, pin 4) controls the input current of the pre-drive (Q9), drive (Q8) and power (Q7) amplifiers to reduce the output power.

• APC CIRCUITS



4-3 PLL CIRCUITS

4-3-1 PLL CIRCUIT

A PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL output compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by the divided ratio (N-data) of a programmable divider.

The PLL circuit contains the TX/RX VCO circuits (TX: Q13, D16, D17, D21; RX: Q14, D19, D20, D22). The oscillated signal is amplified at the buffer amplifiers (Q11, Q12) and then applied to the PLL IC (IC4, pin 8) after being passed through the low-pass filter (L32, C206–C208).

The phase detected signal outputs from pins 15 and 16, and is then applied to the charge pump (Q39, Q40). The signal passes through the loop filter (C146, C147, C149, R95–R97), and is then applied to the TX and RX VCO circuits as a lock voltage.

The PLL IC contains a prescaler, programmable counter, programmable divider and phase detector, etc. The entered signal is divided at the prescaler and programmable counter section by the N-data ratio from the CPU. The divided signal is detected on phase at the phase detector using the reference frequency.

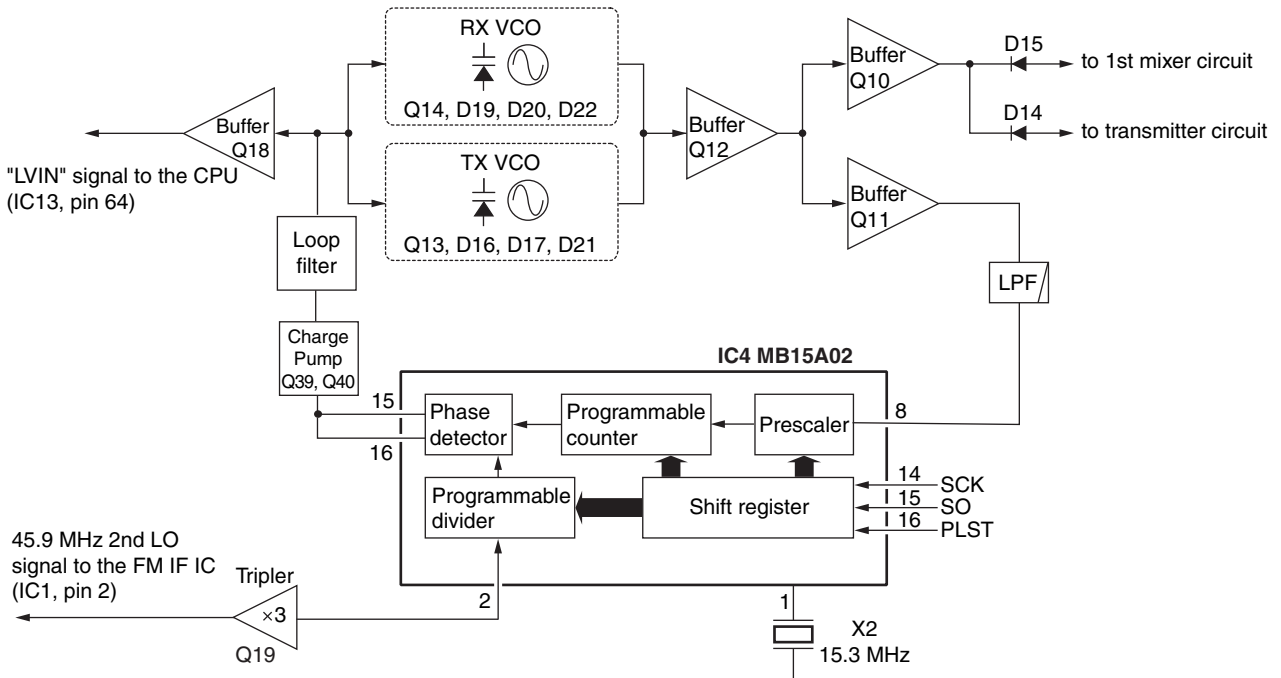
If the oscillated signal drifts, its phase changes from that of the reference frequency, causing a lock voltage change to compensate for the drift in the oscillated frequency.

4-3-2 VCO CIRCUIT

The VCO circuit contains a separate RX VCO (Q14, D19, D20) and TX VCO (Q13, D16, D17, D21). The oscillated signal is amplified by the buffer amplifiers (Q10, Q12) and is then applied to the T/R switch (D14 for TX, D15 for RX). Then the receive 1st LO (RX) signal is applied to the 1st mixer circuit (Q3) and the transmit (TX) signal to the pre-drive amplifier (Q9).

A portion of the signal from the buffer amplifier (Q12) is fed back to the PLL IC (IC4, pin 8) via the buffer amplifier (Q11) and low-pass filter (L32, C206–C208) as the comparison signal.

• PLL CIRCUITS



4-4 OTHER CIRCUITS

LED CONTROL CIRCUITS

The LED control circuit is composed of the LED driver (Q32) and LED (DS1).

The CPU outputs “RLED” and “TLED” signals from the pins 42 and 43. The signals are applied to the LED driver (Q32, pins 3 and 1).

CONDITION	COLOR
RECEIVING (2/5-TONE CODE)	ORANGE (Lighting)
LOW BATTERY (Nearly exhausted)	RED (Blinks Slowly)
LOW BATTERY (Almost exhausted)	RED (Blinks Fast)
CLONING	ORANGE (Blinking)
RECEIVING/SQUELCH OPEN	GREEN (Lighting)
TRANSMITTING	RED (Lighting)

4-5 POWER SUPPLY CIRCUIT

VOLTAGE LINE

LINE	DESCRIPTION
VCC	The voltage from the attached battery pack.
+5V	Common 5 V converted from the VCC line at the +5 regulator circuit (IC9). The output voltage is supplied to the D/A converter (IC8), analog SW (IC10) and so on.
S5V	Common 5 V converted from the VCC line at the S5 regulator circuit (Q23–Q25). The output voltage is supplied to the ripple filter (Q17), PLL IC (IC4), etc.
R5V	Receive 5 V converted from the S5V line at the R5 regulator circuit (Q22). The output voltage is supplied to the tripler (Q19), FM IF IC (IC1), IF amplifier (Q4), VCO switch (Q15, Q16), 1st mixer (Q3), etc.
T5V	Transmit 5 V converted from the S5V line at the T5 regulator circuit (Q21). The output voltage is supplied to the pre-drive (Q9), APC amplifier (IC2).

4-6 PORT ALLOCATION

4-6-1 D/A CONVERTER IC (IC8)

Pin number	Port name	Description
11	BAL	Outputs the modulation balance level control signal. The signal is applied to the buffer amplifier (IC7, pin 6).
23	T2	<ul style="list-style-type: none"> Outputs the bandpass filter tuning signal during receive. The output signal is applied to the bandpass filters (D9, D10). Outputs the TX power control signal during transmit. The output signal is applied to the APC amplifier (IC2, pin 1).
22	T1	Outputs the bandpass filter tuning signal. The output signal is applied to the bandpass filters (D4, D8).
14	LVA	Outputs the PLL lock voltage control signal. The output signal is applied to the buffer amplifier (IC7, pin 3).
15	REF	Outputs the reference oscillator correcting voltage. The voltage is applied to the buffer amplifier (IC7, pin 5).

4-6-2 CPU (IC13)

Pin number	Port name	Description
1	TEMP	Input port for the transceiver's internal temperature detecting signal.
2	BATV	Input port for the detect signal for connecting battery pack's voltage.
7	RES	Input port for power reset signal.
13	SENC0	Output single tone encoder signal.
14	SENC1	
16	DUSE	Outputs DTSC LPF control signal.
18	AFON	Outputs AF power amplifier control signal.
19	SENC2	Output single tone encoder signal.
20	SENC3	
21	CBI0	Input ports for rotary selector.
22	CBI1	
23	CENC0	Output CTCSS/DTCS signals.
24	CENC1	
25	CENC2	
26	CBI2	Input ports for rotary selector.
27	CBI3	
28	SCK	Outputs serial clock signal to the PLL IC (IC4, pin 9), D/A convertor (IC8, pin 7), etc.
29	SO	Outputs serial data to the PLL IC (IC4, pin 8) and D/A convertor (IC8, pin 8).
30	BEEP	Outputs beep audio signals.
31	ESDA	I/O port for data signals from/to the EEPROM (IC15, pin 5).
32	ESCL	Outputs clock signal to the EEPROM (IC15, pin 6).
33	UNLK	Input port for unlock signal from PLL IC (IC4, pin 9).
34	PLST	Outputs strobe signals to the PLL IC (IC4, pin 11).
36	NWC	Output/input port for wide/narrow control signal.
37	DAST	<ul style="list-style-type: none"> • Outputs strobe signals to the D/A convertor (IC8, pin 6). • Input port for the connecting battery type detect signal.
38	S5C	Outputs power save control signal.
39	T5C	Outputs T5 regulator control signal. Low: While transmitting
40	R5C	Outputs R5 regulator control signal. Low: While receiving

Pin number	Port name	Description
42	RLED	Outputs receiving LED control signal.
43	TLED	Outputs transmitting LED control signal.
47	PTT	Input port for the PTT switch detection signal. Low : While the PTT switch is pushed.
48	SI	Serial Bus inputport.
49	CLI	Input port for the cloning data signal.
50	CLO	Outputs the cloning data signal.
53	NOIS	Input port for the noise signal from the FM IF IC (IC1, pin 13).
55	CCS	Outputs chip select signal.
56	TMUT	Outputs transmit mute signal.
57	RMUT	Input port for AF mute signal from the RX circuit.
58	MMUT	Outputs MIC mute signal.
59	REMO	Inputs key signal from remote mic.
60	CDEC	Input port for CTCSS/DTCS signal from the amplifier (IC5, pin 8).
61	SDEC	Input port for single tone decode signal from the LPF (IC5, pin 8).
62	KEY	Inputs key input signal.
63	RSSI	Input port for the S-meter signal from the FM IF IC (IC1, pin 12).
64	LVIN	Input port for the PLL lock voltage.

SECTION 5 ADJUSTMENT PROCEDURE

5-1 PREPARATION

■ REQUIRED EQUIPMENTS

EQUIPMENT	SPECIFICATION	EQUIPMENT	SPECIFICATION
Adjustment software	"CS-F3010 ADJ" (Revision 1.0 or later)	JIG cable (see the page 5-3)	Modified OPC-478U/UC (USB type) or OPC-478 (RS-232 type)
Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV	Attenuator	Power attenuation : 30 dB Capacity : More than 6 W
RF power meter (terminated type)	Measuring range : 1–10 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 μV to 32 mV (–127 to –17 dBm)
Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy : ±1 ppm or better Input level : Less than 1 mW	AC Millivoltmeter	Measuring range : 10 mV to 10 V
		Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
Modulation analyzer	Frequency range : 30–300 MHz Measuring range : 0 to ±10 kHz	External speaker	Input impedance : 8 Ω Capacity : More than 1 W

■ SYSTEM REQUIREMENTS

- Microsoft® Windows® 98/SE/ME/2000/XP
- RS-232C/USB port

■ BEFORE STARTING SOFTWARE ADJUSTMENT

Clone adjustment frequencies, TX power, CTCSS frequency, DTCS code and IF bandwidth into the transceiver using the CS-F3011/F3013 CLONING SOFTWARE before starting adjustment.

CAUTION!: BACK UP the originally programmed memory data in the transceiver before programming the adjustment frequencies. When program the adjustment frequencies into the transceiver, the transceiver's memory data will be overwritten and lose original memory data at the same time.

■ ADJUSTMENT CHANNEL SETTING

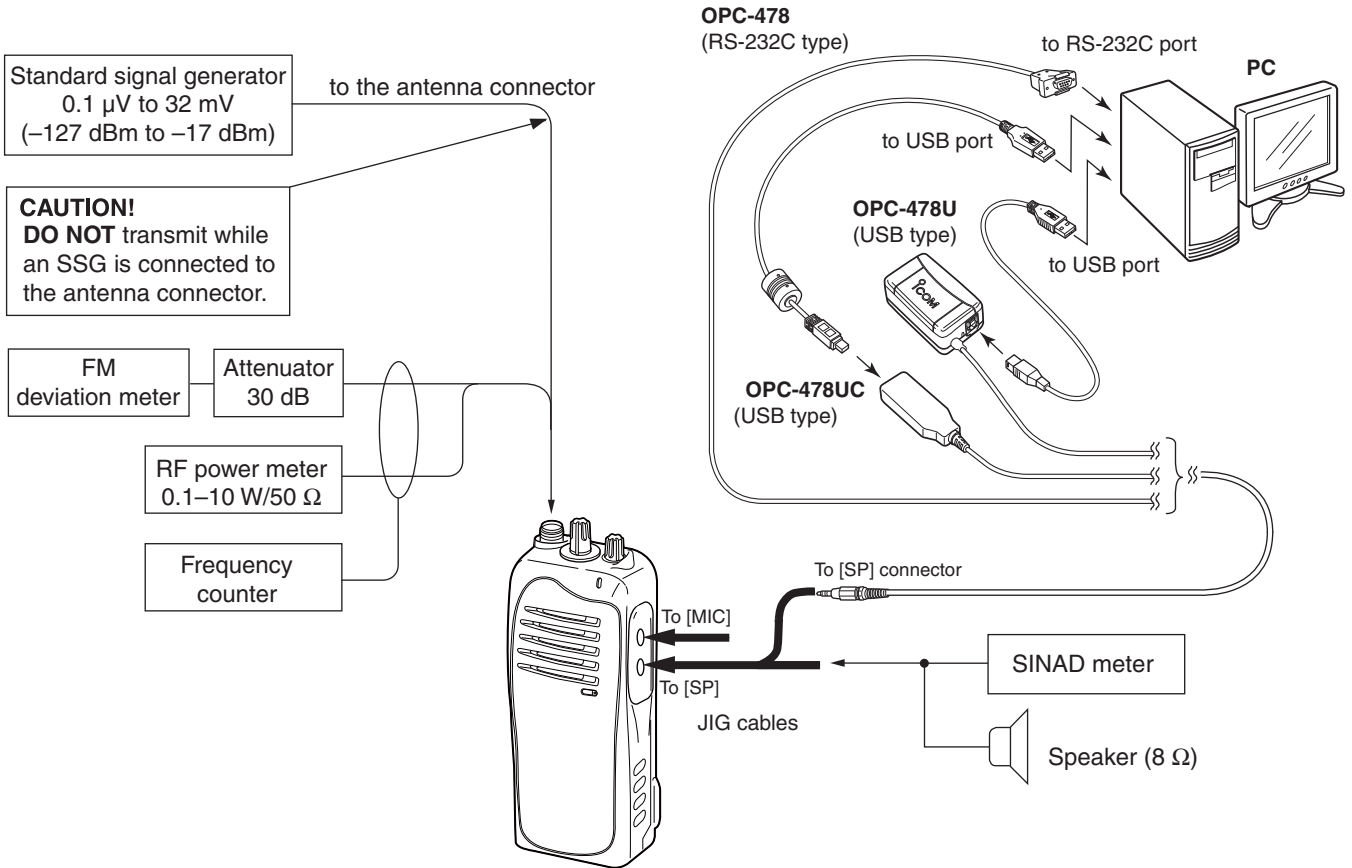
- Using the CS-F3011/F3013 CLONING SOFTWARE, create the cloning data for adjustments as shown below.

Memory CH													
CH	Atr	Inh	Frequency (MHz)					C.Tone					
			RX	TX	Tx Inh	W/N	SQL Tight	RX	TX	TOT	RF PWR	F S	
1	AB		174.000000	<-		W						L1	
2			136.000000	<-		W						L1	
3			155.000000	<-		W						H	
4			155.000000	<-		W						L2	
5			155.000000	<-		W						L1	
6			155.000000	<-		N						L1	
7			155.000000	<-		N						L1	
8			174.000000	<-		N			.007N			L1	
9			174.000000	<-		W			.007N			L1	
10			155.000000	<-		W			.151.4			L1	
11			136.100000	<-	i	W						L1	
12			155.000000	<-	i	W						L1	

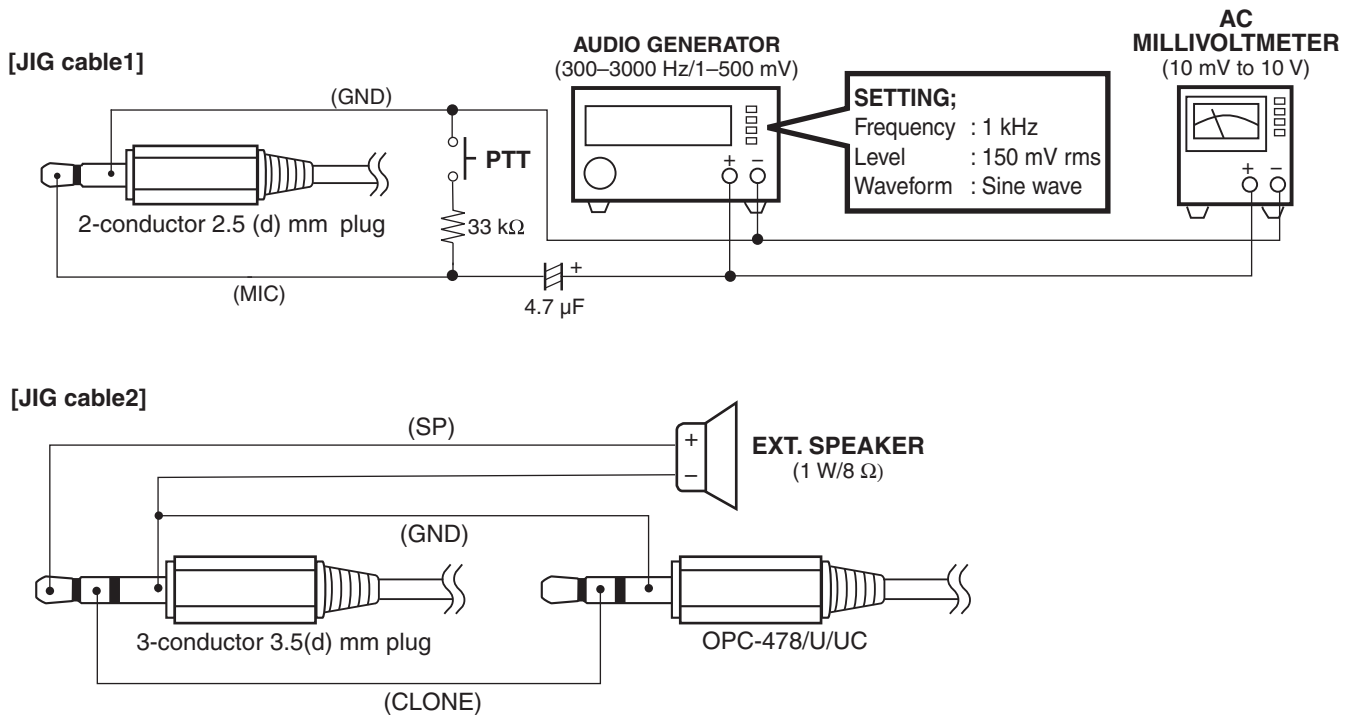
- Clone the data file into the transceiver.

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• CONNECTION



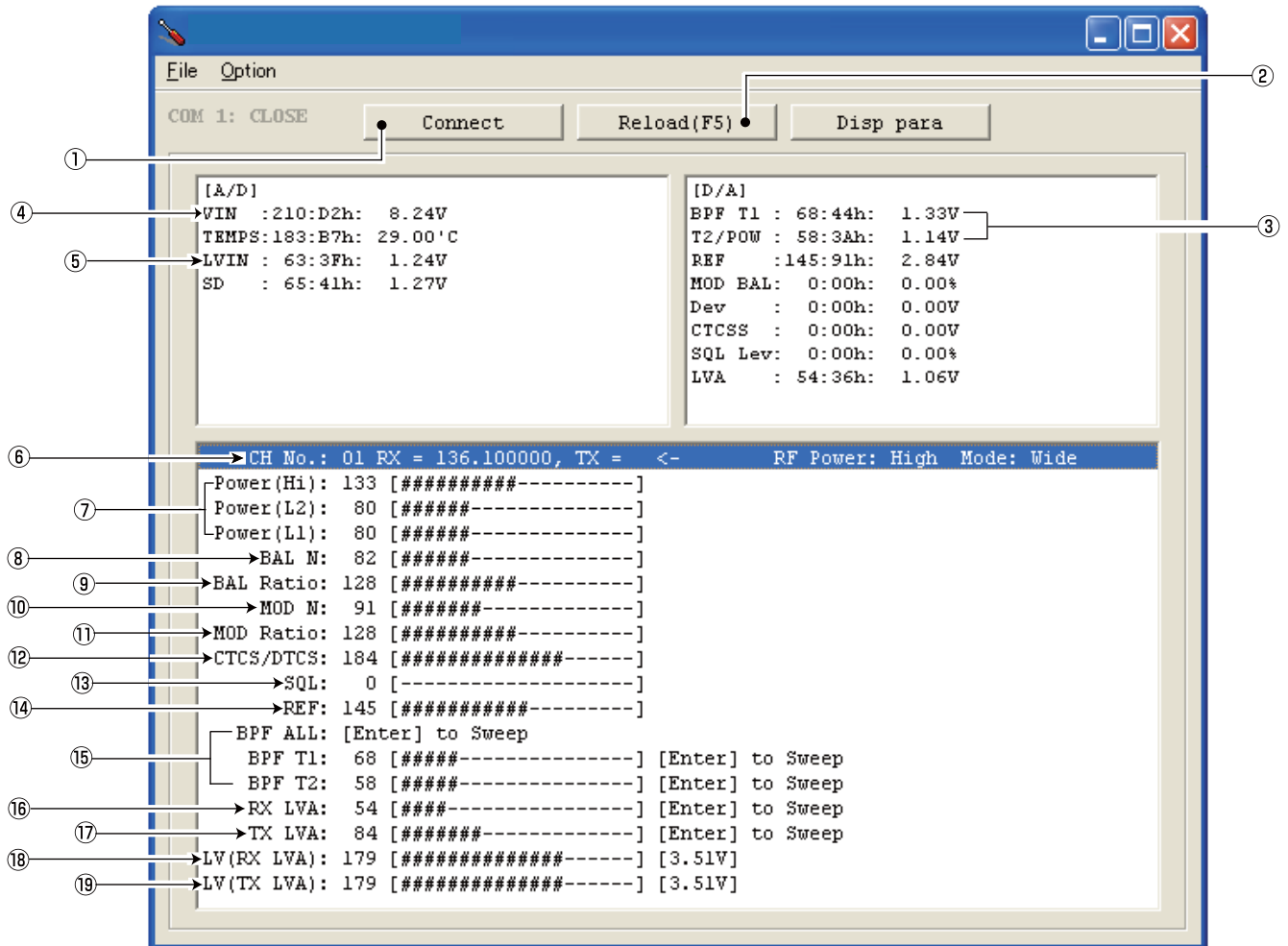
• JIG CABLES



■ STARTING SOFTWARE ADJUSTMENT

- (1) Connect the transceiver and PC with OPC-478/U/UC and JIG CABLE (see the previous page).
- (2) Turn the transceiver power ON.
- (3) Boot up Windows, and click the program group 'CS-F3010 ADJ' in the 'Programs' folder of the [Start] menu, then CS-F3010 ADJ's window appears.
- (4) Click 'Connect' on the CS-F3010's window, then IC-F3011/IC-F3013's up-to-date condition appears as below.
- (5) Set or modify adjustment value as specified in the following guidances.

• ADJUSTMENT WINDOW



NOTE: The above screen is an example.

Each transceiver has its own specific values for each setting.

- | | |
|-------------------------------------|--|
| ①: Transceiver's connection state | ⑫: CTCSS/DTCS deviation |
| ②: Reload adjustment data | ⑬: Squelch level |
| ③: Receive sensitivity measurement | ⑭: Reference frequency |
| ④: Connected DC voltage measurement | ⑮: Receive sensitivity (automatically) |
| ⑤: PLL lock voltage measurement | ⑯: PLL lock voltage for RX (automatically) |
| ⑥: Operating channel select | ⑰: PLL lock voltage for TX (automatically) |
| ⑦: RF output power | ⑱: PLL lock voltage for RX (manually) |
| ⑧: FM deviation balance (Narrow) | ⑲: PLL lock voltage for RX (manually) |
| ⑨: FM deviation balance (Wide) | |
| ⑩: FM deviation (Narrow) | |
| ⑪: FM deviation (Wide) | |

5-2 FREQUENCY ADJUSTMENT

1) Select an adjustment item using cursor or [↑] / [↓] of the PC's keyboard.

2) Set or modify the adjustment value as specified using [←] / [→] of the PC's keyboard, then push [ENTER].

ADJUSTMENT		ADJUSTMENT CONDITION	OPERATION	ADJUSTMENT ITEM	VALUE
PLL LOCK VOLTAGE	1	–	• Connect an RF power meter to the antenna.	–	–
RX	2	• Channel : CH.1 • Receiving	• Adjust the [RX LVA] using [←] / [→] on the PC's keyboard until the "LVIN" in the "ADJUSTMENT WINDOW" shows the specified value, then push [ENTER]. or • Set the [RX LVA] to "179", then push [ENTER].	[RX LVA]	3.5 V (at the "LVIN" item)
TX	3	• Channel : CH.1 • Transmitting	• Adjust the [TX LVA] using [←] / [→] on the PC's keyboard until the "LVIN" in the "ADJUSTMENT WINDOW" shows the specified value, then push [ENTER]. or • Set the [TX LVA] to "179", then push [ENTER].	[TX LVA]	or "179" (at the [RX/TX LVA])
LOCK VOLTAGE VERIFICATION	1	–	• Connect an RF power meter to the antenna.	–	–
RX	2	• Channel : CH.2 • Receiving	• Verify the lock voltage displayed at the "LVIN" in the "ADJUSTMENT WINDOW" (see the previous page).	[LVIN]	0.9–1.5 V (Verify)
TX	3	• Channel : CH.2 • Transmitting			
REFERENCE FREQUENCY	1	–	• Loosely couple a frequency counter to the antenna connector.	–	–
	2	• Channel : CH.1 • Transmitting	1) Adjust the frequency using [←] / [→] on the PC's keyboard. 2) Push [ENTER] to store the adjust value.	[REF]	174.0000 MHz

5-3 TRANSMIT ADJUSTMENT

1) Select an adjustment item using cursor or [↑] / [↓] of the PC's keyboard.

2) Set or modify the adjustment value as specified using [←] / [→] of the PC's keyboard, then push [ENTER].

ADJUSTMENT		ADJUSTMENT CONDITION	OPERATION	ADJUSTMENT ITEM	VALUE
TRANSMIT OUTPUT POWER	1	—	• Connect an RF power meter to the antenna connector.	—	—
Hi power	2	• Channel : CH.3 • Transmitting	1) Adjust the transmit output power using [←] / [→] on the PC's keyboard. 2) Push [ENTER] to store the adjust value.	[Power (Hi)]	5.0 W
L2 power	3	• Channel : CH.4 • Transmitting		[Power (L2)]	2.0 W
L1 power	4	• Channel : CH.5 • Transmitting		[Power (L1)]	1.0 W
DEVIATION -Preparation-	1	• Connect a modulation analyzer to the antenna connector through an Attenuator.	• Set the modulation analyzer as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2	—	—
	2	• Connect an audio generator to the MIC line through the JIG cable.	• Set the audio generator as; Modulation : 1 kHz Level : 150 mV rms Wave form : Sine wave	—	—
-Adjustment-WIDE	3	• Channel : CH.5 • Transmitting	1) Adjust the deviation using [←] / [→] on the PC's keyboard. 2) Push [ENTER] to store the adjust value.	[MOD Ratio]	±4.05–4.15 kHz
NARROW	5	• Channel : CH.7 • Transmitting		[MOD N]	±2.05–2.15 kHz
MODULATION BALANCE -Preparation-	1	• Connect a modulation analyzer to the antenna connector through an attenuator.	• Set the modulation analyzer as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2	—	—
	2	• Connect an oscilloscope to the detect terminal of the modulation analyzer.	—	—	—
-Adjustment-NARROW	3	• Channel : CH.8 • No audio signals are applied. • Transmitting	1) Adjust the waveform using [←] / [→] on the PC's keyboard. 2) Push [ENTER] to store the adjust value.	[BAL N]	Square waveform
WIDE	5	• Channel : CH.9 • No audio signals are applied. • Transmitting		[BAL Ratio]	Flat 
CTCSS/DTCS DEVIATION -Preparation-	1	• Connect a modulation analyzer to the antenna connector through an attenuator.	• Set the modulation analyzer as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2	—	—
-Adjustment-	2	• Channel : CH.10 • No audio signals are applied. • Transmitting	1) Adjust the deviation using [←] / [→] on the PC's keyboard. 2) Push [ENTER] to store the adjust value.	[CTCSS/DTCS]	±0.66–0.70 kHz

5-2 RECEIVE ADJUSTMENT

1) Select an adjustment item using cursor or [↑] / [↓] of the PC's keyboard.

2) Set or modify the adjustment value as specified using [←] / [→] of the PC's keyboard, then push [ENTER].

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION	ADJUSTMENT ITEM	VALUE	
RECEIVE SENSITIVITY -Preparation-	1	<ul style="list-style-type: none"> Connect an SSG to the antenna connector. 	<ul style="list-style-type: none"> Set the SSG as; Frequency : 136.1000 MHz Level : +20 dB_μ (-87 dBm)[†] Modulation : 1 kHz Deviation : 3.5 kHz 	-	-
-Adjustment-	2	<ul style="list-style-type: none"> Channel : CH.11 Receiving 	1) Select the [BPF (T1)] item, then push [ENTER]. 2) Select the [BPF (T2)] item, then push [ENTER].	[BPF (T1)] [BPF (T2)]	(Automatic adjustment)
CONVINIENT: [BPF (T1)] and [BPF (T2)] can be adjusted at the same time as below.					
	2	<ul style="list-style-type: none"> Channel : CH.11 Receiving 	<ul style="list-style-type: none"> Select the [BPF ALL] item, then push [ENTER]. 	[BPF ALL]	(Automatic adjustment)
SQUELCH -Preparation-	1	<ul style="list-style-type: none"> Connect an SSG to the antenna connector. 	<ul style="list-style-type: none"> Set the SSG as; Frequency : 155.0000 MHz Level : -15 dB_μ (-122 dBm)[†] Modulation : 1 kHz Deviation : 3.5 kHz 	-	-
-Adjustment-	2	<ul style="list-style-type: none"> Channel : CH.12 Receiving 	1) Once close the squelch by increasing the value of [SQL] item, then decrease the value to open the squelch. 2) Push [ENTER] to store the value.	[SQL]	(Automatic adjustment)

[†]; The output level of the standard signal generator (SSG) is indicated as the SSG's open circuit.

SECTION 6

PARTS LIST

[CONNECT UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C501	4030017460	S.CER ECJ0EB1E102K	T	8.3/5.3
C502	4030016930	S.CER ECJ0EB1A104K	T	9.3/5.3
J501	6910016390	CON IMSA-9230B-1-02Z145-PT1		

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
IC1	1110003201	S.IC TA31136FNG(EL)	B	51.8/19
IC2	1110002751	S.IC TA75S01F(TE85R,F)	T	68.9/21
IC4	1140005991	S.IC MB15A02PFV1-G-BND-ERE1	T	38.3/35.7
IC5	1110005340	S.IC NJM12902V-TE1-#ZZZB	T	29.7/11.6
IC6	1110005320	S.IC NJM13403V-TE1-#ZZZB	T	16/34.6
IC7	1110005340	S.IC NJM12902V-TE1-#ZZZB	T	29.9/34.6
IC8	1190000350	S.IC M62363FP-650C	T	40.3/15.2
IC9	1110005350	S.IC NJM2870F05-TE1-#FZZB	B	84.2/14.2
IC10	1130011770	S.IC CD4066BPWR	T	22.9/34.6
IC12	1110001811	S.IC TA7368FG(5,ER)	T	89.6/13.6
IC13	1140012721	S.IC HD6433687C73FPV(FX-2775A-1)	T	12.5/14.3
IC14	1110006260	S.IC BD5242G-TR	T	6.6/5.9
IC15	1130011540	S.IC BR24L16FV-WE2	B	16/11.6
Q1	1560000841	S.FET 2SK1829(TE85R,F)	T	75/39.5
Q2	1580000731	S.FET 3SK293(TE85L,F)	B	77.8/37.9
Q3	1580000800	S.FET 3SK324UG-TL-E	B	66.2/37.9
Q4	1530003311	S.TRA 2SC5107-O(TE85R,F)	B	51.4/23.1
Q6	1590003231	S.TRA UNR9113G0L	T	71.7/19.1
Q7	1560001232	S.FET RD07MVS2-T112	T	82.6/27
Q8	1560001241	S.FET RD01MUS1-T113	T	76.1/27.6
Q9	1530003421	S.TRA 2SC5110-O(TE85R,F)	T	70.7/34.4
Q10	1530003311	S.TRA 2SC5107-O(TE85R,F)	T	59.4/36.3
Q11	1530003311	S.TRA 2SC5107-O(TE85R,F)	B	56.8/36.4
Q12	1530003311	S.TRA 2SC5107-O(TE85R,F)	T	59.1/31.6
Q13	1530002920	S.TRA 2SC4226-T1 R25	T	54.1/32.3
Q14	1530002920	S.TRA 2SC4226-T1 R25	T	54.1/34.8
Q15	1590001400	S.TRA XP1214(TX)	B	56.5/32.6
Q16	1590003291	S.TRA UNR9213G0L	B	59.1/32.6
Q17	1530002851	S.TRA 2SC4116-BL(TE85R,F)	T	55.5/44.1
Q18	1560000541	S.FET 2SK880-Y(T5RICOM,F)	B	51.5/39.2
Q19	1530002851	S.TRA 2SC4116-BL(TE85R,F)	T	43.3/29.9
Q20	1560001360	S.FET 2SK3019 TL	T	27.7/29.4
Q21	1510000920	S.TRA 2SA1577 T106 Q	T	71.9/16.4
Q22	1510000920	S.TRA 2SA1577 T106 Q	T	24.9/25.9
Q23	1520000460	S.TRA 2SB1132 T100 R	T	81.1/15.1
Q24	1590001190	S.TRA XP6501-(TX).AB	T	76.5/15.1
Q25	1590003231	S.TRA UNR9113G0L	T	75.7/11.7
Q26	1590003291	S.TRA UNR9213G0L	T	49.6/18.4
Q27	1590003291	S.TRA UNR9213G0L	T	24.8/16.7
Q28	1590003431	S.TRA UNR911HG0L	B	63.8/10.8
Q29	1590003271	S.TRA UNR9210G0L	B	36.1/9.4
Q30	1510001080	S.TRA 2SA2048 TLR	T	91.9/8.5
Q31	1590001190	S.TRA XP6501-(TX).AB	T	91.4/5.2
Q32	1590003020	S.TRA XP4216-(TX)	T	16.5/23.5
Q34	1560001360	S.FET 2SK3019 TL	T	11.6/31.9
Q35	1560001360	S.FET 2SK3019 TL	T	9.5/30.5
Q39	1530002060	S.TRA 2SC4081 T106 R	B	39.1/42.7
Q40	1510000510	S.TRA 2SA1576A T106R	B	39.1/40
D1	1790001790	S.DIO RB876W TL	B	93.6/17.6
D2	1750000581	S.DIO 1SV307(TPH3,F)	B	91.5/31.1
D4	1750000721	S.VAR HVC375BTRF-E	B	80.3/33.4
D5	1750000581	S.DIO 1SV307(TPH3,F)	B	87.6/33.4
D6	1790001261	S.DIO MA2S077G0L	B	86.7/35.9
D8	1750000721	S.VAR HVC375BTRF-E	B	83/33.4
D9	1750000711	S.VAR HVC350BTRF-E	B	73.6/37.7
D10	1750000711	S.VAR HVC350BTRF-E	B	72.3/37.7
D14	1790001261	S.DIO MA2S077G0L	T	65.8/35.3
D15	1790001261	S.DIO MA2S077G0L	T	65.8/36.7
D16	1750000771	S.VAR HVC376BTRF-E	T	55.1/28.8
D17	1750000771	S.VAR HVC376BTRF-E	T	53.7/28.8
D18	1720000471	S.VAR 1SV239(TPH3,F)	B	49.6/28.2
D19	1750000771	S.VAR HVC376BTRF-E	T	53.6/37.8
D20	1750000771	S.VAR HVC376BTRF-E	T	50.9/37.5
D21	1750000721	S.VAR HVC375BTRF-E	T	49.2/31.5
D22	1750000721	S.VAR HVC375BTRF-E	T	49.2/34.9
D23	1790001251	S.DIO MA2S1110GL	T	70.5/40.4
D24	1790001251	S.DIO MA2S1110GL	T	41.5/39.2
D26	1790001790	S.DIO RB876W TL	B	36.1/7.3
D27	1750000520	S.DIO DAN222TL	B	21.3/6.5
D28	1790001261	S.DIO MA2S077G0L	B	8.5/11.2
D29	1750000940	S.DIO ISS400 TE61	B	21.5/4.2
D30	1790001261	S.DIO MA2S077G0L	T	28.6/42.4
F11	2030000150	S.MON DSF753SB 46.350 MHz(FL-335)	B	62.7/27.1
F12	2020002410	CER LTM450FW <JJE>		
X1	6070000300	S.DIS JTBM450CX24 <JJE>	T	54.4/20
X2	6050012050	S.XTA CR-794 TTS14VSB-A6 15.3 MHz	T	36.9/28.9
X3	6050011720	S.XTA CR-764 SMD-49TB 19.6608 MHz <KDS>	B	12/5.9
L1	6200012780	S.COI 0.30-1.4-6TL 27.2N <COMO>	B	94.9/40.3
L2	6200012470	S.COI 0.30-1.7-7TL 45.3N <COMO>	B	94.6/36.2
L3	6200012910	S.COI 0.35-1.6-8TL 45.5N <COMO>	B	94.6/31.9
L4	6200012470	S.COI 0.30-1.7-7TL 45.3N <COMO>	B	92.5/25.7
L5	6200012390	S.COI 0.30-0.92-3TR 5.8N <COMO>	B	89.8/19.8
L6	6200012470	S.COI 0.30-1.7-7TL 45.3N <COMO>	B	89.5/36.5
L7	6200007871	S.COI ELJRF 39NJFB	B	86.8/37.7
L8	6200008090	S.COI LQW2BHN68NJ03L	B	83.9/35.2
L9	6200008090	S.COI LQW2BHN68NJ03L	B	79.6/35.2
L10	6200007750	S.COI LQW2BHN56NJ03L	B	76.4/35

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

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
L11	6200007750	S.COI LQW2BHN56NJ03L	B	70.6/37.8
L12	6200008090	S.COI LQW2BHN68NJ03L	B	64.4/40.2
L13	6200007850	S.COI ELJNC R82K-F	B	66.8/33.9
L15	6200002861	S.COI NLV25T-4R7J	T	93.2/31.7
L16	6200012400	S.COI 0.30-0.91-4TL 8.6N <COMO>	B	86.2/20.8
L17	6200013100	S.COI 0.45-1.5-5TL 18.3N <COMO>	B	81.2/20.8
L18	6200005701	S.COI ELJRE 22NGFA	T	79/22.5
L19	6200010401	S.COI ELJRE 39NJFA	T	73/32.9
L20	6200003590	S.COI EXCL3225U1	B	81.5/17.6
L21	6200011031	S.COI ELJRF R10JFB	T	59.2/38.6
L22	6200011031	S.COI ELJRF R10JFB	T	59.9/29.8
L23	6200011031	S.COI ELJRF R10JFB	B	55.9/38.3
L24	6200003640	S.COI MLF1608E 100K-T	T	49.3/27.5
L25	6200007760	S.COI LQW2BHN82NJ03L	T	50.1/29.3
L26	6200008090	S.COI LQW2BHN68NJ03L	T	48.5/38
L27	6200007170	S.COI MLF1608A 3R3K-T	B	52.2/30.9
L28	6200007170	S.COI MLF1608A 3R3K-T	B	52.2/35.5
L31	6200011021	S.COI ELJRF 82NJFB	B	83.4/38.7
L32	6200007881	S.COI ELJRF 33NJFB	B	55.9/42.3
L33	6200004480	S.COI MLF1608D R82K-T	T	43.4/25.9
L35	6200003540	S.COI MLF1608D R22K-T	T	41.7/31.8
L37	6200003640	S.COI MLF1608E 100K-T	T	53.7/39.1
L38	6200008090	S.COI LQW2BHN68NJ03L	T	57.9/27.7
L39	6200007720	S.COI LQW2BHN33NJ03L	T	55.9/38
L42	6200007170	S.COI MLF1608A 3R3K-T	B	48.5/34.1
L43	6200007170	S.COI MLF1608A 3R3K-T	B	48.5/30.9
R1	7030003540	S.RES ERJ3GEYJ 682 V (6.8K)	B	93.6/20.2
R2	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	73.3/19.4
R3	7030005530	S.RES ERJ2GEJ 100 X (10)	T	66.7/22.8
R4	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	75.3/21.1
R5	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	73.3/21.1
R6	7030005070	S.RES ERJ2GEJ 683 X (68K)	T	66.7/17.7
R7	7030005310	S.RES ERJ2GEJ 124 X (120K)	T	68/17.7
R8	7030005110	S.RES ERJ2GEJ 224 X (220K)	T	71.3/21.1
R9	7030004980	S.RES ERJ2GEJ 101 X (100)	T	70.3/23.9
R10	7030005030	S.RES ERJ2GEJ 152 X (1.5K)	B	73.2/19.9
R11	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	82.3/34.7
R12	7030005530	S.RES ERJ2GEJ 100 X (10)	T	77.1/36.7
R13	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	80.6/34.7
R14	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	80.6/35.7
R15	7030005310	S.RES ERJ2GEJ 124 X (120K)	B	79.8/39
R16	7030008280	S.RES ERJ2GEJ 271 X (27)	B	74.8/39.9
R17	7030004970	S.RES ERJ2GEJ 470 X (470)	B	74.8/33.9
R18	7030005530	S.RES ERJ2GEJ 100 X (10)	T	79.9/36.7
R19	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	78.8/37.7
R20	7030008370	S.RES ERJ2GEJ 561 X (560)	B	72.9/40.4
R21	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	72.2/38.9
R22	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	70.2/38.9
R23	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	71.2/38.9
R24	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	64.6/38
R25	7030005080	S.RES ERJ2GEJ 823 X (82K)	B	68/37.8
R26	7030005000	S.RES ERJ2GEJ 471 X (470)	B	68.5/40.1
R27	7030005000	S.RES ERJ2GEJ 471 X (470)	B	66/41.7
R28	7030005530	S.RES ERJ2GEJ 100 X (10)	B	66/40.8
R29	7030005590	S.RES ERJ2GEJ 680 X (68)	B	64.2/35.1
R30	7030005000	S.RES ERJ2GEJ 471 X (470)	B	67.7/35.7
R31	7030007250	S.RES ERJ2GEJ 220 X (22)	B	64.2/32.1
R32	7030010040	S.RES ERJ2GEJ-JPW	B	66.1/31.1
R33	7030007270	S.RES ERJ2GEJ 151 X (150)	B	55.7/24.8
R34	7030008300	S.RES ERJ2GEJ 184 X (180K)	B	52.5/25.5
R35	7030004980	S.RES ERJ2GEJ 101 X (100)	B	50.5/25.2
R36	7030008410	S.RES ERJ2GEJ 392 X (3.9K)	T	52.5/15.5
R37	7030009140	S.RES ERJ2GEJ 272 X (2.7K)	T	50.7/16.3
R38	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	46.5/21
R39	7030004970	S.RES ERJ2GEJ 470 X (47)	B	55.8/29.7
R40	7030005030	S.RES ERJ2GEJ 152 X (1.5K)	B	56.2/21.1
R42	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	51.8/15.4
R43	7030005000	S.RES ERJ2GEJ 471 X (470)	B	47.5/15.4
R44	7030006610	S.RES ERJ2GEJ 394 X (390K)	B	54.8/15.4
R45	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	52.8/13.7
R46	7030007290	S.RES ERJ2GEJ 222 X (2.2K)	B	53.8/13.7
R48	7030005010	S.RES ERJ2GEJ 681 X (680)	B	51.5/25.2
R50	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	66.3/38
R51	7030003670	S.RES ERJ3GEYJ 823 V (82K)	B	97.3/41
R52	7030003350	S.RES ERJ3GEYJ 181 V (180)	T	93.1/34.9
R53	7030007250	S.RES ERJ2GEJ 220 X (22)	T	80.2/22.9
R54	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	81.5/21.8
R55	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	79/20.8
R57	7030005590	S.RES ERJ2GEJ 680 X (68)	T	74.3/23.9
R58	7030005060	S.RES ERJ2GEJ 333 X (33K)	T	72.3/23.9
R59	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	71.3/23.9
R61	7030005530	S.RES ERJ2GEJ 100 X (10)	T	71.4/36.2
R62	7030004980	S.RES ERJ2GEJ 101 X (100)	T	68.7/32.3
R63	7030005000	S.RES ERJ2GEJ 471 X (470)	T	68.1/35.2
R65	7030007290	S.RES ERJ2GEJ 222 X (2.2K)	T	68.7/33.9
R67	7030004980	S.RES ERJ2GEJ 101 X (100)	T	65.6/34.1
R68	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	65.6/33.1
R69	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	61.4/36.1
R70	7030004980	S.RES ERJ2GEJ 101 X (100)	B	57.7/39.3
R71	7030005310	S.RES ERJ2GEJ 124 X (120K)	T	58.1/38.6
R72	7030009320	S.RES ERJ2GEJ 4R7 X (4.7)	T	59.9/34.4
R75	7030005110	S.RES ERJ2GEJ 224 X (220K)	B	58.6/37
R76	7030004980	S.RES ERJ2GEJ 101 X (100)	B	57.7/38.3
R77	7030004980	S.RES ERJ2GEJ 101 X (100)	B	57.5/30.5
R78	7030005310	S.RES ERJ2GEJ 124 X (120K)	T	58.2/33.4
R79	7030008340	S.RES RR0510P-182-D (1.8K)	T	53.7/36.6
R80	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	56.5/30.5
R81	7030010040	S.RES ERJ2GEJ-JPW	T	51.7/35.3
R82	7030009320	S.RES ERJ2GEJ 4R7 X (4.7)	T	51.7/32.8
R83	7030008340	S.RES RR0510P-182-D (1.8K)	T	53.6/30.5
R84	7030011000	S.RES RR0510P-392-D (3.9K)	T	50.4/32.8
R85	7030011000	S.RES RR0510P-392-D (3.9K)	T	50.4/34.5
R86	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	47.5/26.9

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REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
R87	7030008370	S.RES ERJ2GEJ 561 X (560)	B	54.6/34.1
R88	7030008370	S.RES ERJ2GEJ 561 X (560)	B	54.6/32.4
R89	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	50.8/36.8
R90	7030005110	S.RES ERJ2GEJ 224 X (220K)	B	47.5/25.2
R91	7030005060	S.RES ERJ2GEJ 333 X (33K)	B	46.5/23.5
R92	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	46.5/25.2
R93	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	39.8/39.4
R94	7030005100	S.RES ERJ2GEJ 154 X (150K)	T	43.3/37.7
R95	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	50.8/35.8
R96	7030009270	S.RES ERJ2GEJ 821 X (820)	B	49.4/36.3
R97	7030008280	S.RES ERJ2GEJ 271 X (270)	B	47/36.8
R98	7030007290	S.RES ERJ2GEJ 222 X (2.2K)	T	53.7/44
R100	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	53.6/38.3
R101	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	51.4/42.3
R102	7030008310	S.RES ERJ2GEJ 564 X (560K)	T	32.3/27.8
R103	7030005160	S.RES ERJ2GEJ 105 X (1M)	T	32.3/29.8
R104	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	30.6/29.8
R105	7030005100	S.RES ERJ2GEJ 154 X (150K)	T	30.6/28.8
R106	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	38.1/31.4
R107	7030004970	S.RES ERJ2GEJ 470 X (47)	B	55.9/43.3
R108	7030005070	S.RES ERJ2GEJ 683 X (68K)	T	44.9/21
R109	7030008300	S.RES ERJ2GEJ 184 X (180K)	T	43.9/21
R111	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	29.3/28.9
R113	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	B	47/31.7
R115	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	40.5/32
R116	7030007060	S.RES ERJ2GEJ 684X (680K)	T	43.4/32.7
R117	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	35.3/40.1
R118	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	37/40.1
R121	7030005110	S.RES ERJ2GEJ 224 X (220K)	T	77.1/35.7
R122	7030008290	S.RES ERJ2GEJ 183 X (18K)	T	77.1/38.7
R123	7030009290	S.RES ERJ2GEJ 562 X (5.6K)	T	75.7/37.2
R124	7030005170	S.RES ERJ2GEJ 474 X (470K)	T	72.7/40.4
R125	7030005030	S.RES ERJ2GEJ 334 X (330K)	T	73.2/38.9
R131	7510001730	S.THE ERTJOEP 473J	T	40.9/28.1
R132	7030010080	S.RES ERJ2RHD 104 X (100K)	T	40.9/27.1
R133	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	84.2/14.1
R134	7030007290	S.RES ERJ2GEJ 222 X (2.2K)	T	76.2/16.9
R135	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	24.5/24
R136	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	22.5/24
R137	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	69.8/14.7
R138	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	69.8/16.7
R140	7030010040	S.RES ERJ2GEJ-JPW	T	37.1/20.3
R141	7030005000	S.RES ERJ2GEJ 471 X (470)	T	37.1/9.8
R142	7030005000	S.RES ERJ2GEJ 471 X (470)	T	42.9/9.8
R143	7030007340	S.RES ERJ2GEJ 153 X (15K)	T	37.1/22.8
R144	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	46.5/13.7
R145	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	33.4/18.1
R146	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	31.6/18.1
R147	7030007350	S.RES ERJ2GEJ 393 X (39K)	T	33.4/16.1
R148	7030005080	S.RES ERJ2GEJ 823 X (82K)	T	31.6/16.1
R149	7030005080	S.RES ERJ2GEJ 823 X (82K)	T	31.6/16.1
R149	7030006610	S.RES ERJ2GEJ 394 X (390K)	T	33.4/12.9
R150	7030008610	S.RES ERJ2GEJ 394 X (390K)	T	33.4/12.9
R150	7030008300	S.RES ERJ2GEJ 184 X (180K)	T	33.4/11.9
R151	7030005030	S.RES ERJ2GEJ 152 X (1.5K)	T	33.4/13.9
R152	7030005030	S.RES ERJ2GEJ 152 X (1.5K)	T	33.4/13.9
R152	7030005220	S.RES ERJ2GEJ 223 X (22K)	T	32.3/41.1
R153	7030005220	S.RES ERJ2GEJ 223 X (22K)	T	32.3/40.1
R154	7030005220	S.RES ERJ2GEJ 223 X (22K)	T	30.6/40.1
R155	7030007300	S.RES ERJ2GEJ 332 X (3.3K)	T	28.6/41.1
R156	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	28.6/40.1
R157	7030007290	S.RES ERJ2GEJ 222 X (2.2K)	T	26.9/39.1
R159	7030008010	S.RES ERJ2GEJ 123 X (12K)	T	16/28.8
R161	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	14.3/26.8
R162	7030005290	S.RES ERJ2GEJ 224 X (6.8K)	T	9/32.6
R163	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	14.3/29.8
R164	7030008410	S.RES ERJ2GEJ 392 X (3.9K)	T	12.6/27.8
R165	7030008410	S.RES ERJ2GEJ 392 X (3.9K)	T	10/34.4
R166	7030005240	S.RES ERJ2GEJ 473 X (47K)	T	12.6/36.1
R167	7030009290	S.RES ERJ2GEJ 562 X (5.6K)	T	16/29.8
R168	7030005000	S.RES ERJ2GEJ 471 X (470)	T	13/39.2
R169	7030005100	S.RES ERJ2GEJ 154 X (150K)	T	15.4/39.9
R170	7030008010	S.RES ERJ2GEJ 123 X (12K)	T	12.6/29.8
R171	7030005100	S.RES ERJ2GEJ 154 X (150K)	T	11.6/36.1
R172	7030005070	S.RES ERJ2GEJ 274 X (270K)	T	17.4/39.9
R173	7030005310	S.RES ERJ2GEJ 124 X (120K)	T	19.4/26.8
R174	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	19.4/28.8
R175	7030005110	S.RES ERJ2GEJ 224 X (220K)	T	19.4/27.8
R176	7030005110	S.RES ERJ2GEJ 224 X (220K)	T	19.4/27.8
R176	7030005310	S.RES ERJ2GEJ 124 X (120K)	T	17.7/27.8
R177	7030005060	S.RES ERJ2GEJ 333 X (

[MAIN UNIT]

Table with columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Contains parts list for the left main unit, including items like ERJ2GEJ 473 X (47K) and ERJ2GEJ 104 X (100K).

[MAIN UNIT]

Table with columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Contains parts list for the right main unit, including items like 4030017580 S.CER ECJ0EC1H060C and 4030017430 S.CER ECJ0EC1H101J.

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

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C140	4030016930	S.CER ECJ0EB1A104K	T	43.3/35.9
C141	4030017460	S.CER ECJ0EB1E102K	B	53.6/39.3
C143	4030017460	S.CER ECJ0EB1E102K	B	51.4/41.3
C144	4030017460	S.CER ECJ0EB1E102K	T	42.9/21
C145	4030017460	S.CER ECJ0EB1E102K	T	44.9/22.7
C146	4550000270	S.TAN TEESVA 1E 474M8R	B	50.5/32.3
C147	4550004040	S.TAN TEESVA 0J 685M8R	B	49.2/39.8
C148	4550006250	S.TAN TEESVA 1A 106M8R	T	50.3/43.7
C149	4550000270	S.TAN TEESVA 1E 474M8R	B	47.1/39.8
C150	4030018860	S.CER ECJ0EB0J105K	T	43.9/22.7
C151	4030016930	S.CER ECJ0EB1A104K	T	43.3/39.4
C152	4030017420	S.CER ECJ0EC1H470J	T	35.3/41.1
C153	4030017420	S.CER ECJ0EC1H470J	T	37/41.1
C154	4030017420	S.CER ECJ0EC1H470J	T	37.8/39.1
C155	4030017460	S.CER ECJ0EB1E102K	T	44.3/37.7
C156	4030017460	S.CER ECJ0EB1E102K	T	39.5/32
C157	4030017620	S.CER ECJ0EC1H100C	T	38.1/32.4
C158	4030016930	S.CER ECJ0EB1A104K	T	36.1/31.4
C159	4030017460	S.CER ECJ0EB1E102K	T	36.1/32.4
C161	4030017620	S.CER ECJ0EC1H100C	T	43.4/33.8
C162	4030017500	S.CER ECJ0EC1H560J	T	43.9/28.1
C163	4030017570	S.CER ECJ0EC1H040B	T	42.5/27.6
C164	4030017590	S.CER ECJ0EC1H070C	T	43.9/27.1
C165	4030016790	S.CER ECJ0EB1C103K	T	43.4/31.7
C166	4030017360	S.CER ECJ0EC1H030B	T	43.2/24.7
C167	4030016930	S.CER ECJ0EB1A104K	B	55.8/23.3
C168	4030016930	S.CER ECJ0EB1A104K	B	56.5/19.8
C169	4030016930	S.CER ECJ0EB1A104K	B	56.5/18.6
C171	4030017460	S.CER ECJ0EB1E102K	T	91.7/35.7
C172	4030017460	S.CER ECJ0EB1E102K	B	85.7/18.9
C174	4030017530	S.CER ECJ0EC1H0R5B	B	92.5/19.1
C175	4030017550	S.CER ECJ0EC1H1R5B	B	94.5/33.9
C176	4030017640	S.CER ECJ0EC1H150J	B	94.8/30
C182	4030017460	S.CER ECJ0EB1E102K	T	65.2/39.3
C183	4030017620	S.CER ECJ0EC1H100C	T	66.5/39.3
C184	4030017460	S.CER ECJ0EB1E102K	T	80.6/37.7
C185	4030016930	S.CER ECJ0EB1A104K	T	40.9/30.1
C186	4030016930	S.CER ECJ0EB1A104K	T	77.1/37.7
C188	4030017460	S.CER ECJ0EB1E102K	B	47.5/20.4
C190	4030017380	S.CER ECJ0EC1H050B	T	51/38.9
C191	4030017570	S.CER ECJ0EC1H040B	T	52/38.9
C192	4030017360	S.CER ECJ0EC1H030B	T	53.6/27.1
C193	4030017360	S.CER ECJ0EC1H030B	T	55.3/27.1
C194	4030017380	S.CER ECJ0EC1H050B	T	51.2/27.5
C195	4030017570	S.CER ECJ0EC1H040B	T	52.2/27.5
C200	4030017420	S.CER ECJ0EC1H470J	T	27.2/27.3
C201	4030018860	S.CER ECJ0EB0J105K	T	28.2/27.3
C202	4030016930	S.CER ECJ0EB1A104K	B	47/30.7
C203	4030017460	S.CER ECJ0EB1E102K	B	47/29.7
C205	4030017620	S.CER ECJ0EC1H100C	B	55.9/39.3
C206	4030017630	S.CER ECJ0EC1H120J	B	55.9/40.3
C207	4030017620	S.CER ECJ0EC1H100C	B	55.9/41.3
C208	4030017630	S.CER ECJ0EC1H120J	B	54.2/42.3
C209	4030017460	S.CER ECJ0EB1E102K	B	54.2/43.3
C211	4030018860	S.CER ECJ0EB0J105K	T	32.3/26.8
C213	4030016930	S.CER ECJ0EB1A104K	T	30.6/27.8
C221	4030016930	S.CER ECJ0EB1A104K	T	26.8/31.6
C222	4030016930	S.CER ECJ0EB1A104K	B	18.9/33.7
C223	4030016930	S.CER ECJ0EB1A104K	B	29.7/9
C224	4030016930	S.CER ECJ0EB1A104K	B	40.9/29.1
C225	4030017460	S.CER ECJ0EB1E102K	B	83/11.6
C226	4550005980	S.TAN TEESVA 1A 475M8R	B	81.2/13.5
C227	4030016790	S.CER ECJ0EB1C103K	B	86.9/13
C228	4510008540	S.ELE EEE1CA100SR	B	89.4/15.7
C229	4030017460	S.CER ECJ0EB1E102K	B	85.7/17.9
C230	4030016930	S.CER ECJ0EB1A104K	B	85.7/16.9
C231	4030016790	S.CER ECJ0EB1C103K	T	74.4/13.3
C232	4030017730	S.CER ECJ0EB1E471K	T	76.2/13.3
C233	4030016790	S.CER ECJ0EB1C103K	T	24.5/23
C234	4030017460	S.CER ECJ0EB1E102K	T	24.2/27.8
C235	4030016790	S.CER ECJ0EB1C103K	T	69.8/15.7
C236	4030017460	S.CER ECJ0EB1E102K	T	69.8/17.7
C237	4510008660	S.ELE EEE0JA220SR	B	76/15.5
C238	4030017460	S.CER ECJ0EB1E102K	T	78.5/16.9
C241	4030016930	S.CER ECJ0EB1A104K	T	35.3/9.8
C242	4030016930	S.CER ECJ0EB1A104K	T	44.7/9.8
C243	4030016790	S.CER ECJ0EB1C103K	T	40.5/9.8
C244	4030017460	S.CER ECJ0EB1E102K	B	46.5/15.4
C251	4030016970	S.CER ECJ0EB1C223K	T	33.4/17.1
C252	4030017740	S.CER ECJ0EB1E821K	T	29.9/16.1
C253	4030017740	S.CER ECJ0EB1E821K	T	33.4/14.9
C254	4030016930	S.CER ECJ0EB1A104K	T	33.4/10.9
C255	4030016950	S.CER ECJ0EB1A473K	B	34.5/12.1
C256	4030016940	S.CER ECJ0EB1A393K	T	30.6/41.1
C257	4030016930	S.CER ECJ0EB1A104K	T	32.3/39.1
C258	4030017790	S.CER ECJ0EB1E682K	T	30.6/39.1
C260	4030017730	S.CER ECJ0EB1E471K	T	28.6/39.1
C261	4030016930	S.CER ECJ0EB1A104K	T	26.9/40.1
C264	4510008540	S.ELE EEE1CA100SR	B	69.7/15.5
C265	4030017460	S.CER ECJ0EB1E102K	B	64.8/12.4
C266	4030016930	S.CER ECJ0EB1A104K	B	63.4/8.7
C269	4030017720	S.CER ECJ0EB1H331K	T	11.6/37.8
C270	4030016950	S.CER ECJ0EB1A473K	T	14.3/28.8
C271	4030016950	S.CER ECJ0EB1A473K	T	14.3/27.8
C272	4030016950	S.CER ECJ0EB1A473K	T	9.5/28.8
C273	4030016950	S.CER ECJ0EB1A473K	T	12.6/28.8
C274	4030016950	S.CER ECJ0EB1A473K	T	10/32.6
C275	4030016970	S.CER ECJ0EB1C223K	T	11.6/34.4
C276	4030016950	S.CER ECJ0EB1A473K	T	12.6/34.4
C277	4030016930	S.CER ECJ0EB1A104K	T	12.6/37.8

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C278	4030017430	S.CER ECJ0EC1H101J	T	16.4/39.9
C279	4030018910	S.CER C1608 JB 0J 475K-T	T	36.8/21.6
C280	4030018110	S.CER ECJ0EB1H272K	T	21.1/27.8
C281	4030017780	S.CER ECJ0EB1E472K	T	17.7/26.8
C282	4030017710	S.CER ECJ0EC1H181J	T	17.7/29.8
C283	4030018900	S.CER ECJ0EB0J474K	T	19.4/31.7
C284	4030016930	S.CER ECJ0EB1A104K	T	22.9/39.1
C285	4030016930	S.CER ECJ0EB1A104K	T	22.9/40.1
C286	4030017460	S.CER ECJ0EB1E102K	B	16.6/41.2
C287	4550006250	S.TAN TEESVA 1A 106M8R	B	22.1/40.7
C288	4030017460	S.CER ECJ0EB1E102K	B	18.6/39.5
C290	4030017920	S.CER ECJ0EB1A683K	T	27.5/16.1
C291	4030016780	S.CER ECJ0EB1C153K	T	25.7/10.9
C292	4030016930	S.CER ECJ0EB1A104K	T	25.7/13.9
C293	4030017740	S.CER ECJ0EB1E821K	T	25.7/11.9
C294	4030016930	S.CER ECJ0EB1A104K	T	23.9/13.9
C295	4030018110	S.CER ECJ0EB1H272K	T	29/5.1
C296	4030018240	S.CER ECJ0EB1E562K	T	29/6.1
C297	4030017710	S.CER ECJ0EC1H181J	T	27.1/17.1
C298	4030018090	S.CER ECJ0EB1C822K	T	30.8/7.1
C299	4030017510	S.CER ECJ0EC1H680J	T	30.8/5.1
C300	4030017450	S.CER ECJ0EB1E271K	T	18.4/39.9
C306	4030017460	S.CER ECJ0EB1E102K	B	61.7/12
C307	4030017460	S.CER ECJ0EB1E102K	B	61.7/10.2
C308	4030017460	S.CER ECJ0EB1E102K	T	75.7/9.8
C309	4030017460	S.CER ECJ0EB1E102K	B	75.5/11.3
C310	4030016930	S.CER ECJ0EB1A104K	T	21.3/11.9
C311	4030017460	S.CER ECJ0EB1E102K	B	65.4/8.7
C312	4030017420	S.CER ECJ0EC1H470J	B	74.5/16.1
C313	4030017420	S.CER ECJ0EC1H470J	B	33.9/7.8
C314	4030017460	S.CER ECJ0EB1E102K	T	86.6/3.3
C315	4030017460	S.CER ECJ0EB1E102K	T	93.2/5.9
C316	4030016930	S.CER ECJ0EB1A104K	T	91.6/2.8
C317	4550007080	S.TAN TEESVA 1C 106M8R	B	93/11.3
C318	4030016930	S.CER ECJ0EB1A104K	T	90.4/10.1
C319	4030016930	S.CER ECJ0EB1A104K	T	89.6/3.7
C320	4030017730	S.CER ECJ0EB1E471K	T	88.6/3.7
C321	4030017460	S.CER ECJ0EB1E102K	B	19.3/4.2
C322	4030016950	S.CER ECJ0EB1A473K	T	94/14
C323	4030016950	S.CER ECJ0EB1A473K	T	88.1/10.1
C324	4030017420	S.CER ECJ0EC1H470J	T	85.2/14.1
C325	4550006250	S.TAN TEESVA 1A 106M8R	T	89.4/17.6
C326	4510008900	S.ELE EEEFC0J101P	B	87.8/8.9
C335	4030018860	S.CER ECJ0EB0J105K	B	54.6/22.6
C339	4030016930	S.CER ECJ0EB1A104K	B	5.9/17.2
C340	4030016930	S.CER ECJ0EB1A104K	B	9.3/12.5
C341	4030016930	S.CER ECJ0EB1A104K	B	5.9/10.1
C342	4030017630	S.CER ECJ0EC1H120J	B	18.3/4.2
C343	4030017580	S.CER ECJ0EC1H060C	B	5.6/4.2
C344	4030017640	S.CER ECJ0EC1H150J	B	7.6/9.1
C345	4030016930	S.CER ECJ0EB1A104K	B	11/11.2
C346	4030016930	S.CER ECJ0EB1A104K	B	11/10.1
C347	4030016790	S.CER ECJ0EB1C103K	T	8.9/6.3
C348	4030016930	S.CER ECJ0EB1A104K	T	6/10
C349	4030016930	S.CER ECJ0EB1A104K	T	21.3/14.9
C350	4030017460	S.CER ECJ0EB1E102K	T	59.4/43.4
J1	6510021901	S.CON BM02B-ASRS-TF(LF)(SN)	T	86.6/6.8
J2	6450001680	CON HSJ1122-010010		
J3	6450002250	CON HSJ1456-010320		
F1	5210000830	S.FUS ERBFE3R00U	T	98/14.8
DS1	5040002670	S.LED CL-165HR/YG	T	102.8/12.4
MC1	7700002750	MIC EM9745P-38-G <HOR>		
S1	2260001900	SWI SW-149 (SKHLLD)		
S2	2260002800	S.SWI SW-167 (SKQTLAE010)	B	99.4/44.2
S3	2260002800	S.SWI SW-167 (SKQTLAE010)	B	60.9/44.2
S4	2250000490	ENC TP70TF5163-15.9F-2775		
EP2	6910015600	S.BEA ACZ1005Y-241 (240)	T	77.4/22.2
EP3	6910018460	S.BEA MMZ1005Y102C-T	T	34.7/32
EP4	6910018460	S.BEA MMZ1005Y102C-T	B	55.5/30.5
EP6	6910018460	S.BEA MMZ1005Y102C-T	T	44.3/35.9
MP1	8410002531	S.HEA 2681 PA HEATSINK-1	B	79/28.2
MP3	8510016470	S.CAS 2775 VCO CASE	T	54.1/33.2

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

SECTION 7

MECHANICAL PARTS

[CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6910015910	ANT CONNECTOR 104	1
J2	6910015860	IMSA-6277S-O2A-G	1
SP1	2510001530	PSC-3650P-0806A2 <PRI>	1
W1	8900009640	OPC-963	1
MP1	8010019696	2775 CHASSIS-6	1
MP2	8210024550	2775 A-FRONT PANEL (Incl. MP3, 4, 5, 43)	1
MP3	8210024560	2775 A-PTT PANEL	1
MP4	8930063360	2775 PTT BUTTON	1
MP5	8930063370	2775 PTT RUBBER	1
MP8	8210020550	2721 REAR PANEL	1
MP9	8930063351	2775 LENS-1	1
MP10	8610011930	KNOB N-318 (Incl. MP23)	1
MP11	8610012130	KNOB N-323 (Incl. MP24)	1
MP13	8930075190	2775 C-MAIN SEAL	1
MP14	8930063060	2721 T-RUBBER	1
MP16	8930063400	2775 SIDE PLATE	1
MP17	8930063411	2775 B-TOP PLATE-1	1
MP20	8930043760	1923 MIC SEAL	1
MP21	8930059360	2600 RELEASE BUTTON	1
MP22	8930070362	2775 RELEASE PLATE (A)-2	1
MP23	8610007510	KNOB SPRING NO.7800	1
MP24	8610007920	KNOB SPRING NO.1500	1
MP25	8830001720	2721 ANT NUT	1
MP26	8810009221	SCREW BT B0 2X8 NI-ZK3 (BT)	2
MP27	8810009561	SCREW BT B0 2X6 NI-ZK3 (BT)	2
MP28	8810009511	SCREW BT B0 2X4 NI-ZC3 (BT)	9
MP29	8810009511	SCREW BT B0 2X4 NI-ZC3 (BT)	1
MP30	8810009511	SCREW BT B0 2X4 NI-ZC3 (BT)	1
MP31	8810010430	SCREW TRUSS M3X5 SUS SSBC	1
MP32	8310072660	2775 OPT PLATE	1
MP33	8930042350	1922 MIC SHEET	1
MP34	8930056540	PUSH SPRING (AH)	2
MP35	8830001701	VR NUT (Q)-1	1
MP36	8830001701	VR NUT (Q)-1	1
MP42	8930074580	2775 NAME SHEET	1
MP43	8930074610	SP NET (E)	1

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1*	6510021901	BM02B-ASRS-TF (LF) (SN)	1
J2	6450001680	HSJ1122-010010	1
J3	6450002250	HSJ1456-010320	1
J4*	6510018430	AXN330C038	1
J6*	6510023350	MM8430-2600RA1	1
MC1	7700002750	EM9745P-38-G	1
S1	2260001900	SW-149 (SKHLLD)	1
S2*	2260002800	SW-167 (SKQT)	1
S3*	2260002800	SW-167 (SKQT)	1
S4	2250000490	TP70TF5163 15.9F-2775	1
F1*	5210000830	ERBFE3R00U	1
MP1*	8410002531	2681 PA HEATSINK-1	1
MP2	8510016460	2775 VCO COVER	1
MP3*	8510016470	2775 VCO CASE	1
MP4	8510016580	2775 SHIELD PLATE	1

[ANT UNIT]

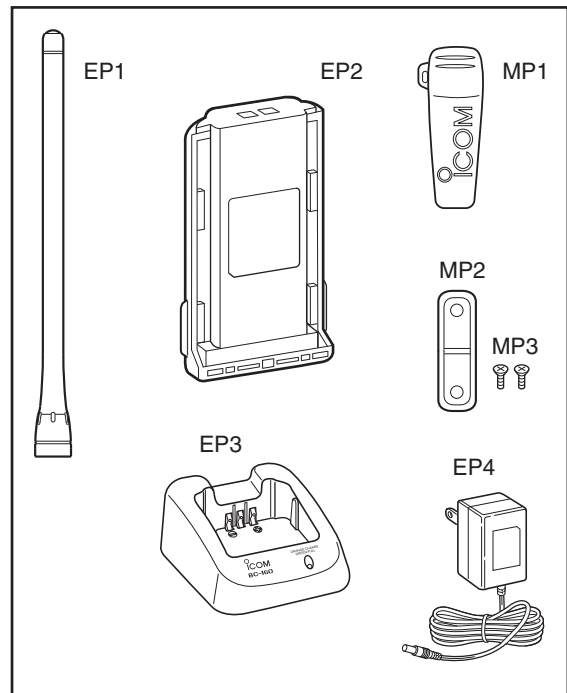
REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP601	8510016350	2721 ANT PLATE	1

[CONNECT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J501	6910016390	IMSA-9230B-1-02Z145-PT1	1

[ACCESSORIES]

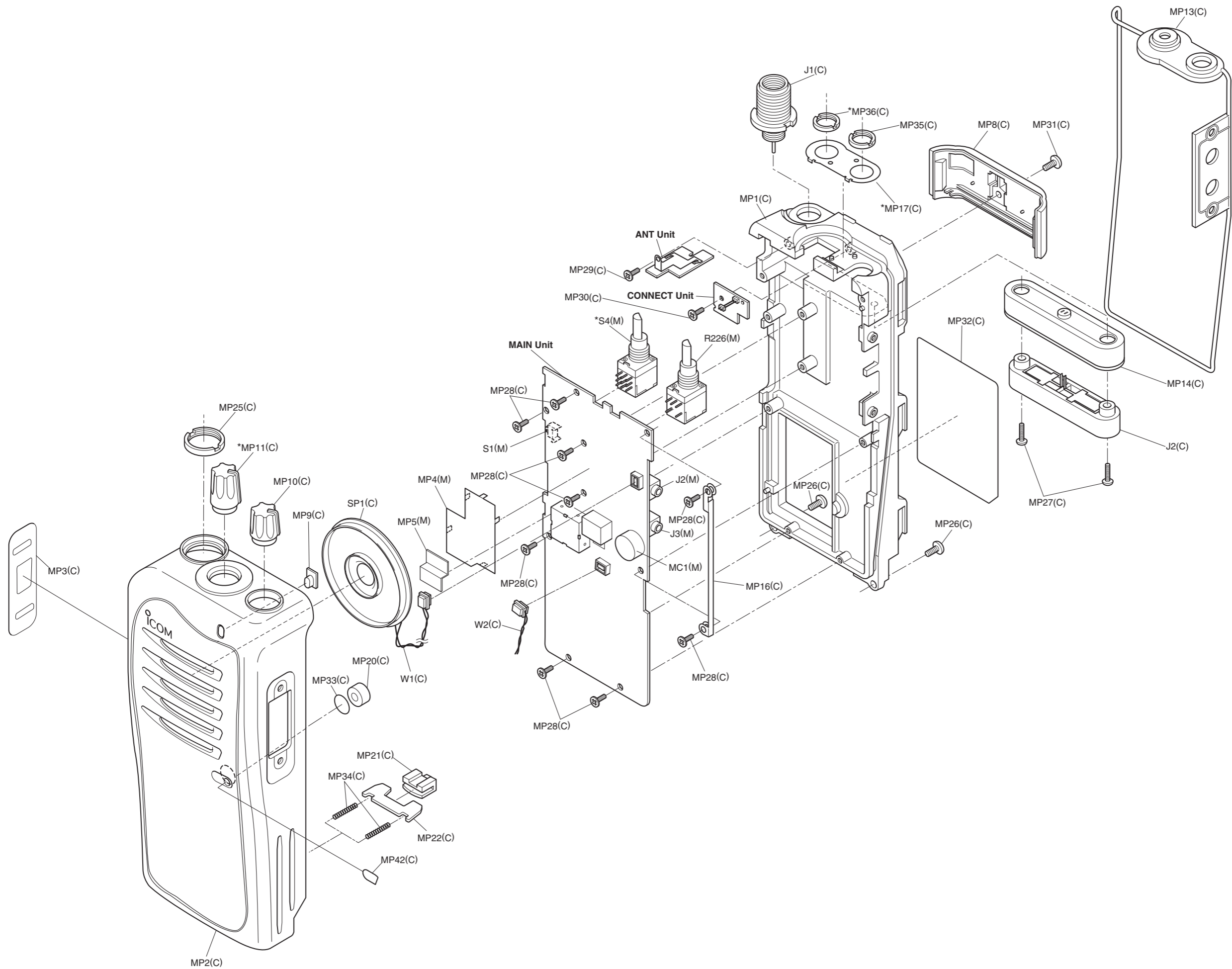
REF NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	(Optional)	FA-SC55V	1
EP2	(Optional)	BP-232N	1
EP3	(Optional)	BC-160	1
EP4	(Optional)	BC-145SA	1
MP1	(Optional)	MB-94	1
MP2	8210022780	2927 JACK PANEL	1
MP3	8810004861	SCREW PH M2X6 ZK3	2



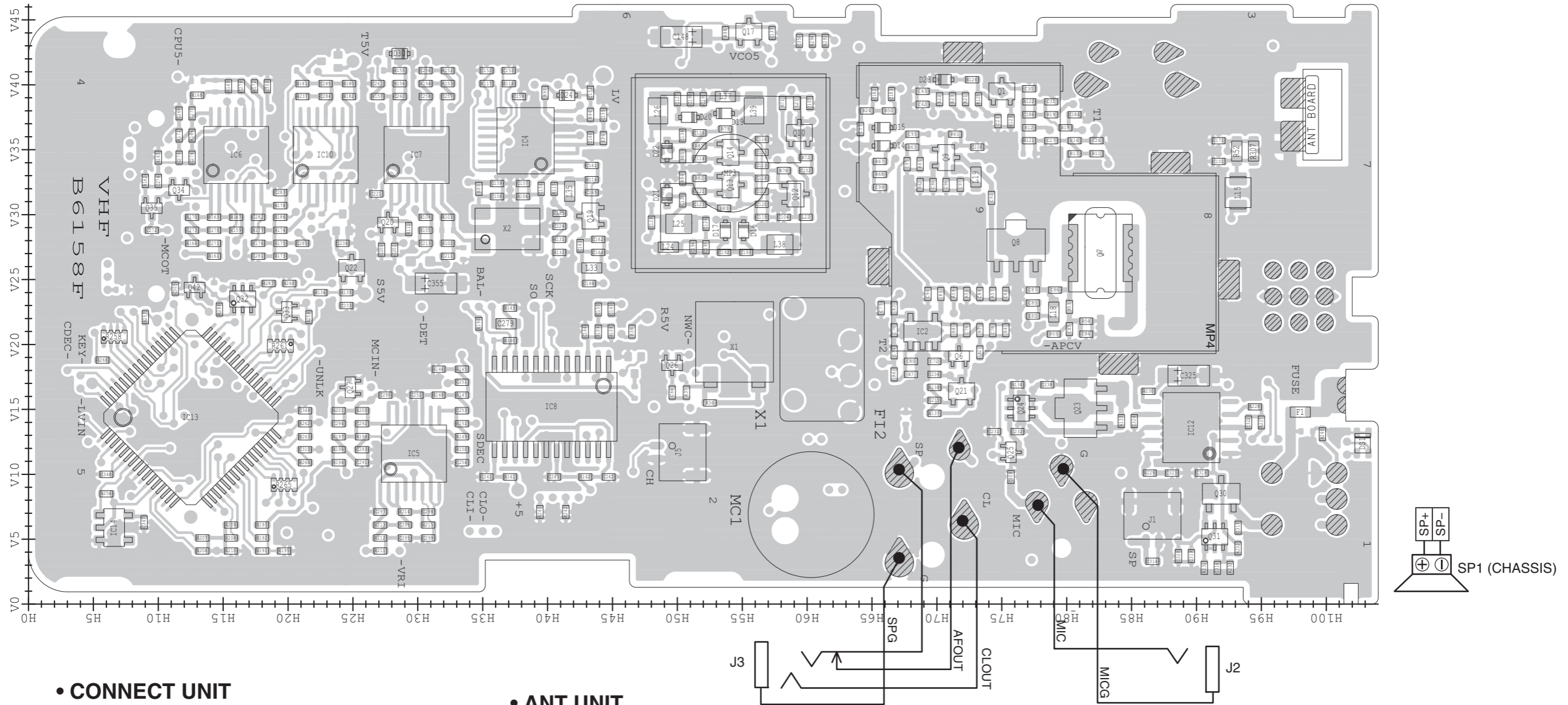
*: Refer to "BOARD LAYOUTS."

** : Optional product.

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

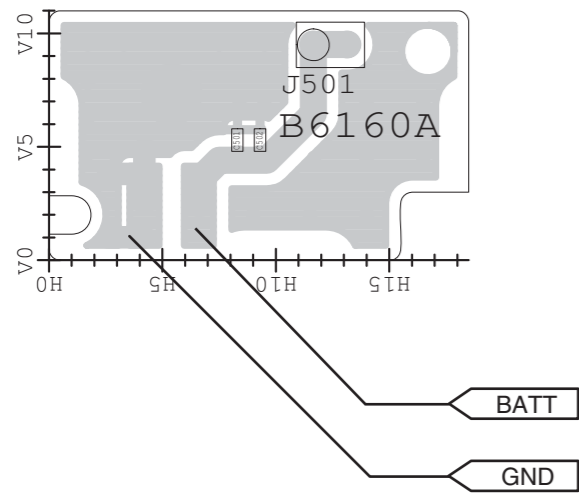


• MAIN UNIT
(TOP VIEW)

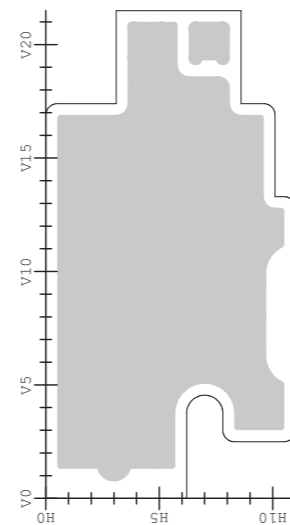


The combination of this side and the bottom side shows the board layout in the same configuration as the actual P.C.Board.

• CONNECT UNIT
(TOP VIEW)

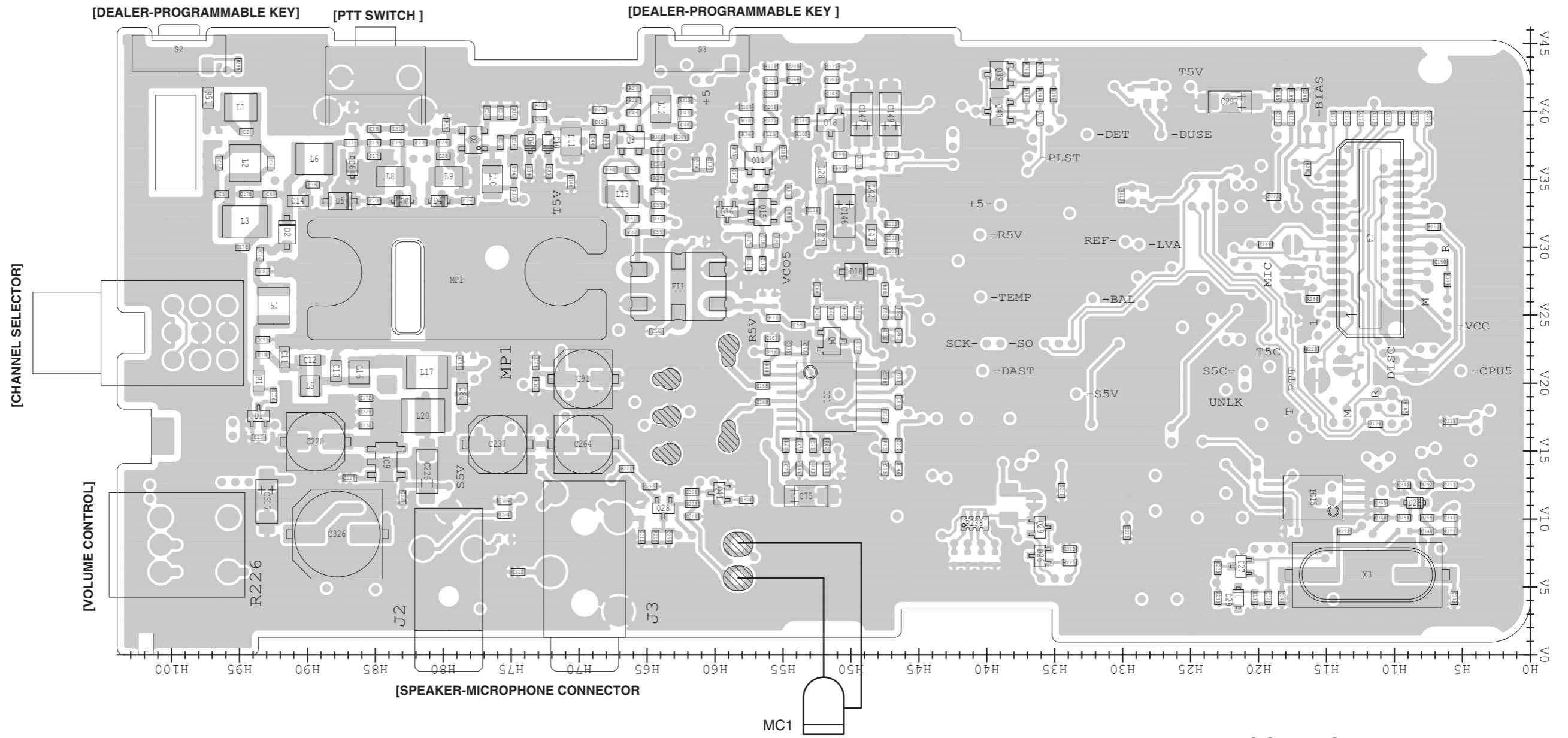


• ANT UNIT
(TOP VIEW)

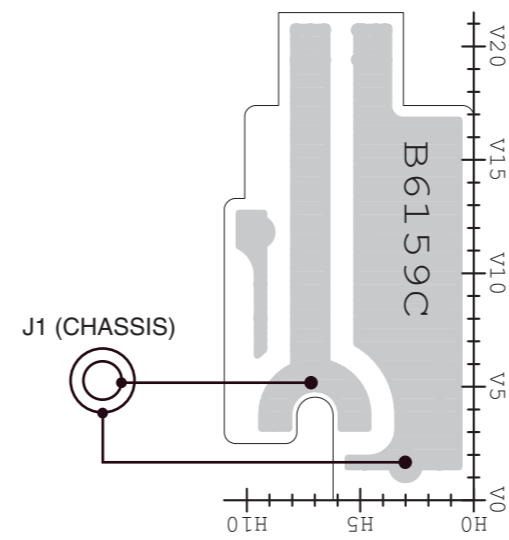


• MAIN UNIT
(BOTTOM VIEW)

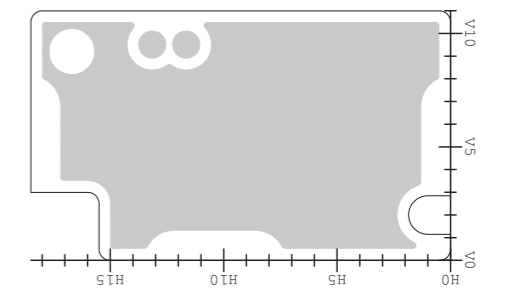
The combination of this side and the bottom side shows the board layout in the same configuration as the actual P.C.Board.



• ANT UNIT
(BOTTOM VIEW)

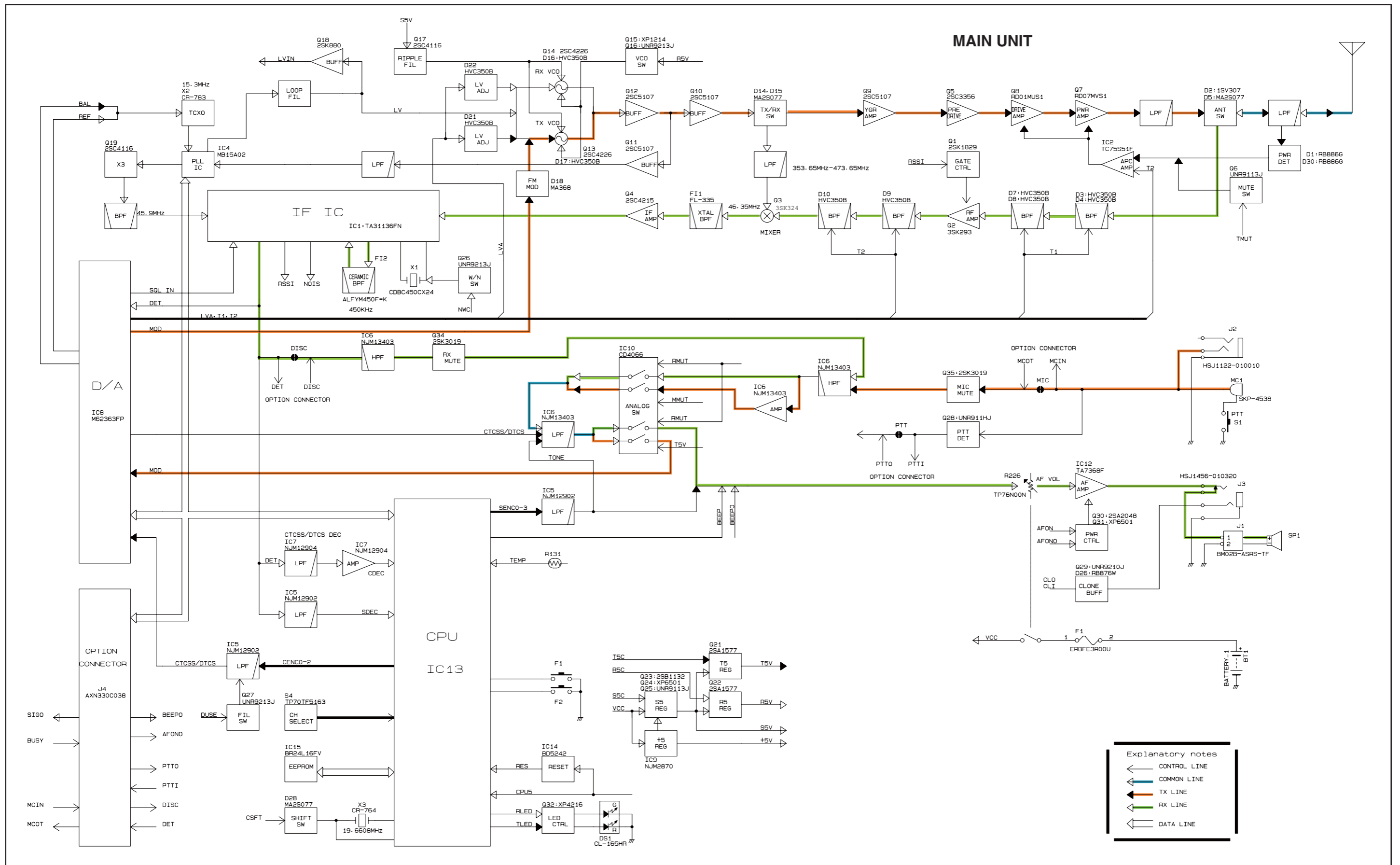


• CONNECT UNIT
(BOTTOM VIEW)

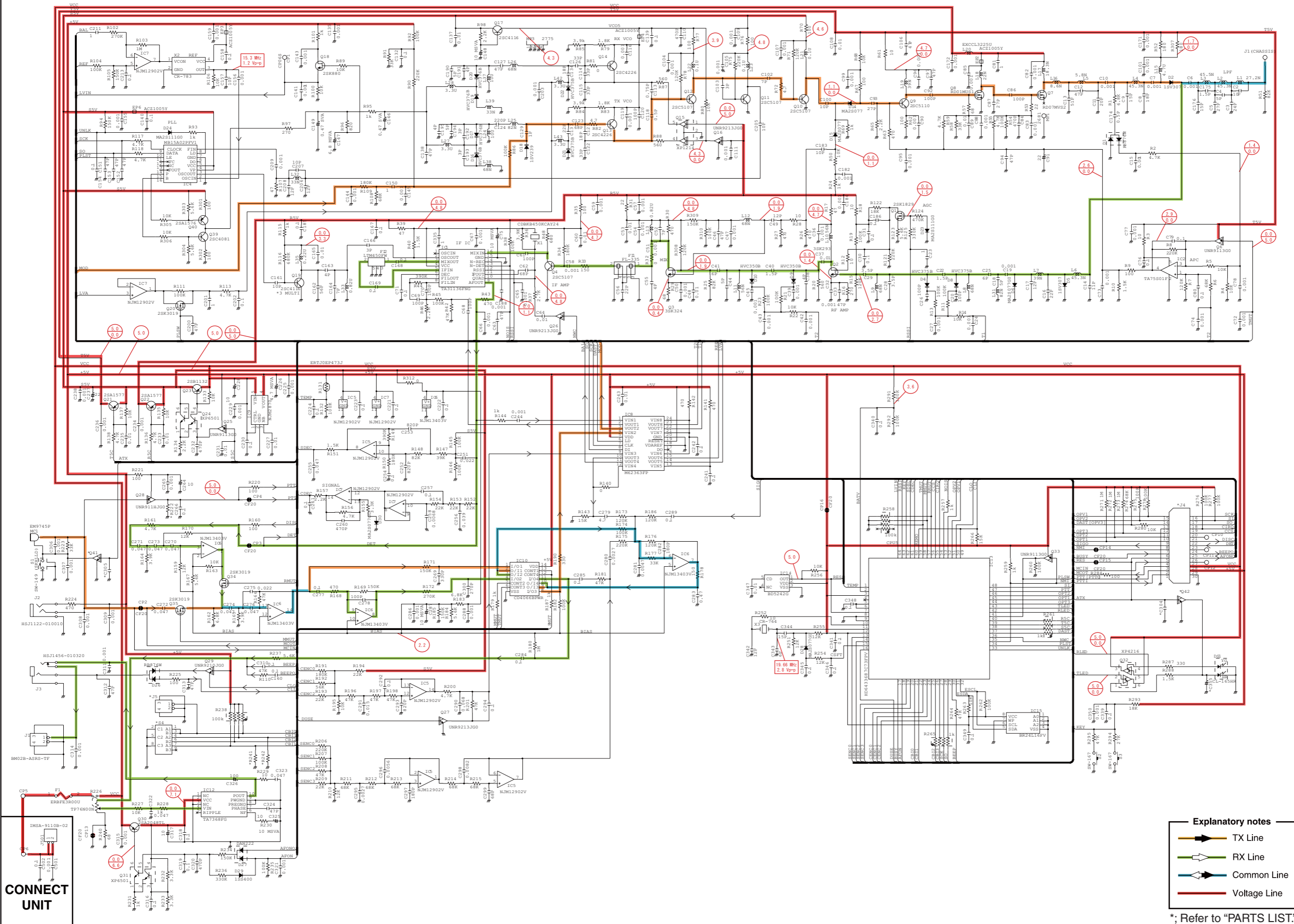


SECTION 9

BLOCK DIAGRAM



• MAIN UNIT



CONNECT UNIT

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

*; Refer to "PARTS LIST."

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