

## IC-V82 IC-V82-T

### CONTENTS

REPLACEMENT PAGES .....	1-1, 5-2
PARTS LIST .....	1
VOLTAGE DIAGRAM .....	7

### [VERSION LIST]

Model	Version	Battery Pack
IC-V82	[EUR]	-
	[EXP]	
	[USA]	
IC-V82-T	[THA]	-
	[THA-01]	
IC-V82	[CSA]	BP-208
	[EUR-1]	
	[EXP-1]	
	[USA-1]	
	[CHN]	
	[CSA-1]	BP-222N
	[EUR-2]	
	[EXP-2]	
	[USA-2]	
	[KOR]	
	[CHN-01]	-
	[CSA-2]	
	[EXP-3]	
	[CHN-02]	
[CSA-3]	BP-209N	
[EUR-3]		
[EXP-4]		
[USA-3]		

## SECTION 1 SPECIFICATIONS

### ■ GENERAL

- Frequency range : TX 144.000–148.000 MHz [USA], [USA-1], [USA-2], [USA-3]  
144.000–146.000 MHz [EUR], [EUR-1], [EUR-2], [EUR-3], [KOR], [THA]  
136.000–174.000 MHz\* [EXP], [EXP-1], [EXP-2], [EXP-3], [EXP-4],  
[CHN], [CHN-01], [CHN-02],  
[CSA], [CSA-1], [CSA-2], [CSA-3]
  - : RX 136.000–174.000 MHz\* [USA], [USA-1], [USA-2], [USA-3],  
[EXP], [EXP-1], [EXP-2], [EXP-3], [EXP-4],  
[CHN], [CHN-01], [CHN-02],  
[CSA], [CSA-1], [CSA-2], [CSA-3]
  - 144.000–146.000 MHz [EUR], [EUR-1], [EUR-2], [EUR-3], [KOR], [THA],  
[THA-01]
- \*Specifications are guaranteed within 144.000 to 148.000 MHz range only.
- Operating temperature range : –10°C to 60°C; +14°F to +140°F
  - Operating mode : F2D, F3E, F7W\* (\*With optional digital unit **UT-118**)
  - Frequency stability : ±2.5 ppm (–10°C to +60°C; +14°F to +140°F)
  - Antenna impedance : 50 Ω (BNC type)
  - Power supply requirement : Specified Icom's battery pack only (Operating voltage range; 6.0–10.3 V)
  - Number of memory channels : 207 channels (Including 6 scan edges and 1 call channel)
  - Scan types : Program/Memory/Skip/Priority/Tone scans
  - Tuning steps : 5, 10, 12.5, 15, 20, 25, 30 and 50 kHz
  - Current drain (At 7.2 V DC; approx.) : TX High 2.6 A  
Middle 2.0 A  
Low 1.0 A  
RX Max. audio Less than 250 mA  
Stand-by Less than 80 mA  
Power save Less than 30 mA
  - Dimensions (Projections not included) : 54.0 (W) × 139.0 (H) × 36.7 (D) mm; 2 1/8 (W) × 5 15/32 (H) × 1 9/32 (D) in.
  - Weight (Except antenna, battery pack) : Approx. 200 g (7 5/32 oz)
  - Data connector : 3-conductor 2.5 (d) mm (1/10")

### ■ TRANSMITTER

- Output power (At 7.2 V DC) : 7.0 W (High), 4.0 W (Middle), 0.5 W (Low) Other than [IC-V82-T]  
5.5 W (High), 4.0 W (Middle), 0.5 W (Low) [IC-V82-T]
- Modulation system : Variable reactance frequency modulation
- Maximum deviation : ±2.5 kHz (Narrow), ±5.0 kHz (Wide)
- Spurious emissions : Less than –60 dBc
- Ext. microphone connector : 3-conductor 2.5 (d) mm (1/10")/2.2 kΩ

### ■ RECEIVER

- Receiving system : Double conversion superheterodyne system
- Intermediate frequencies : 1st; 46.35 MHz, 2nd; 450 kHz
- Sensitivity : Less than –14 dBμ at 12 dB SINAD (0.16 μV typ.)
- Squelch sensitivity (At threshold) : Less than –16 dBμ (0.11 μV typ.)
- Selectivity : More than 55 dB (Wide; 65 dB typ.)  
More than 50 dB (Narrow)
- Intermodulation : More than 55 dB (65 dB typ.)
- Spurious image rejection : More than 60 dB (80 dB typ.)
- Audio output : More than 300 mW at 10% distortion with an 8 Ω load
- Ext. speaker connector : 3-conductor 3.5 (d) mm (1/8")/8 Ω

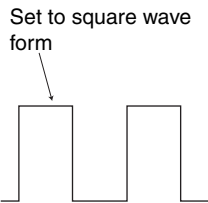
All stated specifications are subject to change without notice or obligation.

## 5-2 ADJUSTMENTS

### 5-2-1 KEY OPERATION FOR THE ADJUSTMENT

- Rotate [VOL] to adjust the value.
- Push [D•CLR] key to store the adjustment value and move to next adjustment item.
- Push [▲]/[▼] key to move to next adjustment item without changing the value.

### 5-2-2 FREQUENCY AND TRANSMIT ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION
ENTERING ADJUSTMENT MODE	• While pushing [▲], [▼] and [D•CLR] keys, turn power ON.	
REFERENCE FREQUENCY <i>F<sub>r</sub></i> 146.00	1 • Connect a frequency counter to the antenna connector through an attenuator. • Transmitting	• Rotate [VOL] to set to 146.000 MHz ±100Hz. • Push [D•CLR] key.
TRANSMIT LOCK VOLTAGE <i>L<sub>V</sub></i> 146.00	1 • Transmitting	• Push [D•CLR] key, then push [▼] key. (Do not release [PTT] button when pushing [D•CLR] key.)
OUTPUT POWER (High) <i>P<sub>o</sub></i> 146.00	1 • Connect an RF power meter to the antenna connector. • Transmitting	• Rotate [VOL] to set the transmit power to 7.0 W (except [THA], [THA-01])/5.5W (for [THA], [THA-01] only). • Push [D•CLR] key.
(Middle) <i>P<sub>o</sub></i> 146.00 M	2 • Transmitting	• Rotate [VOL] to set the transmit power to 4.0 W. • Push [D•CLR] key.
(Low) <i>P<sub>o</sub></i> 146.00 L	3 • Transmitting	• Rotate [VOL] to set the transmit power to 0.5 W. • Push [D•CLR] key.
FREQUENCY DEVIATION <i>d<sub>E</sub></i> 146.00	1 • Mode : Wide • Connect an FM deviation meter to the antenna connector through an attenuator and set as : HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • Connect an audio generator to [MIC] jack and set as; Frequency : 1 kHz Level : 150 mV rms • Transmitting	• Rotate [VOL] to set to ±4.2 kHz. • Push [D•CLR] key.
DIGITAL VCO FREQUENCY DEVIATION <i>d<sub>E</sub></i> 146.00 DV	1 • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to ±1.20 kHz. • Push [D•CLR] key.
DTCS WAVE FORM <i>d<sub>t</sub></i> 146.00	1 • Mode : Wide • Connect an oscilloscope and the FM deviation meter to the antenna connector. • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to square wave form as shown below. • Push [D•CLR] key.  Set to square wave form 
DIGITAL REFERENCE FREQUENCY DEVIATION <i>d<sub>t</sub></i> 146.00 DV	1 • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to ±1.20 kHz. • Push [D•CLR] key.

# PARTS LIST

**[MAIN UNIT]**

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
IC2	1110003491	S.IC TA31136FNG(DEL)	T	101.7/33.75
IC3	1110006470	S.IC LMV324IPWR	T	103.7/13.3
IC4	1130011770	S.IC CD4066BPWR	T	84.9/15.0
IC5	1110002810	S.IC NJM2070M-TE1-#ZZZB	B	67.3/10.3
IC7	1130015560	S.IC S-24C64CI-T8T1U3	B	26.1/21.6
IC8	1140012490	S.IC M30220MA-136RP	B	43.3/22.9
		(FX-2826B EXP) [EUR]		
	1140012490	S.IC M30220MA-136RP	[EXP]	
		(FX-2826B EXP) [USA]		
	1140012480	S.IC M30220MA-135RP	[THA]	
		(FX-2826B JPN)		
	1140012490	S.IC M30220MA-136RP	[CSA]	
		(FX-2826B EXP)		
	1140012490	S.IC M30220MA-136RP	[EUR-1]	
		(FX-2826B EXP)		
	1140012490	S.IC M30220MA-136RP	[EXP-1]	
		(FX-2826B EXP) [USA-1]		
	1140012490	S.IC M30220MA-136RP	[CHN]	
		(FX-2826B EXP) [THA-01]		
	1140012490	S.IC M30220MA-136RP	[CSA-1]	
		(FX-2826B EXP)		
	1140012490	S.IC M30220MA-136RP	[EUR-2]	
		(FX-2826B EXP)		
	1140012490	S.IC M30220MA-136RP	[EXP-2]	
		(FX-2826B EXP) [USA-2]		
	1140012490	S.IC M30220MA-136RP	[KOR]	
		(FX-2826B EXP)		
	1140012490	S.IC M30220MA-136RP	[CHN-01]	
		(FX-2826B EXP)		
	1140012490	S.IC M30220MA-136RP	[CSA-2]	
		(FX-2826B EXP)		
	1140012490	S.IC M30220MA-136RP	[EXP-3]	
		(FX-2826B EXP) [CHN-02]		
	1140012490	S.IC M30220MA-136RP	[CSA-3]	
		(FX-2826B EXP)		
	1140012490	S.IC M30220MA-136RP	[EUR-3]	
		(FX-2826B EXP)		
	1140012490	S.IC M30220MA-136RP	[EXP-4]	
		(FX-2826B EXP) [USA-3]		
IC10	1190000350	S.IC M62363FP-650C	B	65.1/34.5
IC12	1180002251	S.IC S-812C50AMC-C3E-G	T	109.8/39.8
IC13	1130011770	S.IC CD4066BPWR	B	10.8/16.8
IC14	1130011770	S.IC CD4066BPWR	B	19.2/21.2
IC15	1130011770	S.IC CD4066BPWR	B	23.0/10.2
IC16	1130011781	S.IC SN74AHC2G53HDCT3	B	36.3/41.1
IC17	1110005310	S.IC AN6123MS	B	12.4/27.9
IC19	1130011671	S.IC MB15E03SLPFV1-G-ER-6E1	T	87.0/33.4
IC20	1130011801	S.IC SN74AHC1G66HDBV3	T	80.9/28.0
IC21	1110006260	S.IC BD5242G-TR	B	27.6/14.0
IC22	1180002680	S.REG S-812C50BMC-C5E-T2G	B	13.6/35.7
IC23	1110006490	S.IC LMV321IDCKR	B	40.6/40.2
IC24	1180002690	S.REG S-812C36AMC-C2Q-T2G	T	87.4/28.2
IC25	1110006490	S.IC LMV321IDCKR	B	18.4/14.6
Q1	1560001371	S.FET RD12MVS1-T112	T	118.4/24.1
Q2	1560001241	S.FET RD01MUS1-T113	T	109.6/24.4
Q3	1530003231	S.TRA 2SC5085-Y(TE85RF)	T	101.6/20.0
Q5	1530003260	S.TRA 2SC5006-T1	B	87.3/30.2
Q11	1590001650	S.TRA XP4601(TX)	T	86.7/21.8
Q12	1580000790	S.FET 3SK318YB-TL-E	B	106.8/4.2
Q13	1580000790	S.FET 3SK318YB-TL-E	B	99.8/14.9
Q14	1530003260	S.TRA 2SC5006-T1	B	97.6/33.9
Q15	1520000460	S.TRA 2SB1132 T100 R	B	61.8/16.4
Q16	1590001190	S.TRA XP6501-(TX).AB	B	65.9/18.2

**[MAIN UNIT]**

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
Q17	1590003421	S.TRA UNR911FGOL [EUR]	B	28.1/10.6
	1590003421	S.TRA UNR911FGOL [EXP]		
	1590003421	S.TRA UNR911FGOL [USA]		
	1590003421	S.TRA UNR911FGOL [THA]		
	1590003421	S.TRA UNR911FGOL [CSA]		
	1590003421	S.TRA UNR911FGOL [EUR-1]		
	1590003421	S.TRA UNR911FGOL [EXP-1]		
	1590003421	S.TRA UNR911FGOL [USA-1]		
	1590003421	S.TRA UNR911FGOL [CHN]		
	1590004320	S.TRA DRA9143XOL [THA-01]		
	1590003421	S.TRA UNR911FGOL [CSA-1]		
	1590003421	S.TRA UNR911FGOL [EUR-2]		
	1590003421	S.TRA UNR911FGOL [EXP-2]		
	1590003421	S.TRA UNR911FGOL [USA-2]		
	1590003421	S.TRA UNR911FGOL [KOR]		
	1590003421	S.TRA UNR911FGOL [CHN-01]		
	1590003421	S.TRA UNR911FGOL [CSA-2]		
	1590003421	S.TRA UNR911FGOL [EXP-3]		
	1590003421	S.TRA UNR911FGOL [CHN-02]		
	1590003421	S.TRA UNR911FGOL [CSA-3]		
	1590003421	S.TRA UNR911FGOL [EUR-3]		
	1590003421	S.TRA UNR911FGOL [EXP-4]		
	1590003421	S.TRA UNR911FGOL [USA-3]		
Q21	1510000510	S.TRA 2SA1576A T106R	B	113.4/31.3
Q22	1510000510	S.TRA 2SA1576A T106R	B	109.8/32.2
Q25	1530002851	S.TRA 2SC4116-BL(TE85RF)	T	67.1/4.2
Q31	1590003271	S.TRA UNR9210GOL [EUR]	T	95.8/4.2
	1590003271	S.TRA UNR9210GOL [EXP]		
	1590003271	S.TRA UNR9210GOL [USA]		
	1590003271	S.TRA UNR9210GOL [THA]		
	1590003271	S.TRA UNR9210GOL [CSA]		
	1590003271	S.TRA UNR9210GOL [EUR-1]		
	1590003271	S.TRA UNR9210GOL [EXP-1]		
	1590003271	S.TRA UNR9210GOL [USA-1]		
	1590003271	S.TRA UNR9210GOL [CHN]		
	1590004340	S.TRA DRC9144TOL [THA-01]		
	1590003271	S.TRA UNR9210GOL [CSA-1]		
	1590003271	S.TRA UNR9210GOL [EUR-2]		
	1590003271	S.TRA UNR9210GOL [EXP-2]		
	1590003271	S.TRA UNR9210GOL [USA-2]		
	1590003271	S.TRA UNR9210GOL [KOR]		
	1590003271	S.TRA UNR9210GOL [CHN-01]		
	1590003271	S.TRA UNR9210GOL [CSA-2]		
	1590003271	S.TRA UNR9210GOL [EXP-3]		
	1590003271	S.TRA UNR9210GOL [CHN-02]		
	1590003271	S.TRA UNR9210GOL [CSA-3]		
	1590003271	S.TRA UNR9210GOL [EUR-3]		
	1590003271	S.TRA UNR9210GOL [EXP-4]		
	1590003271	S.TRA UNR9210GOL [USA-3]		
Q34	1560000811	S.FET 2SK1069-4-TL-E	T	74.9/28.1
Q37	1590003231	S.TRA UNR9113GOL [EUR]	T	109.9/15.9
	1590003231	S.TRA UNR9113GOL [EXP]		
	1590003231	S.TRA UNR9113GOL [USA]		
	1590003231	S.TRA UNR9113GOL [THA]		
	1590003231	S.TRA UNR9113GOL [CSA]		
	1590003231	S.TRA UNR9113GOL [EUR-1]		
	1590003231	S.TRA UNR9113GOL [EXP-1]		
	1590003231	S.TRA UNR9113GOL [USA-1]		
	1590003231	S.TRA UNR9113GOL [CHN]		
	1590004190	S.TRA DRA9144EOL [THA-01]		
	1590003231	S.TRA UNR9113GOL [CSA-1]		
	1590003231	S.TRA UNR9113GOL [EUR-2]		
	1590003231	S.TRA UNR9113GOL [EXP-2]		
	1590003231	S.TRA UNR9113GOL [USA-2]		
	1590003231	S.TRA UNR9113GOL [KOR]		
	1590003231	S.TRA UNR9113GOL [CHN-01]		
	1590003231	S.TRA UNR9113GOL [CSA-2]		
	1590003231	S.TRA UNR9113GOL [EXP-3]		
	1590003231	S.TRA UNR9113GOL [CHN-02]		
	1590003231	S.TRA UNR9113GOL [CSA-3]		
	1590003231	S.TRA UNR9113GOL [EUR-3]		
	1590003231	S.TRA UNR9113GOL [EXP-4]		
	1590003231	S.TRA UNR9113GOL [USA-3]		
Q38	1590003291	S.TRA UNR9213GOL [EUR]	B	41.2/36.7
	1590003291	S.TRA UNR9213GOL [EXP]		
	1590003291	S.TRA UNR9213GOL [USA]		
	1590003291	S.TRA UNR9213GOL [THA]		
	1590003291	S.TRA UNR9213GOL [CSA]		
	1590003291	S.TRA UNR9213GOL [EUR-1]		
	1590003291	S.TRA UNR9213GOL [EXP-1]		
	1590003291	S.TRA UNR9213GOL [USA-1]		
	1590003291	S.TRA UNR9213GOL [CHN]		
	1590004350	S.TRA DRC9144EOL [THA-01]		
	1590003291	S.TRA UNR9213GOL [CSA-1]		
	1590003291	S.TRA UNR9213GOL [EUR-2]		
	1590003291	S.TRA UNR9213GOL [EXP-2]		
	1590003291	S.TRA UNR9213GOL [USA-2]		
	1590003291	S.TRA UNR9213GOL [KOR]		
	1590003291	S.TRA UNR9213GOL [CHN-01]		
	1590003291	S.TRA UNR9213GOL [CSA-2]		
	1590003291	S.TRA UNR9213GOL [EXP-3]		
	1590003291	S.TRA UNR9213GOL [CHN-02]		
	1590003291	S.TRA UNR9213GOL [CSA-3]		
	1590003291	S.TRA UNR9213GOL [EUR-3]		
	1590003291	S.TRA UNR9213GOL [EXP-4]		
	1590003291	S.TRA UNR9213GOL [USA-3]		
Q53	1590001650	S.TRA XP4601(TX)	B	47.5/39.0
Q54	1510000510	S.TRA 2SA1576A T106R	B	100.8/26.6

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
Q55	1520000460	S.TRA 2SB1132 T100 R	T	115.1/39.5
Q56	1590003291	S.TRA UNR9213G0L [EUR]	T	120.3/33.4
	1590003291	S.TRA UNR9213G0L [EXP]		
	1590003291	S.TRA UNR9213G0L [USA]		
	1590003291	S.TRA UNR9213G0L [THA]		
	1590003291	S.TRA UNR9213G0L [CSA]		
	1590003291	S.TRA UNR9213G0L [EUR-1]		
	1590003291	S.TRA UNR9213G0L [EXP-1]		
	1590003291	S.TRA UNR9213G0L [USA-1]		
	1590003291	S.TRA UNR9213G0L [CHN]		
	1590004350	S.TRA DRC9144E0L [THA-01]		
	1590003291	S.TRA UNR9213G0L [CSA-1]		
	1590003291	S.TRA UNR9213G0L [EXP-2]		
	1590003291	S.TRA UNR9213G0L [EUR-2]		
	1590003291	S.TRA UNR9213G0L [USA-2]		
	1590003291	S.TRA UNR9213G0L [KOR]		
	1590003291	S.TRA UNR9213G0L [CHN-01]		
	1590003291	S.TRA UNR9213G0L [CSA-2]		
	1590003291	S.TRA UNR9213G0L [EXP-3]		
	1590003291	S.TRA UNR9213G0L [CHN-02]		
	1590003291	S.TRA UNR9213G0L [CSA-3]		
	1590003291	S.TRA UNR9213G0L [EUR-3]		
	1590003291	S.TRA UNR9213G0L [EXP-4]		
	1590003291	S.TRA UNR9213G0L [USA-3]		
Q57	1590001170	S.TRA XP1501-(TX).AB	B	119.7/37.0
Q61	1510000620	S.TRA 2SA1576 T106 S	B	14.4/39.9
Q62	1530002851	S.TRA 2SC4116-BL(TE85RF)	B	11.9/39.9
Q63	1510000510	S.TRA 2SA1576A T106R	B	15.5/28.9
Q64	1510000510	S.TRA 2SA1576A T106R	B	31.9/42.5
Q65	1530002851	S.TRA 2SC4116-BL(TE85RF)	B	98.9/24.7
Q67	1590002230	S.TRA UMG2N TR	T	94.6/17.0
Q68	1590003291	S.TRA UNR9213G0L [EUR]	T	93.6/13.5
	1590003291	S.TRA UNR9213G0L [EXP]		
	1590003291	S.TRA UNR9213G0L [USA]		
	1590003291	S.TRA UNR9213G0L [THA]		
	1590003291	S.TRA UNR9213G0L [CSA]		
	1590003291	S.TRA UNR9213G0L [EUR-1]		
	1590003291	S.TRA UNR9213G0L [EXP-1]		
	1590003291	S.TRA UNR9213G0L [USA-1]		
	1590003291	S.TRA UNR9213G0L [CHN]		
	1590004350	S.TRA DRC9144E0L [THA-01]		
	1590003291	S.TRA UNR9213G0L [CSA-1]		
	1590003291	S.TRA UNR9213G0L [EXP-2]		
	1590003291	S.TRA UNR9213G0L [EUR-2]		
	1590003291	S.TRA UNR9213G0L [USA-2]		
	1590003291	S.TRA UNR9213G0L [KOR]		
	1590003291	S.TRA UNR9213G0L [CHN-01]		
	1590003291	S.TRA UNR9213G0L [CSA-2]		
	1590003291	S.TRA UNR9213G0L [EXP-3]		
	1590003291	S.TRA UNR9213G0L [CHN-02]		
	1590003291	S.TRA UNR9213G0L [CSA-3]		
	1590003291	S.TRA UNR9213G0L [EUR-3]		
	1590003291	S.TRA UNR9213G0L [EXP-4]		
	1590003291	S.TRA UNR9213G0L [USA-3]		
Q73	1530003630	S.TRA 2SC4617 TLS	B	61.4/6.2
Q74	1530003582	S.TRA 2SC5231A-8-TL-E	B	87.1/23.3
Q75	1530003582	S.TRA 2SC5231A-8-TL-E	B	83.2/22.2
Q76	1530003582	S.TRA 2SC5231A-8-TL-E	B	77.5/21.2
Q77	1590003301	S.TRA UNR921NG0L [EUR]	B	83.1/29.0
	1590003301	S.TRA UNR921NG0L [EXP]		
	1590003301	S.TRA UNR921NG0L [USA]		
	1590003301	S.TRA UNR921NG0L [THA]		
	1590003301	S.TRA UNR921NG0L [CSA]		
	1590003301	S.TRA UNR921NG0L [EUR-1]		
	1590003301	S.TRA UNR921NG0L [EXP-1]		
	1590003301	S.TRA UNR921NG0L [USA-1]		
	1590003301	S.TRA UNR921NG0L [CHN]		
	1590004250	S.TRA DRC9143Z0L [THA-01]		
	1590003301	S.TRA UNR921NG0L [CSA-1]		
	1590003301	S.TRA UNR921NG0L [EUR-2]		
	1590003301	S.TRA UNR921NG0L [EXP-2]		
	1590003301	S.TRA UNR921NG0L [USA-2]		
	1590003301	S.TRA UNR921NG0L [KOR]		
	1590003301	S.TRA UNR921NG0L [CHN-01]		
	1590003301	S.TRA UNR921NG0L [CSA-2]		
	1590003301	S.TRA UNR921NG0L [EXP-3]		
	1590003301	S.TRA UNR921NG0L [CHN-02]		
	1590003301	S.TRA UNR921NG0L [CSA-3]		
	1590003301	S.TRA UNR921NG0L [EUR-3]		
	1590003301	S.TRA UNR921NG0L [EXP-4]		
	1590003301	S.TRA UNR921NG0L [USA-3]		
Q81	1530002851	S.TRA 2SC4116-BL(TE85RF)	T	95.0/32.8
Q82	1530002851	S.TRA 2SC4116-BL(TE85RF)	B	20.5/29.5
D1	1710000871	S.DIO HVU131TRF-E	B	112.5/12.8
D2	1790000620	S.DIO MA77(TX)	T	115.9/7.7
D3	1790001621	S.DIO 1SV308(TPL3F)	T	90.7/21.1
D4	1790001261	S.DIO MA25077G0L	T	91.6/19.2
D9	1750000721	S.VAR HVC375BTRF-E	T	110.8/2.9
D11	1750000711	S.VAR HVC350BTRF-E	T	104.5/3.3
D12	1750000711	S.VAR HVC350BTRF-E	B	101.7/2.4
D27	1790000981	S.DIO MA3J7420GL	T	93.5/4.7
D32	1790000981	S.DIO MA3J7420GL	T	115.0/14.2
D33	1790000981	S.DIO MA3J7420GL	T	115.0/16.7

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
D34	1790000951	S.ZEN MAZ8056GML [EUR]	B	94.0/8.2
	1790000951	S.ZEN MAZ8056GML [EXP]		
	1790000951	S.ZEN MAZ8056GML [USA]		
	1790000951	S.ZEN MAZ8056GML [THA]		
	1790000951	S.ZEN MAZ8056GML [CSA]		
	1790000951	S.ZEN MAZ8056GML [EUR-1]		
	1790000951	S.ZEN MAZ8056GML [EXP-1]		
	1790000951	S.ZEN MAZ8056GML [USA-1]		
	1790000951	S.ZEN MAZ8056GML [CHN]		
	1750001980	S.ZEN DZZJ056M0L [THA-01]		
	1790000951	S.ZEN MAZ8056GML [CSA-1]		
	1790000951	S.ZEN MAZ8056GML [EUR-2]		
	1790000951	S.ZEN MAZ8056GML [EXP-2]		
	1790000951	S.ZEN MAZ8056GML [USA-2]		
	1790000951	S.ZEN MAZ8056GML [KOR]		
	1790000951	S.ZEN MAZ8056GML [CHN-01]		
	1790000951	S.ZEN MAZ8056GML [CSA-2]		
	1790000951	S.ZEN MAZ8056GML [EXP-3]		
	1790000951	S.ZEN MAZ8056GML [CHN-02]		
	1790000951	S.ZEN MAZ8056GML [CSA-3]		
	1790000951	S.ZEN MAZ8056GML [EUR-3]		
	1790000951	S.ZEN MAZ8056GML [EXP-4]		
	1790000951	S.ZEN MAZ8056GML [USA-3]		
D39	1750000940	S.DIO 1SS400 TE61	B	117.3/38.7
D40	1750000940	S.DIO 1SS400 TE61	B	60.9/43.3
D41	1750000940	S.DIO 1SS400 TE61	B	63.7/43.2
D42	1750000940	S.DIO 1SS400 TE61	B	65.0/43.2
D43	1750000940	S.DIO 1SS400 TE61	B	66.3/43.2
D44	1750000940	S.DIO 1SS400 TE61	B	67.6/43.2
D45	1750000940	S.DIO 1SS400 TE61 [EUR]	T	58.4/41.9
	1750000940	S.DIO 1SS400 TE61 [USA]		
	1750000940	S.DIO 1SS400 TE61 [EUR-1]		
	1750000940	S.DIO 1SS400 TE61 [USA-1]		
	1750000940	S.DIO 1SS400 TE61 [EUR-2]		
	1750000940	S.DIO 1SS400 TE61 [USA-2]		
	1750000940	S.DIO 1SS400 TE61 [KOR]		
	1750000940	S.DIO 1SS400 TE61 [EUR-3]		
	1750000940	S.DIO 1SS400 TE61 [USA-3]		
D46	1750000940	S.DIO 1SS400 TE61 [EXP]	T	59.7/41.9
	1750000940	S.DIO 1SS400 TE61 [THA]		
	1750000940	S.DIO 1SS400 TE61 [CSA]		
	1750000940	S.DIO 1SS400 TE61 [EXP-1]		
	1750000940	S.DIO 1SS400 TE61 [CHN]		
	1750000940	S.DIO 1SS400 TE61 [THA-01]		
	1750000940	S.DIO 1SS400 TE61 [CSA-1]		
	1750000940	S.DIO 1SS400 TE61 [EXP-2]		
	1750000940	S.DIO 1SS400 TE61 [CHN-01]		
	1750000940	S.DIO 1SS400 TE61 [CSA-2]		
	1750000940	S.DIO 1SS400 TE61 [EXP-3]		
	1750000940	S.DIO 1SS400 TE61 [CHN-02]		
	1750000940	S.DIO 1SS400 TE61 [CSA-3]		
	1750000940	S.DIO 1SS400 TE61 [EXP-4]		
D47	1750000940	S.DIO 1SS400 TE61 [THA]	T	61.1/41.9
	1750000940	S.DIO 1SS400 TE61 [THA-01]		
	1750000940	S.DIO 1SS400 TE61 [KOR]		
D48	1750000940	S.DIO 1SS400 TE61 [EUR]	T	67.1/40.9
	1750000940	S.DIO 1SS400 TE61 [USA]		
	1750000940	S.DIO 1SS400 TE61 [EUR-1]		
	1750000940	S.DIO 1SS400 TE61 [USA-1]		
	1750000940	S.DIO 1SS400 TE61 [THA-01]		
	1750000940	S.DIO 1SS400 TE61 [EUR-2]		
	1750000940	S.DIO 1SS400 TE61 [USA-2]		
	1750000940	S.DIO 1SS400 TE61 [KOR]		
	1750000940	S.DIO 1SS400 TE61 [EUR-3]		
	1750000940	S.DIO 1SS400 TE61 [USA-3]		
D49	1750000940	S.DIO 1SS400 TE61 [EUR]	T	68.4/40.9
	1750000940	S.DIO 1SS400 TE61 [THA]		
	1750000940	S.DIO 1SS400 TE61 [EUR-1]		
	1750000940	S.DIO 1SS400 TE61 [THA-01]		
	1750000940	S.DIO 1SS400 TE61 [EUR-2]		
	1750000940	S.DIO 1SS400 TE61 [KOR]		
	1750000940	S.DIO 1SS400 TE61 [EUR-3]		
D50	1790000661	S.DIO MA2J7280GL	T	114.2/3.3
D51	1750000940	S.DIO 1SS400 TE61	B	13.6/42.0
D56	1750000771	S.VAR HVC376BTRF-E	B	33.5/9.8
D58	1790001261	S.DIO MA2S077G0L	B	81.4/27.8
D59	1720000730	S.VAR MA2S30400L	B	76.4/27.6
D60	1720000730	S.VAR MA2S30400L	B	78.9/27.6
D61	1720000651	S.VAR 1SV286(TPH3F)	B	76.5/31.3
D63	1750000370	S.DIO DA221 TL	B	93.5/30.8
D64	1750000940	S.DIO 1SS400 TE61	T	84.0/37.9
D65	1750000711	S.VAR HVC350BTRF-E	T	102.8/7.7
D66	1750000940	S.DIO 1SS400 TE61 [EUR]	T	67.6/43.4
	1750000940	S.DIO 1SS400 TE61 [EXP]		
	1750000940	S.DIO 1SS400 TE61 [THA]		
	1750000940	S.DIO 1SS400 TE61 [EUR-1]		
	1750000940	S.DIO 1SS400 TE61 [EXP-1]		
	1750000940	S.DIO 1SS400 TE61 [CHN]		
	1750000940	S.DIO 1SS400 TE61 [THA-01]		
	1750000940	S.DIO 1SS400 TE61 [EUR-2]		
	1750000940	S.DIO 1SS400 TE61 [EXP-2]		
	1750000940	S.DIO 1SS400 TE61 [CHN-01]		
	1750000940	S.DIO 1SS400 TE61 [EXP-3]		
	1750000940	S.DIO 1SS400 TE61 [CHN-02]		
	1750000940	S.DIO 1SS400 TE61 [EUR-3]		
	1750000940	S.DIO 1SS400 TE61 [EXP-4]		
D67	1750000940	S.DIO 1SS400 TE61 [EXP]	T	66.3/43.4
	1750000940	S.DIO 1SS400 TE61 [THA]		
	1750000940	S.DIO 1SS400 TE61 [EXP-1]		
	1750000940	S.DIO 1SS400 TE61 [CHN]		
	1750000940	S.DIO 1SS400 TE61 [EXP-2]		
	1750000940	S.DIO 1SS400 TE61 [CHN-01]		
	1750000940	S.DIO 1SS400 TE61 [EXP-3]		
	1750000940	S.DIO 1SS400 TE61 [CHN-02]		

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION		
D68	1750000940	S.DIO 1SS400 TE61 [EUR]	T	65.0/43.4		
	1750000940	S.DIO 1SS400 TE61 [EXP]				
	1750000940	S.DIO 1SS400 TE61 [EUR-1]				
	1750000940	S.DIO 1SS400 TE61 [EXP-1]				
	1750000940	S.DIO 1SS400 TE61 [CHN]				
	1750000940	S.DIO 1SS400 TE61 [THA-01]				
	1750000940	S.DIO 1SS400 TE61 [EUR-2]				
	1750000940	S.DIO 1SS400 TE61 [EXP-2]				
	1750000940	S.DIO 1SS400 TE61 [CHN-01]				
	1750000940	S.DIO 1SS400 TE61 [EXP-3]				
	1750000940	S.DIO 1SS400 TE61 [CHN-02]				
	1750000940	S.DIO 1SS400 TE61 [EUR-3]				
	1750000940	S.DIO 1SS400 TE61 [EXP-4]				
	D69	1750000940	S.DIO 1SS400 TE61 [EXP]		T	63.7/43.4
		1750000940	S.DIO 1SS400 TE61 [EXP-1]			
1750000940		S.DIO 1SS400 TE61 [CHN]				
1750000940		S.DIO 1SS400 TE61 [EXP-2]				
1750000940		S.DIO 1SS400 TE61 [KOR]				
1750000940		S.DIO 1SS400 TE61 [CHN-01]				
1750000940		S.DIO 1SS400 TE61 [EXP-3]				
1750000940		S.DIO 1SS400 TE61 [CHN-02]				
1750000940		S.DIO 1SS400 TE61 [EXP-4]				
D71		1750000940	S.DIO 1SS400 TE61	T	79.6/37.9	
		D72	1750000940	B		
F11		2030000150	S.MON DSF753SB 46.350 MHz(FL-335)	B	94.4/25.05	
		F12	CER 2020001590 ALFY450F=K			
X2		6050011500	S.XTA CR-739 SX-1302 9.8304 MHz	B	46.1/4.6	
X3		6070000300	S.DIS JTBM450CX24 <JJE>	T	96.8/26.0	
X4	6050011940	S.XTA CR-783 TTS14VSB-A6 15.3 MHz	B	84.2/36.9		
L1	6200012910	S.COI 0.35-1.6-8TL 45.5N <COMO>	B	116.7/6.0		
L2	6200012470	S.COI 0.30-1.7-7TL 45.3N <COMO>	B	115.8/9.3		
L4	6200012470	S.COI 0.30-1.7-7TL 45.3N <COMO>	B	117.8/13.5		
L5	6200012880	S.COI 0.30-1.3-6TL 24.5N <COMO>	T	119.8/29.8		
L6	6200007710	S.COI LQW2BHN27N30J3L	T	114.0/28.5		
L7	6200005451	S.COI LL1608-FSL68NJ	T	101.8/22.7		
L15	6200012910	S.COI 0.35-1.6-8TL 45.5N <COMO>	T	112.7/9.2		
L16	6200012460	S.COI 0.30-1.7-8TL 54N <COMO>	B	111.4/3.3		
L18	6200009930	S.COI C2012C-68NG-A	T	107.3/5.2		
L19	6200009890	S.COI C2012C-82NG-A	T	102.7/3.6		
L20	6200003271	S.COI NLV25T-R56J	B	97.2/17.1		
L24	6200004870	S.COI ELJFC 2R7K-F	B	110.0/13.0		
L26	6200003590	S.COI EXCL3225U1	T	117.6/33.8		
L29	6200009531	S.COI ELJRE R15GFA	B	94.2/12.6		
L32	6200012390	S.COI 0.30-0.92-6TL 5.8N <COMO>	T	121.0/19.0		
L37	6200006991	S.COI ELJRE 56NGFA	T	93.3/21.1		
L38	6200007871	S.COI ELJRF 39NJFB	B	90.6/14.0		
L40	6200009351	S.COI ELJRE 82GFA	B	87.0/21.6		
L41	6200011031	S.COI ELJRF R10JFB	B	83.0/20.7		
L42	6200011001	S.COI ELJRF 56NJFB	B	85.8/30.0		
L43	6200007001	S.COI ELJRE 82NGFA	T	88.4/36.8		
L44	6200010100	S.COI C2012C-33NG-A	B	76.9/25.8		
L45	6200010210	S.COI C2012C-22NG-A	B	81.0/25.9		
L46	6200001981	S.COI NLV25T-1R0J	B	79.5/31.2		
L47	6200012880	S.COI 0.30-1.3-6TL 24.5N <COMO>	B	119.9/17.5		
L48	6200005691	S.COI ELJRE 18NGFA	T	113.9/23.9		
L49	6200005691	S.COI ELJRE 18NGFA	T	105.6/20.3		
L50	6200003271	S.COI NLV25T-R56J	B	98.3/31.1		
L51	6200004480	S.COI MLF1608D R82K-T	T	96.1/35.7		
L55	6200003540	S.COI MLF1608D R22K-T	T	94.3/35.0		
L56	6200010330	S.COI C2012C-R18G-A	B	110.1/6.6		
L57	6200009930	S.COI C2012C-68NG-A	B	100.8/11.5		
L58	6200010540	S.COI C2012C-47NG-A	T	113.5/6.0		
L59	6200007871	S.COI ELJRF 39NJFB	B	91.8/13.0		
R1	7030003670	S.RES ERJ3GEYJ 823 V (82K)	T	118.6/6.8		
R5	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	114.6/21.2		
R7	7030004990	S.RES ERJ2GEJ 221 X (220)	T	108.3/20.6		
R10	7030007260	S.RES ERJ2GEJ 330 X (33)	T	98.8/18.9		
R11	7030007300	S.RES ERJ2GEJ 332 X (3.3K)	T	98.1/22.0		
R12	7030007300	S.RES ERJ2GEJ 332 X (3.3K)	T	100.6/22.0		
R13	7030007260	S.RES ERJ2GEJ 330 X (33)	T	100.9/25.0		
R14	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	96.8/20.5		
R15	7030004980	S.RES ERJ2GEJ 101 X (100)	T	95.5/20.0		
R16	7030005300	S.RES ERJ2GEJ 150 X (15)	T	95.5/21.0		
R20	7030005220	S.RES ERJ2GEJ 223 X (22K)	B	87.2/28.7		
R21	7030007290	S.RES ERJ2GEJ 222 X (2.2K)	B	85.3/28.7		
R30	7030008400	S.RES ERJ2GEJ 182 X (1.8K)	T	86.7/19.9		
R44	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	74.9/17.9		
R48	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	78.2/35.7		
R49	7030010040	S.RES ERJ2GEJ-JPW	B	80.8/37.1		
R50	7030005700	S.RES ERJ2GEJ 274 X (270K)	B	79.8/37.1		
R52	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	108.5/11.7		
R53	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	109.3/13.0		
R54	7030008300	S.RES ERJ2GEJ 184 X (180K)	T	104.1/16.6		
R57	7030005110	S.RES ERJ2GEJ 224 X (220K)	T	109.9/4.3		
R59	7030004980	S.RES ERJ2GEJ 101 X (100)	B	106.3/7.0		
R61	7030005530	S.RES ERJ2GEJ 100 X (10)	T	107.6/7.4		
R64	7030005110	S.RES ERJ2GEJ 224 X (220K)	T	103.6/6.1		
R66	7030005110	S.RES ERJ2GEJ 224 X (220K)	T	101.1/4.1		
R68	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	B	92.2/16.0		
R69	7030004980	S.RES ERJ2GEJ 101 X (100)	B	92.7/18.3		
R70	7030008300	S.RES ERJ2GEJ 184 X (180K)	B	98.0/13.0		
R71	7030005000	S.RES ERJ2GEJ 471 X (470)	B	96.2/19.9		
R72	7030005310	S.RES ERJ2GEJ 124 X (120K)	B	101.5/14.4		
R75	7030004990	S.RES ERJ2GEJ 221 X (220)	B	101.4/17.0		
R77	7030004980	S.RES ERJ2GEJ 101 X (100)	B	93.2/20.1		
R79	7030007280	S.RES ERJ2GEJ 331 X (330)	B	95.0/30.3		
R80	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	96.0/32.1		

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
R81	7030005000	S.RES ERJ2GEJ 471 X (470)	B	102.6/30.9
R82	7030008410	S.RES ERJ2GEJ 392 X (3.9K)	T	97.9/30.3
R83	7030005000	S.RES ERJ2GEJ 471 X (470)	T	98.4/31.8
R84	7030009280	S.RES ERJ2GEJ 391 X	T	105.0/32.8
R85	7030005030	S.RES ERJ2GEJ 152 X (1.5K)	T	103.0/30.0
R86	7030005240	S.RES ERJ2GEJ 473 X (47K)	T	98.3/38.4
R87	7030007290	S.RES ERJ2GEJ 222 X (2.2K)	T	97.3/40.4
R88	7030005060	S.RES ERJ2GEJ 333 X (33K)	T	96.3/38.4
R93	7030005600	S.RES ERJ2GEJ 273 X (27K)	B	104.7/18.0
R94	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	107.9/12.4
R95	7030007310	S.RES ERJ2GEJ 155 X (1.5M)	B	108.6/15.1
R97	7030005110	S.RES ERJ2GEJ 224 X (220K)	T	89.2/15.8
R98	7030005100	S.RES ERJ2GEJ 154 X (150K)	T	80.3/17.5
R99	7030008300	S.RES ERJ2GEJ 184 X (180K)	B	105.2/16.0
R100	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	105.1/10.9
R101	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	34.7/12.6
R102	7030005530	S.RES ERJ2GEJ 100 X (10)	B	36.0/13.1
R103	7030008010	S.RES ERJ2GEJ 123 X (12K)	B	31.6/13.8
R104	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	104.9/15.0
R105	7030005000	S.RES ERJ2GEJ 471 X (470)	T	98.3/16.9
R107	7030005100	S.RES ERJ2GEJ 154 X (150K)	T	80.8/16.1
R108	7030005110	S.RES ERJ2GEJ 224 X (220K)	T	99.3/15.3
R112	7030005160	S.RES ERJ2GEJ 105 X (1M)	T	88.5/13.9
R113	7030005070	S.RES ERJ2GEJ 683 X (68K)	T	80.8/15.0
R114	7030008290	S.RES ERJ2GEJ 183 X (18K)	T	97.7/13.8
R115	7030005310	S.RES ERJ2GEJ 124 X (120K)	T	96.8/12.7
R117	7030005030	S.RES ERJ2GEJ 152 X (1.5K)	T	96.8/11.7
R120	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	62.7/20.5
R121	7030005030	S.RES ERJ2GEJ 152 X (1.5K)	B	66.0/20.5
R122	7030009140	S.RES ERJ2GEJ 272 X (2.7K)	B	65.4/16.3
R123	7030005290	S.RES ERJ2GEJ 682 X (6.8K)	B	67.0/20.5
R126	7030005310	S.RES ERJ2GEJ 124 X (120K)	B	63.5/8.1
R127	7030007260	S.RES ERJ2GEJ 330 X (33)	B	67.5/14.6
R128	7030005530	S.RES ERJ2GEJ 100 X (10)	B	73.9/4.5
R130	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	29.6/10.7
R131	7030008400	S.RES ERJ2GEJ 182 X (1.8K)	B	26.5/10.6
R132	7030005000	S.RES ERJ2GEJ 471 X (470)	B	93.8/2.1
R136	7030004980	S.RES ERJ2GEJ 101 X (100)	B	23.6/40.9
R137	7030004980	S.RES ERJ2GEJ 101 X (100)	B	20.7/17.0
R139	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	110.5/35.0
R141	7030007290	S.RES ERJ2GEJ 222 X (2.2K)	B	107.2/32.2
R144	7030005220	S.RES ERJ2GEJ 223 X (22K)	B	82.4/3.1
R148	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	30.0/14.2
R150	7030005000	S.RES ERJ2GEJ 471 X (470)	B	69.5/28.0
R155	7030004980	S.RES ERJ2GEJ 101 X (100)	T	67.8/1.9
R159	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	105.1/11.9
R160	7030003340	S.RES ERJ3GEYJ 151 V (150)	B	109.3/9.6
R161	7030005220	S.RES ERJ2GEJ 223 X (22K)	T	111.9/12.0
R162	7030005220	S.RES ERJ2GEJ 223 X (22K)	T	111.9/15.0
R163	7030007290	S.RES ERJ2GEJ 222 X (2.2K)	T	111.9/13.0
R164	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	26.9/29.0
R169	7030007350	S.RES ERJ2GEJ 393 X (39K)	T	76.3/18.3
R170	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	79.5/13.5
R174	7030007340	S.RES ERJ2GEJ 153 X (15K)	T	93.5/2.9
R176	7030008410	S.RES ERJ2GEJ 392 X (3.9K)	B	103.4/17.5
R177	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	100.3/16.6
R178	7030005110	S.RES ERJ2GEJ 224 X (220K)	B	107.2/15.5
R181	7030010080	S.RES ERJ2RHD 1003X (100K)	B	45.5/8.2
R182	7510001661	S.THR NTCG16 4LH 473JT	B	49.9/8.8
R184	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	75.3/30.0
R185	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	76.1/26.0
R186	7030005240	S.RES ERJ2GEJ 473 X (47K)	T	74.8/22.4
R187	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	104.9/7.7
R193	7030005720	S.RES ERJ2GEJ 563 X (56K)	B	50.3/12.1
R194	7030005720	S.RES ERJ2GEJ 563 X (56K)	B	48.6/12.5
R195	7030005720	S.RES ERJ2GEJ 563 X (56K)	B	48.9/13.5
R196	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	49.4/11.0
R204	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	65.2/3.6
R205	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	66.5/19.9
R210	7030008410	S.RES ERJ2GEJ 392 X (3.9K)	T	108.8/14.3
R222	7030005240	S.RES ERJ2GEJ 473 X (47K)	T	106.4/22.6
R224	7030007350	S.RES ERJ2GEJ 393 X (39K)	B	47.7/9.2
R225	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	25.8/17.2
R227	7030008410	S.RES ERJ2GEJ 392 X (3.9K)	B	4

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
R336	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	49.2/38.4
R337	7030007310	S.RES ERJ2GEJ 155 X (1.5M)	T	88.0/18.6
R340	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	T	114.0/18.5
R341	7030005240	S.RES ERJ2GEJ 473 X (47K)	T	115.5/17.7
R346	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	31.0/15.8
R357	7030007340	S.RES ERJ2GEJ 153 X (15K)	T	112.2/18.6
R358	7030005600	S.RES ERJ2GEJ 273 X (27K)	T	110.6/20.0
R362	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	29.8/32.3
R363	7030007300	S.RES ERJ2GEJ 332 X (3.3K)	B	11.5/42.0
R364	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	10.2/40.1
R367	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	15.5/30.8
R368	7030005110	S.RES ERJ2GEJ 224 X (220K)	B	15.0/32.0
R369	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	31.9/40.7
R370	7030005170	S.RES ERJ2GEJ 474 X (470K)	B	33.1/40.2
R371	7030009270	S.RES ERJ2GEJ 821 X (820)	B	10.2/24.8
R372	7030009290	S.RES ERJ2GEJ 562 X (5.6K)	B	9.2/26.6
R373	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	13.2/23.1
R374	7030008370	S.RES ERJ2GEJ 561 X (560)	B	12.2/23.1
R375	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	10.2/28.4
R376	7030004980	S.RES ERJ2GEJ 101 X (100)	B	17.3/30.1
R377	7030008300	S.RES ERJ2GEJ 184 X (180K)	B	38.7/38.9
R378	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	38.7/40.5
R379	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	38.8/42.0
R380	7030005170	S.RES ERJ2GEJ 474 X (470K)	B	40.4/42.0
R381	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	27.1/42.4
R382	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	26.9/28.0
R384	7030005060	S.RES ERJ2GEJ 333 X (33K)	B	22.7/6.0
R385	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	20.9/5.3
R386	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	17.4/32.7
R387	7030007300	S.RES ERJ2GEJ 332 X (3.3K)	B	98.2/29.0
R388	7030005240	S.RES ERJ2GEJ 473 X (47K)	T	92.3/24.9
R389	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	99.5/22.9
R397	7030008400	S.RES ERJ2GEJ 182 X (1.8K)	T	97.0/16.1
R398	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	35.8/8.6
R402	7030010040	S.RES ERJ2GEJ-JPW	T	89.9/29.1
R405	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	60.3/7.8
R406	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	57.2/5.7
R413	7030010040	S.RES ERJ2GEJ-JPW	T	106.0/16.7
R417	7030010040	S.RES ERJ2GEJ-JPW	B	91.0/18.5
R418	7030010040	S.RES ERJ2GEJ-JPW	B	90.2/15.2
R419	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	89.7/16.5
R420	7030007290	S.RES ERJ2GEJ 222 X (2.2K)	T	90.1/18.7
R421	7030010040	S.RES ERJ2GEJ-JPW	T	89.6/20.0
R422	7030005000	S.RES ERJ2GEJ 471 X (470)	B	85.9/20.2
R423	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	85.3/22.2
R424	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	B	86.4/24.9
R425	7030004980	S.RES ERJ2GEJ 101 X (100)	B	84.6/25.3
R426	7030005000	S.RES ERJ2GEJ 471 X (470)	B	79.5/20.7
R427	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	81.6/20.2
R428	7030008410	S.RES ERJ2GEJ 392 X (3.9K)	B	81.7/22.7
R429	7030005710	S.RES ERJ2GEJ 121 X (120)	B	81.1/21.5
R430	7030007250	S.RES ERJ2GEJ 220 X (22)	B	86.4/25.9
R431	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	87.3/27.7
R432	7030007310	S.RES ERJ2GEJ 155 X (1.5M)	T	90.9/38.0
R433	7030004970	S.RES ERJ2GEJ 470 X (47)	B	78.0/19.7
R434	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	75.9/21.0
R435	7030009270	S.RES ERJ2GEJ 821 X (820)	B	80.7/23.3
R436	7030007350	S.RES ERJ2GEJ 393 X (39K)	B	77.6/24.2
R437	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	B	79.5/29.0
R438	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	80.5/29.2
R439	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	81.5/29.2
R440	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	76.9/29.3
R441	7030007320	S.RES ERJ2GEJ 225 X (2.2M)	T	80.1/30.2
R442	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	78.8/30.7
R443	7030005220	S.RES ERJ2GEJ 223 X (22K)	T	75.7/32.7
R444	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	75.7/33.7
R445	7030009290	S.RES ERJ2GEJ 562 X (5.6K)	T	78.8/32.4
R446	7030005010	S.RES ERJ2GEJ 681 X (680)	T	75.6/31.3
R447	7030005010	S.RES ERJ2GEJ 681 X (680)	T	81.8/25.8
R448	7030007570	S.RES ERJ2GEJ 122 X (1.2K)	T	83.1/26.8
R449	7030004980	S.RES ERJ2GEJ 101 X (100)	T	83.1/28.4
R455	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	95.5/33.4
R456	7030010040	S.RES ERJ2GEJ-JPW	B	95.5/34.4
R457	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	75.9/37.7
R458	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	77.4/37.0
R459	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	74.8/36.6
R460	7030008290	S.RES ERJ2GEJ 183 X (18K)	T	81.0/36.8
R463	7030007060	S.RES ERJ2GEJ 684X (680K)	T	93.2/32.2
R465	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	91.9/32.7
R466	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	106.4/6.8
R467	7030005110	S.RES ERJ2GEJ 224 X (220K)	T	102.9/8.9
R469	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	89.5/35.5
R473	7030010040	S.RES ERJ2GEJ-JPW	B	54.2/29.3
	7030010040	S.RES ERJ2GEJ-JPW	[EXP]	
	7030010040	S.RES ERJ2GEJ-JPW	[THA]	
	7030010040	S.RES ERJ2GEJ-JPW	[CSA]	
	7030010040	S.RES ERJ2GEJ-JPW	[EXP-1]	
	7030010040	S.RES ERJ2GEJ-JPW	[CHN]	
	7030010040	S.RES ERJ2GEJ-JPW	[THA-01]	
	7030010040	S.RES ERJ2GEJ-JPW	[CSA-1]	
	7030010040	S.RES ERJ2GEJ-JPW	[EXP-2]	
	7030010040	S.RES ERJ2GEJ-JPW	[CHN-01]	
	7030010040	S.RES ERJ2GEJ-JPW	[CSA-2]	
	7030010040	S.RES ERJ2GEJ-JPW	[EXP-3]	
	7030010040	S.RES ERJ2GEJ-JPW	[CHN-02]	
	7030010040	S.RES ERJ2GEJ-JPW	[CSA-3]	
	7030010040	S.RES ERJ2GEJ-JPW	[EXP-4]	
R474	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	32.0/15.4
R475	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	36.1/15.4
R476	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	28.8/32.3
R477	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	27.8/32.4
R478	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	26.9/30.0
R479	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	26.9/31.0
R480	7030004980	S.RES ERJ2GEJ 101 X (100)	B	20.7/18.2
R482	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	25.1/32.5
R483	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	25.1/31.5

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
R484	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	25.1/30.5
R485	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	9.2/40.1
R486	7030005160	S.RES ERJ2GEJ 105 X (1M)	T	94.5/11.2
R487	7030005220	S.RES ERJ2GEJ 223 X (22K)	T	76.1/36.1
R488	7030005220	S.RES ERJ2GEJ 223 X (22K)	T	79.3/35.5
R489	7030005220	S.RES ERJ2GEJ 223 X (22K)	T	77.2/38.2
R491	7030005110	S.RES ERJ2GEJ 224 X (220K)	B	45.0/10.5
R492	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	44.3/9.5
R493	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	44.2/8.5
R494	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	40.2/11.3
R495	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	40.9/8.1
R496	7030007340	S.RES ERJ2GEJ 153 X (15K)	B	19.3/31.2
R497	7030007320	S.RES ERJ2GEJ 225 X (2.2M)	B	20.3/27.4
R498	7030005080	S.RES ERJ2GEJ 823 X (82K)	B	19.0/27.7
R499	7030005080	S.RES ERJ2GEJ 823 X (82K)	B	19.0/25.8
R500	7030010010	S.RES ERJ2RKF 334 X (330K)	B	37.5/10.5
R501	7030005471	S.RES ERA3YKD 244V (240K)	B	38.0/8.6
R502	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	37.7/12.4
R503	7030004980	S.RES ERJ2GEJ 101 X (100)	T	108.9/9.6
R504	7030005220	S.RES ERJ2GEJ 223 X (22K)	T	78.2/39.5
R505	7030007270	S.RES ERJ2GEJ 151 X (150)	T	91.6/30.0
R506	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	38.4/37.6
R507	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	37.9/36.4
R508	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	20.7/16.0
R509	7030005170	S.RES ERJ2GEJ 474 X (470K)	B	20.2/14.6
R510	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	18.2/16.5
R511	7030008300	S.RES ERJ2GEJ 184 X (180K)	B	16.7/14.6
R512	7030004970	S.RES ERJ2GEJ 470 X (47)	T	107.3/20.6
R513	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	65.9/14.6
R514	7030004980	S.RES ERJ2GEJ 101 X (100)	B	78.5/37.2
R515	7030010040	S.RES ERJ2GEJ-JPW	B	25.4/41.8
R516	7030005310	S.RES ERJ2GEJ 124 X (120K)	B	96.8/15.1
R517	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	95.8/15.1
R518	7030005050	S.RES ERJ2GEJ 103 X (10K)	T	75.9/38.7
C1	4030006980	S.CER C1608 CH 1H 070D-T	B	119.4/6.3
C2	4030009530	S.CER C1608 CH 1H 030B-T	B	116.4/9.3
C3	4030007060	S.CER C1608 CH 1H 270J-T	B	118.6/8.6
C4	4030009920	S.CER C1608 CH 1H 050B-T	B	113.7/8.7
C5	4030007050	S.CER C1608 CH 1H 220J-T	B	118.6/10.6
C8	4030006680	S.CER C1608 JB 1H 102K-T	B	113.1/10.6
C10	4030017460	S.CER C1005 JB 1H 102K-T	T	110.6/12.5
C13	4030017460	S.CER C1005 JB 1H 102K-T	T	114.2/19.5
C14	4030016790	S.CER C1005 JB 1E 103K-T	T	118.0/30.1
C15	4030007090	S.CER C1608 CH 1H 470J-T	T	113.1/25.2
C17	4030017460	S.CER C1005 JB 1H 102K-T	T	109.3/20.6
C18	4030017460	S.CER C1005 JB 1H 102K-T	B	113.3/18.6
C19	4030016790	S.CER C1005 JB 1E 103K-T	T	115.9/29.0
C20	4030017460	S.CER C1005 JB 1H 102K-T	T	119.8/35.9
C21	4550006480	S.TAN TEESVA 1C 475M8R	T	113.7/31.4
C22	4030017430	S.CER C1005 CH 1H 101J-T	T	103.9/19.9
C23	4030017460	S.CER C1005 JB 1H 102K-T	T	99.8/18.9
C24	4030017460	S.CER C1005 JB 1H 102K-T	T	100.6/26.7
C25	4030017460	S.CER C1005 JB 1H 102K-T	T	98.1/21.0
C26	4030017460	S.CER C1005 JB 1H 102K-T	T	96.8/18.7
C50	4550006250	S.TAN TEESVA 1A 106M8R	T	82.0/21.1
C52	4030007080	S.CER C1608 CH 1H 390J-T	T	115.5/9.2
C54	4030017460	S.CER C1005 JB 1H 102K-T	T	91.9/33.7
C70	4030017460	S.CER C1005 JB 1H 102K-T	B	79.5/35.2
C73	4030016930	S.CER C1005 JB 1A 104K-T	T	109.5/11.7
C75	4030016930	S.CER C1005 JB 1A 104K-T	T	104.1/17.6
C76	4030007040	S.CER C1608 CH 1H 180J-T	T	115.5/10.8
C79	4030017580	S.CER C1005 CH 1H 060C-T	B	112.7/5.7
C81	4030017440	S.CER C1005 CH 1H 221J-T	T	110.9/4.3
C82	4030017460	S.CER C1005 JB 1H 102K-T	T	109.8/5.6
C87	4030016790	S.CER C1005 JB 1E 103K-T	B	106.3/6.0
C88	4030017460	S.CER C1005 JB 1H 102K-T	B	107.5/6.4
C89	4030017460	S.CER C1005 JB 1H 102K-T	B	104.7/5.3
C90	4030017460	S.CER C1005 JB 1H 102K-T	T	110.0/6.6
C92	4030017690	S.CER C1005 CH 1H 121J-T	T	104.6/5.3
C93	4030017460	S.CER C1005 JB 1H 102K-T	T	102.4/6.6
C94	4030017340	S.CER C1005 CH 1H 010B-T	B	103.5/5.5
C95	4030017460	S.CER C1005 JB 1H 102K-T	T	99.9/4.6
C96	4030017680	S.CER C1005 CH 1H 820J-T	B	101.7/4.4
C97	4030017340	S.CER C1005 CH 1H 010B-T	B	102.7/4.2
C99	4030017460	S.CER C1005 JB 1H 102K-T	B	92.2/17.0
C102	4030017600	S.CER C1005 CH 1H 080C-T	B	93.1/12.3
C104	4030017460	S.CER C1005 JB 1H 102K-T	B	100.1/16.7
C105	4030016790	S.CER C1005 JB 1E 103K-T	B	1

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C135	4030017450	S.CER C1005 JB 1H 271K-T	T	98.1/12.2
C136	4030018240	S.CER C1005 JB 1H 562K-T	T	96.1/13.8
C137	4030017040	S.CER C1005 JB 1A 333K-T	T	95.5/12.2
C138	4030017460	S.CER C1005 JB 1H 102K-T	B	104.6/3.0
C139	4030018860	S.CER C1005 JB 0J 105K-T	B	63.8/20.5
C144	4030017460	S.CER C1005 JB 1H 102K-T	B	30.3/17.4
C145	4510008540	S.ELE EEE1CA100SR	B	61.9/11.0
C147	4030016950	S.CER C1005 JB 1A 473K-T	B	30.6/10.7
C149	4030016790	S.CER C1005 JB 1E 103K-T	B	63.5/6.1
C150	4550000460	S.TAN TEESVA 1C 105M8R	B	68.9/16.2
C152	4030016950	S.CER C1005 JB 1A 473K-T	B	72.6/4.0
C153	4510008500	S.ELE EEE1CA101WP	B	80.8/11.1
C154	4550006220	S.TAN TEESVA 0J 156M8R	B	27.2/6.8
C161	4030016790	S.CER C1005 JB 1E 103K-T	B	111.6/31.5
C162	4030016790	S.CER C1005 JB 1E 103K-T	B	109.2/35.3
C163	4030017460	S.CER C1005 JB 1H 102K-T	B	83.4/3.1
C164	4030017460	S.CER C1005 JB 1H 102K-T	B	72.1/2.7
C165	4030017460	S.CER C1005 JB 1H 102K-T	B	92.6/7.5
C166	4030017460	S.CER C1005 JB 1H 102K-T	B	93.8/4.1
C167	4030017420	S.CER C1005 CH 1H 470J-T	B	93.8/5.1
C168	4030017460	S.CER C1005 JB 1H 102K-T	B	92.2/9.5
C169	4030017460	S.CER C1005 JB 1H 102K-T	B	84.3/6.9
C171	4030016930	S.CER C1005 JB 1A 104K-T	B	65.5/5.9
C173	4510008500	S.ELE EEE1CA101WP	B	111.9/39.9
C174	4510008660	S.ELE EEE0JA220SR	B	117.5/32.1
C179	4030016790	S.CER C1005 JB 1E 103K-T	T	106.0/17.7
C193	4030017530	S.CER C1005 CH 1H 0R5B-T	B	33.6/13.6
C194	4030017600	S.CER C1005 CH 1H 080C-T	B	35.6/11.6
C195	4030017500	S.CER C1005 CH 1H 560J-T	B	33.1/12.6
C197	4030016930	S.CER C1005 JB 1A 104K-T	B	33.1/14.9
C199	4030016930	S.CER C1005 JB 1A 104K-T	B	46.6/11.0
C204	4030017460	S.CER C1005 JB 1H 102K-T	B	111.4/8.4
C205	4030006860	S.CER C1608 JB 1H 102K-T	B	114.6/13.2
C209	4030016930	S.CER C1005 JB 1A 104K-T	B	29.0/8.8
C212	4030016790	S.CER C1005 JB 1E 103K-T	T	79.0/18.0
C213	4550002890	S.TAN TEESVA 1A 225M8R	T	77.3/16.4
C214	4030017040	S.CER C1005 JB 1A 333K-T	T	80.5/13.5
C216	4030018920	S.CER C1005 JB 1H 392K-T	B	39.6/37.2
C217	4030016930	S.CER C1005 JB 1A 104K-T	T	101.3/17.6
C219	4030017040	S.CER C1005 JB 1A 333K-T	B	46.5/8.7
C230	4030017030	S.CER C1005 JB 1A 273K-T	B	27.5/16.2
C232	4030016930	S.CER C1005 JB 1A 104K-T	B	50.0/10.0
C233	4030017460	S.CER C1005 JB 1H 102K-T	T	74.8/21.4
C234	4030017460	S.CER C1005 JB 1H 102K-T	T	75.8/24.7
C236	4030016790	S.CER C1005 JB 1E 103K-T	B	67.9/28.0
C243	4030017460	S.CER C1005 JB 1H 102K-T	B	112.3/16.6
C244	4030016790	S.CER C1005 JB 1E 103K-T	B	65.8/29.5
C245	4030016790	S.CER C1005 JB 1E 103K-T	B	59.5/38.7
C249	4030016790	S.CER C1005 JB 1E 103K-T	B	50.9/41.1
C251	4030017460	S.CER C1005 JB 1H 102K-T	T	111.9/16.0
C252	4030017460	S.CER C1005 JB 1H 102K-T	T	113.1/13.5
C277	4030017580	S.CER C1005 CH 1H 060C-T	B	108.8/4.4
C278	4030007040	S.CER C1608 CH 1H 180J-T	B	114.6/14.5
C281	4030010760	S.CER C1608 CH 1H 331J-T	B	118.1/16.2
C282	4030017460	S.CER C1005 JB 1H 102K-T	T	109.4/34.3
C283	4030017760	S.CER C1005 JB 1H 222K-T	T	119.8/34.9
C285	4030009650	S.CER C1608 CH 1H 240J-T	B	116.8/16.4
C287	4030007050	S.CER C1608 CH 1H 220J-T	B	121.4/14.7
C288	4030017460	S.CER C1005 JB 1H 102K-T	B	111.4/9.4
C289	4030017460	S.CER C1005 JB 1H 102K-T	T	121.5/30.1
C293	4030016930	S.CER C1005 JB 1A 104K-T	T	82.3/37.3
C296	4030017730	S.CER C1005 JB 1H 471K-T	B	35.8/10.6
C297	4030016790	S.CER C1005 JB 1E 103K-T	B	35.8/9.6
C298	4550005980	S.TAN TEESVA 1A 475M8R	B	109.9/18.5
C299	4030017730	S.CER C1005 JB 1H 471K-T	B	93.8/3.1
C300	4030017460	S.CER C1005 JB 1H 102K-T	B	84.8/30.0
C301	4030017460	S.CER C1005 JB 1H 102K-T	T	88.5/21.3
C303	4030017460	S.CER C1005 JB 1H 102K-T	T	103.2/29.0
C304	4030016950	S.CER C1005 JB 1A 473K-T	B	22.7/17.0
C305	4030017730	S.CER C1005 JB 1H 471K-T	T	111.3/36.6
C351	4030017570	S.CER C1005 CH 1H 040B-T	B	97.7/21.5
C369	4030017040	S.CER C1005 JB 1A 333K-T	B	49.2/36.8
C370	4030018080	S.CER C1005 JB 1H 182K-T	B	46.2/36.6
C372	4030016970	S.CER C1005 JB 1E 223K-T	B	44.2/38.4
C373	4030017790	S.CER C1005 JB 1H 682K-T	B	52.8/38.6
C374	4030017760	S.CER C1005 JB 1H 222K-T	B	43.8/36.6
C375	4030017460	S.CER C1005 JB 1H 102K-T	B	102.2/29.7
C376	4030017460	S.CER C1005 JB 1H 102K-T	T	109.9/36.8
C377	4550006350	S.TAN TEESVB2 1A 226M8R	T	119.8/39.2
C378	4030016930	S.CER C1005 JB 1A 104K-T	B	121.4/39.2
C379	4030017460	S.CER C1005 JB 1H 102K-T	T	117.3/41.8
C380	4510008660	S.ELE EEE0JA220SR	B	118.3/41.8
C381	4550006250	S.TAN TEESVA 1A 106M8R	T	110.7/42.6
C385	4030016930	S.CER C1005 JB 1A 104K-T	B	120.8/33.3
C386	4030017590	S.CER C1005 CH 1H 070C-T	T	97.3/36.1
C387	4030017360	S.CER C1005 CH 1H 030B-T	T	97.7/34.8
C388	4550005980	S.TAN TEESVA 1A 475M8R	B	106.0/30.6
C399	4030017770	S.CER C1005 JB 1H 332K-T	B	62.9/7.1
C400	4030017760	S.CER C1005 JB 1H 222K-T	T	111.3/37.6
C401	4030016790	S.CER C1005 JB 1E 103K-T	B	18.5/40.6
C402	4030016930	S.CER C1005 JB 1A 104K-T	B	16.5/41.0
C404	4550007080	S.TAN TEESVA 1C 106M8R	B	17.7/42.5
C405	4030017460	S.CER C1005 JB 1H 102K-T	B	13.1/37.8
C406	4550007520	S.TAN F931A106MAABMA	B	10.4/30.7
C407	4550006250	S.TAN TEESVA 1A 106M8R	B	10.4/32.8
C408	4030017460	S.CER C1005 JB 1H 102K-T	B	15.5/26.7
C409	4030018860	S.CER C1005 JB 0J 105K-T	B	10.2/23.1
C410	4030016930	S.CER C1005 JB 1A 104K-T	B	13.2/24.9
C411	4030016930	S.CER C1005 JB 1A 104K-T	B	10.2/26.6
C412	4030016790	S.CER C1005 JB 1E 103K-T	B	34.1/40.2
C413	4030017460	S.CER C1005 JB 1H 102K-T	B	29.8/42.5
C414	4030017460	S.CER C1005 JB 1H 102K-T	B	14.5/13.3
C415	4030017460	S.CER C1005 JB 1H 102K-T	B	22.7/18.0
C416	4030017460	S.CER C1005 JB 1H 102K-T	B	19.8/8.3
C417	4030016930	S.CER C1005 JB 1A 104K-T	B	98.2/28.0

[MAIN UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C418	4030016930	S.CER C1005 JB 1A 104K-T	B	99.5/21.9
C421	4030016930	S.CER C1005 JB 1A 104K-T	T	105.0/34.6
C422	4030016930	S.CER C1005 JB 1A 104K-T	T	101.7/38.6
C423	4030017490	S.CER C1608 JB 1A 105K-T	T	95.9/14.9
C424	4030016790	S.CER C1005 JB 1E 103K-T	B	34.0/11.2
C425	4030016790	S.CER C1005 JB 1E 103K-T	B	52.9/31.0
C429	4030018860	S.CER C1005 JB 0J 105K-T	B	92.1/35.3
C430	4030016790	S.CER C1005 JB 1E 103K-T	T	89.5/27.9
C431	4030017460	S.CER C1005 JB 1H 102K-T	B	59.8/6.1
C432	4030018860	S.CER C1005 JB 0J 105K-T	B	58.8/6.1
C433	4030017390	S.CER C1005 CH 1H 180J-T	T	93.1/20.0
C434	4030017390	S.CER C1005 CH 1H 180J-T	T	95.5/22.0
C435	4030017640	S.CER C1005 CH 1H 150J-T	B	93.1/13.9
C437	4030017640	S.CER C1005 CH 1H 150J-T	B	88.9/14.7
C438	4030017460	S.CER C1005 JB 1H 102K-T	B	88.1/16.5
C439	4030017340	S.CER C1005 CH 1H 010B-T	T	90.5/22.3
C440	4030017600	S.CER C1005 CH 1H 080C-T	B	87.9/20.2
C441	4030017460	S.CER C1005 JB 1H 102K-T	B	84.6/20.2
C442	4030017460	S.CER C1005 JB 1H 102K-T	B	86.9/20.2
C443	4030017420	S.CER C1005 CH 1H 470J-T	T	77.4/20.8
C444	4030017570	S.CER C1005 CH 1H 040B-T	B	85.1/24.0
C445	4030017530	S.CER C1005 CH 1H 0R5B-T	B	85.1/26.5
C446	4030017400	S.CER C1005 CH 1H 220J-T	B	84.1/24.0
C447	4030017340	S.CER C1005 CH 1H 010B-T	B	83.0/19.7
C448	4030017340	S.CER C1005 CH 1H 010B-T	B	79.3/21.9
C449	4030017460	S.CER C1005 JB 1H 102K-T	T	88.5/23.0
C450	4030017460	S.CER C1005 JB 1H 102K-T	B	80.0/19.7
C451	4030017360	S.CER C1005 CH 1H 030B-T	B	87.9/26.4
C452	4030017570	S.CER C1005 CH 1H 040B-T	B	87.4/31.8
C453	4030017420	S.CER C1005 CH 1H 470J-T	B	85.7/31.3
C454	4030017360	S.CER C1005 CH 1H 030B-T	T	88.4/38.0
C455	4030017360	S.CER C1005 CH 1H 030B-T	T	90.9/37.0
C456	4030007040	S.CER C1608 CH 1H 180J-T	B	79.5/23.6
C457	4030007050	S.CER C1608 CH 1H 220J-T	B	77.7/23.1
C458	4030017460	S.CER C1005 JB 1H 102K-T	B	76.2/19.7
C459	4030017460	S.CER C1005 JB 1H 102K-T	T	79.0/19.6
C460	4030007020	S.CER C1608 CH 1H 120J-T	B	75.8/23.2
C461	4030017460	S.CER C1005 JB 1H 102K-T	B	79.0/26.2
C462	4030017460	S.CER C1005 JB 1H 102K-T	B	83.1/27.1
C463	4030017460	S.CER C1005 JB 1H 102K-T	B	91.4/20.1
C464	4030006910	S.CER C1608 CH 1H 0R5C-T	B	75.8/29.4
C465	4030017460	S.CER C1005 JB 1H 102K-T	B	78.2/28.7
C466	4030007110	S.CER C1608 CH 1H 680J-T	B	115.5/18.6
C467	4030007010	S.CER C1608 CH 1H 100D-T	T	122.9/21.9
C471	4030011600	S.CER C1608 JB 1E 104K-T	T	77.9/33.6
C472	4550004040	S.TAN TEESVA 0J 685M8R	T	78.4/24.7
C473	4550000550	S.TAN TEESVA 1V 224M8R	T	85.0/24.5
C474	4550000530	S.TAN TEESVA 1V 104M8R	T	77.2/29.8
C475	4030017460	S.CER C1005 JB 1H 102K-T	T	76.9/24.7
C476	4030017460	S.CER C1005 JB 1H 102K-T	T	80.0/25.5
C478	4030017460	S.CER C1005 JB 1H 102K-T	B	97.7/19.4
C479	4030016790	S.CER C1005 JB 1E 103K-T	B	95.0/32.1
C482	4030017460	S.CER C1005 JB 1H 102K-T	B	101.1/31.3
C486	4030016930	S.CER C1005 JB 1A 104K-T	T	91.5/29.0
C487	4030017420	S.CER C1005 CH 1H 470J-T	T	83.7/36.8
C488	4030017730	S.CER C1005 JB 1H 471K-T	T	85.5/36.8
C489	4030017460	S.CER C1005 JB 1H 102K-T	T	91.4/28.0
C491	4030017500	S.CER C1005 CH 1H 560J-T	T	94.7/37.1
C492	4030017570	S.CER C1005 CH 1H 040B-T	T	94.7/36.1
C493	4030017460	S.CER C1005 JB 1H 102K-T	T	92.3/23.9
C496	4030016790	S.CER C1005 JB 1E 103K-T	T	93.4/36.4
C497	4030017380	S.CER C1005 CH 1H 050B-T	T	92.0/31.3
C499	4030017360	S.CER C1005 CH 1H 030B-T	T	106.4/3.6
C500	4030018860	S.CER C1005 JB 0J 105K-T	T	108.7/7.4
C502	4030017350	S.CER C1005 CH 1H 020B-T	B	103.9/6.7
C503	4030017340	S.CER C1005 CH 1H 010B-T	B	102.9/6.7
C504	4030017340	S.CER C1005 CH 1H 010B-T	B	102.8/8.4
C505	4030017430	S.CER C1005 CH 1H 101J-T	T	103.6/9.9
C506	4030017460	S.CER C1005 JB 1H 102K-T	T	93.8/9.9
C507	4030017350	S.CER C1005 CH 1H 020B-T	B	101.7/9.3
C509	4030017460	S.CER C1005 JB 1H 102K-T		



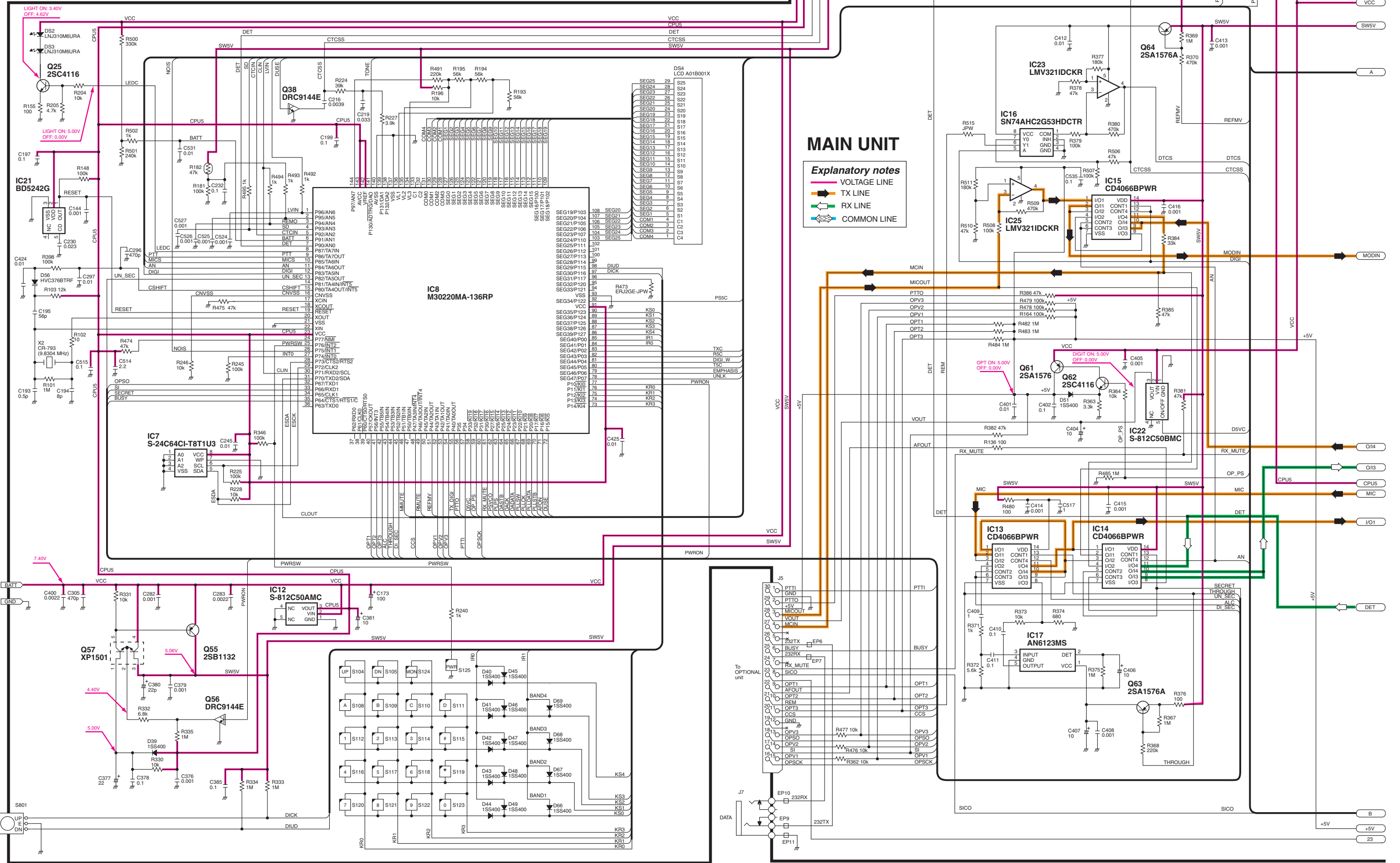
[MAIN UNIT]

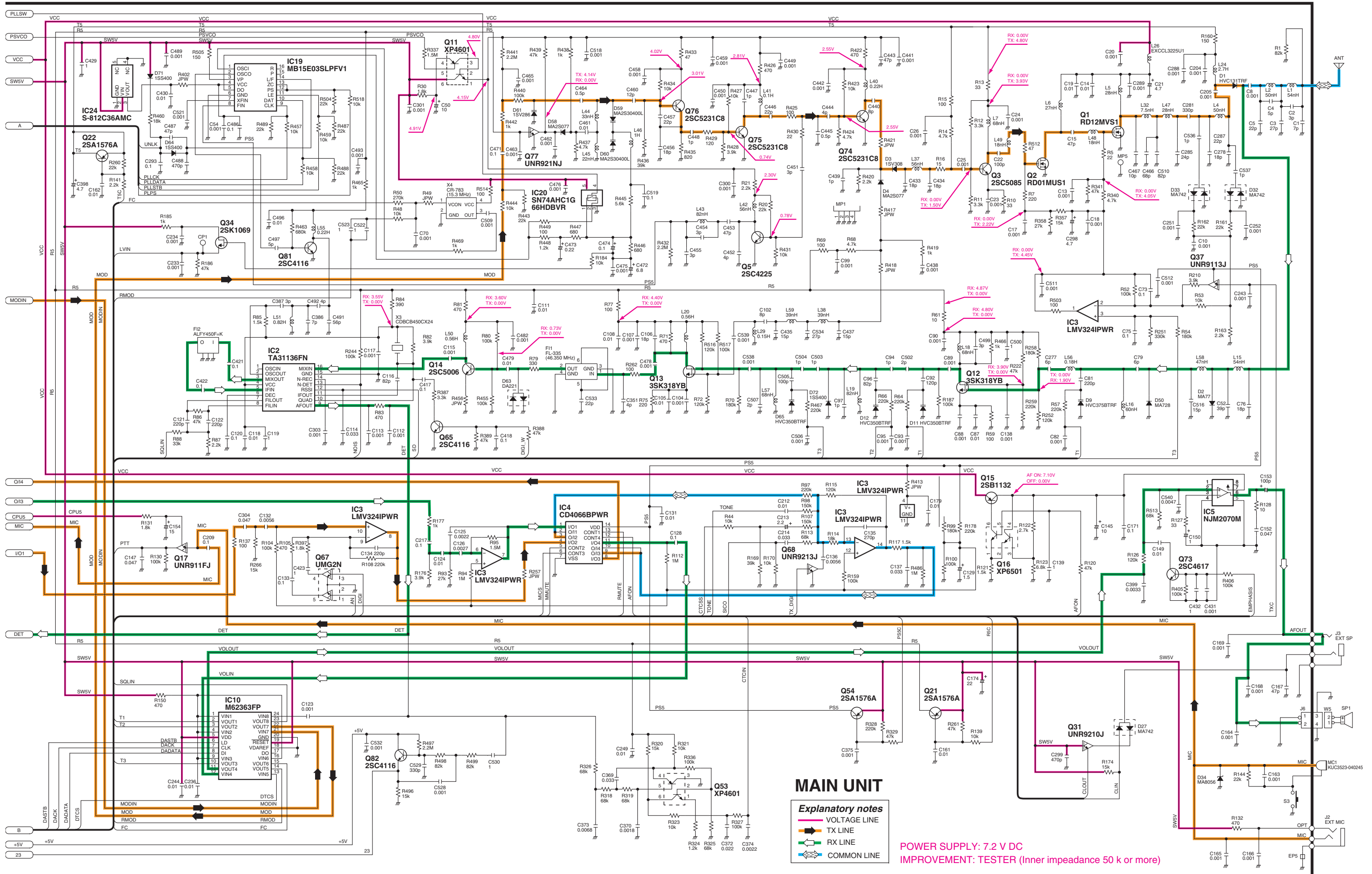
REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
J6	6510021901	S.CON BM02B-ASRS-TF(LF)(SN)	T	71.5/4.0
J7	6510024580	S.CON HSJ1621-019011	B	12.6/1.9
DS2	5010000160	S.LED LNJ310M6URA	T	64.1/38.9
DS3	5010000160	S.LED LNJ310M6URA	T	64.1/7.1
DS4	5030002801	LCD A01B001A 2826 LCD		
MC1	7700002700	MIC EM9445P-45-LF <HOR>		
S3	2260002840	SWI SKHLLFA010		
S801	7600000210	ENC TP70N00E20-15F-1903		
EP5	6910012350	S.BEA MMZ1608Y 102BT	T	101.2/9.4
EP6	6910012350	S.BEA MMZ1608Y 102BT	B	20.8/42.4
EP7	6910012350	S.BEA MMZ1608Y 102BT	B	22.1/42.4
EP9	6910012350	S.BEA MMZ1608Y 102BT	B	5.2/9.1
EP10	6910012350	S.BEA MMZ1608Y 102BT	B	7.2/12.0
EP11	6910012350	S.BEA MMZ1608Y 102BT	B	5.2/6.4
EP12	8930064900	LCD SRCN-2826-SP-N-W (SHJ)		

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

# VOLTAGE DIAGRAM

## • MAIN UNIT





**MAIN UNIT**

- Explanatory notes**
- VOLTAGE LINE
  - TX LINE
  - RX LINE
  - COMMON LINE

POWER SUPPLY: 7.2 V DC  
 IMPROVEMENT: TESTER (Inner impedance 50 k or more)



# SERVICE MANUAL ADDENDUM

## IC-V82 IC-V82-T

### CONTENTS

REPLACEMENT PAGES .....	1-1, 5-2
PARTS LIST .....	1
BOARD LAYOUTS .....	6
VOLTAGE DIAGRAM .....	8

### [VERSION LIST]

Model	Version	Battery Pack
IC-V82	[EUR]	-
	[EXP]	
	[USA]	
IC-V82-T	[THA]	
IC-V82	[CSA]	BP-208
	[EUR-1]	
	[EXP-1]	
	[USA-1]	
	[CHN]	
	[CSA-1]	BP-222N
	[EUR-2]	
	[EXP-2]	
	[USA-2]	
	[KOR]	
	[CHN-01]	-
	[CSA-2]	
	[EXP-3]	BP-209N
	[CHN-02]	
	[CSA-3]	
[EUR-3]		
[EXP-4]		
	[USA-3]	

## SECTION 1 SPECIFICATIONS

### ■ GENERAL

- Frequency range : TX 144.000–148.000 MHz [USA], [USA-1], [USA-2], [USA-3]  
144.000–146.000 MHz [EUR], [EUR-1], [EUR-2], [EUR-3], [KOR], [THA]  
136.000–174.000 MHz\* [EXP], [EXP-1], [EXP-2], [EXP-3], [EXP-4],  
[CHN], [CHN-01], [CHN-02],  
[CSA], [CSA-1], [CSA-2], [CSA-3]  
: RX 136.000–174.000 MHz\* [USA], [USA-1], [USA-2], [USA-3],  
[EXP], [EXP-1], [EXP-2], [EXP-3], [EXP-4],  
[CHN], [CHN-01], [CHN-02],  
[CSA], [CSA-1], [CSA-2], [CSA-3]  
144.000–146.000 MHz [EUR], [EUR-1], [EUR-2], [EUR-3], [KOR], [THA]  
\*Specifications are guaranteed within 144.000 to 148.000 MHz range only.
- Operating temperature range : –10°C to 60°C; +14°F to +140°F
- Operating mode : F2D, F3E, F7W\* (\*With optional digital unit **UT-118**)
- Frequency stability : ±2.5 ppm (–10°C to +60°C; +14°F to +140°F)
- Antenna impedance : 50 Ω (BNC type)
- Power supply requirement : Specified Icom's battery pack only (Operating voltage range; 6.0–10.3 V)
- Number of memory channels : 207 channels (Including 6 scan edges and 1 call channel)
- Scan types : Program/Memory/Skip/Priority/Tone scans
- Tuning steps : 5, 10, 12.5, 15, 20, 25, 30 and 50 kHz
- Current drain (At 7.2 V DC; approx.) : TX High 2.6 A  
Middle 2.0 A  
Low 1.0 A  
RX Max. audio Less than 250 mA  
Stand-by Less than 80 mA  
Power save Less than 30 mA
- Dimensions (Projections not included) : 54.0 (W) × 139.0 (H) × 36.7 (D) mm; 2 1/8 (W) × 5 15/32 (H) × 1 9/32 (D) in.
- Weight (Except antenna, battery pack) : Approx. 200 g (7 5/32 oz)
- Data connector : 3-conductor 2.5 (d) mm (1/10")

### ■ TRANSMITTER

- Output power (At 7.2 V DC) : 7.0 W (High), 4.0 W (Middle), 0.5 W (Low) Other than [IC-V82-T]  
5.5 W (High), 4.0 W (Middle), 0.5 W (Low) [IC-V82-T]
- Modulation system : Variable reactance frequency modulation
- Maximum deviation : ±2.5 kHz (Narrow), ±5.0 kHz (Wide)
- Spurious emissions : Less than –60 dBc
- Ext. microphone connector : 3-conductor 2.5 (d) mm (1/10")/2.2 kΩ

### ■ RECEIVER

- Receiving system : Double conversion superheterodyne system
- Intermediate frequencies : 1st; 46.35 MHz, 2nd; 450 kHz
- Sensitivity : Less than –14 dBμ at 12 dB SINAD (0.16 μV typ.)
- Squelch sensitivity (At threshold) : Less than –16 dBμ (0.11 μV typ.)
- Selectivity : More than 55 dB (Wide; 65 dB typ.)  
More than 50 dB (Narrow)
- Intermodulation : More than 55 dB (65 dB typ.)
- Spurious image rejection : More than 60 dB (80 dB typ.)
- Audio output : More than 300 mW at 10% distortion with an 8 Ω load
- Ext. speaker connector : 3-conductor 3.5 (d) mm (1/8")/8 Ω

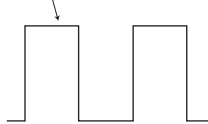
All stated specifications are subject to change without notice or obligation.

## 5-2 ADJUSTMENTS

### 5-2-1 KEY OPERATION FOR THE ADJUSTMENT

- Rotate [VOL] to adjust the value.
- Push [D•CLR] key to store the adjustment value and move to next adjustment item.
- Push [▲]/[▼] key to move to next adjustment item without changing the value.

### 5-2-2 FREQUENCY AND TRANSMIT ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION
ENTERING ADJUSTMENT MODE	• While pushing [▲], [▼] and [D•CLR] keys, turn power ON.	
REFERENCE FREQUENCY <i>F<sub>r</sub></i> 146.00	1 • Connect a frequency counter to the antenna connector through an attenuator. • Transmitting	• Rotate [VOL] to set to 146.000 MHz ±100Hz. • Push [D•CLR] key.
TRANSMIT LOCK VOLTAGE <i>L<sub>V</sub></i> 146.00	1 • Transmitting	• Push [D•CLR] key, then push [▼] key. (Do not release [PTT] button when pushing [D•CLR] key.)
OUTPUT POWER (High) <i>P<sub>o</sub></i> 146.00	1 • Connect an RF power meter to the antenna connector. • Transmitting	• Rotate [VOL] to set the transmit power to 7.0 W (except [THA])/5.5W (for [THA] only). • Push [D•CLR] key.
(Middle) <i>P<sub>o</sub></i> 146.00 <sub>M</sub>	2 • Transmitting	• Rotate [VOL] to set the transmit power to 4.0 W. • Push [D•CLR] key.
(Low) <i>P<sub>o</sub></i> 146.00 <sub>L</sub>	3 • Transmitting	• Rotate [VOL] to set the transmit power to 0.5 W. • Push [D•CLR] key.
FREQUENCY DEVIATION <i>d<sub>E</sub></i> 146.00	1 • Mode : Wide • Connect an FM deviation meter to the antenna connector through an attenuator and set as : HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • Connect an audio generator to [MIC] jack and set as; Frequency : 1 kHz Level : 150 mV rms • Transmitting	• Rotate [VOL] to set to ±4.2 kHz. • Push [D•CLR] key.
DIGITAL VCO FREQUENCY DEVIATION <i>d<sub>V</sub></i> 146.00	1 • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to ±1.20 kHz. • Push [D•CLR] key.
DTCS WAVE FORM <i>d<sub>t</sub></i> 146.00	1 • Mode : Wide • Connect an oscilloscope and the FM deviation meter to the antenna connector. • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to square wave form as shown below. • Push [D•CLR] key.  Set to square wave form 
DIGITAL REFERENCE FREQUENCY DEVIATION <i>d<sub>V</sub></i> 146.00	1 • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to ±1.20 kHz. • Push [D•CLR] key.











[MAIN UNIT]

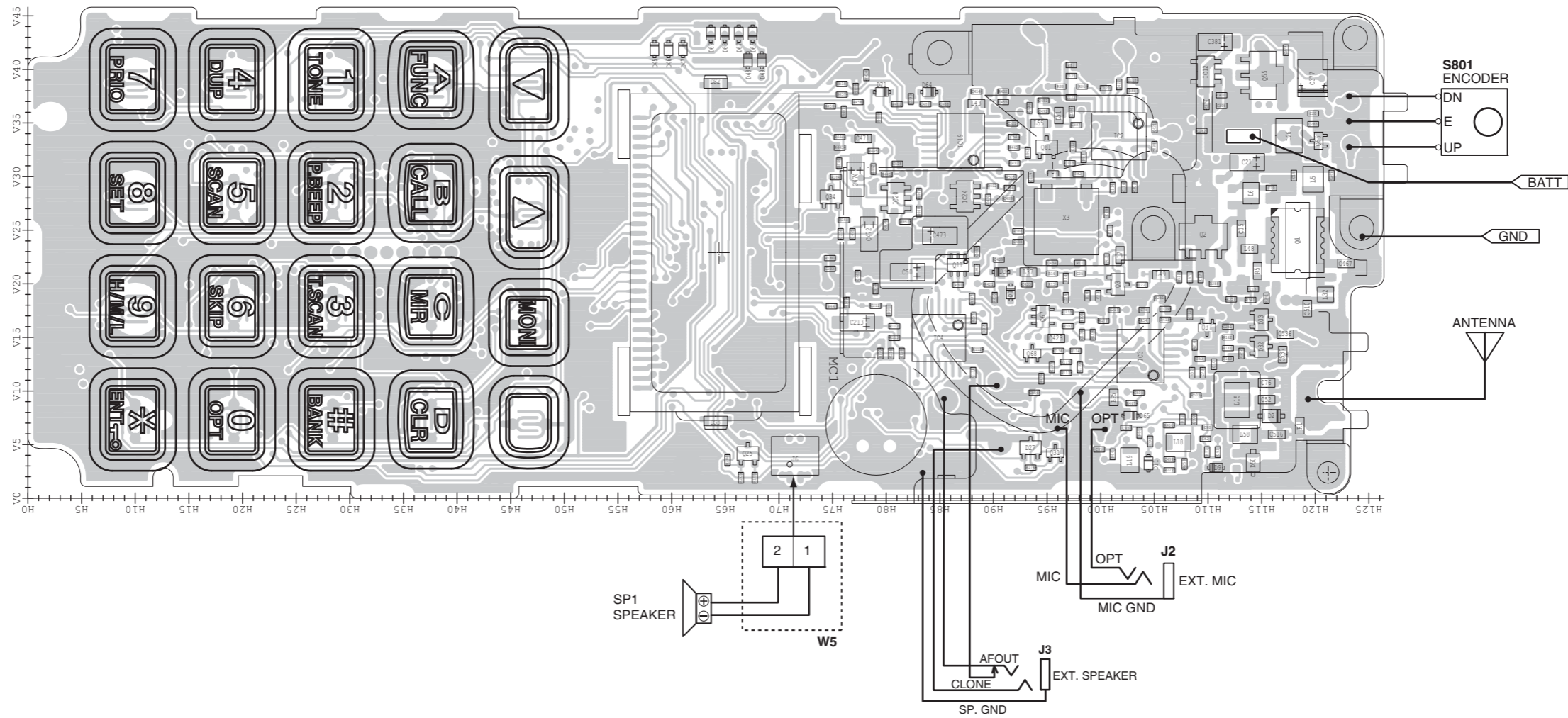
REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
EP5	6910012350	S.BEA MMZ1608Y 102BT	T	101.2/9.4
EP6	6910012350	S.BEA MMZ1608Y 102BT	B	20.8/42.3
EP7	6910012350	S.BEA MMZ1608Y 102BT	B	22.1/42.3
EP9	6910012350	S.BEA MMZ1608Y 102BT	B	5.1/9.1
EP10	6910012350	S.BEA MMZ1608Y 102BT	B	7.1/12
EP11	6910012350	S.BEA MMZ1608Y 102BT	B	5.1/6.3
EP12	8930064900	LCD SRCN-2826-SP-N-W (SHJ)		
MP1	8510016471	S.CAS 2775 VCO CASE-1	B	81.7/25.7
MP5	8410002580	S.HEA 2826 PA HEATSINK Y760	B	114.6/25.2

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

# BOARD LAYOUTS

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

## • MAIN UNIT (TOP VIEW)



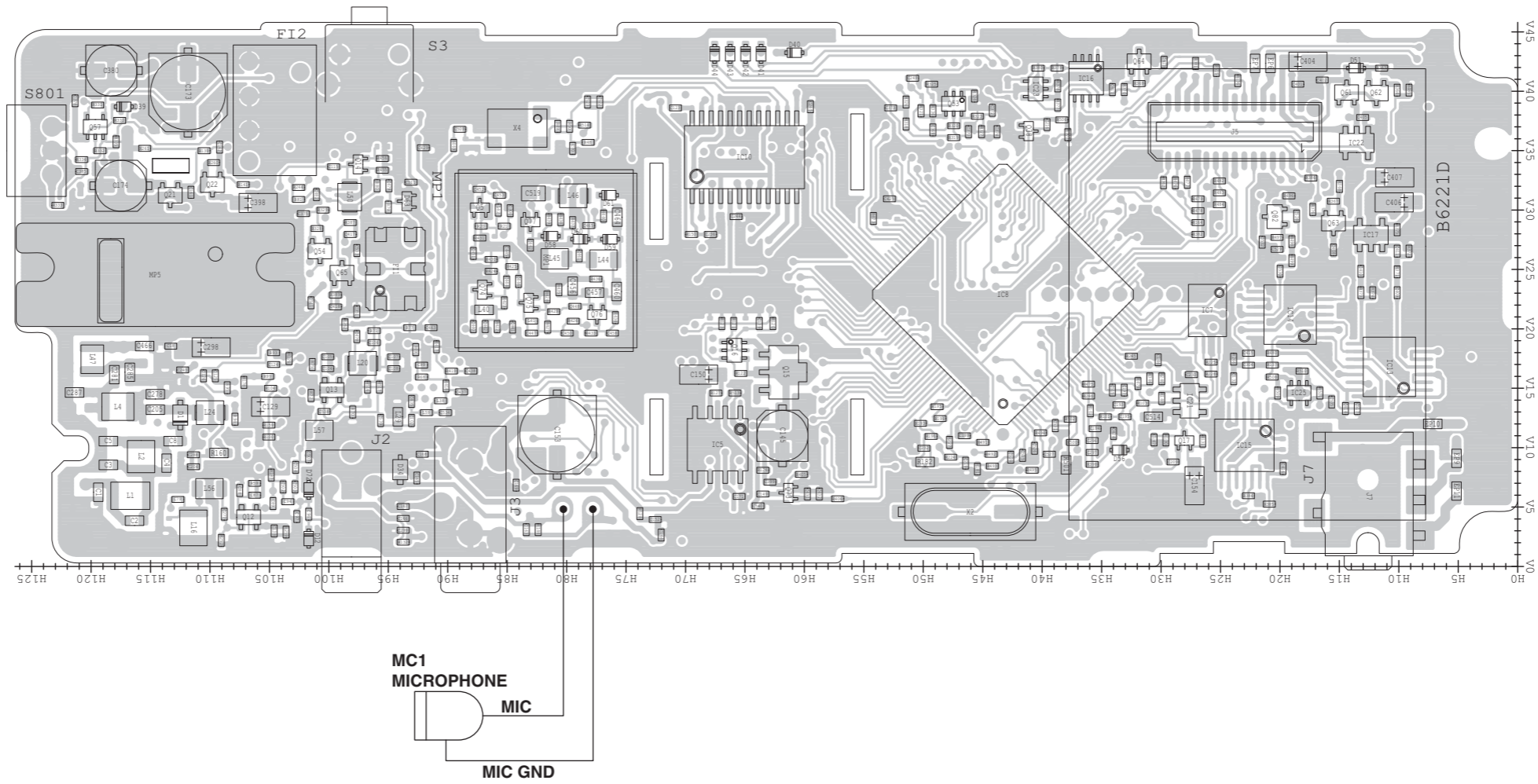
The combination of this page and next page shows the top side and bottom side of actual P.C. board.

• MAIN UNIT  
(BOTTOM VIEW)

To Optional unit J301

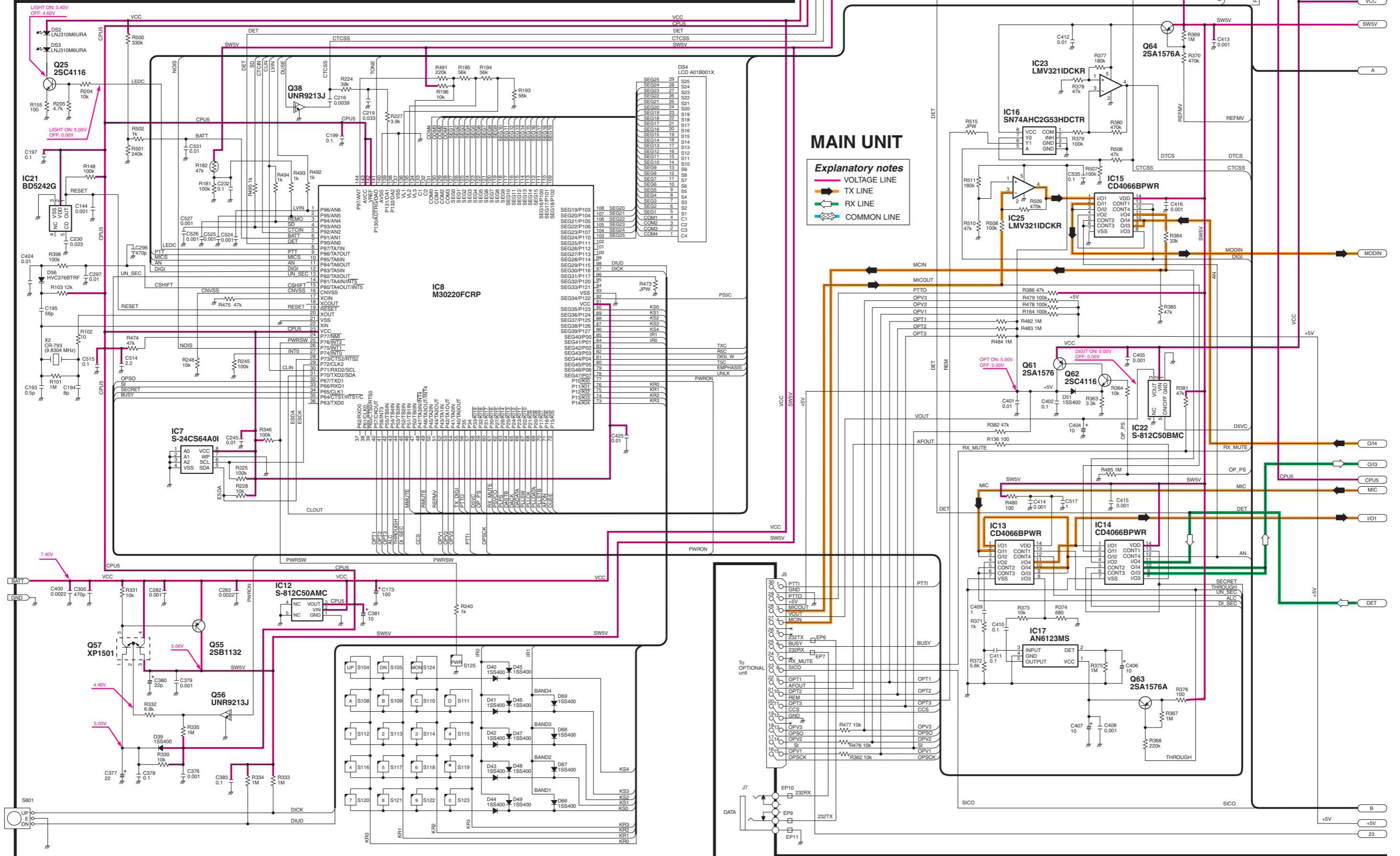
16	OPV1	OPV2	OPV3	GND	OPT2	OPT1	SICO	NC	BUSY	NC	MICIN	MICOUT	PTTOUT	15
	OPV1	OPV2	OPV3	GND	OPT2	OPT1	SICO	NC	BUSY	NC	MICIN	MICOUT	PTTOUT	
	OPSCK	SI	OPSO	NC	CCS	REFMOD	AFOUT	FMDDET	RXMUTE	232RX	232TX	VCC 5V	GND	30

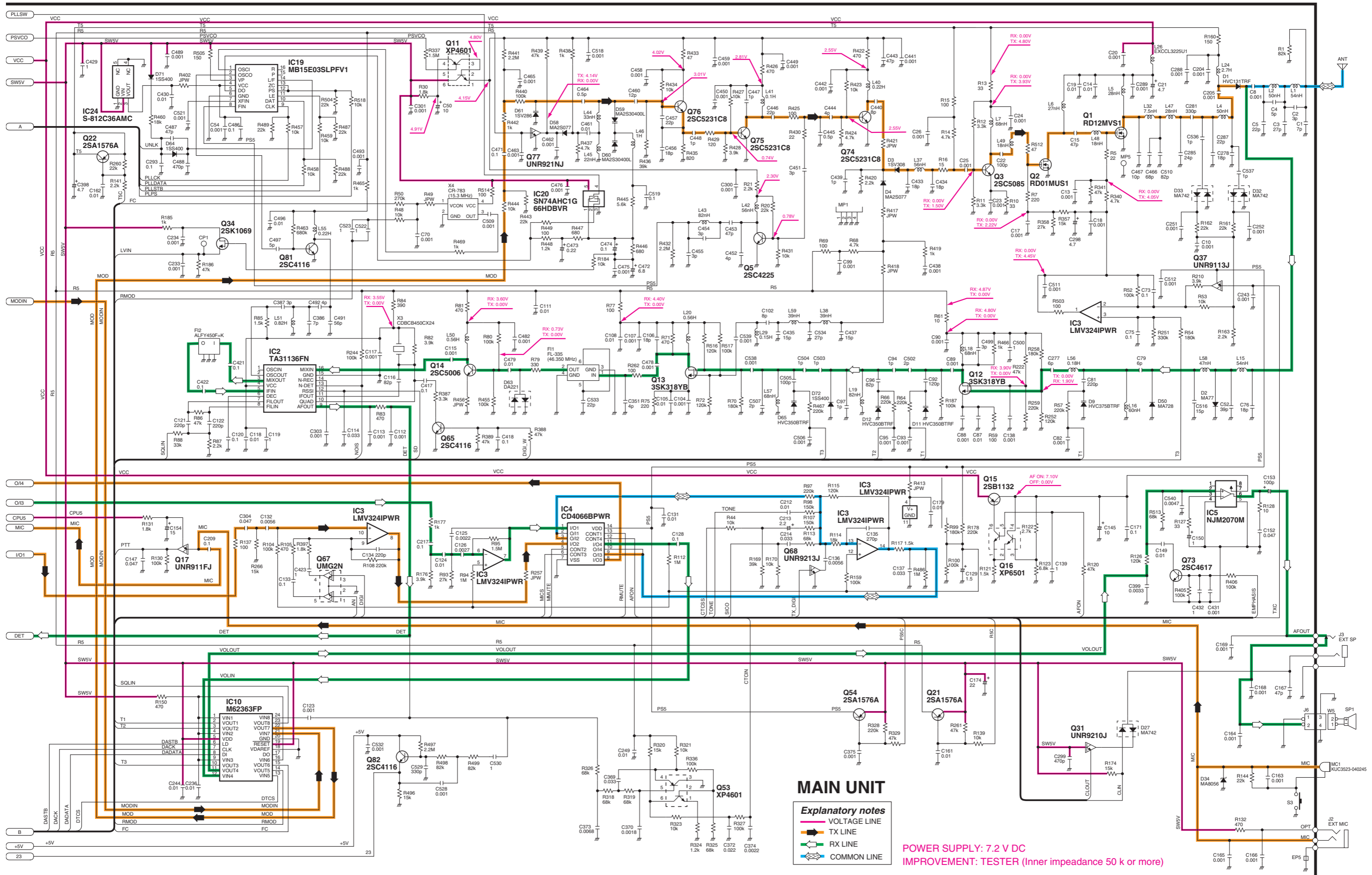
J5



# VOLTAGE DIAGRAM

## MAIN UNIT





**ICOM<sup>®</sup>**

**SERVICE  
MANUAL**

VHF TRANSCEIVER

**IC-V82**

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## INTRODUCTION

This service manual describes the latest service information for the **IC-V82** VHF TRANSCEIVER at the time of publication.

MODEL	VERSION	SYMBOL	BATTERY PACK
IC-V82	USA	[USA-1]	BP-208N
		[USA-2]	BP-222N
		[USA-3]	BP-209N
	EUR	[EUR-1]	BP-208N
		[EUR-2]	BP-222N
		[EUR-3]	BP-209N
	CSA	[CSA-1]	BP-208N
		[CSA-2]	BP-222N
		[CSA-3]	BP-209N
	EXP	[EXP-1]	BP-208N
		[EXP-2]	BP-222N
		[EXP-3]	
[EXP-4]		BP-209N	

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

## DANGER

**NEVER** connect the transceiver to an AC outlet or a DC power supply that uses more than 10.3 V. 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 order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

### <SAMPLE ORDER>

1110003490 S.IC TA31136FN IC-V82 MAIN UNIT 1 piece  
8210021290 2826 front panel IC-V82 CHASSIS 5 pieces

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



## REPAIR NOTES

1. Make sure 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 signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB or 50 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 equipment to the transceiver.

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## TABLE OF CONTENTS

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<b>SECTION 1</b>	<b>SPECIFICATIONS</b>	
<b>SECTION 2</b>	<b>INSIDE VIEWS</b>	
<b>SECTION 3</b>	<b>DISASSEMBLY INSTRUCTIONS</b>	
<b>SECTION 4</b>	<b>CIRCUIT DESCRIPTION</b>	
4 - 1	RECEIVER CIRCUITS .....	4 - 1
4 - 2	TRANSMITTER CIRCUITS .....	4 - 2
4 - 3	PLL CIRCUITS .....	4 - 3
4 - 4	OTHER CIRCUITS .....	4 - 3
4 - 5	POWER SUPPLY CIRCUITS .....	4 - 4
4 - 6	CPU PORT ALLOCATIONS .....	4 - 4
4 - 7	UT-118 CIRCUIT DESCRIPTION .....	4 - 6
4 - 8	UT-118 POWER SUPPLY CIRCUITS .....	4 - 6
4 - 9	UT-118 PORT ALLOCATIONS .....	4 - 6
<b>SECTION 5</b>	<b>ADJUSTMENT PROCEDURES</b>	
5 - 1	PREPARATION .....	5 - 1
5 - 2	IC-V82 ADJUSTMEN.....	5 - 2
5 - 3	UT-118 ADJUSTMENT .....	5 - 6
<b>SECTION 6</b>	<b>PARTS LIST</b>	
<b>SECTION 7</b>	<b>MECHANICAL PARTS AND DISASSEMBLY</b>	
<b>SECTION 8</b>	<b>SEMICONDUCTOR INFORMATION</b>	
<b>SECTION 9</b>	<b>BOARD LAYOUTS</b>	
9 - 1	MAIN UNIT .....	9 - 1
<b>SECTION 10</b>	<b>BLOCK DIAGRAM</b>	
<b>SECTION 11</b>	<b>VOLTAGE DIAGRAM</b>	
<b>SECTION 12</b>	<b>UT-118 DIGITAL UNIT (OPTIONAL UNIT)</b>	
12 - 1	UT-118 BOARD LAYOUT .....	12 - 1
12 - 2	UT-118 SEMICONDUCTER INFORMATION.....	12 - 2
12 - 3	UT-118 BLOCK DIAGRAM .....	12 - 2
12 - 4	UT-118 VOLTAGE DIAGRAM.....	12 - 3

# SECTION 1 SPECIFICATIONS

## ■ GENERAL

- Frequency range : TX 144.000–148.000 MHz [USA]  
144.000–146.000 MHz [EUR]  
136.000–174.000 MHz\* [EXP], [CSA]  
RX 136.000–174.000 MHz\* [USA], [EXP], [CSA]  
144.000–146.000 MHz [EUR]  
\*Specifications are guaranteed within 144.000 to 148.000 MHz range only.
- Operating temperature range : –10°C to 60°C; +14°F to +140°F
- Operating mode : F2D, F3E, F7W\* (\*with optional digital unit **UT-118**)
- Frequency stability : ±2.5 ppm (–10°C to +60°C; +14°F to +140°F)
- Antenna impedance : 50 Ω (BNC Type)
- Power supply requirement : Specified Icom's battery pack only (Operating voltage range; 6.0–10.3 V)
- Number of memory channels : 207 channels (Including 6 scan edges and 1 call channel)
- Scan types : Program/Memory/Skip/Priority/Tone scans
- Tuning steps : 5, 10, 12.5, 15, 20, 25, 30 and 50 kHz
- Current drain (at 7.2 V DC; approx.) : TX High 2.6 A  
Middle 2.0 A  
Low 1.0 A  
RX Max. audio Less than 250 mA  
Stand-by Less than 80 mA  
Power save Less than 30 mA
- Dimensions (Projections not included) : 54.0 (W) × 139.0 (H) × 41.1 (D) mm; 2 1/8 (W) × 5 15/32 (H) × 1 5/8 (D) in.
- Weight (except antenna, battery pack) : Approx. 200 g (7 5/32 oz)
- Data connector : 3-conductor 2.5 (d) mm (1/10")

## ■ TRANSMITTER

- Output power (at 7.2 V DC) : 7.0 W (High), 4.0 W (Middle), 0.5 W (Low)
- Modulation system : Variable reactance frequency modulation
- Maximum deviation : ±2.5 kHz (Narrow), ±5.0 kHz (Wide)
- Spurious emissions : Less than –60 dBc
- Ext. microphone connector : 3-conductor 2.5 (d) mm (1/10")/2.2 kΩ

## ■ RECEIVER

- Receiving system : Double conversion superheterodyne system
- Intermediate frequencies : 1st; 46.35 MHz, 2nd; 450 kHz
- Sensitivity : Less than –14 dBμ at 12 dB SINAD (0.16 μV typ.)
- Squelch sensitivity (at threshold) : Less than –16 dBμ (0.11 μV typ.)
- Selectivity : More than 55 dB (Wide; 65 dB typ.)  
More than 50 dB (Narrow)
- Intermodulation : More than 55 dB (65 dB typ.)
- Spurious image rejection : More than 60 dB (80 dB typ.)
- Audio output : More than 300 mW at 10% distortion with an 8 Ω load
- Ext. speaker connector : 3-conductor 3.5 (d) mm (1/8")/8 Ω

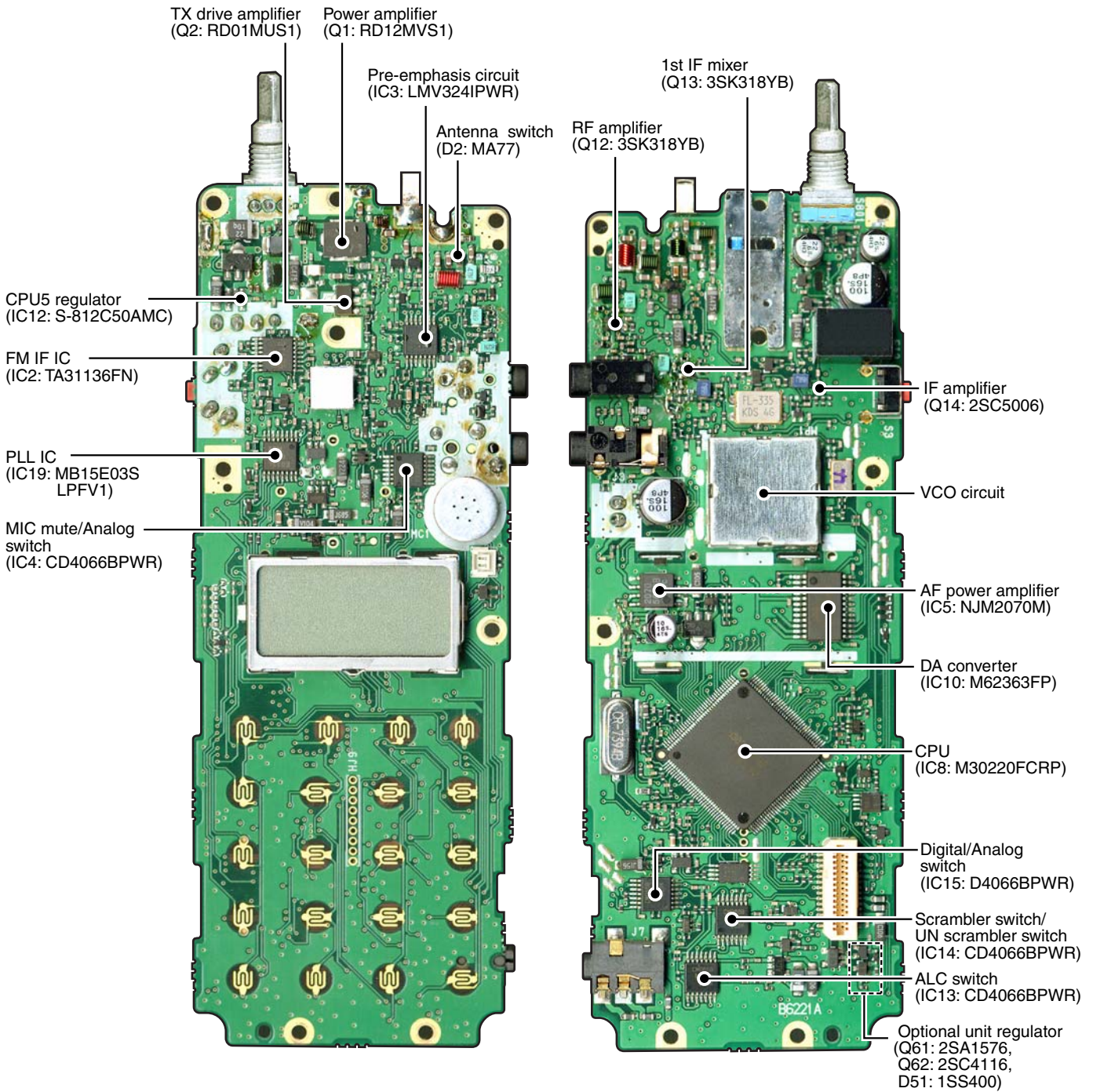
All stated specifications are subject to change without notice or obligation.

# SECTION 2 INSIDE VIEWS

## • MAIN UNIT

Top view

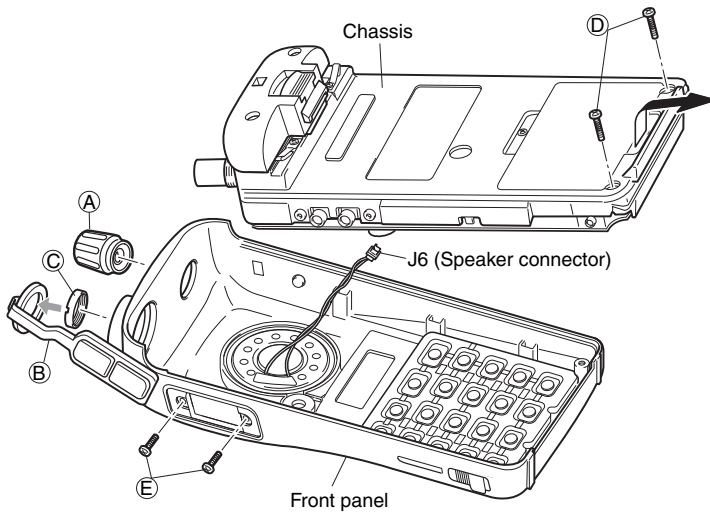
Bottom view



## SECTION 3 DISASSEMBLY INSTRUCTIONS

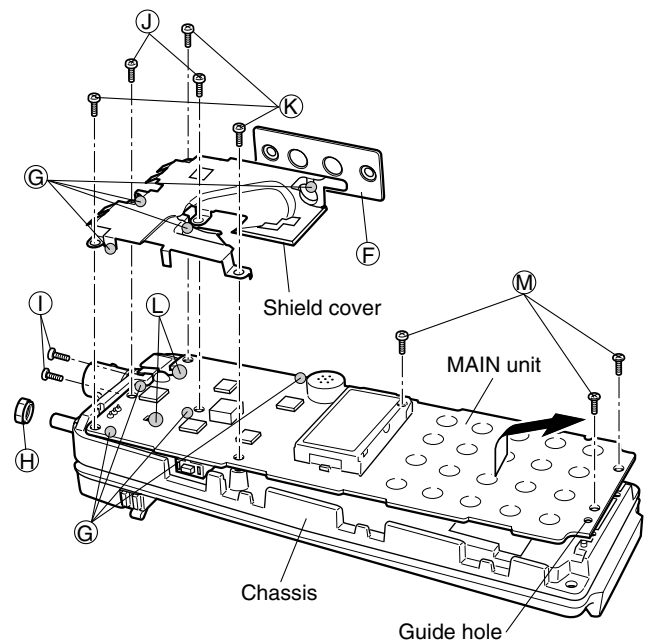
### 1. Removing the chassis panel

- ① Remove the knob (A) and jack cap (B).
- ② Unscrew 1 nut (C).
- ③ Unscrew 2 screws (D) (2 × 10 mm, black) and 2 screws (E) (2 × 4 mm, black) from the chassis.
- ④ Unplug the speaker connector (J6).
- ⑤ Take off the chassis in the direction of the arrow.



### 2. Removing the MAIN unit.

- ① Remove the Jack seal (F).
- ② Unsolder 4 points (G) of the shield cover.
- ③ Unscrew 1 nut (H) and 2 screws (I) (2 × 4 mm, black).
- ④ Unscrew 2 screws (J) (2 × 4 mm, black) and 3 screws (K) (2 × 4 mm, silver) and remove the shield cover.
- ⑤ Unsolder 2 points (L).
- ⑥ Unscrew 3 screws (M) (2 × 4 mm, silver).
- ⑦ Take off the MAIN unit in the direction of the arrow.



## SECTION 4 CIRCUIT DESCRIPTION

### 4-1 RECEIVER CIRCUITS

#### 4-1-1 ANTENNA SWITCHING CIRCUIT

The antenna switching circuit toggles receive line and transmit line. This circuit does not allow transmit signals to enter the receiver circuits.

Received signals from the antenna are passed through the low-pass filter (LPF: L1, L2, C1–C5) and applied to the  $\lambda/4$  type antenna switching circuit (D1, D2).

While receiving, no voltage is applied to D1 and D2. Thus, the receive line and the ground are disconnected and L15, L58, C52, C76 and C516 function as a two-stage LPF which leads received signals to the RF circuits via the limiter (D50).

#### 4-1-2 RF CIRCUITS

The RF circuits amplify received signals within the range of frequency coverage and filters off out-of-band signals.

The signals from the antenna switching circuit are passed through a tunable bandpass filter (BPF: D9, L16, C79, C81), then applied to the RF amplifier (Q12).

The amplified signals are passed through the limiter (D72) and another two-stage BPF (D11, D12, D65, L19, L57, C92, C94, C96, C97, C502–C505, C507) to suppress unwanted signals. The filtered signals are then applied to the 1st mixer circuit.

#### 4-1-3 1st MIXER AND 1st IF AMPLIFIER CIRCUITS

The 1st mixer circuit converts received signals into the 1st intermediate frequency (IF) signal by mixing with the local oscillator (LO) signal. The converted 1st IF signal is filtered at the 1st IF filter, then amplified at the 1st IF amplifier.

The signals from the two-stage BPF are converted into the 46.35 MHz 1st IF signal at the 1st mixer (Q13) by being mixed with the 1st LO signals generated at the VCO (Q76, D59, D60).

### • 2ND IF AND DEMODULATOR CIRCUITS

The 1st IF signal from the 1st mixer is passed through the crystal filter (F11) to suppress unwanted signals, and the limiter (D63) and then applied to the 1st IF amplifier (Q14).

The amplified 1st IF signal is applied to the FM IF IC (IC2, pin 16).

#### 4-1-4 2nd IF AND DEMODULATOR CIRCUITS

The 1st IF signal is converted into the 2nd IF signal and demodulated by the FM IF IC. The FM IF IC contains 2nd mixer, limiter amplifier, quadrature detector, etc. in its package.

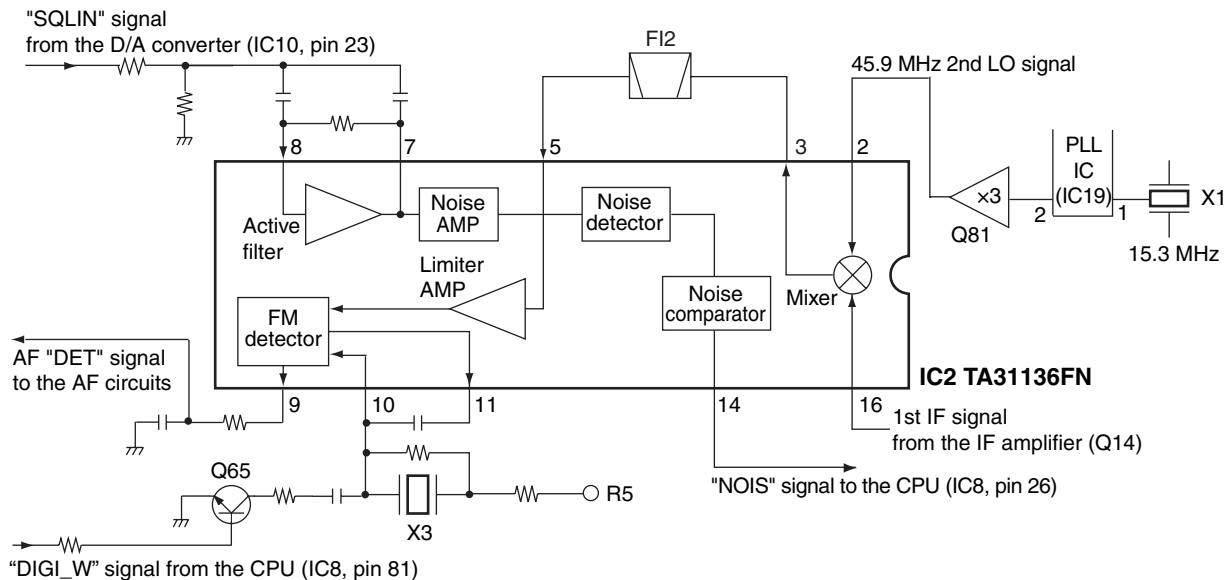
The 1st IF signal from the 1st IF amplifier is applied to the FM IF IC (IC2, pin 16), and mixed with the 45.9 MHz 2nd LO signal from the tripler (Q81) at the mixer section, to convert into the 450 kHz 2nd IF signal. The 2nd IF signal is output from pin 3 and is filtered by the ceramic filter (F12) to suppress the heterodyne noise. The filtered signal is applied to IC2 (pin 5) again and amplified at the limiter amplifier section and demodulated by the quadrature detector.

The quadrature detector is a detection method which uses a ceramic discriminator (X3). Q65 is a mode switch and toggles the detecting mode from wide and narrow, controlled by the "DIGI\_W" signal from CPU (IC8, pin 81).

The demodulated AF signals are output from pin 9.

#### 4-1-5 AF CIRCUITS

The AF signals from FM IF IC (IC2, pin 9) are passed through the AN switch (IC14, pins 10, 11), HPF (IC3, pins 6, 7), analog switch (IC4, pins 1, 2), the LPF (IC3, pins 13, 14) and analog switch (IC4, pins 10, 11). The signals from the analog switch are applied to the D/A converter (IC10, pins 11, 12) to adjust the AF output level, and then passed through the emphasis switch (Q73) which toggles the AF response characteristic according to the selected operating mode (analog/FM or digital). The AF signals from the emphasis switch are applied to the AF amplifier (IC5) to obtain 300 mW of AF output power. The amplified AF signals are applied to the internal speaker (SP1) via [SP] jack (J3).



### 4-1-6 SQUELCH CIRCUIT

Squelch circuit mutes AF output signal when no signals are received.

A portion of the AF signals from the FM IF IC (IC2, pin 9) are applied to the D/A converter (IC10, pin 24) to control its level. The level controlled signals are output from pin 23 and applied to the active filter (IC2, pins 7, 8; R86–R88, C121, C122). The filtered signals are applied to the noise amplifier section to amplify the noise components only.

The amplified noise components are detected at the noise detector section, and output from pin 13 as the “NOIS” signal and applied to the CPU (IC8, pin 26). Then the CPU outputs “AFON” signal from pin 71 according to the “NOIS” signal level to toggle the AF regulator (Q15, Q16) ON/OFF.

## 4-2 TRANSMITTER CIRCUITS

### 4-2-1 ALC AMPLIFIER AND PRE-EMPHASIS CIRCUIT

The ALC (Audio Level Control) amplifier maintains the level of the audio signals from the microphone constant. The pre-emphasis circuit amplifies the audio signals within +6 dB/oct pre-emphasis characteristic.

#### • When ALC function is ON.

The AF signals from the microphone are passed through the ALC switch (IC13, pins 3, 4) and applied to the ALC amplifier (IC17, pin 3) to limit its level.

The level limited signals are output from pin 5 and passed through the another ALC switch (IC13, pins 8, 9) and UN\_SEC switch (IC13, pins 10, 11). The signals from UN\_SEC switch are then applied to the pre-emphasis circuit (IC3, pins 8, 10) to obtain frequency characteristic of +6 dB/oct.

#### • When ALC function is OFF.

The audio signals from the microphone are passed through the ALC switch (IC13, pins 1, 2 and pins 10, 11) and UN\_SEC switch (IC13, pins 10, 11). The signals from UN\_SEC switch are then applied to the pre-emphasis circuit (IC3, pins 8, 10).

The signals from the pre-emphasis circuit are passed through the analog switch (IC4, pins 3, 4) and LPF (IC3, pins 13, 14). The signals from the LPF are passed through another analog switch (IC4, pins 8, 9), digital/analog switch (IC15, pins 8, 9 and pins 3, 4) and D/A converter (IC10, pins 21, 22) to adjust its level. The level adjusted signals from the D/A converter are applied to the modulator circuit (D61).

### 4-2-2 MODULATOR CIRCUIT

The modulation circuit modulates the VCO oscillating signal with the audio signals from the microphone.

AF signals from the D/A converter (IC10, pin 22) are applied to the modulation circuit (D61) to modulate the oscillated signal by changing the reactance of D61 at the VCO (Q76, D59, D60).

### 4-2-3 TRANSMIT AMPLIFIERS

The VCO output signal is amplified to transmit power level by the transmit amplifiers .

The VCO output signal is buffer-amplified by the buffer amplifiers (Q74, Q75) and passes through the TX/RX switch (D3). The signals from the TX/RX switch are applied to the pre-driver (Q3), driver (Q2) and power (Q1) amplifiers, to be amplified to the transmit output power level.

The power amplifier output is applied to the antenna connector (J1: CHASSIS UNIT) via the antenna switching circuit (D1), power detector (D32, D33), and two-stage LPFs.

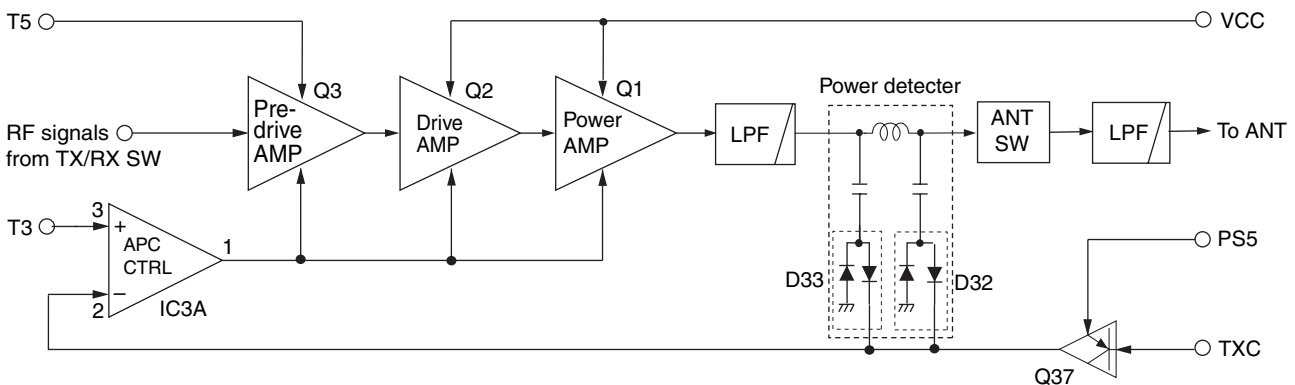
### 4-2-4 APC CIRCUIT

The APC (Automatic Power Control) circuit stabilizes transmit output power and controls transmit output power High, Middle and Low.

The RF output signal from the power amplifier (Q1) is detected at the power detector (D32, D33). The detector converts the RF signals into DC voltage, and the detected voltage is applied to the APC amplifier (IC3, pin 2).

The transmit output power setting voltage “T3” is applied to input terminal of the APC amplifier (IC3, pin 3) as the reference voltage. The APC amplifier controls the bias of the pre-driver (Q3), driver (Q2) and power amplifier (Q1) by comparing the detected voltage and the reference voltage. Thus the APC circuit maintains a constant output power.

### • APC CIRCUITS



## 4-3 PLL CIRCUITS

### 4-3-1 GENERAL

PLL circuits control the VCO circuit. IC19 is a PLL IC and contains prescaler, programmable counter, programmable divider, phase detector, charge pump in its package.

The VCO (Q76, D59, D60) directly generates both of the transmit frequency and the 1st LO frequency. The VCO shift circuit (Q77, D58) is used for switching the oscillating frequencies between transmit and receive.

While receiving, only L44 is connected to the VCO and the VCO generates the 1st LO frequency.

While transmitting, L44 and L45 are connected to the VCO to generate the transmit frequency.

The PLL sets the divided ratio based on the N-data from the CPU (IC8), and compares the phase of the VCO output with the reference frequency (15.3 MHz) generated by X4.

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

### 4-3-2 TRANSMIT LOOP

A portion of the generated signal at the VCO (Q76, D59, D60) is applied to the PLL IC (IC19, pin 8) via buffer-amplifiers (Q5, Q75). The applied signal is divided at the prescaler section and programmable divider section, then applied to the phase detector section.

The phase detector compares the input signal with the reference frequency, and then outputs the control signal (pulse-type) from pin 5 via the charge pump section. The pulse-type signal is converted into DC voltage at the loop filter (R446–R448, C472–C474), and then applied to the VCO (Q76, D59, D60) as the lock voltage.

### 4-3-3 RECEIVE LOOP

The generated 1st LO signal is applied to the PLL IC (IC19, pin 8) via the buffer-amplifiers (Q5, Q75) and is divided at the prescaler section and the programmable divider section, then applied to the phase detector section.

The phase detector compares the input signal with the reference frequency, and then outputs the control signal (pulse-type) from pin 5. The pulse-type signal is converted into DC voltage at the loop filter (R446–R448, C472–C474), and then applied to the VCO (Q76, D59, D60) as the lock voltage.

## 4-4 OTHER CIRCUITS

### 4-4-1 CTCSS/DTCS CIRCUIT (DECODING)

The CTCSS/DTCS signal from FM IF IC (IC2, pin 9) is filtered at the LPF (Q53). The filtered signal is then applied to the CPU (IC8, pin 5) to control the AF amplifier according to the received CTCSS/DTCS signal.

### 4-4-2 CTCSS/DTCS CIRCUIT (ENCODING)

#### • CTCSS

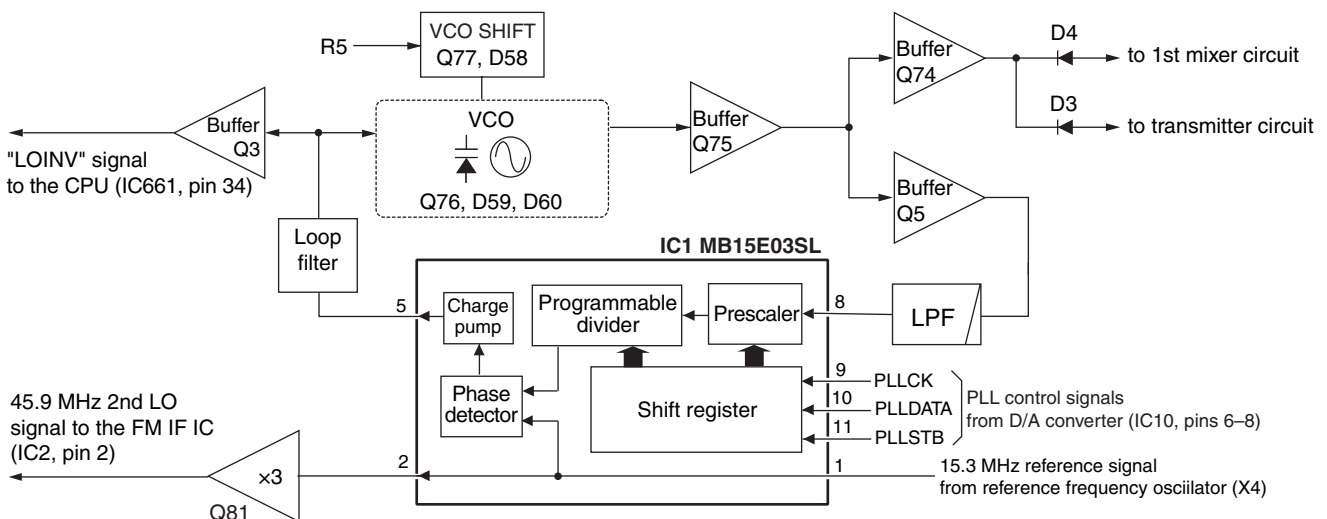
The CTCSS signal is generated by the CPU (IC8) and output from pin 139 and passed through the LPF (R224, C126, C129) and CTCSS switch (Q38). The CTCSS signal is then applied to the splatter filter (IC3, pin 13) to be mixed with the microphone audio signals. The filtered CTCSS signal is then output from pin 14 and applied to the digital/analog switch (IC15, pins 8, 9 and pins 3, 4) via the analog switch (IC4; pins 8, 9).

The CTCSS signal from the digital/analog switch (IC15, pin 3) is applied to the D/A converter (IC10, pin 21) to adjust its level. The level adjusted CTCSS signal is then applied to the modulator circuit (D61).

#### • DTCS

The DTCS signal is also generated by the CPU (IC8) and output from pin 139. The DTCS signal is applied to the DTCS amplifier (IC23, pin 3) via DTCS switch (IC16, pins 1, 7). The amplified DTCS signal is applied to the D/A converter (IC10, pin 13) to adjust its level. The level adjusted DTCS signal is then applied to both of the modulator circuit (D61) and the reference frequency oscillator (X4).

### • PLL CIRCUITS





## 4-5 POWER SUPPLY CIRCUITS

### 4-5-1 VOLTAGE LINES

LINE	DESCRIPTION
VCC	The voltage from the attached battery pack.
CPU5	Common 5 V for the CPU (IC8) converted from the VCC line at the CPU5 regulator circuit (IC12).
SW5V	Common 5 V line converted from the VCC line at the SW5 regulator circuit (Q55–Q57, D39) controlled by the "PWRON" signal.
T5	5 V for the transmit circuits regulated from the SW5V line by the T5 regulator (Q22). The regulator is controlled by the "T5C" signal from the CPU (IC8, pin 80).
PS5	5 V for the power save line regulated from the SW5V line by the PS5 regulator (Q54). The regulator is controlled by the "PS5C" signal from the CPU (IC8, pin 92).
R5	5 V for the receive circuits regulated from the SW5V line by the R5 regulator (Q21). The regulator is controlled by the "R5C" signal from the CPU (IC8, pin 82).
VCO5	5 V for the VCO circuit regulated from the SW5V line by the VCO5 regulator (Q11). The regulator is controlled by the "PSVCO" signal from the CPU (IC8, pin 62).
+5V	5 V for the optional unit power supply regulated from the VCC line by the option power supply regulator (Q61, Q62, D51). The regulator is controlled by the "OP_PS" signal from the CPU (IC8, pin 59).

## 4-6 PORT ALLOCATION

### 4-6-1 CPU (IC8)

PIN NUMBER	PORT NAME	DESCRIPTION
1	LVIN	Input port for PLL lock voltage.
3	REMO	Input port for remote control microphone.
4	SD	Input port for receiving signal strength detect signal.
5	CTCIN	Input port for CTCSS/DTCS signals.
7	DET	Input port for weather alert tone detect signal.
8	LEDC	Outputs LCD backlight control signal. HIGH : Lights ON
9	PTT	Input port for [PTT].
10	MICS	Outputs AF filter switch (IC4) control signal. HIGH : While transmitting
11	AN	Output ports AN switch (IC14) control signal.
12	DIGITAL	Input port for UT-118 accept/refuse signal. LOW : Accept
13	UN_SEC	Output ports UN_SEC switch (IC14) control signal.
15	CSHIFT	Outputs CPU (IC8) clock control signal.
19	RESET	Input port for "RESET" signal.
25	PWRSW	Input port for [PWR]. LOW : While pushing [PWR]

PIN NUMBER	PORT NAME	DESCRIPTION
26	NOIS	Input port for "NOIS" signal.
28	ESDA	I/O port for EEPROM (IC7).
29	ESCK	Outputs clock signal for EEPROM (IC7).
30	CLIN	Input port for cloning data.
31	CLOUT	Output port for cloning data.
32	OPSO	Outputs serial data for optional unit.
33	SI	Input port for DTMF decode signal.
34	SECRET	Outputs secret switch (IC14) control signal.
35	BUSY	Outputs receive detection (busy) signal to UT-118.
40–42	OPT1–OPT3	I/O ports for optional unit.
43	ALC	Outputs ALC switch (IC13) control signal. HIGH : During digital mode operation.
44	THROUGH	Outputs ALC switch (IC13) control signal. HIGH : During analog mode operation.
45	DI_SEC	Outputs modulation/demodulation mode switching signal. HIGH : During digital mode operation
46	MMUTE	Outputs analog switch (IC4) control signal.
49	RMUTE	Outputs audio mute signal. HIGH : While muting
52–54	OPV1–OPV3	Input ports for optional unit type detect signal.
55	TX_DIGI	Outputs transmit audio frequency characteristic control signal. LOW : During digital mode operation.
56	PTTO	Input port for transmit request control signal from UT-118.
57	PTTI	Output port for transmit request control signal to UT-118.
58	D5VC	Output port for D5VC line (5 V power supply; IC22) control signal. HIGH : Power ON
59	OP_PS	Outputs option power supply (Q61, Q62, D51) control signal. HIGH : Power ON
60	OPSK	Outputs clock signal for optional unit.
61	RX_MUTE	Input port for RX mute signal for digital mode operation.
62	PSVCO	Outputs PS5 regulator (Q22) control signal. LOW : Power ON
63	PLPS	Outputs power save control signal to the PLL IC (IC19). LOW : Power saved
64	DASTB	Outputs strobe signal to D/A convertor (IC10).
66	DADATA	Outputs serial data to D/A convertor (IC10).
67	PLLSW	Outputs PLL loop filter switch (IC20) control signal.
68	PLLCK	Outputs clock signal to PLL IC (IC19).
69	PLLDATA	Outputs serial data to the PLL IC (IC19).

PIN NUMBER	PORT NAME	DESCRIPTION
70	PLLSTB	Outputs PLL strobe signal.
71	AFON	Outputs AF regulator (Q15, Q16) control signal. HIGH : While emitting audio
72	DUSE	Outputs LPF cut-off frequency control signal to the CTCSS switch (Q38). LOW : When CTCSS or no signaling system is in use. HIGH : DTCS is in use.
73–76	KR0–KR3	Input ports for keypad.
78	UNLK	Input port for PLL unlock signal.
79	EMPHASIS	Outputs emphasis switch (Q73) control signal. HIGH : During FM mode operation.
80	T5C	Outputs T5 regulator (Q22) control signal. LOW : While transmitting
81	DEGI_W	Outputs detect circuit (Wide/Narrow) switch (Q53) control signal. HIGH : During narrow mode operation.
82	R5C	Outputs R5 regulator (Q21) control signal. LOW : During receive
83	TXC	Outputs RF output power control signal. LOW : During transmit
86–90	KS0–KS4	Output ports for keypad.
92	PS5C	Outputs PS5 regulator (Q54) control signal. LOW : Power saved
97, 98	DICK, DIUD	Input port for [VOL] control (S801).
141	TONE	Outputs DTMF, BEEP, 1750 Hz tone signals, etc.

#### 4-6-2 D/A CONVERTER (IC10)

PIN NUMBER	PORT NAME	DESCRIPTION
2	T1	Outputs the tunable BPF tuning signal. The output signal is applied to BPF (D9, D11, D12).
3	T2	Outputs the tunable BPF tuning signal. The output signal is applied to BPF (D11, D12).
10	T3	<ul style="list-style-type: none"> <li>Outputs the tunable BPF tuning signal. The output signal is applied to BPF (D65).</li> <li>Output port for transmit output power setting signal. The output signal is applied to the APC amplifier (IC3, pin 3).</li> </ul>
11	VOLOUT	Outputs AF output signals to the AF amplifier (IC5).
13	DTCS	Input port for DTCS signal from the DTCS amplifier (IC23).
15	FC	Outputs reference frequency control voltage.
22	MOD	Outputs modulating audio signal to the modulator circuit (D61).
23	SQLIN	Outputs squelch control signal to the noise active filter (IC2, pins 7, 8; R86–R88, C121, C122).

## 4-7 UT-118 CIRCUIT DESCRIPTION

### 4-7-1 RECEIVER CIRCUIT

The detected digital signals "FMDET" from the connected transceiver via the J301 (pin 22) are amplified at the buffer amplifier (IC251, pin 2). The amplified signals are applied to the GMSK modem circuit (IC252, pin 11), and are then applied to the CPU (IC204) as clock synchronizer digital signal. The digital signals from the CPU are applied to the AMBE voice CODEC IC (IC151) to process code extension, and are then applied to the linear CODEC IC (IC50) as 32 bits digital voice data. The applied digital signals are converted to the analog AF signals at the D/A converter section (IC50), and are then applied to the connected transceiver via the J301 (pin 21) as "DAFOUT" signal.

### 4-7-2 TRANSMITTER CIRCUIT

The analog AF signals "AMODIN" from the connected transceiver via the J301 (pin 4) are amplified at the buffer amplifier (IC251, pin 6). The amplified signals are applied to the linear CODEC IC (IC50, pin 5) to convert 32 bits digital voice data at the A/D converter section via the "ADIN" line. The digital signals are applied to the AMBE voice CODEC IC (IC151) to process code compression, and are then applied to the CPU (IC204). The digital signals from the CPU convert to the GMSK base band signal at the GMSK modem (IC252), and are then amplified at the buffer amplifier (IC253, pin 5). The amplified signals are applied to the connected transceiver via the J301 (pin 3).

### 4-7-3 RESET CIRCUIT

The UT-118 has the reset IC (IC203). The reset IC outputs "RES" signal to the CPU (IC204, pin 7) when more than 2.8 V of voltage is applied to the "VDD" port (pin 2).

### 4-7-4 RS-232C CIRCUIT

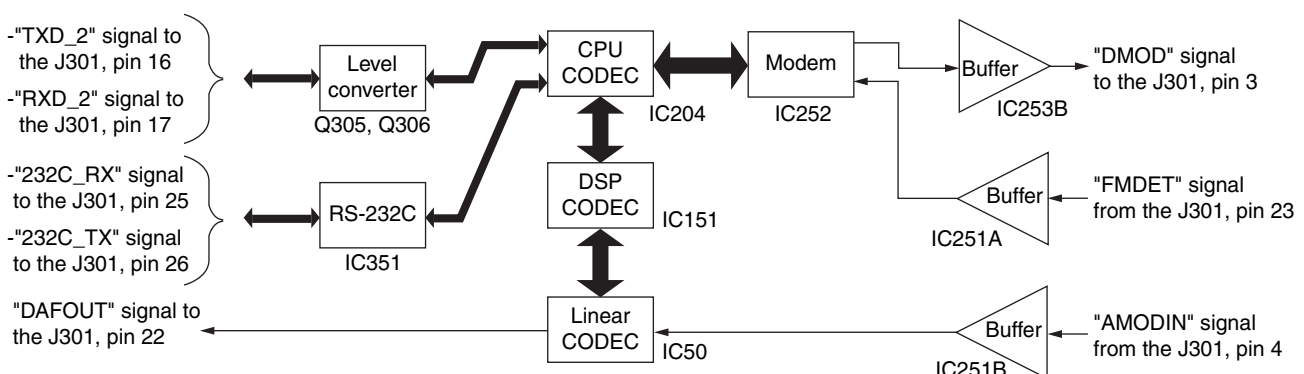
IC351 is a RS-232C compatible serial interface IC which converts data between the CPU and the external equipment (ex. Personal Computer).

### 4-7-5 LEVEL CONVERTER CIRCUIT

The level converter circuit (Q305 and Q306) converts communication data level between the CPU (IC204) and the connected transceiver's CPU.

Q301, Q302 and Q303 convert control signals level between the UT-118 and the IC-V82.

## • UT-118 BLOCK DIAGRAM



## 4-8 UT-118 POWER SUPPLY CIRCUITS

### 4-8-1 VOLTAGE LINES

LINE	DESCRIPTION
5V	5 V from the connected transceiver via the J301 (pin 29). The 5V line is controlled by the +5 V control circuit (Q50 and Q51). The circuit is controlled by the "PSAVE" signal from the CPU (IC204, pin 58 and 59).
3.3V	Common 3.3 V converted from the 5V line by the 3.3V regulator circuit (IC1). One of the 3.3 V line is controlled by the +3V control circuit (Q400 and Q401). The circuit is controlled by the "PSAVE" signal from the CPU (IC204, pin 58 and 59).
3.2V	Common 3.2 V converted from the 4.5–8 V line by the 3.2V regulator circuit (IC2). The circuit is controlled by the "APWR" signal from the CPU (IC204, pin 16).

## 4-9 UT-118 PORT ALLOCATIONS

### 4-9-1 MODEM IC (IC252)

PIN NUMBER	PORT NAME	DESCRIPTION
2	MCLK	Outputs 2.4576 MHz clock signal to the CPU (IC151, pin 39).
7	ACQ	Outputs the PLL bandwidth control signal while receiving.
19	TXDT	Outputs transmitting data signal to the CPU (IC204, pin 54).
20	RXDT	Input port for receiving data signal from the CPU (IC204, pin 53).
21	RXCK	Input port for receive clock signal from the CPU (IC204, pin 52).
22	TXCK	Outputs transmit clock signal to the CPU (IC204, pin 51).

# SECTION 5 ADJUSTMENT PROCEDURES

## 5-1 PREPARATION

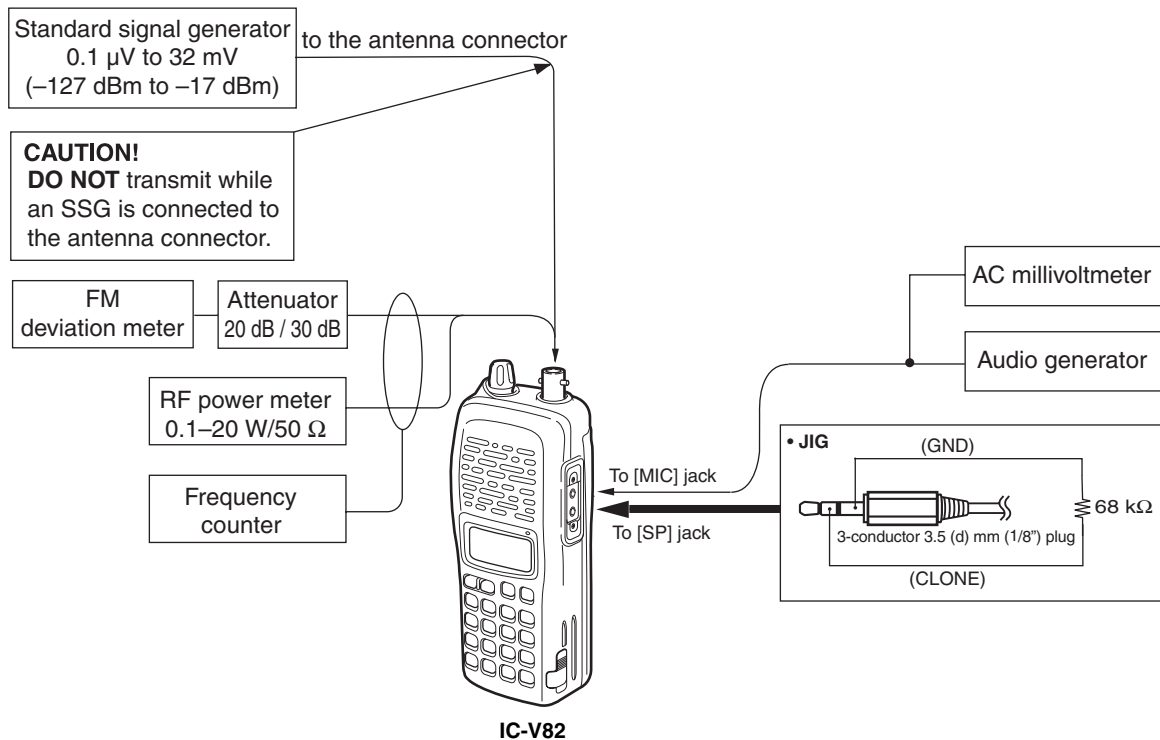
### ■ REQUIRED TEST EQUIPMENTS

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supplies*	Output voltage : 5.0 V DC 8.0 V DC Current capacity : 1 A or more	Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 $\mu$ V to 32 mV (–127 to –17 dBm)
RF power meter (terminated type)	Measuring range : 0.1–20 W Frequency range : 100–300 MHz Impedance : 50 $\Omega$ SWR : Less than 1.2 : 1	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–10 V
Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy: $\pm$ 1 ppm or better Sensitivity : 100 mV or better	AC millivoltmeter	Measuring range : 10 mV to 10 V
		External speaker	Input impedance : 8 $\Omega$ Capacity : More than 0.5 W
Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV	Attenuator	Power attenuation : 20 or 30 dB Capacity : More than 5 W
FM deviation meter	Frequency range : 30–300 MHz Measuring range : 0 to $\pm$ 10 kHz		

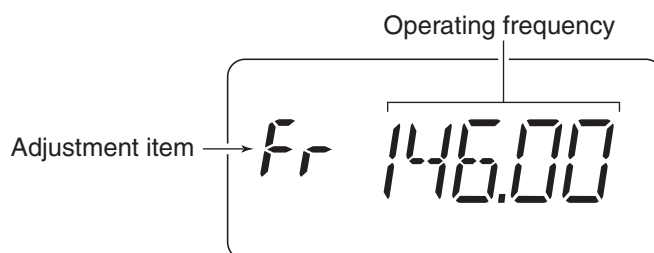
\*; For UT-118 adjustment only.

**CAUTION!** BACK UP the originally programmed contents (Memory channels, Call signs, Common settings, etc.) in the transceiver using CS-V82 CLONING SOFTWARE before starting adjustment. When all adjustments are completed, these contents in the transceiver will be cleared.

### • CONNECTION



### • ADJUSTMENT MODE DISPLAY

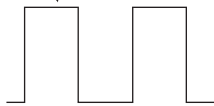


## 5-2 IC-V82 ADJUSTMENT

### 5-2-1 KEY OPERATION FOR THE ADJUSTMENT

- Rotate [VOL] to adjust the value.
- Push [D•CLR] key to store the adjustment value and move to next adjustment item.
- Push [▲]/[▼] key to move to next adjustment item without changing the value.

### 5-2-2 FREQUENCY AND TRANSMIT ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION
ENTERING ADJUSTMENT MODE	• While pushing [▲], [▼] and [D•CLR] keys, turn power ON.	
REFERENCE FREQUENCY <i>F<sub>r</sub></i> 146.00	1 • Connect a frequency counter to the antenna connector through an attenuator. • Transmitting	• Rotate [VOL] to set to 146.000 MHz ±100Hz. • Push [D•CLR] key.
TRANSMIT LOCK VOLTAGE <i>L<sub>V</sub></i> 146.00	1 • Transmitting	• Push [D•CLR] key, then push [▼] key. (Do not release [PTT] button when pushing [D•CLR] key.)
OUTPUT POWER (High) <i>P<sub>o</sub></i> 146.00	1 • Connect an RF power meter to the antenna connector. • Transmitting	• Rotate [VOL] to set the transmit power to 7.0 W. • Push [D•CLR] key.
(Middle) <i>P<sub>o</sub></i> 146.00 <sub>M</sub>	2 • Transmitting	• Rotate [VOL] to set the transmit power to 4.0 W. • Push [D•CLR] key.
(Low) <i>P<sub>o</sub></i> 146.00 <sub>L</sub>	3 • Transmitting	• Rotate [VOL] to set the transmit power to 0.5 W. • Push [D•CLR] key.
FREQUENCY DEVIATION <i>d<sub>F</sub></i> 146.00	1 • Mode : Wide • Connect an FM deviation meter to the antenna connector through an attenuator and set as : HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • Connect an audio generator to [MIC] jack and set as; Frequency : 1 kHz Level : 150 mV rms • Transmitting	• Rotate [VOL] to set to ±4.2 kHz. • Push [D•CLR] key.
DIGITAL VCO FREQUENCY DEVIATION <i>d<sub>V</sub></i> 146.00	1 • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to ±1.20 kHz. • Push [D•CLR] key.
DTCS WAVE FORM <i>d<sub>t</sub></i> 146.00	1 • Mode : Wide • Connect an oscilloscope and the FM deviation meter to the antenna connector. • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to square wave form as shown below. • Push [D•CLR] key.  Set to square wave form 
DIGITAL REFERENCE FREQUENCY DEVIATION <i>d<sub>V</sub></i> 146.00	1 • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to ±1.20 kHz. • Push [D•CLR] key.

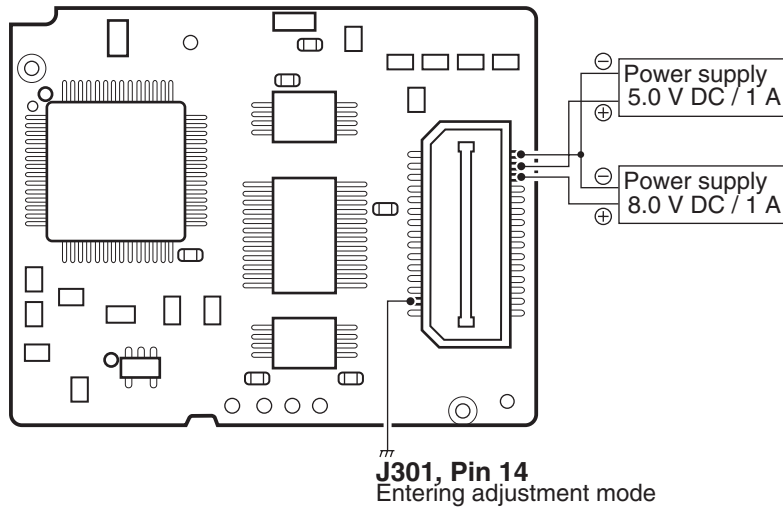
### 5-2-3 RECEIVE ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION	
SENSITIVITY 	1	<ul style="list-style-type: none"> <li>• Connect an SSG to the antenna connector and set as;                Frequency : 136.020 MHz                Level : 0 dBμ*                Modulation : 1 kHz                Deviation : ± 3.5 kHz</li> <li>• Receiving</li> </ul>	• Push [D•CLR] key.
	2	<ul style="list-style-type: none"> <li>• Set the SSG as;                Frequency : 147.980 MHz                Level : 0 dBμ*                Modulation : 1 kHz                Deviation : ± 3.5 kHz</li> <li>• Receiving</li> </ul>	• Push [D•CLR] key.
	3	<ul style="list-style-type: none"> <li>• Set the SSG as;                Frequency : 173.980 MHz                Level : 0 dBμ*                Modulation : 1 kHz                Deviation : ± 3.5 kHz</li> <li>• Receiving</li> </ul>	• Push [D•CLR] key.
SQUELCH 	1	<ul style="list-style-type: none"> <li>• Set the SSG as;                Frequency : 145.020 MHz                Level : -19 dBμ*                Modulation : 1 kHz                Deviation : ± 3.5 kHz</li> <li>• Receiving</li> </ul>	• Close the squelch once, then set the squelch level at the point where the audio signals just appears.
S-METER 	1	<ul style="list-style-type: none"> <li>• Set the SSG as;                Frequency : 145.020 MHz                Level : -6 dBμ*                Modulation : 1 kHz                Deviation : ± 3.5 kHz</li> <li>• Receiving</li> </ul>	• Push [D•CLR] key.
QUITTING ADJUSTMENT MODE	1	• Turn power OFF.	
	2	• While pushing [MONI] and [D•CLR] keys, turn power ON.	

\*; This output level of the standard signal generator (SSG) is indicated as SSG's terminated circuit.

### 5-3 UT-118 ADJUSTMENT

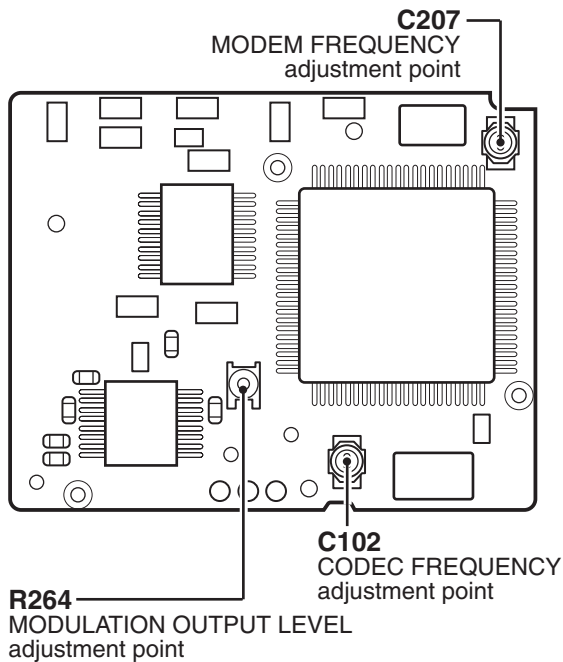
#### • CONNECTION (BOTTOM VIEW)



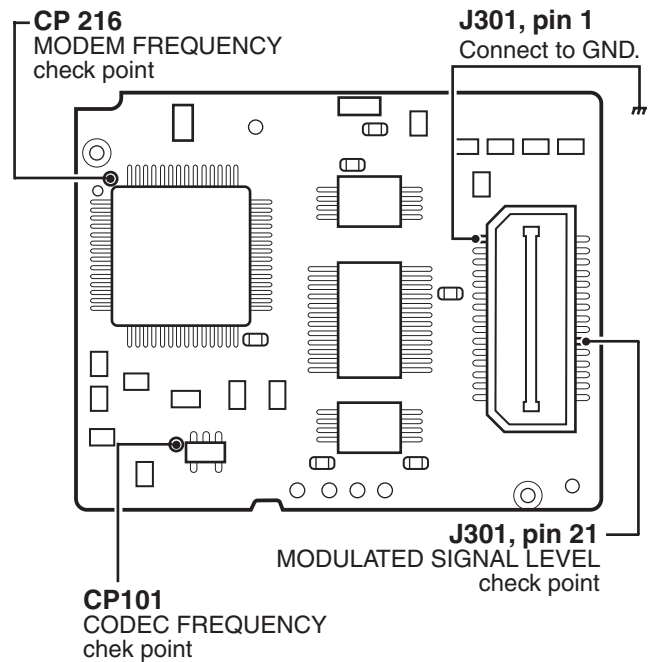
#### • ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION
ENTERING ADJUSTMENT MODE	<ul style="list-style-type: none"> <li>Connect the pin 14 of J301 to GND to enter the adjustment mode.</li> </ul>	
CODEC FREQUENCY	1 • Connect the frequency counter to CP101 through a capacitor (1000 pF).	• Adjust C102 to set to 16.38400 MHz $\pm$ 10 Hz.
MODEM FREQUENCY	1 • Connect the frequency counter to CP216 through a capacitor (1000 pF).	• Adjust C207 to set to 2.457600 MHz $\pm$ 3 Hz.
MODURATION OUTPUT LEVEL	1 • Connect the pin 1 of J301 to GND to enter the transmit mode. • Connect the oscilloscope to pin 21 of J301.	• Adjust R264 to set to 350 mVp-p $\pm$ 10 mV.
	2 • Disconnect the pin 1 of J301 from GND after the adjustment to quit the transmit mode.	
QUITTING ADJUSTMENT MODE	<ul style="list-style-type: none"> <li>Disconnect the pin 14 of J301 from GND to quit the adjustment mode.</li> </ul>	

#### • UT-118 TOP VIEW



#### • UT-118 BOTTOM VIEW















# SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

## [CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510022460	Connector BNC-R162	1
SP1	2510001280	Speaker SDRS-3650P-008A	1
W1	8900009640	Cable OPC-963	1
MP1	8210021290	2826 front panel	1
MP2	8930064470	2826 keyboard	1
MP3	8010019850	2826 chassis	1
MP4	8930064420	2826 D-cap	1
MP5	8930064440	2826 jack cap	1
MP6	8930064910	2826 S-jack seal	1
MP7	8930050870	2251 release button	1
MP9	8930064460	2826 PTT button	1
MP10	8210021300	2826 PTT panel	1
MP11	8930064450	2826 PTT rubber	1
MP12	8210021270	2826 rear panel	1
MP13	8210017091	2337 terminal holder-1	1
MP14	8310062510	2826 window plate	1
MP15	8930042350	1922 microphone sheet	1
MP16	8930051300	2251 microphone sponge	1
MP18	8610012170	Knob N-326	1
MP19	8810008640	Screw No.0-1 FH B0 2 × 4 NI-ZU (BT)	3
MP20	8930054881	2458 plus terminal-1	1
MP21	8930050840	2251 minus terminal	1
MP23	8830001340	1903 hex. Nut	1
MP24	8830001250	Nut ANT connector-101	1
MP25	8930036751	Spring (Y)-1	1
MP27	8810009510	Screw PH B0 2 × 4 NI-ZU (BT)	6
MP28	8810009560	Screw PH B0 2 × 6 ZK (BT)	4
MP29	8810000100	Screw PH M2 × 4 ZK	2
MP30	8810008990	Screw PH B0 2 × 10 ZK (BT)	2
MP31	8860001210	2251 antenna lug plate	1
MP32	8510016800	2826 shield cover	1
MP33	8510016790	2826 option plate	1
MP34	8930064880	2826 window sheet	1
MP35	8810005700	Screw No.0-1 PH M2 × 4 ZK	4
MP36	8930065490	Rubber sheet (BO)	1
MP37	8510016890	2826 U-shield cover	1

## [MAIN UNIT]

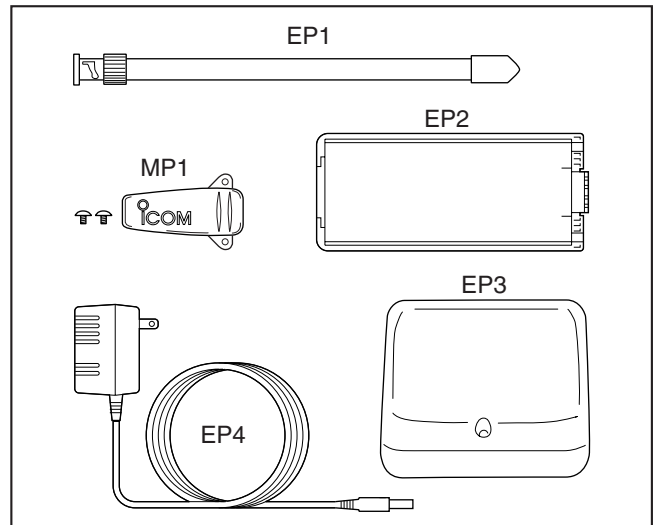
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
DS4	5030002800	LCD A01B001X	1
MP1	8510016470	2775 VCO case	1
MP2	8510016470	2775 VCO cover	1
MP3	8210021280	2826 reflector	1
MP4	8930064560	2826 LCD holder	1
MP6	8930058840	Shield sponge	1

### Screw abbreviations

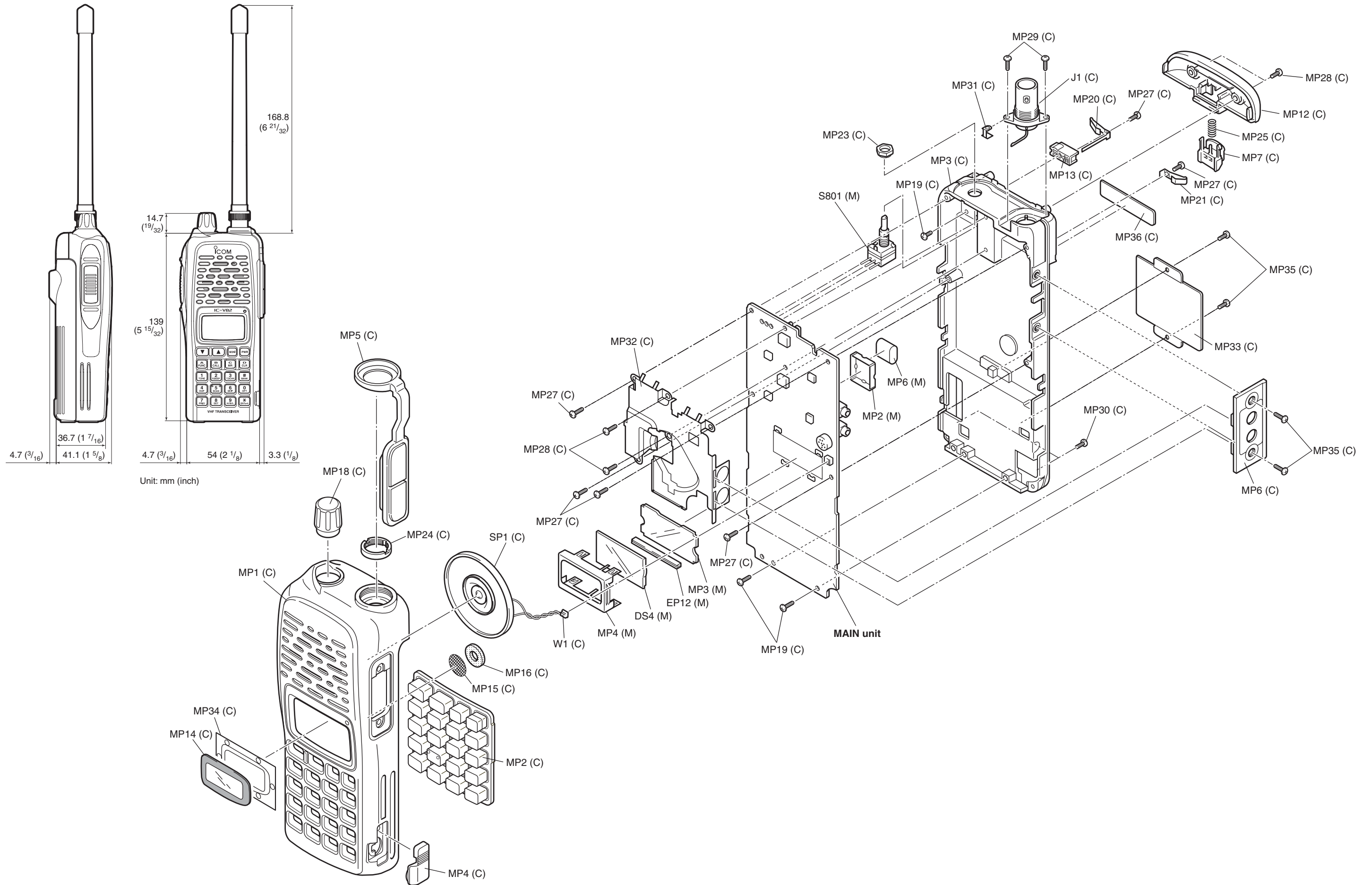
B0, BT: Self-tapping PH: Pan head  
 NI-ZU: Nickel-Zinc ZK: Black

## [ACCESSORIES]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	Optional product	Antenna FA-B2E	1
EP2	Optional product	Battery BP-208N [EUR-1], [EXP-1], [USA-1], [CSA-1]	1
	Optional product	Battery BP-222N EXP [EUR-2], [EXP-2], [CSA-2]	1
	Optional product	Battery BP-222N RBRC [USA-2] only	1
	Optional product	Battery BP-209N EXP [CSA-3], [EUR-3], [EXP-4]	1
	Optional product	Battery BP-209N RBRC [USA-3] only	1
EP3	Optional product	AC adpater BC-146	1
EP4	Optional product	AC adpater BC-147E [EUR-2], [EXP-2], [EUR-3], [EXP-4]	1
	Optional product	AC adpater BC-147A [USA-2], [CSA-2], [USA-3]	1
MP1	Optional product	MB-103	1



\* Design is depended on versions.



UNIT abbreviations (C): CHASSIS PARTS, (M): MAIN UNIT

# SECTION 8 SEMICONDUCTOR INFORMATION

## •TRANSISTORS AND FETS

<p>2SA1576S (Symbol: FS)</p>	<p>2SA1576A (Symbol: FA)</p>	<p>2SB1132R (Symbol: BAR)</p>	<p>2SC4116BL (Symbol: LL)</p>	<p>2SC4617 TLS (Symbol: BS)</p>
<p>2SC5006-T1 (Symbol: 24)</p>	<p>2SC5085Y (Symbol: R6)</p>	<p>2SC5231 C8 (Symbol: C8)</p>	<p>2SK1069-4 (Symbol: FJ)</p>	<p>3SK299-U73 (Symbol: U73)</p>
<p>3SK318YB-TL-E (Symbol: YB)</p>	<p>RD01MUS1 (Symbol: K2)</p>	<p>RD12MVS1-T12 (Symbol: RD12MVS1)</p> <p>Index mark (Gate)</p>	<p>UMG2N TL (Symbol: G2)</p>	<p>UNR911FJ (Symbol: 6O)</p>
<p>UNR9113J (Symbol: 6C)</p>	<p>UNR9210J (Symbol: 8L)</p>	<p>UNR9213J (Symbol: 8C)</p>	<p>UNR921NJ (Symbol: EX)</p>	<p>XP1501 AB (Symbol: 5R)</p>
<p>XP4601 (Symbol: 5C)</p>	<p>XP6501-AB (Symbol: 5N)</p>			

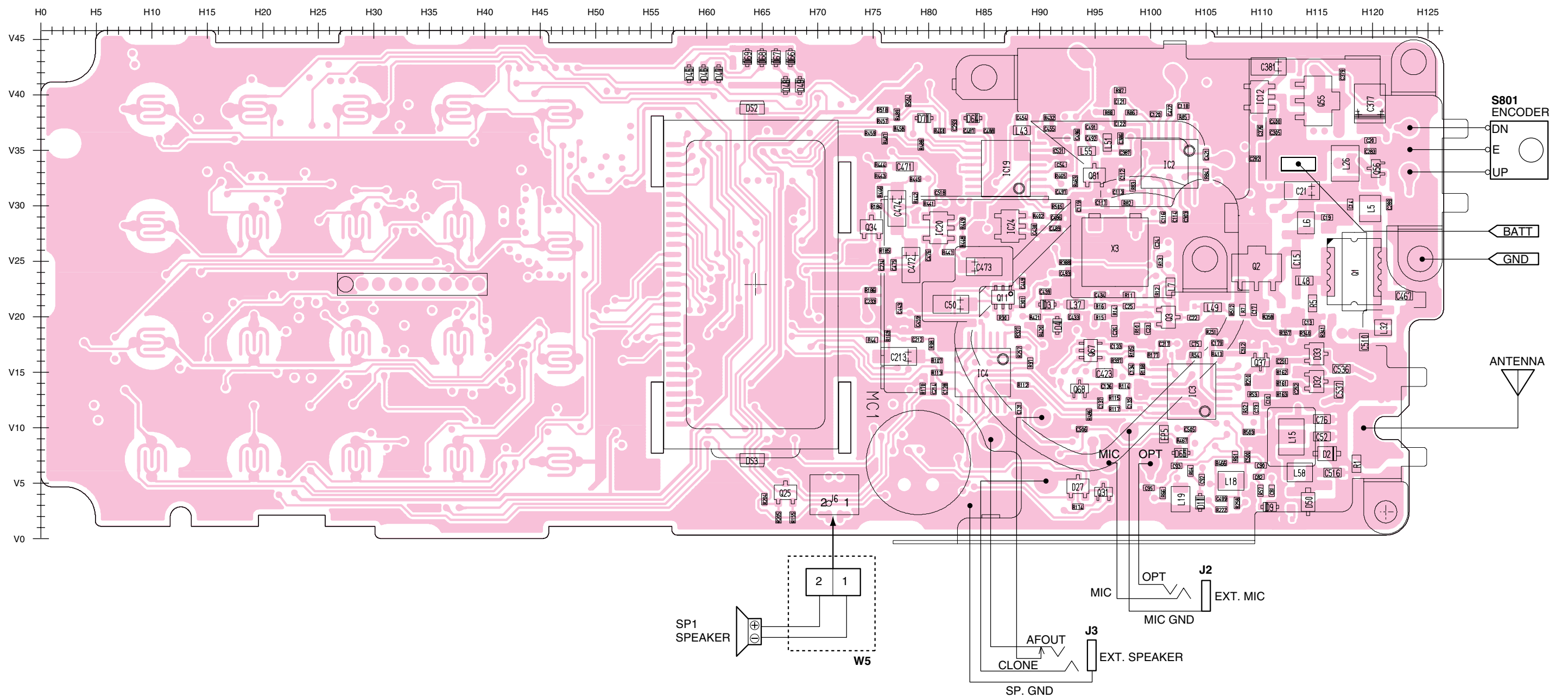
## •DIODES

<p>1SV286 (Symbol: T7)</p>	<p>1SV308 (Symbol: K)</p>	<p>MA2S30400L (Symbol: BAR)</p>	<p>HVC375BTRF (Symbol: B8)</p>	<p>1SS400 (Symbol: A)</p>
<p>DA221 TL (Symbol: K)</p>	<p>MA742 (Symbol: M1U)</p>	<p>HVU131TRF (Symbol: P1)</p>	<p>MA2S077 (Symbol: S)</p>	<p>MA728 (Symbol: 2A)</p>
<p>MA77 (Symbol: 4B)</p>	<p>MA8056-M (Symbol: 5-6)</p>			

# SECTION 9 BOARD LAYOUTS

## MAIN UNIT •TOP VIEW

The combination of this page and next page shows the unit layout in the same configuration as the actual P.C. Board.





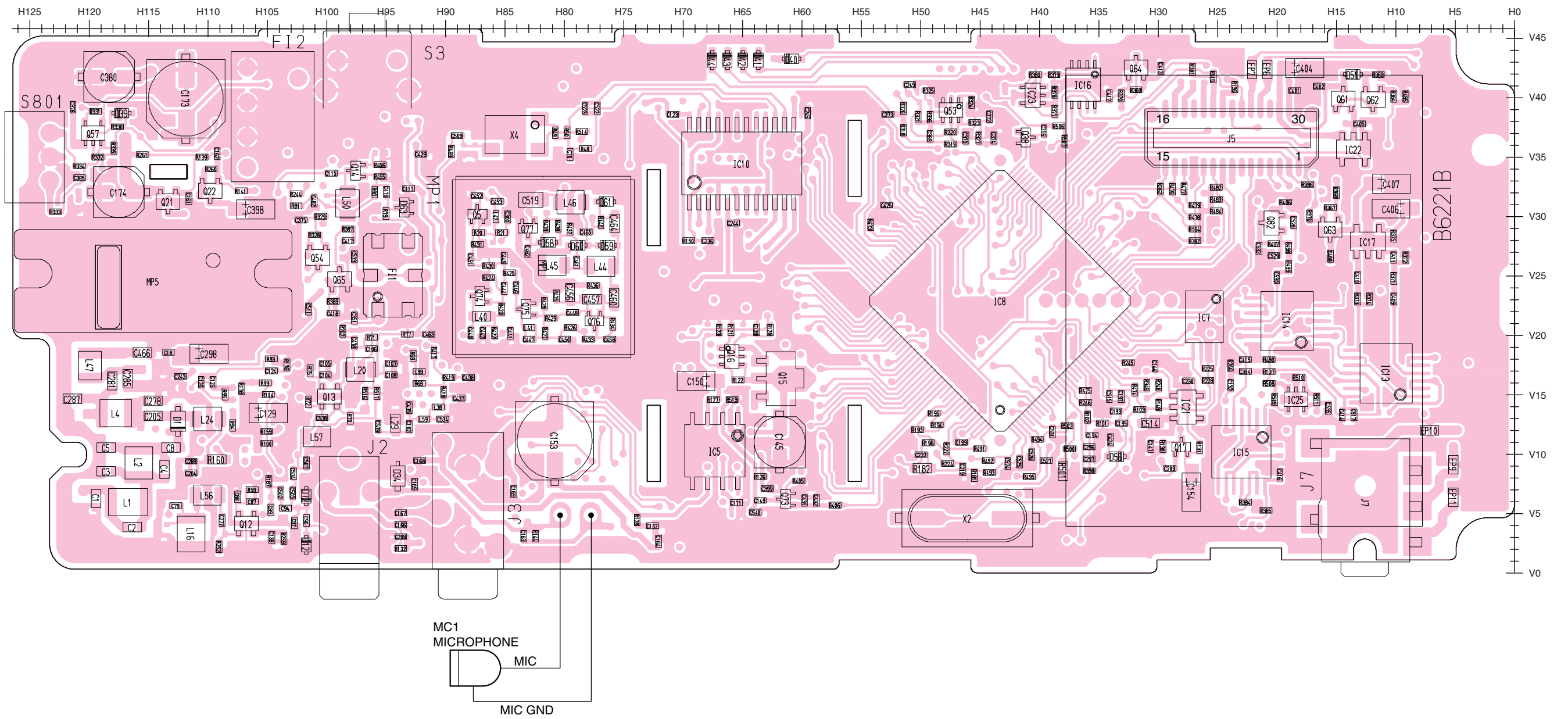
• BOTTOM VIEW

The combination of this page and previous page shows the unit layout in the same configuration as the actual P.C. Board.

To Optional unit J301

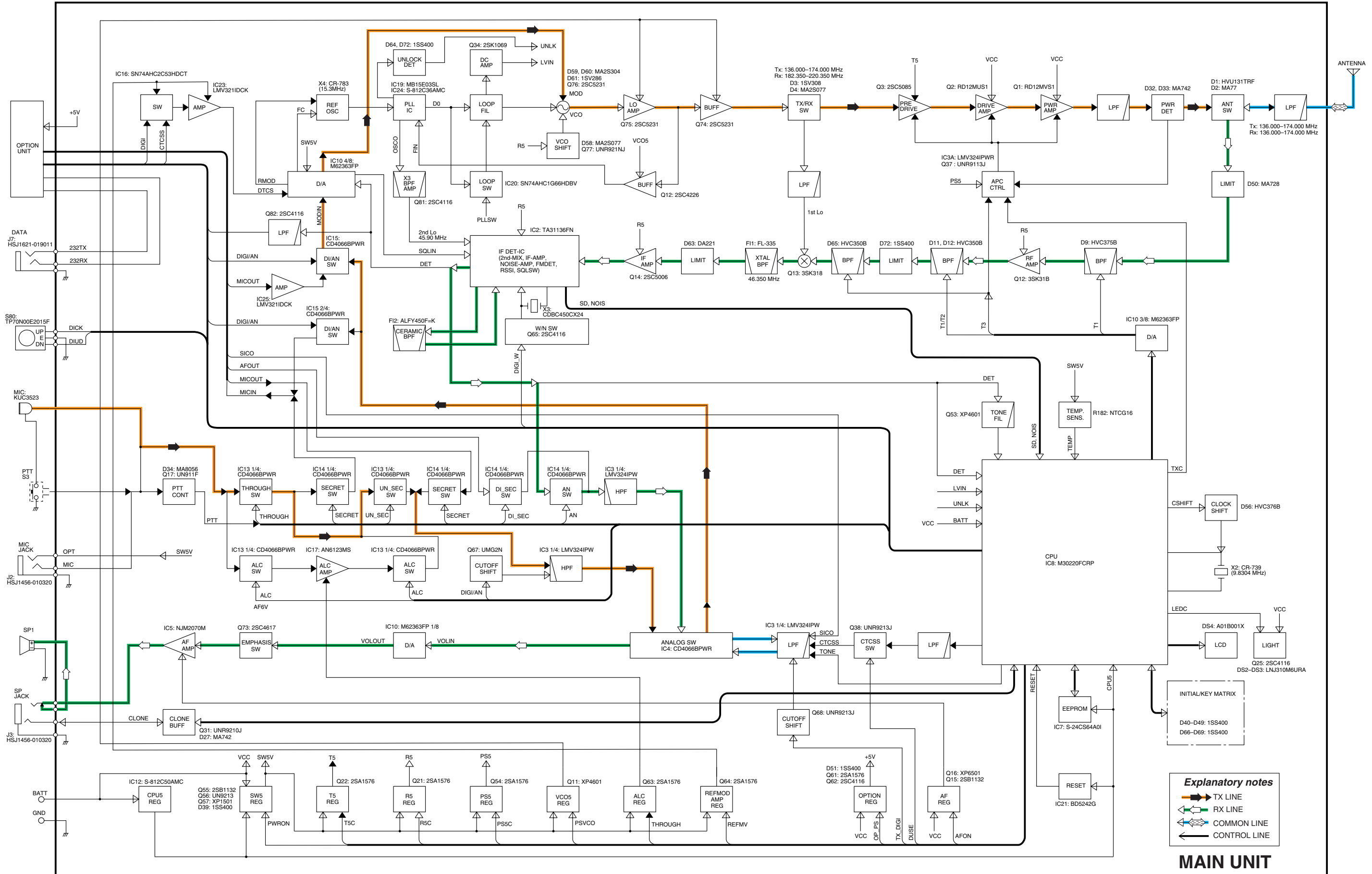
16	OPV1	OPSK	SI	OPV2	OPV3	OPSO	CCS	REFMOD	OPT2	AFOUT	SICO	FMDDET	RXMLUTE	232RX	232TX	MICIN	MICOUT	VCC 5V	PTTOUT	GND	30
15	OPV1	OPSK	SI	OPV2	OPV3	OPSO	CCS	REFMOD	OPT2	AFOUT	SICO	FMDDET	RXMLUTE	232RX	232TX	MICIN	MICOUT	VCC 5V	PTTOUT	GND	1

J5



# SECTION 10 BLOCK DIAGRAM

## • MAIN UNIT



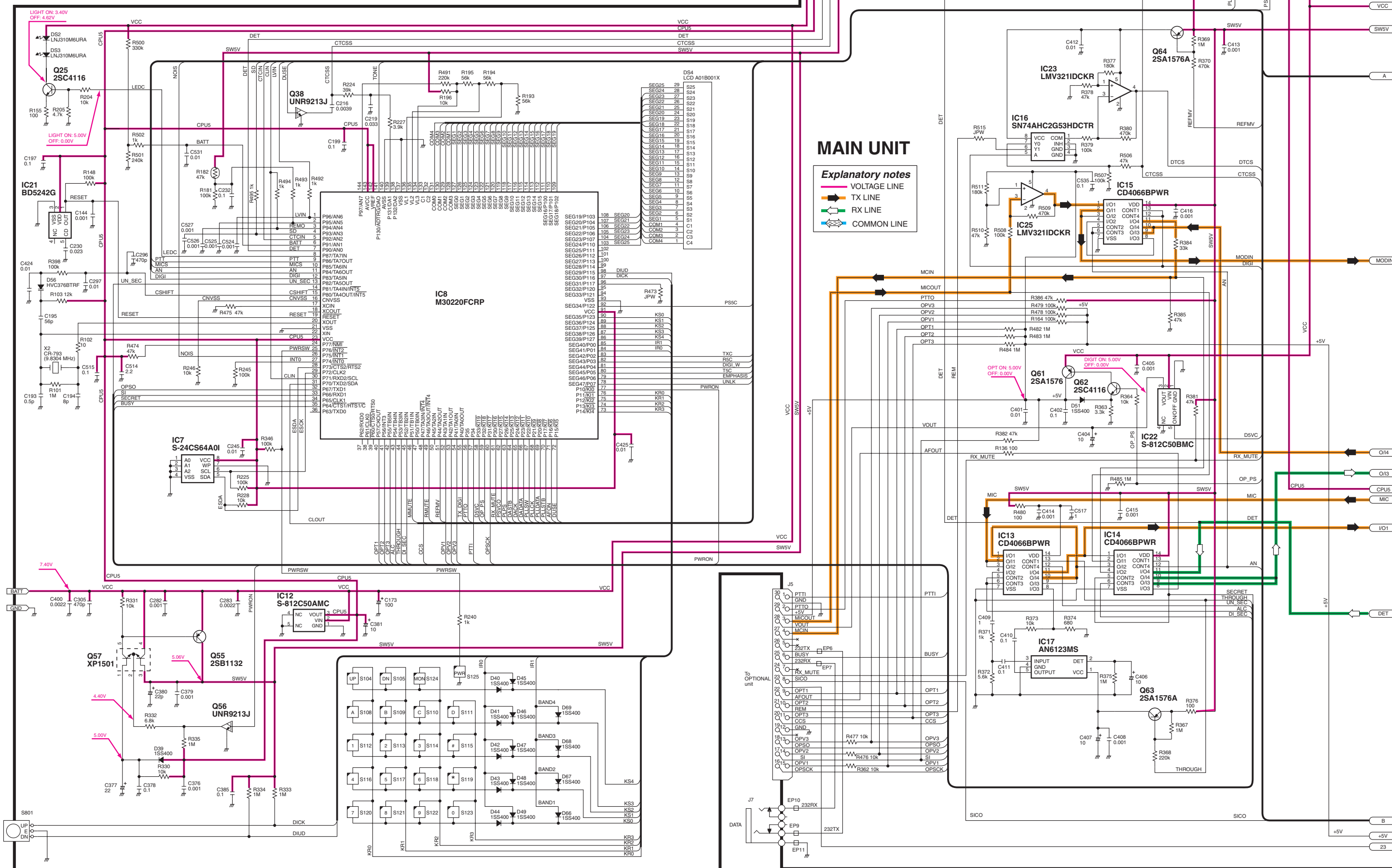
**Explanatory notes**

- TX LINE
- ← RX LINE
- ↔ COMMON LINE
- CONTROL LINE

**MAIN UNIT**

# SECTION 11 VOLTAGE DIAGRAM

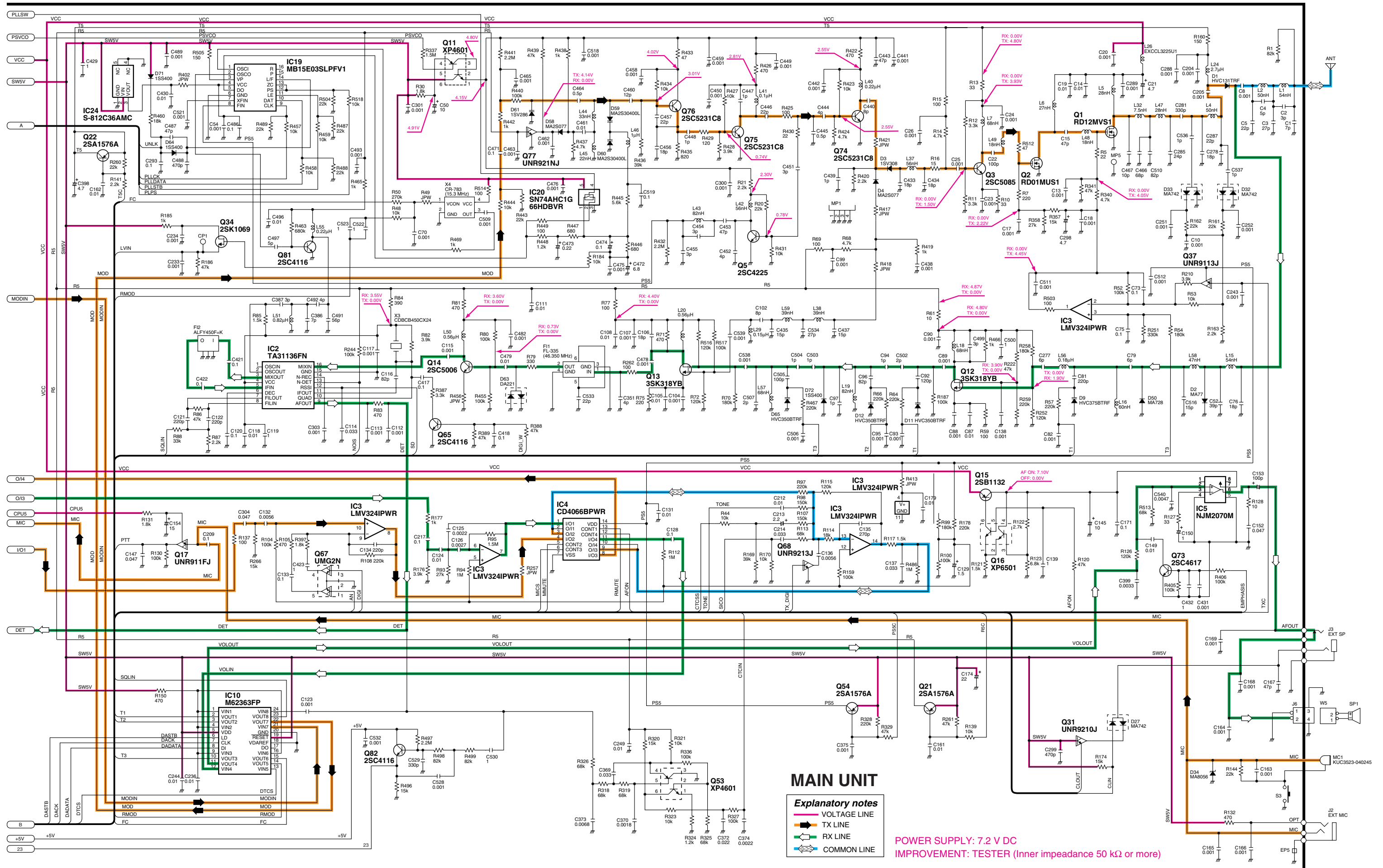
## • MAIN UNIT



### MAIN UNIT

#### Explanatory notes

- VOLTAGE LINE
- TX LINE
- RX LINE
- COMMON LINE



**MAIN UNIT**

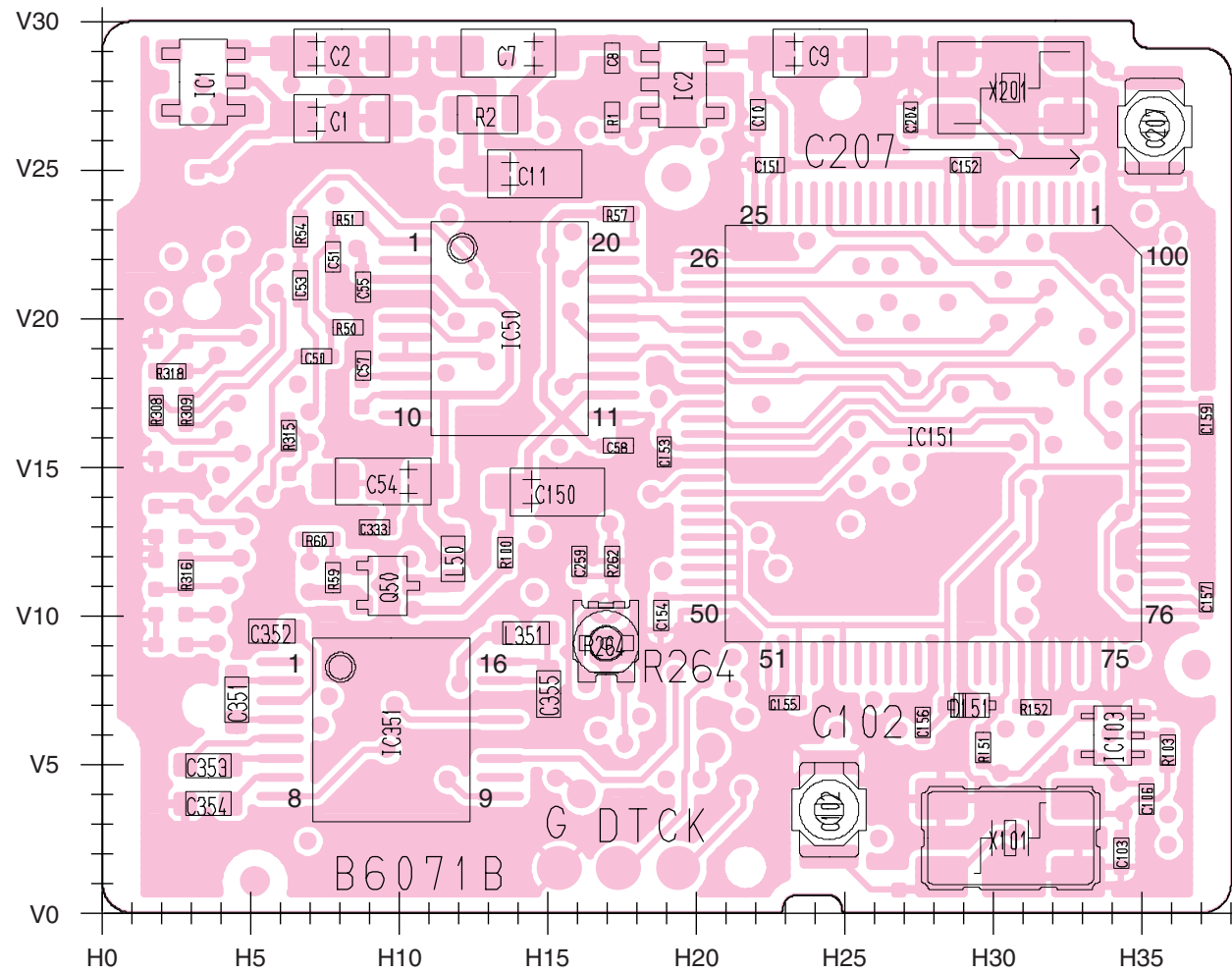
- Explanatory notes**
- VOLTAGE LINE
  - TX LINE
  - RX LINE
  - COMMON LINE

POWER SUPPLY: 7.2 V DC  
IMPROVEMENT: TESTER (Inner impedance 50 kΩ or more)

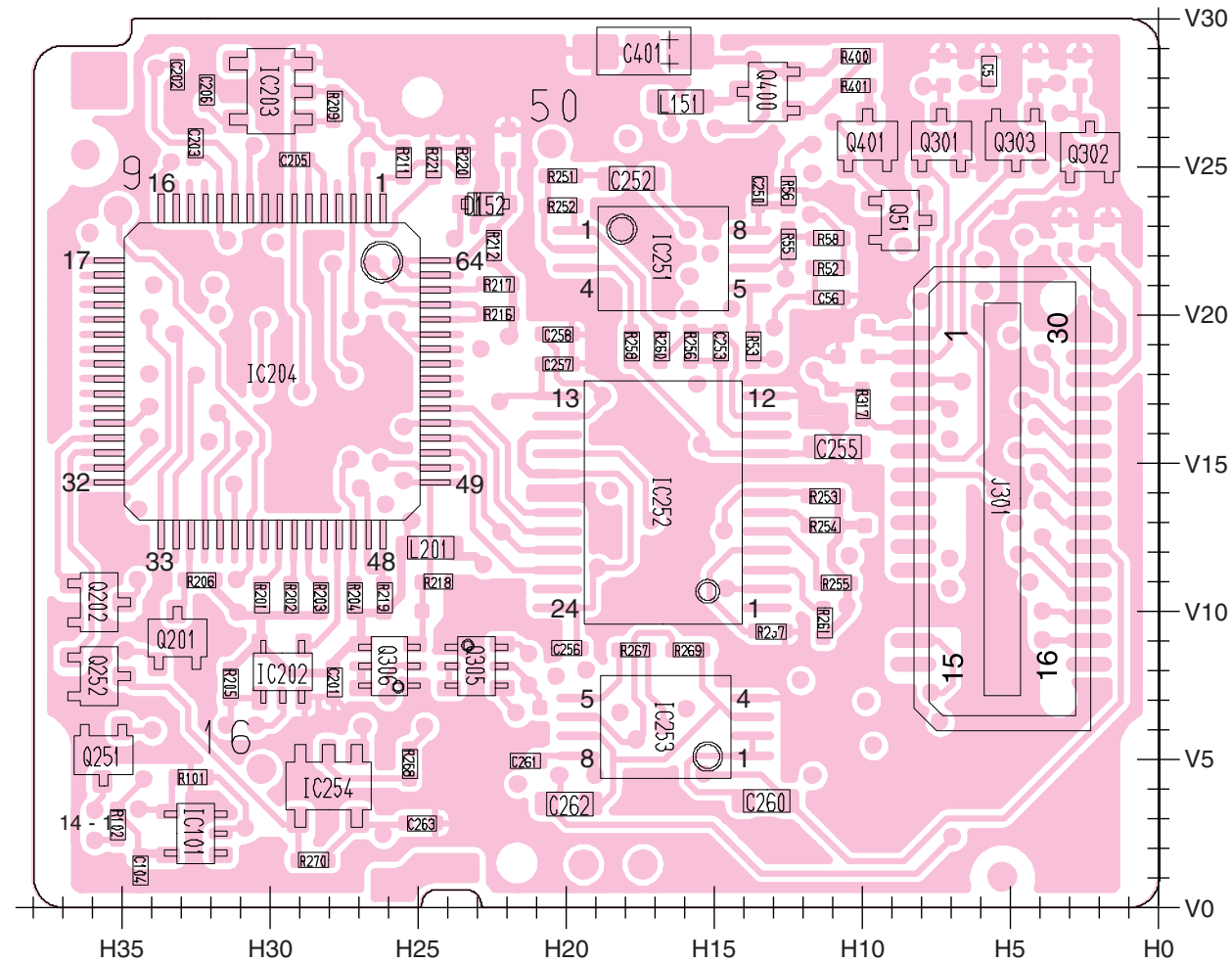
# SECTION 12 UT-118 DIGITAL UNIT (OPTIONAL UNIT)

## 12-1 UT-118 BOARD LAYOUT

• TOP VIEW



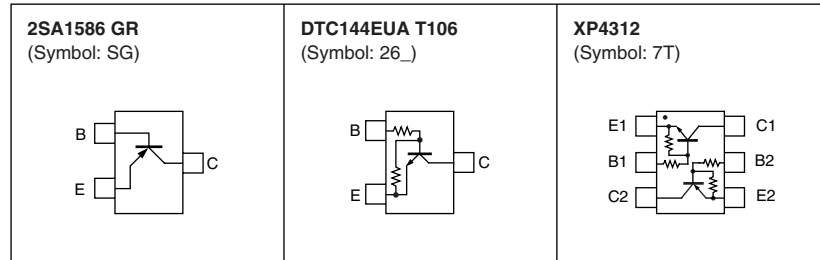
• BOTTOM VIEW



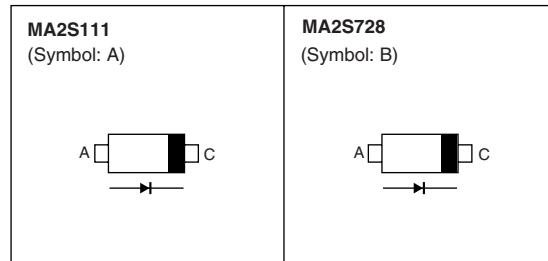
J301		
1	PTTIN	GND
	PTTOUT	5V
	MICOUT	VCC_8V
	MICIN	—
	BUSY	232TX
	—	232RX
	—	RXMUTE
	SICO	FMDT
	OPT1	AFOUT
	OPT2	REFMOD
	OPT3	CSS
	GND	—
	OPV3	OPSO
	OPV2	SI
	OPV1	OPSK
15	To Main unit J5	

## 12-2 UT-118 SEMICONDUCTOR INFORMATION

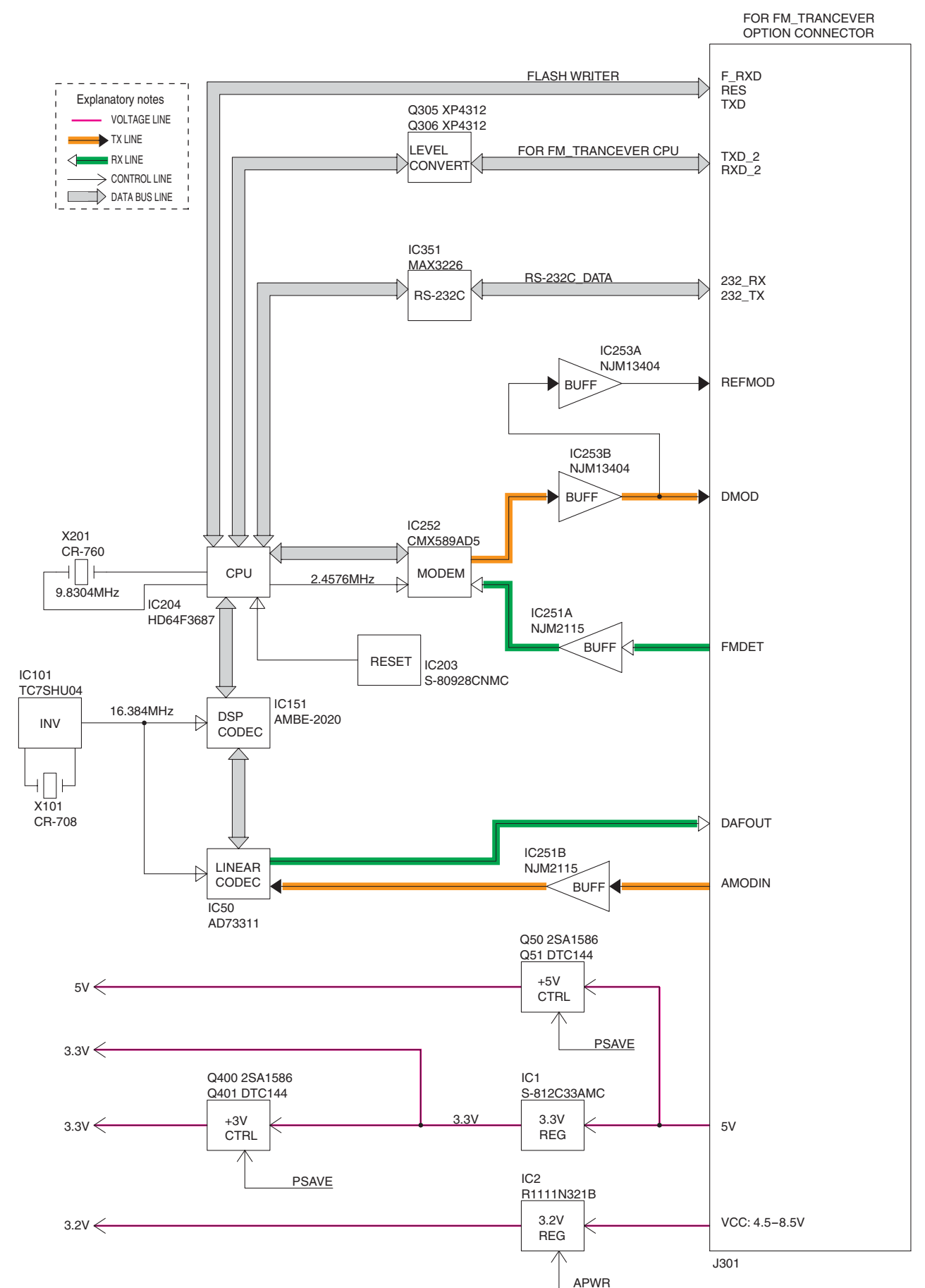
### • TRANSISTORS AND FET'S



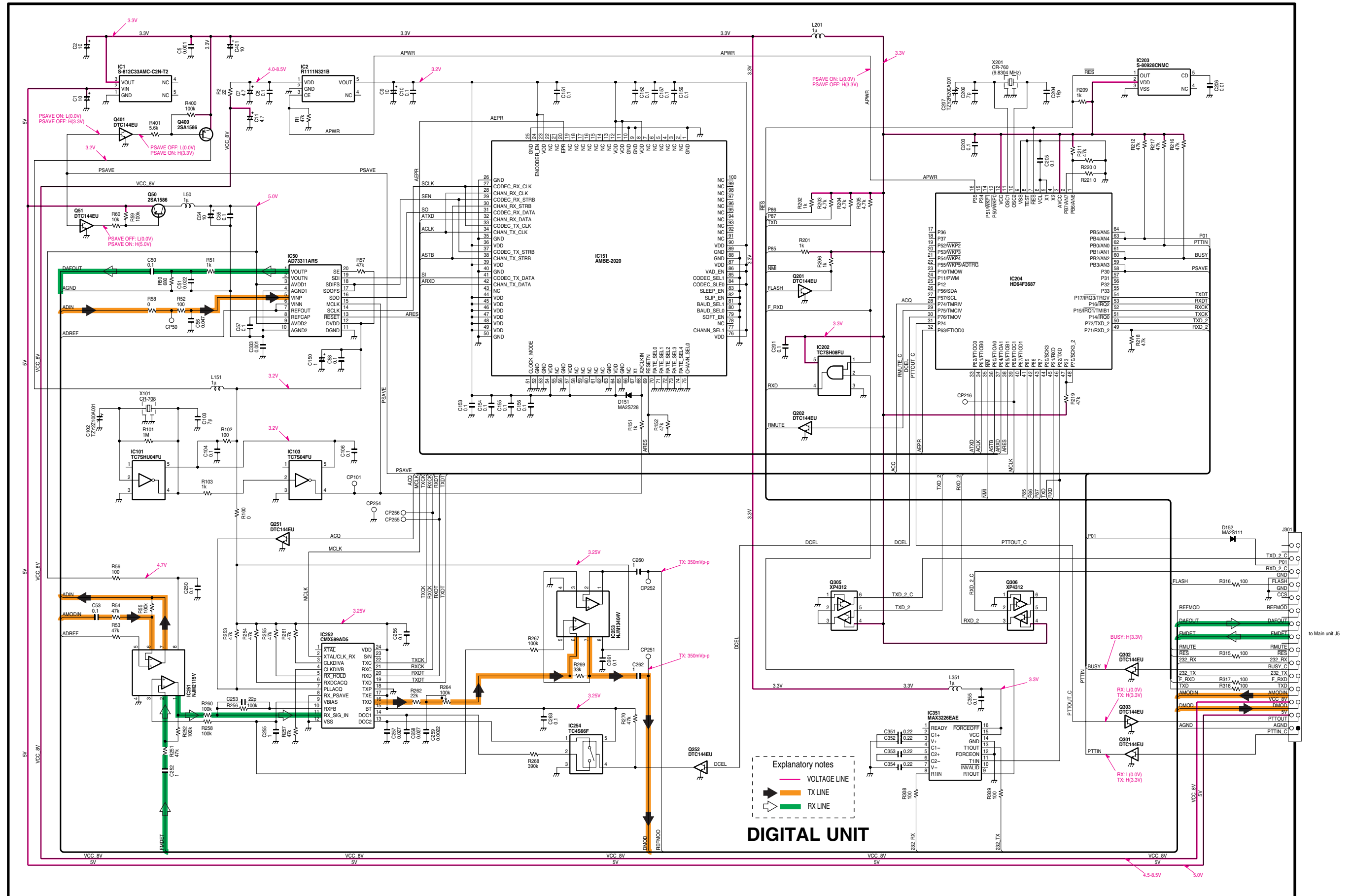
### • DIODES



## 12-3 UT-118 BLOCK DIAGRAM



# 12-4 UT-118 VOLTAGE DIAGRAM



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