

Aug. 2009



SERVICE MANUAL ADDENDUM

IC-F6021/F6022/F6023/F6023H/F6028H

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ADJUSTMENT FREQUENCIES

Before starting adjustment, clone adjustment frequencies and settings into the transceiver as below.

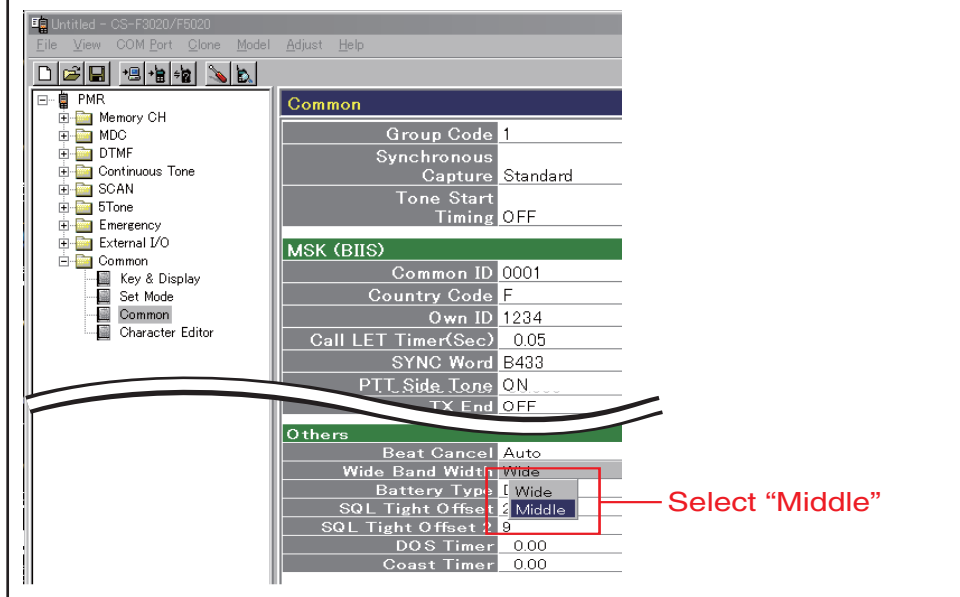
• For [Low band] version (400–470 MHz)

Zone 1: (Left CH - 108)																
CH	Atr	Inh	Frequency (MHz)				C.Tone				Text	TOT	RF PWR	PWR Save	Lock-out	
			RX	TX	TX Inh	W/N	SQL Tight	RX	TX							
1- 1	AB		400.000000	<-		W						LV ADJ		L1	ON	
1- 2			470.000000	<-		W						LV VERIFY		L1	ON	
1- 3			470.000000	<-		W						REF FREQ		L1	ON	
1- 4			435.000000	<-		W						TXPWR H.		H	ON	
1- 5			435.000000	<-		W						TXPWR L2		L2	ON	
1- 6			435.000000	<-		W						TXPWR L1		L1	ON	
1- 7			435.000000	<-		W				007N		BAL		L1	ON	
1- 8			435.000000	<-		N						MOD N		H	ON	
1- 9			435.000000	<-		W						MOD W		H	ON	
1- 10			435.000000	<-		W						MOD M		H	ON	
1- 11			435.000000	<-		W				250.3		CTC/BTC		H	ON	
1- 12			400.100000	<-	i	W						BPF		H	ON	
1- 13			400.100000	<-	i	W						RSSI		H	ON	
1- 14			400.100000	<-	i	N						SQL		H	ON	
1- 15																

• For [High band] version (450–512/520 MHz)

Zone 1: (Left CH - 108)																
CH	Atr	Inh	Frequency (MHz)				C.Tone				Text	TOT	RF PWR	PWR Save	Lock-out	
			RX	TX	TX Inh	W/N	SQL Tight	RX	TX							
1- 1	AB		450.000000	<-		W						LV ADJ		L1	ON	
1- 2			520.000000	<-		W						LV VERIFY		L1	ON	
1- 3			520.000000	<-		W						REF FREQ		L1	ON	
1- 4			485.000000	<-		W						TXPWR H.		H	ON	
1- 5			485.000000	<-		W						TXPWR L2		L2	ON	
1- 6			485.000000	<-		W						TXPWR L1		L1	ON	
1- 7			485.000000	<-		W				007N		BAL		L1	ON	
1- 8			485.000000	<-		N						MOD N		H	ON	
1- 9			485.000000	<-		W						MOD W		H	ON	
1- 10			485.000000	<-		W						MOD M		H	ON	
1- 11			485.000000	<-		W				250.3		CTC/BTC		H	ON	
1- 12			450.100000	<-	i	W						BPF		H	ON	
1- 13			450.100000	<-	i	W						RSSI		H	ON	
1- 14			450.100000	<-	i	N						SQL		H	ON	
1- 15																

NOTE: FOR [F6022], when adjust “Deviation,” “Modulation Balance,” “RX SENSITIVITY” and “S-meter” in the middle mode, change the bandwidth to “Middle” as below.



6-4 RECEIVE ADJUSTMENT

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

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

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION	VALUE	
RECEIVE SENSITIVITY [BPF T1] [BPF T2]	NOTE: When "RECEIVE SENSITIVITY" is re-adjusted, "S-METER" must be re-adjusted too.			
1	<ul style="list-style-type: none"> • Channel : 1-12 • Receiving • Connect an SSG to the antenna connector and set it as; <ul style="list-style-type: none"> Frequency : 400.100 MHz [Low band] : 450.100 MHz [High band] Level : +20 dBμ[†] (-87 dBm) Modulation : 1 kHz Deviation : ±3.0 kHz except [EUR] : ±2.4 kHz [EUR] 	1) Select the item [BPF T1] then push [ENTER]. 2) Select the item [BPF T2] then push [ENTER].	(Automatic adjustment)	
S-METER [RSSI] (S3 level)	NOTE: "RECEIVE SENSITIVITY" MUST be adjusted before "S-METER." When "RECEIVE SENSITIVITY" is re-adjusted, "S-METER" MUST be re-adjusted too.			
1	<ul style="list-style-type: none"> • Channel : 1-13 • Connect an SSG to the antenna connector and set it as; <ul style="list-style-type: none"> Frequency : 400.100 MHz [Low band] : 450.100 MHz [High band] Level : +23 dBμ[†] (-84 dBm) Modulation : 1 kHz Deviation : ±3.0 kHz except [EUR] : ±2.4 kHz [EUR] • Receiving 	Select the item [RSSI S3 Level], then push [ENTER] to store the adjust value for S3 level.	(Automatic adjustment)	
(S1 level)	2	<ul style="list-style-type: none"> • Set the SSG as; <ul style="list-style-type: none"> Level : -7 dBμ[†] (-114 dBm) • Receiving 	Select the item [RSSI S1 Level], then push [ENTER], to store the adjust value for S1 level.	
SQUELCH [SQL]	1	<ul style="list-style-type: none"> • Channel : 1-14 • Connect an SSG to the antenna connector and set it as; <ul style="list-style-type: none"> Frequency : 400.100 MHz [Low band] : 450.100 MHz [High band] Level : -13 dBμ[†] (-120 dBm) Modulation : 1.5 kHz Deviation : ±3.0 kHz • Receiving 	1) Once close the squelch by increasing [SQL] value, then decrease the value to open the squelch. 2) Push [ENTER] to store the value.	(Automatic adjustment)

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

[MAIN-A UNIT] (For other than [EXP-02])

Table with columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Lists various components and their specifications for the MAIN-A UNIT.

[MAIN-A UNIT] (For other than [EXP-02])

Table with columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Lists various components and their specifications for the MAIN-A UNIT.

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

[MAIN-B UNIT] (For [EXP-02])

Table with 5 columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Rows include parts like ECJ0EC1H470J, ECJ0EB1E102K, etc.

[MAIN-B UNIT] (For [EXP-02])

Table with 5 columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Rows include parts like ECJ0EB1A473K, ECJ0EB1E102K, etc.

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

[MAIN-B UNIT] (For [EXP-02])

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C320	4030016940	S.CER ECJ0EB1A393K	T	29.1/18.6
C321	4030016930	S.CER ECJ0EB1A104K	T	27.5/18.6
C322	4030017790	S.CER ECJ0EB1E682K	T	27.5/17.7
C325	4030016970	S.CER ECJ0EB1C223K	T	27.5/21.3
C332	4030017340	S.CER ECJ0EC1H010B	B	84.9/50
C333	4030017420	S.CER ECJ0EC1H470J	B	40.4/40.7
C334	4030017590	S.CER ECJ0EC1H070C	B	94.9/68.3
C335	4030017630	S.CER ECJ0EC1H120J	B	93.8/68.3
C336	4030017710	S.CER ECJ0EC1H181J	B	62/68.7
C337	4030017460	S.CER ECJ0EB1E102K	T	82.7/31.4
C340	4030017710	S.CER ECJ0EC1H181J	B	107.7/28.7
C342	4550002980	S.TAN TEESVA 1C 225M8R	T	78.3/66
C343	4030017460	S.CER ECJ0EB1E102K	B	51.5/39.2
C344	4030017460	S.CER ECJ0EB1E102K	B	54.2/68
C345	4030017730	S.CER ECJ0EB1E471K	B	54.2/67.1
C346	4030017420	S.CER ECJ0EC1H470J	B	66/68.7
C347	4030016930	S.CER ECJ0EB1A104K	T	52.1/24.3
C348	4030017460	S.CER ECJ0EB1E102K	T	59.3/20.2
C349	4030016930	S.CER ECJ0EB1A104K	B	21/17.7
C350	4030017920	S.CER ECJ0EB1A683K	T	95.9/15.3
C351	4030016780	S.CER ECJ0EB1C153K	B	131.6/18.7
C357	4030016930	S.CER ECJ0EB1A104K	T	103.5/34.3
C358	4030017340	S.CER ECJ0EC1H010B	B	91.2/35.8
C359	4030018860	S.CER ECJ0EB0J105K	B	29.4/18
C361	4030016930	S.CER ECJ0EB1A104K	B	56.7/6.3
C362	4030017460	S.CER ECJ0EB1E102K	T	133.3/62.5
C366	4030017460	S.CER ECJ0EB1E102K	B	97/64.4
C367	4030017730	S.CER ECJ0EB1E471K	B	97/65.8
C368	4030017420	S.CER ECJ0EC1H470J	B	97/67.3
C369	4030011020	S.CER GRM31M4C2H1R0CY21L (GRM42-6 CK)		
C372	4030017730	S.CER ECJ0EB1E471K	T	60.2/67.6
C376	4030017730	S.CER ECJ0EB1E471K	B	88.7/49.5
C377	4030017460	S.CER ECJ0EB1E102K	T	57.8/61.6
C378	4030017910	S.CER ECJ0EB1H152K	B	23.4/14.9
C379	4030016790	S.CER ECJ0EB1C103K	B	30.3/10.7
C382	4030017460	S.CER ECJ0EB1E102K	B	75.8/9.1
C383	4030017420	S.CER ECJ0EC1H470J	T	33.1/35.8
C384	4030016930	S.CER ECJ0EB1A104K	T	59.1/29.4
C385	4030016930	S.CER ECJ0EB1A104K	T	53.5/33.5
C388	4030017730	S.CER ECJ0EB1E471K	B	68.2/36.7
C390	4030017460	S.CER ECJ0EB1E102K	B	75/40.6
C391	4030017420	S.CER ECJ0EC1H470J	B	75.9/40.6
C392	4030017520	S.CER ECJ0EC1H0R3B	B	60.3/39.2
C393	4030017350	S.CER ECJ0EC1H020B	B	66.3/40.5
C394	4030016930	S.CER ECJ0EB1A104K	T	52.6/32
C395	4030016930	S.CER ECJ0EB1A104K	T	45.7/30.4
C396	4030016930	S.CER ECJ0EB1A104K	T	53.9/29.3
C397	4030016790	S.CER ECJ0EB1C103K	B	39.4/31.5
C398	4030016790	S.CER ECJ0EB1C103K	B	39.4/32.4
C399	4030016790	S.CER ECJ0EB1C103K	T	47.4/28.6
C400	4030017710	S.CER ECJ0EC1H181J	T	80.6/38.3
C401	4030017360	S.CER ECJ0EC1H030B	B	78.6/40.6
C402	4030011070	S.CER GRM31M2C2H5R0CY21L (GRM42-6 CH)	B	38/68.7
C403	4030011070	S.CER GRM31M2C2H5R0CY21L (GRM42-6 CH)	B	34.9/65.2
C404	4030011100	S.CER GRM31M2C2H8R0DV01L (GRM42-6 CH) [USA-02]	B	15.5/60.7
	4030011100	S.CER GRM31M2C2H8R0DV01L (GRM42-6 CH) [EXP-04]		
C408	4030017730	S.CER ECJ0EB1E471K	B	23.9/48.1
C409	4030017460	S.CER ECJ0EB1E102K	B	39.3/51.1
C411	4030017460	S.CER ECJ0EB1E102K [USA-02]	T	42.2/55.4
	4030017460	S.CER ECJ0EB1E102K [EXP-04]		
C412	4030017420	S.CER ECJ0EC1H470J	B	93.7/25.3
C413	4030018890	S.CER ECJ0EB0J224K	T	91.4/23.1
C414	4030017460	S.CER ECJ0EB1E102K	B	94.6/25.3
C415	4030011600	S.CER C1608 JB 1E 104K-T	T	110.5/47.4
C417	4030017730	S.CER ECJ0EB1E471K	B	106.5/19.3
C418	4030018890	S.CER ECJ0EB0J224K	T	102.8/17.3
C420	4030011040	S.CER GRM31M4C2H2R0CY21L (GRM42-6 CK)	B	21.7/60.7
C421	4030011040	S.CER GRM31M4C2H2R0CY21L (GRM42-6 CK)	B	28.2/60.7
C423	4030017360	S.CER ECJ0EC1H030B	B	77.7/40.6
C429	4030017610	S.CER ECJ0EC1H090C	B	61.9/42
C436	4030017460	S.CER ECJ0EB1E102K	T	114.9/8
C437	4030017460	S.CER ECJ0EB1E102K	B	116.7/9.6
C446	4030017710	S.CER ECJ0EC1H181J	T	84.1/28.7
C447	4030017730	S.CER ECJ0EB1E471K	B	83.3/52
C448	4030017670	S.CER ECJ0EC1H390J	B	87.8/49.5
C453	4030017420	S.CER ECJ0EC1H470J	B	101.3/35.3
C454	4030017460	S.CER ECJ0EB1E102K	T	100.4/35.3
C455	4030018860	S.CER ECJ0EB0J105K	B	37.8/16.6
C457	4030017420	S.CER ECJ0EC1H470J	B	71.9/34.8
C458	4030017420	S.CER ECJ0EC1H470J	B	72.8/34.8
C459	4030017420	S.CER ECJ0EC1H470J	T	84.7/48.3
C460	4030017420	S.CER ECJ0EC1H470J	T	73.8/38.5
C461	4030017420	S.CER ECJ0EC1H470J	T	64.8/17.5
C462	4030017420	S.CER ECJ0EC1H470J	T	64.8/18.4
C463	4030017420	S.CER ECJ0EC1H470J	T	72.2/37.8
C464	4030017420	S.CER ECJ0EC1H470J	B	74.6/34.8
C465	4030017420	S.CER ECJ0EC1H470J	B	72.2/30.9
C466	4030017420	S.CER ECJ0EC1H470J	T	62.7/49.8
C467	4030017420	S.CER ECJ0EC1H470J	T	89/22.2
C468	4030017420	S.CER ECJ0EC1H470J	B	97/13.7
C492	4030018860	S.CER ECJ0EB0J105K	T	53.4/16.3

[MAIN-B UNIT] (For [EXP-02])

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C493	4030019120	S.CER GRM188B31E105KA75D	T	114.9/49.5
J1	6510026770	S.CON AXK540147YG	T	23/8.3
J2	6510022472	S.CON 40FLT-SM2-TB(LF)(SN)(M)	T	67.5/10.6
J4	6450000140	CON HSJ0807-01-010		
J6	6510022891	S.CON B13B-ZR-SM4-TF(LF)(SN)	T	120/17.2
J7	6510014961	S.CON B2B-ZR-SM4-TF(LF)(SN)	T	130.5/27.3
S1	2260003180	S.SWI MINISMDC050F-2 CN	T	114/33.3
W1	7120000470	JUM ERDS2T0		
W2	8900011863	CAB OPC-1195C <TJM>!		
EP1	6910018460	S.BEA MMZ1005Y102C-T	B	107.5/32.7
EP4	6910010280	BEA HF70BB9.5X10.4X4.9		
EP5	6910010280	BEA HF70BB9.5X10.4X4.9		
EP7	6910018460	S.BEA MMZ1005Y102C-T	B	84.3/25
EP8	6910018460	S.BEA MMZ1005Y102C-T	T	84.3/27.5
EP9	6910018460	S.BEA MMZ1005Y102C-T	T	27/25.9
EP10	6910018460	S.BEA MMZ1005Y102C-T	B	96.1/20.1
EP11	6910018460	S.BEA MMZ1005Y102C-T	B	92.8/25.3
EP12	6910018460	S.BEA MMZ1005Y102C-T	B	91/23.1
EP13	6910018460	S.BEA MMZ1005Y102C-T	B	100.1/25.3
EP15	6910018460	S.BEA MMZ1005Y102C-T	B	104.9/19.3
MP1	8510019340	S.CAS 3179 VCO CASE Y1142	B	99.2/27.3

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
DS7	5040002310	S.LED SML-311YTT86	T	82.5/22.1
DS8	5040002310	S.LED SML-311YTT86	T	65.2/5
DS9	5040002310	S.LED SML-311YTT86	T	36.2/5
DS11	5030003200	LCD A01B011X 3179 LCD		
SP1	2510001221	SPE C052SB500-14 <OSC>		
W1	8900010503	CAB OPC-1046B-1(P0.5,N40,L55) <TJM>		
EP2	8930059170	LCD SRCN-2622-SP-N-W (SHJ)		

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

IC-F6021/F6022/F6023/F6023H/F6028H

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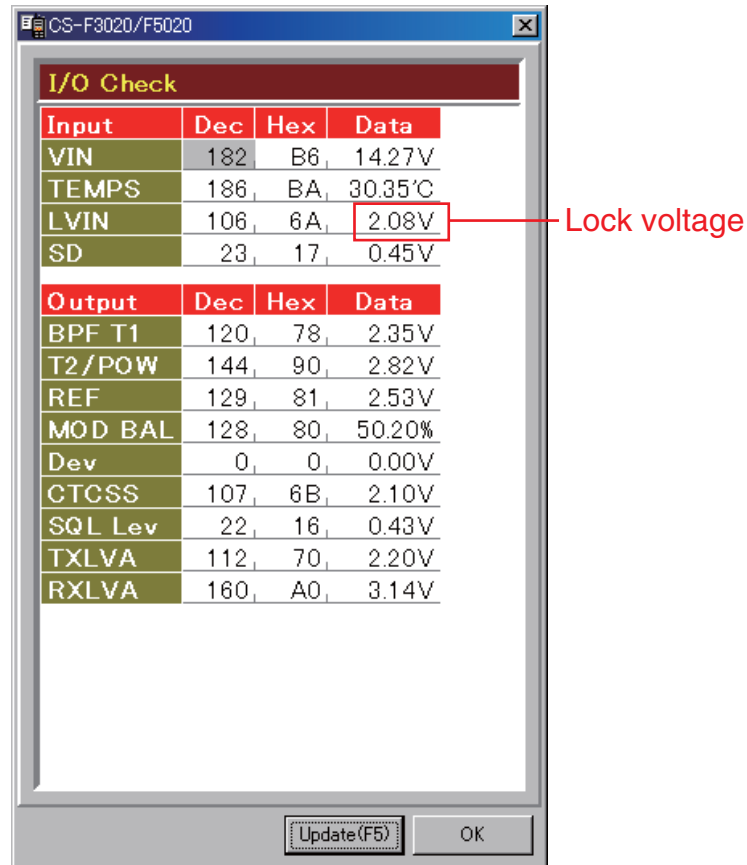
MODEL	VERSION	FREQUENCY RANGE	CHANNEL SPACING	TX POWER
IC-F6022	EUR-01	400-470 MHz	12.5/20.0/25.0 kHz	25 W
IC-F6023	EXP-01			
	EXP-02	450-520 MHz	12.5/25.0 kHz	45W
IC-F6021	USA-01	400-470 MHz		
IC-F6023H	EXP-03			
IC-F6028H	CHN-01			

6-2 FREQUENCY ADJUSTMENT

- 1) Select an adjustment item using cursor or [↑] / [↓] of the PC's keyboard.
- 2) Set or modify the adjustment value as specified using [←] / [→] of the PC's keyboard, then push [ENTER].

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION	VALUE
PLL LOCK VOLTAGE -adjustment- [RX LVA]	1 • Channel : 1-1 • Receiving	Select the item [RX LVA], then adjust the voltage (LVIN) using [←] / [→] of the PC's keyboard.	1.3 V
[TX LVA]	2 • Channel : 1-1 • Transmitting	Select the item [TX LVA], then adjust the voltage (LVIN) using [←] / [→] of the PC's keyboard.	1.5 V
PLL LOCK VOLTAGE -verification-	1 • Channel : 1-2 • Receiving	Click [Reload (F5)] button, then check the "LVIN" item on the "I/O Check window."	3.2-4.2 V
	2 • Channel : 1-2 • Transmitting		2.8-3.8 V [Low band] 3.2-4.2 V [High band]
REFERENCE FREQUENCY [REF]	1 • Channel : 1-3 • Connect an RF power meter to the antenna connector. • Transmitting	Loosely couple a frequency counter to the antenna connector.	470.000000 MHz [Low band] 520.000000 MHz [High band]

• I/O Check window



(The values shown in the above screen are example only. Each transceiver has their own values.)

[MAIN-A UNIT] (For other than [EXP-02])

Table with columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Lists parts like ERJ2GEJ 470 X (47) through ERJ2GEJ 683 X (68K).

[MAIN-A UNIT] (For other than [EXP-02])

Table with columns: REF NO., PARTS NO., DESCRIPTION, M., H/V LOCATION. Lists parts like ERJ2GEJ 104 X (100K) through ERJ2GEJ 474 X (470K).

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

[MAIN-A UNIT] (For other than [EXP-02])

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
S1	2260003180	S.SWI MINISMDC050F-2 CN	T	114/33.3
W1	7120000470	JUM ERDS2T0		
W2	8900011863	CAB OPC-1195C <TJM>!		
EP1	6910018460	S.BEA MMZ1005Y102C-T	B	107.5/32.7
EP4	6910010280	BEA HF70BB9.5X10.4X4.9		
EP5	6910010280	BEA HF70BB9.5X10.4X4.9		
EP7	6910018460	S.BEA MMZ1005Y102C-T	B	84.3/25
EP8	6910018460	S.BEA MMZ1005Y102C-T	T	84.3/27.5
EP9	6910018460	S.BEA MMZ1005Y102C-T	T	27/25.9
EP10	6910018460	S.BEA MMZ1005Y102C-T	B	96.1/20.1
EP11	6910018460	S.BEA MMZ1005Y102C-T	B	92.8/25.3
EP12	6910018460	S.BEA MMZ1005Y102C-T	B	91/23.1
EP13	6910018460	S.BEA MMZ1005Y102C-T	B	100.1/25.3
EP15	6910018460	S.BEA MMZ1005Y102C-T	B	104.9/19.3
MP1	8510019340	S.CAS 3179 VCO CASE Y1142	B	99.2/27.3

[MAIN-B UNIT] (For [EXP-02])

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
IC1	1110003491	S.IC TA31136FNG(D,EL)	T	57.8/24.7
IC2	1110002751	S.IC TA75S01F(TE85R,F)	T	60/54.9
IC3	1150002390	IC RA30H4552M1-101		
IC4	1140005991	S.IC MB15A02PFV1-G-BND-ERE1	T	77.8/29.2
IC8	1110003091	IC LA4425A-E		
IC9	1180003500	S.REG NJM7808DL1A-TE1-#FZZB	T	123.3/45.7
IC10	1180003460	S.REG NJM2831F05-TE1-#ZZZB	T	121.6/35.4
IC14	1130011770	S.IC CD4066BPWR	B	35.1/16.4
IC15	1110002751	S.IC TA75S01F(TE85R,F)	B	32/6.7
IC16	1110005340	S.IC NJM12902V-TE1-#ZZZB	B	20.6/21.1
IC17	1130011760	S.IC CD4094BPWR	B	53.1/9.9
IC18	1110007290	S.IC AK2330P-L	B	35.9/25.7
IC19	1110002751	S.IC TA75S01F(TE85R,F)	B	83.7/18.1
IC20	1190001340	S.IC M62334FP 600C	B	72.3/26.3
Q2	1580000731	S.FET 3SK293(TE85L,F)	B	41.5/38.7
Q3	1580000731	S.FET 3SK293(TE85L,F)	B	71.4/38.4
Q4	1530002601	S.TRA 2SC4215-O(TE85R,F)	T	64.5/25.3
Q5	1590000430	S.TRA DTC144EUA T106	T	55.9/16.1
Q6	1590000430	S.TRA DTC144EUA T106	T	62.6/52.1
Q8	1530002680	S.TRA 2SC3357-T1	B	90.4/52.8
Q9	1530003260	S.TRA 2SC5006-T1	B	84.9/51.5
Q10	1530003311	S.TRA 2SC5107-O(TE85R,F)	B	92.8/33.1
Q11	1530003311	S.TRA 2SC5107-O(TE85R,F)	B	100.5/31.7
Q12	1530004110	S.TRA MT3S37T(TE85L,F)	B	97.6/30.4
Q13	1530002920	S.TRA 2SC4226-T1 R25	B	105.2/30.9
Q14	1530002920	S.TRA 2SC4226-T1 R25	B	98.3/24.2
Q15	1590001400	S.TRA XP1214(TX)	T	101/34.4
Q16	1590000430	S.TRA DTC144EUA T106	T	103.5/36.6
Q17	1530002851	S.TRA 2SC4116-BL(TE85R,F)	T	107.7/33.8
Q18	1560000541	S.FET 2SK880-Y(T5RICOM,F)	T	78/24.5
Q19	1590000430	S.TRA DTC144EUA T106	T	91.8/11.7
Q23	1550000190	S.FET 2SJ506STR-E	T	115.3/45.4
Q24	1590000430	S.TRA DTC144EUA T106	T	110.5/44.3
Q25	1540000550	S.TRA 2SD1664 T100Q	B	125.1/47.6
Q26	1510000920	S.TRA 2SA1577 T106 Q	T	107.7/44.3
Q27	1520000450	S.TRA 2SB1132 T100 Q	B	123.5/21.1
Q28	1590001190	S.TRA XP6501-(TX).AB	B	118.7/22.2
Q29	1590003391	S.TRA UNR9215G0L	B	126.4/43.3
Q30	1590000430	S.TRA DTC144EUA T106	T	107.7/39.4
Q31	1590001451	S.FET 2SJ144-GR (TE85R,F)	B	114.3/13.1
Q33	1590000430	S.TRA DTC144EUA T106	T	113.6/26.6
Q34	1530002851	S.TRA 2SC4116-BL(TE85R,F)	B	67.6/25.1
Q35	1590000990	S.TRA DTC363EK T146	B	128.9/17.8
Q36	1590000430	S.TRA DTC144EUA T106	B	118.7/18.3
Q37	1590000430	S.TRA DTC144EUA T106	T	112.3/15.8
Q39	1590001650	S.TRA XP4601(TX)	T	25.2/19.5
Q40	1590003381	S.TRA UNR9111G0L	T	46.8/33
Q43	1590000680	S.TRA DTC114EUA T106	T	36.4/15.2
Q44	1590000430	S.TRA DTC144EUA T106	T	53/14.3
D1	1790001211	S.DIO 1SS375-TL-E	B	19.2/49.9
D3	1710001061	DIO L407CDB		
D4	1750000711	S.VAR HVC350BTRF-E	B	36/40.2
D5	1750001360	S.DIO L709CER (9401)	T	26.8/51.9
D6	1750000581	S.DIO 1SV307(TPH3,F)	T	24.5/52.3
D8	1750000711	S.VAR HVC350BTRF-E	B	28/41.6
D9	1750000711	S.VAR HVC350BTRF-E	B	52.8/42.6
D10	1750000711	S.VAR HVC350BTRF-E	B	55.5/39.9
D11	1790001211	S.DIO 1SS375-TL-E	B	8.2/49.9
D12	1790001211	S.DIO 1SS375-TL-E	B	22.8/49.9
D14	1750000581	S.DIO 1SV307(TPH3,F)	B	82.2/41.8
D15	1790001261	S.DIO MA2S077G0L	B	82.2/39.2
D18	1750001650	S.VAR 1SV309(TPH3,F)	B	101.8/25.9
D19	1750000711	S.VAR HVC350BTRF-E	B	61.9/39.9
D20	1750000711	S.VAR HVC350BTRF-E	B	28/40.2
D21	1750000711	S.VAR HVC350BTRF-E	B	36/41.6
D22	1790000700	DIO DSA3A1		
D23	1750000370	S.DIO DA221 TL	B	124/43.3
D26	1790001251	S.DIO MA2S1110GL	B	116.7/12
D29	1790001251	S.DIO MA2S1110GL	B	119.2/20.2
D37	1790001251	S.DIO MA2S1110GL	T	79.9/33.4
D42	1160000140	S.DIO DAP222 TL	B	37.1/7.2
D43	1160000140	S.DIO DAP222 TL	B	35/7.2
D44	1790001251	S.DIO MA2S1110GL	B	48.9/5.4
D45	1790001251	S.DIO MA2S1110GL	B	51.5/5.4
D52	1750000711	S.VAR HVC350BTRF-E	B	93.6/24
D53	1750000711	S.VAR HVC350BTRF-E	B	104.5/21
D56	1750001070	S.DIO DAN235ETL	T	51.5/33.5
D57	1750001070	S.DIO DAN235ETL	T	48.2/30.4
D58	1750000370	S.DIO DA221 TL	B	113.7/10.8
D59	1750000370	S.DIO DA221 TL	T	113/7.1
D60	1750000370	S.DIO DA221 TL	B	113/8.4
D61	1750000370	S.DIO DA221 TL	T	113/9.4
D62	1750000711	S.VAR HVC350BTRF-E	B	97.8/20.5
D64	1750000711	S.VAR HVC350BTRF-E	B	106.5/21.7
F11	2030000150	S.MON DSF753SB 46.350 MHz (FL-335)	T	66.6/34.9
F12	2020002410	CER LTM450FW <JJE>		
F13	2040001440	S.LC NFE31PT152Z1E9L (NFM60R20T152)	B	97.7/55.4
F14	2040001440	S.LC NFE31PT152Z1E9L (NFM60R20T152)	B	97.7/58.9
F16	2020002460	CER LTM450GW <JJE>		
X1	6070000300	S.DIS JTBM450CX24 <JJE>	B	52.4/24.5
X2	6050012050	S.XTA CR-794 TTS14VSB-A6 15.3 MHz	B	80.8/23.8
L1	6200010150	S.COI AS080340-15N	B	8.4/62.7
L2	6200010150	S.COI AS080340-15N	B	12.9/55.5

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

[MAIN-B UNIT] (For [EXP-02])

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C459	4030017420	S.CER ECJ0EC1H470J	T	84.7/48.3
C460	4030017420	S.CER ECJ0EC1H470J	T	73.8/38.5
C461	4030017420	S.CER ECJ0EC1H470J	T	64.8/17.5
C462	4030017420	S.CER ECJ0EC1H470J	T	64.8/18.4
C463	4030017420	S.CER ECJ0EC1H470J	T	72.2/37.8
C464	4030017420	S.CER ECJ0EC1H470J	B	74.6/34.8
C465	4030017420	S.CER ECJ0EC1H470J	B	72.2/30.9
C466	4030017420	S.CER ECJ0EC1H470J	T	62.7/49.8
C467	4030017420	S.CER ECJ0EC1H470J	T	89/22.2
C468	4030017420	S.CER ECJ0EC1H470J	B	97/13.7
C492	4030018860	S.CER ECJ0EB0J105K	T	53.4/16.3
C493	4030019120	S.CER GRM188B31E105KA75D	T	114.9/49.5
J1	6510026770	S.CON AXK540147YG	T	23/8.3
J2	6510022472	S.CON 40FLT-SM2-TB(LF)(SN)(M)	T	67.5/10.6
J4	6450000140	S.CON HSJ0807-01-010	T	
J6	6510022891	S.CON B13B-ZR-SM4-TF(LF)(SN)	T	120/17.2
J7	6510014961	S.CON B2B-ZR-SM4-TF(LF)(SN)	T	130.5/27.3
S1	2260003180	S.SWI MINISMD050F-2 CN	T	114/33.3
W1	7120000470	JUM ERDS2T0		
W2	8900011863	CAB OPC-1195C <TJM>!		
EP1	6910018460	S.BEA MMZ1005Y102C-T	B	107.5/32.7
EP4	6910010280	BEA HF70BB9.5X10.4X4.9		
EP5	6910010280	BEA HF70BB9.5X10.4X4.9		
EP7	6910018460	S.BEA MMZ1005Y102C-T	B	84.3/25
EP8	6910018460	S.BEA MMZ1005Y102C-T	T	84.3/27.5
EP9	6910018460	S.BEA MMZ1005Y102C-T	T	27/25.9
EP10	6910018460	S.BEA MMZ1005Y102C-T	B	96.1/20.1
EP11	6910018460	S.BEA MMZ1005Y102C-T	B	92.8/25.3
EP12	6910018460	S.BEA MMZ1005Y102C-T	B	91/23.1
EP13	6910018460	S.BEA MMZ1005Y102C-T	B	100.1/25.3
EP15	6910018460	S.BEA MMZ1005Y102C-T	B	104.9/19.3
MP1	8510019340	S.CAS 3179 VCO CASE Y1142	B	99.2/27.3

[FRONT UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
IC1	1140015190	S.IC HD6432238BB45TFV (FX-3179A-2)	B	67.8/23
IC2	1110005771	S.IC S-80942CNMC-G9CT2G	B	89.1/19.3
IC3	1130001240	S.IC S-24CS64A0I-T8T1G	B	90.2/15.7
IC5	1110005340	S.IC NJM12902V-TE1-EZZZB	B	25.5/23.3
IC6	1130009090	S.IC LC75834W-TLM-E	B	43/21.2
Q1	1530002851	S.TRA 2SC4116-BL(TE85R,F)	B	33.6/16.2
Q2	1590001050	S.TRA DTC114TUA T106	B	33.7/19.8
Q3	1590000430	S.TRA DTC144EUA T106	B	35/27
Q5	1590001050	S.TRA DTC114TUA T106	B	33.7/22.3
D1	1790000951	S.ZEN MAZ8056GML	T	13.4/17.1
D2	1790000951	S.ZEN MAZ8056GML	T	5.2/17.1
D3	1790000951	S.ZEN MAZ8056GML	B	18.1/12.3
D5	1790001251	S.DIO MA2S1110GL	B	61.6/15.7
D6	1790001261	S.DIO MA2S077G0L	B	78/13.8
X1	6050011830	S.XTA CR-774 SMD-49TB 12.288 MHz <KDS>	B	82.3/16.5
L1	6200003640	S.COI MLF1608E 100K-T	B	11.6/17.1
L2	6200001981	S.COI NLV25T-1R0J	B	59.5/9.7
R7	7030009160	S.RES ERJ2GEJ 181 X (180)	B	35.7/16.2
R8	7030009160	S.RES ERJ2GEJ 181 X (180)	B	36.6/16.2
R9	7030005000	S.RES ERJ2GEJ 471 X (470)	B	37.5/16.2
R11	7030009280	S.RES ERJ2GEJ 391 X	B	33.1/18
R12	7030009140	S.RES ERJ2GEJ 272 X (2.7K)	B	34.7/18
R14	7210003330	VAR RK09D1130A1N		
R15	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	7.2/17.1
R16	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	16.5/13.2
R18	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	8.2/17.1
R19	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	19.7/13.2
R20	7030005110	S.RES ERJ2GEJ 224 X (220K)	B	61.3/29.9
R21	7030005720	S.RES ERJ2GEJ 563 X (56K)	B	61.3/30.8
R22	7030005220	S.RES ERJ2GEJ 223 X (22K)	B	61.3/31.7
R23	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	30.9/27.9
R24	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	30.9/27
R25	7030005220	S.RES ERJ2GEJ 223 X (22K)	B	32.6/28.8
R26	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	29.2/27
R27	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	26.9/27.9
R28	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	B	30.9/26.1
R29	7030008290	S.RES ERJ2GEJ 183 X (18K)	B	32.6/27.9
R32	7030007340	S.RES ERJ2GEJ 153 X (15K)	B	30.9/23.3
R33	7030005220	S.RES ERJ2GEJ 223 X (22K)	B	30.9/24.2
R34	7030005060	S.RES ERJ2GEJ 333 X (33K)	B	30.9/22.4
R35	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	30.9/21.5
R36	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	30.9/20.6
R37	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	29.2/21.5
R38	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	29.2/22.4
R39	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	29.2/23.3
R40	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	B	20.1/26.1
	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	[EUR-01]	
	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	[EXP-01]	
	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	[EXP-02]	
	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	[USA-01]	
	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	[EXP-03]	
	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	[CHN-01]	
R41	7030005600	S.RES ERJ2GEJ 273 X (27K)	B	20.1/27.9
R42	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	23.6/27.9
R43	7030007350	S.RES ERJ2GEJ 393 X (39K)	B	25.2/27.9
R44	7030005100	S.RES ERJ2GEJ 154 X (150K)	B	21.8/27
R45	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	23.6/28.8
R46	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	33.4/3.3
R47	7030009140	S.RES ERJ2GEJ 272 X (2.7K)	B	33.4/5.1
R48	7030010040	S.RES ERJ2GEJ-JPW	B	28/18.3
R51	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	59.5/15.7
R58	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	85.8/13.6
R60	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	84/8.6
R65	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	59.7/29.9
R68	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	85.8/15.2
R73	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	45.2/14.6
R74	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	47/14.6
R75	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	44.3/14.6
R76	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	10.4/17.1
R77	7030005030	S.RES ERJ2GEJ 152 X (1.5K)	B	72.5/9.3
R78	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	42.2/14.3
R82	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	39/14.6
R83	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	40.8/14.6
R84	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	39.9/14.6
R90	7030006610	S.RES ERJ2GEJ 394 X (390K)	B	53.8/4.1
R101	7030008010	S.RES ERJ2GEJ 123 X (12K)	B	77.4/14.9
R102	7030008010	S.RES ERJ2GEJ 123 X (12K)	B	77.4/12.7
R103	7030008010	S.RES ERJ2GEJ 123 X (12K)	B	78.8/12.7
R104	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	75.7/14.9
R105	7030005530	S.RES ERJ2GEJ 100 X (10)	B	77.4/15.8
R106	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	78.8/17.2
R107	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	86.7/18.5
R108	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	74/29.4
R109	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	72.6/30.9
R110	7030010040	S.RES ERJ2GEJ-JPW	B	59.7/27.7
R111	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	57.5/22.2
R112	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	57.5/23.2
R113	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	75.7/15.8
R114	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	78/25.8
R115	7410001130	S.ARR EXB28V102JX	B	57.5/25.2
R116	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	60.6/17.3
R117	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	71/12.7
R118	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	71.9/14.6
R119	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	73.5/14.9

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

[FRONT UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
R120	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	75.7/30.3
R121	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	72.9/31.8
R122	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	71.3/32.2
R123	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	58.9/17.3
R124	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	58.9/18.2
R125	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	58.9/19.1
R127	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	78/28.5
R128	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	30.9/25.2
R129	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	23.5/18.3
C1	4030018100	S.CER ECJ0EB1H681K	B	42.2/15.2
C2	4030017420	S.CER ECJ0EC1H470J	B	84/7.7
C3	4030017420	S.CER ECJ0EC1H470J	B	28.5/6.1
C4	4030017420	S.CER ECJ0EC1H470J	B	47.2/5
C5	4030017420	S.CER ECJ0EC1H470J	B	56.4/5.5
C6	4030017420	S.CER ECJ0EC1H470J	B	81/27.6
C7	4030017420	S.CER ECJ0EC1H470J	B	16.5/11.6
C8	4030017460	S.CER ECJ0EB1E102K	B	13.7/17.1
C9	4030017460	S.CER ECJ0EB1E102K	T	11.3/17.1
C10	4030017460	S.CER ECJ0EB1E102K	T	20.3/13.1
C11	4030017420	S.CER ECJ0EC1H470J	T	7.3/17.1
C12	4030017460	S.CER ECJ0EB1E102K	T	18.3/13.1
C14	4030017460	S.CER ECJ0EB1E102K	B	29.2/28.8
C15	4030016960	S.CER ECJ0EB1C183K	B	29.2/27.9
C16	4030016930	S.CER ECJ0EB1A104K	B	29.2/26.1
C17	4030017750	S.CER ECJ0EB1E122K	B	26.9/28.8
C19	4030016930	S.CER ECJ0EB1A104K	B	32.6/27
C20	4030017460	S.CER ECJ0EB1E102K	B	30.9/19.7
C21	4030017460	S.CER ECJ0EB1E102K	B	29.2/20.6
C22	4030018140	S.CER ECJ0EB1H391K	B	26.2/18.3
C23	4030016790	S.CER ECJ0EB1C103K	B	29.2/24.2
C24	4030017420	S.CER ECJ0EC1H470J	B	24.4/18.3
C25	4030016790	S.CER ECJ0EB1C103K	B	21.8/28.8
C26	4030016930	S.CER ECJ0EB1A104K	B	20.1/27
C27	4030017450	S.CER ECJ0EB1E271K	B	21.8/27.9
C28	4030016930	S.CER ECJ0EB1A104K	B	25.3/18.3
C29	4550006050	S.TAN TEESVA OJ 106M8R	B	25.5/16.1
C31	4030016930	S.CER ECJ0EB1A104K	B	33.4/4.2
C34	4030017420	S.CER ECJ0EC1H470J	B	56.4/4.5
C36	4030016930	S.CER ECJ0EB1A104K	B	85.8/16.8
C37	4030017420	S.CER ECJ0EC1H470J	B	85.6/20.1
C38	4030017420	S.CER ECJ0EC1H470J	B	78.8/9.3
C41	4030017460	S.CER ECJ0EB1E102K	B	20.1/28.8
C50	4030017420	S.CER ECJ0EC1H470J	B	62.1/9.3
C54	4030017420	S.CER ECJ0EC1H470J	B	63/9.3
C69	4030017420	S.CER ECJ0EC1H470J	B	67.4/1.7
C74	4030017420	S.CER ECJ0EC1H470J	B	61.7/1.7
C75	4030016930	S.CER ECJ0EB1A104K	B	46.1/14.6
C76	4030016930	S.CER ECJ0EB1A104K	B	25.2/28.8
C77	4030016950	S.CER ECJ0EB1A473K	B	71.6/10.9
C78	4030017460	S.CER ECJ0EB1E102K	B	8.9/17.1
C79	4030016930	S.CER ECJ0EB1A104K	B	47.9/14.6
C80	4030016930	S.CER ECJ0EB1A104K	B	43.4/14.6
C82	4030017420	S.CER ECJ0EC1H470J	B	33.1/26.1
C84	4030017420	S.CER ECJ0EC1H470J	B	21.8/26.1
C85	4030017420	S.CER ECJ0EC1H470J	B	29.2/19.7
C87	4030016930	S.CER ECJ0EB1A104K	B	30.9/18
C93	4030017460	S.CER ECJ0EB1E102K	B	56.9/9.2
C101	4030016930	S.CER ECJ0EB1A104K	B	76.1/13.3
C102	4030016930	S.CER ECJ0EB1A104K	B	77.4/11.8
C103	4030016930	S.CER ECJ0EB1A104K	B	75.2/13.3
C104	4030017400	S.CER ECJ0EC1H220J	B	78.8/15.4
C105	4030017600	S.CER ECJ0EC1H080C	B	77.4/16.7
C106	4030017640	S.CER ECJ0EC1H150J	B	77.4/17.6
C107	4030017030	S.CER ECJ0EB1A273K	B	91.3/18.5
C111	4030016930	S.CER ECJ0EB1A104K	B	86.7/20.1
C112	4550006780	S.TAN TEESVB2 OJ 476M8R	B	56.2/16.8
C113	4030018910	S.CER C1608 JB OJ 475K-T	B	78/18.9
C114	4030017420	S.CER ECJ0EC1H470J	B	56.9/10.1
C115	4030016930	S.CER ECJ0EB1A104K	B	75.8/18.9
C116	4030016930	S.CER ECJ0EB1A104K	B	78/20
C117	4030016930	S.CER ECJ0EB1A104K	B	78/20.9
C118	4030016930	S.CER ECJ0EB1A104K	B	78/24.9
C119	4030016930	S.CER ECJ0EB1A104K	B	78/23.1
C120	4030016930	S.CER ECJ0EB1A104K	B	78/24
C123	4030017460	S.CER ECJ0EB1E102K	B	76.2/29.4
C124	4030016930	S.CER ECJ0EB1A104K	B	59.7/28.6
C125	4030016930	S.CER ECJ0EB1A104K	B	53.8/5
C126	4030017460	S.CER ECJ0EB1E102K	B	25.2/4.2
C128	4030016930	S.CER ECJ0EB1A104K	T	14.6/19.3
C129	4030017460	S.CER ECJ0EB1E102K	T	13.7/19.3
C130	4030017460	S.CER ECJ0EB1E102K	B	85.7/8.6
C131	4030018860	S.CER ECJ0EB0J105K	B	32.6/25.2
J1	6450002210	CON 3017-8821 <KIN>		
J2	6510022472	S.CON 40FLT-SM2-TB(LF)(SN)(M)	B	70.9/5.7
DS1	5040002310	S.LED SML-311YTT86	T	64.8/23.5
DS2	5040002310	S.LED SML-311YTT86	T	58.2/23.5
DS3	5040002310	S.LED SML-311YTT86	T	51.6/23.5
DS4	5040002310	S.LED SML-311YTT86	T	31.8/23.5
DS5	5040002310	S.LED SML-311YTT86	T	38.4/23.5
DS6	5040002310	S.LED SML-311YTT86	T	45/23.5
DS7	5040002310	S.LED SML-311YTT86	T	82.5/22.1
DS8	5040002310	S.LED SML-311YTT86	T	65.2/5
DS9	5040002310	S.LED SML-311YTT86	T	36.2/5
DS11	5030003200	LCD A01B011X 3179 LCD		
W1	8900010503	CAB OPC-1046B-1(P0.5,N40,L55) <TJM>		

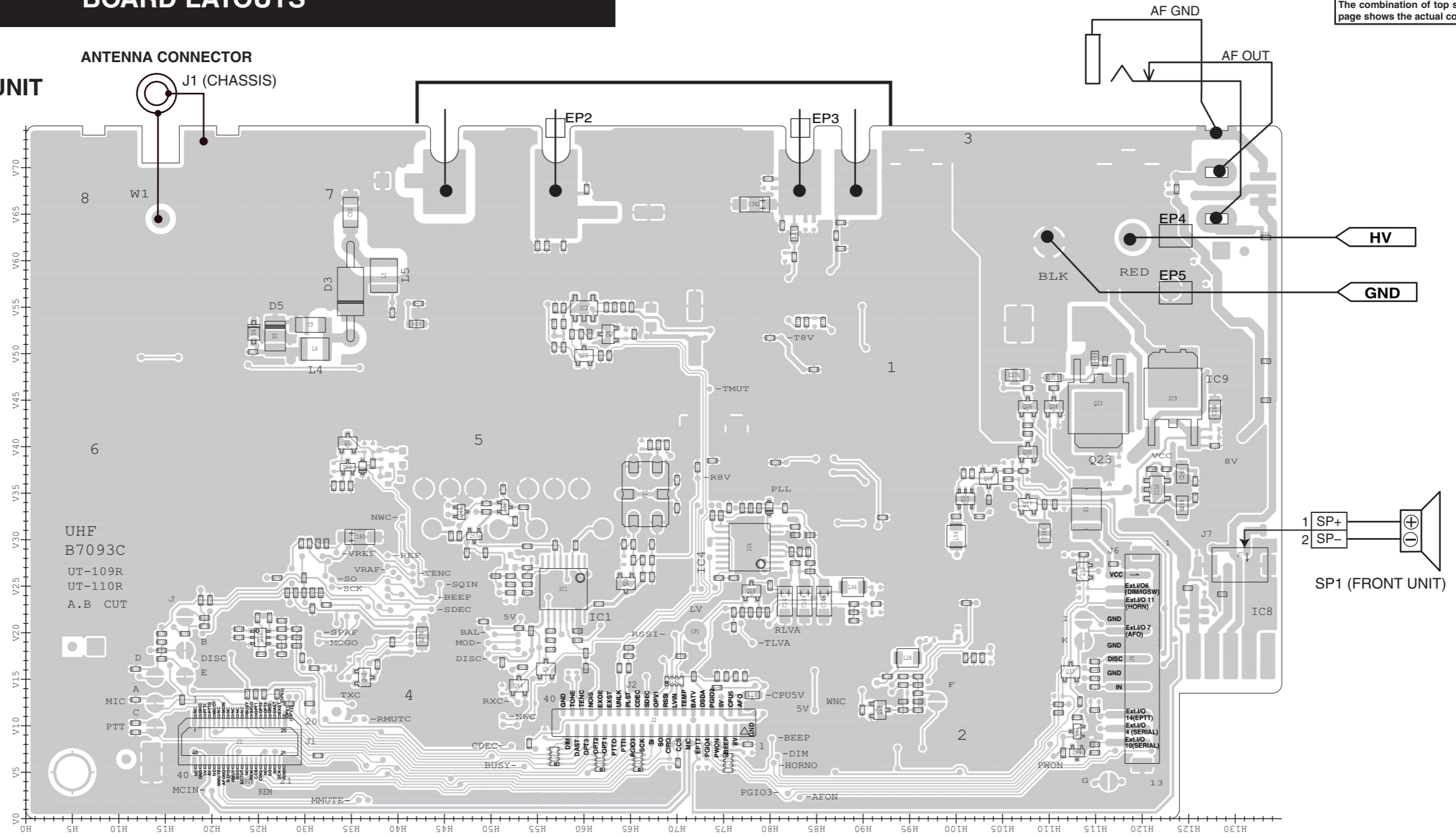
[FRONT UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
EP2	89300059170	LCD SRCN-2622-SP-N-W (SHJ)		

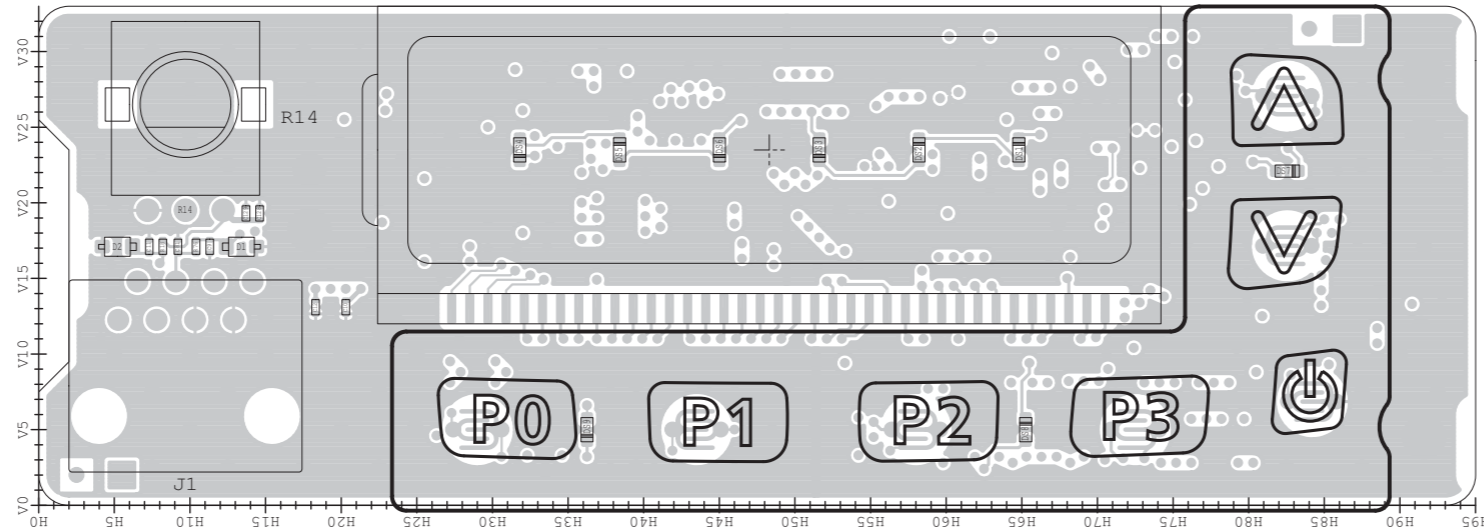
M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

BOARD LAYOUTS

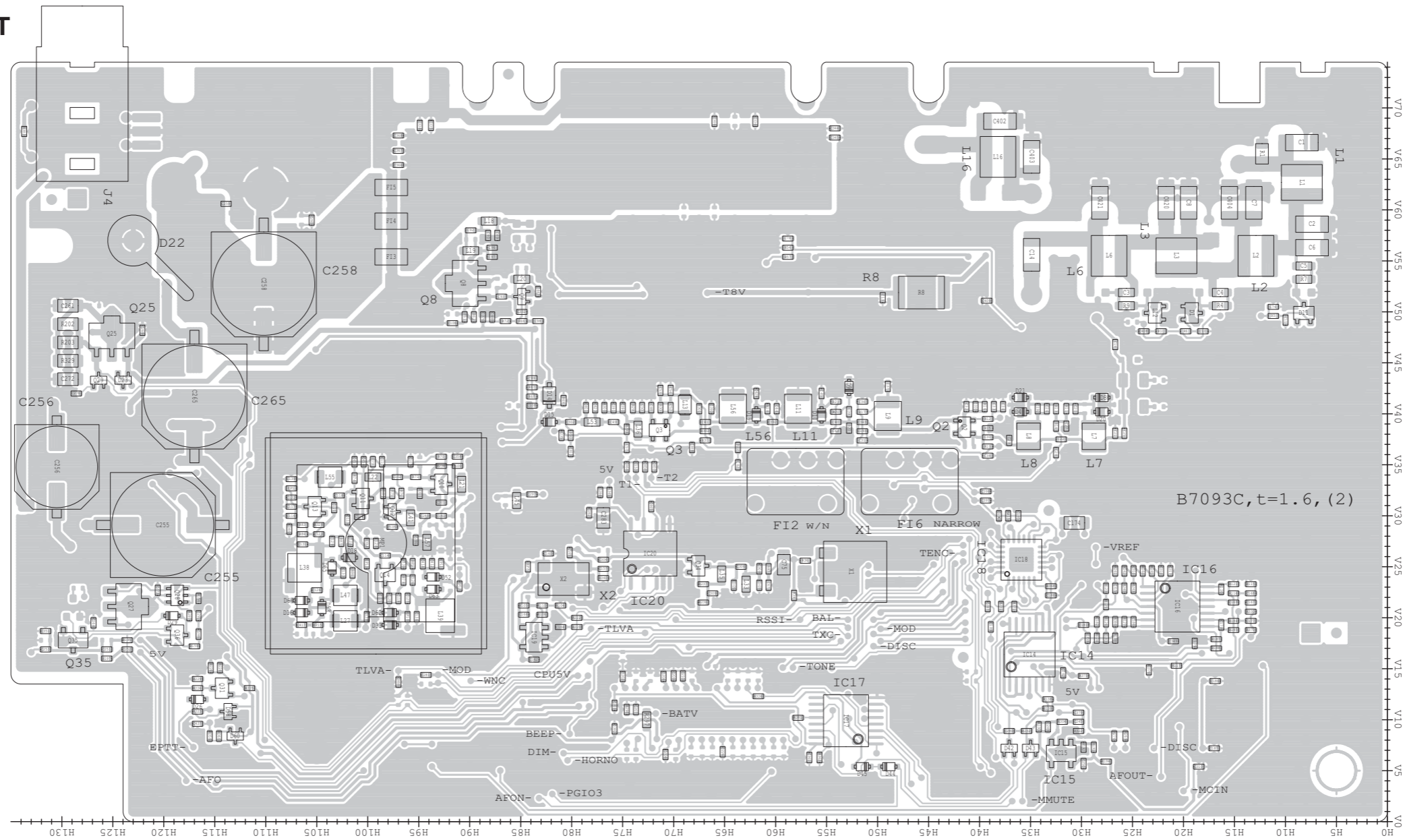
• MAIN-A / MAIN-B UNIT (TOP VIEW)



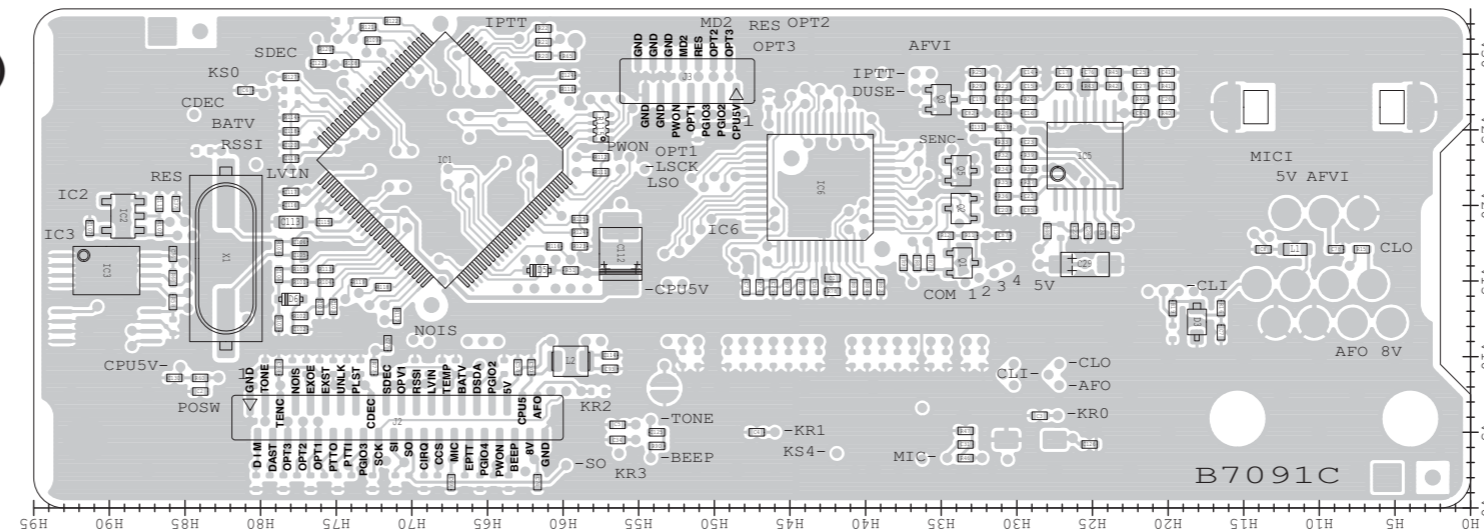
• FRONT UNIT (TOP VIEW)



• MAIN-A / MAIN-B UNIT
(BOTTOM VIEW)

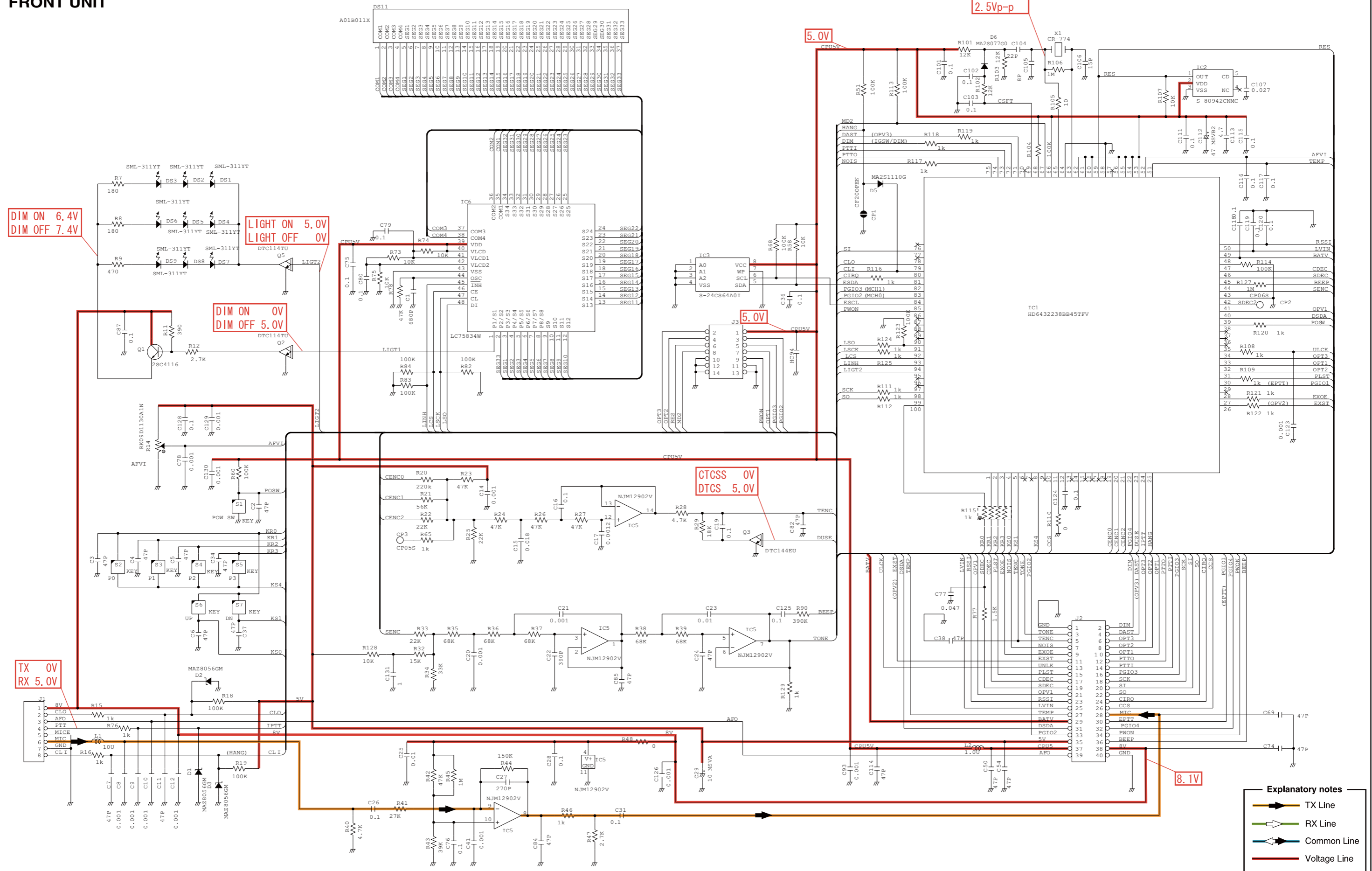


• FRONT UNIT
(BOTTOM VIEW)



VOLTAGE DIAGRAM

FRONT UNIT



DIM ON 6.4V
DIM OFF 7.4V

LIGHT ON 5.0V
LIGHT OFF 0V

DIM ON 0V
DIM OFF 5.0V

5.0V

12.288MHz
2.5Vp-p

5.0V

CTCSS 0V
DTCS 5.0V

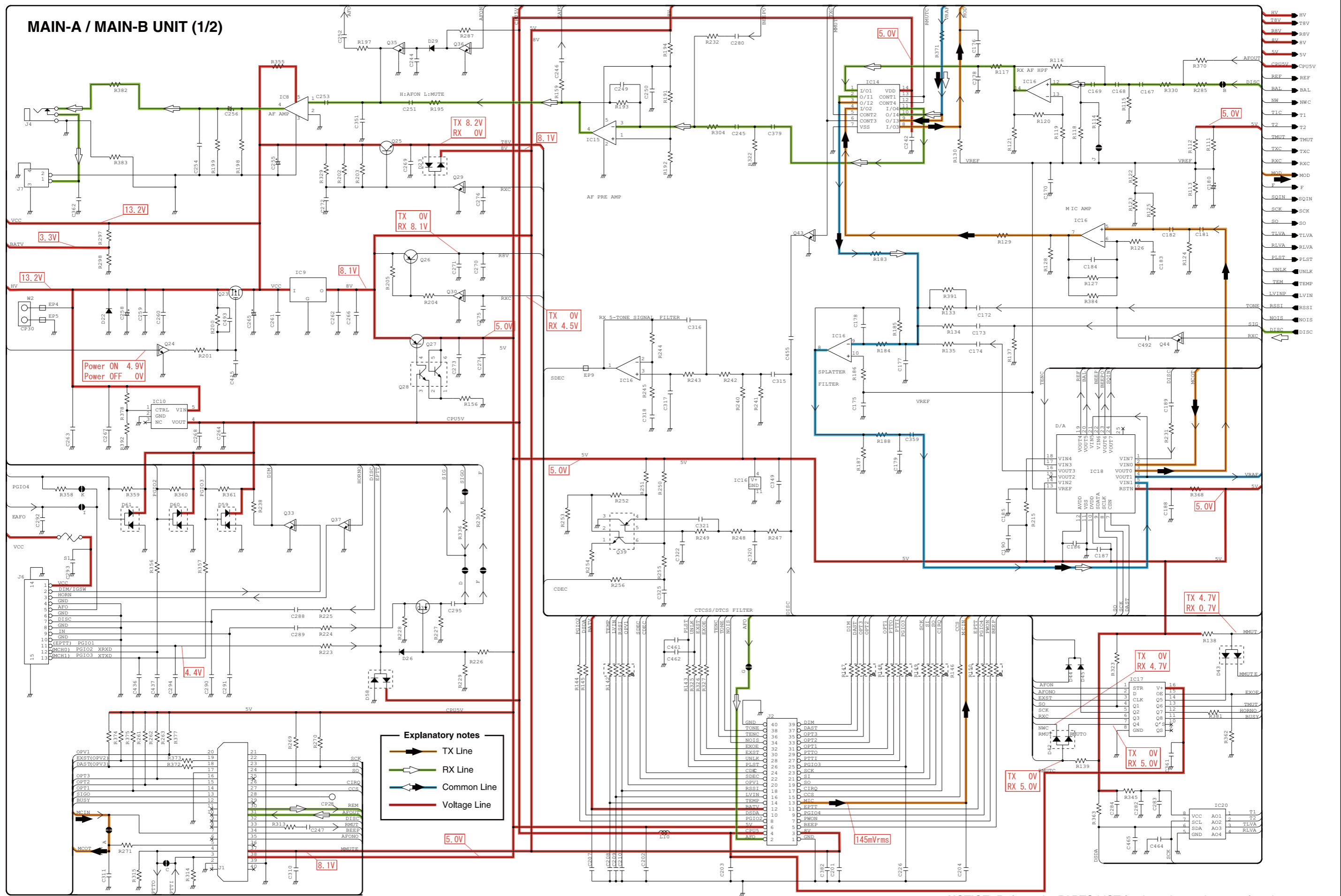
TX 0V
RX 5.0V

8.1V

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

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

MAIN-A / MAIN-B UNIT (1/2)

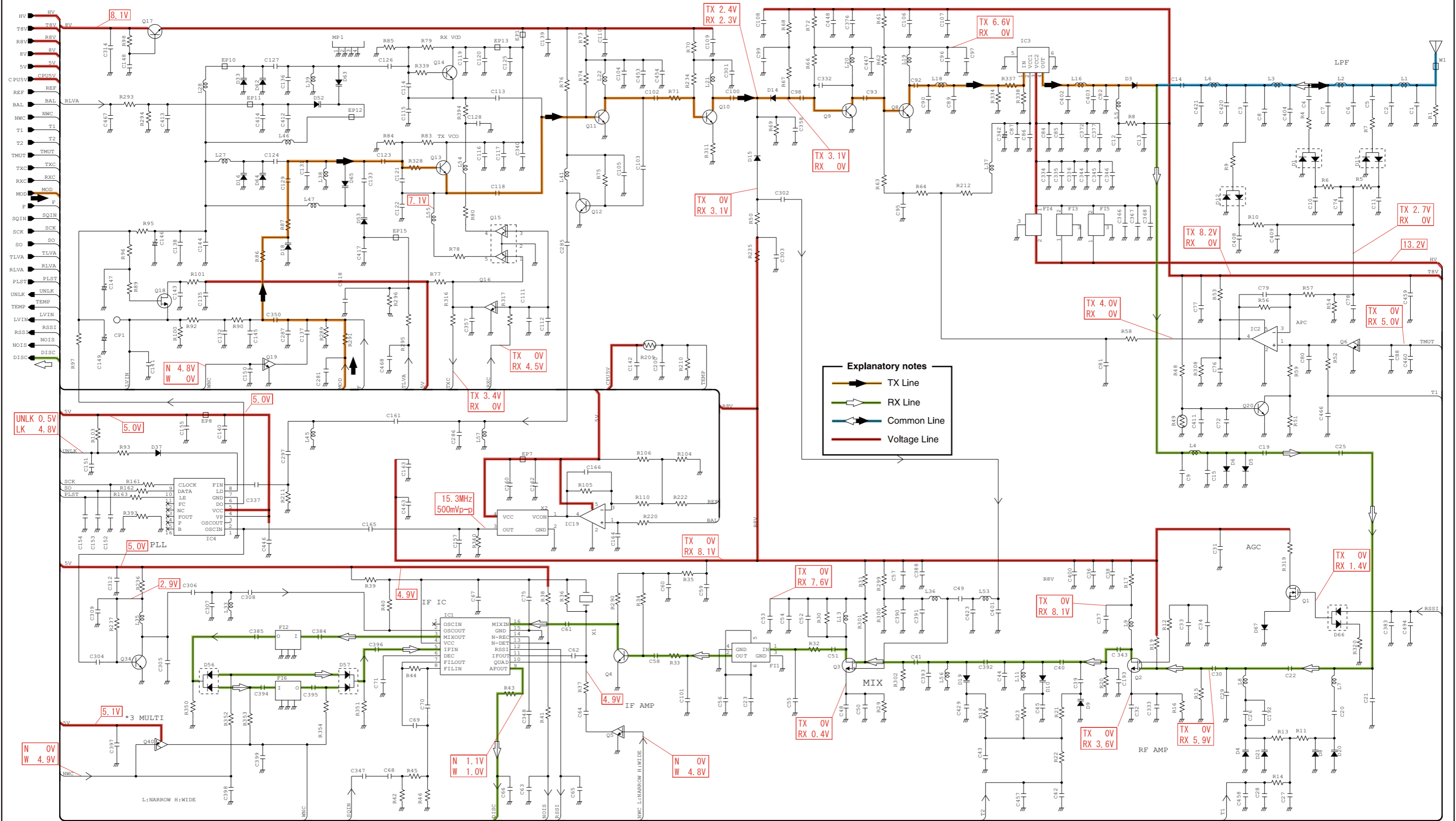


Explanatory notes

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

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

MAIN-A / MAIN-B UNIT (2/2)



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



SERVICE MANUAL

UHF MOBILE TRANSCEIVERS

IC-F6021
IC-F6022
IC-F6023
IC-F6023H
IC-F6028H

S-14601XZ-C1
May. 2009

Icom Inc.

INTRODUCTION

This service manual describes the latest technical information for the **IC-F6021, F6023/H, F6028H UHF MOBILE TRANSCEIVERS** at the time of publication.

MODEL	VERSION	CHANNEL SPACING	TX POWER	FREQUENCY RANGE
F6022	[EUR-01]	12.5/20.0/ 25.0 kHz	25 W	400–470 MHz
F6023	[EXP-01]	12.5/25.0 kHz	45W	
F6021	[USA-01]			
F6023H	[EXP-01]			
F6028H	[CHN-01]			

UNIT ABBREVIATIONS:

F=FRONT UNIT
M=MAIN UNIT

CAUTION

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

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

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

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

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



ORDERING PARTS

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

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

<ORDER EXAMPLE>

1110003491 S.IC TA31136FNG IC-F6022 MAIN UNIT 5 pieces
8820001210 Screw 2438 screw IC-F6023 Top cover 10 pieces

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

REPAIR NOTES

1. Make sure that the problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a Standard Signal Generator or a Sweep Generator.
7. **ALWAYS** connect a 50 dB to 60 dB attenuator between the transceiver and a Deviation Meter or Spectrum Analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting a test equipment to the transceiver.

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SECTION 1

SPECIFICATIONS

			[USA], [CHN]	[EXP]	[EUR]	
GENERAL	• Frequency coverage		400–470 MHz			
	• Type of emission	Wide	16K0F3E (25.0 kHz)			
		Middle	–		14K0F3E (20.0 kHz)	
		Narrow	11K0F3E (12.5 kHz)		8K50F3E (12.5 kHz)	
	• Number of programable channels		128 channels (8 zones)			
	• Antenna impedance		50 Ω (nominal)			
	• Operating temperature range		–30° to +60°; –22°F to +140°F		–25°C to +55°C	
	• Power supply requirement (negative ground)		13.6 V DC (nominal)		13.2 V DC (nominal)	
	• Current drain (approx.)	RX	Stand-by	250 mA		
			Max.audio	700 mA		
		TX	at 25 W	5.0 A		
			at 45 W	11.0 A		
	• Dimensions	[25 W ver.]	150 (W) × 40 (H) × 117.5 (D) mm; (5 ^{29/32} (W) × 1 ^{9/16} (H) × 4 ^{5/8} (D) in)			
[45 W ver.]		150 (W) × 40 (H) × 167.5 (D) mm; (5 ^{29/32} (W) × 1 ^{9/16} (H) × 6 ^{19/32} (D) in)				
• Weight	[25 W ver.]	0.8 kg (1 ^{3/4} lb)				
	[45 W ver.]	1.1 kg (2 ^{7/16} lb)				
TRANSMITTER	• Transmit output power	[25 W ver.]	25 W (High), 10 W (Low2), 2.5 W (Low1)		25 W	
		[45 W ver.]	45 W (High), 25 W (Low2), 4.5 W (Low1)		–	
	• Modulation		Variable reactance frequency modulation			
	• Max. permissible deviation	Wide	±5.0 kHz			
		Middle	–		±4.0 kHz	
		Narrow	±2.5 kHz			
	• Frequency error		±2.5 ppm		±1.5 kHz	
	• Spurious emission		70 dB typ.		0.25 μW (≤1 GHz), 1.0 μW (>1 GHz)	
	• Adjacent channel power	Wide	More than 70 dB			
		Middle	–		More than 70 dB	
		Narrow	More than 60 dB			
	• Audio harmonic distortion		3% typ. (with 1 kHz AF 40% deviation)			
	• FM hum and noise (without CCITT filter)	Wide	More than 40 dB (46 dB typ.)		–	
		Narrow	More than 34 dB (40 dB typ.)		–	
	• Residual modulation (with CCITT filter)	Wide	–		More than 45 dB (55 dB typ.)	
		Middle	–		More than 43 dB (53 dB typ.)	
		Narrow	–		More than 40 dB (50 dB typ.)	
• Limiting charact of modulation		70–100% of max. deviation				
• Microphone impedance		600 Ω				

Measurements made in accordance with TIA-603 or EN 300 086.

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

		[USA], [CHN]	[EXP]	[EUR]	
RECEIVER	• Receive system	Double-conversion superheterodyne			
	• Intermediate frequencies	1st IF; 46.35 MHz, 2nd IF; 450 kHz			
	• Sensitivity	0.25 μ V typ. at 12 dB SINAD		-4 dB μ V (EMF) typ. at 20 dB SINAD	
	• Squelch sensitivity (at threshold)	0.25 μ V typ.		-4 dB μ V (EMF) typ.	
	• Adjacent channel selectivity	Wide	More than 70 dB (75 dB typ.)		
		Middle	-		More than 70 dB (75 dB typ.)
		Narrow	More than 60 dB (65 dB typ.)		
	• Spurious response	More than 70 dB			
	• Intermodulation	More than 70 dB (75 dB typ.)		More than 65 dB (67 dB typ.)	
	• Hum and noise (without CCITT filter)	Wide	More than 40 dB (45 dB typ.)		-
		Narrow	More than 34 dB (40 dB typ.)		-
	• Hum and noise (with CCITT filter)	Wide	-		More than 45 dB (55 dB typ.)
		Middle	-		More than 43 dB (53 dB typ.)
		Narrow	-		More than 40 dB (50 dB typ.)
• Audio output power	4.0 W typ. at 5% distortion with a 4 Ω load				
• Audio output impedance	4 Ω				

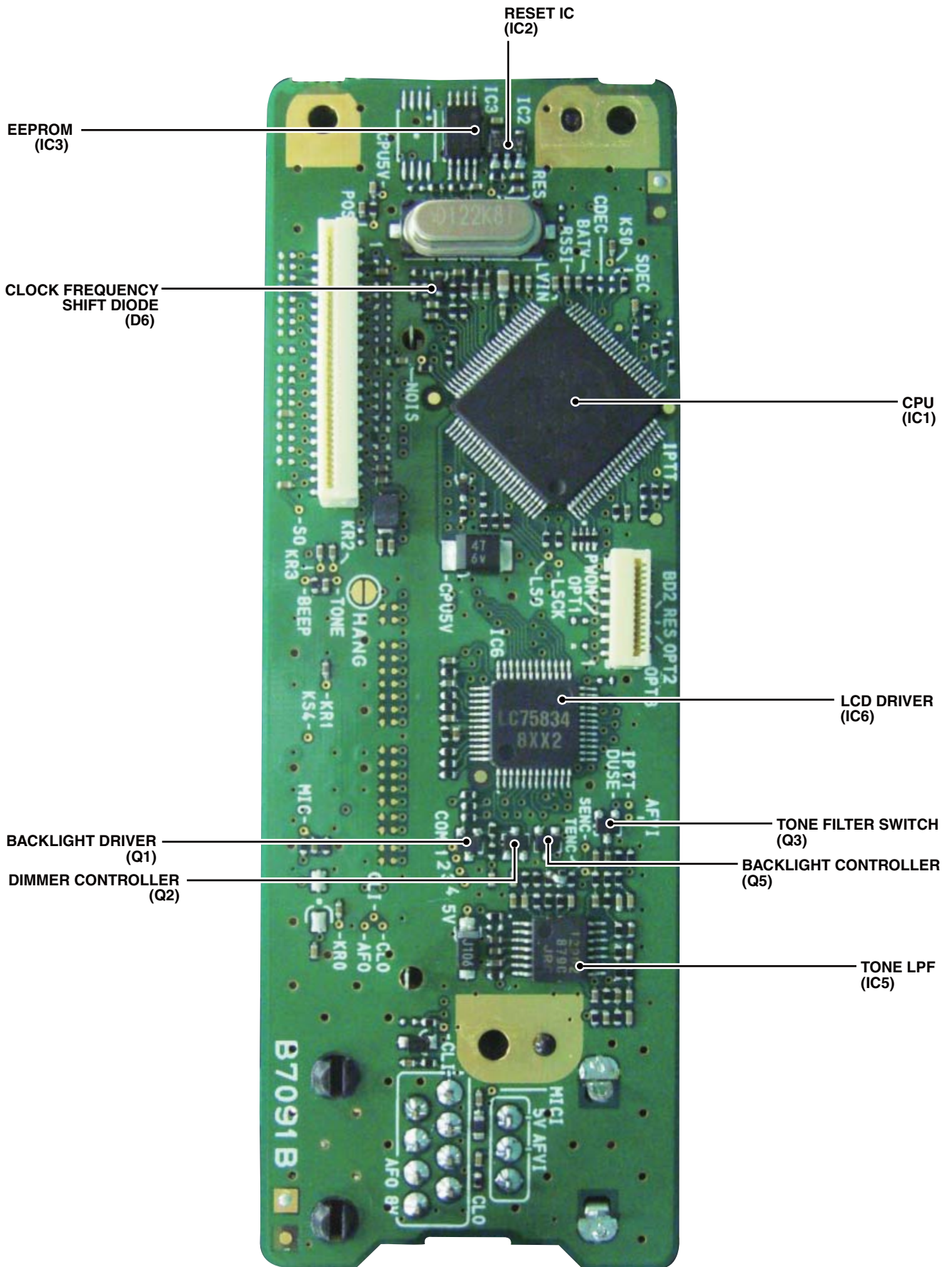
Measurements made in accordance with TIA-603 or EN 300 086.

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

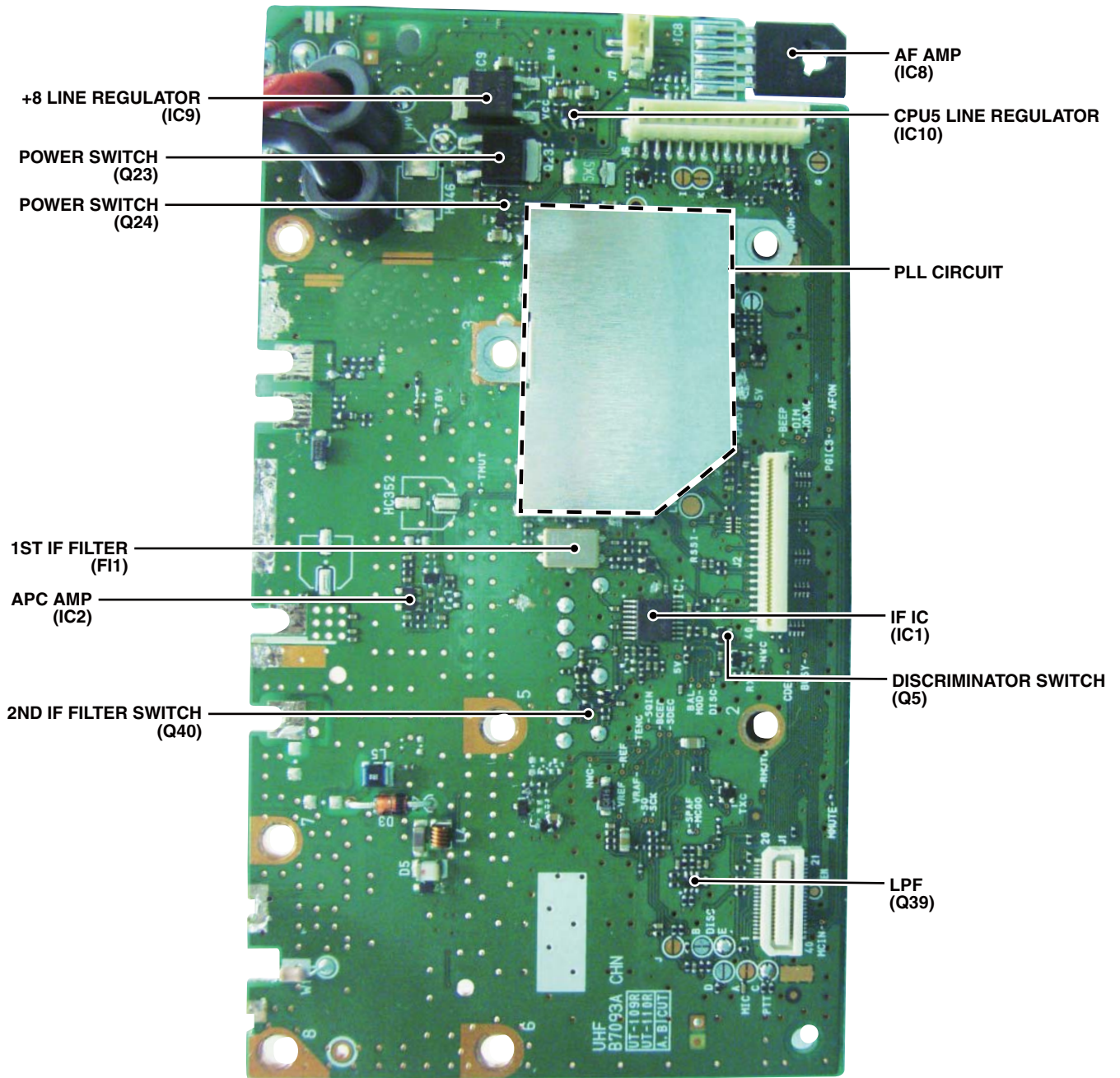
SECTION 2

INSIDE VIEWS

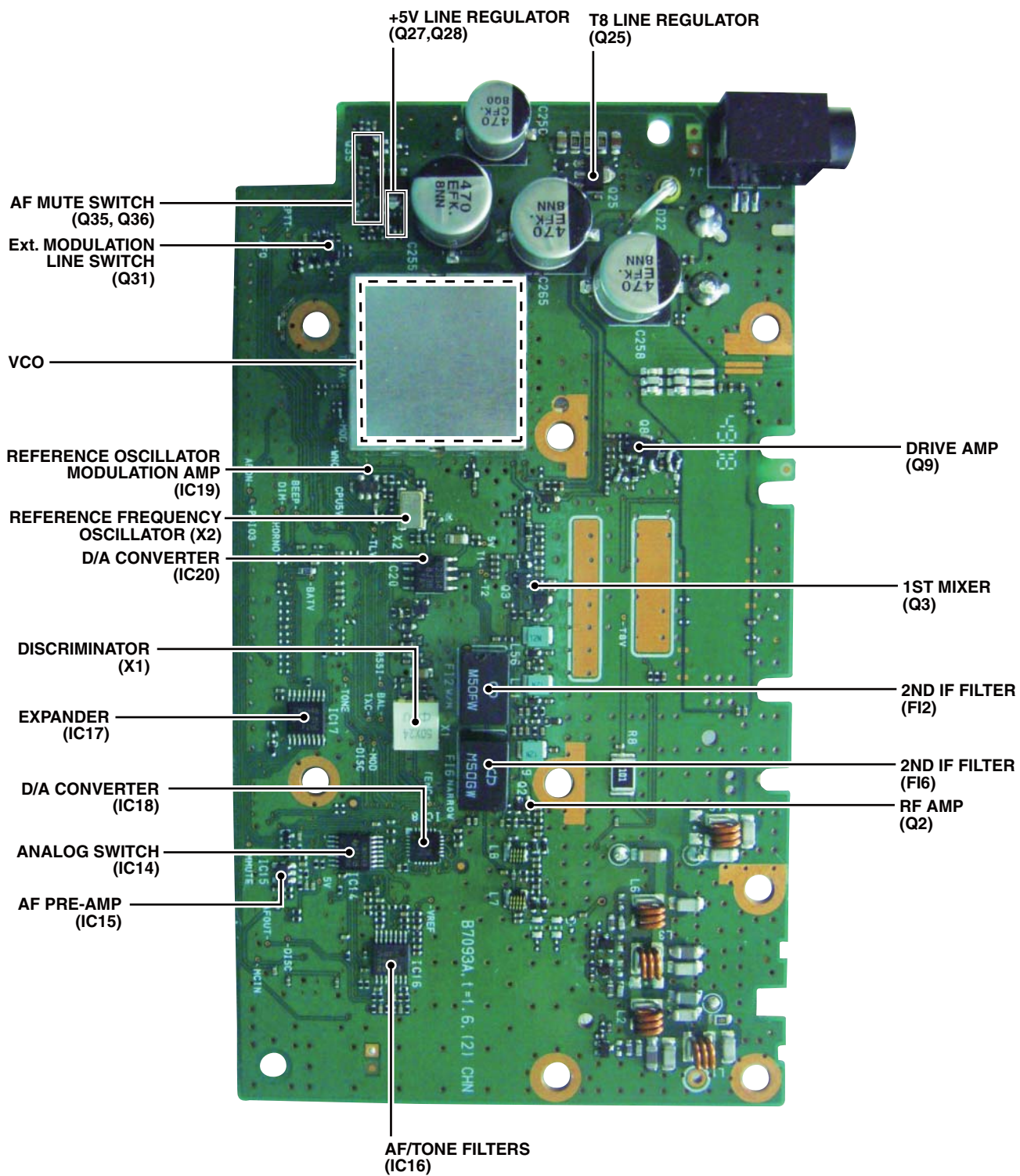
• FRONT UNIT



• MAIN-A UNIT
(TOP VIEW)

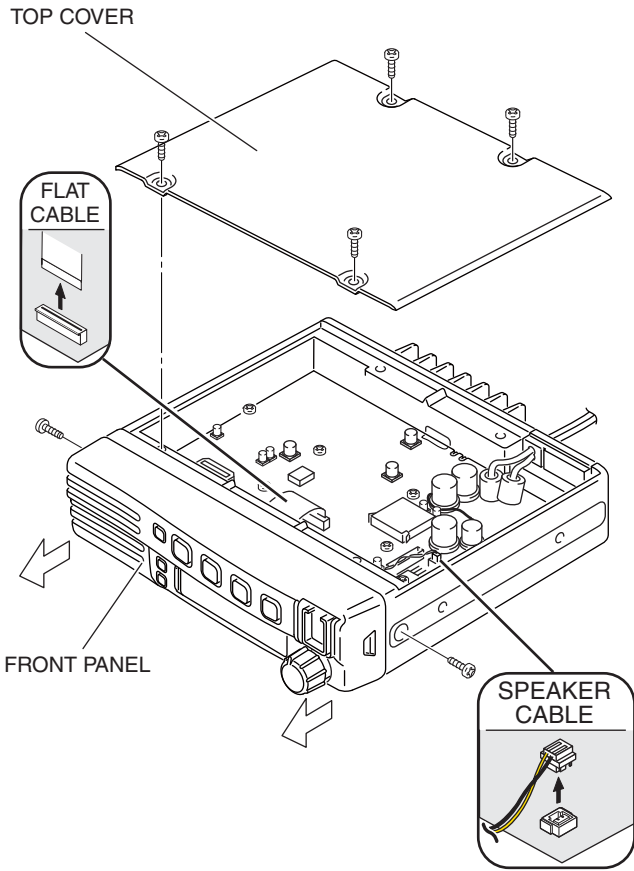


• MAIN-A UNIT
(BOTTOM VIEW)

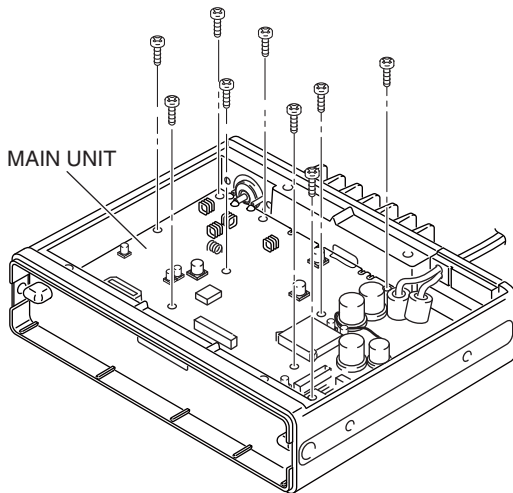


SECTION 3 DISASSEMBLY INSTRUCTION

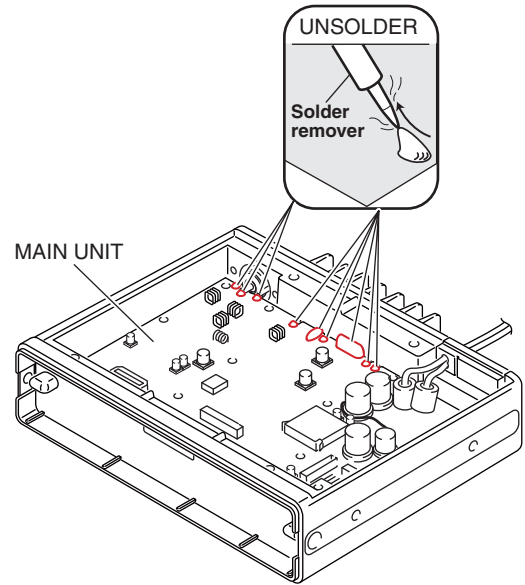
- 1) Unscrew 4 screws from the top cover, and remove the top cover.
- 2) Disconnect the flat cable and speaker cable.
- 3) Unscrew 2 screws from the both sides, and remove the front panel in the direction of the arrow.



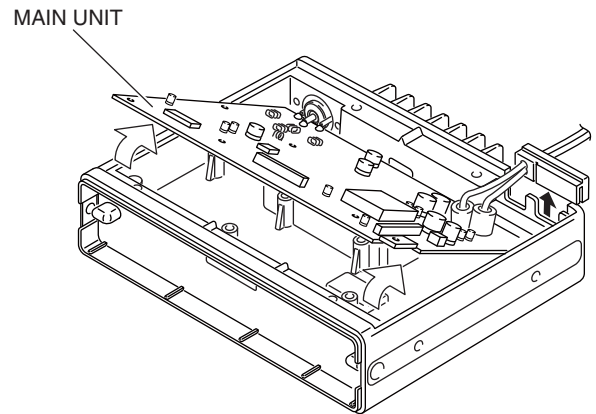
- 4) Unscrew 9 screws from the MAIN UNIT.



- 5) Unsolder total of 9 points; 3 points at the antenna connector, 6 points at the PA module.



- 6) Take off the MAIN UNIT from the CHASSIS.

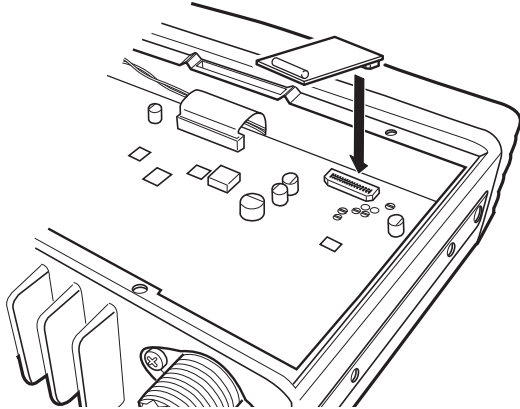


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SECTION 4 OPTIONAL PRODUCTS INSTALLATION

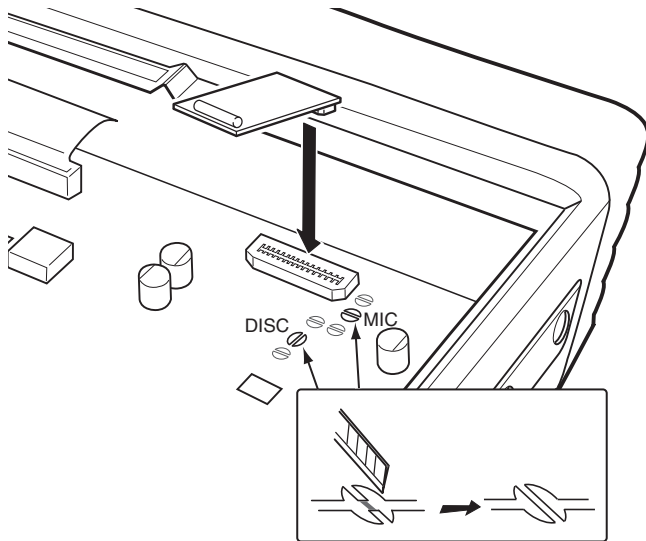
Install optional UT-108R as follows;

- 1) Turn the transceiver power OFF, then disconnect the DC power cable.
- 2) Unscrew 4 screws, then remove the bottom cover.
- 3) Install the unit as shown below.
- 4) Recover the bottom cover, screws and DC power cable.

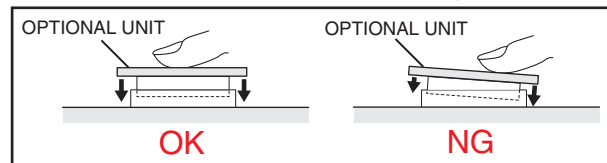


Install optional UT-109R or UT-110R as follows;

- 1) Turn the transceiver power OFF, then disconnect the DC power cable.
- 2) Unscrew 4 screws, then remove the bottom cover.
- 3) Cut the pattern on the PCB at "MIC" and "DISC" as shown below.
- 4) Install the unit as shown below.
- 5) Recover the bottom cover, screws and DC power cable.

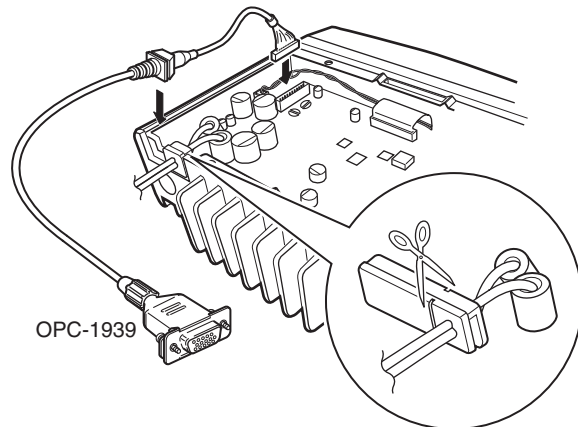


NOTE: When attaching the unit
Be sure that the unit is inserted correctly.



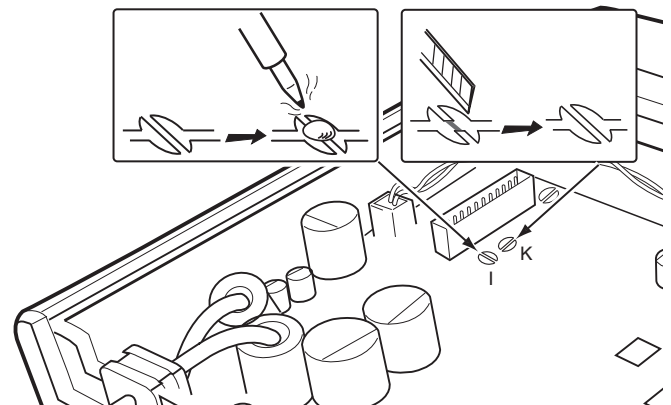
Install optional OPC-1939 as follows;

- 1) Turn the transceiver power OFF, then disconnect the DC power cable.
- 2) Unscrew 4 screws, then remove the bottom cover.
- 3) Install the cable as shown below.

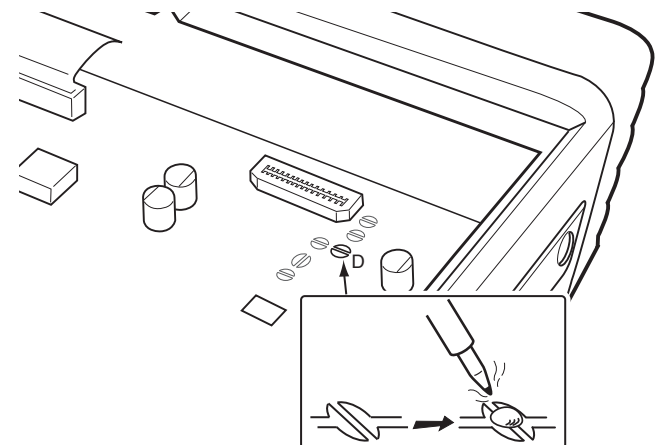


Cut off the bushing as in the illustration, when you install the optional OPC-1939.

- 4) Cut or short the patterns as below. (For AF output)

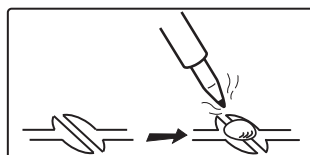
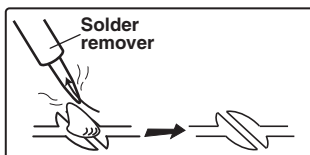


- 5) Short the pattern as below. (For modulation input)



- 6) Recover the bottom cover, screws and DC power cable.

NOTE: Be sure to recover the patterns when you remove the optional product. Otherwise no TX modulation or AF output is available.



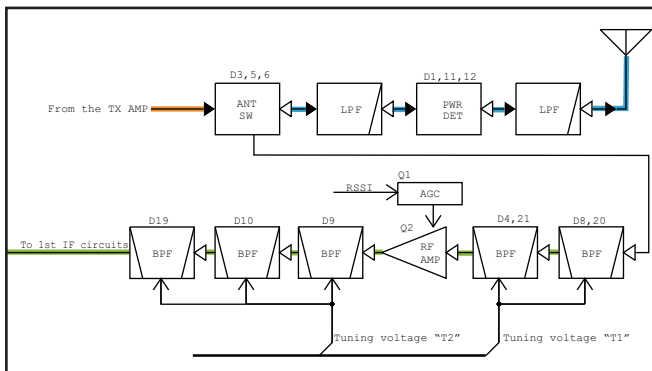
5-1 RECEIVER CIRCUITS
RF CIRCUITS

RF signals from the antenna are passed through the LPF (as the harmonic filter for transmitting) and antenna SW, then applied to the RX BPF circuit.

The applied RX signals are passed through the 2-staged tuned BPF (D8, 20 and D4, 21) to remove unwanted out-of-band signals, and amplified by the low-noise RF AMP (Q2), then applied to the 1st mixer (Q3) via three BPFs (D9, 10 and D19).

Each BPF is tuned to the RX frequency by the tuning voltage "T1" and "T2" from the D/A converter (IC20), to obtain required IMD characteristic.

• RF CIRCUITS



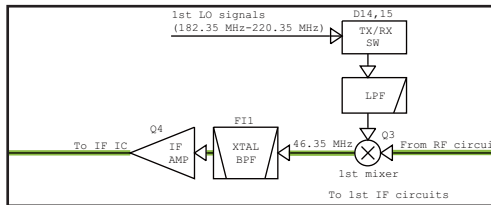
1ST IF CIRCUITS

The RX signals from the BPF are mixed with the 1st LO signals to be converted into the 46.35 MHz 1st IF signal.

The 1st LO signals are generated by the RX VCO (Q14, D33, 62, 63), and passed through the LO SW (D15) and attenuator, then applied to the 1st mixer (Q3)

The converted 1st IF signal is filtered by the crystal filter (F11) and amplified by the 1st IF AMP (Q4), then applied to the IF IC (IC1).

• 1ST IF CIRCUITS



2ND IF AND DEMODULATOR CIRCUITS

The amplified 1st IF signal is mixed with the 2nd LO signal at the internal 2nd IF mixer of the IF IC (IC1), to obtain the 450 kHz 2nd IF signal.

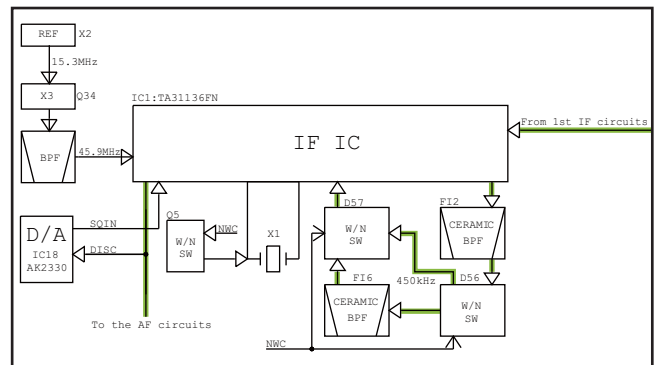
The 15.3 MHz signal generated by the reference oscillator (X2) is passed through the filter AMP (Q34) to extract the 45.9 MHz 3rd harmonic component. The 45.9 MHz signal is then applied to pin 2 of IF IC (IC1) as the 2nd LO signal.

The converted 2nd IF signal is output from pin 3 of IF IC (IC1), and filtered by the ceramic filters (FI2 and FI6 for Narrow mode; FI2 only for Wide mode) to remove unwanted out-of-band signals, then applied to the internal frequency-demodulator of IF IC (IC1) from pin 5.

The demodulator is a quadrature type which uses X1 as the phase shifter.

The frequency-demodulated AF signals are output from pin 9 to AF circuits.

• 2ND IF AND DEMODULATOR CIRCUITS



AF CIRCUITS

The demodulated AF signals from the IF IC (IC1) are amplified and filtered by the HPF (IC16), and passed through the AF line SW (IC14) and LPF (IC16). The filtered AF signals are adjusted its level (=loudness) by the D/A converter (IC18), and applied to the AF AMP (IC15) via the AF line SW (IC14).

The amplified AF signals are applied to the AF power AMP (IC8) and power-amplified to obtain AF output level.

The power-amplified AF signals are applied to the internal speaker on the FRONT UNIT or output from the external speaker jack on the rear panel.

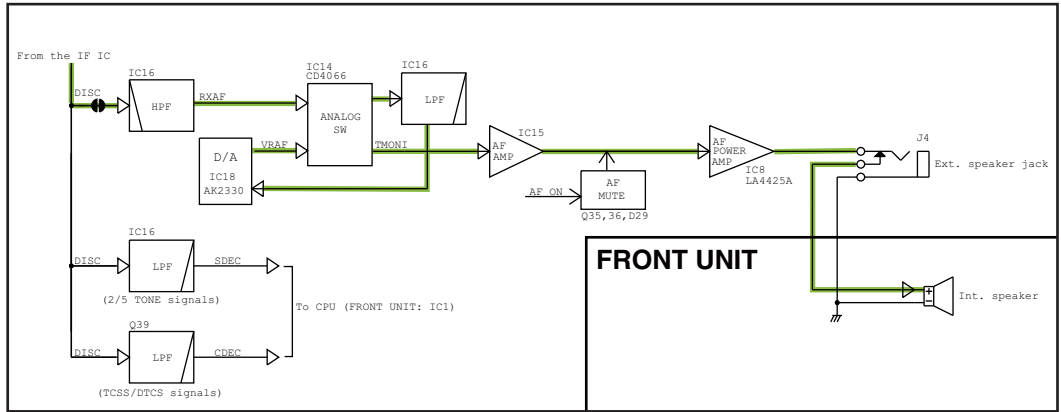
SIGNALING (DECODING)

Demodulated signals from pin 9 of the IF IC (IC1) are passed through the LPF to extract tone signals contained in the demodulated signals.

2/5 tone signals are extracted by the LPF (IC16). CTCSS/DTCS signals are extracted by the LPF (Q39).

These extracted tone signals are applied to the CPU (FRONT UNIT: IC1) for decoding.

• RX AF CIRCUITS



5-2 TRANSMITTER CIRCUITS

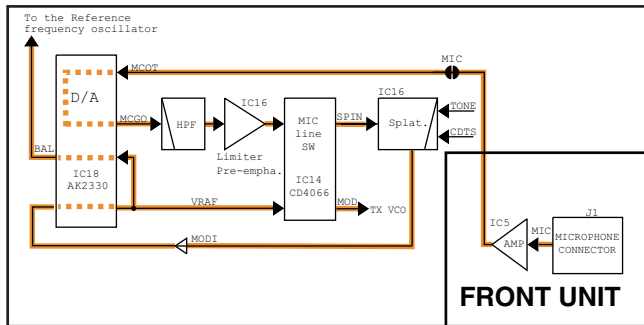
MIC AMPLIFIER (FRONT UNIT)

Audio signals from the connected microphone are applied to the MIC AMP (IC5) via the microphone connector (J1). The amplified MIC signals are applied to the MAIN UNIT.

TX AF CIRCUITS

The MIC signals from the FRONT UNIT are passed through the D/A converter (as a MIC gain controller; IC18) for level adjustment, and applied to the limiter AMP which is also rolled to the pre-emphasis circuit (IC16).

• TX AF CIRCUITS



MIC MUTE SWITCH

The pre-emphasized MIC signals are passed through the MIC mute SW (IC14).

While receiving, the MIC mute SW (IC14) cuts the MIC line off, and is controlled by "MMUT" signal from the expander (IC17).

SPLATTER FILTER

The MIC signals from the MIC mute SW (IC14) are applied to the splatter filter (IC16).

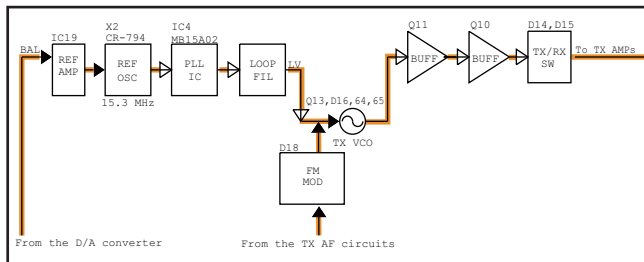
The splatter filter (IC16) is also used as the AF Summing AMP for tone signals modulation (CTCSS, 2/5 TONE).

MODULATION CIRCUIT

MIC signals from the splatter filter (IC16) is level-adjusted (=deviation adjustment) by the D/A converter (IC18), and applied to the TX VCO (Q13, D16, 64, 65) via modulation mute SW (IC14) as the modulation signals.

The MIC signals are also applied to the reference frequency oscillator (X2) as the modulation signals via D/A converter (IC18) and REF AMP (IC19).

• MODULATION CIRCUITS



CTCSS/DTCS SIGNALS ENCODING (FRONT UNIT)

The CTCSS/DTCS encoding signals from the CPU (IC1) "CENC0-CENC2" are passed through the LPF (IC5) for waveform conversion, and applied to the MAIN UNIT as tone modulation signals.

2/5 TONE, DTMF ENCODING (FRONT UNIT)

Encoding signal from the CPU (IC1) named "SENC" is passed through the LPF (IC5), and applied to the MAIN UNIT as tone modulation signals.

TX AMPLIFIERS

The frequency-modulated signal from the TX VCO is buffer-amplified by two buffers (Q11 and Q10), and applied to the YGR AMP (Q9) as the TX signal via the LO SW (D14).

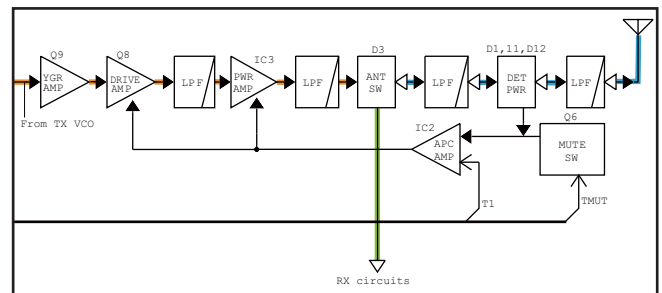
The amplified TX signal is amplified by the drive AMP (Q8), and applied to the FET HPA module (IC3) via the LPF, and power-amplified to obtain TX output power level.

The power-amplified TX signal is passed through the antenna SW (D3) and LPF as a harmonic filter, then fed to the antenna.

APC CIRCUIT

A portion of TX signal rectified by D1, D11 and D12 on the TX line to detect TX power level. The rectified voltage is applied to the APC AMP (IC2), and the APC AMP controls the gain of HPA module (IC3) automatically by comparing the rectified voltage and the power setting voltage "T1."

• TX AMPLIFIERS APC CIRCUIT



5-3 FREQUENCY SYNTHESIZER CIRCUITS

VCOs

The TX VCO which generates TX signal is composed by Q13, D16, 64 and 65, and the frequency modulation is carried out by applying modulation signals to D18.

The RX VCO which generates 1st LO signals is composed by Q14, D33, 62 and 63.

These two VCOs are switched by the VCO SW (Q15, 16) using "RXC" signal.

The output signals from each VCO are amplified by the buffer AMP (Q11) and LO AMP (Q10), then applied to the TX or RX circuits.

A portion of oscillated signals is applied to the PLL IC (IC4) via the doubler (Q12) and Lo filters (BPF and LPF).

PLL

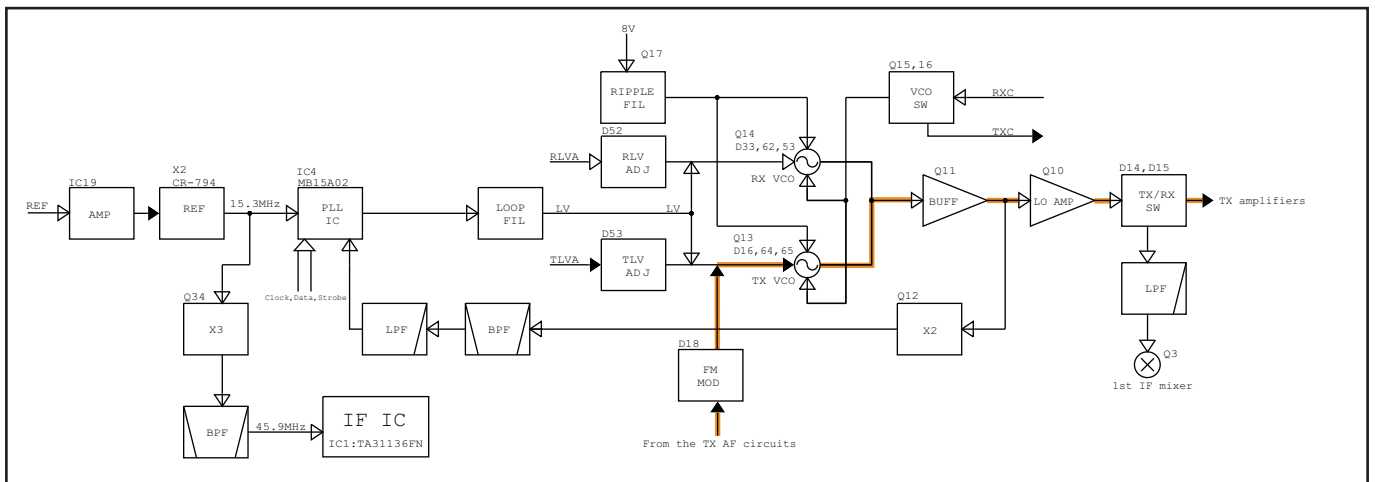
The applied VCO output is divided according to the serial data including divide ratio from the CPU, at the prescaler and programmable divider. In the same way, the reference frequency signal from the reference frequency signal oscillator is applied to the PLL IC and divide so that these are the same frequency.

The frequency-matched signals are applied to the phase comparator and phase-compared. The resulted phase difference is detected as a phase-type signal, and level-adjusted at the charge pump then output. The output pulse type signal is passed through the loop filter to be converted into the DC voltage (=Lock Voltage).

Applying the lock voltage to the variable capacitors (VD) which composes a part of the resonator of VCO, the capacitance of VDs changes corresponding to the applied lock voltage. This causes the change of resonance frequency that determines the VCO oscillating frequency to keep the VCO frequency constant.

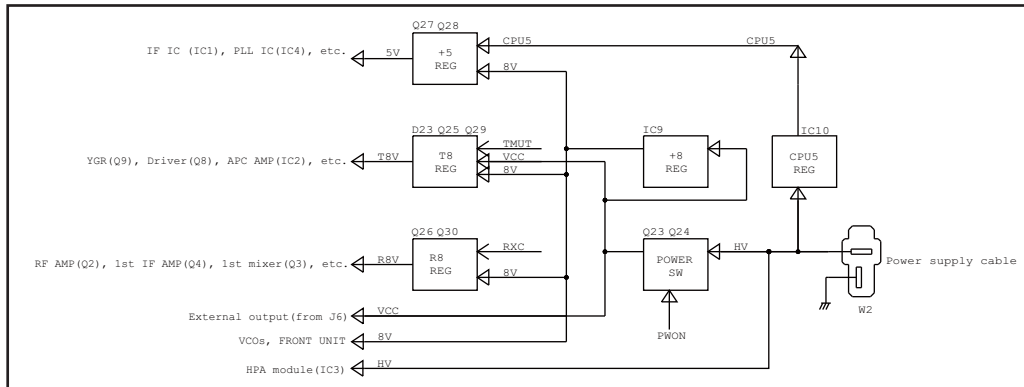
When the oscillation frequency drifts, its phase changes from that of the reference frequency, causing a lock voltage change to compensate for the drift in the VCO oscillating frequency.

• FREQUENCY SYNTHESIZER CIRCUITS



5-4 VOLTAGE BLOCK DIAGRAM

Voltage from the power supply is routed to the whole of the transceiver via regulators and switches.



5-5 PORT ALLOCATIONS

5-5-1 CPU (FRONT UNIT; IC1)

Pin No.	Port Name	Description
1-3	KR1-KR3	Input ports for dealer-programmable keys.
4-8	KS0-KS4	Output ports for dealer-programmable keys.
10	CCS	Outputs chip-select signal to the attached optional unit.
19-21	CENC0-CENC2	Output ports for CTCSS/DTCS signal.
23	DUSE	Frequency response of tone filter (FRONT UNIT; IC5) switching signal. "Low"=While transmitting.
24	IPTT	PTT input from connected microphone. "Low"=PTT is pushed.
25	HANG	Microphone on/off hook detect. "Low"=The microphone is off hook.
30	PLST	Outputs PLL strobe signal to the PLL IC (MAIN UNIT; IC4, pin 11).
34	ULCK	Input port for PLL unlock detect signal from the PLL IC (MAIN UNIT; IC4, pin 7). "Low"=While the PLL circuit is unlocked.
39	DSDA	Outputs serial data to the D/A converter (MAIN UNIT; IC20, pin 6).
43	SENC	Outputs DTMF signals to the LPF (FRONT UNIT; IC5, pin 3).
44	BEEP	Outputs beep sounds to the LPF (FRONT UNIT; IC5, pin 7).
45	SDEC	Input port for DTMF signals.
46	CDEC	Input port for CTCSS/DTCS signals.
48	BATV	Input port for power supply voltage.
49	LVIN	Input port for VCO lock voltage.
50	RSSI	Input port for receive signal strength level signal from the IF IC (MAIN UNIT; IC1, pin 12).
51	TEMP	Voltage divided by thermal register (MAIN UNIT; R209) and R210. (temperature monitor)
52	AFVI	[VOL] dial (FRONT UNIT; R14) input. (divided voltage of 5V line)
59	RES	Input port for CPU reset signal from the reset IC (FRONT UNIT; IC2, pin 1). "Low"=When the CPU is reset.
69	CSFT	Outputs CPU clock shift signal to the clock frequency shift switch (FRONT UNIT; D6).
71	DAST	Outputs strobe signal to the D/A converter (MAIN UNIT; IC18, pin 7).
72	IGSW/ DIM	• Ignition SW control input. Or • Dimmer control input.
75	NOIS	Input port for noise signal from the IF IC (MAIN UNIT; IC1, pin 13).
79	CLO	Cloning data output.
80	CLI	Cloning data input.
82	ESDA	Outputs serial data to the EEPROM (FRONT UNIT; IC3, pin 5).
85	ESCL	Outputs clock signal to the EEPROM (FRONT UNIT; IC3, pin 6).
86	PWON	Transceiver's power control. "High"=Power ON.
91	LSO	Outputs serial data to the LCD driver (FRONT UNIT; IC6, pin 48).
92	LSCK	Outputs clock signal to the LCD driver (FRONT UNIT; IC6, pin 47).
93	LCS	Outputs chip-enable signal to the LCD driver (FRONT UNIT; IC6, pin 46).
94	LINH	Outputs display inhibit signal to the LCD driver (FRONT UNIT; IC6, pin 45).
95	LIGT2	Outputs LCD backlight control signal to the backlight LEDs (FRONT UNIT; DS1-9) driver (FRONT UNIT; Q5). "High"=While the backlight is ON.

Pin No.	Port Name	Description
98	SCK	Outputs serial clock signal to the PLL IC (IC4, pin 9) and D/A converters (IC17, pin 3/IC18, pin 8/IC20, pin 7).
99	SO	Outputs serial data to the PLL IC (IC4, pin 9) and D/A converters (IC17, pin 3/IC18, pin 8/IC20, pin 7).
100	KR0	Input ports for dealer-programmable keys.

5-5-2 EXPANDER (MAIN UNIT; IC17)

Pin No.	Line Name	Description
1	EXST	Strobe (load enable) input.
2	SO	Serial data input.
3	SCK	Serial clock input.
4	RXC	T8V, R8V lines and RX VCO ON/OFF control.
5	AFON	AF mute SW (Q35) control. "Low"=Mute
6	NWC	• RX band width switching signal to the 2nd IF filter SW (D56, 57). "Low"=Narrow mode • RX band width switching signal to the phase shifter SW (Q5). "Low"=Wide mode
7	RMUT	Outputs AF mute signal to the analog switch (IC3, pins 12, 13). "Low"=While the squelch is close or transmitting.
12	HORNO	External device control. "Low"=Pin 6 of OPC-1939 (if connected) is "Low."
13	TMUT	Outputs transmit mute signal to the transmit mute switch (Q46). "High"=Transmitting is muted.

5-5-3 D/A CONVERTER (MAIN UNIT; IC18)

Pin No.	Description
2, 3	MIC signal level adjustment.
4, 5	RX AF/MIC signal level adjustment.
16, 17	Tone signal level adjustment.
18, 19	Oscillation frequency control voltage to the reference frequency oscillator (X2).
20, 21	Modulation signal level adjustment.
22, 23	Beep sound loudness adjustment.
24, 25	Squelch threshold level adjustment.

5-5-4 D/A CONVERTER (MAIN UNIT; IC20)

Pin No.	Line Name	Description
1	T1	• While receiving Tuning voltage to the tuned BPFs (D4, 21 and D8, 20). • While transmitting TX power level setting signal to the APC AMP IC2).
2	T2	Tuning voltage to the tuned BPFs (D9, D10 and D19).
3	TLVA	Oscillation frequency correcting voltage to the TX VCO (Q13, D16, 53, 64, 65).
4	RLVA	Oscillation frequency correcting voltage to the RX VCO (Q14, D33, 52, 62, 63).

SECTION 6 ADJUSTMENT PROCEDURE

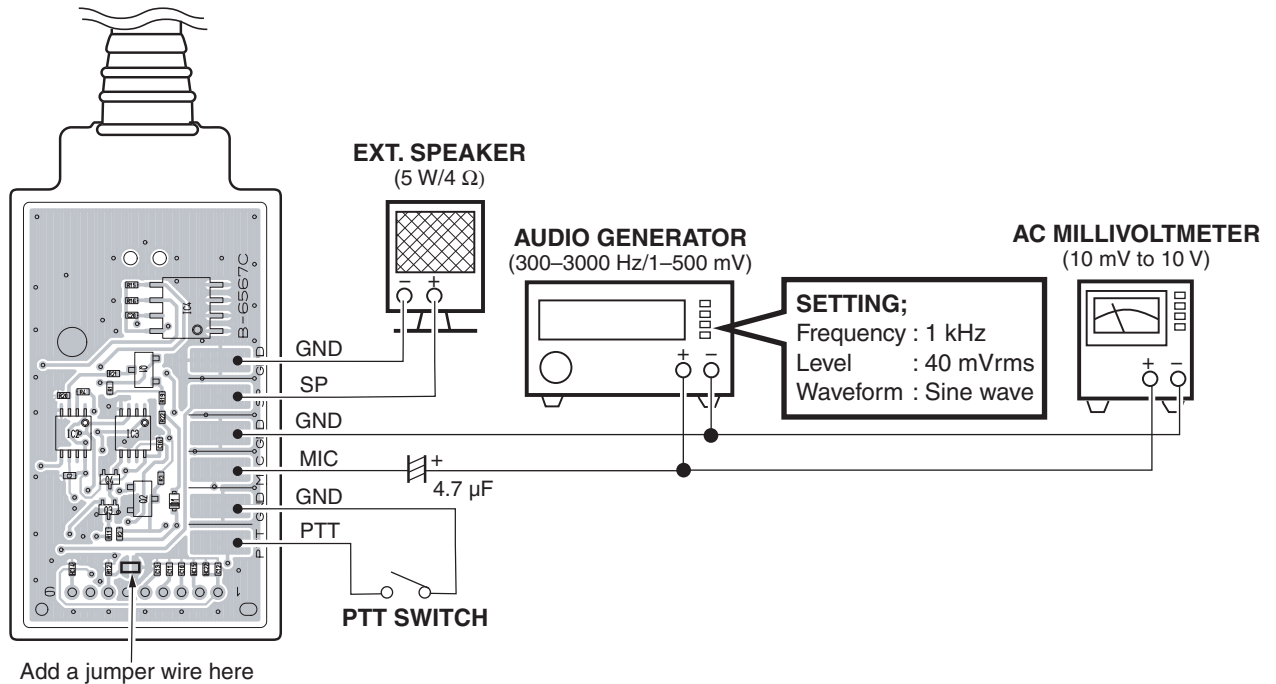
6-1 PREPARATION

REQUIRED EQUIPMENTS

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
Cloning Software	CS-F5020 : Revision 1.0 or later	JIG Cable	Modified OPC-1122U (see the illust below)
DC Power Supply	Output voltage : 13.6 V DC except [EUR] 13.2 V DC [EUR] Current capacity : 15 A except [EUR] 10 A [EUR]	Attenuator	Power attenuation : 40 or 50 dB Capacity : 30 W [25 W ver.] 60 W [45 W ver.]
Modulation Analyzer	Frequency range : DC-600 MHz Measuring range : 0 to ±10 kHz	External Speaker	Input impedance : 4 Ω Capacity : 5 W or more
Frequency Counter	Frequency range : 0.1-600 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Standard Signal Generator (SSG)	Frequency range : 0.1-600 MHz Output level : -20 to 90 dBμ (-127 to -17 dBm)
RF Power Meter	Measuring range : 0.1-30 W [25 W ver.] 0.1-60 W [45 W ver.] Frequency range : 100-600 MHz Impedance : 50 Ω SWR : Better than 1.2 : 1	Oscilloscope	Frequency rang : DC-20 MHz Measuring range : 0.01-20 V

JIG CABLE

OPC-1122U (USB type Cloning cable)



ADJUSTMENT FREQUENCIES

Before starting adjustment, clone adjustment frequencies and settings into the transceiver as below.

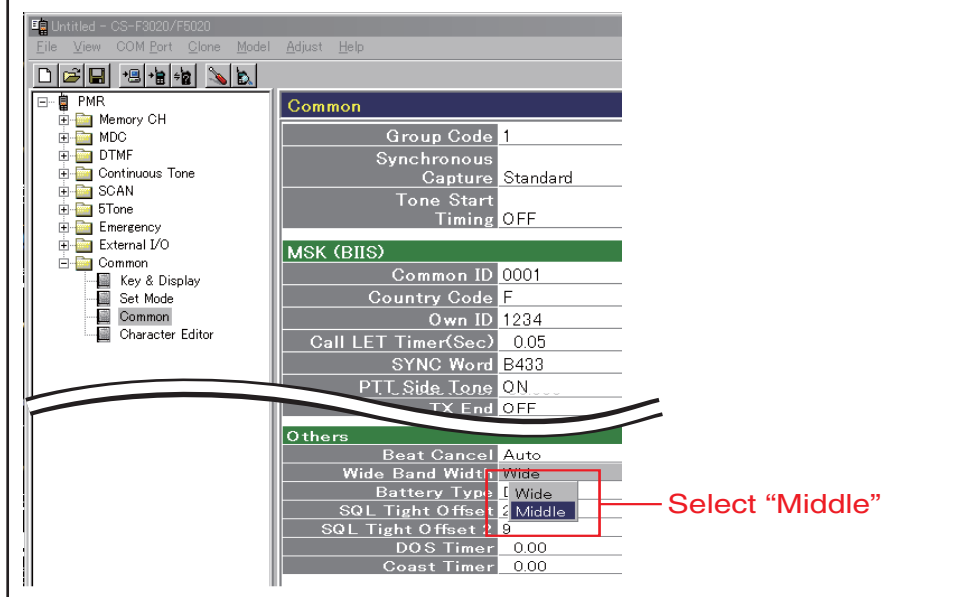
• For [Low band] version (400–470 MHz)

Zone 1: (Left CH - 108)															
CH	Atr	Inh	Frequency (MHz)				W/N	SQL Tight	C.Tone		Text	TOT	RF PWR	PWR Save	Lock-out
			RX	TX	TX Inh	RX			TX						
1- 1	AB		400.000000	<-		W					LV ADJ		L1	ON	
1- 2			470.000000	<-		W					LV VERIFY		L1	ON	
1- 3			470.000000	<-		W					REF FREQ		L1	ON	
1- 4			435.000000	<-		W					TXPWR H1		H	ON	
1- 5			435.000000	<-		W					TXPWR L2		L2	ON	
1- 6			435.000000	<-		W					TXPWR L1		L1	ON	
1- 7			435.000000	<-		W			007N		BAL		L1	ON	
1- 8			435.000000	<-		N					MOD N		H	ON	
1- 9			435.000000	<-		W					MOD W		H	ON	
1- 10			435.000000	<-		W					MOD M		H	ON	
1- 11			435.000000	<-		W			250.3		CTC/DTC		H	ON	
1- 12			400.100000	<-	i	W					BPF		H	ON	
1- 13			400.100000	<-	i	W					RSSI		H	ON	
1- 14			400.100000	<-	i	W					SQL		H	ON	

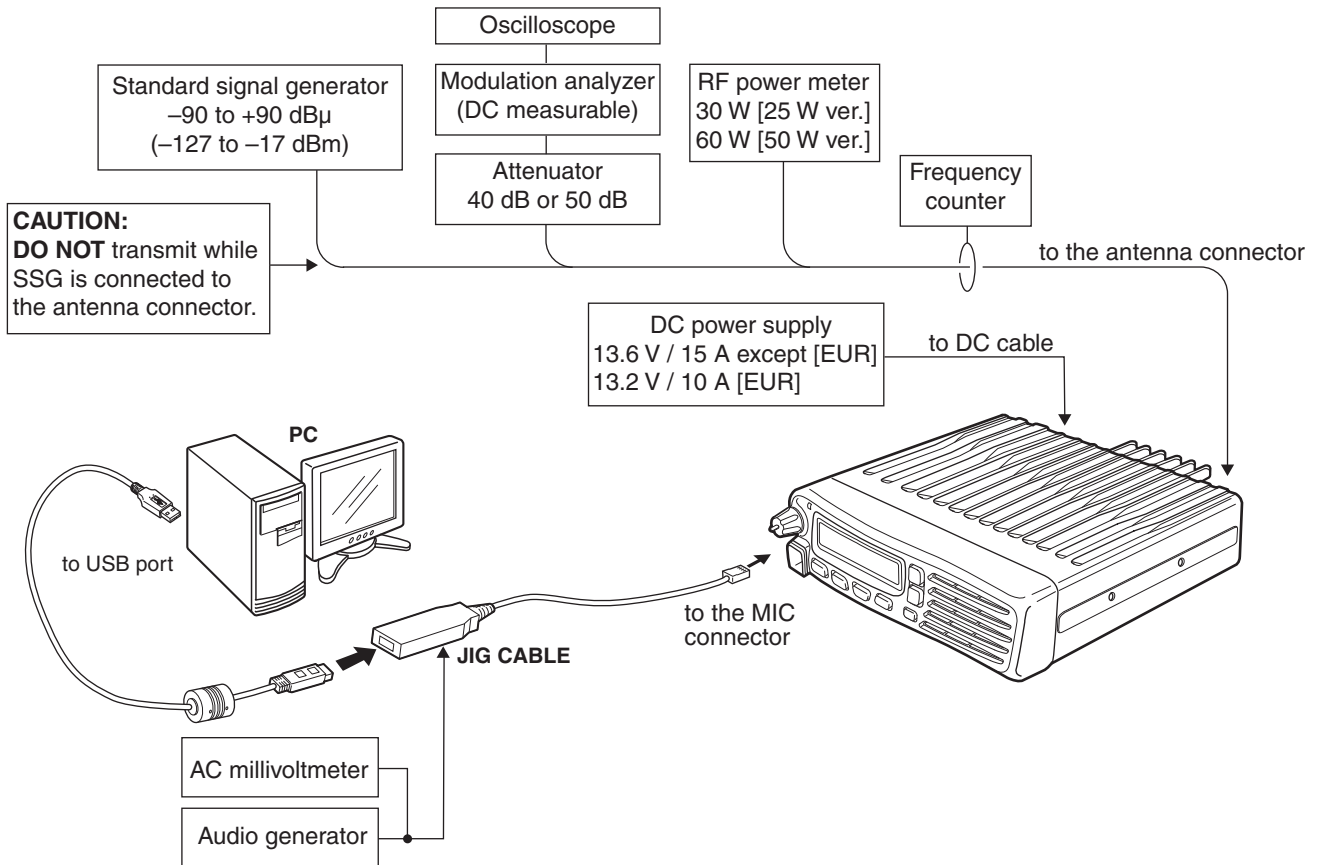
• For [High band] version (450–512/520 MHz)

Zone 1: (Left CH - 108)															
CH	Atr	Inh	Frequency (MHz)				W/N	SQL Tight	C.Tone		Text	TOT	RF PWR	PWR Save	Lock-out
			RX	TX	TX Inh	RX			TX						
1- 1	AB		450.000000	<-		W					LV ADJ		L1	ON	
1- 2			520.000000	<-		W					LV VERIFY		L1	ON	
1- 3			520.000000	<-		W					REF FREQ		L1	ON	
1- 4			485.000000	<-		W					TXPWR H1		H	ON	
1- 5			485.000000	<-		W					TXPWR L2		L2	ON	
1- 6			485.000000	<-		W					TXPWR L1		L1	ON	
1- 7			485.000000	<-		W			007N		BAL		L1	ON	
1- 8			485.000000	<-		N					MOD N		H	ON	
1- 9			485.000000	<-		W					MOD W		H	ON	
1- 10			485.000000	<-		W					MOD M		H	ON	
1- 11			485.000000	<-		W			250.3		CTC/DTC		H	ON	
1- 12			450.100000	<-	i	W					BPF		H	ON	
1- 13			450.100000	<-	i	W					RSSI		H	ON	
1- 14			450.100000	<-	i	W					SQL		H	ON	

NOTE: FOR [F6022], when adjust “Deviation,” “Modulation Balance,” “RX SENSITIVITY” and “S-meter” in the middle mode, change the bandwidth to “Middle” as below.



CONNECTION



ADJUSTMENT UTILITY WINDOW (example)

Click to open the
"I/O Check window"

Adjust Utility

Setting

CH No. 2 RX=155.10000, TX=155.10000
RF Power=High, Mode=Narrow

Adjust

Power (Hi)	174	[#####-----]
Power (L2)	103	[#####-----]
Power (L1)	49	[###-----]
BAL	128	[#####-----]
MOD N	119	[#####-----]
MOD Ratio	117	[#####-----]
CTCS/DTCS	118	[#####-----]
SQL	40	[###-----]
REF	126	[#####-----]
BPF ALL		[Enter] to Sweep
BPF T1	45	[###-----] [Enter] to Sweep
BPF T2	69	[#####-----] [Enter] to Sweep
RX LVA	95	[#####-----] [Enter] to Sweep
TX LVA	143	[#####-----] [Enter] to Sweep
LV(RX LVA)	56	1.10V
LV(TX LVA)	54	1.06V
RSSI	86	[Enter] to Capture

ADJ. CHANNEL

TX POWER

MOD. BALANCE

DEVIATION

CTCSS\DTCS

SQUELCH

REF. FREQUENCY

RX SENSITIVITY

LOCK VOLTAGE

RSSI
(S3 and S1 level)

6-2 FREQUENCY ADJUSTMENT

- 1) Select an adjustment item using cursor or [↑] / [↓] of the PC's keyboard.
- 2) Set or modify the adjustment value as specified using [←] / [→] of the PC's keyboard, then push [ENTER].

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION	VALUE
PLL LOCK VOLTAGE -adjustment- [RX LVA]	1 • Channel : 1-1 • Receiving	Select the item [RX LVA], then adjust the voltage (LVIN) using [←] / [→] of the PC's keyboard.	1.3 V
[TX LVA]	2 • Channel : 1-1 • Transmitting	Select the item [TX LVA], then adjust the voltage (LVIN) using [←] / [→] of the PC's keyboard.	1.5 V
PLL LOCK VOLTAGE -verification-	1 • Channel : 1-2 • Receiving	Click [Reload (F5)] button, then check the "LVIN" item on the "I/O Check window."	3.2-4.2 V
	2 • Channel : 1-2 • Transmitting		2.8-3.8 V
REFERENCE FREQUENCY [REF]	1 • Channel : 1-3 • Connect an RF power meter to the antenna connector. • Transmitting	Loosely couple a frequency counter to the antenna connector.	470.000000 MHz [Low band] 520.000000 MHz [High band]

• I/O Check window

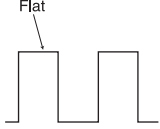
I/O Check			
Input	Dec	Hex	Data
VIN	182	B6	14.27V
TEMPS	186	BA	30.35°C
LVIN	106	6A	2.08V
SD	23	17	0.45V
Output	Dec	Hex	Data
BPF T1	120	78	2.35V
T2/POW	144	90	2.82V
REF	129	81	2.53V
MOD BAL	128	80	50.20%
Dev	0	0	0.00V
CTCSS	107	6B	2.10V
SQL Lev	22	16	0.43V
TXLVA	112	70	2.20V
RXLVA	160	A0	3.14V

Lock voltage

(The values shown in the above screen are example only.
Each transceiver has their own values.)

6-3 TRANSMIT ADJUSTMENT

- 1) Select an adjustment item using cursor or [↑] / [↓] of the PC's keyboard.
- 2) Set or modify the adjustment value as specified using [←] / [→] of the PC's keyboard, then push [ENTER].

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION	VALUE
OUTPUT POWER [Power (Hi)]	1 • Channel : 1-4 • Transmitting	Connect an RF power meter to the antenna connector.	25 W [25W ver.] 45 W [45 W ver.]
[Power (L2)]	2 • Channel : 1-5 • Transmitting		10 W [25W ver.] 25 W [45 W ver.]
[Power (L1)]	3 • Channel : 1-6 • Transmitting		2.5 W [25W ver.] 4.5 W [45 W ver.]
MODULATION BALANCE [BAL]	1 • Channel : 1-7 • No audio signals applied to the JIG cable. • Set a modulation analyzer as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • Transmitting.	Connect the modulation analyzer with an oscilloscope to the antenna connector through an attenuator.	Set to square waveform 
DEVIATION -PREPARATION -	1 • Connect an audio generator to the JIG cable and set as; Frequency : 1.0 kHz Level : 40 mVrms • Set the modulation analyzer to the same condition as "MODULATION BALANCE."	Connect a modulation analyzer with an oscilloscope to the antenna connector through an attenuator.	—
(NARROW) [MOD N]	2 • Channel : 1-8 • Transmitting		±2.05 to ±2.15 kHz
(WIDE) [MOD Ratio]	3 • Channel : 1-9 • Transmitting		±4.05 to ±4.15 kHz
(MIDDLE)* [MOD Ratio]	4 • Channel : 1-10 • Transmitting		±3.25 to ±3.35 kHz
CTCSS/DTCS DEVIATION [CTCSS/DTCS]	1 • Channel : 1-11 • No audio signals applied to the JIG cable. • Set the modulation analyzer to the same condition as "MODULATION BALANCE." • Transmitting		Connect a modulation analyzer with an oscilloscope to the antenna connector through an attenuator.

*: [EUR] only

6-4 RECEIVE ADJUSTMENT

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

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

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION	VALUE	
RECEIVE SENSITIVITY [BPF T1] [BPF T2]	NOTE: When "RECEIVE SENSITIVITY" is re-adjusted, "S-METER" must be re-adjusted too.			
1	<ul style="list-style-type: none"> • Channel : 1-12 • Receiving • Connect an SSG to the antenna connector and set it as; <ul style="list-style-type: none"> Frequency : 400.100 MHz [Low band] : 450.100 MHz [High band] Level : +20 dBμ[†] (-87 dBm) Modulation : 1 kHz Deviation : ±3.0 kHz except [EUR] : ±2.4 kHz [EUR] 	1) Select the item [BPF T1] then push [ENTER]. 2) Select the item [BPF T2] then push [ENTER].	(Automatic adjustment)	
S-METER [RSSI] (S3 level)	NOTE: "RECEIVE SENSITIVITY" MUST be adjusted before "S-METER." When "RECEIVE SENSITIVITY" is re-adjusted, "S-METER" MUST be re-adjusted too.			
1	<ul style="list-style-type: none"> • Channel : 1-13 • Connect an SSG to the antenna connector and set it as; <ul style="list-style-type: none"> Frequency : 400.100 MHz [Low band] : 450.100 MHz [High band] Level : +23 dBμ[†] (-84 dBm) Modulation : 1 kHz Deviation : ±3.0 kHz except [EUR] : ±2.4 kHz [EUR] • Receiving 	Select the item [RSSI S3 Level], then push [ENTER] to store the adjust value for S3 level.	(Automatic adjustment)	
(S1 level)	2	<ul style="list-style-type: none"> • Set the SSG as; <ul style="list-style-type: none"> Level : -7 dBμ[†] (-114 dBm) • Receiving 	Select the item [RSSI S1 Level], then push [ENTER], to store the adjust value for S1 level.	
SQUELCH [SQL]	1	<ul style="list-style-type: none"> • Channel : 1-14 • Connect an SSG to the antenna connector and set it as; <ul style="list-style-type: none"> Frequency : 400.100 MHz [Low band] : 450.100 MHz [High band] Level : -13 dBμ[†] (-120 dBm) Modulation : 1 kHz Deviation : ±3.0 kHz • Receiving 	1) Once close the squelch by increasing [SQL] value, then decrease the value to open the squelch. 2) Push [ENTER] to store the value.	(Automatic adjustment)

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

[MAIN-A UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
C453	4030017420	S.CER ECJ0EC1H470J	B	101.3/35.3
C454	4030017460	S.CER ECJ0EB1E102K	B	100.4/35.3
C455	4030018860	S.CER ECJ0EB0J105K	T	37.8/16.6
C457	4030017420	S.CER ECJ0EC1H470J	B	71.9/34.8
C458	4030017420	S.CER ECJ0EC1H470J	B	72.8/34.8
C459	4030017420	S.CER ECJ0EC1H470J	T	84.7/48.3
C460	4030017420	S.CER ECJ0EC1H470J	T	73.8/38.5
C461	4030017420	S.CER ECJ0EC1H470J	T	64.8/17.5
C462	4030017420	S.CER ECJ0EC1H470J	T	64.8/18.4
C463	4030017420	S.CER ECJ0EC1H470J	T	72.2/37.8
C464	4030017420	S.CER ECJ0EC1H470J	B	74.6/34.8
C465	4030017420	S.CER ECJ0EC1H470J	B	72.2/30.9
C466	4030017420	S.CER ECJ0EC1H470J	T	62.7/49.8
C467	4030017420	S.CER ECJ0EC1H470J	T	89/22.2
C468	4030017420	S.CER ECJ0EC1H470J	B	97/13.7
C492	4030018860	S.CER ECJ0EB0J105K	T	53.4/16.3
C493	4030019120	S.CER GRM188B31E105KA75D	T	114.9/49.5
C494	4030018860	S.CER ECJ0EB0J105K	T	34/35.8
J1	6510026770	S.CON AXK540147YG	T	23/8.3
J2	6510022472	S.CON 40FLT-SM2-TB(LF)(SN)(M)	T	67.5/10.6
J4	6450000140	CON HSJ0807-01-010		
J6	6510022891	S.CON B13B-ZR-SM4-TF(LF)(SN)	T	120/17.2
J7	6510014961	S.CON B2B-ZR-SM4-TF(LF)(SN)	T	130.5/27.3
S1	2260003180	S.SWI MINISMDC050F-2 CN	T	114/33.3
W1	7120000470	JUM ERDS2T0		
W2	8900011863	CAB OPC-1195C <TJM>!		
EP1	6910018460	S.BEA MMZ1005Y102C-T	B	107.5/32.7
EP4	6910010280	BEA HF70BB9.5X10.4X4.9		
EP5	6910010280	BEA HF70BB9.5X10.4X4.9		
EP7	6910018460	S.BEA MMZ1005Y102C-T	B	84.3/25
EP8	6910018460	S.BEA MMZ1005Y102C-T	T	84.3/27.5
EP9	6910018460	S.BEA MMZ1005Y102C-T	T	27/25.9
EP10	6910018460	S.BEA MMZ1005Y102C-T	B	96.1/20.1
EP11	6910018460	S.BEA MMZ1005Y102C-T	B	92.8/25.3
EP12	6910018460	S.BEA MMZ1005Y102C-T	B	91/23.1
EP13	6910018460	S.BEA MMZ1005Y102C-T	B	100.1/25.3
EP15	6910018460	S.BEA MMZ1005Y102C-T	B	104.9/19.3
MP1	8510019340	S.CAS 3179 VCO CASE Y1142	B	99.2/27.3

[FRONT UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
IC1	1140015190	S.IC HD6432238BB45TFV (FX-3179A-2)	B	67.8/23
IC2	1110005771	S.IC S-80942CNMC-G9CT2G	B	89.1/19.3
IC3	1130012430	S.IC S-24CS64A0I-T8T1G	B	90.2/15.7
IC5	1110005340	S.IC NJM12902V-TE1-#ZZZB	B	25.5/23.3
IC6	1130009090	S.IC LC75834W-TLM-E	B	43/21.2
Q1	1530002851	S.TRA 2SC4116-BL(TE85R,F)	B	33.6/16.2
Q2	1590001050	S.TRA DTC114TUA T106	B	33.7/19.8
Q3	1590000430	S.TRA DTC144EUA T106	B	35/27
Q5	1590001050	S.TRA DTC114TUA T106	B	33.7/22.3
D1	1790000951	S.ZEN MAZ8056GML	T	13.4/17.1
D2	1790000951	S.ZEN MAZ8056GML	T	5.2/17.1
D3	1790000951	S.ZEN MAZ8056GML	B	18.1/12.3
D5	1790001251	S.DIO MA2S1110GL	B	61.6/15.7
D6	1790001261	S.DIO MA2S077G0L	B	78/13.8
X1	6050011830	S.XTA CR-774 SMD-49TB 12.288 MHz <KDS>	B	82.3/16.5
L1	6200003640	S.COI MLF1608E 100K-T	B	11.6/17.1
L2	6200001981	S.COI NLV25F-1R0J	B	59.5/9.7
R7	7030009160	S.RES ERJ2GEJ 181 X (180)	B	35.7/16.2
R8	7030009160	S.RES ERJ2GEJ 181 X (180)	B	36.6/16.2
R9	7030005000	S.RES ERJ2GEJ 471 X (470)	B	37.5/16.2
R11	7030009280	S.RES ERJ2GEJ 391 X	B	33.1/18
R12	7030009140	S.RES ERJ2GEJ 272 X (2.7K)	B	34.7/18
R14	7210003330	VAR RK09D1130A1N		
R15	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	7.2/17.1
R16	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	16.5/13.2
R18	7030005090	S.RES ERJ2GEJ 104 X (100K)	T	8.2/17.1
R19	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	19.7/13.2
R20	7030005110	S.RES ERJ2GEJ 224 X (220K)	B	61.3/29.9
R21	7030005720	S.RES ERJ2GEJ 563 X (56K)	B	61.3/30.8
R22	7030005220	S.RES ERJ2GEJ 223 X (22K)	B	61.3/31.7
R23	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	30.9/27.9
R24	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	30.9/27
R25	7030005220	S.RES ERJ2GEJ 223 X (22K)	B	32.6/28.8
R26	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	29.2/27
R27	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	26.9/27.9
R28	7030005040	S.RES ERJ2GEJ 472 X (4.7K)	B	30.9/26.1
R29	7030008290	S.RES ERJ2GEJ 183 X (18K)	B	32.6/27.9
R32	7030007340	S.RES ERJ2GEJ 153 X (15K)	B	30.9/23.3
R33	7030005220	S.RES ERJ2GEJ 223 X (22K)	B	30.9/24.2
R34	7030005060	S.RES ERJ2GEJ 333 X (33K)	B	30.9/22.4
R35	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	30.9/21.5
R36	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	30.9/20.6
R37	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	29.2/21.5
R38	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	29.2/22.4
R39	7030005070	S.RES ERJ2GEJ 683 X (68K)	B	29.2/23.3
R40	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	20.1/26.1
R41	7030005600	S.RES ERJ2GEJ 273 X (27K)	B	20.1/27.9
R42	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	23.6/27.9
R43	7030007350	S.RES ERJ2GEJ 393 X (39K)	B	25.2/27.9
R44	7030005100	S.RES ERJ2GEJ 154 X (150K)	B	21.8/27
R45	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	23.6/28.8
R46	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	33.4/3.3
R47	7030009140	S.RES ERJ2GEJ 272 X (2.7K)	B	33.4/5.1
R48	7030010040	S.RES ERJ2GEJ-JPW	B	28/18.3
R51	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	59.5/15.7
R58	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	85.8/13.6
R60	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	84/8.6
R65	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	59.7/29.9
R68	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	85.8/15.2
R73	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	45.2/14.6
R74	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	47/14.6
R75	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	44.3/14.6
R76	7030005120	S.RES ERJ2GEJ 102 X (1K)	T	10.4/17.1
R77	7030005030	S.RES ERJ2GEJ 152 X (1.5K)	B	72.5/9.3
R78	7030005240	S.RES ERJ2GEJ 473 X (47K)	B	42.2/14.3
R82	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	39/14.6
R83	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	40.8/14.6
R84	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	39.9/14.6
R90	7030006610	S.RES ERJ2GEJ 394 X (390K)	B	53.8/4.1
R101	7030008010	S.RES ERJ2GEJ 123 X (12K)	B	77.4/14.9
R102	7030008010	S.RES ERJ2GEJ 123 X (12K)	B	77.4/12.7
R103	7030008010	S.RES ERJ2GEJ 123 X (12K)	B	78.8/12.2
R104	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	75.7/14.9
R105	7030005530	S.RES ERJ2GEJ 100 X (10)	B	77.4/15.8
R106	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	78.8/17.2
R107	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	86.7/18.5
R108	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	74/29.4
R109	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	72.6/30.9
R110	7030010040	S.RES ERJ2GEJ-JPW	B	59.7/27.7
R111	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	57.5/22.2
R112	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	57.5/23.2
R113	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	75.7/15.8
R114	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	78/25.8
R115	7410001130	S.ARR EXB28V102JX	B	57.5/25.2
R116	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	60.6/17.3
R117	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	71/12.7
R118	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	71.9/14.6
R119	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	73.5/14.9
R120	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	75.7/30.3
R121	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	72.9/31.8
R122	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	71.3/32.2
R123	7030005090	S.RES ERJ2GEJ 104 X (100K)	B	58.9/17.3

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

[FRONT UNIT]

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
R124	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	58.9/18.2
R125	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	58.9/19.1
R127	7030005160	S.RES ERJ2GEJ 105 X (1M)	B	78/28.5
R128	7030005050	S.RES ERJ2GEJ 103 X (10K)	B	30.9/25.2
R129	7030005120	S.RES ERJ2GEJ 102 X (1K)	B	23.5/18.3
C1	4030018100	S.CER ECJ0EB1H681K	B	42.2/15.2
C2	4030017420	S.CER ECJ0EC1H470J	B	84/7.7
C3	4030017420	S.CER ECJ0EC1H470J	B	28.5/6.1
C4	4030017420	S.CER ECJ0EC1H470J	B	47.2/5
C5	4030017420	S.CER ECJ0EC1H470J	B	56.4/5.5
C6	4030017420	S.CER ECJ0EC1H470J	B	81/27.6
C7	4030017420	S.CER ECJ0EC1H470J	B	16.5/11.6
C8	4030017460	S.CER ECJ0EB1E102K	B	13.7/17.1
C9	4030017460	S.CER ECJ0EB1E102K	T	11.3/17.1
C10	4030017460	S.CER ECJ0EB1E102K	T	20.3/13.1
C11	4030017420	S.CER ECJ0EC1H470J	T	7.3/17.1
C12	4030017460	S.CER ECJ0EB1E102K	T	18.3/13.1
C14	4030017460	S.CER ECJ0EB1E102K	B	29.2/28.8
C15	4030016960	S.CER ECJ0EB1C183K	B	29.2/27.9
C16	4030016930	S.CER ECJ0EB1A104K	B	29.2/26.1
C17	4030017750	S.CER ECJ0EB1E122K	B	26.9/28.8
C19	4030016930	S.CER ECJ0EB1A104K	B	32.6/27
C20	4030017460	S.CER ECJ0EB1E102K	B	30.9/19.7
C21	4030017460	S.CER ECJ0EB1E102K	B	29.2/20.6
C22	4030018140	S.CER ECJ0EB1H391K	B	26.2/18.3
C23	4030016790	S.CER ECJ0EB1C103K	B	29.2/24.2
C24	4030017420	S.CER ECJ0EC1H470J	B	24.4/18.3
C25	4030016790	S.CER ECJ0EB1C103K	B	21.8/28.8
C26	4030016930	S.CER ECJ0EB1A104K	B	20.1/27
C27	4030017450	S.CER ECJ0EB1E271K	B	21.8/27.9
C28	4030016930	S.CER ECJ0EB1A104K	B	25.3/18.3
C29	4550006050	S.TAN TEESVA 0J 106M8R	B	25.5/16.1
C31	4030016930	S.CER ECJ0EB1A104K	B	33.4/4.2
C34	4030017420	S.CER ECJ0EC1H470J	B	56.4/4.5
C36	4030016930	S.CER ECJ0EB1A104K	B	85.8/16.8
C37	4030017420	S.CER ECJ0EC1H470J	B	85.6/20.1
C38	4030017420	S.CER ECJ0EC1H470J	B	78.8/9.3
C41	4030017460	S.CER ECJ0EB1E102K	B	20.1/28.8
C50	4030017420	S.CER ECJ0EC1H470J	B	62.1/9.3
C54	4030017420	S.CER ECJ0EC1H470J	B	63/9.3
C69	4030017420	S.CER ECJ0EC1H470J	B	67.4/1.7
C74	4030017420	S.CER ECJ0EC1H470J	B	61.7/1.7
C75	4030016930	S.CER ECJ0EB1A104K	B	46.1/14.6
C76	4030016930	S.CER ECJ0EB1A104K	B	25.2/28.8
C77	4030016950	S.CER ECJ0EB1A473K	B	71.6/10.9
C78	4030017460	S.CER ECJ0EB1E102K	B	8.9/17.1
C79	4030016930	S.CER ECJ0EB1A104K	B	47.9/14.6
C80	4030016930	S.CER ECJ0EB1A104K	B	43.4/14.6
C82	4030017420	S.CER ECJ0EC1H470J	B	33.1/26.1
C84	4030017420	S.CER ECJ0EC1H470J	B	21.8/26.1
C85	4030017420	S.CER ECJ0EC1H470J	B	29.2/19.7
C87	4030016930	S.CER ECJ0EB1A104K	B	30.9/18
C93	4030017460	S.CER ECJ0EB1E102K	B	56.9/9.2
C101	4030016930	S.CER ECJ0EB1A104K	B	76.1/13.3
C102	4030016930	S.CER ECJ0EB1A104K	B	77.4/11.8
C103	4030016930	S.CER ECJ0EB1A104K	B	75.2/13.3
C104	4030017400	S.CER ECJ0EC1H220J	B	78.8/15.4
C105	4030017600	S.CER ECJ0EC1H080C	B	77.4/16.7
C106	4030017640	S.CER ECJ0EC1H150J	B	77.4/17.6
C107	4030017030	S.CER ECJ0EB1A273K	B	91.3/18.5
C111	4030016930	S.CER ECJ0EB1A104K	B	86.7/20.1
C112	4550006780	S.TAN TEESVB2 0J 476M8R	B	56.2/16.8
C113	4030018910	S.CER C1608 JB 0J 475K-T	B	78/18.9
C114	4030017420	S.CER ECJ0EC1H470J	B	56.9/10.1
C115	4030016930	S.CER ECJ0EB1A104K	B	75.8/18.9
C116	4030016930	S.CER ECJ0EB1A104K	B	78/20
C117	4030016930	S.CER ECJ0EB1A104K	B	78/20.9
C118	4030016930	S.CER ECJ0EB1A104K	B	78/24.9
C119	4030016930	S.CER ECJ0EB1A104K	B	78/23.1
C120	4030016930	S.CER ECJ0EB1A104K	B	78/24
C123	4030017460	S.CER ECJ0EB1E102K	B	76.2/29.4
C124	4030016930	S.CER ECJ0EB1A104K	B	59.7/28.6
C125	4030016930	S.CER ECJ0EB1A104K	B	53.8/5
C126	4030017460	S.CER ECJ0EB1E102K	B	25.2/4.2
C128	4030016930	S.CER ECJ0EB1A104K	T	14.6/19.3
C129	4030017460	S.CER ECJ0EB1E102K	T	13.7/19.3
C130	4030017460	S.CER ECJ0EB1E102K	B	85.7/8.6
C131	4030018860	S.CER ECJ0EB0J105K	B	32.6/25.2
J1	6450002210	CON 3017-8821 <KIN>		
J2	6510022472	S.CON 40FLT-SM2-TB(LF)(SN)(M)	B	70.9/5.7
DS1	5040002310	S.LED SML-311YTT86	T	64.8/23.5
DS2	5040002310	S.LED SML-311YTT86	T	58.2/23.5
DS3	5040002310	S.LED SML-311YTT86	T	51.6/23.5
DS4	5040002310	S.LED SML-311YTT86	T	31.8/23.5
DS5	5040002310	S.LED SML-311YTT86	T	38.4/23.5
DS6	5040002310	S.LED SML-311YTT86	T	45/23.5
DS7	5040002310	S.LED SML-311YTT86	T	82.5/22.1
DS8	5040002310	S.LED SML-311YTT86	T	65.2/5
DS9	5040002310	S.LED SML-311YTT86	T	36.2/5

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

SECTION 8

MECHANICAL PARTS

[CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510004880	MR-DSE-01	1
W1**	8900011800	OPC-1199	1
MP1	8010019065 8010019135	2601 CHASSIS-5 [EUR-01], [EXP-01] 2601 LONG CHASSIS-5 [USA-01], [EXP-03], [CHN-01]	1
MP2	8110007821	2601 COVER-1	1
MP3	8810008661	SCREW BT B0 3X8 NI-ZC3 (BT)	8
MP4	8810008661	SCREW BT B0 3X8 NI-ZC3 (BT)	2
MP5	8810008661	SCREW BT B0 3X8 NI-ZC3 (BT)	2
MP6	8810008661	SCREW BT B0 3X8 NI-ZC3 (BT)	1
MP7	8810009991	SCREW BT B0 3X8 NI-ZK3 (BT)	4
MP8	8810009991	SCREW BT B0 3X8 NI-ZK3 (BT)	2

[FRONT UNIT]

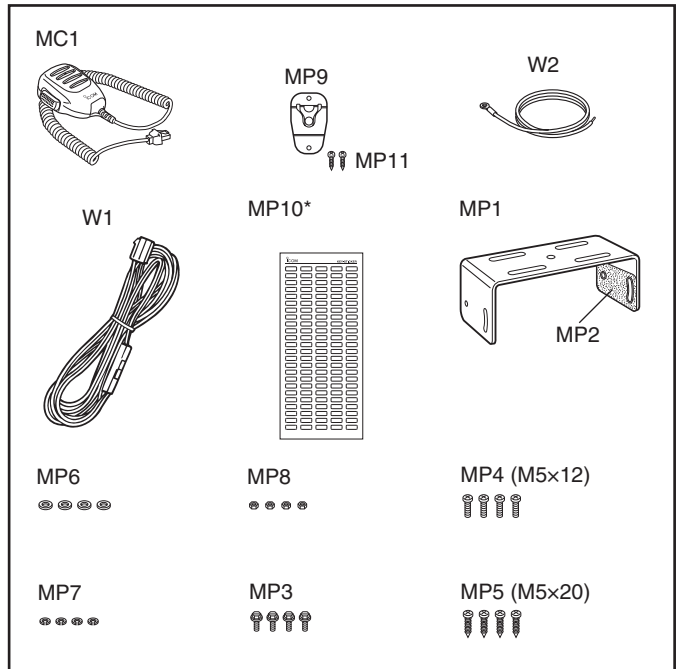
REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6450002210	3017-8821	1
J2*	6510022472	40FLT-SM2-TB (LF) (SN) (M)	1
DS11	5030003200	A01B011X	1
SP1	2510001221	C052SB500-14	1
W1	8900010503	OPC-1046B-1	1
EP2	8930059170	SRCN-2622-SP-N-W	1
MP1	8210025540	3179 FRONT PANEL ASSY (Incl. SP1, MP2, 11)	1
MP2	8310073260	3179 WINDOW PLATE	1
MP3	8510019360	3179 SHIELD PLATE (Incl. MP4)	1
MP4	8930078670	3179 EARTH SPRING	1
MP5	8930078660	3179 KEYBOARD	1
MP6	8610014010	KNOB N-386 (Incl. MP7)	1
MP7	8610007420	KNOB SPRING NO.6601	1
MP8	8930059090	2622 LCD PLATE	1
MP9	8210019350	2622 REFLECTOR	1
MP10	8930059100	2622 LCD FILTER	1
MP11	8930059000	2601 SP NET	1
MP12	8930070850	2979 VOL RUBBER	1
MP13	8810008761	SCREW BT B0 2X8 NI-ZC3 (BT)	3

[MAIN-A UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510026770	AXK540147YG	1
J2	6510022472	40FLT-SM2-TB (LF) (SN) (M)	1
J4	6450000140	HSJ0807-01-010	1
J6	6510022891	B13B-ZR-SM4-TF (LF) (SN)	1
J7	6510014961	B2B-ZR-SM4-TF (LF) (SN)	1
S1*	2260003180	MINISMDC050F	1
W1	7120000470	ERDS2T0	1
W2	8900011863	OPC-1195C	1
EP4*	6910010280	HF70BB9.5X10.4X4.9	1
EP5*	6910010280	HF70BB9.5X10.4X4.9	1
MP1*	8510019340	3179 VCO CASE	1
MP2	8510019350	3179 VCO COVER	1
MP3	8510015110	2602 M-PLATE	1
MP5	8510019570	3179 MAIN SHIELD	1

[ACCESSORIES]

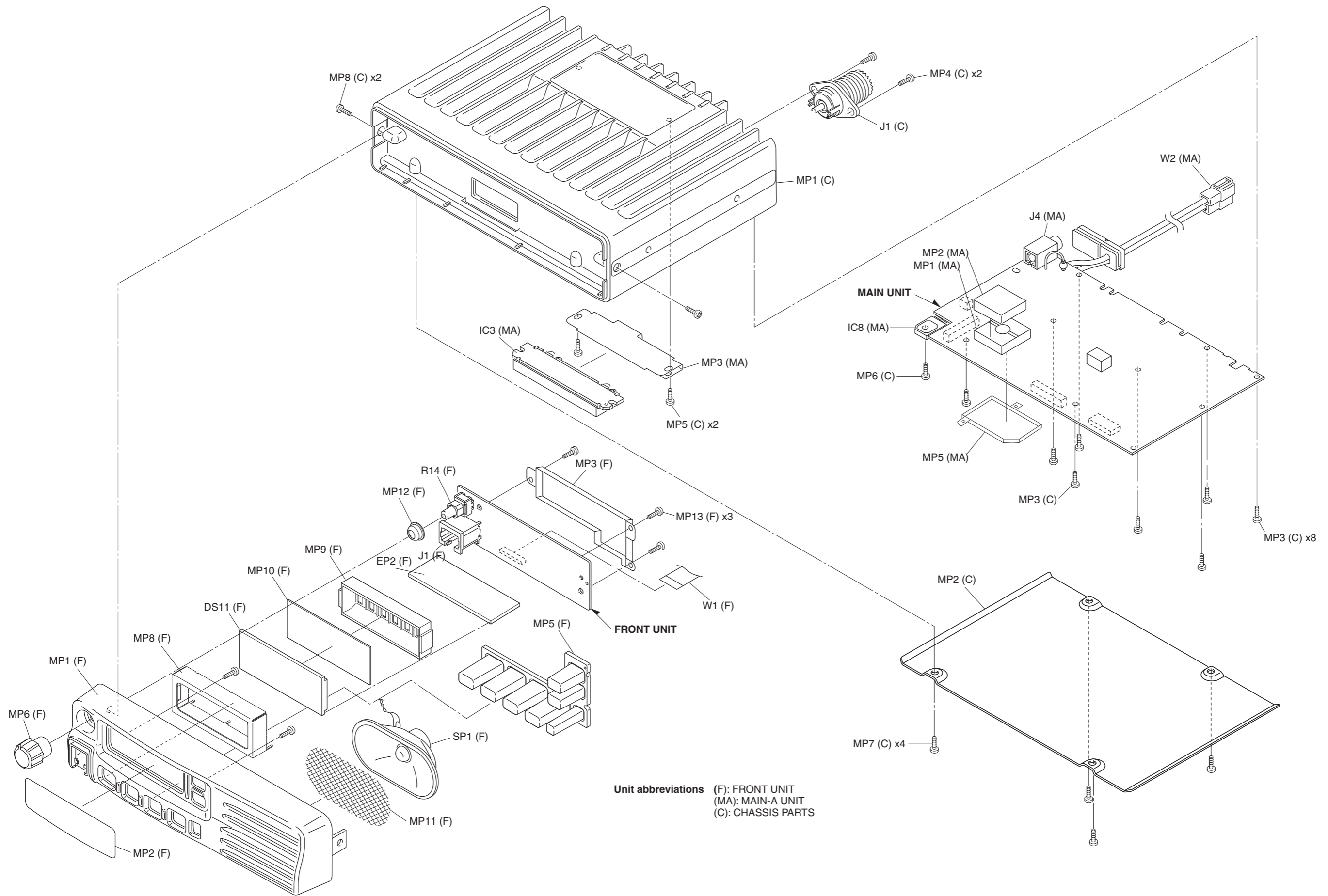
REF NO.	ORDER NO.	DESCRIPTION	QTY.
MC1	(Optional)	HM-152	1
W1	(Optional)	OPC-1194A [EUR-01], [EXP-01]	1
	(Optional)	OPC-1132A [USA-01], [EXP-03], [CHN-01]	1
W2	8900000731	OPC-049A	1
MP1	8010019151	2601 MOBIL BRACKET-1 (Incl. MP2)	1
MP2	8930059160	2601 FELT	2
MP3	8820000530	FLANGE BOLT M4X8 NI	4
MP4	8810000471	SCREW PH (+-) M5X12 ZC3	4
MP5	8810005841	SCREW BT A0 5X20 ZC3	4
MP6	8850000150	FLAT WASHER M5 BS NI	4
MP7	8850000391	SPRING WASHER M5 ZC3	4
MP8	8830000121	NUT M5 ZC3	4
MP9	8950005110	2289 MIC HANGER	1
MP10	8310073440	3179 LCD LABEL	1
MP11	8810004700	SCREW BT A0 3X16 SUS	2



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

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

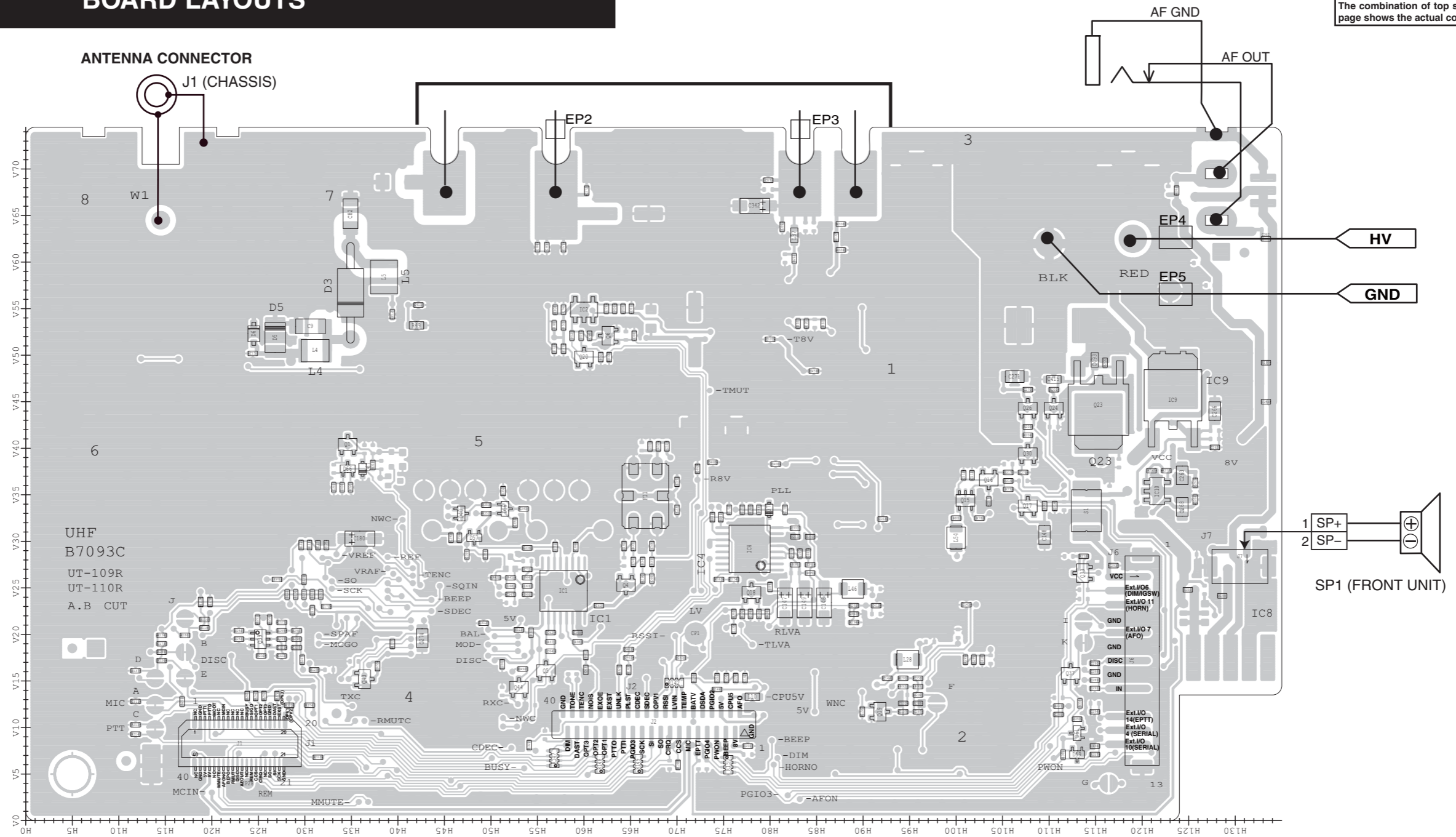
Screw abbreviations A, B0, BT: Self-tapping PH: Pan head ZK: Black NI-ZU: Nickel-Zinc SUS: Stainless



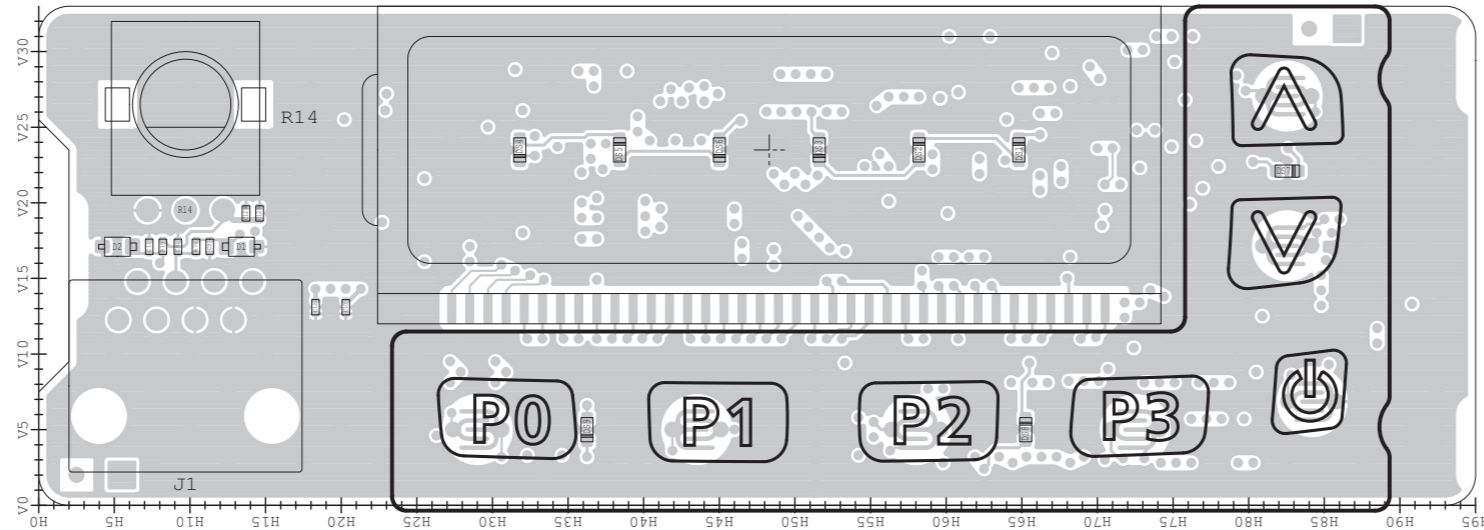
SECTION 9

BOARD LAYOUTS

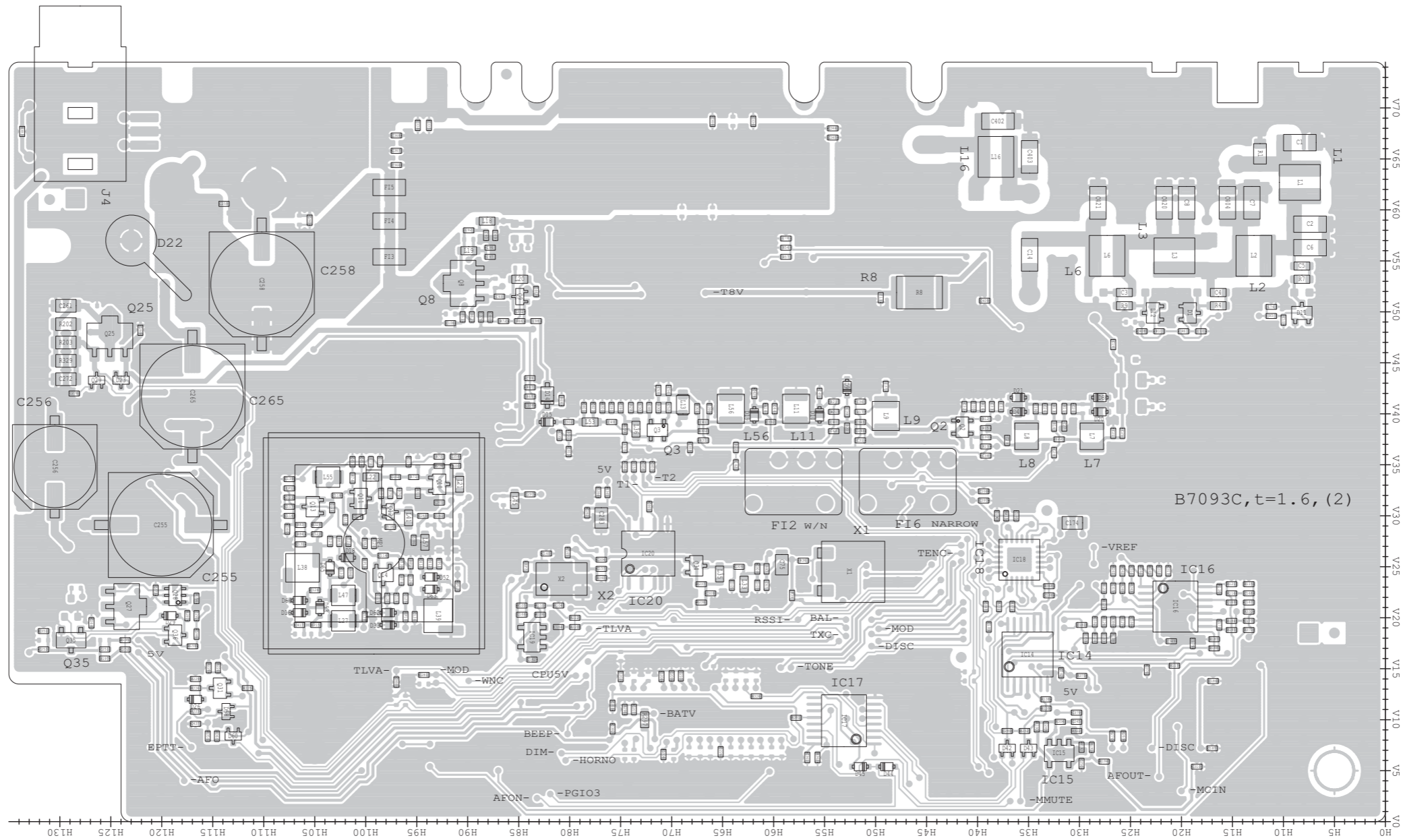
• MAIN-A UNIT (TOP VIEW)



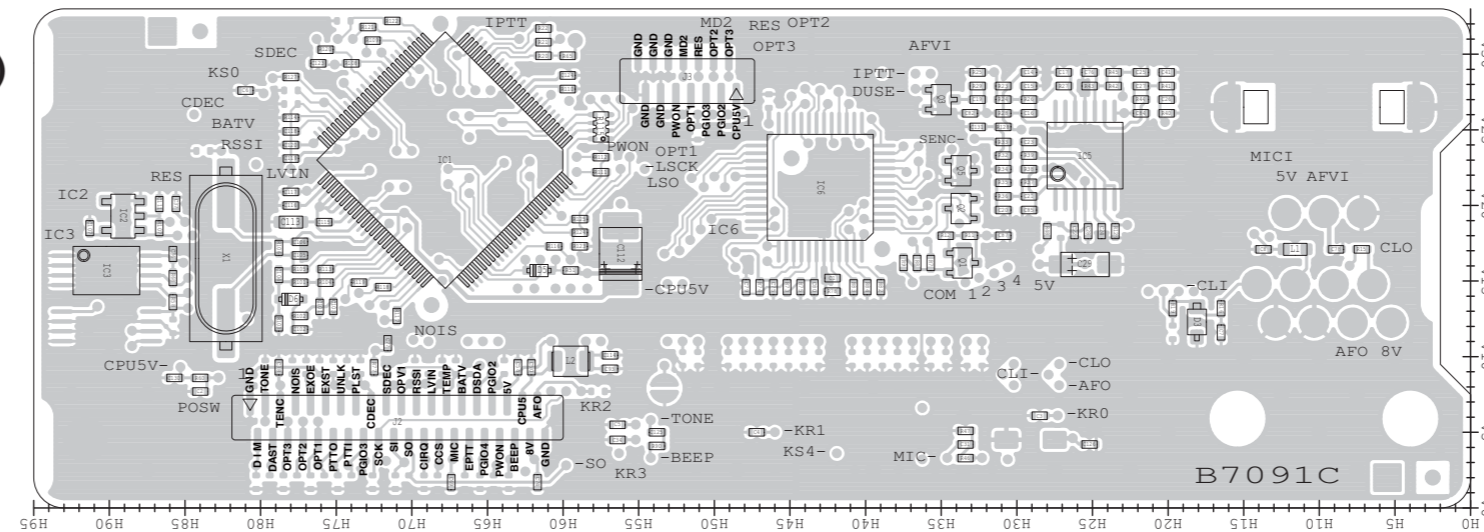
• FRONT UNIT (TOP VIEW)

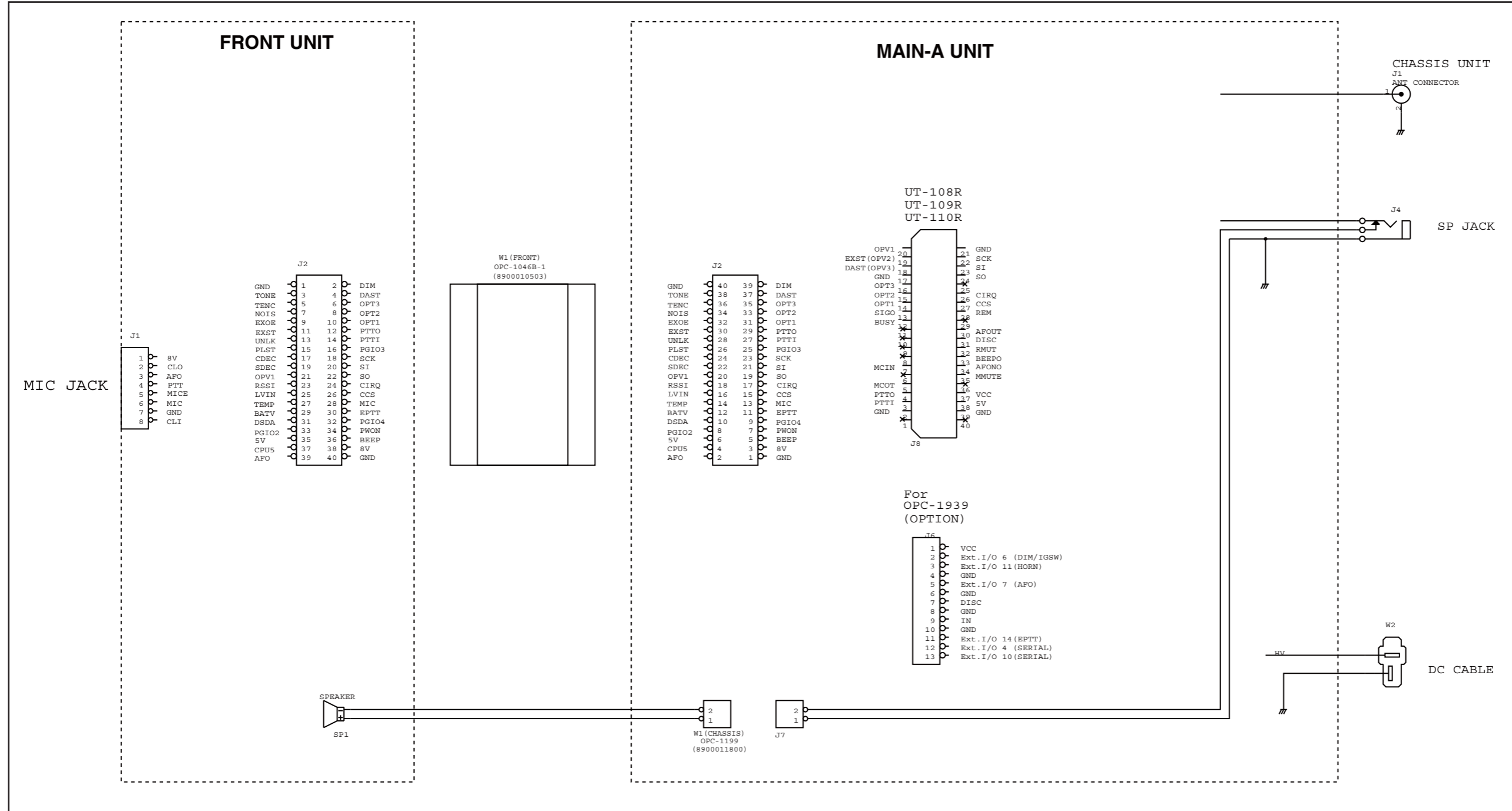


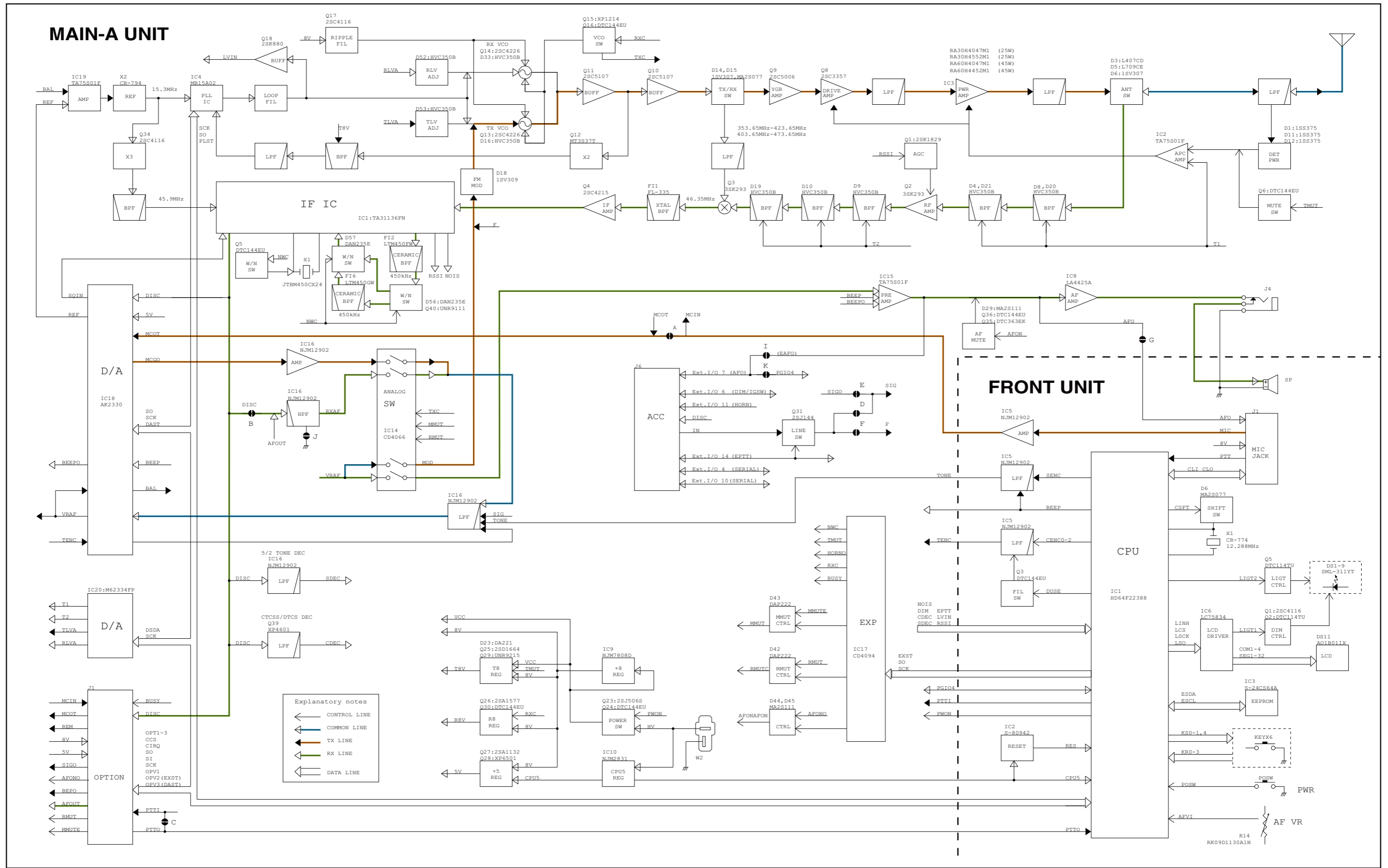
• MAIN-A UNIT
(BOTTOM VIEW)



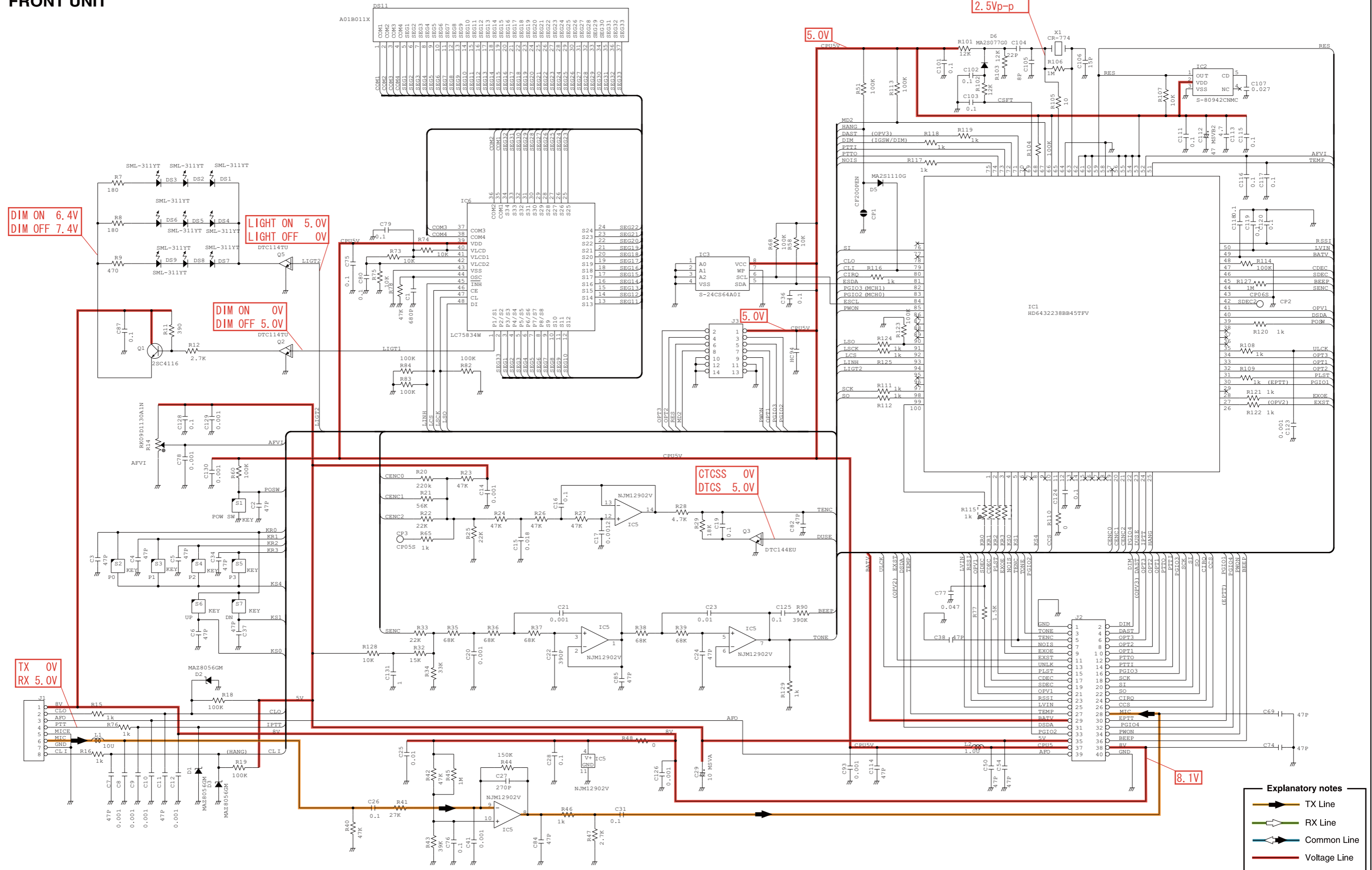
• FRONT UNIT
(BOTTOM VIEW)







FRONT UNIT

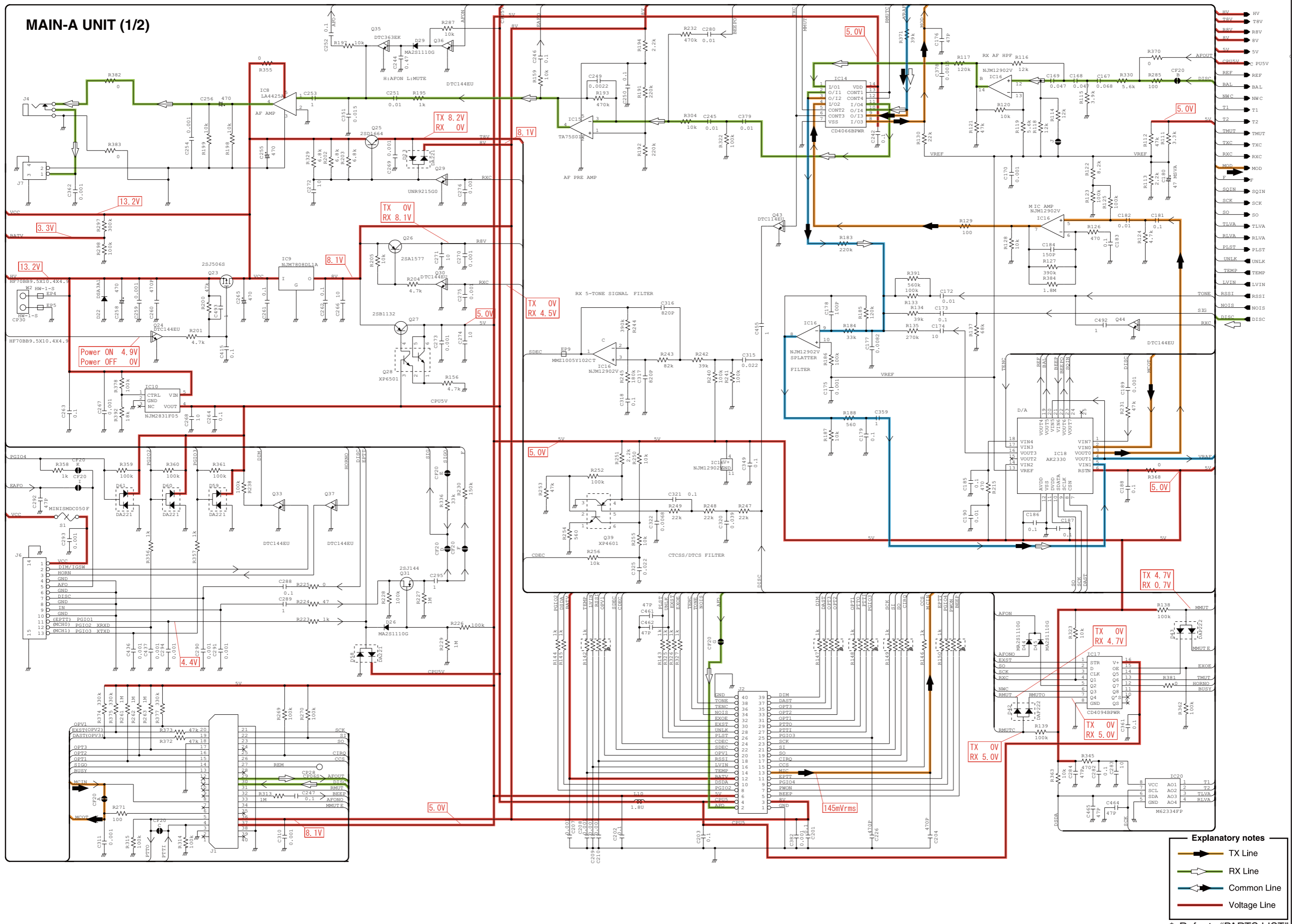


Explanatory notes

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

*; Refer to "PARTS LIST."

MAIN-A UNIT (1/2)

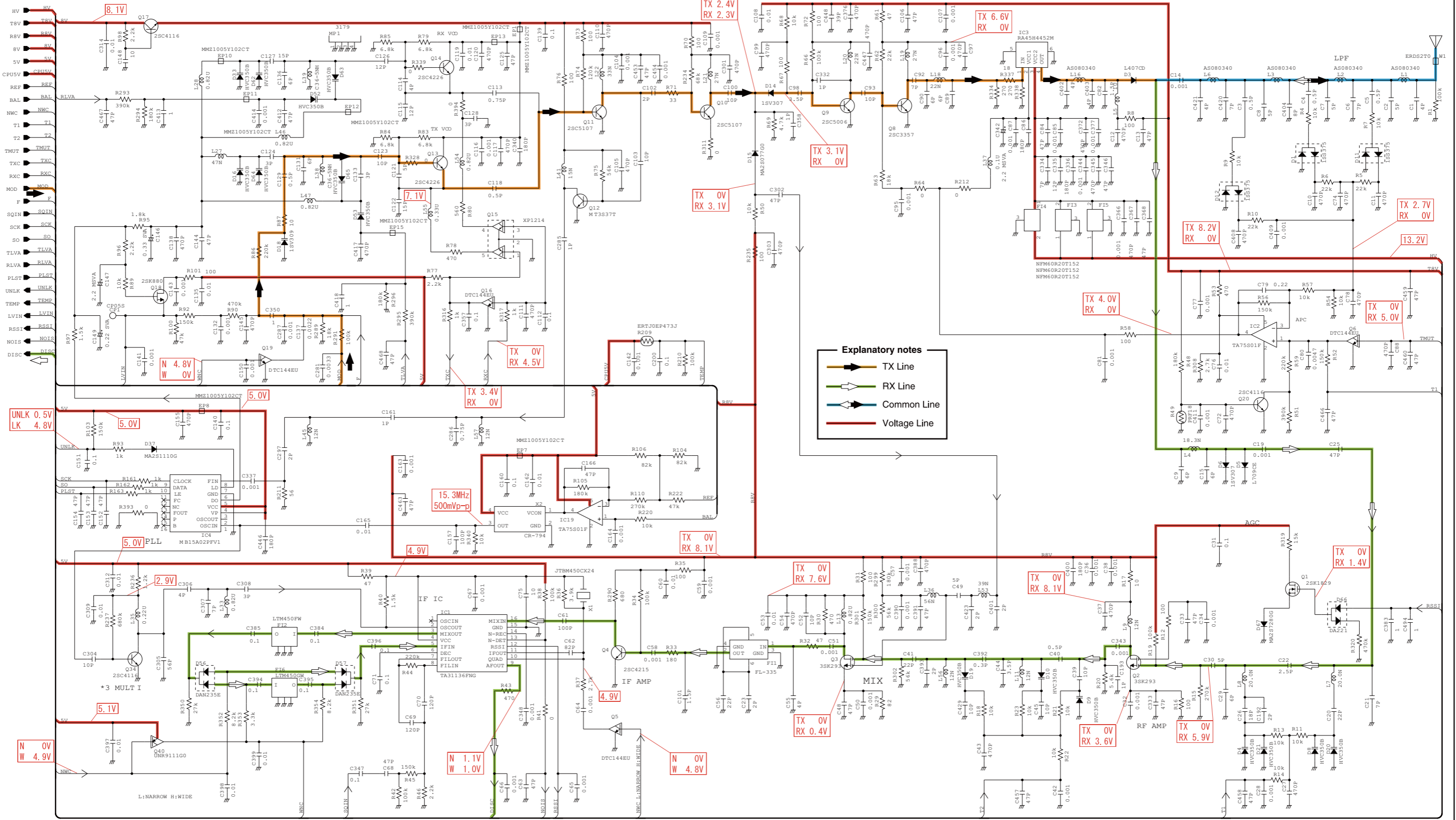


Explanatory notes

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

*; Refer to "PARTS LIST."

MAIN-A UNIT (2/2)



Explanatory notes

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

*; Refer to "PARTS LIST".

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