ADJUSTMENT

Common Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) BATT terminal voltage:7.5V 2) SSG standard modulation [Wide] MOD:1kHz,DEV:3kHz [Narrow] MOD:1kHz,DEV:1.5kHz							
2. LCD contrast	1) Adj item:[CNTR] Adjust:[***] Press [P3] key to store the adjustment value.					[U1] [D1]	Adjust the LCD contrast by looking.	
3. Counter clock-wise volume	1) Adj item:[VOL1] Adjust:[***]						Turn the Volume counter-clockwise fully. Press [P3] key to store the adjustment value.	
4. Clock-wise volume	1) Adj item:[VOL2] Adjust:[***]						Turn the Volume clockwise fully. Press [P3] key to store the adjustment value.	
5. Assist voltage [RX]	1) Adj item:[RAST] Adjust:[***] 2) Adj item:[L RAST]→[L' RAST]→[C RAST]→[H' RAST]→[H RAST] Adjust:[***] Press [P3] key to store the adjustment value.					[U1] [D1]	The display on the left of LCD shows PLL lock voltage. Change the adjustment value within the limit of the specified voltage.	2.5V±0.1V
[TX]	1) Adj item:[TAST] Adjust:[***] 2) Adj item:[L TAST]→[L' TAST]→[C TAST]→[H' TAST]→[H TAST] Adjust:[***] PTT : ON Press [P3] key to store the adjustment value.					[U1] [D1]		
6. RTC oscillation frequency adjust	1) Adj item:[RTC] Adjust:[***]					[S1]	Press [S1] key. After automatic adjustment adjusted value is displayed on LCD. Press [P3] key to store the adjustment value.	
7. Frequency	1) Adj item:[FREQ]	SSG		ANT		[S1]	The display on the left of	

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
adjust *1	SSG output : -20dBm (CW(without modulation))) Adjust:[****]						LCD shows internal temperature (by centigrade) of radio. Press [S1] key. After automatic adjustment adjusted value is displayed on LCD. Press [P3] key to store the adjustment value.	

*1 The reference oscillator frequency may drift due to shock (jarring the radio) or operating conditions. We recommend that the Frequency adjustment be checked each time the radio is serviced, or at least once per year. Maintenance should only be performed under 25℃±2℃.

Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency check	**[Panel test mode]** 1) CH-Sig : 1-1 PTT : ON	f. counter		ANT			Check	+0.05/+0.55ppm +18.26Hz~+200.81Hz @365.1MHz
1. High power adjust	1) Adj item:[HIPWR] Adjust:[****] 2) Adj item:[L HIPWR]→[L' HIPWR]→[C HIPWR]→[H' HIPWR]→[H HIPWR] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Power meter Ammeter		ANT		[U1] [D1]	5.0W	±0.2W 2.3A or less
2. Low power adjust	1) Adj item:[LOPWR] Adjust:[****] 2) Adj item:[L LOPWR]→[L' LOPWR]→[C LOPWR]→[H' LOPWR]→[H LOPWR] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Power meter Ammeter		ANT		[U1] [D1]	0.8W	±0.1W 1.2A or less
3. Balance	1) Adj item:[BAL]	Deviation		ANT		[U1]	The display on the left of	2kHz Tone deviation is

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
adjust *3	Adjust:[***] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item:[L BAL]→[L' BAL]→[C BAL]→[H' BAL]→[H BAL] Adjust:[***] PTT : ON Press [P3] key to store the adjustment value.	meter Oscilloscope				[D1]	LCD shows the single tone frequency that DSP generates. The tone frequency is alternately switched to 20Hz and 2kHz by pressing S1 key while transmitting. Change the adjustment value to get same deviation at 20Hz and 2kHz within the limit of the specified voltage.	within 1.0% of 20Hz tone deviation.
4. NXDN Deviation adjust *3 [Narrow]	1) Adj item:[Nn NDEV] Adjust:[****] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item:[NnL NDEV]→[NnL' NDEV]→[NnC NDEV]→[NnH' NDEV]→[NnH NDEV] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	3056Hz	2995~3117Hz
[Very Narrow]	1) Adj item:[Nv NDEV] Adjust:[****] 2) Adj item:[NvL NDEV]→[NvL' NDEV]→[NvC NDEV]→[NvH' NDEV]→[NvH NDEV] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	1337Hz	1311~1363Hz
6. Analog Deviation adjust *3 [Narrow]	1) Adj item:[An ADEV] Adjust:[****] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item:[AnL ADEV]→[AnL' ADEV]→[AnC ADEV]→[AnH' ADEV]→[AnH ADEV] Adjust:[****] PTT : ON	Deviation meter Oscilloscope		ANT		[U1] [D1]	2100Hz	2050~2150Hz

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
	Press [P3] key to store the adjustment value.							
[Wide]	1) Adj item:[Aw ADEV] Adjust:[****] 2) Adj item:[AwL ADEV]→[AwL' ADEV]→[AwC ADEV]→[AwH' ADEV]→[AwH ADEV] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	4200Hz	4150~4250Hz
1. MIC sensitivity check	**[Panel test mode]** 1) CH-Sig : 1-1 AG : 1kHz PTT : ON	Deviation meter Oscilloscope		ANT			Adjust AG input to get a standard MOD	12.5mV±5.8mV Note : The SSW terminal (1pin) of the universal connector must be connected to GND when checking MIC sensitivity.
7. QT Deviation adjust *3 [Narrow]	1) Adj item:[An QT] Adjust:[****] Deviation meter LPF : 3kHz HPF : OFF PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	0.35kHz	0.30~0.40kHz
[Wide]	1) Adj item:[Aw QT] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	0.75kHz	0.70~0.80kHz
8. DQT Deviation adjust *3 [Narrow]	1) Adj item:[An DQT] Adjust:[****] Deviation meter LPF : 3kHz HPF : OFF PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	0.35kHz	0.30~0.40kHz
[Wide]	1) Adj item:[Aw DQT] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	0.75kHz	0.70~0.80kHz

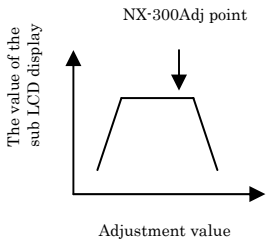
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
9. LTR Deviation adjust *3 [Narrow]	1) Adj item:[An LTR] Adjust:[****] Deviation meter LPF : 3kHz HPF : OFF PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	0.75kHz	0.65~0.85kHz
[Wide]	1) Adj item:[Aw LTR] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	1.00kHz	0.90~1.10kHz
10. DTMF Deviation adjust *3 [Narrow]	1) Adj item:[An DTMF] Adjust:[****] Deviation meter LPF : 15kHz HPF : OFF PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	1.25kHz	1.15~1.35kHz
[Wide]	1) Adj item:[Aw DTMF] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	2.50kHz	2.40~2.60kHz
11. TONE Deviation adjust *3 [Narrow]	1) Adj item:[An TONE] Adjust:[****] Deviation meter LPF : 15kHz HPF : OFF PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	1.50kHz	1.40~1.60kHz
[Wide]	1) Adj item:[Aw TONE] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	3.00kHz	2.90~3.10kHz
12. MSK Deviation adjust *3 [Narrow]	1) Adj item:[An MSK] Adjust:[****] Deviation meter LPF : 15kHz	Deviation meter Oscilloscope		ANT		[U1] [D1]	1.50kHz	1.40~1.60kHz

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
	HPF : OFF PTT : ON Press [P3] key to store the adjustment value.							
[Wide]	1) Adj item:[Aw MSK] Adjust:[****] PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	3.00kHz	2.90~3.10kHz
13. CWID Deviation adjust *3 [Very Narrow]	1) Adj item:[Nv CWID] Adjust:[****] Deviation meter LPF : 15kHz HPF : OFF PTT : ON Press [P3] key to store the adjustment value.	Deviation meter Oscilloscope		ANT		[U1] [D1]	1.10kHz	1.00~1.20kHz
14. VOX1 adjust	1) Adj item:[VOX1] Adjust:[***] AG : 1kHz/45mV at MIC terminal	AG		Universal connector			After apply signal from AG, press [P3] key to store the adjustment value.	
15. VOX10 adjust	1) Adj item:[VOX10] Adjust:[***] AG : 1kHz/3mV at MIC terminal	Power meter DVM		ANT			Press the PTT switch. Apply 6.20V to battery terminal. Confirm that one pre-determined numeric in the range 1 to 256 appears. Press [P3] key to store the adjustment value.	
16. BATT detection writing	1) Adj item:[BATT] Adjust:[***] PTT : ON			BATT terminal				

*3 Necessary adjustment and order for each signaling is shown as below.

Mode	Signaling	Necessary adjustment and order		
		Wide	Narrow	Very Narrow
Analog	Audio	1. Balance adjust 2. Analog Deviation adjust [Wide]	1. Balance adjust 2. Analog Deviation adjust [Narrow]	---
	QT	1. Balance adjust 2. Analog Deviation adjust [Wide] 3. QT Deviation adjust [Wide]	1. Balance adjust 2. Analog Deviation adjust [Narrow] 3. QT Deviation adjust [Narrow]	---
	DQT	1. Balance adjust 2. Analog Deviation adjust [Wide] 3. DQT Deviation adjust [Wide]	1. Balance adjust 2. Analog Deviation adjust [Narrow] 3. DQT Deviation adjust [Narrow]	---
	LTR	1. Balance adjust 2. Analog Deviation adjust [Wide] 3. LTR Deviation adjust [Wide]	1. Balance adjust 2. Analog Deviation adjust [Narrow] 3. LTR Deviation adjust [Narrow]	---
	DTMF	1. Balance adjust 2. Analog Deviation adjust [Wide] 3. DTMF Deviation adjust [Wide]	1. Balance adjust 2. Analog Deviation adjust [Narrow] 3. DTMF Deviation adjust [Narrow]	---
	2TONE	1. Balance adjust 2. Analog Deviation adjust [Wide] 3. TONE Deviation adjust [Wide]	1. Balance adjust 2. Analog Deviation adjust [Narrow] 3. TONE Deviation adjust [Narrow]	---
	MSK(Fleet sync)	1. Balance adjust 2. Analog Deviation adjust [Wide] 3. MSK Deviation adjust [Wide]	1. Balance adjust 2. Analog Deviation adjust [Narrow] 3. MSK Deviation adjust [Narrow]	---
NXDN	Audio	---	1. Balance adjust 2. NXDN Deviation adjust [Narrow]	1. Balance adjust 2. NXDN Deviation adjust [Very Narrow]
	CWID	---	---	1. Balance adjust 2. NXDN Deviation adjust [Very Narrow] 3. CWID Deviation adjust [Very Narrow]

Receiver Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. AF level setting	[Panel test mode] 1)CH-Sig : 1-1 SSG output : -47dBm (MOD : 1kHz /±1.5kHz)	SSG DVM AF VTVM Dummy load		ANT Universal connector		Volume knob	Turn the Volume Knob to obtain 0.63V AF output.	0.63V±0.1V
2. Sensitivity fixed value write	1) Adj item:[SENS1] Adjust:[***] 2) Adj item:[L SENS1]→[L' SENS1]→[C SENS1]→[H' SENS1]→[H SENS1] Adjust:[***] Press [P3] key to store the adjustment value.					[U1] [D1]		Write the value as followings [L SENS1] : 256 [L' SENS1] : 256 [C SENS1] : 256 [H' SENS1] : 256 [H SENS1] : 256
4. Sensitivity2 adjust	1) Adj item:[SENS2] Adjust:[***] 2) Adj item: :[L SENS2]→[L' SENS2]→[C SENS2]→[H' SENS2]→[H SENS2] Adjust:[***] SSG output : -90dBm (MOD : 1kHz /±1.5kHz) Press [P3] key to store the adjustment value.	SSG AF VTVM Oscilloscpoe		ANT Universal connector		[U1] [D1]		The RSSI level is shown on the sub LCD display and PC window. 1.Change the adjustment value to get the maximum RSSI level. 2.Increase the adjustment value to seek "NX-300 ADJ Point " of RSSI level. (as follow) 

Adjustment value

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. Sensitivity check	**[Panel test mode]** 1) CH-Sig : 1-1 SSG output Wide 5k : –118dBm (0.28⌈V) (MOD : 1kHz/±3kHz) Narrow : –118dBm (0.28⌈V) (MOD : 1kHz/±1.5kHz)	SSG AF VTVM Oscilloscpoe		ANT Universal connector			Check	12dB SINAD or more
6. RSSI reference adjust [Analog Narrow]	1) Adj item:[An RRSSI] Adjust:[***] 2) Adj item:[AnL RRSSI]→[AnL' RRSSI]→[AnC RRSSI]→[AnH' RRSSI]→[AnH RRSSI] SSG output:12dB SINAD level -3dB (MOD:1kHz/±1.5kHz)	SSG AF VTVM Oscilloscpoe		ANT Universal connector			After input signal from SSG, press [P3] key to store the adjustment value.	
[Analog Wide]	1) Adj item:[Aw RRSSI] Adjust:[***] 2) Adj item:[AwL RRSSI]→[AwL' RRSSI]→[AwC RRSSI]→[AwH' RRSSI]→[AwH RRSSI] SSG output:12dB SINAD level -3dB (MOD:1kHz/±3kHz)							
[NXDN Very Narrow]	1) Adj item:[Nv RRSSI] Adjust:[***] 2) Adj item:[NvL RRSSI]→[NvL' RRSSI]→[NvC RRSSI]→[NvH' RRSSI]→[NvH RRSSI] SSG output:12dB SINAD level for analog Narrow -3dB (MOD:1kHz/±1.5kHz)							
7. Squelch(Preset) [Analog Narrow]	1) Adj item:[An SQL] Adjust:[***] 2) Adj item:[AnL SQL]→[AnL' SQL]→[AnC SQL]→[AnH' SQL]→[AnH SQL] SSG output:12dB SINAD level +0.5dB (MOD:1kHz/±1.5kHz)	SSG AF VTVM Oscilloscpoe		ANT Universal connector			After input signal from SSG, press [P3] key to store the adjustment value.	
[Analog Wide]	1) Adj item:[Aw SQL] Adjust:[***]							

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
	2) Adj item:[AwL SQL]→[AwL' SQL]→[AwC SQL]→[AwH' SQL] →[AwH SQL] SSG output:12dB SINAD level +0.5dB (MOD:1kHz/±3kHz)							
[NXDN Very Narrow]	1) Adj item:[Nv SQL] Adjust:[***] 2) Adj item:[NvL SQL]→[NvL' SQL]→[NvC SQL]→[NvH' SQL] →[NvH SQL] SSG output:12dB SINAD level for analog Narrow -4dB (MOD:400Hz/±1.1kHz)							
8. RSSI at -118dBm adjust [Analog Narrow]	1) Adj item:[An LRSSI] Adjust:[***] 2) Adj item:[AnL LRSSI]→[AnL' LRSSI]→[AnC LRSSI]→[AnH' LRSSI]→[AnH LRSSI] SSG output : -118dBm (MOD:1kHz/±1.5kHz)	SSG AF VTVM Oscilloscpoe		ANT Universal connector			After input signal from SSG, press [P3] key to store the adjustment value.	
[Analog Wide]	1) Adj item:[Aw R LRSSI] Adjust:[***] 2) Adj item:[AwL LRSSI]→[AwL' LRSSI]→[AwC LRSSI]→[AwH' LRSSI]→[AwH LRSSI] SSG output : -118dBm (MOD:1kHz/±3kHz)							
[NXDN Very Narrow]	1) Adj item:[Nv LRSSI] Adjust:[***] 2) Adj item:[NvL LRSSI]→[NvL' LRSSI]→[NvC LRSSI]→[NvH' LRSSI]→[NvH LRSSI] SSG output : -118dBm (MOD:1kHz/±1.5kHz)							
9. RSSI at -80dBm adjust [Analog Narrow]	1) Adj item:[An HRSSI] Adjust:[***] 2) Adj item:[AnL HRSSI]→[AnL' HRSSI]→[AnC HRSSI]→[AnH' HRSSI]→[AnH HRSSI] SSG output : -80dBm (MOD:1kHz/±1.5kHz)	SSG AF VTVM Oscilloscpoe		ANT Universal connector			After input signal from SSG, press [P3] key to store the adjustment value.	

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
[Analog Wide]	1) Adj item:[Aw R HRSSI] Adjust:[***] 2) Adj item:[AwL HRSSI]→[AwL' HRSSI]→[AwC HRSSI]→[AwH' HRSSI]→[AwH HRSSI] SSG output : -80dBm (MOD:1kHz/±3kHz)							
[NXDN Very Narrow]	1) Adj item:[Nv HRSSI] Adjust:[***] 2) Adj item:[NvL HRSSI]→[NvL' HRSSI]→[NvC HRSSI]→[NvH' HRSSI]→[NvH HRSSI] SSG output : -80dBm (MOD:1kHz/±1.5kHz)							
10. Squelch(Tight) [Analog Narrow]	1) Adj item:[An SQLT] Adjust:[***] 2) Adj item:[AnL SQLT]→[AnL' SQLT]→[AnC SQLT]→[AnH' SQLT]→[AnH SQLT] SSG output:12dB SINAD level +5.5dB (MOD:1kHz/±1.5kHz)	SSG AF VTVM Oscilloscpoe		ANT Universal connector			After input signal from SSG, press [P3] key to store the adjustment value.	
[Analog Wide]	1) Adj item:[Aw SQLT] Adjust:[***] 2) Adj item:[AwL SQLT]→[AwL' SQLT]→[AwC SQLT]→[AwH' SQLT]→[AwH SQLT] SSG output:12dB SINAD level +5.5dB (MOD:1kHz/±3kHz)							

Radio check Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency check	**[Panel test mode]** 1) CH-Sig : 1-1 PTT : ON	f. counter		ANT			Check	+0.05/+0.55ppm +18.26Hz~+200.81Hz @365.1MHz
1. High power check	**[Panel test mode]** 1) CH-Sig : 1-1 PTT : ON	Power meter Ammeter		ANT			Check	4.5W~5.5W 2.3A or less
	2) CH-Sig : 2-1 PTT : ON							
	3) CH-Sig : 3-1 PTT : ON							
1. Low power check	**[Panel test mode]** 1) CH-Sig : 1-1 PTT : ON							0.7W~1.2W 1.2A or less
	2) CH-Sig : 2-1 PTT : ON							
	3) CH-Sig : 3-1 PTT : ON							
4. Sensitivity check	**[Panel test mode]** 1) CH-Sig : 1-1 SSG output Wide 5k : –118dBm (0.28⌈V) (MOD : 1kHz/±3kHz) Narrow : –118dBm (0.28⌈V) (MOD : 1kHz/±1.5kHz)	SSG AF VTVM Oscilloscpoe		ANT Universal connector			Check	12dB SINAD or more

Active Devices

REF.NO		PARTNO	PART NAME(E)
D501,608	Ripple filter	HSC119	DIODE
D505	Bypass diode	DA221	DIODE
D506,507	Frequency control	1SV325F	VARIABLE CAPACITANCE DIODE
D510,514,515	Frequency control	1SV290B-F	VARIABLE CAPACITANCE DIODE
D511,516,517	Frequency control	1SV290B-F	VARIABLE CAPACITANCE DIODE
D518	Ripple filter	HSC119	DIODE
D519	TX modulation	1SV278F	VARIABLE CAPACITANCE DIODE
D600,601	Local switch	HSC277	DIODE
D604	APC switch	HZU2ALL	ZENER DIODE
D605	APC protect	HZU4ALL	ZENER DIODE
D606,607,709,711,712,713	Antenna switch	HVC131	DIODE
D700	Ripple filter	HSC119	DIODE
D702,703,704,706,708	Vari-Cap tune	1SV286F	VARIABLE CAPACITANCE DIODE
D705	RF AGC	HSC119	DIODE
D900	TX/RX LED	B30-2278-05	LED
D901	Reverse protection	1SR154-400	DIODE
D902	50T control	HSC119	DIODE
IC404	OP AMP(RSSI/VAGC)	TC75W51FUF	MOS-IC
IC500	Temp sensor	LM73CIMKX-0	MOS-IC
IC501	DC AMP for TCXO mod	TLV2381IDBV	MOS-IC
IC502	PLL IC	SKY72300-362	MOS-IC
IC503	DC AMP for VCO tune	TLV2381IDBV	MOS-IC
IC504	OP AMP(VCO mod/APC)	TC75W51FUF	MOS-IC
IC600	Auto Power Control	TA75W01FUF	BI-POLAR IC
IC700	Buffer	MCP6021-E/OT	MOS-IC
IC701	FM IC	TK10931VTL-G	ANALOGUE IC
IC702,703	DC AMP for BPF	TLV2381IDBV	MOS-IC
IC900	50T control	TC75S51FE(F)	MOS-IC
IC901	DC/DC converter	XC9101D09AKR	ANALOGUE IC
IC902	Voltage regulator(50C)	TK11250CUCB	MOS-IC
IC903	Voltage regulator(33C)	TK71733S	BI-POLAR IC
Q503	Ripple filter	2SC5383-T111	TRANSISTOR
Q504	Buffer AMP	2SK879(Y)F	FET
Q507	Ripple filter	2SC5383-T111	TRANSISTOR
Q508,509	VCO oscillation	2SK508NV(K52)	FET
Q510	T/R sswitch	SSM6L05FU	FET
Q511	T/R sswitch	2SJ347F	FET
Q512	Buffer AMP	2SC5636	TRANSISTOR
Q600	Buffer AMP	2SC5636	TRANSISTOR
Q601	RF AMP	2SC5636	TRANSISTOR
Q602	RF AMP	2SK3077F	FET
Q603	RF driver AMP	RD01MUS1-T113	FET
Q604	APC switch	2SC5383-T111	TRANSISTOR
Q605	APC switch	SSM3K15TE(F)	FET
Q606	RF final AMP	RD07MUS2BT112	FET
Q607	APC switch	DTC144EE	TRANSISTOR
Q608	APC switch	2SK1824-A	FET
Q610	APC switch	EMD5	TRANSISTOR
Q700	2nd Local buffer AMP	2SC5108(Y)F	TRANSISTOR
Q701	IF AMP	2SC4215-F(Y)	TRANSISTOR
Q703	Mixer	3SK318	FET
Q704	Ripple filter	2SC5383-T111	TRANSISTOR
Q705	RF AMP	3SK318	FET
Q706	RF AGC	2SK1830F	FET
Q900	TX/RX LED switch	UMG9N	TRANSISTOR
Q901	SB3 switch	SSM6L05FU	FET
Q902	50R switch	SSM6L05FU	FET
Q903	50IF switch	SSM6L05FU	FET
Q904	DC/DC converter switch	SSM5H01TU	FET
Q905	50T switch	2SA1955A-F	TRANSISTOR

CIRCUIT DESCRIPTION (NX-300)

1. Overview

NX-300 is a UHF portable transceiver designed to operate in the frequency range of 380 to 400MHz. The unit consists of receiver, transmitter, phase-locked loop (PLL) frequency synthesizer, base band parts, power supply, and control circuits.

2. Frequency Configuration

The receiver is a double-conversion super-heterodyne using first intermediate frequency (IF) of 58.05MHz and second IF of 450kHz. Incoming signals from the antenna are mixed with the local signal from the PLL circuit to produce the first IF of 58.05MHz. This is then mixed with the 57.6MHz second local oscillator output to produce the 450kHz second IF. The transmit signal frequency is generated by the PLL VCO, and modulated by the signal from the DSP. It is then amplified and fed to the antenna.

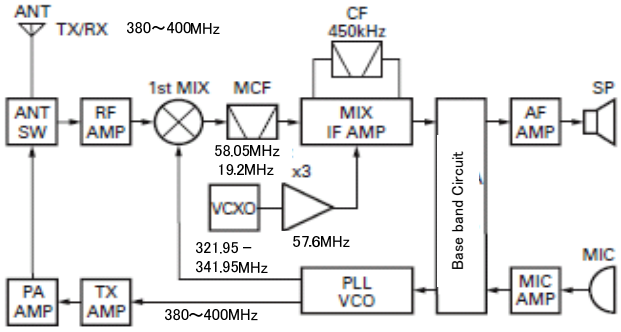


Fig. 1 Frequency configuration

3. Receiver System

3-1. RF circuit

An incoming RF signal from the antenna terminal is passed through the antenna switch (D606, 607, 709 ,711,712,713) and then the bandpass filter (L721, L722). The bandpass filter is adjusted by a variable capacitor. The input voltage to the variable capacitor is regulated by the voltage output from the D/A converter (IC703). The signal is amplified by RF amplifier (Q705), and passed through the bandpass filter (L713, 714,715). The resulting signal is applied to the first mixer (Q703), where it is mixed with the first local oscillator signal output from the frequency synthesizer to produce the first IF(58.05MHz).

3-2. IF circuit

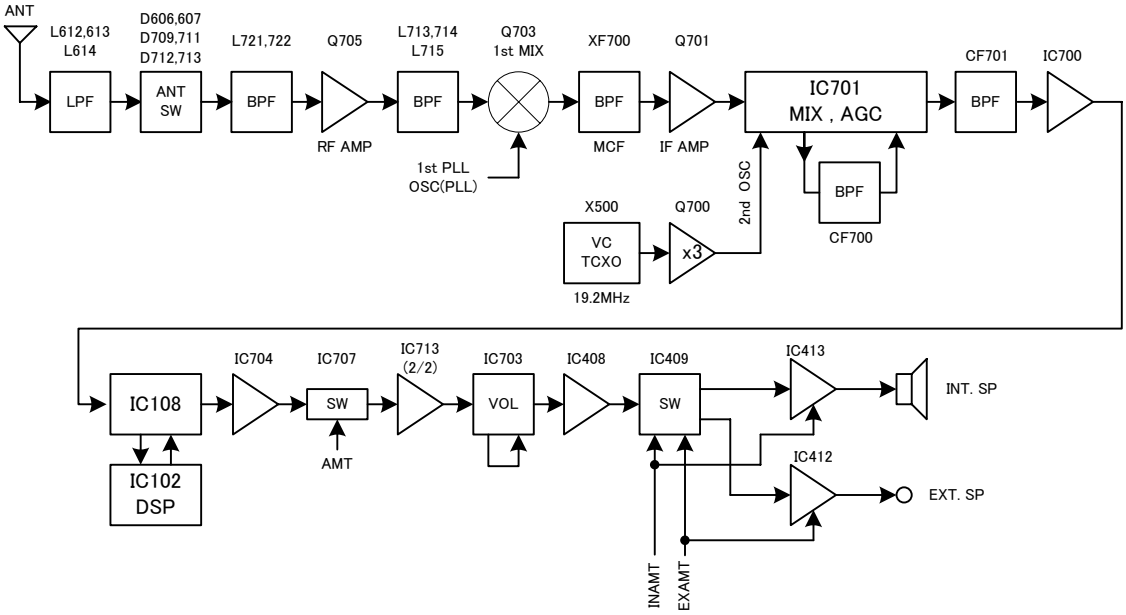
3-2. IF unit

The first IF signal is passed through a four-pole monolithic crystal filter (XF700) to reject adjacent channel signal. The filtered first IF signal is amplified by the first IF amplifier (Q701) and then applied to the lF system IC (IC701). The IF system IC provides a second mixer, AGC amplifier,and RSSI (Received Signal Strength Indicator).

The second mixer mixes the first IF signal with the 57.6MHz of second local oscillator output and produces the second IF signal of 450kHz.

The second IF signal is passed through the ceramic filter (CF700) to reject the adjacent channel signal. The filtered second IF signal is amplified by AGC amplifier.

The signal from AGC amplifier is input to AD converter (IC108) through ceramic filter (CF701) and operational amplifier (IC700).

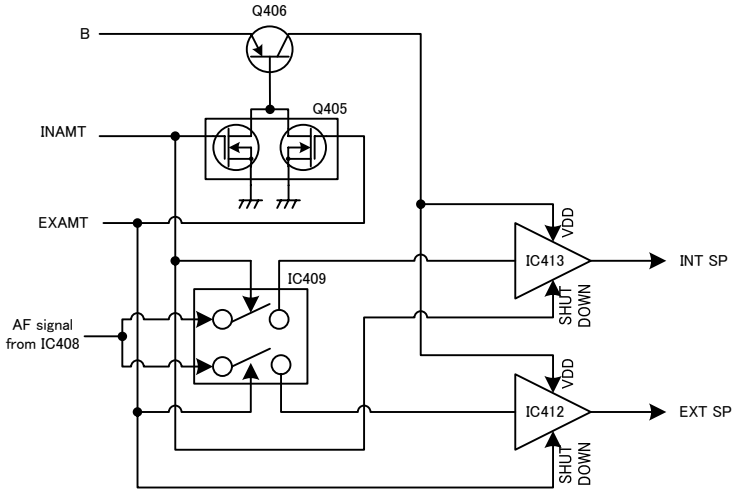


3-3. Audio amplifier circuit

Audio processing (high-pass filter, low-pass filter, de-emphasized and so on) at FM mode and decoding at NXDN mode are processed by DSP. Audio signal from IC108, IC102 goes through the amplifier (IC704). The signal then goes through mute switch (IC707), amplifier (IC713), electronic volume control (IC703), and an amplifier (IC408).

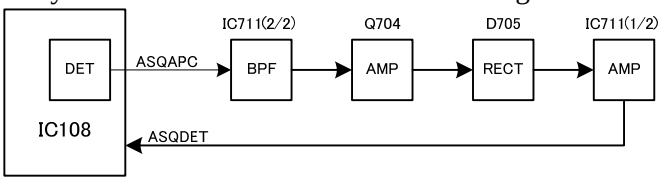
While busy, AMT becomes Low to turn IC707 on, and signal is fed to AF switch. While INAMT is High, AF switch (IC409) selects internal speaker, and audio signal is fed to internal audio power amplifier (IC413), and output to the internal speaker. While EXAMT is High, AF switch (IC409) selects external speaker, and audio signal is fed to external audio power amplifier (IC412), and output to the external speaker. Power supply for IC413 and IC412 is turned on while INAMT or EXANT is High.

The speaker is switched by the logic of speaker switching terminal SSW on the universal connector. When SP-MIC is not attached, SSW becomes High. IC108 detects the logic of SSW and activate INAMT or either EXAMT.



3-4. Squelch Circuit

It amplifies the demodulated noise signal from IC108 after filtering through BPF circuit. Then, the amplified signal is converted to DC signal by the detection circuit. The converted signal is fed back to IC108.



4. Transmitter System

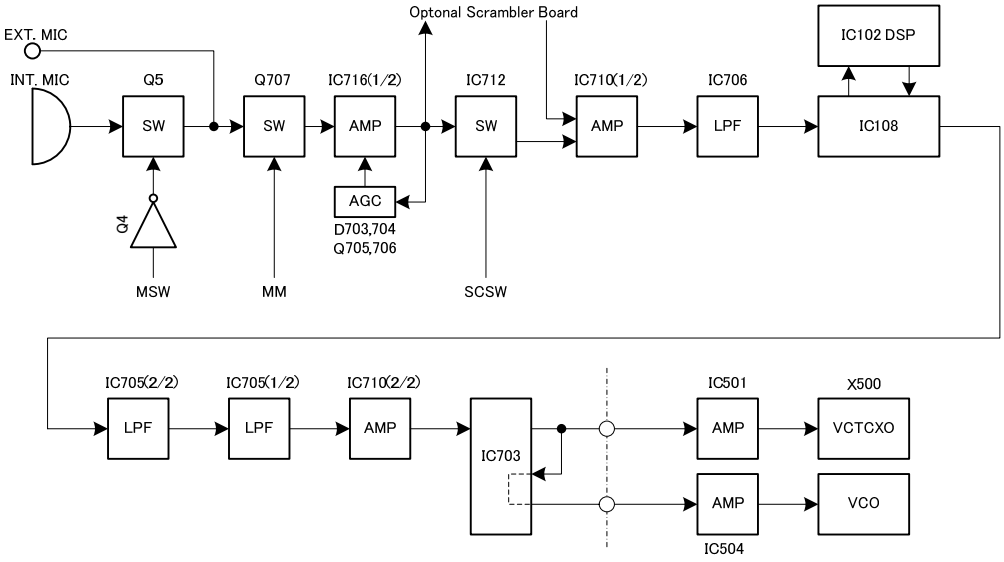
4-1. Audio Band Circuit

The signal from the internal microphone goes through the mute switch (Q5).When the SP-MIC is not attached, the microphone switching terminal (MSW) on the universal connector becomes High, and mute switch (Q5) is turned on. When the SPMIC is attached, MSW is connected to GND at inside of SPMIC. For this reason, Q5 is turned off, the internal microphone is muted, and only the input of the external microphone is supplied to the microphone amplifier. The signal from microphone goes through mute switch (Q707), and amplified by IC716 (1/2) and limited by AGC circuit composed of D703, D704, Q705 and Q706. If an optional scrambler board is installed, the switch (IC712) adjusts the signal path so that the audio signal is input to the A/D converter through the scrambler board. LPF (IC706) works as anti-aliasing filter.

4-2. Base Band Circuit

The audio signal output from the base band circuit is converted to digital data of a sampling frequency of 48 kHz. This digital data is sent to the DSP (IC102), and voice signals of 300Hz or lower and frequencies of 3kHz or higher are cut off and an audio range 300Hz to 3kHz is extracted. The audio signal is then pre-emphasized in FM mode and synthesized with the signals, such as QT and DQT, as required, and is then output from the IC108. In Digital mode, the audio signal is converted to the 4-Level FSK base band signal and output from the IC108. The DTMF and MSK base band signals are also generated by the DSP and output by the IC108.

LPF (IC705) works as smoothing filter. The DAC (IC703) assigns the base band signal to the VCO and VCTCXO (X500). At this time, the level output according to the transmit carrier is fine-adjusted according to each modulation method.



4-2. VOX

The IC716 (2/2) amplify the audio signal captured in the microphone, and then the signal is converted into the DC voltage D706 rectifies. The DC voltage activates the CPU (IC108), and the VOX starts.

4-3. Drive and Final amplifier

The signal from the T/R switch (D601 is on) is amplified by drive amplifier (Q601,Q602 and Q603) to 25~27dBm. The output of the drive amplifier is amplified by the RF power amplifier (Q606) to 5.0W (1W when the power is low). The RF power amplifier is MOS FET. The output of the RF power amplifier is then passed through the harmonic filter (LPF) and antenna switch (D606, D607 are on) and applied to the antenna terminal.

4-4. APC circuit

The APC circuit always monitors the current flowing through the RF power amplifier (Q606) and keeps a constant current. The voltage drop at R642, R645 and R647 is caused by the current flowing through the RF power amplifier and this voltage is applied to the differential amplifier (IC600 1/2). IC600 (2/2) compares the output voltage of IC600 (1/2) with the reference voltage from IC108, and the output of IC600 (2/2) controls the VGG of Q602, Q603 and Q606 to make the both voltages to same voltage. The change of power high/low is carried out by the change of the reference voltage. Q607, Q608 and Q610 are turned on and Q604 and Q605 is turned off in transmit and the APC circuit is active.

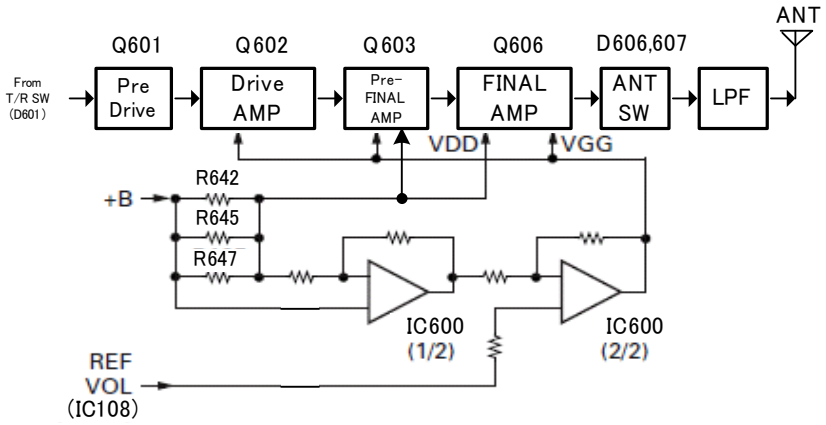


Fig. 8 Drive and final amplifier and APC circuit

5. PLL Frequency Synthesizer

5-1. VCTCXO (X500)

VCTCXO (X500) generates a reference frequency of 19.2MHz for the PLL frequency synthesizer. This reference frequency is applied to pin 9 of the PLL IC (IC502) and connected to IF circuit as a 2nd local signal through Tripler. The VCTCXO oscillation frequency is determined by DC voltage of VC terminal. The VC voltage is fixed to 1.65V by R500 and R501, and supplied to VC terminal through IC501. Modulation signal is also fed to VC terminal through IC501

The frequency adjustment is achieved by switching the ratio of dividing frequency that is not adjusted by the DC voltage impressed to VC. The resolution of adjusting frequency is approximately 4Hz.

5-2. VCO

There is a RX VCO and a TX VCO.

The TX VCO (Q509) generates a transmit carrier and the RX VCO (Q508) generates a 1st local signal. For the VCO oscillation frequency, the transmit carrier is 380 to 400 MHz and the 1st local signal is 321.95 to 341.95MHz.

The VCO oscillation frequency is determined by one system of operation switching terminal "T/R" and two systems of voltage control terminals "CV" and "ASSIST".

The operation switching terminal, "T/R", is controlled by the control line (/T_R) output from the CPU (IC108). When the /T_R logic is low, the VCO outputs the transmit carrier and when it is high, it outputs a 1st local receive signal.

The voltage control terminals, "CV" and "ASSIST", are controlled by the PLL IC (IC502) and CPU (IC108) and the output frequency changes continuously according to the applied voltage. For the modulation input terminal, "VCOMOD", the output frequency changes according to the applied voltage. This is used to modulate the VCO output. "VCOMOD" works only when "/T_R" is low.

5-4. PLL IC (IC502)

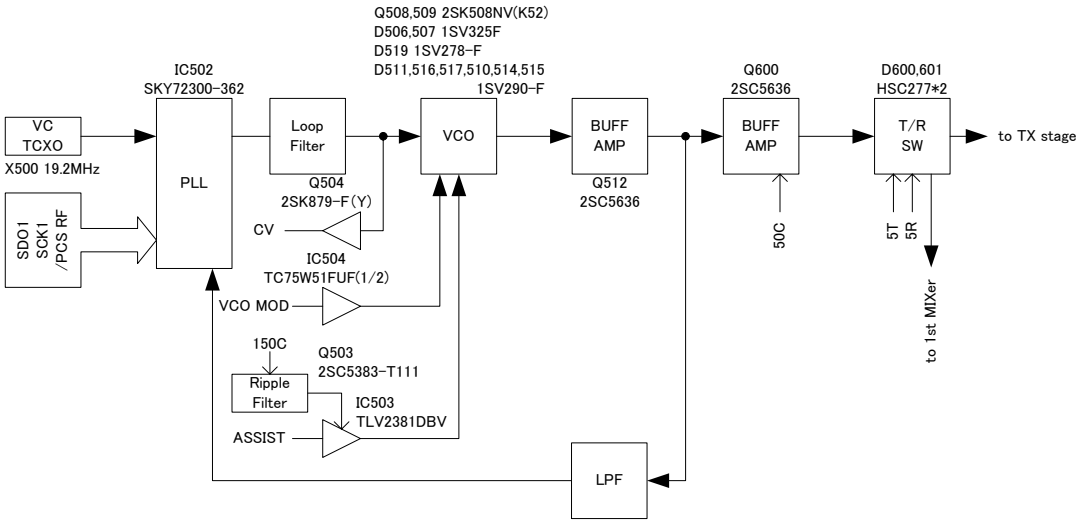
PLL IC compares the differences in phases of the VCO oscillation frequency and the VCTCXO reference frequency, returns the difference to the VCO CV terminal and realizes the "Phase Locked Loop" for the return control. This allows the VCO oscillation frequency to accurately match (lock) the desired frequency.

When the frequency is controlled by the PLL , the frequency convergence time increases as the frequency difference increases when the set frequency is changed. To supplement this, the CPU is used before control by the PLL IC to bring the VCO oscillation frequency close to the desired frequency. As a result, the VCO CV voltage does not change and is always stable at approx. 2.5V.

The desired frequency is set for the PLL IC by the CPU (IC108) through the 3-line "SDO1", "SCK1", "PCS_RF" serial bus. Whether the PLL IC is locked or not is monitored by the CPU through the “PLD” signal line. If the VCO is not the desired frequency (unlock), the "PLD" logic is low.

5-6. Local Switch (D600, D601)

The connection destination of the signal output from the buffer amplifier (Q600) is changed with the diode switch (D601) that is controlled by the transmission power supply, 5T, and the diode switch (D600) that is controlled by the receive power supply, 5R. If the 5T logic is high, it is connected to a send-side pre-drive (Q601). If the 5T logic is low, it is connected to a receive-side mixer (Q703).


Q508,509 2SK508NV(K52)
D506,507 1SV325F
D519 1SV278-F
D511,516,517,510,514,515
1SV290-F
IC502
SKY72300-362
Q600
2SC5636
D600,601
HSC277*2
VC
TCXO
X500 19.2MHz
PLL
Loop
Filter
VCO
BUFF
AMP
BUFF
AMP
T/R
SW
to TX stage
SDO1
SCK1
/PCS RF
Q504
2SK879-F(Y)
CV
Q512
2SC5636
50C
5T
5R
to 1st MIXer
IC504
TC75W51FUF(1/2)
VCO MOD
150C
Q503
2SC5383-T111
Ripple
Filter
IC503
TLV2381DBV
ASSIST
LPF

6. Control Circuit

The control circuit consists of CPU (IC108) and its peripheral circuits. IC108 mainly performs the following;

1) Switching between transmission and reception by PTT signal input.
2) Reading system, zone, frequency, and program data from the memory circuit.
3) Sending frequency program data to the PLL.
4) Controlling squelch on/off by the DC voltage from the squelch circuit.
5) Controlling the audio mute circuit by decode data input.

6-1. CPU

The CPU (IC108) is 32bit RISC processor, equipped with peripheral function and ADC/DAC.
This CPU operates at 18.432MHz clock and 3.3V /1.5V DC. Controls the flash memory, SRAM, DSP, the receive circuit, the transmitter circuit, the control circuit, and the display circuit and transfers data to or from an external device.

6-2. Memory Circuit

Memory circuit consists of the CPU (IC108) and the SRAM(IC103),the flash memory (IC101). The flash memory has capacity of 32Mbit that contains the transceiver control program for the CPU and stores the data. It also stores the data for transceiver channels and operating parameter that are written by the FPU. This program can be easily written from external devices. The SRAM has capacity of 1Mbit that contains work area and data area.

■ Flash memory

Note : The flash memory stores the data that is written by the FPU (KPG-111D), tuning data (Deviation, Squelch, etc.) ,and firmware program (User mode, Test mode, Tuning mode, etc.). This data must be rewritten when replacing the flash memory.

■ SRAM (static memory)

Note : The SRAM has temporary data area and work area.
When the power supply is off, it is backed up by an internal secondary lithium battery. Therefore, the save data does not break.

■ Real-time clock

The clock function is based on real-time clock IC (IC106). When the power supply is off, it is backed up by an internal secondary lithium battery

6-2. LCD

The LCD is controlled using the bus lines on the connector (CN1) of the control unit. It corrects the LCD contrast voltage using IC1.

6-4. Key Detection Circuit

Keys are detected using Key scan circuit in IC108. The /KEYI* signals that are normally pulled down go high when any key is pressed.

6-5. Low Battery Warning

The battery voltage is divided using R444 and R445 and is detected by the CPU (IC108). When the battery voltage falls below the voltage set by the Low battery warning adjustment, the red LED blinks to notify the operator that it is time to replace the battery. If the battery voltage falls even more (approx. 5.8V), a beep sounds and transmission stops.

Low battery warning	Battery condition
The red LED blinks during transmission.	The battery voltage is low but the transceiver is still usable.
The red LED blinks and the warning tone beeps while the PTT switch is pressed.	The battery voltage is low and the transceiver is not usable to make calls.

6-7. DSP

The DSP circuit consists of a DSP (IC102) and processes the base band signal. The DSP operates on an external clock of 18.432MHz (the same as the IC108), the I/O section operates at 3.3V and the core section operates at 1.5V. The DSP carries out the following processes:

- 4Level FSK processing
- Analog FM pre-emphasis/de-emphasis
- Vocoder processing between audio codec and modulation/demodulation
- CAI processing, such as error correction encoding
- QT/DQT encoding/decoding
- DTMF encoding/decoding
- MSK encoding/decoding
- 2-tone encoding/ecoding
- Compressor/expander processing
- Voice scrambler processing
- Transmit/receive audio filtering processing
- Microphone amplifier AGC processing
- Audio mute processing
- Modulation level processing

7. Power Supply Circuit

The battery voltage (+B) is provided from battery terminal on TX/RX unit (X57). The battery voltage passes through the 2.5A fuse (F900), and goes to RF final amplifier, AVR ICs (IC902, IC536), and control unit (X53).

In the control unit, +B is connected to DC/DC (IC407), AVR ICs (IC411, IC708, IC416), and voltage detector IC (IC414). Voltage detector watches battery voltage. If the battery voltage is 5.6V or higher, detector outputs High. During the output of IC414 is High, IC416 and Q406 provide 3.1V (31BU) to backup-section.

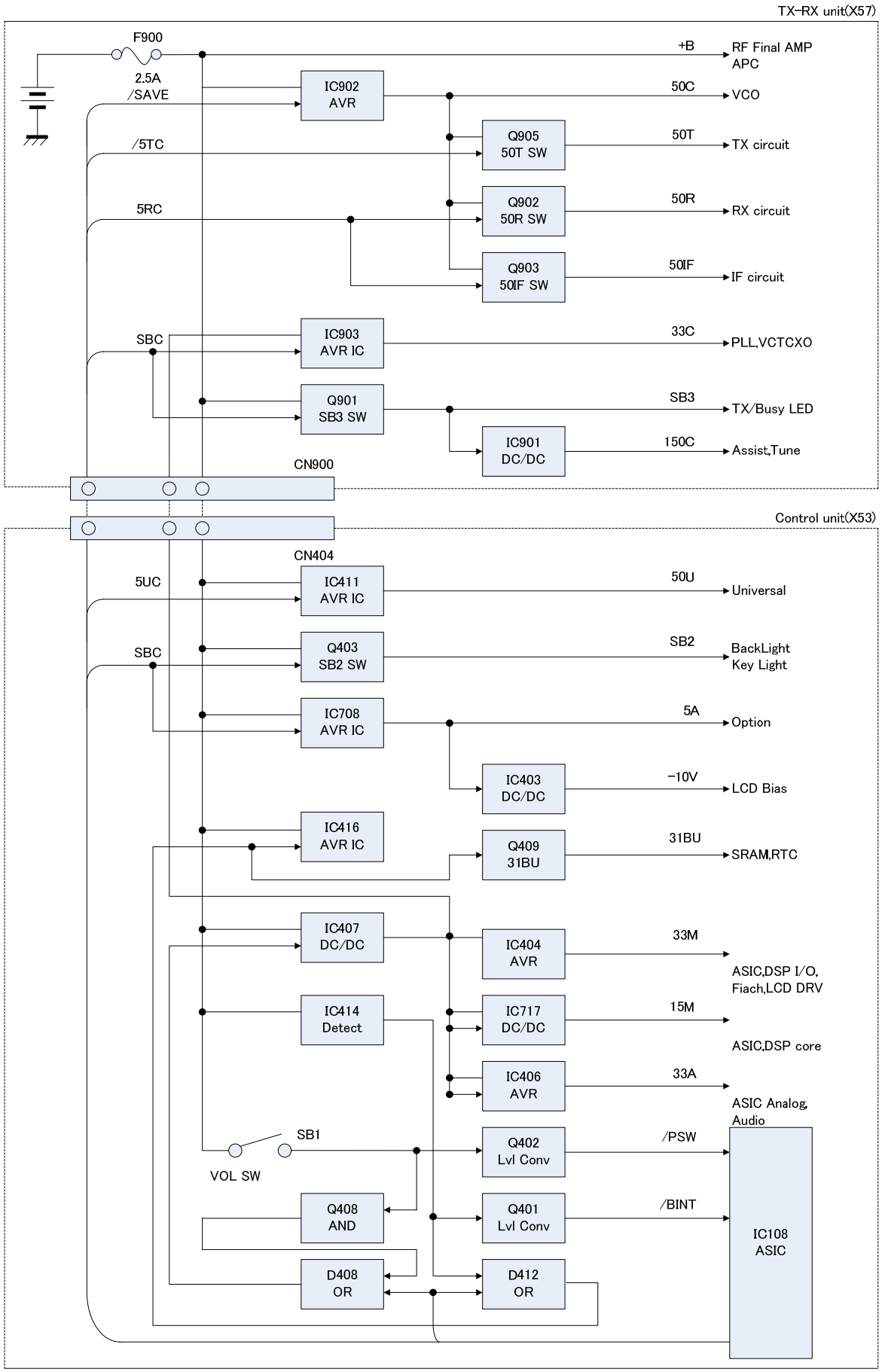
When the VOL SW is turned on, SB1 becomes high (battery voltage). DC/DC (IC407) operates if both SB1 and output of detector are high. IC407 outputs 3.8V, and it activates IC404 (33M), IC717 (15M), and IC406 (33A). As a result, CPU and DSP operate.

SBC signal becomes High after CPU operates, and IC708 (50A), Q403 (SB2) on control unit and Q901 on TXRX unit(SB3) are turned on. IC901 and IC903 operate by turning on these AVR ICs and FET switches.

5UC signal becomes High when option is installed on universal connector. Then IC411 (50U) operates.

When /SAVE signal becomes High, IC902 (50C) operates. The output of IC902 is connected to three FET switches (Q902, Q903, Q905). IC903 (33C) operates by turning on 38M. FET switches are controlled by CPU. Q905 (50T) is turned on in transmit mode. Q902 (50R) and Q903 (50IF) are turned on in receive mode.

When the VOL SW is turned off /PSW signal becomes Low. After detecting /PSW signal, CPU changes SBC signal to Low. Then power supplies except IC416 (31BU) stop.


TX-RX unit(X57)
F900
2.5A
/SAVE
+B
RF Final AMP
APC
IC902
AVR
50C
VCO
Q905
50T SW
50T
TX circuit
/5TC
5RC
Q902
50R SW
50R
RX circuit
Q903
50IF SW
50IF
IF circuit
SBC
IC903
AVR IC
33C
PLL,VCTCXO
Q901
SB3 SW
SB3
TX/Busy LED
IC901
DC/DC
150C
Assist,Tune
CN900
Control unit(X53)
CN404
5UC
IC411
AVR IC
50U
Universal
SBC
Q403
SB2 SW
SB2
BackLight
Key Light
IC708
AVR IC
5A
Option
IC403
DC/DC
-10V
LCD Bias
IC416
AVR IC
Q409
31BU
31BU
SRAM,RTC
IC407
DC/DC
IC404
AVR
33M
ASIC,DSP I/O,
Fiach,LCD DRV
IC414
Detect
IC717
DC/DC
15M
ASIC,DSP core
IC406
AVR
33A
ASIC Analog,
Audio
SB1
VOL SW
Q402
Lvl Conv
/PSW
Q408
AND
Q401
Lvl Conv
/BINT
IC108
ASIC
D408
OR
D412
OR

8. Signaling Circuit

8-1. Encode (QT/DQT/DTMF/2TONE /MSK)

Each signaling data signal of QT, DQT, DTMF,2TONE and MSK is generated by the DSP circuit, superposed on a modulation signal and output from IC108. The modulation balance of the QT/DQT signal is adjusted by the D/A converter(IC703) and the resulting signal is routed to the modulation input of the VCO and VCXO (X500). The each deviation of the TX QT, DQT, DTMF,2TONE and MSK tone is adjusted by changing the output level of the IC108 and the resulting signal is routed to VCO and VCXO. The RX DTMF tone is routed to the receive audio signal system, and is output from the speaker.

8-2. Decode (QT/DQT/DTMF/2TONE/MSK)

The audio signal is removed from the FM detection signal sent to the DSP circuit and the resulting signal is decoded.

9. Compander Circuit

The term “compander” means compressor and expander. The compander reduces noise by utilizing a compressor and an expander. The NX-300 contains DSP(IC102) to perform this operation. The NX-300 compander can be turned on or off using the FPU.

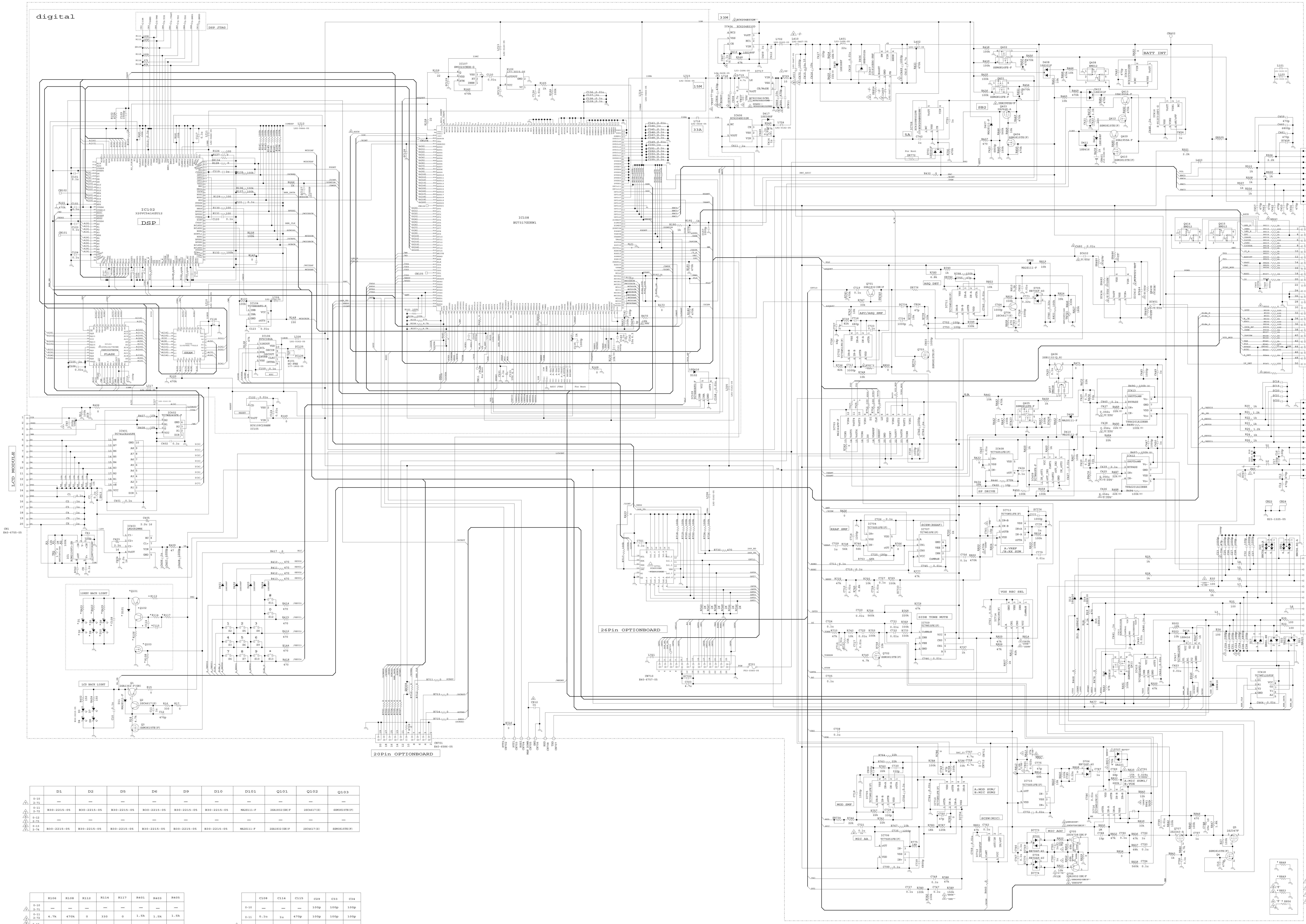
PARTS LIST

PARTNO	PROCESS	UNIT	PART NAME(E)	RATING/FEATURES
Z83-3242-03		1	INTERCONNECTION DIAGRAM	
X41-3760-10		1	SWITCH UNIT	
X41-3770-10		1	SWITCH UNIT	
X42-3380-10		1	CORD ASSY	
X53-4432-71		1	CONTROL UNIT	
X53-4432-72		1	CONTROL UNIT	
X53-4432-73		1	CONTROL UNIT	
X53-4432-74		1	CONTROL UNIT	
X57-7830-12		1	TX-RX UNIT	
X60-3910-10		1	TERMINAL ASSY	
A02-4002-23		1	PLASTIC CABINET	
A02-4003-23		1	PLASTIC CABINET	
A10-4111-21		1	CHASSIS	
A10-4112-04		1	CHASSIS	
A62-1156-02		1	PANEL	
B09-0712-03		1	CAP	
B11-1853-24		1	FILTER	
B11-1854-02		1	ILLUMINATION GUIDE	
B11-1855-04		1	ILLUMINATION GUIDE	
B38-0923-05		1	LCD ASSY	
B42-7325-04		1	SERIAL NUMBER STICKER	
B42-7417-04		1	STICKER	
B43-1606-04		1	BADGE	
B44-1000-00		1	POS LABEL	'FOR PRINTING *(ROHS)
B44-2163-04		1	UPC CODE LABEL	
B44-2165-04		5	UPC CODE LABEL	
B59-2523-00		1	PAMPHLET	
B62-2224-00		1	INSTRUCTION MANUAL	
B72-2639-04		1	MODEL NAME-PLATE	
B72-2640-04		1	MODEL NAME-PLATE	
D32-0446-14		1	STOPPER	
E04-0475-05		1	RF COAXIAL RECEPTACLE(SMA)	
E23-1322-04		1	TERMINAL	
E29-1220-04		1	RELAY HARDWARE	
E29-1221-14		1	RELAY HARDWARE	
E58-0532-05		1	RECTANGULAR RECEPTACLE	'14P
E72-0425-03		1	TERMINAL BLOCK	
F07-1931-04		1	COVER	
F10-3106-03		1	SHIELDING CASEASSY	
F15-1016-04		1	SHIELDING PLATE	
F20-3387-04		1	INSULATING SHEET	
F20-3390-04		1	INSULATING SHEET	
G02-1836-13		1	EARTH SPRING	
G02-1837-04		1	EARTH SPRING	
G10-1373-04		1	FIBROUS SHEET	
G10-1384-14		1	FIBROUS SHEET	
G11-4331-04		1	SHEET	
G11-4272-14		1	RUBBER CUSHION	
G11-4428-04		1	SHEET	
G11-4440-04		1	SHEET	
G11-4458-14		1	SHEET	
G11-4459-04		1	SHEET	
G11-4476-04		1	SHEET	
G11-4497-04		1	SHEET	
G13-2129-14		1	CUSHION	
G13-2249-04		1	CUSHION	

PARTS LIST

G11-4429-04		1	RUBBER SHEET	
G13-2220-04		1	CUSHION	
G13-2252-04		1	CONDUCTIVE CUSHION	
G13-2258-04		1	CUSHION	
G13-2265-04		1	CUSHION	
G53-1762-02		1	PACKING	
G53-1763-03		1	PACKING	
G53-1764-03		1	PACKING	
G53-1765-11		1	PACKING	
G53-1766-11		1	PACKING	
G53-1768-04		1	PACKING	
G53-1769-04		1	PACKING	
G53-1792-04		1	PACKING	
H12-4228-12		1	PACKING FIXTURE	
H13-2135-04		1	CARTON BOARD	
H52-2327-02		1	ITEM CARTON CASE	
H62-2017-03		5	OUTER CARTON CASE	
J19-5505-11		1	HOLDER	
J19-5506-03		1	HOLDER	
J19-5507-02		1	HOLDER	
J21-8579-04		1	MOUNTING HARDWARE	
J29-0730-05		1	HOOK	
J30-1296-04		1	SPACER	
J87-0028-05		1	FPC(LEAD FREE)	
J87-0007-15		1	FPC(LEAD FREE)	
J99-0390-04		1	ADHESIVE SHEET	
J99-0711-04		1	ADHESIVE SHEET	
J99-0712-14		1	ADHESIVE SHEET	
J99-0714-04		1	ADHESIVE SHEET	
J99-0715-08		1	ADHESIVE SHEET	
J99-0719-04		1	ADHESIVE SHEET	
J99-0725-04		1	ADHESIVE SHEET	
J99-0727-04		1	ADHESIVE SHEET	
J99-0728-04		1	ADHESIVE SHEET	
K25-2001-03		1	PUSH KNOB	
J99-0732-04		1	ADHESIVE SHEET	
K29-9405-03		1	KNOB	
K29-9406-03		1	BUTTON KNOB	
K29-9407-03		1	KNOB	
K29-9408-13		1	KNOB	
N08-0564-04		1	DRESSED SCREW	
N09-2426-14		1	HEXAGON HEAD SCREW	
N09-6554-05		1	PAN HEAD SCREW	
N09-2440-15		1	SPECIAL SCREW	
N09-6549-04		1	STEPPED SCREW	
N14-0844-04		1	CIRCULAR NUT	
N30-3008-60		1	PAN HEAD MACHINE SCREW	
N83-2005-48		1	PAN HEAD TAPTITE SCREW	'M2X 5
N16-0020-48		1	SPRING WASHER	
N88-2005-48		1	FLAT HEAD TAPTITE SCREW	'M2X5
R31-0666-05		1	VARIABLE RESISTOR	
S60-0437-05		1	ROTARY SWITCH	
S79-0472-05		1	KEYBOARD ASSY	
T07-0755-15		1	SPEAKER	
T91-0575-05		1	MIC ELEMENT	
W09-0971-05		1	LITHIUM CELL	'ML614U/3.4MAH

USE FOR	SYMBOL	REVISION NO	ISSUED	DATE



	D1	D2	D5	D6	D9	D10	D101	Q101	Q102	Q103
7 0-10 2-71	—	—	—	—	—	—	—	—	—	—
7 0-11 2-72	B30-2215-05	B30-2215-05	B30-2215-05	B30-2215-05	B30-2215-05	B30-2215-05	MA2S111-F	2SA1832(GR)F	2SC4617(S)	SSM3K15TE(F)
5 7 0-12 2-73	—	—	—	—	—	—	—	—	—	—
5 7 0-13 2-74	B30-2215-05	B30-2215-05	B30-2215-05	B30-2215-05	B30-2215-05	B30-2215-05	MA2S111-F	2SA1832(GR)F	2SC4617(S)	SSM3K15TE(F)

	R106	R108	R112	R114	R117	R401	R403	R405
7 0-10 2-71	—	—	—	—	—	—	—	—
7 0-11 2-72	4.7k	470k	0	330	0	1.5k	1.5k	1.5k
5 7 0-12 2-73	—	—	—	—	—	—	—	—
5 7 0-13 2-74	4.7k	470k	0	330	0	1.5k	1.5k	1.5k

	C108	C114	C115	C29	C33	C34
0-10	—	—	—	100p	100p	100p
0-11	0.1u	1u	470p	100p	100p	100p
5 0-12	—	—	—	100p	100p	100p
5 0-13	0.1u	1u	470p	100p	100p	100p
7 2-71	—	—	—	—	—	—
7 2-72	0.1u	1u	470p	—	—	—
7 2-73	—	—	—	—	—	—
7 2-74	0.1u	1u	470p	—	—	—

5 6

	R848	R849	R853	R856	
0-10	O	—	—	—	6KEY
0-11	—	O	—	—	18KEY
0-12	O	—	O	—	6KEY Service unit
0-13	—	O	O	—	18KEY Service unit
7 2-71	O	—	—	O	6KEY(NX-300E4)
7 2-72	—	O	—	O	18KEY(NX-300E)
7 2-73	O	—	O	O	6KEY Service unit (NX-300E4)
7 2-74	—	O	O	O	18KEY Service unit (NX-300E)

DESIGNED	DRAWN	CHECKED	APPROVED	PART NAME
				PART NUMBER
株式会社ケンウッド KENWOOD CORPORATION				Z92-1120-01 1/1 11

09/09/29 14:20:24 x53426taaa.cir/001.sht

USE FOR	SYMBOL	REVISION NO	ISSUED	DATE
	1 X			– –
	2 X			– –
	3 X			– –
	4 X			– –
	5 X			– –
	6 X			– –
	7 X			– –
	8 X			– –
	9 X			– –

	R950	R951	R952	R953	R961
0-10	0	–			
0-11	–	0			
0-12	0	0			
3-01					
0-01					

A/2

B/2 OPTION

EX-3785 UHF RF

DESIGNED	DRAWN	CHECKED	APPROVED	PART NAME
株式会社ケンウッド KENWOOD CORPORATION				PART NUMBER Z92-1117-01 1/1 07

USE FOR	SYMBOL	REVISION NO	ISSUED	DATE
	1 X			– –
	2 X			– –
	3 X			– –
	4 X			– –
	5 X			– –
	6 X			– –
	7 X			– –
	8 X			– –
	9 X			– –

	CN601	D510	4 D511	D514	D515	4 D516	4 D517	D605	4 D608	D710	4 D712	4 D713	4 Q606	4 IC702
K 0-10	–	1SV282-F	1SV282-F	1SV282-F	1SV282-F	1SV282-F	1SV282-F	HZU5CLL	HSC119	1SV286F	–	–	RD07MVS1BT122	TLV2381IDBV
K2 0-11	E23-1167-05	1SV290B-F	1SV282-F	1SV290B-F	1SV290B-F	1SV282-F	1SV282-F	HZU5CLL	–	1SV286F	–	–	RD07MVS1BT122	TLV2381IDBV
8 K3 0-12	E23-1167-05	1SV290B-F	1SV290B-F	1SV290B-F	1SV290B-F	1SV290B-F	1SV290B-F	HZU4ALL	–	–	HVC131	HVC131	RD07MUS2BT112	–

	1 L504	L520	L521	L528	4 L530	4 L600	L602	L603	L605	4 L606	L615	L709	L710	L711	L713	L714	L715	L720	L721	L722	4 L723	L725	L726	4 L727	L902	L903
K 0-10	12n L40-1275-92	18n L40-1878-67	22n L40-2278-67	27n L40-2775-71	56n L40-5675-57	22n L40-2275-92	18n L40-1875-92	15n L40-1575-92	6.8n L40-6865-92	18n L41-1875-43	15n L40-1575-57	18n L40-1875-92	18n L40-1875-92	22n L40-2275-92	8.2n L41-8268-14	8.2n L41-8268-14	8.2n L41-8268-14	10n L40-1075-92	8.2n L41-8268-14	8.2n L41-8268-14	4T L34-4564-05	8.2n L40-8265-92	33n L41-3378-03	–	–	–
K2 0-11	12n L40-1275-92	22n L40-2278-67	27n L40-2778-67	33n L40-3375-71	56n L40-5675-57	22n L40-2275-92	27n L40-2775-92	18n L40-1875-92	12n L40-1275-92	18n L41-1875-43	22n L40-2275-57	15n L40-1575-92	15n L40-1575-92	33n L40-3375-92	10n L41-1078-14	10n L41-1078-14	10n L41-1078-14	–	10n L41-1078-14	10n L41-1078-14	4T L34-4564-05	6.8n L40-6865-92	39n L41-3978-03	–	27u L40-2702-86	6.8n L41-6869-16
8 K3 0-12	18n L40-1875-92	27n L40-2778-67	39n L40-3978-67	39n L40-3975-71	18n L40-1875-57	33n L40-3375-92	39n L40-3975-92	27n L40-2775-92	18n L40-1875-92	22n L41-2275-43	33n L40-3375-57	22n L40-2275-92	22n L40-2275-92	56n L40-5675-92	18n L41-1878-14	18n L41-1878-14	18n L41-1878-14	–	15n L41-1578-14	18n L41-1878-14	5T L34-4565-05	–	–	6.8n L40-6865-92	27u L40-2702-86	6.8n L41-6869-16

	4 R502	R504	R533	R552	R559	4 R560	4 R561	R568	R573	R583	4 R606	R619	R620	R621	R623	R624	R626	R630	R632	4 R636	4 R639	R644	1 R658	R663	1 R669	R710	1 R749	R757	R759	R760	R769	1 R771	4 R773	4 R774	4 R777	R785	R788	R790	R800	4 R802	R935	R954	R955	R956	R957	R958	TH601
K 0-10	120k	100k	180K(D)	120k	180(D)	22	180(D)	470k	–	–	330	–	0	–	10k	47k	120	33k	10k	220	10k	47	1.8k	0	470	0	180k	100k	100k	100k	10k	180	820k	100k	10k	100k	100k	100k	–	–	–	–	–	–	–	–	–
K2 0-11	–	100k	220k(D)	100k	220(D)	22	220(D)	470k	120k	0	330	820	5.6	820	12k	33k	220	~~100k~~ 10k	~~56k~~ 5.6k	220	10k	22	820	–	–	–	220k	1M	1M	1M	10k	150	820k	100k	10k	1M	1M	1M	0	–	15k	0	0	0	0	0	–
8 K3 0-12	68k	39k	220k(D)	68k	180(D)	82	220(D)	–	680k	0	270	~~X~~ 820	~~0~~ 5.6	~~X~~ 820	12k	~~22k~~ 27k	330	47k	18k	330	~~27k~~ 39k	22	820	–	–	–	220k	1M	1M	1M	–	150	–	–	–	1M	1M	–	–	0	–	0	0	0	0	0	ERTJ0EV104H

	C516	C529	C537	C543	C545	C547	C553	C557	C561	C563	4 C565	C566	C567	C568	4 C571	C573	C574	C575	C586	4 C588	C609	C613	C621	C623	C627	C639	C647	C650	C654	C662	C664	C665	C666	C667	C668	C669	C671	1 C672	4 C692
K 0-10	0.0u	100p	5p(B)	3p(B)	–	100p	5p(B)	100p	–	–	33p	68p	–	–	3p(B)	4p(B)	1p(B)	3p(B)	7p(B)	10p(B)	–	7p(B)	15p	15p	10p(B)	39p	18p(G) C93-0941-05	12p(G) C93-0937-05	7.5p(D) C93-0987-05	1p(B)	4p(B)	2p(B)	5p(B)	1.5p(B)	8p(B)	4p(B) 7p(B)	470p	47p(G) C93-0951-05
K2 0-11	–	–	–	4p(B)	470p	470p	10p(B)	470p	0.01u	100p	33p	82p	0.5p(B)	1.5p(B)	3p(B)	6p(B)	2p(B)	6p(B)	10p(B)	10p(B)	1p(B)	4p(B)	4p(B)	12p	8p(B)	33p	–	–	–	4p(B)	2.5p(B)	3p(B)	8p(B)	2.5p(B)	10p(C)	1.5p(B)	10p(B)	–	47p(G) C93-0951-05
8 K3 0-12	–	–	–	~~4p(B)~~ 5p(B)	470p	470p	~~470p~~ 100p	470p	0.01u	100p	82p	100p	~~1.5p(B)~~ 1p(B)	~~1p(B)~~ 0.5p(B)	5p(B)	6p(B)	3p(B)	5p(B)	10p(B)	4p(B)	3p(B)	6p(B)	10p	12p	18p	15p	–	–	–	3p(B)	9p(B)	3.5p(B)	10p(C)	3.5p(B)	10p(C)	4p(B)	10p(B)	–	–

	C702	C704	C715	C716	4 C747	C749	C751	C753	C754	C755	4 C756	4 C764	C767	C770	C772	C773	C774	C776	4 C780	C796	C798	C800	4 C802	C804	C807	C809	C810	C811	C813	C814	4 C850	C975	C987	C988	C989	4 C990	4 C991	4 C993	4 C994
K 0-10	–	47p	0.01u	82p	10p(B)	2p(B)	10p(B)	2p(B)	3p(B)	4p(B)	9p(B)	1.5p(B)	9p(B)	4p(B)	9p(B)	1p(B)	3p(B)	9p(B)	0.1u	9p(B)	1.5p(B)	2p(B)	4p(B)	9p(B)	5p(B)	18p	2p(B)	9p(B)	–	–	100p	7.5p(D) C93-0987-05	–	–	–	–	–	–	–
K2 0-11	82p	10p(B)	47p	–	10p(B)	4p(B)	9p(B)	4p(B)	9p(B)	5p(B)	470p	1.5p(B)	12p(G)	3p(B)	12p(G)	1.5p(B)	2p(B)	12p(G)	0.1u	11p(G)	3p(B)	1.5p(B)	4p(B)	11p(G)	3p(B)	–	4p(B)	7p(B)	27p	27p	100p	9p(C) C93-0899-05	5p(B)	27p C93-0945-05	15p C93-0939-05	–	–	–	–
8 K3 0-12	82p	10p(B)	47p	–	9p(B)	4p(B)	18p	2p(B)	15p	5p(B)	470p	–	18p	2p(B)	22p	0.75p(B)	0.5p(B)	22p	–	27p	1p(B)	1p(B)	–	22p	3p(B)	–	3p(B)	470p	27p	27p	–	9p(C) C93-0899-05	5p(B)	–	–	22p(G) C93-0943-05	12p(G) C93-0937-05	47p(G) C93-0951-05	18p(G) C93-0941-05

DESIGNED	DRAWN	CHECKED	APPROVED	PART NAME
株式会社ケンウッド KENWOOD CORPORATION				PART NUMBER Z92-1117-01 1/1 07

09/09/29 18:00:33 X5773fcaaa.c1X/D02.sht

POWER SW/
AF VOL

CHANNEL
SELECTOR

6KEY/SP/MIC

SWITCH UNIT
X41-372

CN403

33M
VOL
VOL_GND
EN1
EN4
AGND
EN3
SB1
+B
EN2

JU

CN23

AGND
6_/KEY0
BL_SB
6_/KEY01
6_/KEY00
6_/KEY02
BL_SB
6_/KEY11
SP-
SP-
SP+
SP+
EMC
ME

CORD ASSY
X42-334

CN404

LED_G
/EMG
LED_R
IFC
/SAVE
I2CCK
/5TC
I2CSDA
SBC
/T_R
TV2
ASSIST
TV1
VAGC
SRC
TCXO_MOD
GND
RSSI
GND
CV
GND
NC
NC
+B
+B
+B
+B
NC
NC
GND
/PTT
Side_G
Side_1
W_/N
SDO1
Side_2
/PCS_RF
/DSW
APC
/APCSW
VCO_MOD
THP
PLD
3BM
SCK1
GND
S_DET
GND
NC
IF_DET

50

CN900

LED_G
/EMG
LED_R
IFC
/SAVE
I2CCK
/5TC
I2CSDA
SBC
/T_R
TV2
ASSIST
TV1
VAGC
SRC
TCXO_MOD
GND
RSSI
GND
CV
GND
NC
NC
+B
+B
+B
+B
NC
NC
GND
/PTT
Side_G
Side_1
W_/N
SDO1
Side_2
/PCS_RF
/DSW
APC
/APCSW
VCO_MOD
THP
PLD
3BM
SCK1
GND
S_DET
GND
NC
IF_DET

50

TX-RX PCB
X57-737 A/2

ANT

SWITCH UNIT
X41-371

CN901

PTT
GND
Side_G
Side_1
Side_2

PTT
Side_1
Side_2

+
-
BATT

LCD ASSY

CN1

/CS
/RES
A0
/WR
D0
D1
D2
D3
D4
D5
D6
D7
VDD
VSS
VDD
V1
V2
V3
V4
V5

20

CONTROL PCB
X53-426

CN710

OPT1
OPT3
2NP_RD
2NP_TD
NC
OPT4
OPT10
OPT5
DGND
AGND
AI
AO
AGND
5V
OPT9
TX1
OPT8
OPT11
OPT7
OPT2
TXO
RXE0
RXE1
OPT6
POW

20

CN737

OPT1
OPT3
2NP_RD
2NP_TD
NC
OPT4
OPT10
OPT5
AGND
AGND
AI
AO
AGND
5V
OPT9
TX1
OPT8
OPT11
OPT7
OPT2
TXO
RXE0
RXE1
OPT6
POW

CN405

NC
RXD
TXD
SCHG
E
OPT
PF
PTT
ME
MIC
MSK
SP-
SP+
3SW

14

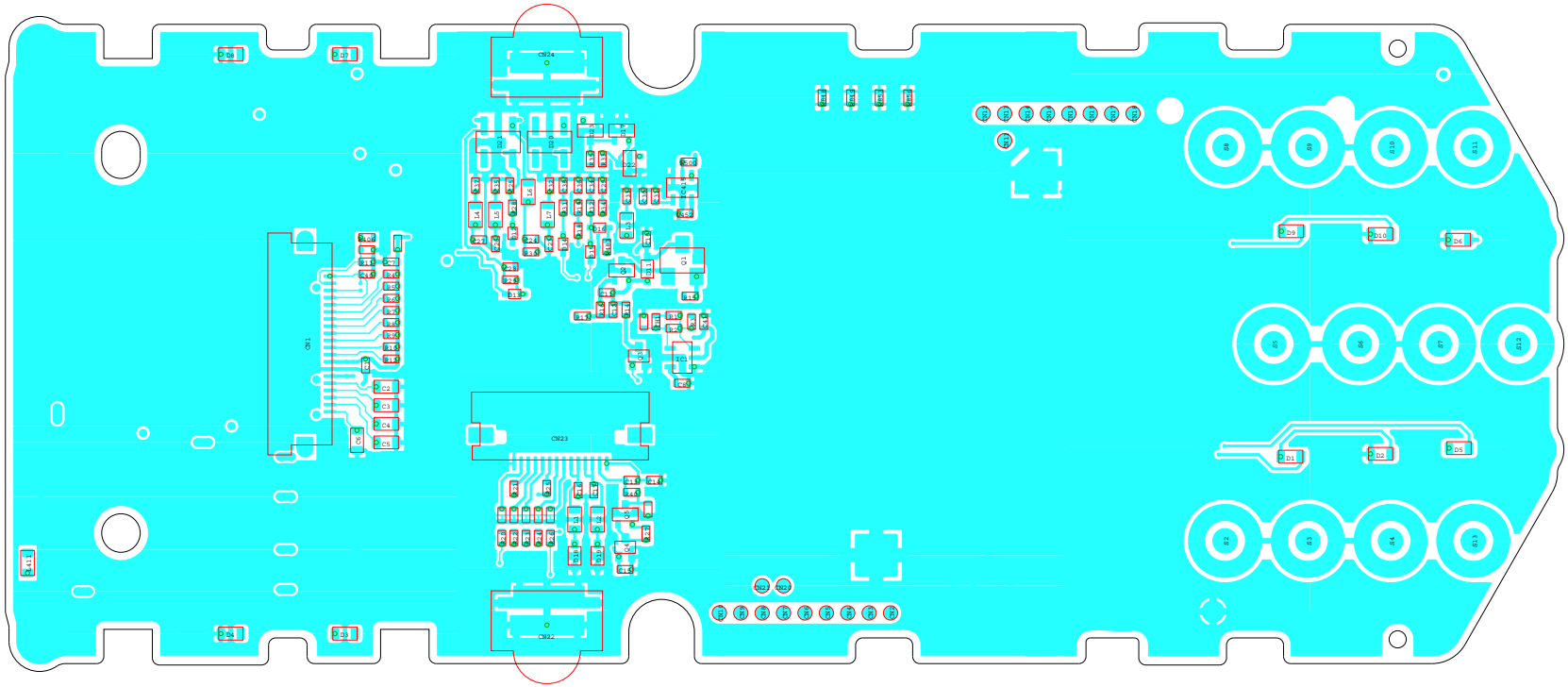
1

UNIVERSAL CONNECTOR

TXO
RXE0
RXE1
TX1
C3
SB2
1HK
OPT1
OPT2
OPT4
OPT3
DGND
AGND
SA
STBY
DI
TCKI
NOWK
1HK
OPT5
OPT7
OPT6
AGND

X57-737 B/2

OPTION PCB



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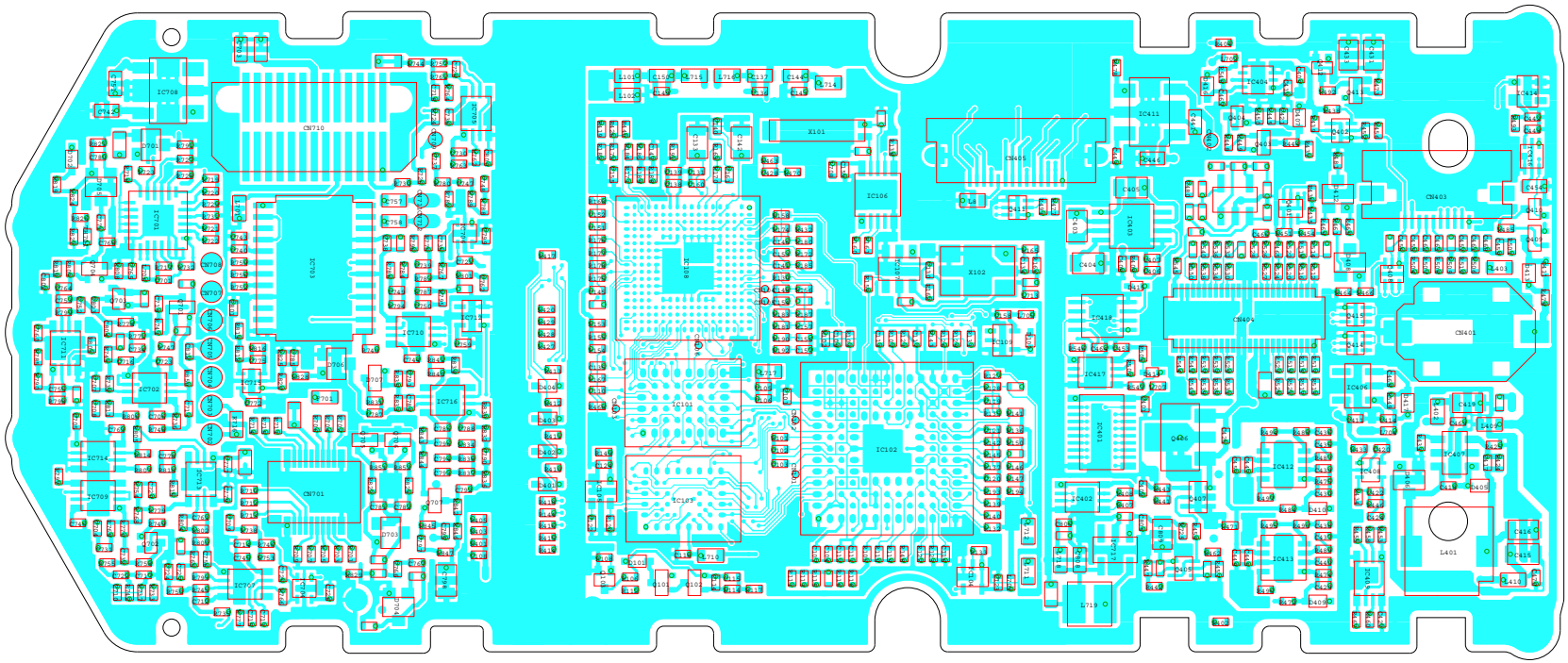
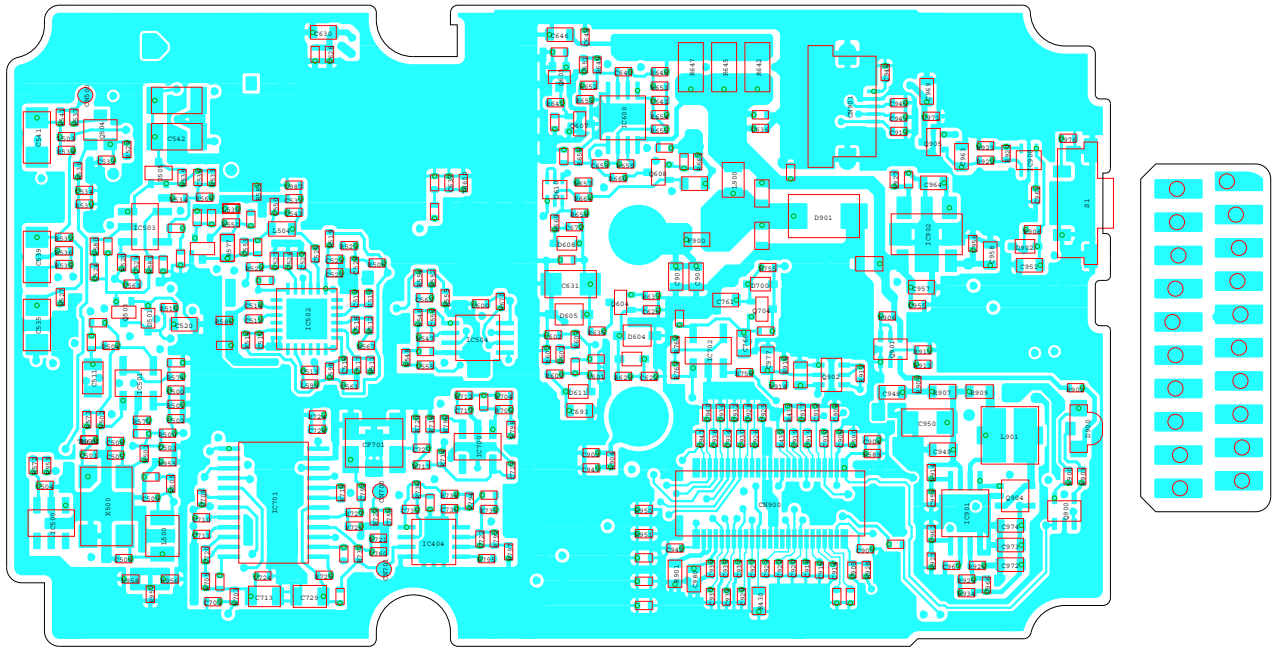
Time: 12:37 30-sep-2009 Comment: Part_Side



Node: BS4 User: Designer File: x53426isc3.pnl
Time: 12:37 30-sep-2009 Comment: Flow_Side



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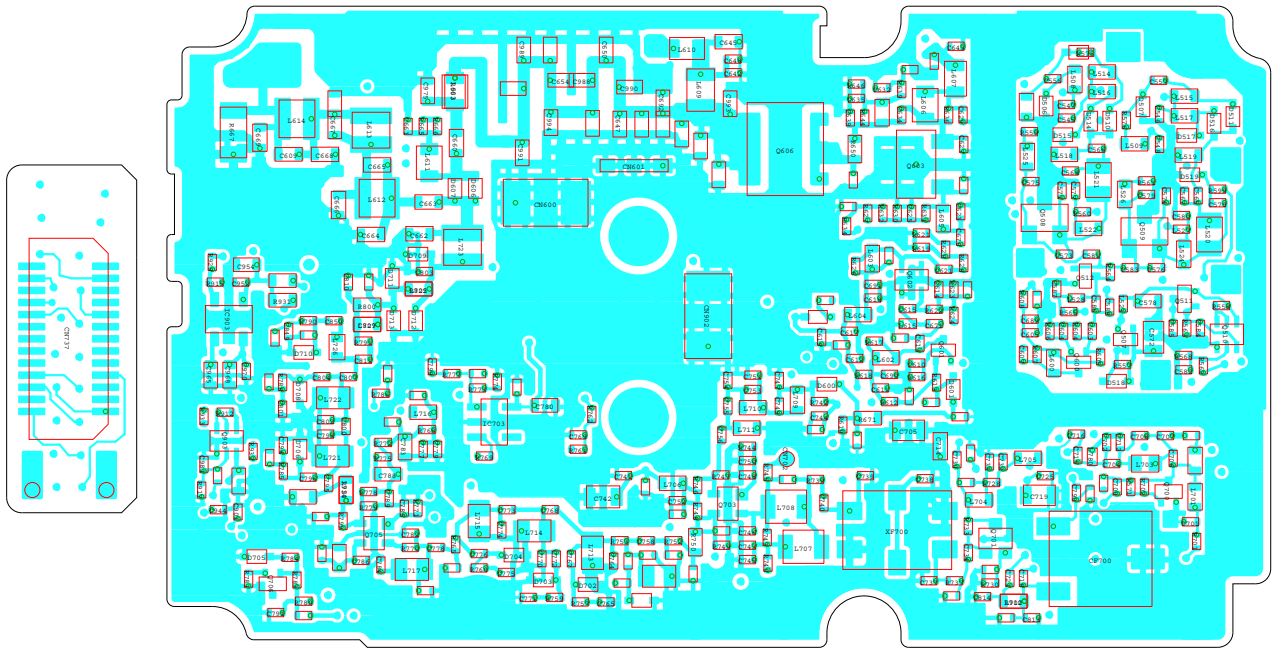

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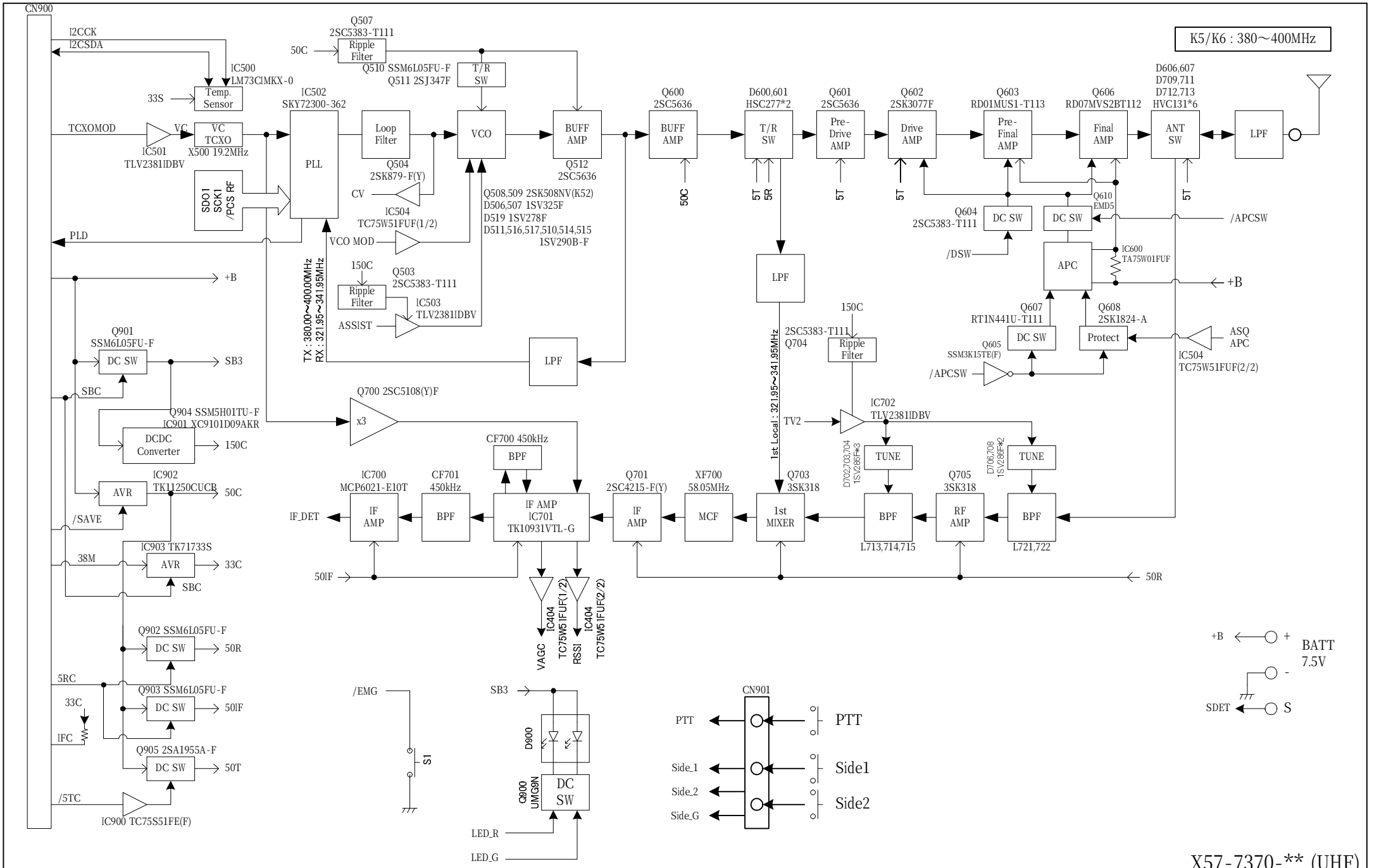
Time: 12:38 30-sep-2009 Comment: Flow_Side



X57-7370-** (UHF)

EX-3785 TXRX unit BLOCK DIAGRAM

IC101 29PL032J70BFI
Flash ROM
IC103 L1024GL-70LLI
SRAM
DSP IC102 320VC5416ZU12
/SCRST,SCSCK,/SCREQ,SCBSY,SCMOSI,SCBCK,/SCSS,SCMISO,/SCWKUP,/SCBFS
/DRST,DCLK,/HDS2,/HRDY,/SYMTIM,/RSSITIM,/DINT,/SWUP,FSDET,/HINT
MCD1AF,/MCSCKAF,/MCCSAF,MCD0AF,MCD1CN,/MCCXCN,/MCD0CN,/MCCSRCN,MCSCKCN
D0~15,A0~20,/RD,/WR,/CS0,/CS2,/CS3,/CS4
SM5023CNDH-G IC107
X102 18.432MHz
VC TCXO
33M
33A 15M 33M
BSHIFT
IC401 TC74LCX245FK
IC402 TC7WZ245FK-F
BUS SW
CN1 to LCD Module
/LCDRST
33M
LCDCNT
IC703 M62364FP-F(7/8)
DAC
IC1 NJM2130F3-ZB
-10V
TXD0 RXD0 RTS0 CTS0 DSR /PTT /UDET RXD3 ENC1 ENC2 ENC3 ENC4 /BINT /PSW
ASQDET VOX VOL BATT PFKEY
BLC MM SCSW /AMT STSW EXAMT INAMT BEEP TONESW /MNDNU 5UC
IC105 XC6109C29ANLN
RESET
33M
IF_DET
IC108
12key Back Light
D1,2,5,6 D9,10
Q101 2SA1832(GR)F
Q102 2SC4617(S)
Q103 SSM3K15TE(F)
SB2 5A
AVR
BLC
LCD Back Light
D3,D4 D7,D8
Q1 2SA1362(GR)-F
Q2 2SC4617(S)
Q3 SSM3K15TE(F)
BL_SB
Q415 EMD12
DC SW
LED-G
Q414 EMD12
DC SW
LED-R
SBC
+B
TV1
TV2
IC703 M62364FP-F (3/8,4/8)
33A
DAC
SDO0,SCK0 /EVCS
RSSI, THP, VAGC, CV, S-DET
/EMG, PTT, Side_1, Side_2,Side_G, IFC, 5RC, 5TC, /DSW, /APCSW,SBC, /T_R, ASSIST, SDO1, SCK1, PLD
CN404 50pin Board to Board
/RINT
32K
I2CCK,I2CSDA
SCTAM1
33M
SCTXD
SCRXD
/SCRST SCSCK /SCREQ SCBSY SCMOSI SCBCK /SCSS SCMISO /SCWKUP /SCBFS
CN701 20pin Option Board
IC106 RV5C386A
RTC
X101 32.768kHz
I/O Expander IC701 PCA9535RGE
/OINT
POW 5A 26P_RD 26P_TD OPT10 OPT9 DTI AO AI RXEI RXEO TXI TXO
OPT1,2,3,4,5,6,7,8,11
KEY0 0,1,2,3 /KEY1 0,1,2,3,4
CN710 26pin Option Board
KEY Matrix (12key)
IC404 XC6204B332D
AVR
33M
IC717 XC9235A15CMN
DC-DC
15M
IC406 XC6204B332M
AVR
33A
L401 , D406 , D405
IC407 LT1616ES6-PBF
DCDC Converter
+B
SBC
D408 1SS301F
Q402 SSM6N16FE-F
Q401 SSM6N16FE-F
/PSW
/BINT
SB1
DCSW
Q408 EMD12
IC414 XC61CC5602NR
RESET
IC416 S-812C31BPI-G
AVR
SCTAM1
DCSW
Q413 2SA1955A-F
Q412 SSM3K15TE
31BU
DCSW
CN401 Li Battery
D412 1SS301F
SBC
Q409 2SA1955A-F
Q410 SSM3K15TE
Q403 2SJ648-A
Q404 SSM3K15TE
SB2
DCSW
BATT
IC708 XC6204E502PR
AVR
5A
-10V
DCDC
IC403 LM2682MMX
50U
AVR
5UC
IC411 NJM2880U105ZB
IC711 TC75W51FK(FX2/2)
BPF
Q704 2SC4617(S)
AMP
D705 RB706F-40
Rect
IC711 TC75W51FK(FX1/2)
AMP
ASQAPC
ASQDET
IC702 TC75W51FK(FX2/2)
LPF
IC702 TC75W51FK(FX1/2)
LPF
APC
IC703 M62364FP-F(8/8)
DAC
DO
Q701 2SA1832(GR)-F
MUTE
OPT10
SCSW
/AMT
IC704 TC75S51FE(F)
LPF
RXAE
IC707 TC7W53FK(F)
RXEO to Scrambler
RXEI from Scrambler
IC713 TC75W51FK(FX2/2)
SUM
STSW
BEEP
IC703 M62364FP-F(6/8)
DAC
IC703 M62364FP-F(5/8)
DAC
IC408 TC75S51FE(F)
AMP
TC75W66FK-F
EXAMT
IC709 TC7W53FK(F)
MUTE
Q702 SSM3K15TE
SW
TONE
TONESW
OPT9
AI from VGS
IC714 TC7W53FK(F)
OPT6
AO to VGS
IC715 TC75S51FE(F)
AMP
VOX
D706 RB706F-40
Rect
VOX AMP
IC716 TC75W51FK(FX2/2)
IC706 TC75S51FE(F)
LPF
MIC
IC710 TC75W51FK(FX1/2)
SUM
IC712 TC7S66FUF
MUTE
SCSW
DTI from ANI
TXI from Scrambler
TXO to Scrambler
IC716 TC75W51FK(FX1/2)
AMP
AGC
D703,704 RB706F-40
Q705 2SC4738(GR)F
Q706 2SA1832(GR)F
AI from VGS
Q707 2SJ243-A
MUTE
MM
Q4 SSM3K15TE(F)
Q5 2SJ347F
MUTE
MSW
IC705 TC75W51FK(F)(2/2)
LPF
MOD
IC705 TC75W51FK(FX1/2)
LPF
IC710 TC75W51FK(FX2/2)
SUM
DI
IC703 M62364FP-F(1/8)
DAC
IC703 M62364FP-F(2/8)
DAC
TCXOMOD
VCOMOD
CN403
+B
SB1
33A
VOL
ENC1 ENC2 ENC3 ENC4
Volume
Selector knob
CN23
KEY02 KEY01 KEY00 /KEY10 /KEY11
KEY Matrix (6key)
BL_SB
6key Back Light
+B
Q406 2SB1132(Q,R)
Q407 UMG3N
AVR
INAMT
EXAMT
Q405 SSM6N16FE-F
IC409 TC75W66FK-F
IC413 TPA6201A1DRBR
IC412 TPA6201A1DRBR
CN405
EMC MSW SSW PTT PFKEY OPT 5V TXD RXD NC
MSW /UDET /PTT PFKEY
50U
RXD3
Q411 SSM6N16FE-F
IC418 TC7WT125FUF
IC415 TC7SET08FU-F
IC417 TC7WH126FK(2/2)
RTS0
BER_CLK
BER_DATA
BER_EN
TXD0 SCTXD SCRXD RXD0

X53-4430-** (CONT)

EX-3785 Control unit BLOCK DIAGRAM

NX-300-K5, NX-300-K6 Specifications

1. General

Model Name	NX-300-K5, NX-300-K6
Description of Product	UHF DIGITAL TRANSCEIVER
Category	Portable Device
Channel Spacing	25 kHz / 12.5 kHz / 6.25 kHz
Number of Channels:	512 ch
Type of Emission	16K0F3E, 11K0F3E, 8K30F1E, 8K30F1D, 8K30F7W, 4K00F1E, 4K00F1D, 4K00F7W, 4K00F2D
Power Supply Voltage:	7.5V ± 20%
Antenna Impedance:	50 Ω
Operating Temperature:	-30 °C to +60 °C
Dimension:	W 62.5 mm x D 41.8 mm x H 146.4 mm (w/ KNB-47L)
Weight:	375 g (w/ KNB-47L)

2. RECEIVER

Conversion type	Double conversion
Intermediate freq	1st 58.05MHz (Lower) 2nd 450 kHz (Lower)

3. TRANSMITTER

Output Power	5W (Power output continuously variable to 1 W)
Maximum deviation:	± 5 kHz (16K0F3E) / ± 2.5 kHz (11K0F3E)
Frequency stability:	± 1.0 ppm (-30 to +60 °C)
Current consumption:	2.3 A max.