Measuring NXR-800 K4

1 Power up procedure

1.1 Turning on

NXR-800 has no power switch. It operates by ON/OFF of an external power-supply unit. The power cable of the attachment must be both connected with the power-supply unit and NXR-800. The power-supply unit with the ON/OFF function of the output voltage is recommended. After the output voltage of the power-supply unit is set to a necessary voltage, turned on the output voltage of the power-supply unit.

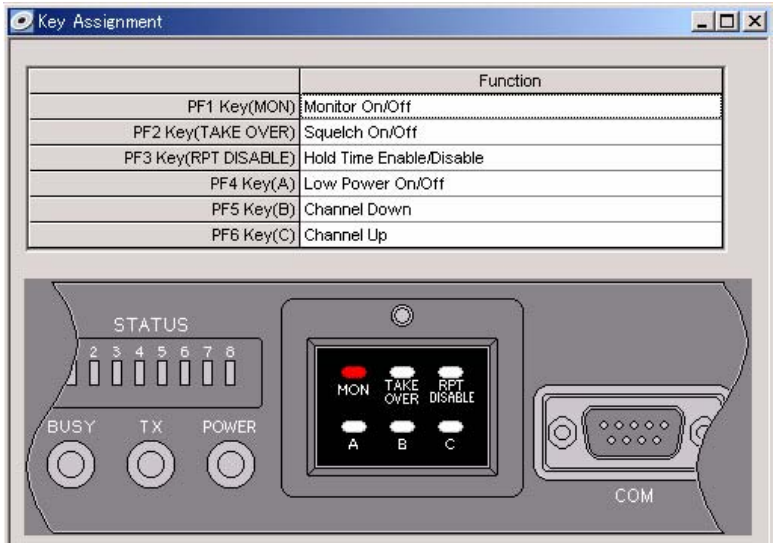
Switch existing in the volume knob on front panel of NXR-800 controls audio output ON/OFF, not a power switch.

When the power supply is turned on, NXR-800 begins CPU start sequence. LED of the front panel begins blinking. LED lights when about one minute passes. All afterwards, 17segments LED begins blinking. When about one minute passes, channel information is displayed in 17 segments LED. At this point, the operation preparation of NXR-800 is completed.

OCXO is built into NXR-800. Built-in OCXO needs warm up time. General measurement should be started 15 minutes later after the power supply turned on. Warm up for about at least 30 minutes when you execute the measurement of the frequency precision.

1.2 Until OCXO and the modulator operate normally

Built-in OCXO can be switched non-active/active. OCXO starts in active mode when the power supply is turned on ("RPT DISABLE" Key LED lighting). Pressing the "RPT DISABLE" Key changes OCXO Non-active/active whenever Key is pressed. ("RPT DISABLE" Key LED is off when OCXO is in non-active mode.)



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OCXO LED (Showing the status of a standard signal) lights green when OCXO is used. When OCXO is not used and the internal standard signal is used, LED will be off. While using the standard signal input

from the outside equipment, LED lights in orange.

The frequency precision is not guaranteed during 30minutes from power supply turned on. Measure it after 30 minutes or more from the power supply turning on of OCXO (At the activated time) when you measure the frequency stability level and the modulation characteristic, etc.

If measuring after the “RPT DSABLE” key pressed (OCXO off), wait at least 1minute after turning the OXCO on again. This will make enough time to settle the built-in frequency of PLL.

There is no need to wait when changing the channel with 'B' or 'C' key.

1.3 About 'E3' display of 17 segments LED

"E3" display might appear to 17segment LED when "RPT DSABLE" key is turned on and off. About one minute passes, "E3" display becomes a usual channel display as previously stated. This is normal action.

2 FPU Settings

2.1 Method of connecting FPU

Test Mode procedure.

-After CPU of NXR-800 starts, use the cross cable to connect the serial port of PC and D-SUB9 pin connector of the front panel. The cross cable must be "Null modem cable with full handshaking"

-Start the software of FPU.

-Select ‘Program/Read Data from the Repeater’ from the menu. Click the ‘Read’ in dialog box.

-The dialog that shows progress appears. When the data reading is completed, click ‘OK’.

-Check if the 17segment LED showing channel information, then select ‘Program/Test Mode’ from the menu.

-'PC' will be displayed in 17segment LED, and the test mode window opens.

-Click ‘Close’ when returning to normal operation.

-All the LED will be off and on, then the channel display blinks in 17segment LED. Afterwards channel display appears normally.

2.2 Adjustment item

NXR-800 can be adjusted from test mode window.

2.2.1 Adjustment of transmitting power

Click 'High Transmit Power' or 'Low Transmit Power' from the list, and push 'Enter'. Or, double click the item in the list. Select the transmit frequency from the tab of Low/Center/High, and adjust the value with slider bar.

The adjusted value is recorded in NXR-800 by clicking 'Apply All' in each tab.

2.2.2 Maximum Deviation adjustment of analog mode

Click ‘Maximum Deviation (Analog)’ from the list, and press 'Enter'. Or, double-click the item. After Analog Wide/Analog Narrow is selected, use the slide bar to adjust the value. Complete adjustment by pressing ‘Apply’ which will record the adjusted value to NXR-800.

It is necessary to do a special procedure to adjust the digital mode. When the adjustment is needed in a digital mode by any chance, it is necessary to readjust in Kenwood. Never adjust the item of 'Maximum Deviation (NXDN)' and 'Deviation', if you don’t know the procedure.

2.3 Sending of CW ID

NXR-800 has the function to send CW ID. It is necessary to keep sending CW ID continuously to measure the emission mask etc. though the transmission usually ends if finished sending the standard number of characters. The setting method when the emission mask is measured in the Very Narrow mode is shown as follows.

2.3.1 CW ID sending method in test mode (Very Narrow measuring).

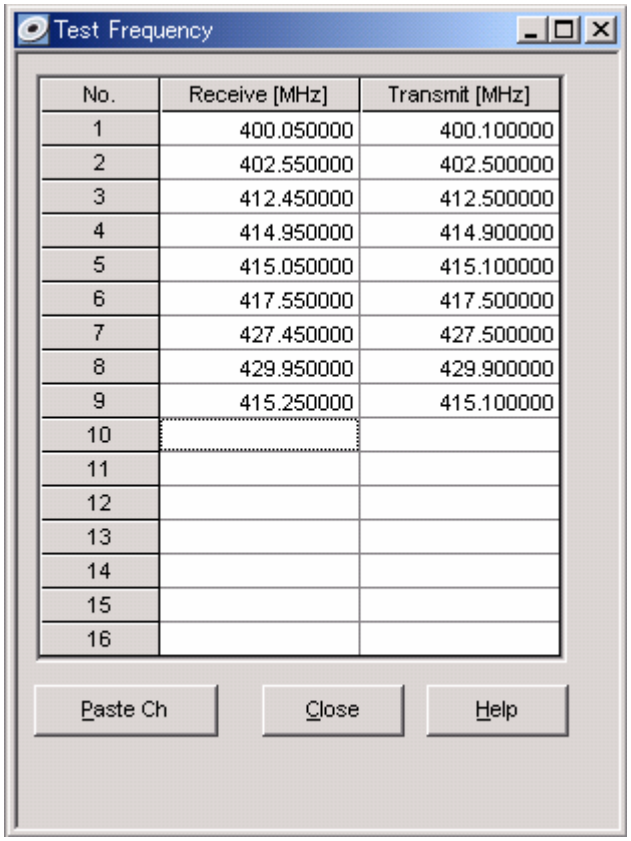
Select "Narrow" from the ‘Wide/Narrow’ pull down menu in the Test Mode window (Narrow/Very Narrow measurement uses common setting window). Click 'CW ID Deviation' from the list of the adjustment item, and press 'Enter'. Or, double-click the item in the list. Check if the ‘Analog Narrow’ shown on the top right corner on the window, then press ‘Transmit’ button to start the transmission.

Narrow Deviation should be adjusted to 1 kHz. If not, use the slide bar in left to adjust the value.

2.4 Test Frequency

Test mode frequency can be selected from the prepared ‘Test Frequency’ table. Edit this table to change the test mode frequency.

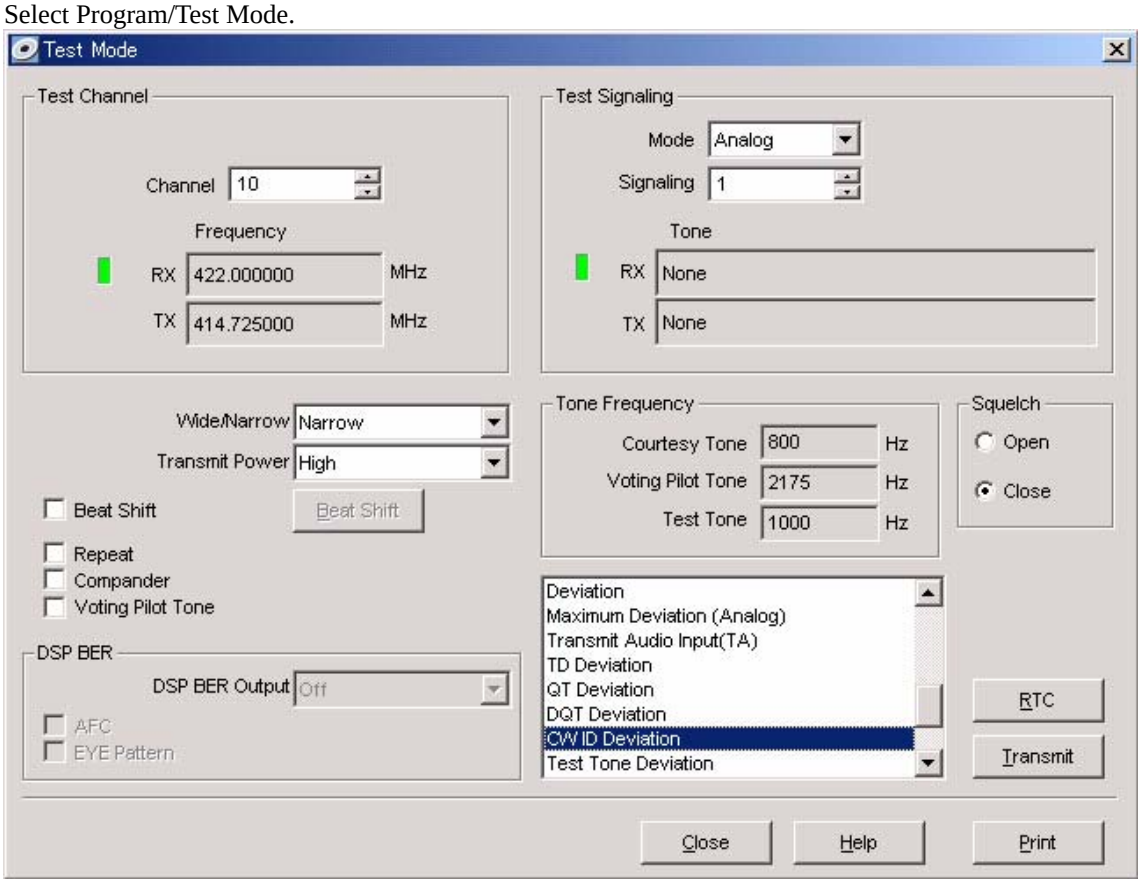
Select ‘Edit/ Test Frequency’ to show Test Frequency table. (Example of K3 type below)



Add user defined frequency to the table then click 'Close' button to close the table. There should be a warning which is meaning "Please write data before entering test mode", then press 'OK'.

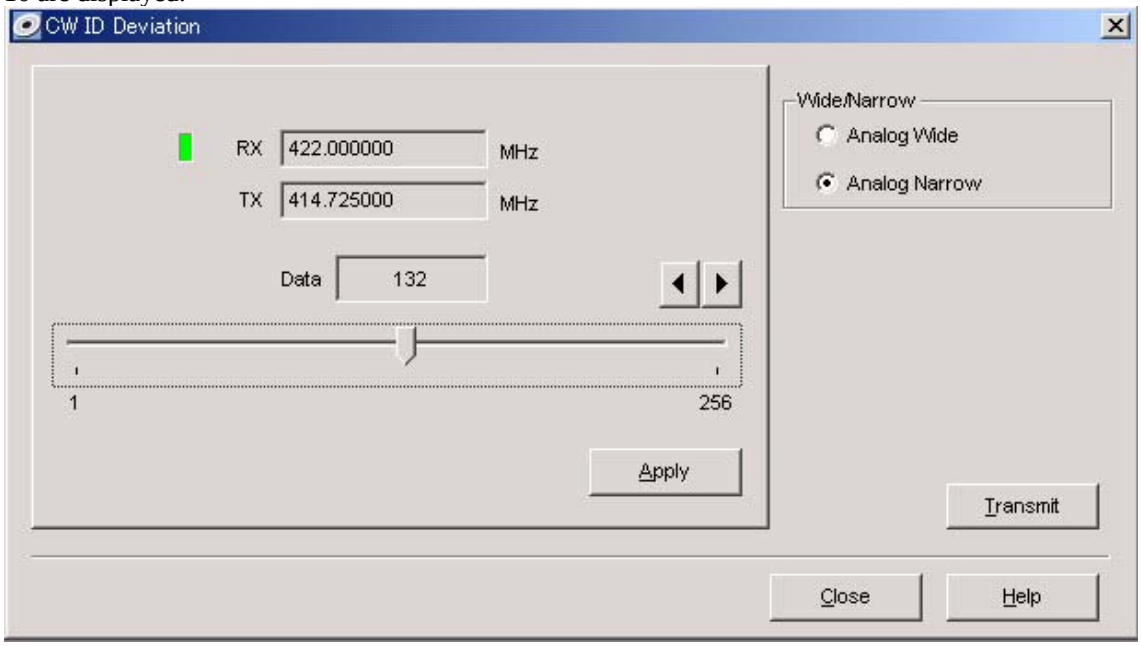
Before entering test mode, select ‘Program/Write Data to the Repeater’ from the menu to apply the fixed data to NXR-800. Changes made in test frequency table will not be applied to NXR-800 without procedure shown above.

Select Program/Test Mode.



The Frequency added to the Test Frequency table can be selected from the Channel selection part on the upper left. Channel selected here is reflected in each adjustment item.

The adjustment screen of CW ID is shown as follows. RX 422.000MHz and TX 414.725MHz of Channel 10 are displayed.



FOR MODEL: NXR-800
<X45-382> FINAL UNIT

CIRCUIT SYMBOL	PART NUMBER	DESCIPTION
D4	Z5W27V	SURGE ABSORBER
D5	DSM3MA1-RPB	DIODE
D6	1SS355	DIODE
D7	02CZ5.6(Y)F	ZENER DIODE
D9	HSB88WS	DIODE
D10	HSB88WS	DIODE
D11	L7091CER	DIODE
D14	L7091CER	DIODE
D15	L7091CER	DIODE
D16	L7091CER	DIODE
D19	02CZ4.7(Y)F	ZENER DIODE
IC1	LTC6101BIS5-F	ANALOGUE IC
IC2	NJM2904E-ZB	ANALOGUE IC
IC3	TA78L05FF	MOS-IC
IC4	NJM2904E-ZB	ANALOGUE IC
IC5	NJM2904E-ZB	ANALOGUE IC
IC6	NJM2904E-ZB	ANALOGUE IC
IC7	S-8130AC	MOS-IC
IC8	NJM2904E-ZB	ANALOGUE IC
IC9	S24CS02AFJTBG	ROM IC
IC10	RA13H3340M131	MOS-IC
IC11	NJM7808FA-ZB	BI-POLAR IC
IC12	NJM7805FA-ZB	BI-POLAR IC
IC15	NJM2904E-ZB	ANALOGUE IC
IC701	NJM78L05UA-ZB	BI-POLAR IC
IC702	LTC1046IS8	MOS-IC
IC703	TK72130CS	BI-POLAR IC
Q2	SSM3K15TE(F)	FET
Q3	2SA1362-F(GR)	TRANSISTOR
Q4	2SJ506-E(S)	FET
Q5	SSM3K15TE(F)	FET
Q6	SSM3K15TE(F)	FET
Q8	SSM3K15TE(F)	FET
Q14	SSM3K15TE(F)	FET

FOR MODEL: NXR-800
<X55-310> RX UNIT

CIRCUIT SYMBOL	PART NUMBER	DESCIPTION
D1	HSC119	DIODE
D2	HSC119	DIODE
D3	1SV283F	VARIABLE CAPACITANCE DIODE
D4	1SV283F	VARIABLE CAPACITANCE DIODE
D5	1SV283F	VARIABLE CAPACITANCE DIODE
D6	1SV283F	VARIABLE CAPACITANCE DIODE
D7	1SV283F	VARIABLE CAPACITANCE DIODE
D8	1SV283F	VARIABLE CAPACITANCE DIODE
D9	JDP4P02U	DIODE
D10	JDP4P02U	DIODE
D11	KV1470-G	VARIABLE CAPACITANCE DIODE
D12	1SV283F	VARIABLE CAPACITANCE DIODE
D13	JDP4P02U	DIODE
D14	JDP4P02U	DIODE
D15	DAN235E	DIODE
D16	DAN235E	DIODE
D17	MA3J742	DIODE
D18	MA3J742	DIODE
D19	DAN235E	DIODE
D20	DAN235E	DIODE
D21	B30-2230-05	LED
IC4	TA75S01F-F	MOS-IC
IC5	ADF4111BCP7	MOS-IC
IC6	LMC7101BIM5	MOS-IC
IC7	AD9835BRUZ	MOS-IC
IC8	NJU6368PF1	MOS-IC
IC9	UPB1509GV	BI-POLAR IC
IC10	TK11230CMCL-G	BI-POLAR IC
IC11	ADF4111BCP7	MOS-IC
IC12	TA31137FNG	MOS-IC
IC13	AD607Z	BI-POLAR IC
IC14	AD8051ART	ANALOGUE IC
IC15	NJM78L05UA-ZB	BI-POLAR IC
IC16	NJM78L05UA-ZB	BI-POLAR IC
IC17	NJM78M05DL1AZB	ANALOGUE IC
IC18	NJM78M05DL1AZB	ANALOGUE IC
IC19	NJM78M05DL1AZB	ANALOGUE IC
IC20	NJM4558E-ZB	ANALOGUE IC
IC22	XC6204B332M	MOS-IC
IC23	BH2220FVM	ANALOGUE IC
IC24	NJM7808FA-ZB	BI-POLAR IC
IC25	NJM7808FA-ZB	BI-POLAR IC
IC26	NJM2386ADL3-09	ANALOGUE IC
IC27	NJM2386ADL3-09	ANALOGUE IC
IC28	AD1582	ANALOGUE IC
IC29	NJM2732V	BI-POLAR IC
IC30	AD7908BRU	MOS-IC
IC31	S24CS02AFJTBG	ROM IC
IC32	NJM2732V	BI-POLAR IC
IC33	LMC7101BIM5	MOS-IC

IC35	LM50BIM3/NOPB	MOS-IC
Q1	2SC5337	TRANSISTOR
Q2	2SC4116(BL)F	TRANSISTOR
Q3	2SC4617(R)	TRANSISTOR
Q4	2SC4116(BL)F	TRANSISTOR
Q5	2SC4617(R)	TRANSISTOR
Q6	2SC4116(BL)F	TRANSISTOR
Q7	2SK2539-7	FET
Q8	2SK2539-7	FET
Q9	2SC4116(BL)F	TRANSISTOR
Q10	2SC4116(BL)F	TRANSISTOR
Q11	2SC4116(BL)F	TRANSISTOR
Q12	2SC4617(R)	TRANSISTOR
Q13	2SA1832F	TRANSISTOR
Q14	SSM3K15TE(F)	FET
Q15	SSM3K15TE(F)	FET
Q16	2SC3356-A(R24)	TRANSISTOR
Q17	2SC3356-A(R24)	TRANSISTOR
Q18	RD01MUS1-T113	FET
Q19	RD01MUS1-T113	FET
Q20	RD01MUS1-T113	FET
Q21	2SC4725	TRANSISTOR
Q22	2SC4617(R)	TRANSISTOR
Q23	2SC3356-A(R24)	TRANSISTOR
Q24	2SK508NV(K52)	FET
Q25	SSM3J01F	FET
Q26	SSM3K15TE(F)	FET
Q27	2SC4116(BL)F	TRANSISTOR
Q28	3SK317-E	FET
Q29	3SK317-E	FET
Q30	2SC4617(R)	TRANSISTOR
Q31	SSM3K15TE(F)	FET
Q32	SSM3J01F	FET
Q33	2SC4725	TRANSISTOR
Q34	2SA1832F	TRANSISTOR
Q35	2SC4725	TRANSISTOR
Q36	2SC4725	TRANSISTOR
Q37	SSM3K15TE(F)	FET
Q38	2SC4725	TRANSISTOR
Q39	2SC4617(R)	TRANSISTOR
Q40	2SC4617(S)	TRANSISTOR
Q45	SSM3K15TE(F)	FET
Q50	SSM3K15TE(F)	FET
Q51	SSM3K15TE(F)	FET
Q52	2SJ484	FET
Q53	2SC4725	TRANSISTOR
Q55	SSM3K15TE(F)	FET
Q56	SSM3K15TE(F)	FET
Q57	DTA144EE	TRANSISTOR
Q58	SSM3K15TE(F)	FET
Q59	SSM3K15TE(F)	FET

FOR MODEL: NXR-800
<X56-312> TX UNIT

CIRCUIT SYMBOL	PART NUMBER	DESCIPTION
D101	1SV283F	VARIABLE CAPACITANCE DIODE
D102	1SV283F	VARIABLE CAPACITANCE DIODE
D106	1SV278F	VARIABLE CAPACITANCE DIODE
D107	1SV283F	VARIABLE CAPACITANCE DIODE
D108	1SV283F	VARIABLE CAPACITANCE DIODE
D112	1SV278F	VARIABLE CAPACITANCE DIODE
D201	HSM88AS-E	DIODE
D202	B30-2230-05	LED
D301	B30-2230-05	LED
D401	HSM88AS-E	DIODE
D402	HSM88AS-E	DIODE
D403	HSM88AS-E	DIODE
D404	JDP4P02U	DIODE
D405	JDP4P02U	DIODE
D406	HSC119	DIODE
D407	HSC119	DIODE
D408	HSM88AS-E	DIODE
D409	CSA70-401L	SURGE ABSORBER
D601	JDP4P02U	DIODE
D602	JDP4P02U	DIODE
D603	UDZS3.0B	ZENER DIODE
D604	UDZS3.0B	ZENER DIODE
D605	UDZS3.0B	ZENER DIODE
D606	UDZS3.0B	ZENER DIODE
D920	B30-2019-05	LED
D921	B30-2108-05	LED
D922	B30-2019-05	LED
D923	B30-2056-05	LED
D924	B30-2019-05	LED
D925	B30-2171-05	LED
D926	B30-2171-05	LED
D927	B30-2171-05	LED
D928	B30-2171-05	LED
D929	B30-2171-05	LED
D930	B30-2171-05	LED
D931	B30-2171-05	LED
D932	B30-2171-05	LED
D933	HSM88AS-E	DIODE
D934	HSM88AS-E	DIODE
D935	1SS355	DIODE
D936	1SS355	DIODE
D960	PSA05-11SRWA	LED
D961	PSA05-11SRWA	LED
IC101	LMX2352TMX/NP	ANALOGUE IC
IC102	LMC7101BIM5	MOS-IC
IC104	NJM2386ADL3-09	ANALOGUE IC
IC201	NJM2904E-ZB	ANALOGUE IC
IC202	AD9835BRUZ	MOS-IC
IC301	NJM2732V	BI-POLAR IC
IC302	NJU6368PF1	MOS-IC

IC303	ADF4001BRUZ	MOS-IC
IC304	M62364FP-F	MOS-IC
IC305	NJM2732V	BI-POLAR IC
IC306	LMC7101BIM5	MOS-IC
IC307	NJU6368PF1	MOS-IC
IC308	NJM2732V	BI-POLAR IC
IC401	LMC7101BIM5	MOS-IC
IC404	ADF4001BRUZ	MOS-IC
IC405	TC75S59F-F	MOS-IC
IC406	TC75S59F-F	MOS-IC
IC407	NJU6368PF1	MOS-IC
IC408	TA75S01F-F	MOS-IC
IC409	TA75S01F-F	MOS-IC
IC601	AD9835BRUZ	MOS-IC
IC602	NJU6368PF1	MOS-IC
IC603	XC6204B332M	MOS-IC
IC701	BH2220FVM	ANALOGUE IC
IC702	S24CS02AFJTBG	ROM IC
IC703	BU4094BCFV	MOS-IC
IC704	NJM78M08DL1AZB	ANALOGUE IC
IC705	NJM78M05DL1AZB	ANALOGUE IC
IC706	NJM78M05DL1AZB	ANALOGUE IC
IC801	AD1582	ANALOGUE IC
IC802	AD5312BRM	MOS-IC
IC803	AD7908BRU	MOS-IC
IC804	LM50BIM3/NOPB	MOS-IC
IC805	TC7SET126FU-F	MOS-IC
IC806	TC7SET126FU-F	MOS-IC
IC807	NJM78M05DL1AZB	ANALOGUE IC
IC808	NJM7808FA-ZB	BI-POLAR IC
IC809	NJM7808FA-ZB	BI-POLAR IC
IC920	TC7SET126FU-F	MOS-IC
IC921	TC7SET126FU-F	MOS-IC
IC922	TC7SET126FU-F	MOS-IC
IC923	BU4094BCFV	MOS-IC
IC924	BU4094BCFV	MOS-IC
IC925	BU4094BCFV	MOS-IC
IC926	NJM2732V	BI-POLAR IC
IC960	BU4094BCFV	MOS-IC
IC961	BU4094BCFV	MOS-IC
IC962	BU4094BCFV	MOS-IC
IC963	BU4094BCFV	MOS-IC
Q101	SSM3K15TE(F)	FET
Q102	2SK2539-7	FET
Q103	2SK2539-7	FET
Q104	2SC3356-A(R24)	TRANSISTOR
Q105	2SC4116(BL)F	TRANSISTOR
Q106	2SC3356-A(R24)	TRANSISTOR
Q107	2SC4116(BL)F	TRANSISTOR
Q108	2SC4116(BL)F	TRANSISTOR
Q109	2SA1832F	TRANSISTOR
Q110	SSM3K15TE(F)	FET
Q201	2SC3356-A(R24)	TRANSISTOR
Q202	2SC5337	TRANSISTOR

Q203	RD01MUS1-T113	FET
Q204	SSM3K15TE(F)	FET
Q205	SSM3J01F	FET
Q206	SSM3K15TE(F)	FET
Q210	SSM3K15TE(F)	FET
Q211	2SC4617(R)	TRANSISTOR
Q212	2SC4617(R)	TRANSISTOR
Q213	2SC4617(R)	TRANSISTOR
Q301	SSM3K15TE(F)	FET
Q302	SSM3K15TE(F)	FET
Q303	2SA1832F	TRANSISTOR
Q304	2SC4617(R)	TRANSISTOR
Q305	2SC4617(R)	TRANSISTOR
Q307	2SC4617(R)	TRANSISTOR
Q401	2SC4617(R)	TRANSISTOR
Q402	2SC4617(R)	TRANSISTOR
Q405	SSM3K15TE(F)	FET
Q407	SSM3K15TE(F)	FET
Q408	SSM3K15TE(F)	FET
Q409	SSM3K15TE(F)	FET
Q410	2SA1832F	TRANSISTOR
Q412	2SC4617(R)	TRANSISTOR
Q413	SSM3K15TE(F)	FET
Q414	SSM3K15TE(F)	FET
Q415	2SC4617(R)	TRANSISTOR
Q416	2SC4617(R)	TRANSISTOR
Q417	2SC4617(R)	TRANSISTOR
Q418	2SC4617(R)	TRANSISTOR
Q419	2SC4617(R)	TRANSISTOR
Q420	3SK317-E	FET
Q421	SSM6L05FU-F	FET
Q422	RD01MUS1-T113	FET
Q423	SSM6L05FU-F	FET
Q424	SSM3K15TE(F)	FET
Q425	RD01MUS1-T113	FET
Q426	SSM3J01F	FET
Q428	SSM3K15TE(F)	FET
Q429	SSM3K15TE(F)	FET
Q430	3SK317-E	FET
Q431	3SK317-E	FET
Q601	SSM3J01F	FET
Q602	SSM3K15TE(F)	FET
Q603	2SC4617(R)	TRANSISTOR
Q604	SSM3K15TE(F)	FET
Q605	SSM3J01F	FET
Q606	2SC4617(R)	TRANSISTOR
Q607	SSM3K15TE(F)	FET
Q608	SSM3K15TE(F)	FET
Q609	SSM3K15TE(F)	FET
Q701	SSM3K15TE(F)	FET
Q702	SSM3K15TE(F)	FET
Q920	UMG1N	TRANSISTOR
Q921	UMG1N	TRANSISTOR
Q922	UMG1N	TRANSISTOR

Q923	UMG1N	TRANSISTOR
Q924	UMG1N	TRANSISTOR
Q925	UMG1N	TRANSISTOR
Q926	UMG1N	TRANSISTOR
Q927	UMG1N	TRANSISTOR
Q928	UMG1N	TRANSISTOR
Q929	UMG1N	TRANSISTOR
Q930	UMG1N	TRANSISTOR
Q931	2SC4116(Y)F	TRANSISTOR
Q932	2SA1586(Y)F	TRANSISTOR
Q960	UMG1N	TRANSISTOR
Q961	UMG1N	TRANSISTOR
Q962	UMG1N	TRANSISTOR
Q963	UMG1N	TRANSISTOR
Q964	UMG1N	TRANSISTOR
Q965	UMG1N	TRANSISTOR
Q966	UMG1N	TRANSISTOR
Q967	UMG1N	TRANSISTOR
Q968	UMG1N	TRANSISTOR
Q969	UMG1N	TRANSISTOR
Q970	UMG1N	TRANSISTOR
Q971	UMG1N	TRANSISTOR
Q972	UMG1N	TRANSISTOR
Q973	UMG1N	TRANSISTOR
Q974	UMG1N	TRANSISTOR
Q975	UMG1N	TRANSISTOR
Q976	UMG1N	TRANSISTOR

FOR MODEL: NXR-800
<X53-413> CONTROL UNIT

CIRCUIT SYMBOL	PART NUMBER	DESCIPTION
D1	CMS05-Q	DIODE
D2	CMS05-Q	DIODE
D3	DA204U	DIODE
D4	DA204U	DIODE
D5	1SS355	DIODE
D6	02DZ18F-X	ZENER DIODE
D7	DA204U	DIODE
D8	DA204U	DIODE
D9	DA204U	DIODE
D10	DA204U	DIODE
D11	DA204U	DIODE
D12	1SS355	DIODE
D13	02DZ18F-X	ZENER DIODE
D14	DA204U	DIODE
D15	DA204U	DIODE
D16	DA204U	DIODE
D17	DA204U	DIODE
D18	DA204U	DIODE
D20	DA204U	DIODE
D23	DA204U	DIODE
D24	SMD185F-2	VARISTOR
D25	MINISMDC020F	VARISTOR
D26	1SS388F	DIODE
D28	1SS355	DIODE
D29	02DZ18F-X	ZENER DIODE
D30	1SS355	DIODE
D31	02DZ18F-X	ZENER DIODE
D32	1SS355	DIODE
D33	02DZ18F-X	ZENER DIODE
D36	DA204U	DIODE
D37	DA204U	DIODE
D38	1SS388F	DIODE
D39	1SS388F	DIODE
IC1	BU4094BCFV	MOS-IC
IC2	BU4053BCFV	MOS-IC
IC3	BU4053BCFV	MOS-IC
IC4	AK4550VTP	MOS-IC
IC5	NJM2732V	BI-POLAR IC
IC6	XC6209B332PR	MOS-IC
IC7	TA75S01F-F	MOS-IC
IC8	M62364FP-F	MOS-IC
IC9	NJM2734V	BI-POLAR IC
IC10	NJM2340RB1	MOS-IC
IC11	NJM2340RB1	MOS-IC
IC12	NJM2732V	BI-POLAR IC
IC14	BU4053BCFV	MOS-IC
IC15	BA33BC0FP	MOS-IC
IC16	XC6209B502PR	MOS-IC
IC17	AL008D90BFI02	ROM IC
IC18	XC6201P182MR	MOS-IC

IC19	NJM2732V	BI-POLAR IC
IC20	NJM2734V	BI-POLAR IC
IC21	NJM2734V	BI-POLAR IC
IC22	BU4094BCFV	MOS-IC
IC23	TC7SH00FU-F	MOS-IC
IC25	TC7S66FUF	MOS-IC
IC27	TC7SET126FU-F	MOS-IC
IC28	TC7SH126FU-F	MOS-IC
IC29	LA4425A	MOS-IC
IC30	TC7SH00FU-F	MOS-IC
IC31	TC7MH4040FK-F	MOS-IC
IC32	TC7SH126FU-F	MOS-IC
IC33	TC7SH126FU-F	MOS-IC
IC34	M30627FHPGP	MICROPROCESSOR IC
IC35	S24CS02AFJTBG	ROM IC
IC36	TC7MET541AFK	MOS-IC
IC37	320VC5402PGE	MICROPROCESSOR IC
IC38	TC7SET08FU-F	MOS-IC
IC39	TC7SH125FU-F	MOS-IC
IC40	TC7SH126FU-F	MOS-IC
IC41	TC7SH08FU-F	MOS-IC
IC50	TC7SH08FU-F	MOS-IC
Q1	DTC114EUA	TRANSISTOR
Q2	2SJ506-E(S)	FET
Q3	2SJ506-E(S)	FET
Q4	2SC4738F	TRANSISTOR
Q5	2SC4738F	TRANSISTOR
Q6	DTC363EU	TRANSISTOR
Q7	DTC114EUA	TRANSISTOR
Q8	DTC114EUA	TRANSISTOR
Q9	2SJ506-E(S)	FET
Q10	2SC4738F	TRANSISTOR
Q11	2SD2114K(W)	TRANSISTOR
Q12	2SC4738F	TRANSISTOR
Q13	2SD2114K(W)	TRANSISTOR
Q14	2SC4116(Y)F	TRANSISTOR
Q15	2SA1586(Y)F	TRANSISTOR
Q16	2SC4116(Y)F	TRANSISTOR
Q17	2SA1586(Y)F	TRANSISTOR
Q18	2SK1830F	FET
Q19	HN1L02FU(F)	FET
Q20	2SA1955A-F	TRANSISTOR
Q21	DTC144EUA	TRANSISTOR
Q22	2SA1955A-F	TRANSISTOR
Q23	DTC144EUA	TRANSISTOR
Q25	DTC144EUA	TRANSISTOR
Q26	DTC144EUA	TRANSISTOR
Q27	2SD2114K(W)	TRANSISTOR
Q28	2SD2114K(W)	TRANSISTOR
Q29	2SD2114K(W)	TRANSISTOR

FOR MODEL: NXR-800
<X53-414> CONTROL UNIT

CIRCUIT SYMBOL	PART NUMBER	DESCIPTION
D300	1SS388F	DIODE
D301	MA2S111-F	DIODE
D701	1SS388F	DIODE
D702	1SS355	DIODE
IC300	TC7SET126FU-F	MOS-IC
IC301	TC7SET126FU-F	MOS-IC
IC302	SN65HVD485ED	MOS-IC
IC303	BU4829FVE	MOS-IC
IC304	TC7SH125FU-F	MOS-IC
IC305	XC6209B332PR	MOS-IC
IC306	BA15BC0FP	MOS-IC
IC307	XC6201P152PR	MOS-IC
IC308	XC61CN2702N	MOS-IC
IC309	AK4550VTP	MOS-IC
IC312	ADCS7476AIMF	MOS-IC
IC313	TC7WU04FK-F	MOS-IC
IC314	AL008D90BFI02	ROM IC
IC315	ADF4001BRUZ	MOS-IC
IC318	TC7SH126FU-F	MOS-IC
IC319	TC7SET126FU-F	MOS-IC
IC320	TC7SET126FU-F	MOS-IC
IC321	TC7SET126FU-F	MOS-IC
IC323	320VC5416ZU12	MICROPROCESSOR IC
IC324	320VC5416ZU12	MICROPROCESSOR IC
IC325	M30627FHPGP	MICROPROCESSOR IC
IC327	TC7SH08FU-F	MOS-IC
IC329	BA33DD0WT	MOS-IC
IC330	TC7SH126FU-F	MOS-IC
IC700	62167DV30LL55	SRAM IC
IC701	RV5C386A	MOS-IC
IC702	29PL127JKCDC	ROM IC
IC703	7760BP200ADV	MICROPROCESSOR IC
IC704	48LC8M16A2P75I	DRAM IC
IC705	ADM3202ARUZ	MOS-IC
IC707	48LC8M16A2P75I	DRAM IC
IC708	BU4829FVE	MOS-IC
IC709	TC7SH126FU-F	MOS-IC
IC710	TC7SH00FU-F	MOS-IC
IC711	TC7SH00FU-F	MOS-IC
IC712	TC7SH32FU-F	MOS-IC
IC713	TC7SH32FU-F	MOS-IC
IC714	TC7MA244FK	MOS-IC
IC715	TC7MA244FK	MOS-IC
IC716	TC7MA244FK	MOS-IC
IC717	TC7MA245FK	MOS-IC
IC718	TC7MA245FK	MOS-IC
IC719	LAN91C111I-NU	MOS-IC
IC720	AT93C4610SU1.8	ROM IC
IC721	TC7SH08FU-F	MOS-IC
IC722	TC7SH32FU-F	MOS-IC

IC723	TC7SH00FU-F	MOS-IC
IC724	TC7SH125FU-F	MOS-IC
IC725	TC7SH126FU-F	MOS-IC
IC726	TC7SH08FU-F	MOS-IC
IC727	TC7SH126FU-F	MOS-IC
IC728	TC7SH126FU-F	MOS-IC
Q300	2SC4738F	TRANSISTOR
Q301	DTC114EUA	TRANSISTOR
Q302	2SA1955A-F	TRANSISTOR
Q303	DTA144EUA	TRANSISTOR
Q304	2SC4738F	TRANSISTOR
Q305	2SC4738F	TRANSISTOR
Q307	2SC4738F	TRANSISTOR
Q308	2SC4738F	TRANSISTOR
Q309	SSM6N16FE-F	FET
Q700	2SC4738F	TRANSISTOR
Q702	2SC4738F	TRANSISTOR
Q704	2SC4738F	TRANSISTOR
Q705	2SC4738F	TRANSISTOR
Q706	DTC114EUA	TRANSISTOR
Q707	DTC144EUA	TRANSISTOR

FOR MODEL: KXK-3
<X42-328> OCXO UNIT

CIRCUIT SYMBOL	PART NUMBER	DESCIPTION
D5	JDP4P02U	DIODE
D8	HSM88AS-E	DIODE
IC3	AD5231BRU10	MOS-IC
IC4	LTC6101BIS5-F	ANALOGUE IC
IC6	TC75S59F-F	MOS-IC
IC9	NJM7805FA-ZB	BI-POLAR IC
IC10	TC7SHU04F-F	MOS-IC
IC11	S24CS02AFJTBG	ROM IC
IC12	AD7418ARMZ	ANALOGUE IC
Q2	SSM3K15TE(F)	FET
Q3	SSM3K15TE(F)	FET
Q4	SSM3K15TE(F)	FET
Q5	2SC4617(R)	TRANSISTOR
Q6	2SC4617(R)	TRANSISTOR
Q13	SSM6L05FU-F	FET
Q14	SSM3K15TE(F)	FET
Q15	2SJ484	FET
Q16	SSM3K15TE(F)	FET
Q17	SSM3K15TE(F)	FET

1. Outline

The NXR-800 is a UHF repeater operating in the 380~ 400MHz frequency range. (Receiver frequency range is 380~400MHz.)

2. Transmitter unit

The transmitter unit (X56-312 A/3) consists of the following circuit.

(1) Internal/external reference circuit

(2) Transmitter reference 19.2MHz PLL circuit

(3) Transmitter Modulation 19.2MHz PLL circuit

(4) Transmitter DDS circuit

(5) Transmitter main PLL circuit

(6) Driver circuit

(7) Modulation level adjustment circuit

(8) AVR circuits

(9) Other circuits

2.1 Internal/external reference circuit

The internal/external reference circuit automatically switches signals used as reference signals among the 5.99MHz internal DDS, the 10MHz external reference signal and the 10MHz OCXO unit.

If no OCXO unit is installed, and there is no external reference signal, the 5.99MHz internal DDS (IC601) is selected as the reference signal.

If the OCXO unit is installed and there is no external reference signal, the 10MHz OCXO unit is selected as the reference signal.

If an external reference signal (CN408/ 10MHz/ 0dBm or higher/ Zin=50Ω) is input, the external reference signal is selected as the reference signal irrespective of an existing OCXO unit.

The internal/external reference circuit consists of Q419, Q418, D401, D403, D404, Q430, Q422, D601 and IC407.

The DDS circuit consists of X601, IC602, IC601, Q606, CF601, Q603 and D602.

If either the OCXO 10MHz or external reference 10MHz is selected as the reference signal, the reference output terminal outputs the reference signal (CN403/ 10MHz/ +9dBm/ Zout=50Ω).

This circuit consists of Q431, Q420 and Q425.

2.2 Transmitter reference 19.2MHz PLL circuit

The transmitter reference 19.2MHz PLL circuit produces a reference frequency signal for the transmitter modulation 19.2MHz PLL circuit, the Receiver unit (X55-310) Receiver DDS circuit and the Control Unit (X53-414) DSP IC.

This circuit consists of Q401, Q402, Q412, Q415, Q416, Q417, X401, IC401, and IC407.

The 5.99MHz or 10MHz signal produced by the internal/ external reference circuit is amplified by IC407 and supplied to the PLL IC (IC404) reference signal pin.

The VCXO (X401) signal enters buffer amp Q417 and is amplified by Q415.

The higher harmonic wave is attenuated by LPF and returns to IC404. Its phase is compared with that of the reference frequency 10kHz.

The phase difference signal produced by the comparing phase is converted to a DC voltage by a lag-lead type loop filter.

This DC voltage is input to the X401 control voltage terminal for controlling the VCXO oscillating frequency.

The DC voltage passes through the IC401 operational amplifier, and is output as a voltage signal (CVT-REF) for monitoring the reference 19.2MHz PLL circuit lock voltage.

The stabilized 19.2MHz reference oscillating signal enters the Q417 buffer amplifier and is amplified by Q412 and Q416.

The higher harmonic wave is attenuated by LPF, fed to IC302 and used as the reference frequency signal for the transmitter modulation 19.2MHz PLL circuit.

The 19.2MHz reference oscillating signal is also used as the reference signal for the receiver unit (X55-310) and control unit (X53-414).

It enters the Q417 buffer amplifier for the receiver unit (X55-310) and is amplified by Q401. The higher harmonic wave is attenuated by LPF and is output from CN406.

It enters the Q417 buffer amplifier for the control unit (X53-414) and is amplified by Q402.

The higher harmonic wave is attenuated by LPF and is output from CN405.

2.3 Transmitter Modulation 19.2MHz PLL circuit

The transmitter modulation 19.2MHz PLL circuit produces the reference frequency signal for the Transmitter DDS circuit and modulates the low-frequency components.

The circuit consists of IC302, IC303, IC306, X301, Q304, Q305, and Q307.

The signal generated by the VCXO (X301) is fed to the buffer amplifier Q307.

The VCXO (X301) signal enters buffer amplifier Q307 and is amplified by Q305.

The higher harmonic wave is attenuated by the LPF and returns to IC303.

Its phase is compared with that of the reference frequency 5kHz.

The phase difference signal produced by the comparing phase is converted to a DC voltage by a lag-lead type loop filter.

This DC voltage is input to the IC305 invert amplifier (B/2) and is synthesized with the modulating signal.

This DC voltage is input to the X301 control voltage terminal for controlling the VCXO oscillating frequency 19.2MHz.

The DC voltage passes through the IC401 operational amplifier, and is output as a voltage signal (CVT-MOD) for monitoring the modulating 19.2MHz PLL circuit lock voltage.

The 19.2MHz oscillating signal is fed to the Q307 buffer amplifier and is amplified by Q304.

The higher harmonic wave is attenuated by the LPF, fed to IC307, and is used as the reference frequency signal of the transmitter DDS circuit.

2.4 Transmitter DDS circuit

The transmitter DDS circuit produces the transmitter main PLL reference frequency signal 4.5MHz.

This circuit consists of IC307, IC202, CF201, Q210, Q211, Q212 and Q213.

The 19.2MHz signal from the transmitter modulation 19.2MHz PLL circuit is amplified by IC307 and supplied to the IC202 reference signal pin.

IC202 produces the transmitter main PLL 4.5MHz reference frequency signal based on 19.2MHz on signal.

The spurious 4.5MHz reference frequency signal output by IC202 is attenuated by CF1 or LPF, amplified by Q211, Q212, and Q213, and fed to the transmitter main PLL.

The comparison frequency of the transmitter main PLL is 100kHz and the PLL frequency step is 100kHz.

However, minute frequency step such as 2.5kHz and 3.125kHz because the DDS output frequency is variable.

2.5 Transmitter main PLL circuit

The transmitter main PLL circuit consists of the VCO (Q102 and Q103), PLL IC (IC101) and IC102 and produces the transmitter frequency signal.

The VCO Q102 produces transmitter frequencies from 380.000MHz to 389.995MHz.

The VCO Q103 produces transmitter frequencies from 390.000MHz to 400.000MHz.

The signal produced by the VCO (Q102 or Q103) is fed to the buffer amplifier and is amplified by Q106.

The higher harmonic wave is attenuated by LPF and returns to the PLL IC (IC101).

IC101 divides the VCO oscillating frequency signal and transmitter PLL reference signal (4.5MHz), and compares the phase with the 100kHz comparison frequency.

The phase difference signal produced by the comparing phase is converted to a DC voltage by a lag-lead type loop filter.

The DC signal is applied to varicaps D101, D102, D107, and D108 to lock the VCO oscillator frequency with the desired oscillator frequency.

At the same time, the DC signal passes through the IC102 operational amplifier for monitoring the transmitter main PLL lock voltage.

The output from the VCO passes through the buffer amplifier Q104 and is supplied to the drive circuit.

2.6 Driver circuit

The driver circuit amplifies the transmitter frequency signal to the level required for input to the Final Unit (X45-382 A/5).

This circuit consists of RF amplifiers Q201, Q202, Q203, switches Q204, Q205 and Q206, and operating amplifier IC201.

DC switches Q204, Q205, and Q206 turns the power supply voltage of RF amplifiers Q201, Q202, and Q203 on and off.

Divided VCOs signal is attenuated by attenuators R201, R202 and R203, by approximately 7dB.

So, the input level to Q201 is approximately -12dBm (63μW).

Q201 amplifies it by approximately 12dB. So, the output level is approximately 0dBm (1mW).

The Q201 output is amplified by Q202 by approximately 10dB.

Furthermore, it is amplified by Q203 by approximately 10dB.

The Q203 output is approximately +20dBm (100mW).

This output signal (driver output power) is fed to driver output connector CN802 and is connected to the Final Unit (X45-382 A/5).

Driver output power level is controlled by D201 and IC201. D201 rectifies a part of the Q203 output power and converts it to DC voltage. It is compared with the control voltage (D_PC) by the operation amplifier IC201. The Q203 Gate terminal voltage is controlled for the stabilizing Q203 output power to be +20dBm.

2.7 Modulation level adjustment circuit

The level adjustment circuit adjusts the modulation signal level to provide the required level of modulation. This circuit consists of IC301, IC304, IC305, and IC308.

The audio signal comes from the Control Unit (X53-413) through pin 4. The modulating signal is input to IC304 from this.

IC304 is an electronic volume control IC.

The modulation waveform balance adjustment, maximum AF Dev. change, and adjustment are performed according to data from the MPU using the FPU.

The modulation signal is produced by the modulating low-pitched tone to the transmitter modulation 19.2MHz PLL circuit and adds the high-pitched modulation to the transmitter main PLL.

IC305 is an inverting amplifier (B/2) for inverting the amplification (A/2) of the modulating signal and synthesizing the VCXO (X301) control voltage and modulating signal.

IC301 is a reference voltage generator (A/2) in modulating level adjusting circuit and non-inverting amplification of modulating signal with a cutoff signal of approximately 9kHz (B/2).

2.8 AVR circuit

IC104, IC603, IC704, IC705, IC706, IC807, IC808 and IC809 are AVR ICs.

Each circuit contains its own power regulator IC to maintain isolation between circuits.

2.9 Other circuits

In addition, IC107 is an EEPROM. The transmitter adjustment data adjusted for each unit is written into the EEPROM. If the unit is installed in another set, it is not necessary to adjust it again from the beginning, but only fine-tuning is necessary for each unit.

The temperature sensor (IC804) monitors the temperature of the transmitter unit (X56-312 A/3).

The D/A converters (IC701 and IC802) converts the AGC setting (D_PC) of the driver circuit and control voltage value (PWR_CONT, PWR_PRT) of the Final Unit (X45-382 A/5).

The A/D converter (IC803) converts the transmitter unit (X56-312 A/3) temperature, VCO & VCXO control voltage (CVT, CVT-REF and CVT-MOD), Final Unit (X45-382 A/5) PA current(PA_CURR), fan current (FUN_CURR), detection voltage (FWD_PWR, RFL_PWR), etc.

The shift register (IC703) controls each part of the transmitter unit (X56-312 A/3) based on serial data of the Control Unit (X53-413).

3. Final unit

The RF final amplifier unit (X45-382 A/5) amplifies the transmitter power to a specified level.

This unit consists of the following circuits:

(1) Transmitter power module

(2) High pass filter

(3) Forward/reflected power detector circuit

(4) Antenna switch

(5) Harmonic filter circuit

(6) APC circuit

(7) High temperature detector circuit

(8) FAN action control circuit

(9) Current detector circuit

(10) AVR Circuit

(11) Other Circuit

3.1 Transmitter power module

Power amplifier module IC10 (RA13H3340M131) is used to improve its efficiency.

The driver output of the transmitter unit passes through an attenuator and enters the power module IC10 pin 1.

Power amplifier module IC10 amplifies the RF power according to the voltage at the amplification control pin 2 (VGG) and outputs it through pin 4 (Pout).

3.2 High pass filter

The T type single stage high pass filter prevents the Power Amplifier Module from being broken by static electricity.

3.3 Forward/reflected power detector circuit

The forward / reflected power detector circuit consists of a CM coupling type detection circuit formed by a strip line and the differential amplifier IC4.

A part of the transmitter power is detected by diodes D9 and D10 and is converted into DC voltage.

3.4 Antenna Switch

If a common antenna is used for the transmitter signal and receiver signal, switch transmitter and receiver signals by connecting CN19 to the RX Unit.

If different antennas are used for the transmitter and receiver, it functions as an On/Off switch for the transmitter circuit.

3.5 Harmonic filter circuit

The harmonic filter circuit uses a three-stage “pi” type Chebyshev type LPF.

This circuit removes harmonics from the transmitter output and sends the filtered signal to the antenna connecter (CN22).

3.6 APC circuit

The APC circuit stabilizes the transmitter power so that the output power specified by the Control Voltage from the MPU is obtained.

It consists of a Forward/Reflected power detector circuit and Differential amplifiers (IC2 and IC5).

It compares the voltage detected by the Forward/Reflect power detector circuit (voltage detected by the Forward Power) and the Control Voltage (PWR_CONT) from the MPU (IC802: X56-312 A/3).

It stabilizes the output power by changing pin 2 (Vgg).

The voltage detected (that detected Reflect Power) by the Forward/Reflect power detector circuit is compared to the Control Voltage (PWR_PRT) from the MPU (IC802: X56-312 A/3).

When a load V.S.W.R. is connected to the Antenna Connecter and is more than 1.5, it functions so that the output power gets smaller as the detection voltage (that detected Reflect Power) gets larger.

3.7 High temperature detector circuit

The high temperature detector circuit consists of a thermal switch IC (IC7) and a switching FET (Q2).

This circuit lowers the transmitter power when the final unit temperature is too high (83°C or higher).

3.8 FAN Action Control Circuit

The FAN action control circuit consists of a FAN, a current detection resistance (R11), a Differential amplifier (IC15), a Switching Transistor (Q3), and a Switching FET (Q14).

It detects the normal and abnormal state by monitoring the current fl owing FAN motor, and stops operation when failure occurs.

3.9 Current detector circuit

The current detector circuit monitors the current of the Power Amplifier Module. It consists of a current detection resistance (R4) and a I-V conversion IC (IC1).

It detects the normal and abnormal state of the Power Amplifier Module by monitoring the current of the Power Amplifier Module. If a failure occurs, it stops operation.

3.10 AVR circuit

IC3, IC11 and IC12 are AVR ICs.

They maintain isolation of each power supply.

3.11 Other circuits

Circuit IC9 saves various adjustment values of the Final Unit in the EEPROM.

4. Receiver unit

The receiver unit (X55-310) consists of the following circuits:

(1) Front-end circuit

(2) 1st-Mixer circuit

(3) 1st-IF circuits

(4) Demodulator circuits

(5) Squelch circuit

(6) Receiver DDS circuit

(7) Receiver PLL circuits

(8) AVR circuit

(9) Other circuits

There are four modulating modes that can receiver demodulate, including Analog_Wide, Analog_Narrow, Digital_Narrow, and Digital_Very-Narrow.

4.1 Front-end circuit

The front-end circuit consists of L132 and L133 helical BPF, Q1 Low Noise Amplifier (LNA), and L134 and L135 helical BPF. Adjusting four helical BPF forms the BPF having a pass band width of 5MHz with a center frequency from 380 to 400MHz.

+9V is applied to the Q1 collector power supply. -3V produced by IC701, IC702 and IC703 mounted on a negative power unit (X45-382 D/5) is applied to the emitter power supply. The collector current is monitored by the IC4 current detection circuit. Detected DC voltage is input to pin 15 of IC30 (ADC).

4.2 1st-Mixer circuit

The unwanted out-of-band RF components produced by Q1 are attenuated by the BPF. Only the desired signal is transmitted to the A1 Double Balanced Mixer (DBM). Here, the desired signal is mixed with the first hetero signal.

49.95MHz is produced as the 1st Intermediate Frequency (IF1).

4.3 1st-IF circuits

The IF1 signal produced by the 1st-Mixer circuit is transmitted through either one of two 1st-IF circuits with different bandwidth.

The signal passes through the WIDE band consisting of D9, XF1, Q19, XF3, Q28 and D13 only in Analog_Wide mode.

Meanwhile, the signal passes through the NARROW band consisting of D10, XF2, Q20, XF4, Q29, and D14 only in Analog_Narrow, Digital_Narrow or Digital_Very-Narrow mode.

XF1 and XF2 is 2 pole and XF3 and XF4 are 4 pole Monolithic Crystal Filters (MCF). They are BPF for removing spurious noise occurring close to the desired signal.

The DC switch consists of Q31, Q32, Q26 and Q25, switches the WIDE and NARROW bands of the 1st-IF circuits.

4.4 Demodulator circuits

The desired signal that passed through the 1st-IF circuits passes through the distributor consisting of LC parts and is fed to the IF system IC_IC12, IC13. The signal in Analog_Wide or Analog_Narrow mode is mixed with the second local oscillator hetero signal by the mixer in IC12. 450kHz is produced as the 2nd Intermediate Frequency (IF2).

It passes through D15, CF2, D16 and D19, and CF5 if the D20 modulation mode is Analog_Wide. It passes through D15, CF3, D16 and D19, and CF7 path if the D20 modulation mode is Analog_Narrow. The base band signal FM-detected by the quadrature detection circuit consisting of L128, Q57, and Q58 and is amplifi ed to a signal level of approximately 100mVrms by IC20 and is then transmitted to the control unit (X53-413) from CN42 (pin12).

The signal in Digital_Narrow or Digital_Very-Narrow mode is mixed with the second local oscillator hetero signal by the mixer in IC13. 450kHz is produced as the 2nd Intermediate Frequency (IF2). Here, irrespective of modulation modes, it passes through the CF4 and CF6 path. It is transmitted as the base band signal via IC14 to the CN43 control unit, X53-414.

CF2 and CF5, and CF4 and CF6 are hexode Ceramic Filters. They are BPF for removing spurious noise occurring close to the desired signal.

4.5 Squelch circuit

The desired noise of the noise component output from IF system IC_IC12 (pin18) is extracted by the BPF.

After passing through Q40, it is DC-detected as the squelch voltage by D17, D18 and input to ADC_IC30 (pin11).

The MPU mounted in the control unit (X53-413) compares it with a predetermined reference voltage and turns the Audio signal on and off. The strength of the receiver signal input from CN5 is output as the RSSI voltage from IF system IC_IC12 (pin21), and is input to_IC30 (ADC) pin12 via IC29 A/2.

4.6 Receiver DDS circuit

The 19.2MHz Internal reference clock produced by transmitter unit (X56-312 A/3) is distributed to CN45 of the receiver unit (X55-310).

It passes through Q39, Q30, and IC8, and is input to IC7 (DDS-IC) pin6 as the Master clock.

Approximately 6MHz signal is generated as the 1st-PLL Reference clock.

IC7 has a resolution of 32 bits for realizing the frequency step minters than the 1st-PLL comparison frequency.

The generated Reference clock is output via Q12, CF1, and Q5. CF1 is a Ceramic Filter. It is the BPF for removing unnecessary spurious noise included in the generated Reference clock.

4.7 Receiver PLL circuits

The receiver unit (X55-310) has the 1st-PLL circuit for controlling the VCO that generates the hetero signal to the first local oscillator, and the 2nd-PLL circuit for controlling the VCO that generates the hetero signal to the second local oscillator.

The 1st-PLL circuit consists of the VCO (Q7 and Q8), the Buffer amplifier (Q17), the RF amplifiers (Q16 and Q3), the PLL-IC (IC5), the Active loop filters (Q2 and Q4) and the Band switches (Q14, Q10 and Q11).

The signal in 330.05 through 340.00MHz band generated by VCO Q7 and the 340.05 through 350.05MHz band generated by VCO Q8 is input to IC5 (pin5) via Q17 and Q16 as the Fin signal.

The 6MHz reference signal generated by the DDS-IC (IC7) is input to IC5 (pin8) via Q3. Two signals, Fin and REFin, are phase-compared as the 100kHz comparison frequency by each frequency divider.

The VCO output with the frequency synchronized is input to the 1st-Mixer as the first local oscillator Lower hetero signal approximately +17dBm via Q17, Q23, and Q18. The control voltage is input to IC30 (ADC) pin16 via IC6.

Meanwhile, the 2nd-PLL circuit consists of the VCO (Q24), the Buffer amplifier (Q33), the RF amplifier (Q38, Q22), and the PLL-IC (IC11).

The 99.0MHz signal generated by Q24 is input to IC11 (pin5) as the Fin signal via Q38. The 19.2MHz Internal reference clock distributed by the transmitter unit (X56-312) is input as the REFin signal to IC11 (pin8) via Q22.

Two signals, Fin and REFin, are phase-compared by each frequency divider as the comparison frequency of 200kHz. The VCO output with the frequency synchronized is input to IC9 (prescaler IC) pin2 via Q33 and Q21.

The 49.5MHz signal is frequency-divided into halves by IC9 and is excited by Q53 and distributed. One is input to IC12 (pin1) via Buffer amplifier_Q35.

The other is input to IC13 (pin4) via Buffer amplifier_Q36. Both are input as approximately - 16dBm for the second local oscillator Lower hetero signal.

The control voltage at this point is input to IC30 (ADC) pin10 via IC33.

4.8 AVR circuit

The power supply voltage supplied from the power unit (X45-382 C/5) is distributed from the receiver unit (X55-310) CN44 to IC24 (8V), IC25 (8V), IC26 (9V), and IC27 (9V) via the Q52 DC switch. The output of IC24 is supplied to the 1st-IF circuits, the 1st-Local amplifiers and the IF system IC_IC12 via IC15 (5V).

Further, the output of IC25 is distributed to IC16 (5V), IC17 (5V), IC18 (5V) and IC19 (5V).

The output of IC16 is supplied to IF system IC_IC13.

The output of IC17 is supplied to the 2nd-Local amplifiers.

The output of IC18 is supplied to the 1st-PLL and the 2nd-PLL.

The output of IC19 is supplied to the DDS circuit.

The output of IC26 is supplied to LNA_Q1.

The output of IC27 is supplied to the VCO buffer amplifiers_Q17, Q33, the 1st-VCO and the 2nd-VCO via Active ripple filters_Q9, Q27, and to the Active loop filter_Q2, Q4 via the Active ripple filters_Q6.

4.9 Other circuits

Other circuits include the EEPROM (IC31), the temperature sensor IC (IC35), the DAC (IC23) and the ADC (IC30).

IC31 saves various adjustment values of the receiver unit.

IC35 is built-in for detecting changes in temperature.

IC23 offsets the RSSI voltage (pin1) and the 1st-VCO_A, VCO_B control voltage (pin2, pin3) detected by the IF system IC (IC12).

IC30 monitors the 1st-VCO control voltage (pin16), the LNA current detection value (pin15), the temperature detected by the temperature sensor IC (IC35 pin14), the RSSI voltage detected by the IF system IC (IC12 pin12), the squelch voltage detected by the IF system IC (IC12 pin11), and the control voltage of the 2nd-VCO (pin10), and outputs each state in serial data (IC30 pin18), sends the signal from CN42 (pin22) to the control unit (X53-413). The signal is processed by the MPU.

5. Base-Band Signal Processing Part

The base-band circuit is located on unit X53-413.

This circuit enables the selection of the Analog Signal Processing mode and the Digital Signal Processing mode, and adjusts the level of the base-band signals in each mode.

This circuit consists of IC2, IC3, IC5, IC8, IC9, IC12, IC14, IC19, IC20 and IC21.

The type of input modulation signals are local microphone terminal, low-speed data (LSD), high-speed data (HSD), external audio input (TA), and external data input (TD), and also the type of output demodulation signals are receiving audio output (RA), and receiving data output (RD).

The multiplexer (IC2, IC3, IC14) selects the signal path, the electronic volume (IC8) adjusts the signal level, and the operational amplifiers (IC5, IC9, IC12, IC19, IC20, and IC21) amplify and sum various signals.

5.1 Demodulation Circuit (Analog/Digital Signal Processing)

In case of the Analog Signal Processing mode, the detected audio signal obtained from the IF SYSTEM IC (X55-307 IC8) is amplified by IC5 (A/2), input into the AINR terminal of CODEC IC (IC4), and then processed as an audio signal by the DSP (IC37).

The processed audio signal from the AOUTR terminal of IC4 is amplified to a sufficient level by IC12 (A/2), and is then passed through the anti-aliasing filter at IC12 (B/2).

In case of the Digital Signal Processing mode, the detected audio/data signal obtained from the IF SYSTEM IC (X55-307 IC7) is input into the ADC (X53-414 IC312).

Receiving signal processing is performed by RX_DSP (X53-414 IC323), and voice decode processing is performed by TX_VOCODER DSP (X53-414 IC324).

The processed audio signal from the AOUTL terminal of CODEC IC (X53-414 IC309) is amplified to a sufficient level by IC20 (D/4), and is then passed through the anti-aliasing filter at IC20 (C/4).

The audio signal path is selected by multiplexer (IC14) depending on the Analog mode (IC14 is setting Y=Y0) or the Digital mode (IC14 is setting Y=Y1).

The audio signal is then routed through an electronic volume (IC8) V3/V4 to multiplexer IC (IC25), and is amplified to a sufficient level to drive the loudspeaker using an audio power amplifier (IC29).

5.2 Audio Amplifier Circuit

The audio amplifier circuit is located in the control section of the Control unit (X53-413).

The 4W output audio power is available from the pin15 test connector “SPO, SPG” on the rear panel to the external speaker in the case of a 13.8V power supply voltage and 4 ohm load.

5.3 Microphone Circuit

The signal from the microphone is passed through the AGC circuit located in the DISPLAY circuit (X56-312 B/3) so that it may not saturate.

This circuit consists of IC926, D933, D934 Q931, and Q932.

The AGC controls the amplifier gains using the detected audio signal depending on the positive and negative peaks of the signal amplitude.

The audio signal goes to the control section of the Control unit (X53-413) from the DISPLAY circuit (X56-312 B/3).

5.4 Modulation Circuit (Analog/Digital Signal Processing)

The transmitting audio signal goes to the input terminal of the multiplexer IC (IC3) for microphone muting.

In case of the Analog Signal Processing mode (multiplexer IC3 is setting X=X0), the audio signal is amplified by IC9 (A/4), input to the AINL terminal of the CODEC IC (IC4), and audio processed by the DSP (IC37).

The processed audio signal from the the AOUTL terminal of IC4 is amplified to a sufficient level by IC9 (B/4), and is then passed through an anti-aliasing filter at IC9 (C/4), and amplified by the summing (TD) amplifier IC9 (D/4).

On the other hand, in the case of the Digital Signal Processing mode (multiplexer IC3 is setting X=X1), the audio signal is amplified by IC20 (A/4), input to the AINL terminal of the CODEC IC (X53-414 IC309), and processed by the TX_VOCODER DSP (X53-414 IC324).

The processed audio signal from the AOUTR terminal of IC309 passes through the anti-aliasing filter at IC19 (B/2).

6. Control Circuit

The control circuit consists of two units, X53-413 and X53-414.

Unit X53-413 mainly has the power supply circuit, baseband signal path selection circuit (level adjustment is included), analog mode voice codec circuit, and RF controller circuit.

Unit X53-414 has the mode selection (analog or digital) circuit, digital node communication processing circuit, LAN interface circuit, and Compact Flash interface circuit.

6.1 X53-413

6.1.1 RF control MPU

The IC34 RF control MPU is a 16-bit single chip microprocessor incorporating 256Kbyte of ROM and 20Kbyte of RAM.

This MPU controls the Flash ROM, DSP, receiver unit, transmitter unit, and EEPROM of each unit, and the display circuit, and has communication I/F with external devices.

6.1.2 DSP

The DSP circuit is in charge of the filtering of transmitting and receiving signals, and the encoding and decoding of sub-audible signals (encode: QT, DQT, DTMF, decode : QT, DQT, DTMF).

This circuit consists of IC37, IC30, IC31, IC4, IC5, IC9, and IC12.

The receiving signal, DET is converted from analog to digital by IC4 with a sampling frequency of 16.128kHz.

The digitized audio signal is sent to the DSP (IC37) to process the sub-audible signal and audio signal. The processed digital audio signal is applied to CODEC IC4, and is converted from digital to analog.

The analog signal is output from pin16 (AOUTR).

The audio signal is then amplified by IC12 (A/2), passes through the low-pass filter at IC12 (B/2), is selected by the multiplexer IC14 (Y0=Y) and is then input into an electronic volume IC8.

On the other hand, the transmitting audio signal output from IC3 is amplified by IC9 (A/4), applied to pin 3 (AINL) of CODEC IC4, and is then converted from analog to digital at a sampling frequency of 16.128kHz.

The digitized transmitting audio signal is AGC-processed, pre-emphasized and filtered, except for the 300Hz to 3kHz range, by DSP IC37, and is then fed back to CODEC IC4, converted from digital to analog, and the analog signal is output from pin15 (AOUTL).

The transmitting signal from the AOUTL is amplified by IC9 (B/4), passed through the IC9 (C/4) low-pass filter, and sent to the IC9 (D/4) summing amplifier.

IC31 is a counter IC. The clock required for the CODEC and DSP is generated by dividing the 16.515072MHz clock signal supplied by the DSP IC37.

6.1.3 Shift Register Circuit

The MPU (IC34) transmits serial data to shift registers IC923 from IC923 to IC960 and from IC960 to IC963 in the display circuit (X56-312 B/3, C/3).

Additionally, it transmit serial data to the control unit (X53-413) IC1 and IC22 and the transmitter unit (X56-312) IC703.

This serial data can control various functions of each unit.

6.1.4 Power Supply Circuit

This circuit consists of X53-413 IC6, IC10, IC11, IC15, IC16 and 18, and X53-414 IC305, IC306, IC307 and IC329.

IC10 is a DC/DC converter that converts 13.8V to 5.0V.

IC11 is a DC/DC converter that converts 13.8V to 8.0V.

IC16 is connected to IC10 via the 5.0V AVR. IC6, 15, 305 and 329 are connected to IC329 via the 3.3V AVR. IC18 is connected to IC329 via the 1.8V AVR. IC306 is connected to IC329 via the 1.5V AVR. IC307 is connected to IC15 via the 1.5V AVR.

6.1.5 Flash ROM (RF control MPU)

IC17 is an 8M bit Flash ROM and contains MPU firmware for controlling the RF.

6.1.6 EEPROMs Circuit

The EEPROM is a built in receiver unit (X55-310), transmitter unit (X56-312) and Final unit (X45-382).

The RF control MPU controls these EEPROMs by the IIC bus.

6.2 X53-414

6.2.1 Main MPU

The Main MPU (IC703) is a 32-bit RISC microprocessor incorporating a 16K byte cache memory.

The main MPU controls the Flash ROM, SDRAM, SRAM, LAN IC, RS-232C driver, receiver and real-time clock (RTC).

6.2.2 LAN Interface

NXR-800 is equipped with a 100Base-TX or 10Base-T LAN interface. This circuit consists of IC719, IC720 and J700. IC719 is a control IC. IC720 saves the MAC address in the EEPROM. J700 is connected to the LAN cable.

6.2.3 Real Time Clock (RTC) Circuit

This circuit consists of IC710 and X701. IC710 is a Real Time Clock. X701 is a crystal oscillator.

IC710 is connected to IC703 (Main_MPU) via the IIC bus.

The oscillating frequency of X701 is 32.768kHz.

It is backed up by a secondary lithium battery (BA300). The IC710 clock data is used after resetting the backup.

6.2.4 RS-232C Circuit

NXR-800 is equipped with a RS-232C interface.

It is connected to a PC with pin9 female RS-232C cross cable.

It uses the FPU and writes the firmware.

IC705 is a RS-232C driver receiver IC, and interfaces at the TTL232C level.

6.2.5 Modem control MPU

Modem control MPU (IC325) is 16-bit single chip microprocessor incorporating 256Kbyte of ROM and 20Kbyte of RAM.

This MPU controls the Flash Rom, two DSPs, the SCM board, the OCXO unit in the transmitter unit (X42-328) and the PLL circuit.

It also monitors the external power supply voltage. If the voltage is abnormal, it stops the system.

6.2.6 RX DSP (IC323)

In digital mode, the IF signal input from the ADC (IC312) to the RX DSP is limited to a very narrow band. So, it passes through the IF band limitation band.

This signal is demodulated by the wave detection processing part. The demodulated wave is made to pass through the base band limitation filter (root nyquist cosine filter and 1/sinc).

This signal is symbol-detected and bit-judged, and is then converted to digital data. Its frame timing is detected and decoded for CAI (Common Air Interface: KENWOOD original format) data error correction.

Sound data is vocoder decode processed by the IC324 TX_Vocoder_DSP. It is then converted into the PCM signal.

It is analog-output as an audio signal by the DAC part of the Audio codec IC (IC309 AOUTL terminal).

6.2.7 TX_Vocoder DSP

In digital mode, vocoder processing is performed by the IC324 TX_Vocoder_DSP.

Audio signal input from the Audio codec IC ADC part (IC309 AINL) terminal is vocoder encode processed and converted to audio data.

CAI data is encoded for correcting errors and converted to transmitter data.

This data is framed, converted to symbol values and made to pass the base band limit filter (root nyquist cosine filter and sinc filter).

The passed signal turns into a MOD signal. It is output as an analog signal by the Audio codec IC DAC part (IC309 AOUTR terminal).

6.2.8 Power Supply Voltage Monitoring Circuit

This circuit always monitors the external power supply voltage assuming that the abnormal power supply voltage is applied.

This circuit consists of X53-413 R67, R68, R71, and R79 and IC7, and X53-414 IC308. If the voltage is reduced, these circuits interrupt the Modem control MPU (IC325) and NXR-800 rapidly shift to the power down state.

The IC325 A/D converter (pin124) monitors the voltage. It detects the voltage rises and returns to the normal voltage range.

6.2.9 Reset Circuit

Reset system diagrams of each device of NXR-800 are attached. With regard to the priority of the reset signal of each device, IC303 that prepares the reset signal of IC325 has the highest priority.

Software of IC325 can activate devices including IC323, IC324, IC703, IC700, IC702, IC719, IC34, and IC17. Software of IC703 can activate the reset of IC325.

6.2.10 Clock Shift Circuit

NXR-800 control unit has a crystal oscillation circuit shown below.

X53-4130-10:

14.7456MHz (IC34 and X1)

16.515072MHz (IC37 and X2)

X53-4140-10:

14.7456MHz (IC325 and X301)

25.8048MHz (IC37 and X2)

25MHz (IC719 and X702)

Each oscillation circuit turns on the NPN transistor “2SC4738 F” and staggers the oscillating frequency by approximately -70ppm.

This may prevent interference against transmitter and receiver frequencies.

Each transistor is turned on and off by the FPU.

6.2.11 Flash ROM (for Main MPU)

IC702 is a 128M bit Flash ROM and contains the firmware of the Main MPU.

6.2.12Flash ROM (Modem control MPU)

IC314 is an 8M bit Flash ROM and contains the firmware of the Modem control MPU, RX DSP, and TX_Vocoder_DSP.

6.2.13 SDRAM

IC704 and IC707 are program execution memory used by the Main MPU and use two 128M bit.

6.2.14 SRAM

IC700 is a memory backed up by a lithium battery (BA300).

The capacity is 16M bits. It contains data required for the system backup.

6.2.15 Frame transmitter and receiver circuit

J702 and J703 are connectors for synchronizing with other repeaters. The differential rectangular wave 12.5Hz or 25Hz is input to and output from this connector for synchronizing multiple repeaters.

In the repeater system, any given repeater outputs a synchronizing signal and that synchronous signal is input to other remaining repeaters.

With regards to the output of the synchronous signal, the frame signal generated by TX_Vocoder_DSP (IC324) is differentially output by IC302.

With regards to the input of the synchronous signal, IC302 receives a differential signal, and is input to the interruption of the RX DSP (IC323) and TX_Vocoder_DSP (IC324).

6.2.16 12.288MHz clock PLL circuit

The PLL circuit is installed in the control unit (X53-414) for operating the RX DSP and TX_Vocoder DSP.

The PLL circuit consists of X300 (12.288MHz VCXO), IC315 (PLL IC), Q300, Q304, Q305, and IC313.

The purpose of this PLL circuit is to synchronize with the 19.2MHz reference signal controlled by the 10MHz OCXO (deviation+/-0.4ppm) in the transmitter unit (X56-312).

So, two DSPs can be executed by a +/-0.4ppm clock deviation.

Q300 is a 19.2MHz buffer amp signal input from the transmitter unit (X56-312).

The signal from the transmitter unit is supplied to IC315 pin8 (reference signal input).

12.288MHz from X300 is amplified by Q304 and distributed to two routes.

One is amplified by Q305 and input to IC315 pin6 (RF signal input). The other is amplified by

IC313 and becomes a clock for the RX DSP and TX_Vocoder DSP.

IC315 compares the reference signal and RF signal and detects their phase errors.

This phase error signal is output from pin2 charge pump (CP), passed through the LPF and is supplied to X300 voltage control pin1.

7. Display Circuit

7.1 Display Circuit

The display circuit (X56-312 B/3,C/3) consists of various types of LEDs, 17-segment type D960, D961 (red), D921 (red: transmission), two-color type D920 (green: busy), D922 (green: power on, red blinking: abnormal voltage), D923 (red: CCH), two-color type D924 (red: OCXO error, green: OCXO normality, orange: external reference signal), 8-bit status LEDs D925 to D932, and LEDs with built in switches S920 to S925.

IC920 to IC925 and IC960 to IC963 are in charge of displaying present channels and states on the front panel.

IC923 to IC925 and IC960 to IC963 are shift registers that convert the MPU serial data to parallel data and turn on LEDs.

7.2 Key Switches Circuit

The logic signals from the front panel key and channel switches (channel selector) are entered directly into the RF MPU (IC34).

PARTNO	QTY	PART NAME(E)
X45-3820-12	1	FINAL UNIT
X53-4130-10	1	CONTROL UNIT
X53-4140-10	1	CONTROL UNIT
X55-3100-12	1	RX UNIT
X56-3120-12	1	TX UNIT
A10-4107-01	1	CHASSIS
A62-1137-02	1	PANEL
A62-1138-02	1	PANEL
A62-1139-02	1	PANEL
A62-1140-02	1	PANEL
A62-1141-02	1	PANEL
A62-1142-02	1	MAIN PANEL
A82-0069-02	1	REAR PANEL
B09-0406-15	4	CAP
B10-2781-04	1	FRONT GLASS
B11-1841-04	1	FILTER
B11-1842-04	1	FILTER
B11-1843-04	1	FILTER
B11-1844-04	1	FILTER
B41-1852-14	1	CAUTION STICKER
B42-2455-04	2	STICKER
B42-7296-04	1	STICKER
B42-7325-04	2	SERIAL NUMBER STICKER
B43-1188-04	1	BADGE
B44-2163-04	1	UPC CODE LABEL
B59-2457-00	1	PAMPHLET
B59-2458-00	1	PAMPHLET
B59-2539-00	1	PAMPHLET
B62-1994-10	1	INSTRUCTION MANUAL
B72-2533-04	1	MODEL NAME-PLATE
E04-0463-05	1	RF COAXIAL RECEPTACLE(BNC)
E30-3344-25	1	DC CORD
E30-7581-05	1	DC CORD
E30-7582-05	1	TRUNK CABLE
E30-7583-05	3	TRUNK CABLE
E37-1295-05	7	FLAT CABLE
E37-1299-05	1	LEAD WIRE WITH TERMINAL
E37-1300-05	1	LEAD WIRE WITH TERMINAL
E37-1301-05	1	LEAD WIRE WITH TERMINAL
E37-1302-05	1	LEAD WIRE WITH TERMINAL
E37-1303-05	1	LEAD WIRE WITH CONNECTOR
E37-1304-05	2	LEAD WIRE WITH CONNECTOR
E37-1305-05	1	LEAD WIRE WITH CONNECTOR
E37-1306-05	1	LEAD WIRE WITH CONNECTOR
E37-1307-05	1	LEAD WIRE WITH CONNECTOR
E37-1308-05	1	LEAD WIRE WITH CONNECTOR
E37-1310-05	1	LEAD WIRE WITH CONNECTOR
E37-1311-05	1	LEAD WIRE WITH CONNECTOR
E37-1313-05	1	LEAD WIRE WITH CONNECTOR
E37-1314-05	1	LEAD WIRE WITH CONNECTOR
E37-1315-05	1	LEAD WIRE WITH CONNECTOR
E37-1316-05	1	LEAD WIRE WITH CONNECTOR

E37-1381-05	1	LEAD WIRE WITH CONNECTOR
F05-7521-05	2	FUSE(BLADE TYPE)
F07-1930-05	1	COVER
F09-0445-05	1	CAP
F09-0484-05	1	CAP
F09-0488-05	1	FANMOTOR
F10-3061-03	1	SHIELDING CASE
F10-3062-04	7	SHIELDING CASE
F10-3068-04	1	SHIELDING PLATE
G10-1343-04	1	FIBROUS SHEET
G11-4408-04	2	RUBBER SHEET
G11-4409-04	1	SHEET
G13-2163-04	1	CUSHION
G13-2164-04	1	CUSHION
G13-2231-04	1	CUSHION
H12-4237-05	1	PACKING FIXTURE
H12-4238-05	1	PACKING FIXTURE
H12-4239-05	4	PACKING FIXTURE
H12-4246-05	4	PACKING FIXTURE
H13-2123-05	1	CARTON BOARD
H20-1437-03	1	PROTECTION COVER
H21-0788-04	1	PROTECTION SHEET
H25-0029-04	3	PROTECTION BAG
H25-0079-04	1	PROTECTION BAG
H25-0113-04	1	PROTECTION BAG
H25-2063-04	2	PROTECTION BAG
H52-2212-02	1	ITEM CARTON CASE
J19-5496-02	1	HOLDER
J19-5497-05	1	HOLDER
J29-0725-04	2	BRACKET
J39-0655-03	1	SPACER
J61-0307-05	1	BAND
K01-0421-05	1	HANDLE
K29-4539-04	1	KNOB
L79-1419-05	1	LINE FILTER
L92-0471-05	1	CLAMP FILTER
N08-0563-04	1	DRESSED SCREW
N09-2292-05	4	HEXAGON HEAD SCREW
N30-2008-43	2	PAN HEAD MACHINE SCREW
N30-2606-48	8	PAN HEAD MACHINE SCREW
N30-3016-43	4	PAN HEAD MACHINE SCREW
N32-3006-43	60	FLAT HEAD MACHINE SCREW
N32-4008-43	10	FLAT HEAD MACHINE SCREW
N67-3008-48	12	PAN HEAD SEMS SCREW
N80-2006-43	3	PAN HEAD TAPTITE SCREW
N80-2608-43	2	PAN HEAD TAPTITE SCREW
N87-2608-48	81	BRAZIER HEAD TAPTITE SCREW
T07-0347-15	1	SPEAKER
490-0174-05	14	ADHESIVE TAPE
BA33DD0WT	1	MOS-IC
LA4425A	1	MOS-IC
NJM7805FA-ZB	1	BI-POLAR IC
NJM7808FA-ZB	5	BI-POLAR IC
RA13H3340M13	1	MOS-IC

PART No.	QTY	PART NAME
X42-3280-20	1	ACCESSORY UNIT
B42-3343-04	1	SERIAL NUMBER STICKER
B48-1319-04	1	LABEL FOR PACKAGE
B62-2022-00	1	INSTRUCTION MANUAL
E31-3269-05	1	LEAD WIRE WITH MINIPIN PLUG
E37-1405-05	1	FLAT CABLE
E37-1406-05	1	LEAD WIRE WITH CONNECTOR
H12-4240-05	2	PACKING FIXTURE
H25-0029-04	2	PROTECTION BAG
H25-0721-04	1	PROTECTION BAG
H52-2213-05	1	ITEM CARTON CASE
N67-3008-48	5	PAN HEAD SEMS SCREW
490-0174-05	6	ADHESIVE TAPE
NJM7805FA-ZB	1	BI-POLAR IC

NXR-800
Tuning procedure

Before attempting to tune the transceiver, connect the unit to a suitable power supply. Whenever the transmitter tuned, unit must be connected to a suitable dummy load, unless the instruction specify otherwise. The speaker output connector must be terminated with a 4 Ohm dummy load at any time during the tuning and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement at all the time during the tuning.

Before turn the power supply switch on, connect to PC to radio by serial cable (reverse cable). Start up the FPU . Select to “Program – Test-Mode” from the menu bar at the FPU window, or press the CTRL-T , then the “Test Mode” window will be appeared.

(1) Manual Tuning
The Manual Tuning needs to be done before PC tuning.
The items are as follows; 1.BPF adjustment, 2. Discriminator adjustment,
BPF parts (L132/L133/L134/L135), discriminator part (L128) and connector CN41 are on RX unit(X55-310*).

1.BPF adjustment
a. Connect the TG (tracking generator) to RX connector on the rear panel.
b. Connect CN41 to the spectrum analyzer input.
c. Adjust L132/L133/L134/L128, and obtain the correct waveform at the desired frequency.

2.Discriminator adjustment
a. Connect the SSG to the RX connector.
b. Input desired RF signal with standard modulation.
c. Adjust L128 until obtain the maximum audio frequency output.

(2) PC Tuning
1 Transmitter section
1.1 Transmit VCO adjustment
a. In the item window, double-click “Transmit VCO Lock Voltage“, then the “Transmit VCO Lock Voltage” window will be appeared.
b. Click "A:Low" tab.
c. It is not necessary to "Transmit " the radio.
d. Adjust L128 on TX unit (X56-312*) that the tuning voltage must be 1.35 to 1.55V.
e. Click "B:Low" tab.
f. Adjust L108 on TX unit (X56-312*) that the tuning voltage must be 1.35 to 1.55V.

1.2 RF High Power
a. In the item window, double-click “High Transmit Power “, then the “High Transmit Power” window will be appeared.
b. It is possible to select a frequency by clicking the tag of Lower frequency, Center frequency, and Higher frequency.
c. Click “Transmit”, then the radio will transmit.
d. Adjust the output power in all the frequencies then push "Apply All".

1.3 RF Low Power
a. In the item window, double-click “Low Transmit Power “, then the “Low Transmit Power” window will be appeared.
b. It is possible to select a frequency by clicking the tag of Lower frequency, Center frequency, and Higher frequency.
c. Click “Transmit”, then the radio will transmit.
d. Adjust the output power in all the frequencies then click "Apply All".

1.4 Digital Maximum Deviation
a. In the item window, double-click " Maximum Deviation (NXDN)", then the " Maximum Deviation (NXDN) " window will be appeared.
b. Select the "NXDN Very Narrow" in the [Digital Narrow/Digital Very Narrow] channel spacing list.
c. Set the data to be "10000", then click "Apply".
d. Select the "NXDN Narrow" in the [Digital Narrow/Digital Very Narrow] channel spacing

list.
e. Set the data to be "22800", then click "Apply".

1.5 Deviation
a. In the item window, double-click “Deviation”, and then the “Deviation” window will be appeared.
b. It is possible to select a frequency by clicking the tab of A:Low, A:Center, A:High, B:Low, B:Center, and B:High.
c. Select a frequency tab, and click the “100Hz Square Signal” radio button in the “Modulation Pattern”.
d. Click “Transmit”, then the radio will transmit.
e. Adjust the data “Sub audible Gain” and “Audible Gain” in turn to complete square wave, note that click “Apply All” if you once change each data.
f. Same as “c” to “e”, select another frequency tab.

1.6 Analog Maximum Deviation
a. In the item window, double-click "Maximum Deviation (Analog)", then the " Maximum Deviation (Analog)" window will be appeared.
b. Click “Transmit”, then the radio will transmit.
c. Adjust the data for the Maximum Deviation (Analog) then click “Apply”.

1.7 Transmit Audio Input (TA)
a. In the item window, double-click “Transmit Audio Input (TA)”, then the “Transmit Audio Input (TA)” window will be appeared.
b. Click “Transmit”, then the radio will transmit.
c. Adjust the data for the Transmit Audio Input (TA) then click “Apply”.

1.8 TD Deviation
a. In the item window, double-click “TD Deviation”, then the “TD Deviation” window will be appeared.
b. Click "Transmit", then the radio will transmit.
c. Adjust the data for the TD Deviation then click "Apply".

1.9 QT Deviation
a. In the item window, double click "QT Deviation", then the "QT Deviation" window will be appeared.
b. Click "Transmit", then the radio will transmit.
c. Adjust the data for the QT Deviation then click "Apply".

1.10 DQT Deviation
a. In the item window, double click "DQT Deviation", then the "DQT Deviation" window will be appeared.
b. Click "Transmit", then the radio will transmit.
c. Adjust the data for the DQT Deviation then click "Apply".

1.11 CW ID Deviation
a. In the item window, double-click “CW ID Deviation” then the “CW ID Deviation” window will be appeared.
b. Click "Transmit", then the radio will transmit.
c. Adjust the data for the CW ID Deviation then click "Apply".

1.12 Test Tone Deviation
a. In the item window, double-click “Test Tone Deviation” then the “Test Tone Deviation” window will be appeared.
b. Click "Transmit", then the radio will transmit.
c. Adjust the data for the Test Tone Deviation then click “Apply”.

1.13 Repeat Gain
a. a. In the item window, double-click “ Repeat Gain “ then the “Repeat Gain” window will be appeared.
b. Click "Transmit", then the radio will transmit.
c. Adjust the data for the Repeat Gain then click “Apply”.

1.14 DTMF Deviation
a. In the item window, double-click “DTMF Deviation” then the “DTMF Deviation” window will be appeared.
b. Click "Transmit", then the radio will transmit.
c. Adjust the data for the DTMF Deviation then click “Apply”.

1.15 Courtesy Tone Deviation
a. In the item window, double-click “Courtesy Tone Deviation” then the “Courtesy Tone Deviation” window will be appeared.
b. Click "Transmit", then the radio will transmit.
c. Adjust the data for the Courtesy Tone Deviation then click “Apply”.

2. Receiver section
2.1 Receiver VCO adjustment
a. In the item window, double-click “Receiver VCO Lock Voltage“, then the “Receiver VCO Lock Voltage” window will be appeared.
b. Click "A:Low" tab.
c. Adjust L28 on RX unit (X55-310*) that the tuning voltage must be 1.30 to 1.35V.
d. Click "B:Low" tab.
e. Adjust L30 on RX unit (X55-310*) that the tuning voltage must be 1.50 to 1.55V.

2.2 Tight Squelch
a. In the item window, double-click "Tight Squelch" then the "Tight Squelch" window will be appeared.
b. Adjust the data for the Tight Squelch then click “Apply”.

2.3 Open Squelch
a. In the item window, double-click " Open Squelch " then the " Open Squelch " window will be appeared.
b. Adjust the data for the Open Squelch then click “Apply”.

2.4 RD Level
a. In the item window, double-click "RD Level" then the "RD Level" window will be appeared.
b. Adjust the data for the RD Level then click "Apply".

2.5 RA Level
a. In the item window, double-click "RA Level" then the "RA Level" window will be appeared.
b. Adjust the data for the RA Level then click "Apply".

3. Reference oscillator section
3.1 Internal VCTCXO
a. In the item window, double-click “VCXO“, then the “VCXO” window will be appeared.
b. Connect the TX port to frequency counter with appropriate leveling pad and then click the "Transmit" button.
c. Adjust the TX frequency must be within +/-0.1ppm.
d. Click "Apply All".

3.2 Optional OCXO
a. Before the adjustment, OCXO unit must be warm-up properly.
b. In the item window, double-click “OCXO Frequency“, then the “OCXO Frequency” window will be appeared.
c. Connect REF OUT port to frequency counter.
d. Adjust the OCXO frequency must be within +/-0.05ppm.
e. Click "Apply".

USE FOR	SYMBOL	REVISION NO	ISSUED	DATE
X53-4130-10	A X 3		C.Saito	2007-11-20
	A X			- -
	A X			- -
	A X			- -
	A X			- -
	A X			- -
	A X			- -
	A X			- -
	A X			- -

DESIGNED	DRAWN	CHECKED	APPROVED	PART NAME	NXR-700/800 CONT UNIT (Analogue)
31/JUL/2007 Takahashi	22/NOV/2007 C.SAITOU	27/NOV/2007 M.TAKAHASHI	27/NOV/2007 F.EBIHARA	Schematic Diagram	
				PART NUMBER	Z92-1058-01 1/1 01

株式会社ケンウッド KENWOOD CORPORATION

YOKOHAMA

07/11/20 09:06:39 x53413X000.C1C/001.SHT

R550	R551
0-10	—
0-11	—

USE FOR	SYMBOL	REVISION NO		ISSUED	DATE
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	△2 × 3	改装設完		C.Saito	2007-11-20
	△3 ×				- -
	△4 ×				- -
	△5 ×				- -
	△6 ×				- -
	△7 ×				- -
	△8 ×				- -
	△9 ×				- -

YOKOHAMA

DESIGNED	DRAWN	CHECKED	APPROVED	PART NAME NXR-700/800 CONT UNIT (Digital) 回 路 図 Schematic Diagram
31/JUL/2007	22/NOV/2007	27/NOV/2007	27/NOV/2007	
M.Takahashi	C.SAITOU	M.TAKAHASHI	F.EBIHARA	PART NUMBER
株式会社ケンウッド KENWOOD CORPORATION				Z92-1060-01 1/102

Y

07/11/27 17:17:08 x53414k000.cir/001.sht

USE FOR	SYMBOL	REVISION NO		ISSUED	DATE
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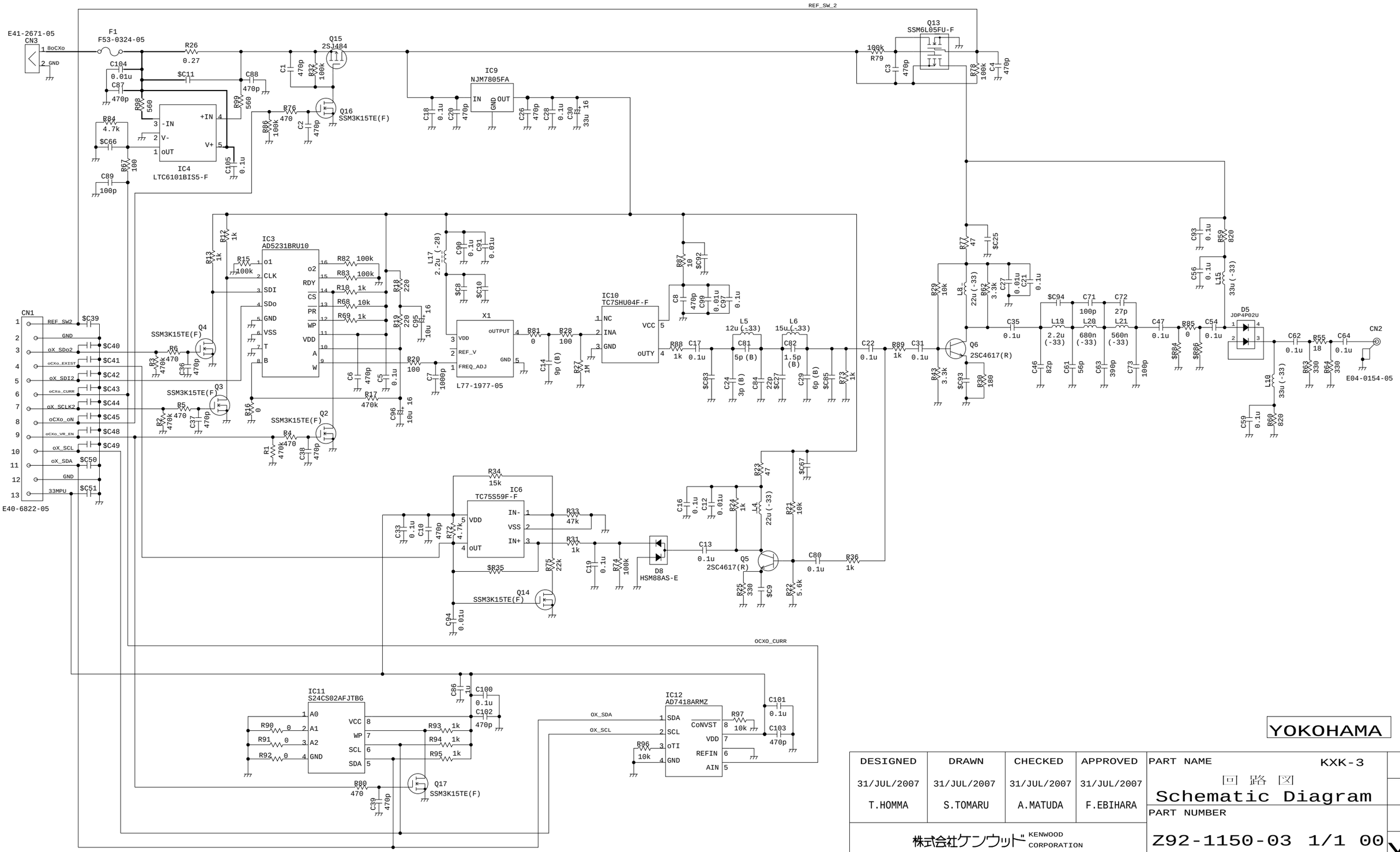
	2 X				- -
	3 X				- -
	4 X				- -
	5 X				- -



YOKOHAMA

DESIGNED	DRAWN	CHECKED	APPROVED
31/JUL/2007	31/JUL/2007	31/JUL/2007	31/JUL/2007
T.HOMMA	S.TOMARU	A.MATUDA	F.EBIHARA

株式会社ケンウッド KENWOOD CORPORATION

PART NAME KXK-3

Schematic Diagram

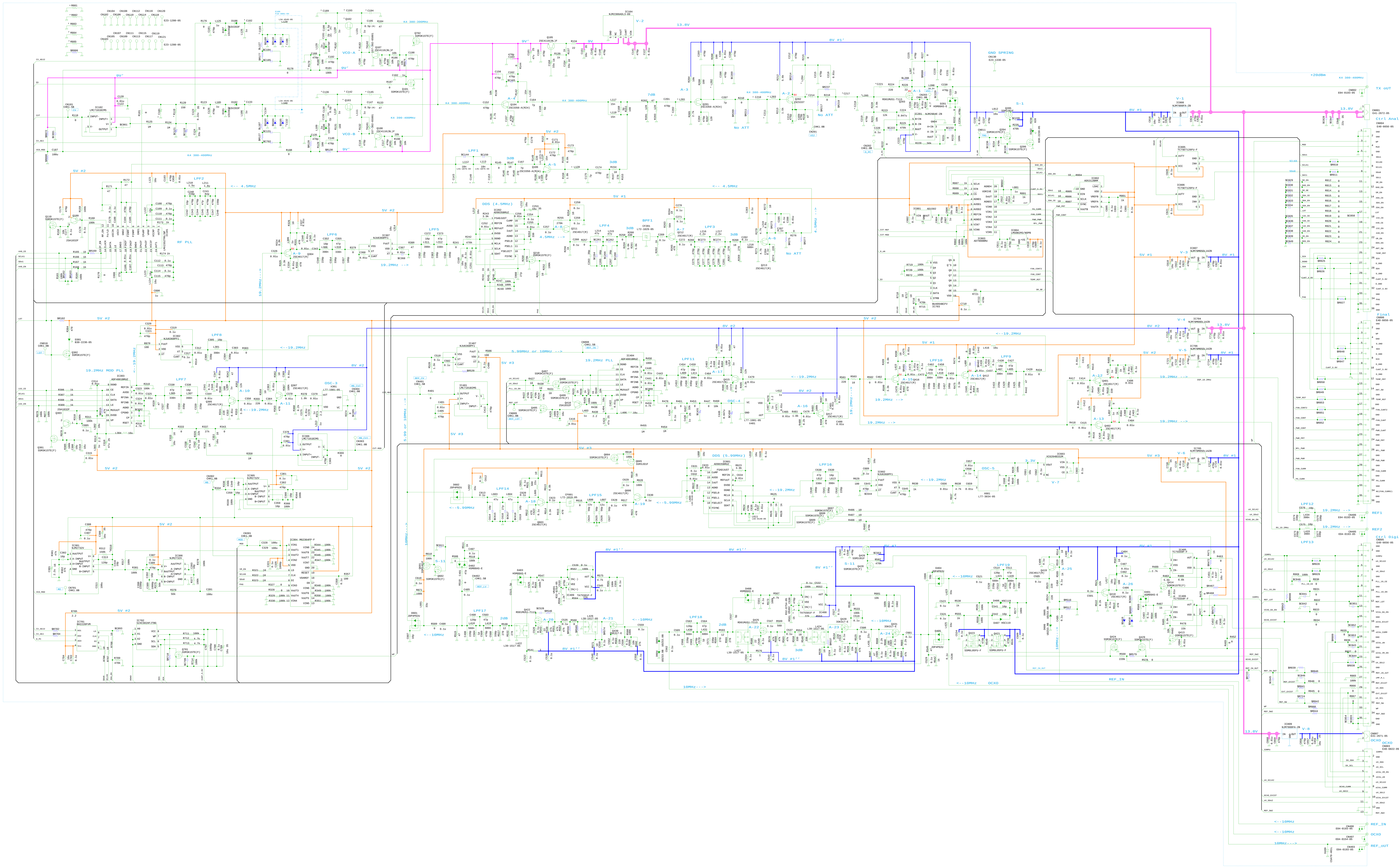
PART NUMBER

Z92-1150-03 1/1 00

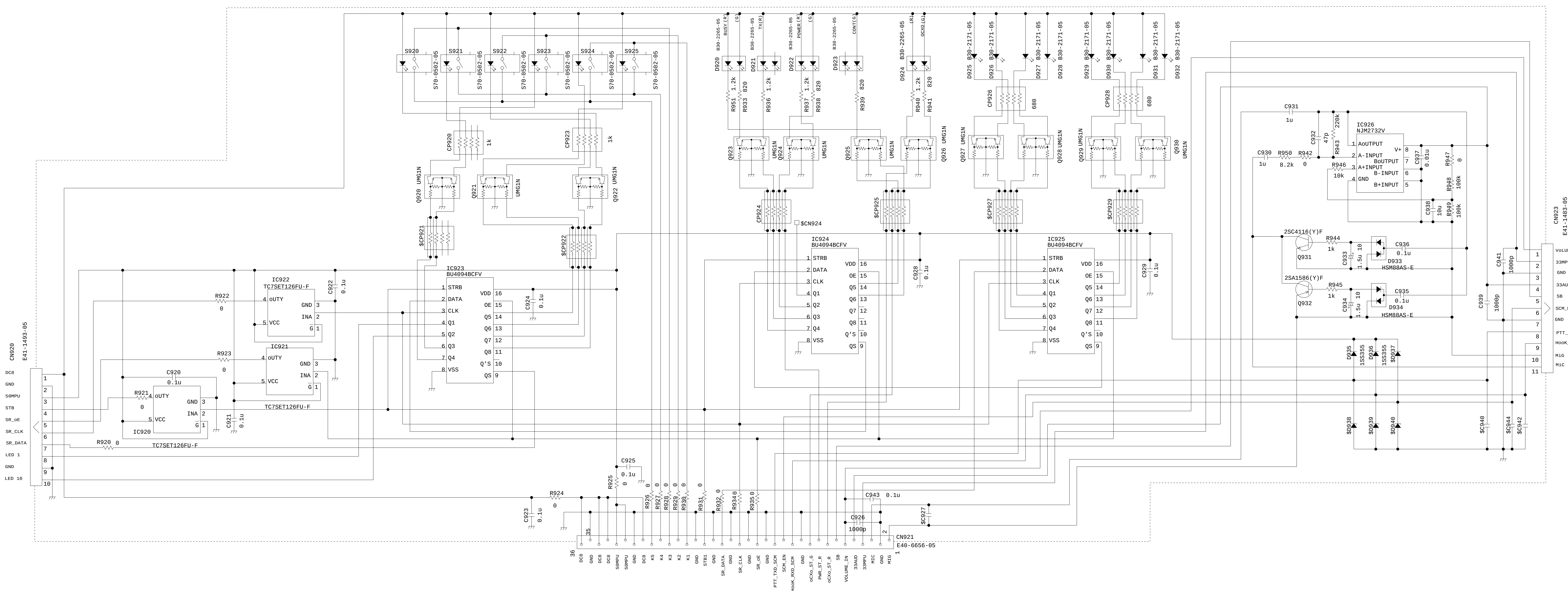
07/07/31 16:21:15 x42328s000.cir/001.sht

X45-382 A/5
PA UNIT
IC10
RA13H4047M131
CN1
E04-0193-05
RF IN
3DB ATT
HPF
Directional Coupler
FORWARD
REFLECT
ANT SW
HPF
LPF
CN19
E04-0193-05
RX
CN22
Current Sense
IC1
LTC6101BIS5-F
IC2
NJM2904E-ZB
IC3
TA78L05FF
IC4
NJM2904E-ZB
IC5
NJM2904E-ZB
IC6
NJM2904E-ZB
IC7
S-8130AC
IC8
NJM2904E-ZB
IC9
S24CS02AFJTBG
IC11
NJM7808FA-ZB
IC12
NJM7805FA-ZB
IC15
NJM2904E-ZB
IC13
NJM78M05FA-ZB
Q2
SSM3K15TE(F)
Q4
2SJ506-E(S)
Q5
SSM3K15TE(F)
Q6
SSM3K15TE(F)
Q8
SSM3K15TE(F)
Q14
SSM3K15TE(F)
CN20
E40-6656-05
GND
GND
WP
GND
D_GND
SDA
D_GND
SCK
D_GND
CONT_5.0V
D_GND
TEMP_PRT
GND
ANT_SW
GND
TEMP_RTT
GND
FAN_CONT2
GND
FAN_CONT
GND
PWR_CONT
GND
PWR_PRT
GND
RFL_PWR
GND
FWD_PWR
GND
FAN_CURR
GND
PA_CURR
GND
NC(FAN_CURR2)
GND
CN2
E23-0902-05
CN21
CN8
E41-2671-05
FAN 1
CN3
FAN 2
PA CURR
ANT SW
PWR CONT
PWR_PRT
PRT
FC1
FC2
X45-382 B/5
FUSE UNIT
CN4
J13-0071-05
X45-382 C/5
DC UNIT
E41-2673-05
CN11
E41-2672-05
CN12
E41-2672-05
CN15
X45-382 D/5
N-DC UNIT
CN701
E41-2741-05
IC701
NJM78L05UA-ZB
IC702
LTC1046IS8
IC703
TK72130CS
L701
L702
L703
L704
X45-382 E/5
MIC UNIT
CN905
E41-1483-05
J901
E58-0526-05
VOLUME_IN
33MPU
GND
33AUD
SB
SCM_EN
GND
PTT_TXD_SCM
HOOK_RXD_SCM
MIG
MIC
1 NC
2 SB
3 GND
4 PTT_TXD_SCM
5 MIG
6 MIC
7 HOOK_RXD_SCM
8 SCM_EN

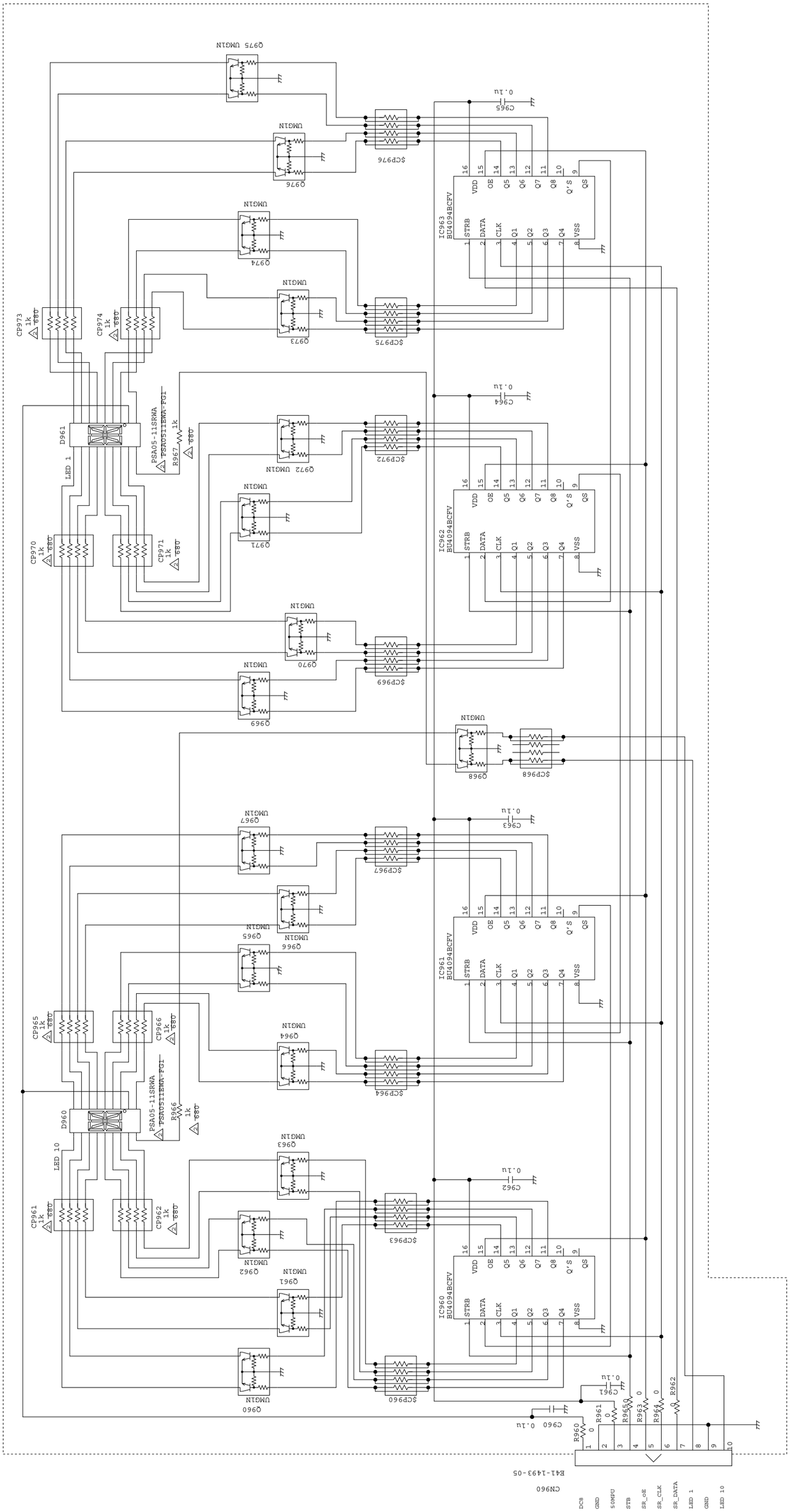

RX_SIGNAL
MONITOR_PORT
CN5 E04-0460-05
CN41 E04-0154-05
E1 F10-2379-04
E2 F10-2409-04
E3 F10-3080-04
MIX
A1 W02-1940-05
IC4 TA75S01F-F
XF1 L71-0661-05
XF2 L71-0660-05
XF3 L71-0648-05
XF4 L71-0647-05
WIDE
NARROW
IC12 TA31137FNG
IC20 NJM4558E-ZB
IC29 NJM2732V
IC32 NJM2732V
IC28 AD1582
IC30 AD7908BRU
IC35 LM50BIM3/NOPB
IC13 AD607Z
IC14 AD8051ART
IC22 XC6204B332M
IC23 BH2220FVM
IC9 UPB1509GV
IC10 TK11230CMCL-G
IC6 LMC7101BIM5
IC33 LMC7101BIM5
VCO_A
VCO_B
IC5 ADF4111BCP7
IC11 ADF4111BCP7
IC7 AD9835BRUZ
IC8 NJU6368PF1
CF1 L72-1019-05
IC15 NJM78L05UA-ZB
IC16 NJM78L05UA-ZB
IC17 NJM78M05DL1AZB
IC18 NJM78M05DL1AZB
IC19 NJM78M05DL1AZB
IC24 NJM7808FA-ZB
IC25 NJM7808FA-ZB
IC26 NJM2386ADL3-09
IC27 NJM2386ADL3-09
IC31 S24CS02AFJTBG
To ADC_VIN3
To ADC_VIN4
From DAC_PO1
RX_IF_VN
CN43 E04-0193-05
CN42 E40-6656-05
GND
GND
NC
RX_POWER_SAVE
DDS_EN
VCO_BAND_SW
PLL1_EN
DA_EN
SIF_CLK
GND
SIF_DAT
RX_AUDIO
PLL_PWR_SAVE
GND
NC
FM_RSSI
PLL2_EN
AGC_RSSI
PLL_LOCK_DET
CONT_5.0V
NC
AD_DAT_READ
GND
AD_CLK
NC(IF_NW_SW)
AD_DAT_WRITE
IF_BW_SW
AD_CS
D_GND
E2PROM_SCL
CONT_5.0V
E2PROM_SDA
D_GND
WP
GND
GND
CN44 E41-2672-05
GND
POWER
POWER
CN45 E04-0193-05
19.2MHz REF_SIG

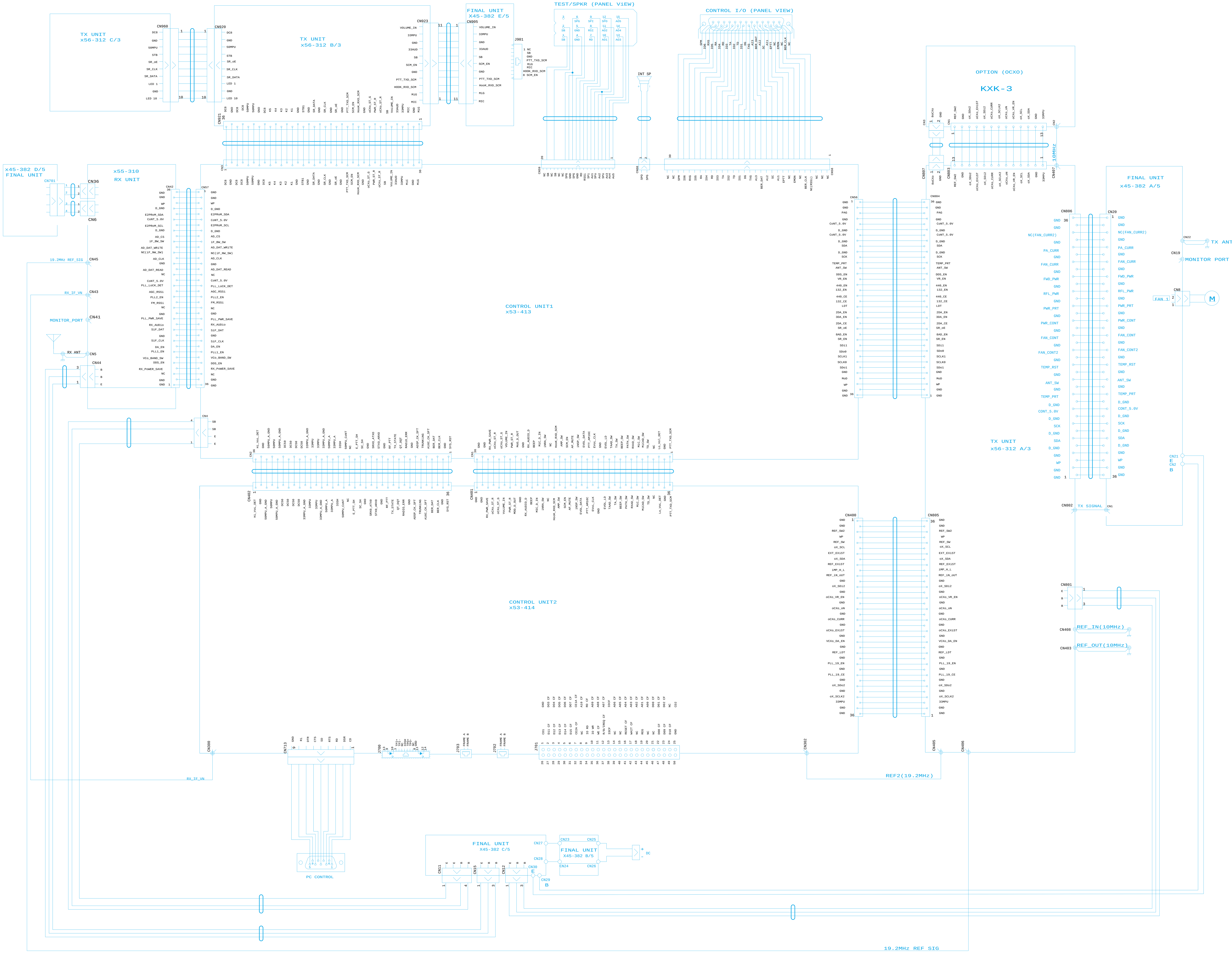


13.8V
GND SPRING
TX OUT
Ctrl Analog
Final
Ctrl Digital
REF1
REF2
REF_IN
OCXO
REF_OUT
LPF12
LPF13

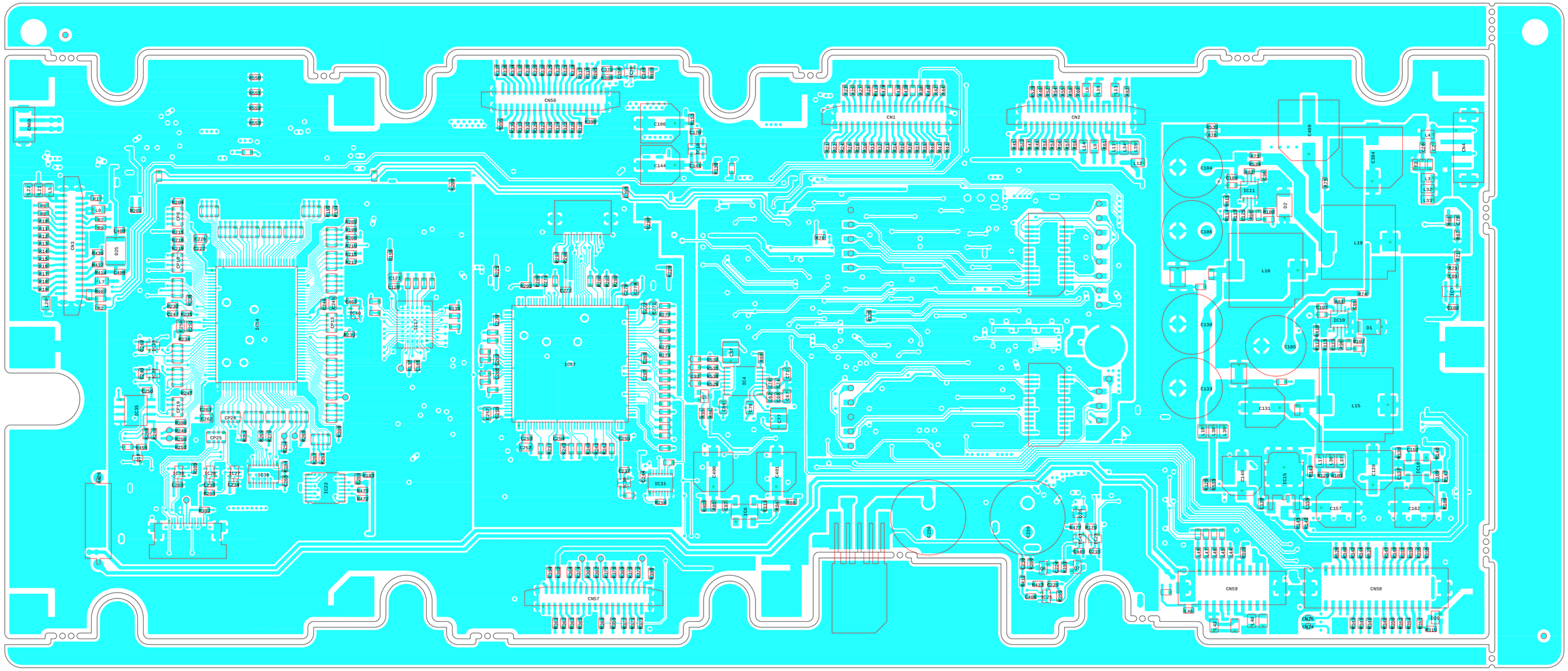


CN920
E41-1493-05
DC8
GND
50MPU
STB
SR_oE
SR_CLK
SR_DATA
LED 1
GND
LED 10
IC922
TC7SET126FU-F
IC921
IC920
TC7SET126FU-F
R920
R921
R922
R923
R924
R925
C920
0.1u
C921
C922
C923
C924
C925
IC923
BU4094BCFV
STRB
DATA
CLK
VDD
OE
VSS
S920
S921
S922
S923
S924
S925
S70-0502-05
CP920
CP923
1k
Q920
Q921
Q922
UMG1N
$CP921
$CP922
D920
D921
D922
D923
D924
B30-2265-05
D925
D926
D927
D928
D929
D930
D931
D932
B30-2171-05
R951
R933
R936
R937
R938
R939
R940
R941
1.2k
820
CP926
CP928
680
Q923
Q924
Q925
Q926
Q927
Q928
Q929
Q930
CP924
$CP925
$CP927
$CP929
$CN924
IC924
BU4094BCFV
IC925
BU4094BCFV
C928
C929
0.1u
IC926
NJM2732V
AoOUTPUT
A-INPUT
A+INPUT
GND
V+
BoUTPUT
B-INPUT
B+INPUT
C930
1u
C931
1u
C932
47p
R943
220k
R950
8.2k
R942
0
R946
10k
C937
0.01u
R947
0
R948
100k
R949
100k
C938
10u
2SC4116(Y)F
Q931
R944
1k
C933
1.5u
C936
0.1u
D933
HSM88AS-E
2SA1586(Y)F
Q932
R945
1k
C934
1.5u
C935
0.1u
D934
HSM88AS-E
D935
D936
1SS355
$D937
$D938
$D939
$D940
$C940
$C944
$C942
C939
1000p
C941
1000p
CN923
E41-1483-05
VoLUME_iN
33MPU
GND
33AUD
SB
SCM_EN
GND
PTT_TXD_SCM
HooK_RXD_SCM
MiG
MiC
CN921
E40-6656-05
C926
1000p
C943
0.1u
$C927
R926
R927
R928
R929
R930
R931
R932
R934
R935
DC8
GND
50MPU
K5
K4
K3
K2
K1
STB1
SR_DATA
SR_CLK
SR_oE
PTT_TXD_SCM
SCM_EN
HooK_RXD_SCM
PWR_ST_R
SB
VOLUME_IN
33AUD
33MPU
MIC
MIG


Q975 UMG1N
Q976
$CP976
C965 0.1u
IC963 BU4094BCFV
VDD OE Q5 Q6 Q7 Q8 Q'S QS
STRB DATA CLK Q1 Q2 Q3 Q4 VSS
Q974
Q973
$CP975
CP973 1k
CP974 1k
C964 0.1u
D961
PSA05-11SRWA
PSA0511EWA-PG1
R967 1k
LED 1
Q972
$CP972
IC962 BU4094BCFV
CP970 1k
CP971 1k
Q971
Q970
$CP969
Q969
Q968
$CP968
Q967
$CP967
C963 0.1u
IC961 BU4094BCFV
Q965
Q966
CP965 1k
CP966 1k
Q964
$CP964
D960
R966 1k
LED 10
Q963
$CP963
CP961 1k
CP962 1k
Q962
Q961
IC960 BU4094BCFV
C962 0.1u
$CP960
Q960
C961 0.1u
C960 0.1u
R960 0
R961 0
R955 0
R963 0
R964 0
R962
E41-1493-05
CN960
DC8
GND
5OMPU
STB
SR_OE
SR_CLK
SR_DATA
LED 1
GND
LED 10



TX UNIT
X56-312 C/3
TX UNIT
X56-312 B/3
FINAL UNIT
X45-382 E/5
TEST/SPKR (PANEL VIEW)
CONTROL I/O (PANEL VIEW)
INT SP
OPTION (OCXO)
KXK-3
X45-382 D/5
FINAL UNIT
X55-310
RX UNIT
19.2MHz REF SIG
RX_IF_VN
MONITOR PORT
RX ANT
CONTROL UNIT1
X53-413
FINAL UNIT
X45-382 A/5
TX ANT
MONITOR PORT
FAN 1
M
TX UNIT
X56-312 A/3
TX SIGNAL
CONTROL UNIT2
X53-414
REF_IN(10MHz)
REF_OUT(10MHz)
REF2(19.2MHz)
RX_IF_VN
PC CONTROL
FINAL UNIT
X45-382 C/5
FINAL UNIT
X45-382 B/5
DC
19.2MHz REF SIG



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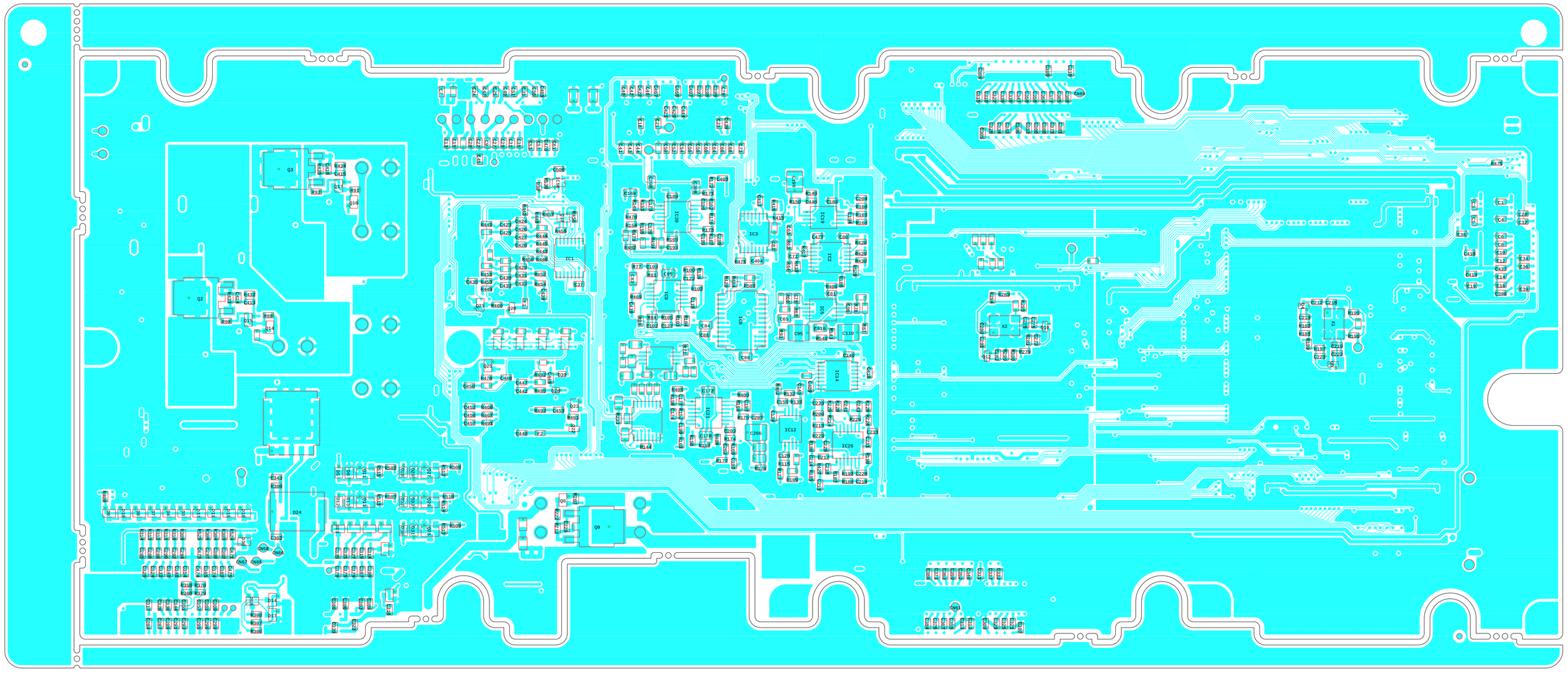

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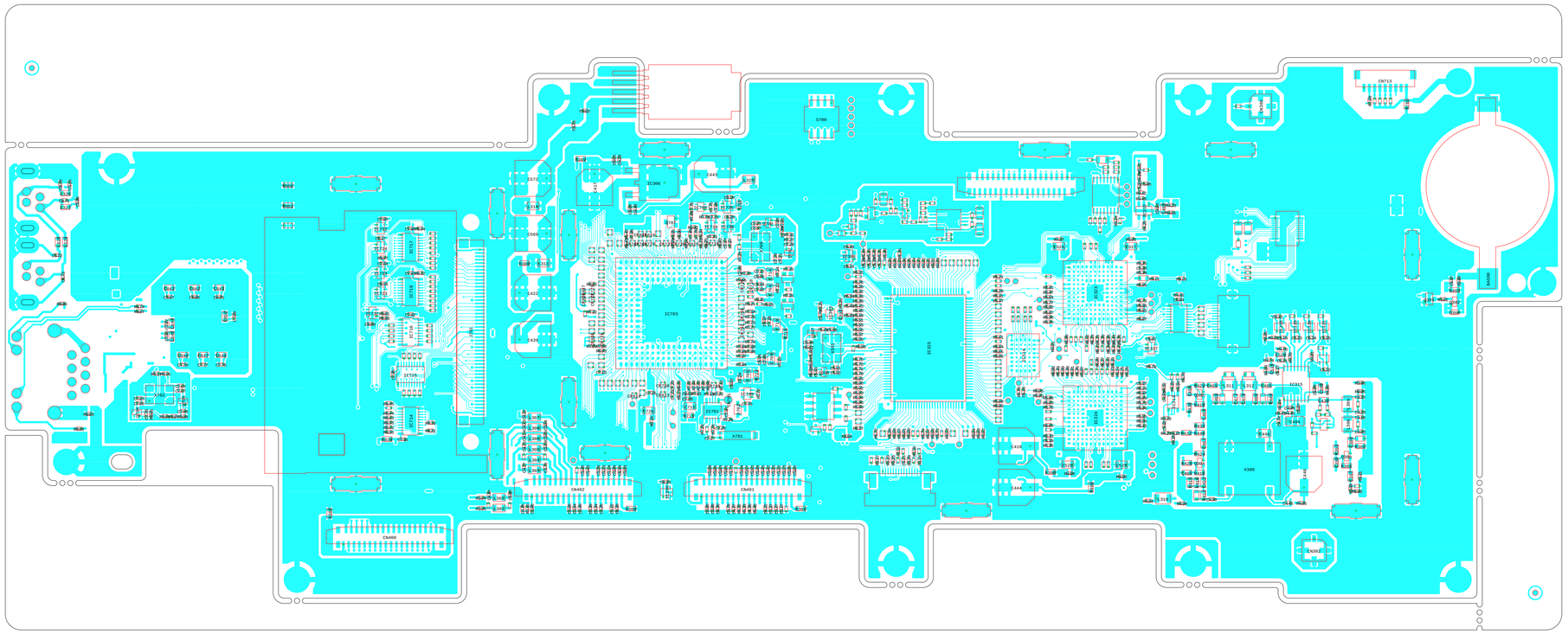

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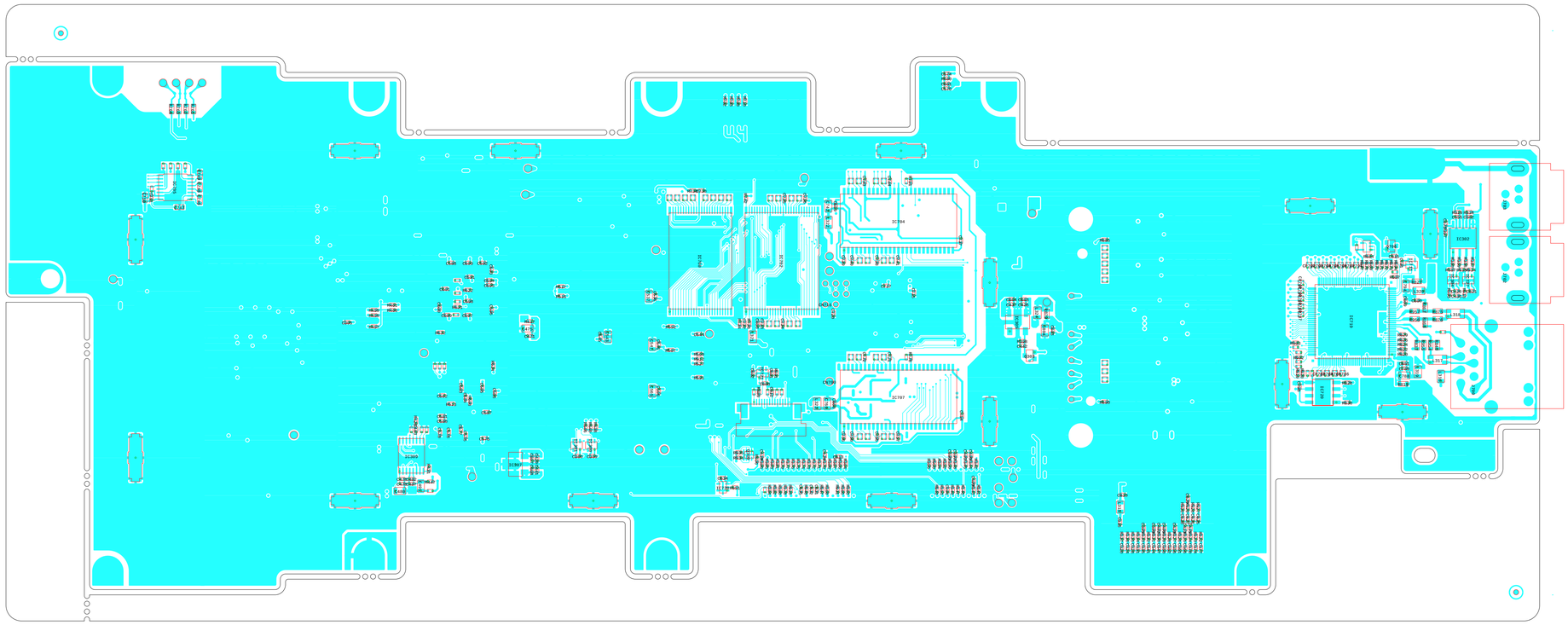

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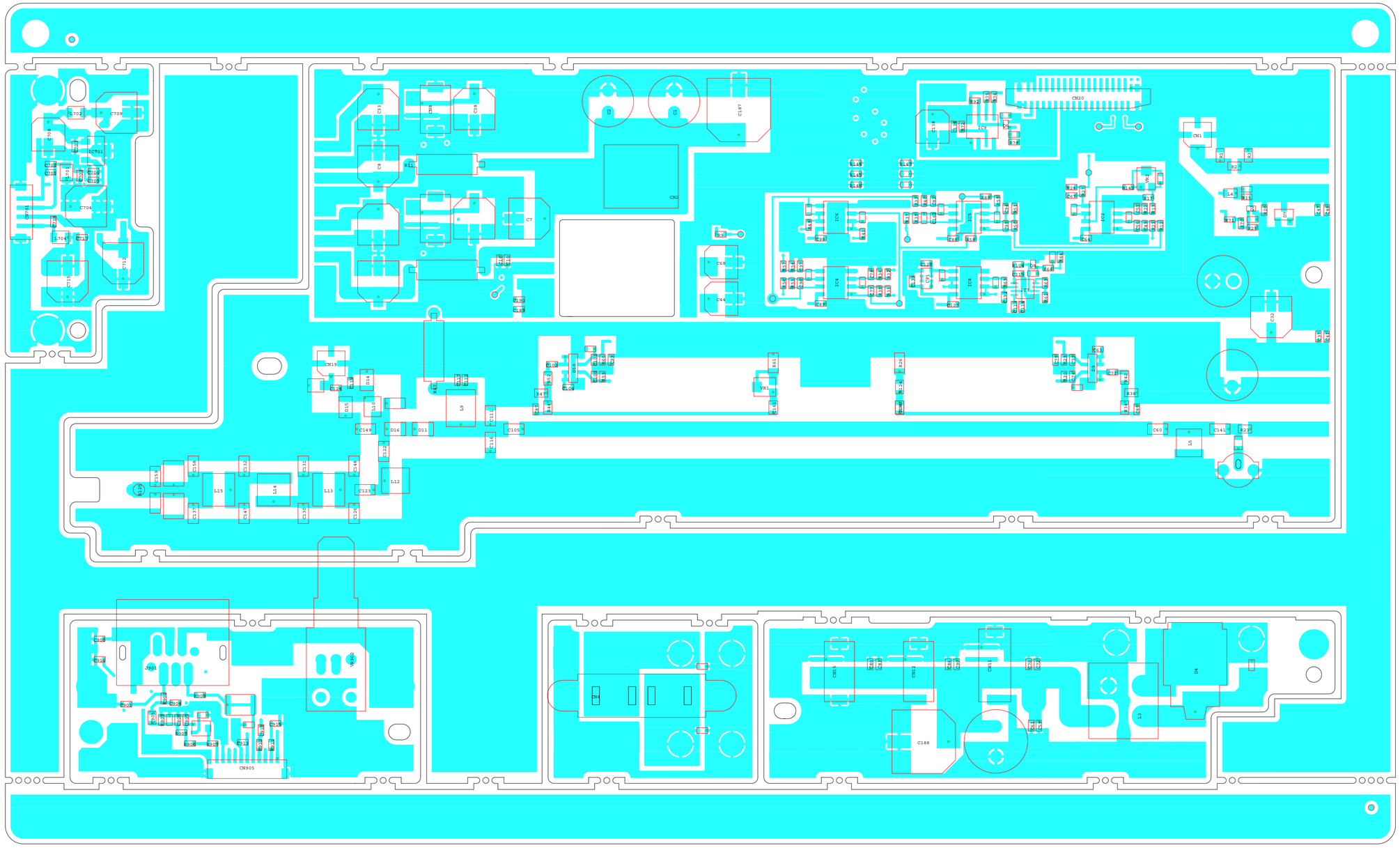

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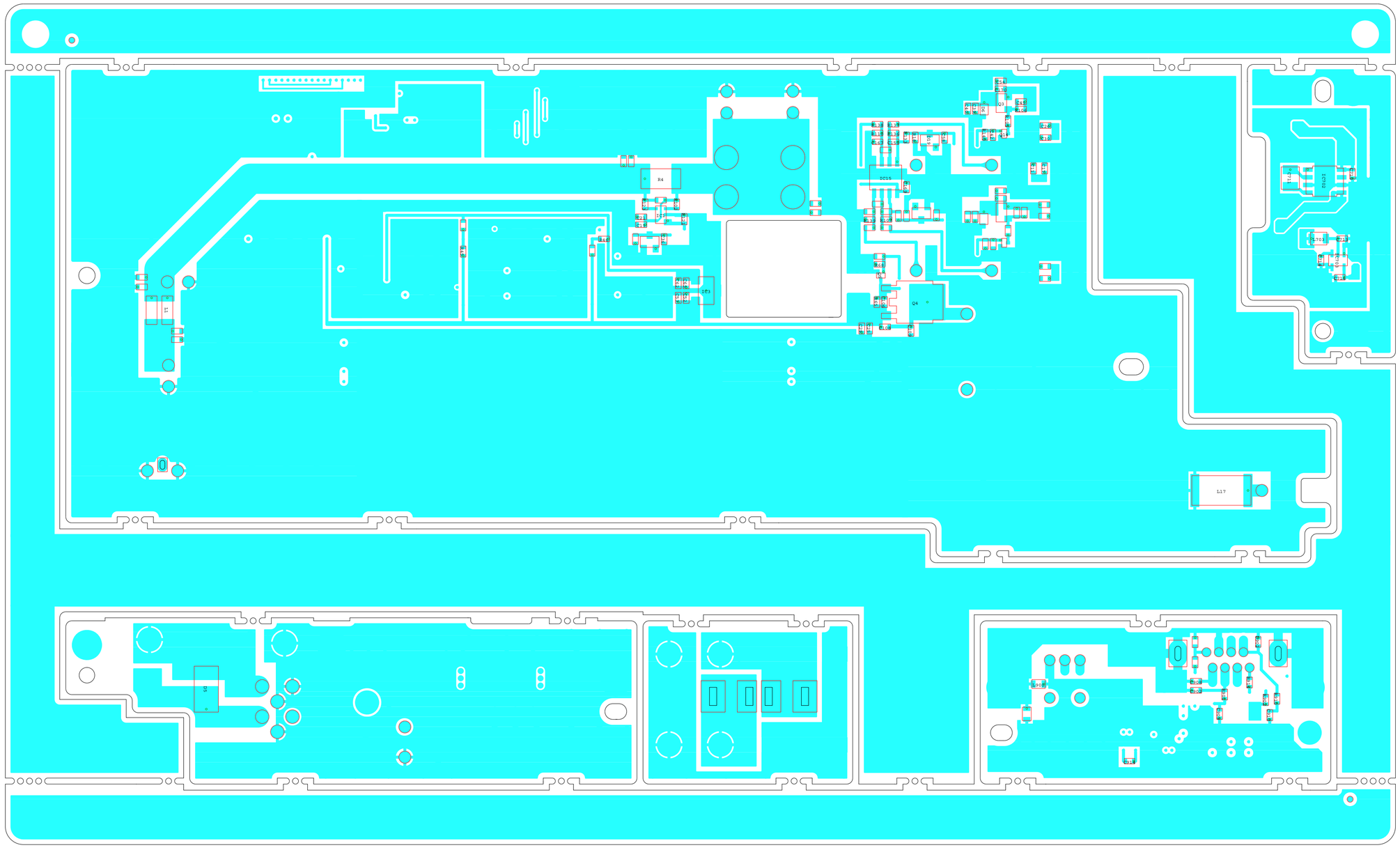

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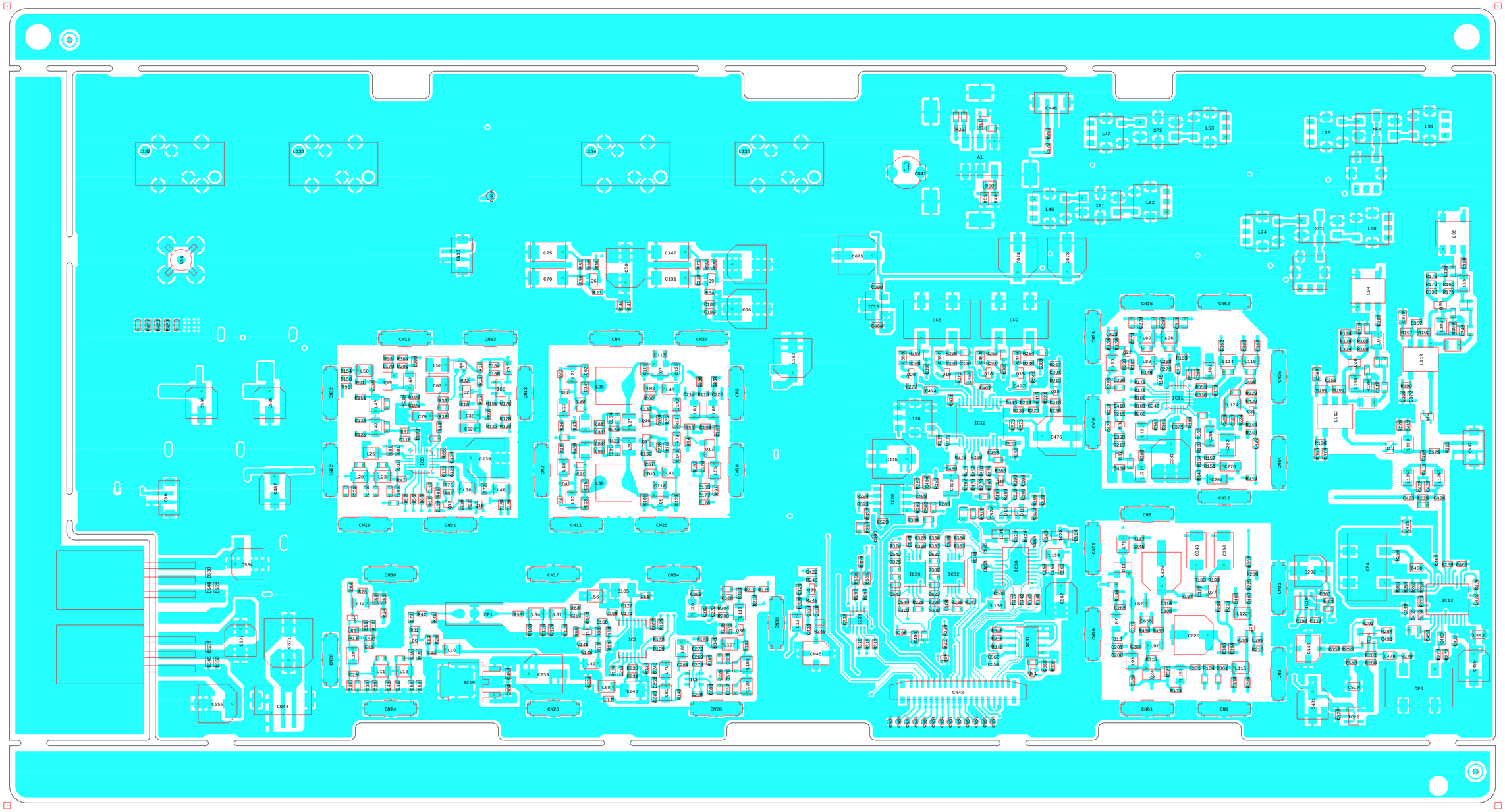

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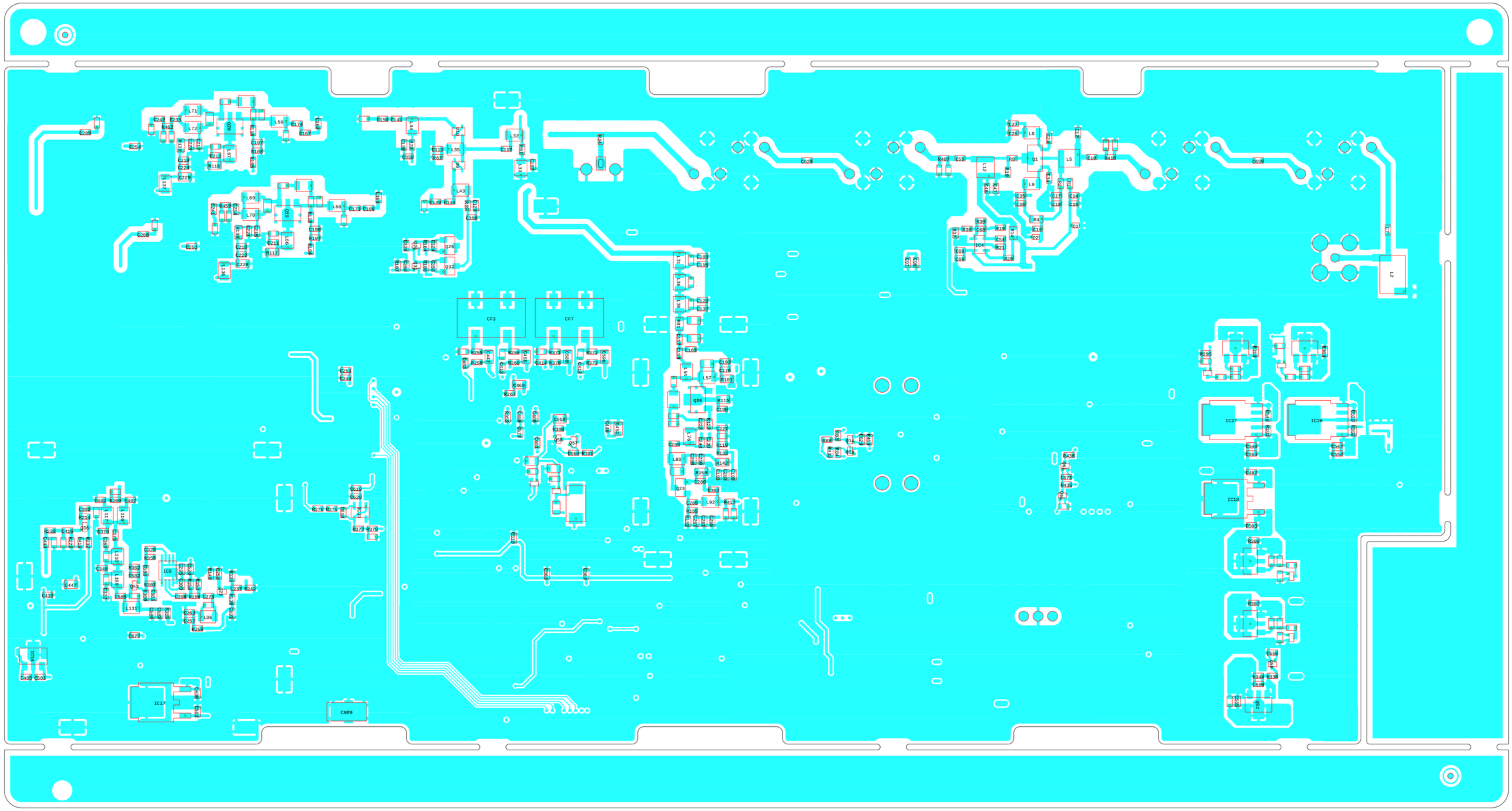

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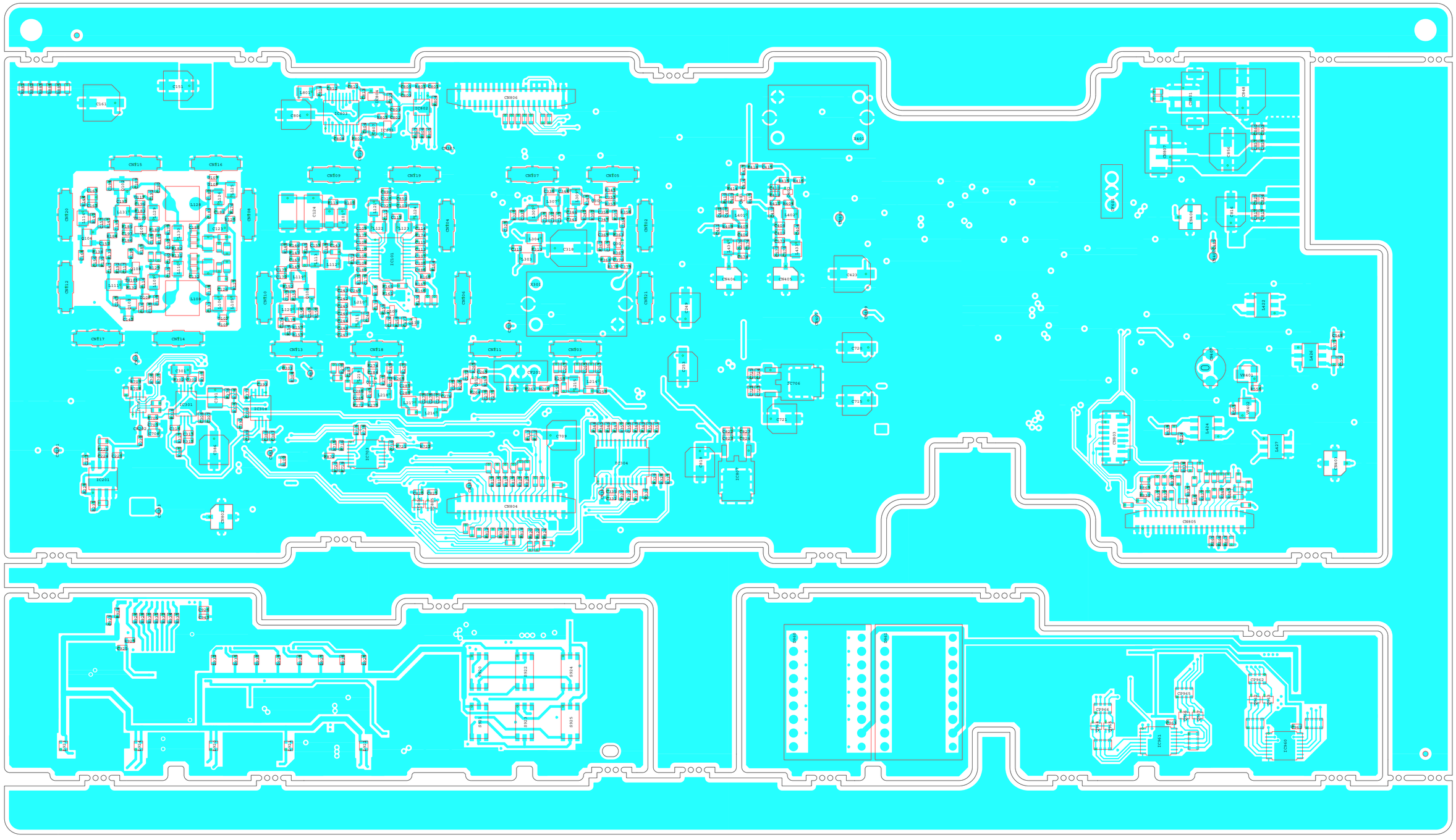

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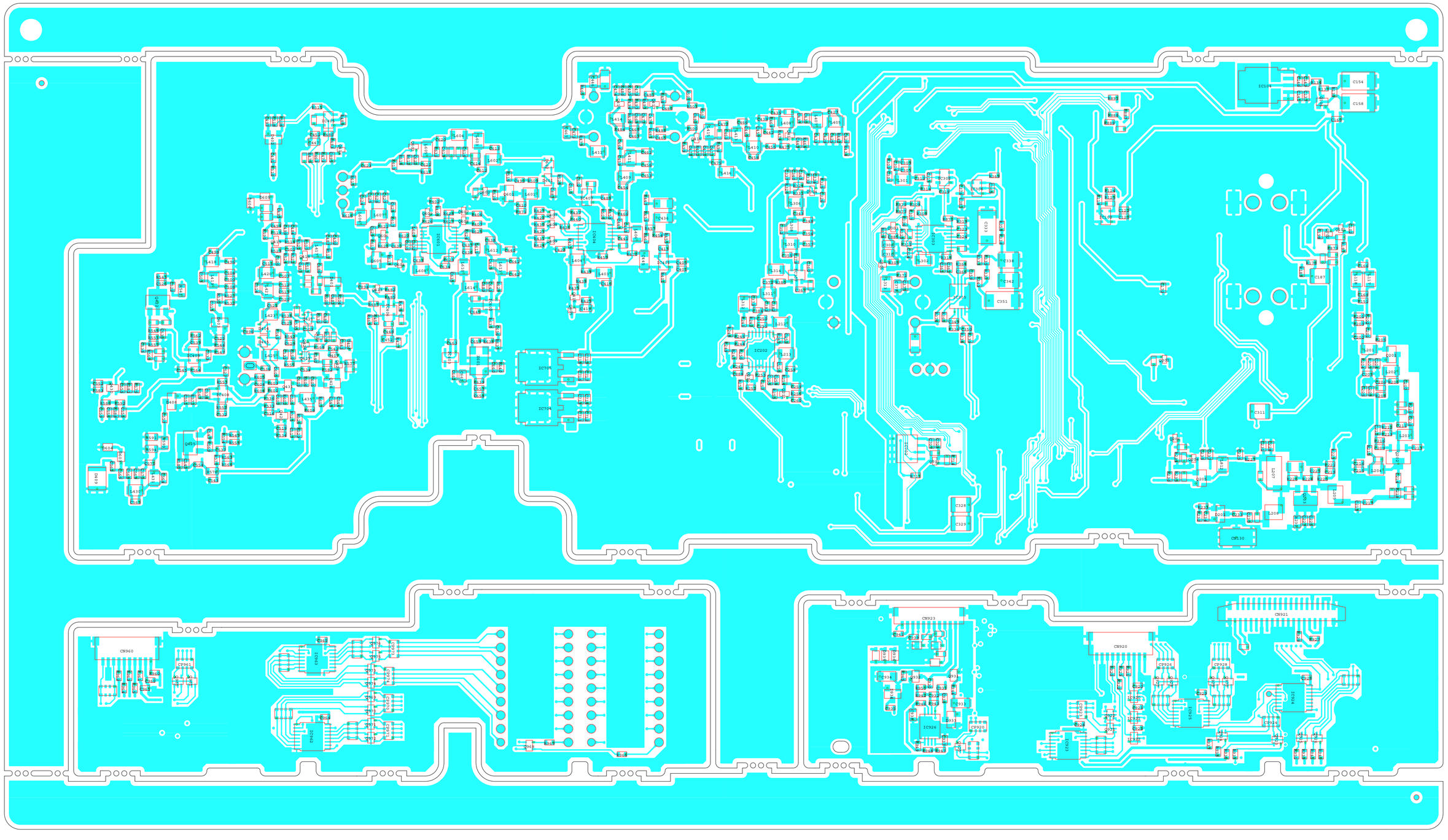

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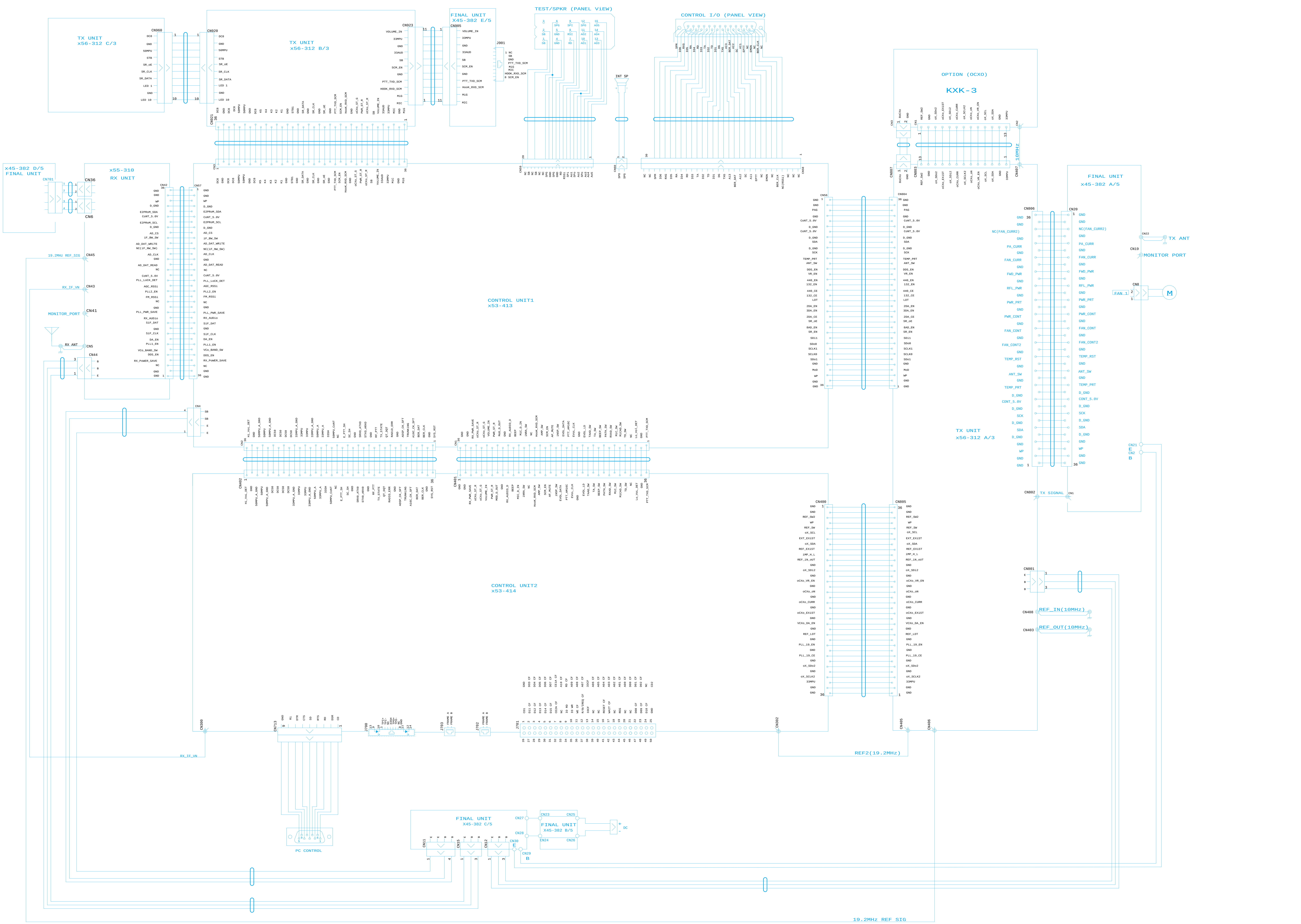

TX UNIT
x56-312 C/3
TX UNIT
x56-312 B/3
FINAL UNIT
X45-382 E/5
TEST/SPKR (PANEL VIEW)
INT SP
CONTROL I/O (PANEL VIEW)
OPTION (OCXO)
KXK-3
x45-382 D/5
FINAL UNIT
x55-310
RX UNIT
19.2MHz REF SIG
RX_IF_VN
MONITOR PORT
RX ANT
CONTROL UNIT1
x53-413
FINAL UNIT
x45-382 A/5
TX ANT
MONITOR PORT
FAN_1
TX UNIT
x56-312 A/3
TX SIGNAL
CONTROL UNIT2
x53-414
REF_IN(10MHz)
REF_OUT(10MHz)
REF2(19.2MHz)
PC CONTROL
FINAL UNIT
X45-382 C/5
FINAL UNIT
X45-382 B/5
DC
19.2MHz REF SIG

NXR-800-K4 Specifications

1. General

Model Name		NXR-800-K4
Description of Product		UHF DIGITAL BASE-REPEATER
Category		Mobile Device (Repeater)
FCC	ID	None
	FCC Rule Part	15B, 90, 90.210, 95 and Confidentiality
	Frequency Ranges	380.0MHz to 400MHz
	Application Purpose	Original Equipment
Channel Spacing		25 kHz / 12.5 kHz / 6.25 kHz
Number of Channels:		30 ch
Type of Emission		16K0F3E, 11K0F3E, 8K30F1E, 8K30F1D, 8K30F7W, 4K00F1E, 4K00F1D, 4K00F7W, 4K00F2D
Power Supply Voltage:		DC 13.8V (10.8 to 15.9V)
Antenna Impedance:		50 Ω
Operating Temperature:		-30 °C to +60 °C
Dimension:		W 482.6 mm x D 365.0 mm x H 44.0 mm
Weight:		5.0 kg

2. RECEIVER

Conversion type	Double conversion
Intermediate freq	1st 49.95MHz (Lower), 2nd 450 kHz (Lower)

3. TRANSMITTER

Output Power	5W (Power output continuously variable to 0.5 W)
Maximum deviation:	± 5 kHz (16K0F3E) / ± 2.5 kHz (11K0F3E)
Frequency stability:	± 0.5 ppm with KXK-3 OCXO UNIT (-30 to +60 °C)
Current consumption:	7.5 A max.