

ADJUSTMENT

Updating the Firmware

The firmware of the main MCU and DSP can be updated using the "TS-590 Update" update software. Update the firmware according to the procedure displayed in update software.

Refer to the help file of the update software for a detailed procedure.

Download the latest "TS-590 Update" update software from the following URL:

http://www.kenwood.com/i/products/info/amateur/software_download.html

* The URL may change without notice.

Note: Update the firmware after replacing the main MCU or Flash memory.

Required Test Equipment

1. DC Voltmeter (DC V.M)

- 1) Input resistance: More than 1MΩ
- 2) Voltage range: 1.5 to 1000V AC/DC

Note: A high-precision multimeter may be used. However, accurate readings can not be obtained for high-impedance circuits.

2. DC Ammeter

- 1) Current range: 100mA, 1.5A, 30A, high-precision ammeter may be used.

3. RF VTVM (RF V.M)

- 1) Input impedance: 1MΩ and less than 3pF, min.
- 2) Voltage range: 10mV to 300V
- 3) Frequency range: 10kHz to 500MHz

4. AF Voltmeter (AF V.M)

- 1) Frequency range: 50Hz to 10kHz
- 2) Input resistance: 1MΩ or greater
- 3) Voltage range: 10mV to 30V

5. AF Generator (AG)

- 1) Frequency range: 200Hz to 5kHz
- 2) Output: 1mV or less to 1V, low distortion

6. AF Dummy Load (DM. SP)

- 1) Impedance: 8Ω
- 2) Dissipation: 3W or greater

7. Oscilloscope

Requires high sensitivity, and external synchronization capability (150MHz or greater).

8. Standard Signal Generator (SSG)

- 1) Frequency range: 50kHz to 60MHz
- 2) Output: -133dBm/0.1μV to 7dBm/1V
- 3) Output impedance: 50Ω
- 4) AM and FM modulation can be possible

Note: Generator must be frequency stable.

9. Frequency Counter (f. counter)

- 1) Minimum input voltage: 50mV
- 2) Frequency range: 150MHz or greater

10. Noise Generator (Noise G.)

Must generate ignition noise containing harmonics beyond 60MHz.

11. Audio Analyzer

12. RF Dummy Load

- 1) Impedance: 150Ω and 50Ω
- 2) Dissipation: 150W or greater

13. Linear Detector

- 1) Frequency range: 60MHz or greater

14. Power Meter

- 1) Impedance: 50Ω
- 2) Dissipation: 300W continuous or greater
- 3) Frequency limits: 60MHz or greater

15. Spectrum Analyzer

- 1) Frequency range: 100kHz to 140MHz or greater
- 2) Bandwidth: 1kHz to 3MHz

16. Tracking Generator

17. Directional Coupler

18. Monitor Receiver

19. Microphone

MC-43S or MC-60S8

20. Distortion Meter

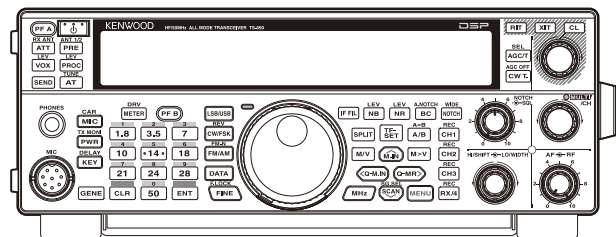
21. Double Signal Pad (50Ω)

Preparation

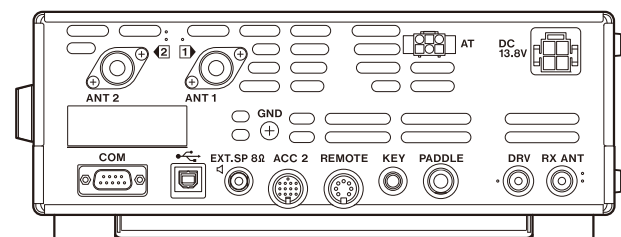
Unless otherwise specified, knobs and switches should be set as follows.

POWER ON
 NOTCH Center
 AF MIN
 RF MAX
 SQL MIN

■ Front panel



■ Rear panel

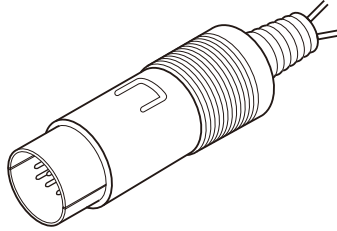


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Service Jig

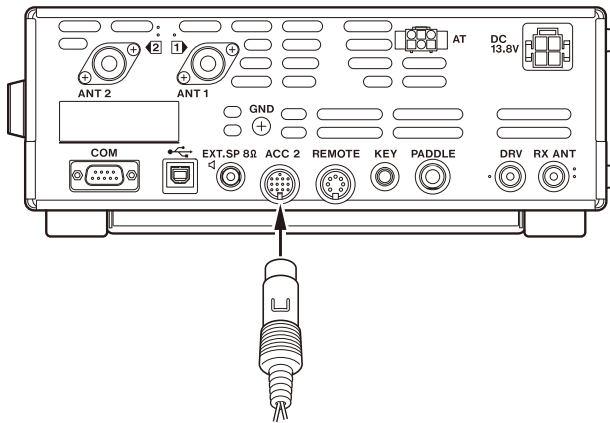
■ ACC 2 connector short plug

Use the same adjustment jig as the TS-570.



■ How to use the ACC 2 connector short plug

Insert the adjustment jig into the ACC 2 connector located on the rear panel of the transceiver.



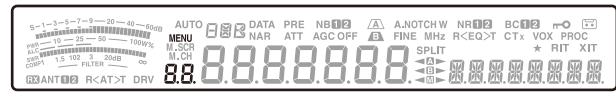
Adjustment Mode

■ Outline

1. You can adjust the transceiver in service adjustment mode (adjustment using the panel keys) or with manual adjustment (turning a coil and trimmer, etc). The service adjustment mode (hereinafter referred to as "adjustment mode") has 63 items (Menu No. 00 to 62) and all adjustment data is stored in the EEPROM (X53-446 A/3: IC309).
2. You can enter adjustment mode and change each setting data.
3. New data is written to the EEPROM by performing Menu No. 60 writing.

■ Operation procedures in adjustment mode

1. How to start the adjustment mode
 - Insert the adjustment jig into the ACC 2 connector located on the rear panel of the transceiver.
 - Turn the transceiver ON while pressing the [MIC] key and [NR] key, to enter adjustment mode and the Menu No. appears on the Memory channel number display. Remove the adjustment jig from the transceiver when the Menu No. appears.



Menu No.

2. Select the adjustment mode Menu No.
Turn the [MULTI/CH] knob to change the Menu No.
3. Change the adjustment mode setting data
Setting data can be changed using the [MR] or [SCAN] key.
4. Write the adjustment mode data
Press the [MR] or [SCAN] key on the main unit or the [UP] or [DWN] key on the microphone on Menu No. 60.
5. Cancel the adjustment mode
Press the [CLR] key to return to normal VFO mode.

Note: When the power is turned OFF during the adjustment mode, adjustment mode is canceled.

■ Adjustment Mode Menu (Menu No. 00~62)

No.	Adjustment Item	Display	Condition		
			Frequency (MHz)	RX IF (MHz)	Mode
00	CAR Point	10M 2.7k	1.81	73	USB
01		11M 2.7k	1.81	11	USB
02		11M 500H	1.81	11	CW
03	HF 11M IF Gain	HF11 GAIN	14.2	11	USB
04	HF 73M IF Gain	HF73 GAIN	14.2	73	USB
05	11M Mix BAL	HF11 BAL	0.136	11	USB
06	73M Mix BAL	HF73 BAL	0.100	73	USB
07	AGC Reference	AGC REF	14.2	73	USB
08	HF S-Meter	HF.SSB S1	14.2	11	USB
09		HF.SSB S9			
10		HF.SSB SF			
11	HF FM S-Meter	HF.FM. S1	29.2	73	FM
12		HF.FM.SFUL			
13	HF FM Squelch	HF.FM.SQ.TH	29.2	73	FM
14		HF.FM.SQ.TI			
15	50M IF Gain	50. GAIN	50.2	73	USB
16	50M S-Meter	50.SSB S1	50.2	73	USB
17		50.SSB S9			
18		50.SSB SF			
19	50M FM S-Meter	50.FM S1	50.2	73	FM
20		50.FMSFUL			
21	50M FM Squelch	50.FM.SQ.TH	50.2	73	FM
22		50.FM.SQ.TI			
23	ALC Reference	ALC REF	14.1	73	USB
24	POC/ Power Meter	POC 100W	14.1	73	CW
25		P.MTR 100W	14.1		
26		50M 100W	50.1		

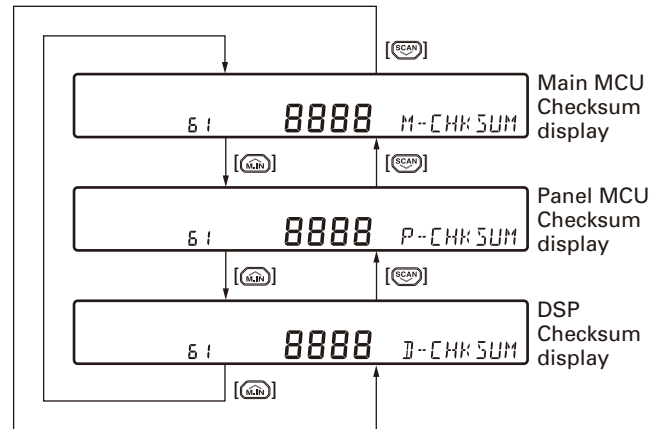
ADJUSTMENT

No.	Adjustment Item	Display	Condition		
			Frequency (MHz)	RX IF (MHz)	Mode
27	POC/ Power Meter	50P.M100W	50.1	73	CW
28		POC 50W	14.1		
29		P.MTR 50W			
30		POC 25W			
31		P.MTR 25W			
32		POC 10W			
33		P.MTR 10W			
34		POC 5W			
35		P.MTR 5W			
36	TX Gain	TGC 14M		14.1	73
37	ALC Meter	ALC.START	14.1	73	CW
38		ALC.MAX			
39	TGC	TGC LW	0.136	11	CW
40		TGC 1.8M	1.83		
41		TGC 3.5M	3.51		
42		TGC 5M	5.30		
43		TGC 7M	7.01		
44		TGC 10M	10.1		
45		TGC 18M	18.1		
46		TGC 21M	21.1		
47		TGC 24M	24.9		
48		TGC 28M	29.1		
49	TGC 50M	50.1	73		
50	PGC	PGC 50W	14.1	73	CW
51		PGC 25W			
52		PGC 10W			
53		PGC 5W			
54	FM Deviation	DEV.WIDE	29.1	11	FM
55		DEV.NAROW	73		
56	Current	CURRENT	28.0	73	USB
57	PRO	SWR PRO	14.1	73	USB
58	SWR	HF SWR	14.1		USB
59		50M SWR	50.1		USB
60	WRITE	WRITE ROM	-	-	-
61	CHECKSUM	M-CHKSUM	-	-	-
62	Display check	-	-	-	-

• MENU No.61 is a checksum confirmation mode

The checksum of the main MCU, the panel MCU, and the DSP can be confirmed using the [GAIN] key or [SCAN] key.

- The checksum value of the main MCU appears on the 7 segment display while [M-CHKSUM] appears on the 13 segment display.
- The checksum value of the panel MCU appears on the 7 segment display while [P-CHKSUM] appears on the 13 segment display.
- The checksum value of the DSP appears on the 7 segment display while [D-CHKSUM] appears on the 13 segment display.



ADJUSTMENT

Display Check


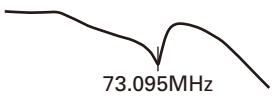
Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting and full reset	1) Connect the DC cord to the DC power supply. DC IN: DC 13.8V							
	2) Full reset (1) Turn the transceiver ON by pressing the power switch while the [A/B] key is pressed, and the reset confirmation message appears. (2) Turn the [MULTI/CH] control and select "FULL RESET". (3) Press [A/B] to perform the Full reset.				Front panel	LCD	After displaying "HELLO", the display is reset as follows; DISP f.: 14.000.00 Mode: USB Meter: ALC ANT: 1 AGC PRE	Display should be normal. Should be at the reset frequency.
2. LCD all segments light	1) Menu No.: 62						Check	LCD all segments light.

PLL Section

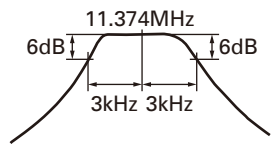
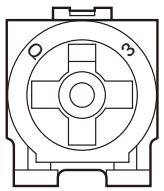
Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. LO2 level	1) Display f.: 14.100MHz Mode: FM Disconnect the cable from CN508 and insert a cable from the spectrum analyzer. After the adjustment, connect the cable to CN508.	Spectrum analyzer	Control (B/3)	CN508 (LO2)	Control (B/3)	L505	Level max.	-15dBm or more
2. LO2 (62.4MHz) frequency	1) Display f.: 14.100MHz Mode: FM Disconnect the cable from CN508 and insert a cable from the frequency counter. After the adjustment, connect the cable to CN508.	f. counter				TC501	62.4MHz	±40Hz Note: If the SO-3 is installed in the transceiver, do not make the LO2 (62.4MHz) frequency adjustment.
3. LO1 level	1) Display f.: 1.900MHz Mode: USB Disconnect the cable from CN654 and insert a cable from the spectrum analyzer. After the adjustment, connect the cable to CN654.	Spectrum analyzer		CN654 (LO1)		L668 L673 L677	Level max.	-7dBm or more
	2) Display f.: 7.1500MHz Mode: USB Disconnect the cable from CN654 and insert a cable from the spectrum analyzer. After the adjustment, connect the cable to CN654.				L671 L676 L681	Level max.	-3dBm or more	
4. Lock voltage	1) Display f.: 14.100MHz Mode: FM	DC V.M		CV		TC801	2.5V	±0.1V

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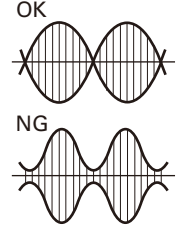


Receiver Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
<ul style="list-style-type: none"> Perform the following in the adjustment mode. Item 4 and 8~22. To terminate the adjustment menu in the middle, save your settings with Menu No. 60. 								
1. Trap frequency (E type only)	1) Display f.: 15.501MHz Mode: USB PRE-AMP: ON	Tracking generator Spectrum analyzer	Rear panel TX-RX (A/2)	ANT 1 CN201	TX-RX (A/2)	TC102	Adjust TC102 to get a null point at 15.501MHz as shown.	
	• 15.5MHz						2) Display f.: 11.700MHz Mode: USB PRE-AMP: ON	TC101
2. HF BPF	1) Display f.: 7.200MHz Mode: USB PRE-AMP: ON					L133 L150 L167		Adjust the coils to obtain the frequency response as shown.
	• 11.7MHz						2) Display f.: 14.200MHz Mode: USB PRE-AMP: ON	L134 L153 L168
3. IF Trap (73.095MHz)	1) Display f.: 50MHz Mode: USB PRE-AMP: ON					L135	Adjust L135 at 73.095MHz to minimum level.	

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Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
4. MCF (11.374MHz)	1) Menu No.: 54 Mode: USB Spectrum analyzer setting Center f.: 11.374MHz Frequency span: 20kHz XdB/DIV: 10dB TG level: 0dBm RBW: 300Hz VBW: 1kHz Connect the tracking generator output to CN301. Connect the spectrum analyzer input to CN302.	Tracking generator Spectrum analyzer	TX-RX (A/2)	CN301 CN302	TX-RX (A/2)	L301 L302	Adjust the coils to obtain the frequency response as shown.	
	5. MCF (73.095MHz)	1) Display f.: 29.200MHz Mode: FM Spectrum analyzer setting Center f.: 73.095MHz Frequency span: 100kHz XdB/DIV: 10dB TG level: 0dBm RBW: 3kHz VBW: 10kHz Connect the tracking generator output to CN303. Connect the spectrum analyzer input to CN304.						
6. RX Trap • 11.3745MHz • 44.150MHz	1) Display f.: 21.4MHz Mode :USB PRE-AMP: ON SSG f.: 11.3745MHz SSG output: -30dBm (7.07mV)	SSG AF V.M	Rear panel	ANT 1 EXT. SP	L253 L255	Check S-meter is not appear. AF output min. Repeat adjust for 2 to 3 times.	If S-meter is appear, turn SSG level settings down until S-meter is not appear.	
	2) Display f.: 21.4MHz Mode: USB PRE-AMP: ON SSG f.: 44.150MHz SSG output: -30dBm (7.07mV)				TC105			Check S-meter is not appear. AF output min.
7. FM discriminator	1) Display f.: 29.200MHz Mode: FM PRE-AMP: ON AF output: 0.63V/8Ω SSG f.: 29.200MHz SSG output: -53dBm (0.501mV) MOD: 1kHz DEV: 3kHz	SSG Oscilloscope AF V.M Distortion meter DM.SP Audio analyzer			L595	Adjust the L595 to AF maximum output of 0.63V/ 8 ohms. Check the distortion and the waveform is a good sine wave.	AF max. 2.3% or less	
8. 1st mixer balance	1) Adjustment of VR261				VR261	Adjust the volume position of VR261 as shown.		
	2) Menu No.: 06 (100kHz, USB) PRE-AMP: OFF SSG: OFF	SSG AF V.M	Rear panel	ANT 1 EXT. SP	VR321	Noise min.		

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Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
9. Carrier point (XF473 10.695M /2.7k)	1) Menu No.: 00 (1.81MHz, USB) AGC: OFF SSG1 f.: 1.81010MHz SSG2 f.: 1.81290MHz SSG output: -33dBm (5.01mV)	SSG1 SSG2 2 signal pad Oscilloscope	Rear panel TX-RX (A/2)	ANT 1 TP2 (CAR)	Front panel	[] or []	Change the adjustment values to get the waveform as shown.	
10. Carrier point (XF474 11.374M /2.7k)	1) Menu No.: 01 (1.81MHz, USB) AGC: OFF SSG1 f.: 1.81010MHz SSG2 f.: 1.81290MHz SSG output: -33dBm (5.01mV)							
11. Carrier point (XF475 11.374M /500)	1) Menu No.: 02 (1.81MHz, CW) AGC: OFF SSG1 f.: 1.80970MHz SSG2 f.: 1.81030MHz SSG output: -33dBm (5.01mV)							
12. AGC start level (11M)	1) Menu No.: 03 (14.2MHz, USB) SSG f.: 14.201MHz SSG output: -110dBm (0.707μV)	SSG Oscilloscope	Rear panel	ANT 1 EXT.SP			Adjust data until the display shown "1 to 2".	
13. AGC start level (73M) • 14M	1) Menu No.: 04 (14.2MHz, USB) SSG f.: 14.201MHz SSG output: -110dBm (0.707μV)	AF V.M DM.SP						
14. HF SSB S-meter • S1 • S9	1) Menu No.: 08 (14.2MHz, USB) SSG f.: 14.201MHz SSG output: -107dBm (1μV)						Set the SSG, then press the [] or [] key.	S-meter lights up to S1 position.
• Full scale (Lights up all)	2) Menu No.: 09 (14.2MHz, USB) SSG output: -81dBm (19.9μV)							S-meter lights up to S9 position.
	3) Menu No.: 10 (14.2MHz, USB) SSG output: -21dBm (19.9mV)							S-meter lights up all.
15. HF FM S-meter • S1 • Full scale (Lights up all)	1) Menu No.: 11 (29.2MHz, FM) SSG f.: 29.200MHz SSG output: -117dBm (0.316μV) MOD: 1kHz DEV: 3kHz							S-meter lights up to 1dot position.
	2) Menu No.: 12 (29.2MHz, FM) SSG output: -95dBm (3.98μV)							S-meter lights up all.
16. HF FM SQL thresh-old	1) Menu No.: 13 (29.2MHz, FM) SSG output: OFF MOD: 1kHz DEV: 3kHz							
17. HF FM SQL tight	1) Menu No.: 14 (29.2MHz, FM) SSG f.: 29.200MHz SSG output: -113dBm (0.501μV) MOD: 1kHz DEV: 3kHz							
18. AGC start level (73M) • 50M	1) Menu No.: 15 (50.2MHz, USB) SSG f.: 50.201MHz SSG output: -114dBm (0.4μV)						Adjust data until the display shown "1 to 2".	

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Item	Condition	Measurement			Adjustment			Specifications / Remarks																																																																																											
		Test-equipment	Unit	Terminal	Unit	Parts	Method																																																																																												
19. 50M SSB S-meter • S1 • S9 • Full scale (Lights up all)	1) Menu No.: 16 (50.2MHz, USB) SSG f.: 50.201MHz SSG output: -111dBm (0.63μV)	SSG Oscilloscope AF V.M DM.SP	Rear panel	ANT 1	Front panel	[G] or [C]	Set the SSG, then press the [G] or [C] key.	S-meter lights up to S1 position.																																																																																											
	2) Menu No.: 17 (50.2MHz, USB) SSG output: -85dBm (12.6μV)			EXT.SP				S-meter lights up to S9 position.																																																																																											
	3) Menu No.: 18 (50.2MHz, USB) SSG output: -25dBm (12.6mV)							S-meter lights up all.																																																																																											
20. 50M FM S-meter • S1 • Full scale (Lights up all)	1) Menu No.: 19 (50.2MHz, FM) SSG f.: 50.2MHz SSG output: -117dBm (0.316μV) MOD: 1kHz DEV: 3kHz							S-meter lights up to 1dot position.																																																																																											
	2) Menu No.: 20 (50.2MHz, FM) SSG output: -95dBm (3.98μV)							S-meter lights up all.																																																																																											
21. 50M FM SQL threshold	1) Menu No.: 21 (50.2MHz, FM) SSG output: OFF MOD: 1kHz DEV: 3kHz																																																																																																		
22. 50M FM SQL tight	1) Menu No.: 22 (50.2MHz, FM) SSG f.: 50.200MHz SSG output: -113dBm (0.501μV) MOD: 1kHz DEV: 3kHz																																																																																																		
<ul style="list-style-type: none"> Writing data: After items 4 and 8~22 have been adjusted; <ol style="list-style-type: none"> Menu No. : 60 [G] or [C] key: Push once time. Display "rEAdy" → "good" (If "nG" is displayed, enter data again.) [CLR] key: Push once time. 																																																																																																			
23. S/N Check (Reference)	1) Display f.: Refer to Table 1. AF output: 0.63V/8Ω AGC: FAST SSG f.: Refer to Table 1. However, USB : +1kHz LSB: -1kHz PRE-AMP: ON ATT: OFF	SSG Oscilloscope AF V.M DM.SP	Rear panel	ANT 1																																																																																															
				EXT.SP																																																																																															
				<table border="1"> <thead> <tr> <th>Frequency</th> <th>Mode</th> <th>SSG RF level (dBm)</th> <th>SSG MOD</th> <th>DEV</th> <th>Measurement</th> <th>Spec.</th> </tr> </thead> <tbody> <tr> <td>550kHz</td> <td>AM</td> <td>-85</td> <td>1kHz</td> <td>60%→OFF</td> <td>S/N</td> <td>>10dB</td> </tr> <tr> <td>1.8MHz</td> <td>LSB</td> <td>-119</td> <td>OFF</td> <td>OFF</td> <td>S/N</td> <td>>10dB</td> </tr> <tr> <td>3.7MHz</td> <td>CW</td> <td>-123</td> <td>OFF</td> <td>OFF</td> <td>S/N</td> <td>>10dB</td> </tr> <tr> <td>5.3MHz</td> <td>LSB</td> <td>-119</td> <td>OFF</td> <td>OFF</td> <td>S/N</td> <td>>10dB</td> </tr> <tr> <td>7.2MHz</td> <td>LSB</td> <td>-119</td> <td>OFF</td> <td>OFF</td> <td>S/N</td> <td>>10dB</td> </tr> <tr> <td>14.2MHz</td> <td>USB</td> <td>-119.5</td> <td>OFF</td> <td>OFF</td> <td>S/N</td> <td>>10dB</td> </tr> <tr> <td>18.2MHz</td> <td>USB</td> <td>-119.5</td> <td>OFF</td> <td>OFF</td> <td>S/N</td> <td>>10dB</td> </tr> <tr> <td>21.2MHz</td> <td>FSK</td> <td>-119.5</td> <td>OFF</td> <td>OFF</td> <td>S/N</td> <td>>10dB</td> </tr> <tr> <td>24.8MHz</td> <td>USB</td> <td>-123</td> <td>OFF</td> <td>OFF</td> <td>S/N</td> <td>>10dB</td> </tr> <tr> <td>29.6MHz</td> <td>FM</td> <td>-119</td> <td>1kHz</td> <td>3kHz</td> <td>SINAD</td> <td>>12dB</td> </tr> <tr> <td>50.2MHz</td> <td>USB</td> <td>-123</td> <td>OFF</td> <td>OFF</td> <td>S/N</td> <td>>10dB</td> </tr> </tbody> </table>								Frequency	Mode	SSG RF level (dBm)	SSG MOD	DEV	Measurement	Spec.	550kHz	AM	-85	1kHz	60%→OFF	S/N	>10dB	1.8MHz	LSB	-119	OFF	OFF	S/N	>10dB	3.7MHz	CW	-123	OFF	OFF	S/N	>10dB	5.3MHz	LSB	-119	OFF	OFF	S/N	>10dB	7.2MHz	LSB	-119	OFF	OFF	S/N	>10dB	14.2MHz	USB	-119.5	OFF	OFF	S/N	>10dB	18.2MHz	USB	-119.5	OFF	OFF	S/N	>10dB	21.2MHz	FSK	-119.5	OFF	OFF	S/N	>10dB	24.8MHz	USB	-123	OFF	OFF	S/N	>10dB	29.6MHz	FM	-119	1kHz	3kHz	SINAD	>12dB	50.2MHz	USB	-123	OFF	OFF	S/N	>10dB				
				Frequency					Mode	SSG RF level (dBm)	SSG MOD	DEV	Measurement	Spec.																																																																																					
				550kHz					AM	-85	1kHz	60%→OFF	S/N	>10dB																																																																																					
				1.8MHz					LSB	-119	OFF	OFF	S/N	>10dB																																																																																					
				3.7MHz					CW	-123	OFF	OFF	S/N	>10dB																																																																																					
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				7.2MHz					LSB	-119	OFF	OFF	S/N	>10dB																																																																																					
				14.2MHz					USB	-119.5	OFF	OFF	S/N	>10dB																																																																																					
				18.2MHz					USB	-119.5	OFF	OFF	S/N	>10dB																																																																																					
				21.2MHz					FSK	-119.5	OFF	OFF	S/N	>10dB																																																																																					
				24.8MHz					USB	-123	OFF	OFF	S/N	>10dB																																																																																					
29.6MHz	FM	-119	1kHz	3kHz	SINAD	>12dB																																																																																													
50.2MHz	USB	-123	OFF	OFF	S/N	>10dB																																																																																													
Table 1																																																																																																			

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
24. PRE-AMP gain	1) Display f.: 14.200MHz Mode: USB PRE-AMP: ON AGC: FAST AF output: 0.63V/8Ω SSG f.: 14.201MHz SSG output: -119dBm (0.25μV)	S S G Oscilloscope AF V.M DM.SP	Rear panel	ANT 1 EXT.SP			Set the AF level at 0dB.	
	2) PRE-AMP: OFF					Check the AF level.	-(5~15)dB	
25. RF ATT	1) Display f.: 14.200MHz Mode: USB ATT: ON AGC: FAST AF output: 0.63V/8Ω SSG f.: 14.201MHz SSG output: -107dBm (1μV)						Set the AF level at 0dB.	
	2) PRE-AMP: OFF					Check the AF level.	-(10~14)dB	
26. NB gain	1) Display f.: 14.200MHz Mode: USB PRE-AMP: ON AGC: FAST NB1: ON SSG f.: 14.201MHz SSG output: -103dBm (1.58μV)	DC V.M S S G Oscilloscope AF V.M DM.SP Noise G.	TX-RX (B/2) Rear panel	TP601 (NB) ANT1 EXT.SP	TX-RX (B/2)	L653 L664 L665	Voltage min.	4V or less
	2) NB1: OFF → ON					Adjust output of noise generator to S5, and check.	Noise should disappear when NB1 is ON.	
27. VGS-1 (Option)	1) Disconnect the antenna cable from the transceiver. Connect the VGS-1 to CN901 on the Control unit (A/3). Display f.: 14.100MHz Mode: USB AF knob: MIN				Front panel	[PF A]	1 push	The display frequency can be heard vocally.
	2) Connect a microphone to the MIC jack.					[CH1]	Hold down [CH1] key, and talk into the microphone for approximately 10 seconds.	
							Press the [CH1] key again.	The recorded voice message is played back.

ADJUSTMENT

Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
<ul style="list-style-type: none"> Perform the following in the adjustment mode. Item 2~24. To terminate the adjustment menu in the middle, save your settings with Menu No. 60. 									
1. Final idling current	1) Display f.: 14.100MHz Mode : USB Final unit (A/2) VR1, 2, 3, 4: MIN Transmit	Ammeter	Final (A/2)	DC IN	Final (A/2)		Check the default current (I ₂) of DC IN.		
						VR1	$I_2 + 500\text{mA} = I_A$	±50mA	
						VR2	$I_A + 1000\text{mA} = I_B$	±100mA	
						VR3	$I_B + 700\text{mA} = I_C$	±50mA	
						VR4	$I_C + 700\text{mA} = I_D$	±50mA	
2. ALC reference voltage	1) Menu No.: 23 (14.1MHz, USB) Transmit	DC V.M	TX-RX (A/2)	TP1 (ALC)	Front panel	[] or []	Set the adjustment value within the limit of the specified voltage.	2.7V±0.1V	
3. HF Max power (100W)	1) Menu No.: 24 (14.1MHz, CW) Transmit	Power meter 150W ATT	Rear panel	ANT 1			Set the adjustment value within the limit of the specified power.	100W±3.0W	
4. 14.1MHz Null	1) Menu No.: 24 (14.1MHz, CW) Transmit	Power meter 150W ATT	Rear panel	ANT 1	Final (A/2)	TC1	VSR voltage min.	0.3V or less	
		DC V.M	Final (A/2)	TP2 (VSR)					
5. Power meter 100W	1) Menu No.: 25 (14.1MHz, CW) Transmit	Power meter 150W ATT	Rear panel	ANT 1	Front panel	[]	1 push	Power meter lights up to 100W position.	
6. 50M Max power (100W)	1) Menu No.: 26 (50.1MHz, CW) Transmit						[] or []	Set the adjustment value within the limit of the specified power.	100W±3.0W
7. 50M Power meter 100W	1) Menu No.: 27 (50.1MHz, CW) Transmit						[]	1 push	Power meter lights up to 100W position.
8. POC 50W	1) Menu No.: 28 (14.1MHz, CW) Transmit						[] or []	Set the adjustment value within the limit of the specified power.	50W±2.0W
9. Power meter 50W	1) Menu No.: 29 (14.1MHz, CW) Transmit						[]	1 push	Power meter lights up to 50W position.
10. POC 25W	1) Menu No.: 30 (14.1MHz, CW) Transmit						[] or []	Set the adjustment value within the limit of the specified power.	25W±1.0W
11. Power meter 25W	1) Menu No.: 31 (14.1MHz, CW) Transmit						[]	1 push	Power meter lights up to 25W position.

ADJUSTMENT

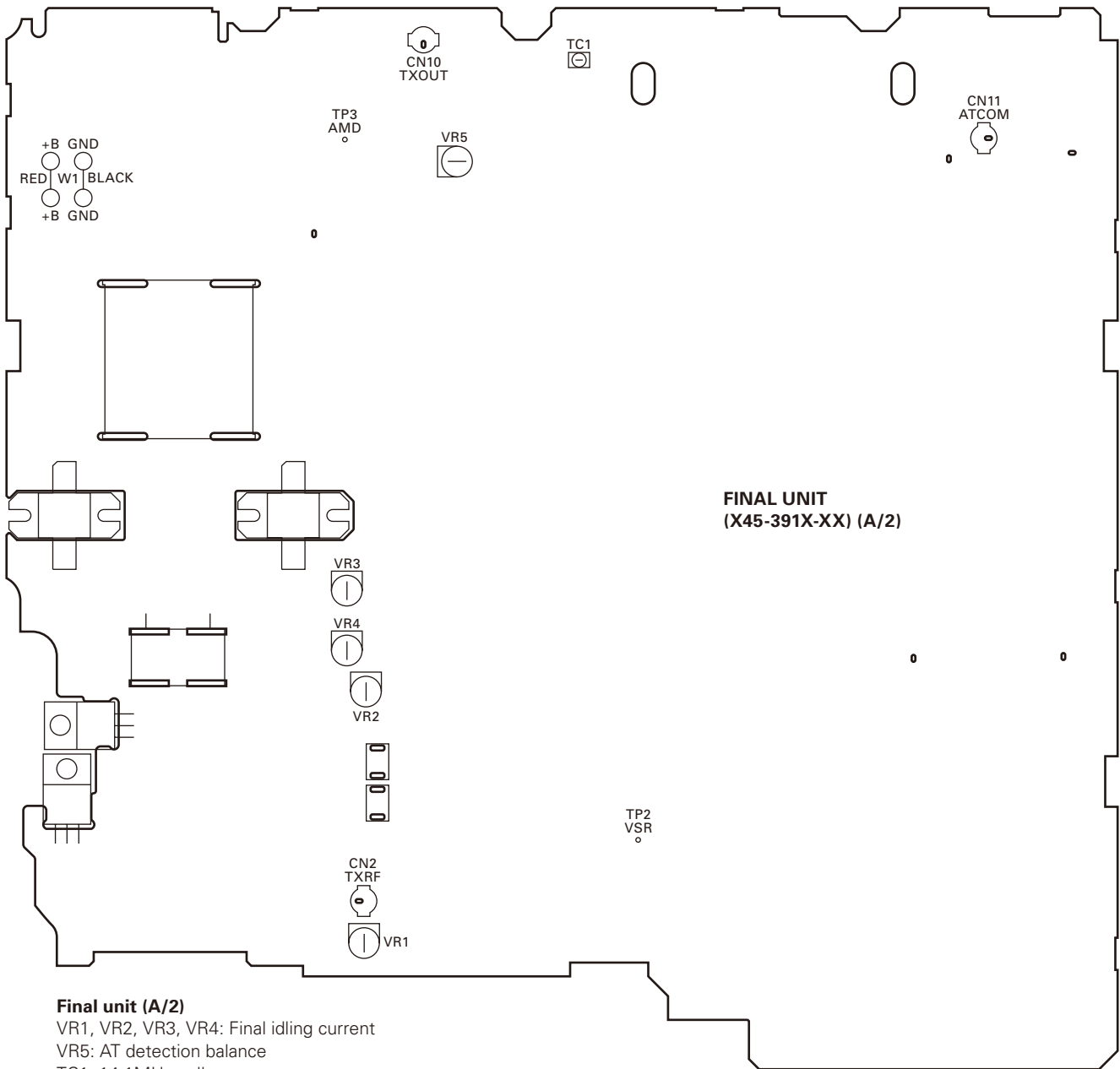
Item	Condition	Measurement			Adjustment			Specifications / Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
12. POC 10W	1) Menu No.: 32 (14.1MHz, CW) Transmit	Power meter 150W ATT	Rear panel	ANT 1	Front panel	[] or []	Set the adjustment value within the limit of the specified power.	10W±0.5W	
13. Power meter 10W	1) Menu No.: 33 (14.1MHz, CW) Transmit					[]	1 push	Power meter lights up to 10W position.	
14. POC 5W	1) Menu No.: 34 (14.1MHz, CW) Transmit					[] or []	Set the adjustment value within the limit of the specified power.	5.0W±0.3W	
15. Power meter 5W	1) Menu No.: 35 (14.1MHz, CW) Transmit					[]	1 push	Power meter lights up to 5W position.	
16. TGC GAIN	1) Menu No.: 36 (14.1MHz, CW) Transmit					[] or []	Set the adjustment value within the limit of the specified power.	100W±3.0W	
17. ALC meter • Start point	1) Menu No.: 37 (14.1MHz, CW) Transmit					[]	1 push	ALC meter lights up to 1.	
	• Zone max. (15 dots) point								2) Menu No.: 38 (14.1MHz, CW) Transmit
18. Band TGC (HF) • 1.8M • 3.5M • 5.0M • 7.0M • 10M • 18M • 21M • 24.9M • 28M	1) Menu No.: 40 (1.83MHz, USB) Transmit					[] or []	Set the adjustment value to become the specified ALC meter.	ALC meter 15 dots	
	• 3.5M								2) Menu No.: 41 (3.51MHz, USB) Transmit
	• 5.0M								3) Menu No.: 42 (5.3MHz, USB) Transmit
	• 7.0M								4) Menu No.: 43 (7.01MHz, USB) Transmit
	• 10M								5) Menu No.: 44 (10.1MHz, USB) Transmit
	• 18M								6) Menu No.: 45 (18.1MHz, USB) Transmit
	• 21M								7) Menu No.: 46 (21.1MHz, USB) Transmit
	• 24.9M								8) Menu No.: 47 (24.9MHz, USB) Transmit
	• 28M								9) Menu No.: 48 (28.1MHz, USB) Transmit
	19. Band TGC • 50M								1) Menu No.: 49 (50.1MHz, USB) Transmit

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
20. Power PGC • 50W • 25W • 10W • 5W	1) Menu No.: 50 (14.1MHz, CW) Transmit	Power meter 150W ATT	Rear panel	ANT 1	Front panel	[] or []	Set the adjustment value to become the specified ALC meter.	ALC meter 15 dots
	2) Menu No.: 51 (14.1MHz, CW) Transmit							
	3) Menu No.: 52 (14.1MHz, CW) Transmit							
	4) Menu No.: 53 (14.1MHz, CW) Transmit							
21. FM deviation • Wide • Narrow	1) Menu No.: 54 (29.1MHz, FM) Transmit	Power meter Linear detector 150W ATT					4.1kHz According to the larger +, -.	±0.1kHz
	2) Menu No.: 55 (29.1MHz, FM) Transmit						2.1kHz According to the larger +, -.	±0.1kHz
22. Current protection	1) Menu No.: 56 (24.9MHz, USB) Transmit DC power supply DC IN: DC 15.9V	Ammeter					Set the adjustment value within the limit of the specified current.	21.0A±0.1A
23. SWR protection	1) Menu No.: 57 (14.1MHz, CW) Transmit DC power supply DC IN: DC 13.8V 150Ω dummy connection : Use a cable that is 1m long	150Ω dummy load Through type power meter					Set the adjustment value within the limit of the specified power.	40W±1W
24. SWR meter • 14M (SWR: 3) • 50M (SWR: 3)	1) Menu No.: 58 (14.1MHz, CW) Transmit DC power supply DC IN: DC 13.8V 150Ω dummy connection : Use a cable that is 1m long					[]	1 push	SWR meter lights up to 3 position.
	2) Menu No.: 59 (51.9MHz, FM) Transmit DC power supply DC IN: DC 13.8V 150Ω dummy connection : Use a cable that is approx. 18cm long							
<ul style="list-style-type: none"> • Writing data : After items 2~24 have been adjusted; <ol style="list-style-type: none"> 1) Menu No.: 60 2) [] or [] key: Push once time. Display "rEAdy" → "good" (If "nG" is displayed, enter data again.) 3) [CLR] key: Push once time. 								
25. AT detection balance	1) Display f.: 51.9MHz Mode: FM Power: 10W Transmit	Oscilloscope Power meter 150W ATT	Final (A/2)	TP3 (AMP)	Final (A/2)	VR5	Turn the VR5 to the point where the waveform on the oscilloscope changes from high to low. (Threshold point)	

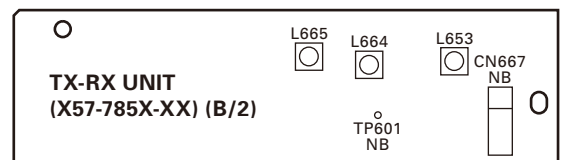
ADJUSTMENT

Adjustment Points (Upper Side)



Final unit (A/2)

VR1, VR2, VR3, VR4: Final idling current
 VR5: AT detection balance
 TC1: 14.1MHz null



TX-RX unit (B/2)

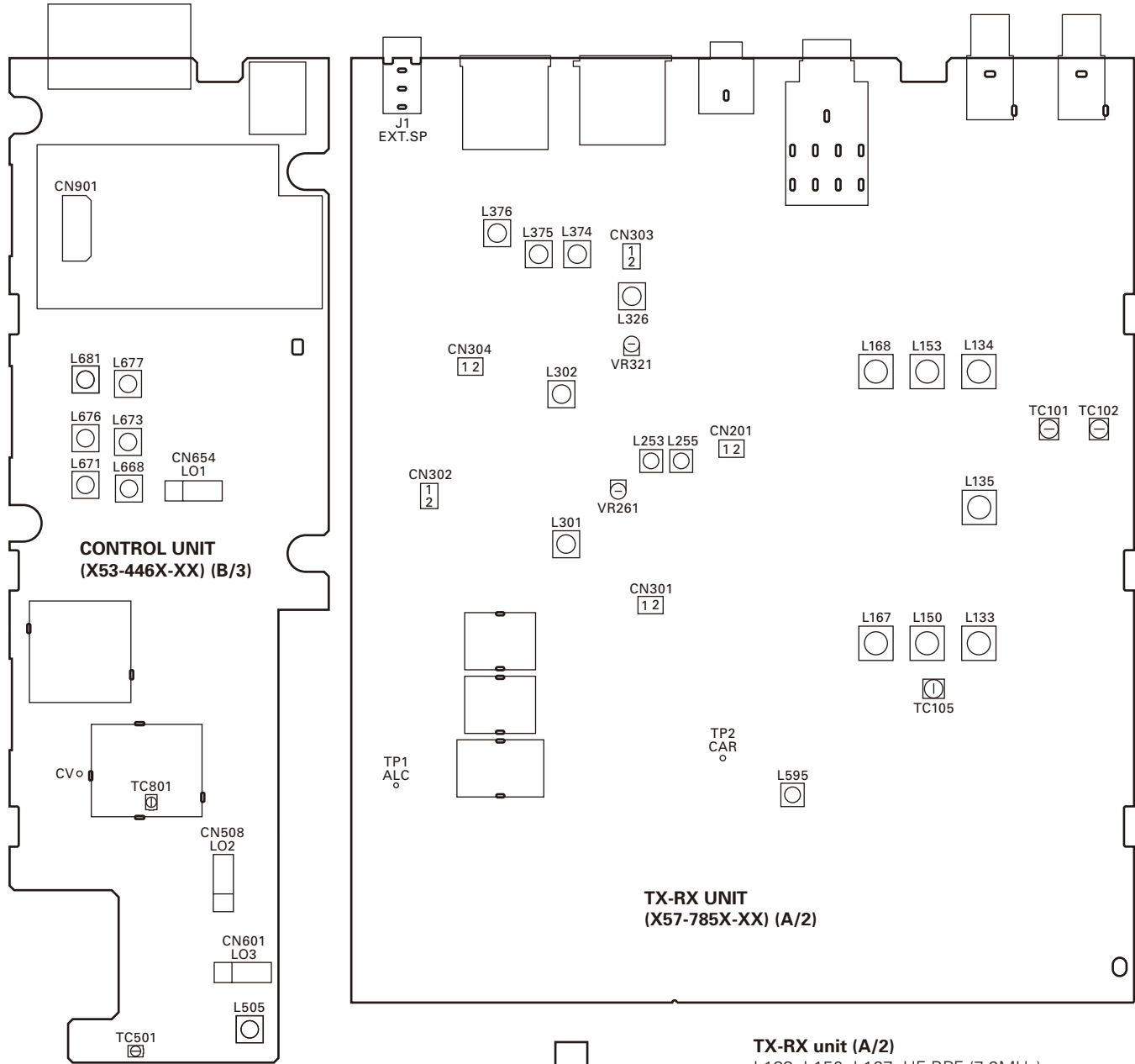
L653, L664, L665: NB gain



FRONT

ADJUSTMENT

Adjustment Points (Lower Side)



Control unit (B/3)

L505: LO2 level
 L671, L676, L681: LO1 level (7.15MHz)
 L668, L673, L677: LO1 level (1.9MHz)
 TC501: LO2 (62.4MHz) frequency
 TC801: Lock voltage



TX-RX unit (A/2)

L133, L150, L167: HF BPF (7.2MHz)
 L134, L153, L168: HF BPF (14.2MHz)
 L135: IF trap (73.095MHz)
 L253, L255: RX trap (11.3745MHz)
 L301, L302: MCF (11.374MHz)
 L326, L374, L375, L376: MCF (73.095MHz)
 L595: FM discriminator
 TC101: Trap frequency (11.7MHz) E type only
 TC102: Trap frequency (15.5MHz) E type only
 TC105: RX trap (44.150MHz)
 VR261, VR321: 1st mixer balance