YAESU
The radio

Version Update Instructions for FT-991 to FT-991A

This Update kit and instructions will add the following features of the FT-991A to the original FT-991 Transceiver.

- Real-Time Spectrum Scope
- Multi-Color Waterfall Display
- Select from seven Spectrum Scope display colors
- Select from seven display colors, or the multicolor Waterfall Display

Introduction and Precautions

Alignment may be required after the components have been replaced.

The following test equipment (and a thorough familiarity with its correct use) is necessary for correct realignment. Most steps do not require all of the equipment listed. The interactions of some adjustments may require that more complex adjustments be performed in a sequence. ***Do not attempt to perform only a single step unless it is clearly isolated electrically from all other steps. Have all test equipment ready before beginning, and follow all of the steps in a section in the order they are presented.***

Required Test Equipment

- ❒ RF Signal Generator
- ❒ AF Signal Generator
- ❒ Spectrum Analyzer good to at least 1 GHz.
- ❒ Frequency Counter
- ❒ AF Millivoltmeter
- ❒ RF Millivoltmeter
- ❒ Digital DC Voltmeter (high-Z, 1 M-Ohm/ V)
- ❒ DC Voltmeter
- ❒ Deviation Meter
- ❒ 50-Ohm Dummy Load (100/200 watts)
- ❒ 16.6-Ohm Dummy Load (100/200 watts)
- ❒ In-Line Wattmeter (150/300 watts, 50-Ohm)
- ❒ 4-Ohm AF Dummy Load (3 watts)
- ❒ 3.5 mm 3-contact Plug

Important Notice
Do not adjust the alignment menus that are not mentioned in this manual.

Adjustment Preparation & Precautions

A 50-ohm RF Dummy load and in-line wattmeter must be connected to the ANT jack in all procedures that call for transmission, except where specified otherwise. Correct alignment is not possible with an adequate 50-ohm load attached to the antenna terminal.

After completing each step, read the following step to determine whether the same test equipment will be required. If not, remove the unneeded test equipment before proceeding. (except the dummy load and wattmeter).

Correct alignment requires that the ambient temperature be maintained constant between 68 °F ~ 86 °F (20 °C ~ 30 °C). When the transceiver is brought into the shop from a hot or cold environment, it should be allowed time to come to room temperature before alignment. Also, the test equipment must be thoroughly warmed up before beginning.

Whenever possible, alignments should be made with oscillator shields and circuit boards firmly affixed in place.

Note: Signal levels in dB referred to in this procedure are based on 0 dBμ = 0.5 μV (closed circuit).

Procedure of replacement

1. Turn the transceiver OFF.
2. Disconnect all the cables from the transceiver.
3. Remove the 19 screws attaching the case, then remove the top and bottom case.

FT-991A Version Update Kit
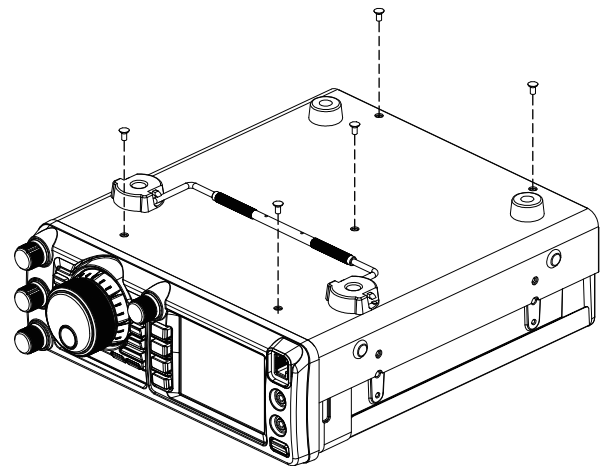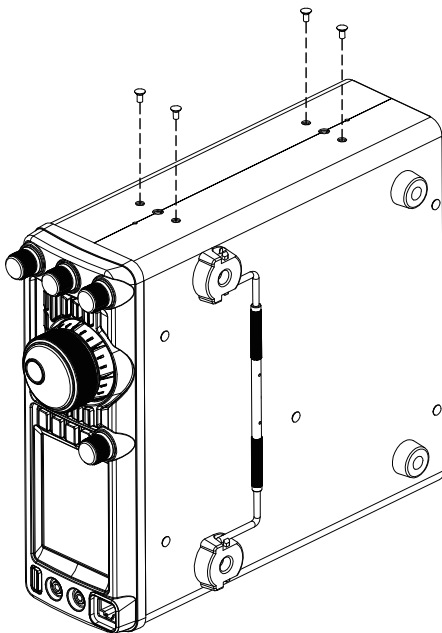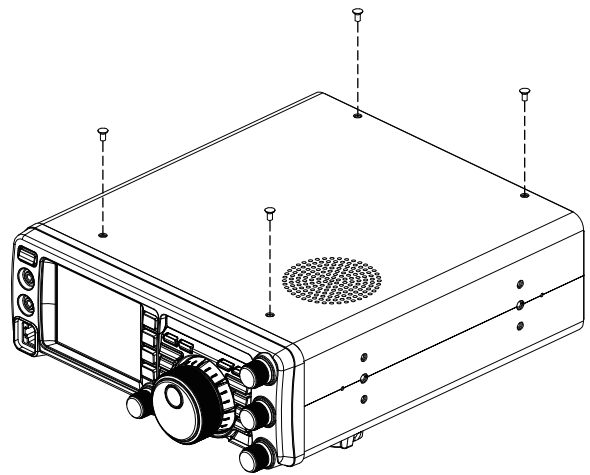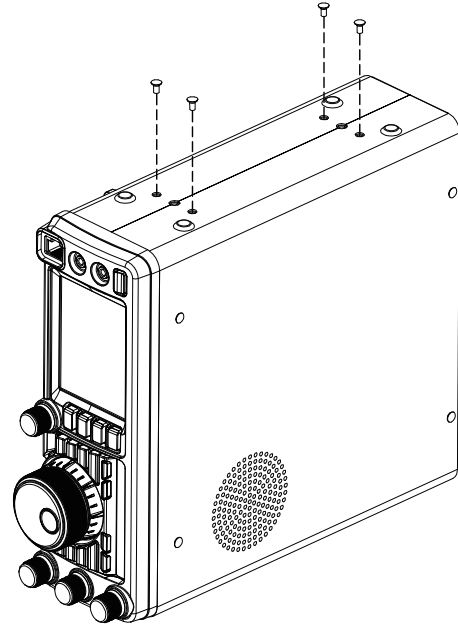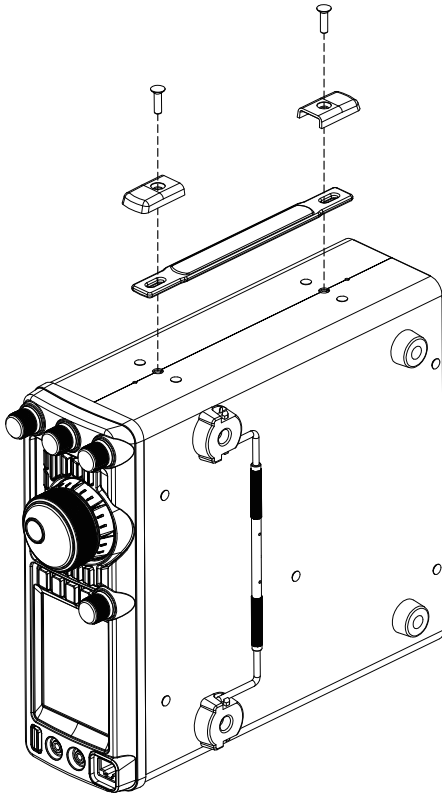
4. Unplug the three cables from the connector on the PANEL-Unit, JACK-UNIT and CNTL-UNIT.

Disconnect

Disconnect

Disconnect
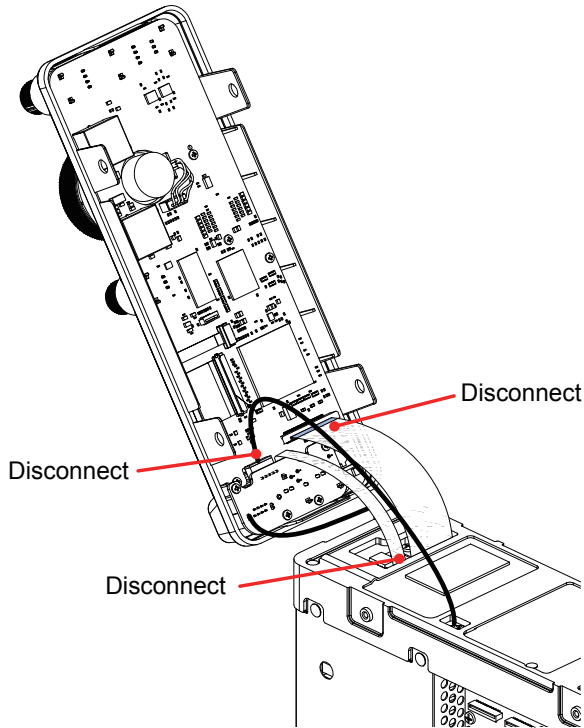
5. Remove the screw attaching the cable.
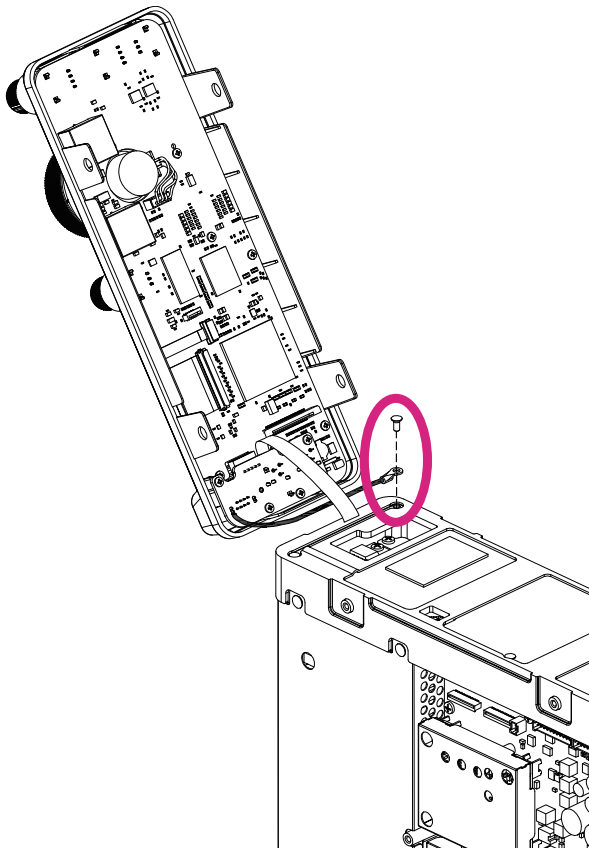
6. Remove the 4 screws attaching the shield cover of the TUNER-Unit, then remove the shield cover.

Shield cover

TUNER-Unit
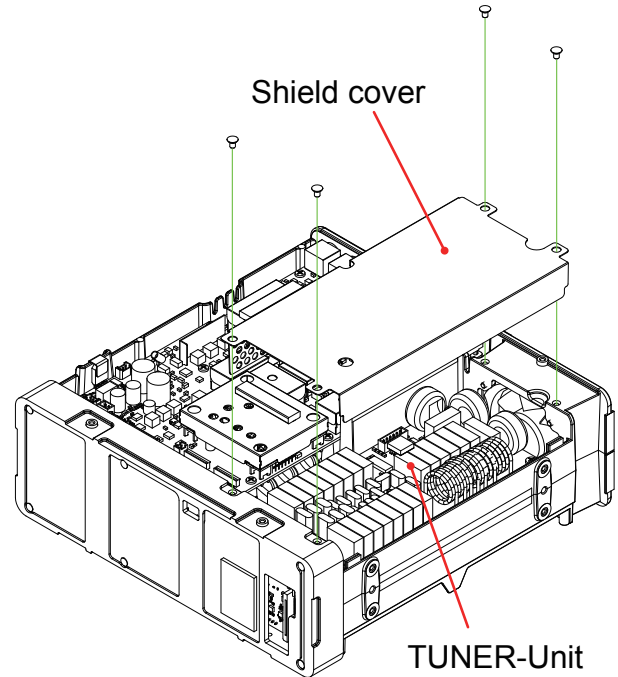
7. Unplug the cable from the connector on the CNTL-Unit.

Disconnect

TUNER-Unit

FT-991A Version Update Kit
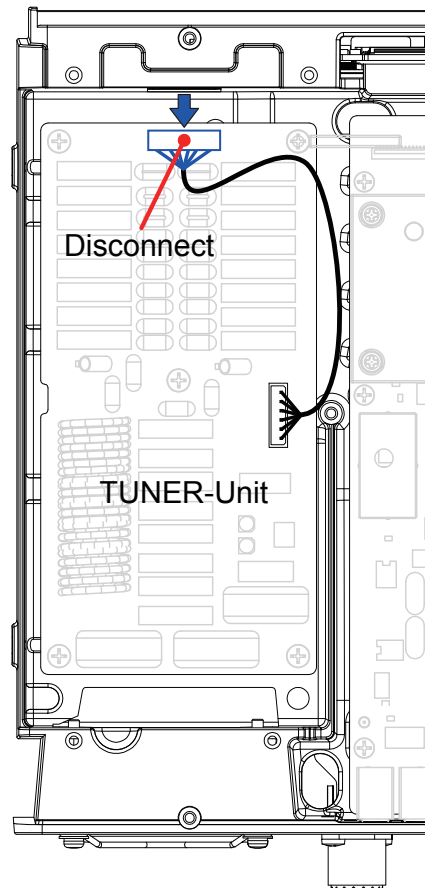
8. Remove the 11 screws attaching the shield cover of the PA-Unit, then remove the shield cover.

Shield cover

9. Unplug the wire cable from the connector on the CNTL-Unit.

Disconnect

HF-PA-Unit
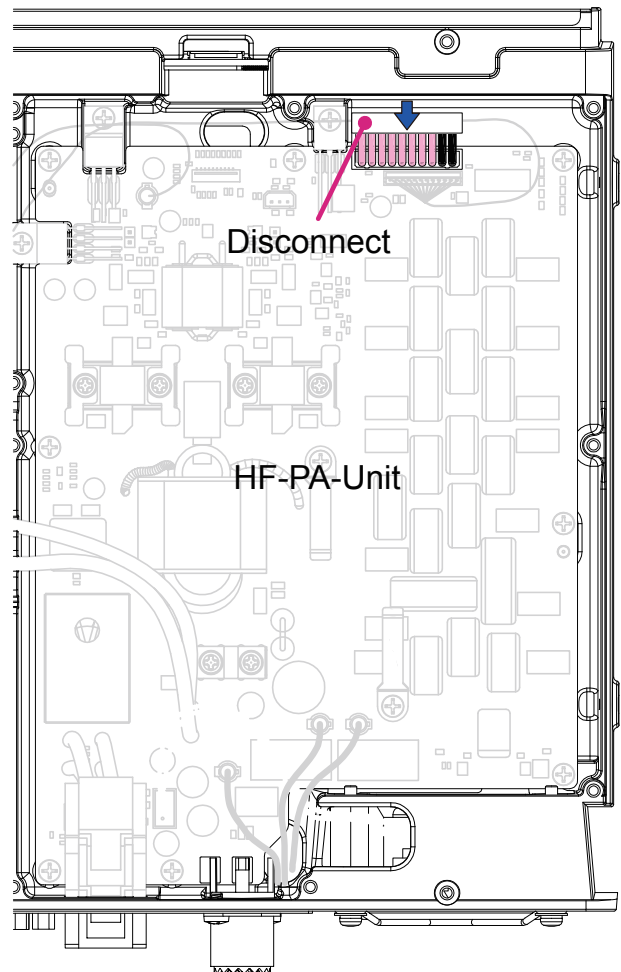
10. Remove the 5 screws attaching the shield cover, then remove the shield cover.
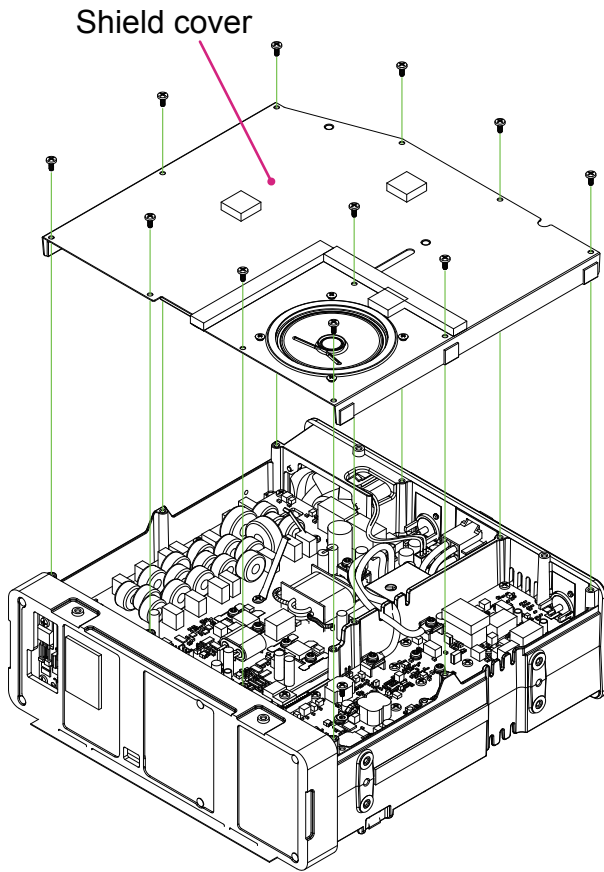11. Unplug the five cables from the connector on the CNTL-Unit.

Disconnect

P0004
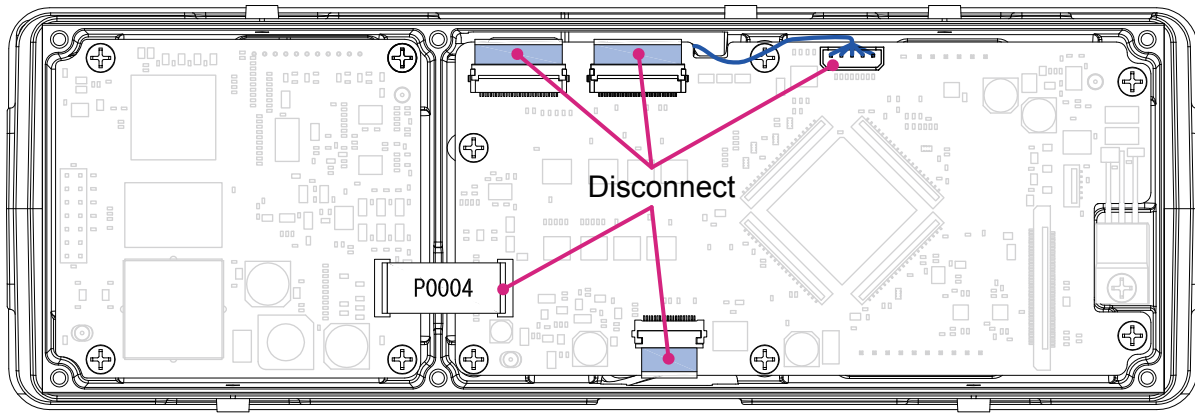
12. Remove the 7 screws attaching the CNTL-Unit, then remove the CNTL-Unit.
13. Remove the DSP-Unit from the CNTL-Unit.

DSP-Unit

CNTL-Unit

Shield cover
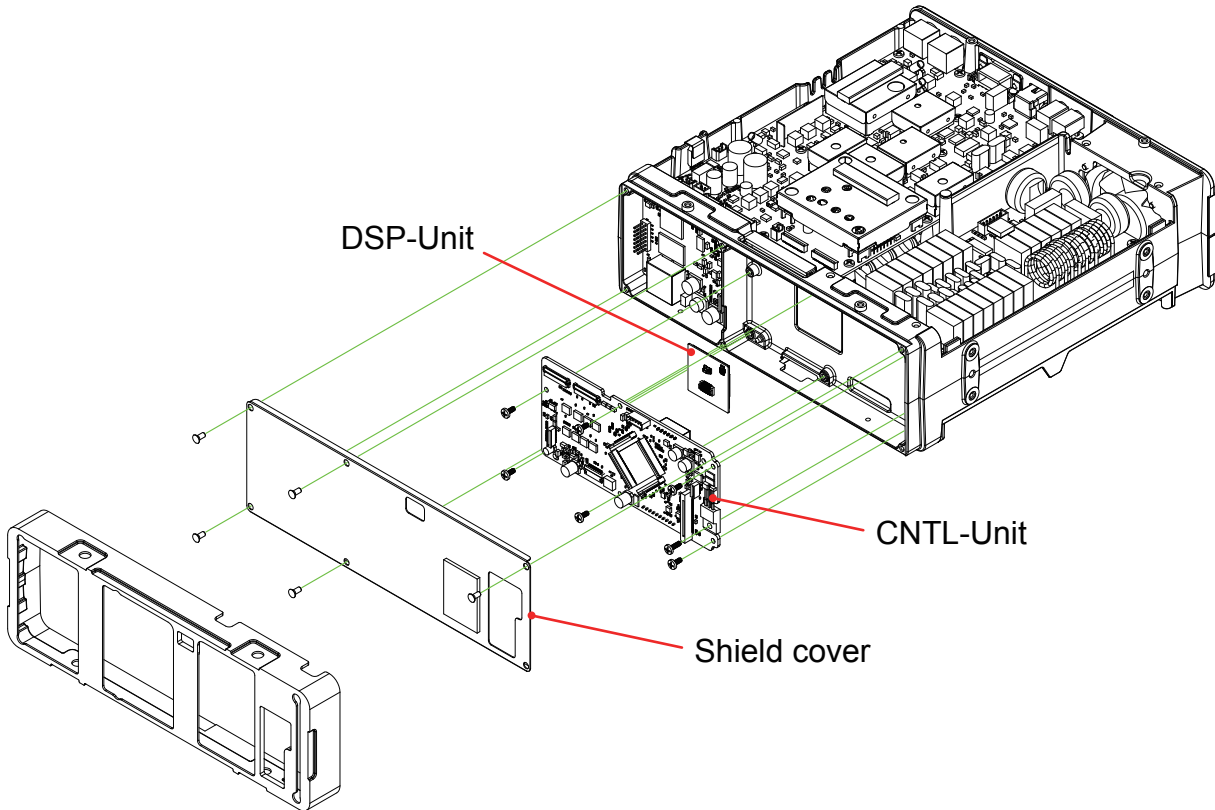
14. Attach the DSP-Unit to the *supplied new* CNTL-Unit.

CNTL-Unit

DSP-Unit
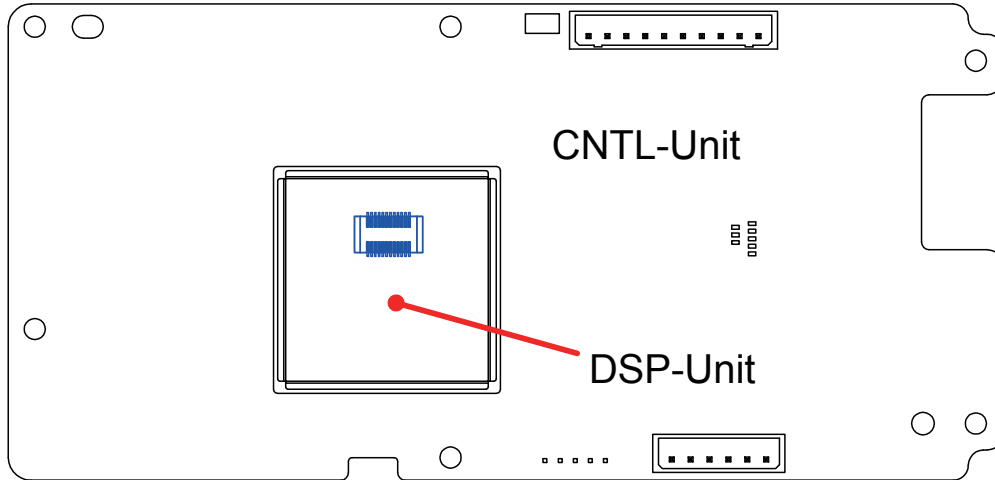
15. Replace the *supplied new* CNTL-Unit and its 7 screws.
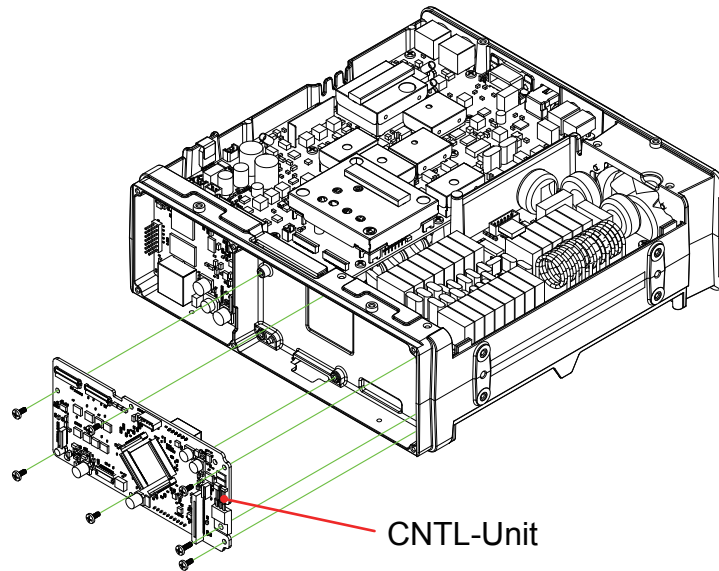
CNTL-Unit

16. Reconnect the five cables to the connector on the CNTL-Unit.

Connect

P0004
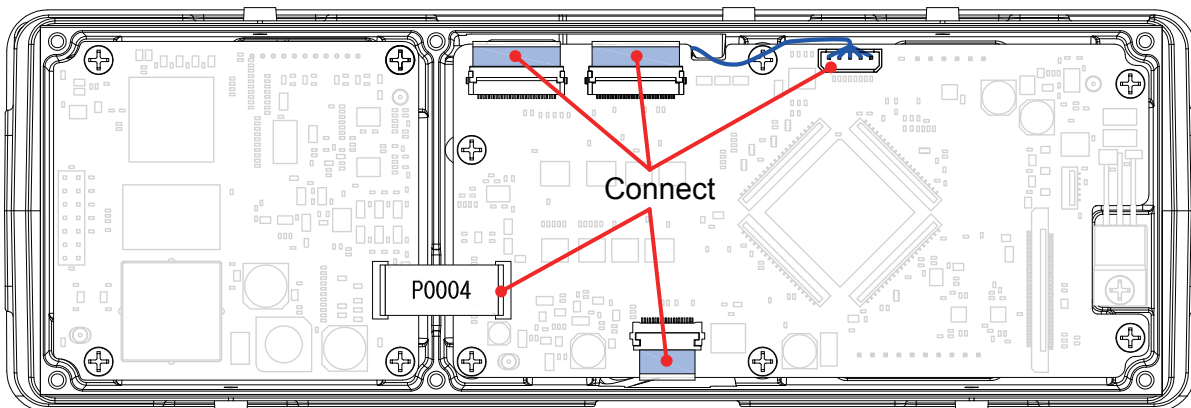
17. Reconnect the wire cable to the connector on the CNTL-Unit.

Connect

HF-PA-Unit

18. Reconnect the wire cable to the connector on the CNTL-Unit

Connect

TUNER-Unit
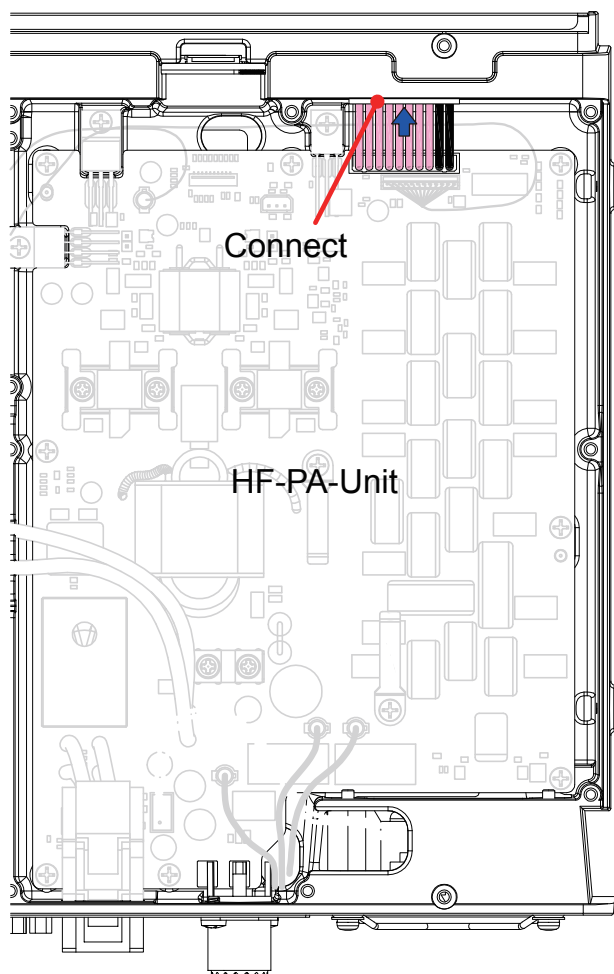
FT-991A Version Update Kit
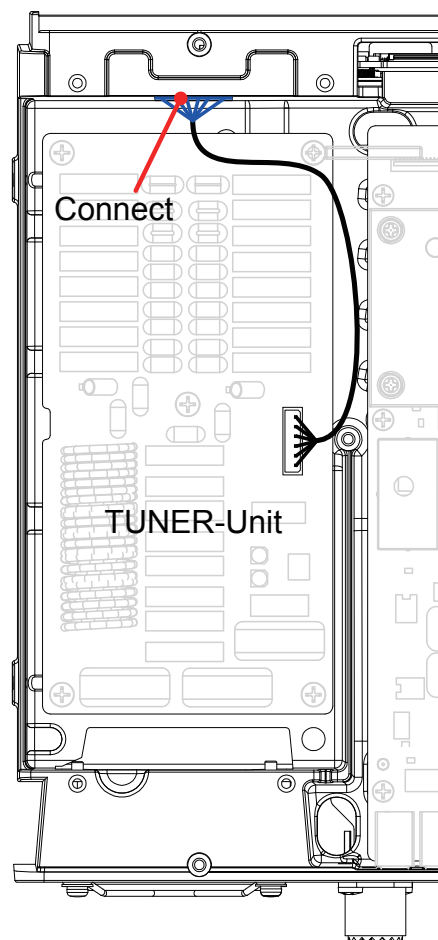
19. Replace the shield cover and its 4 screws.

Shield cover

TUNER-Unit
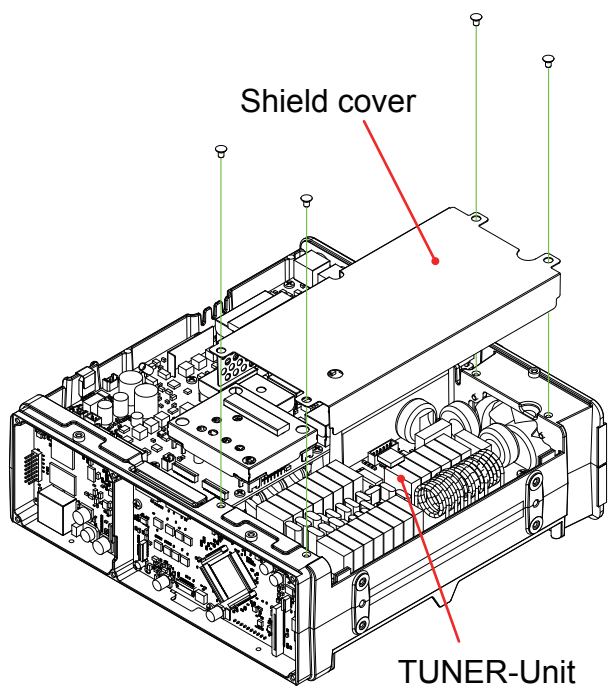
20. Remove the 4 screws attaching the PLL-Unit, then remove the PLL-Unit.

PLL-Unit

FT-991A Version Update Kit
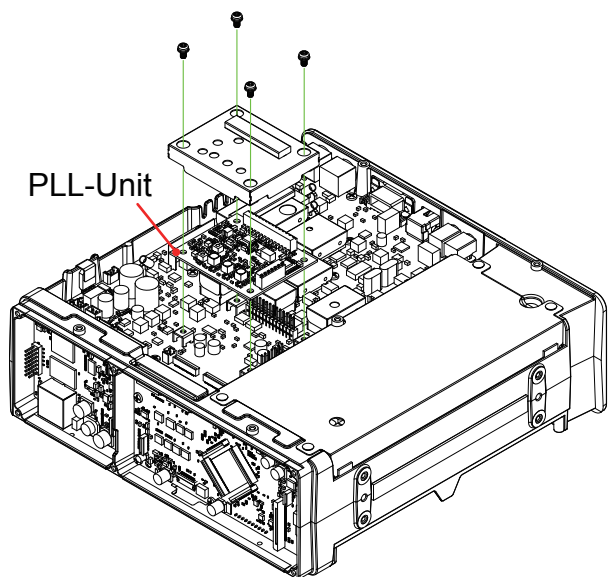
21. Unplug the 12 cables from the connector on the MAIN-Unit.
22. Remove the Lock Plate.
23. Remove the 12 screws attaching the MAIN-Unit, then remove the MAIN-Unit.

MAIN-Unit

Lock Plate
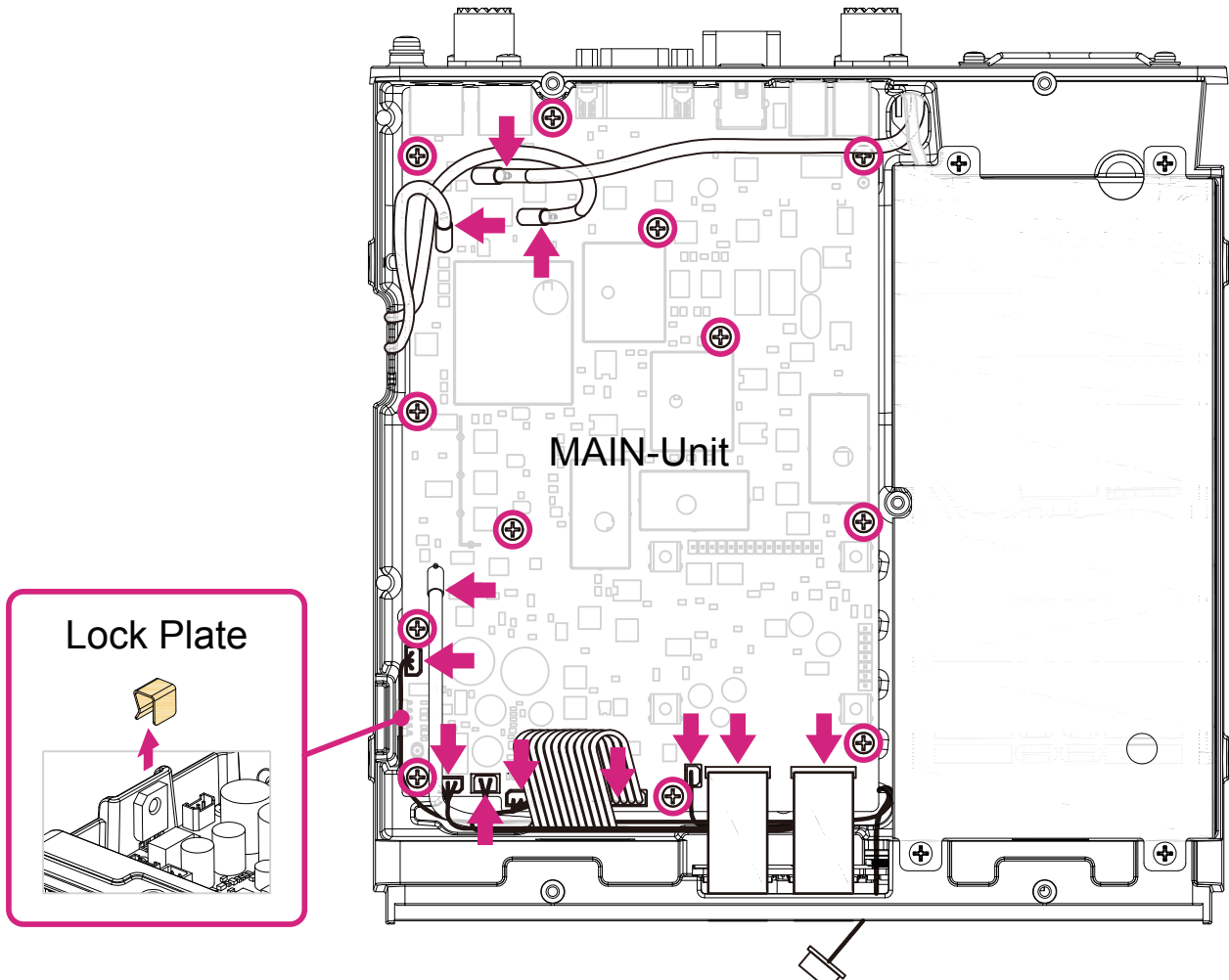
24. Remove the Thermal Pad from the MAIN-Unit, and then attach the Thermal Pad to the *supplied new* MAIN-Unit.

Thermal Pad
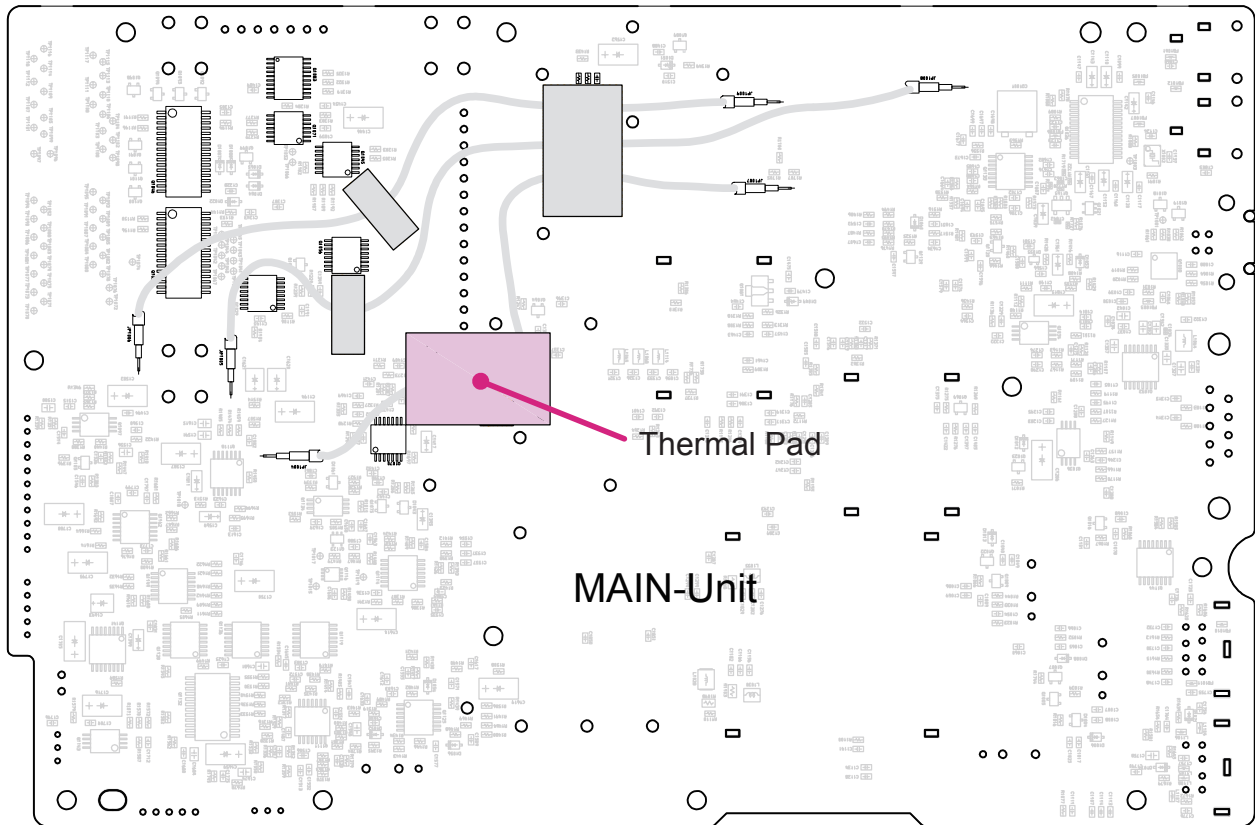
MAIN-Unit

25. Replace the *supplied new* MAIN-Unit and its 9 screws.
    Note: Do not Attach the supplied SCP-Unit in this step.
26. Replace the PLL-Unit and its 4 screws.

MAIN-Unit

PLL-Unit
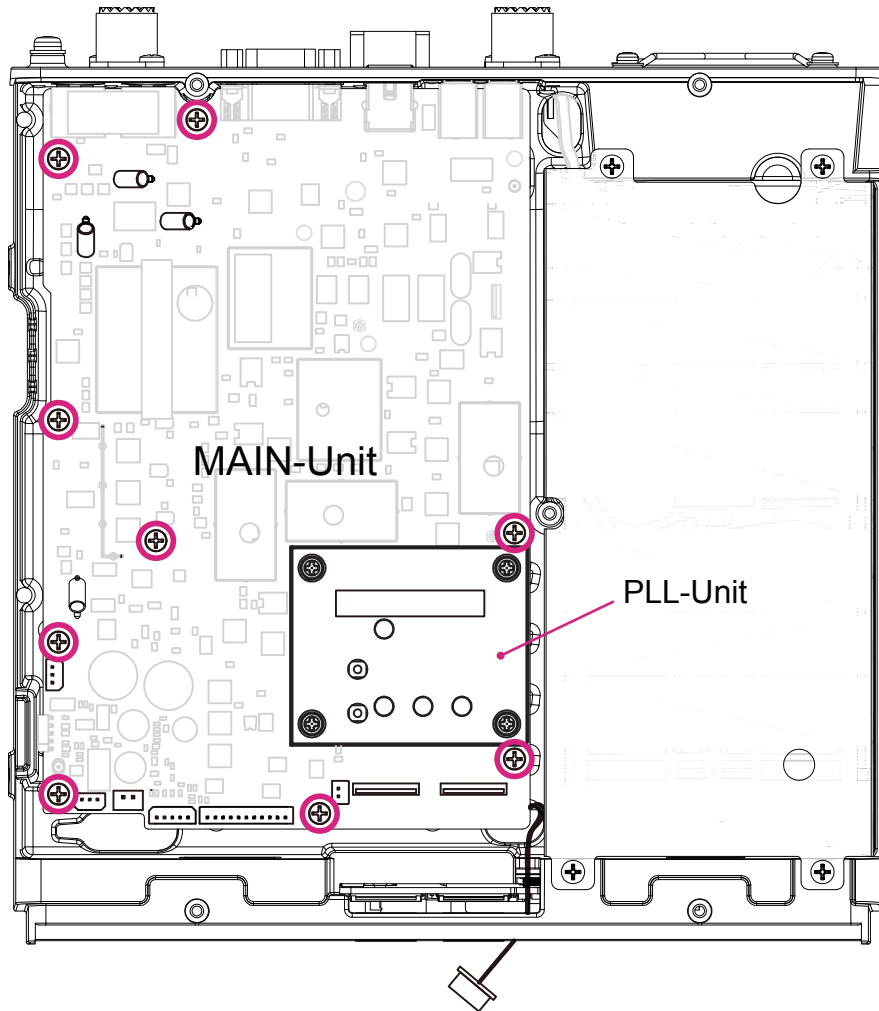
27. Reconnect the 12 cables to the connector on the MAIN-Unit.
    Note: Use the supplied Cable to connect J1011 and J1017.
28. Replace the Lock Plate.

MAIN-Unit

Supplied Cable

Lock Plate
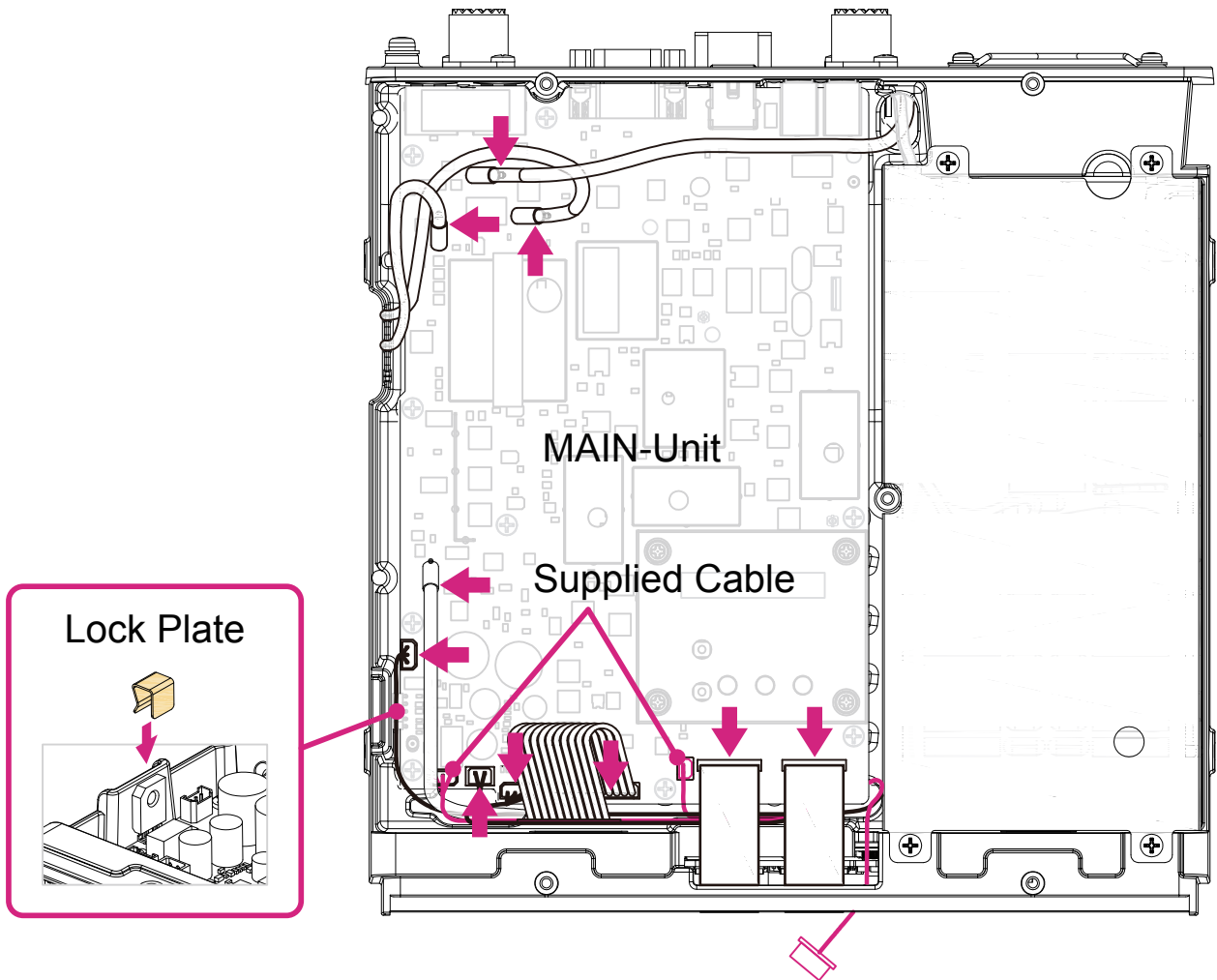
29. Replace the shield cover and its 5 screws.

Shield cover
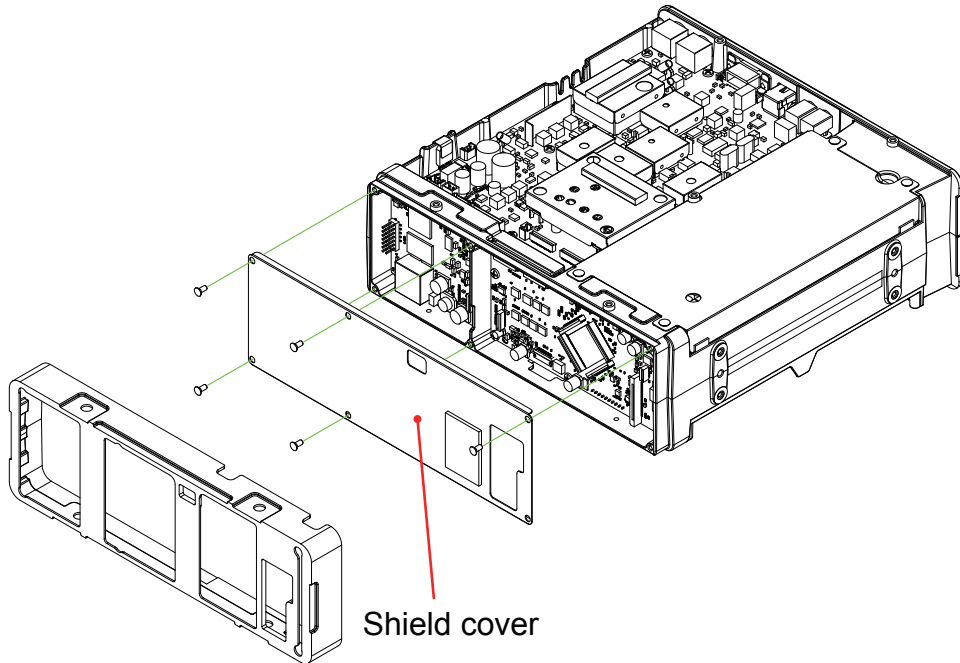
30. Remove the 4 screws attaching the JACK-Unit, then remove the JACK-Unit.
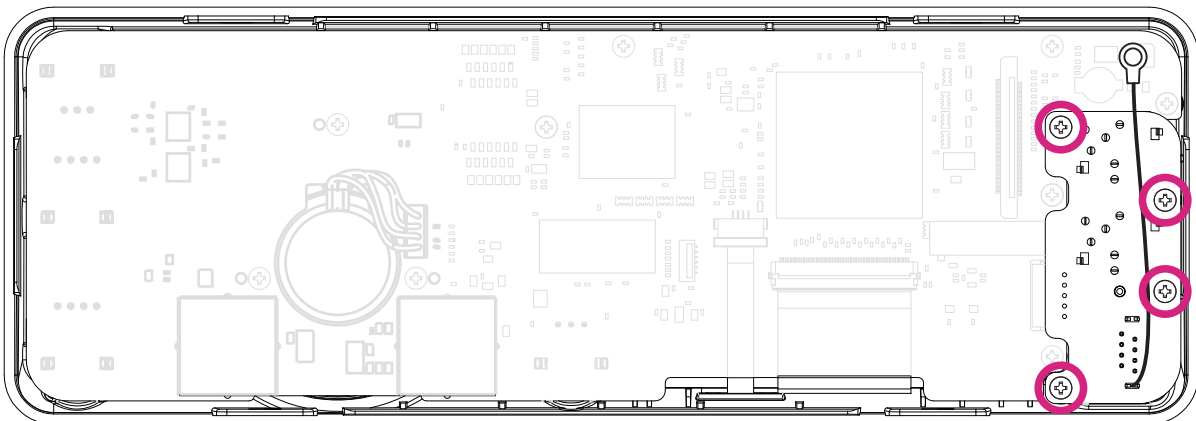
31. Attach the supplied Leaf Spring to the PANEL-Unit.
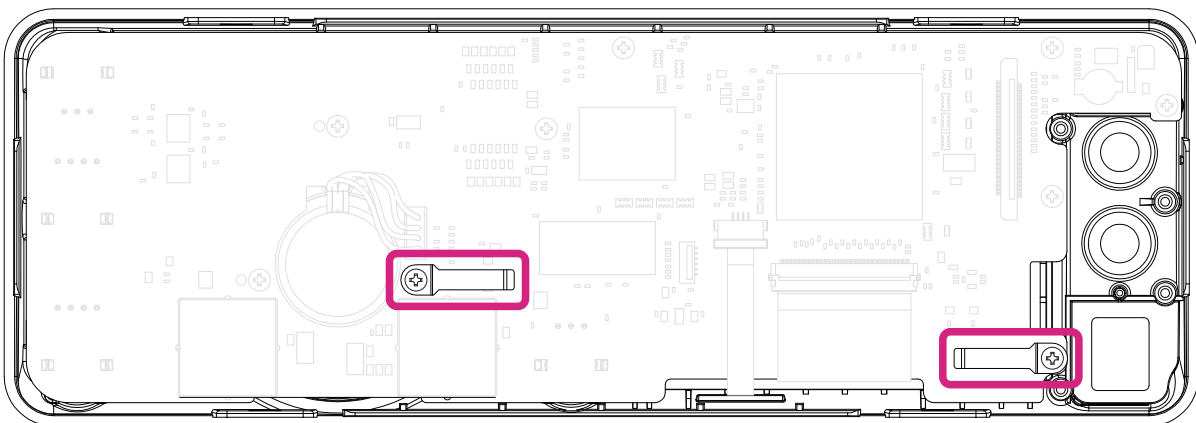
32. Replace the *supplied new* JACK-Unit and its 4 screws. Reconnect the cable to the connector on the JACK-Unit.
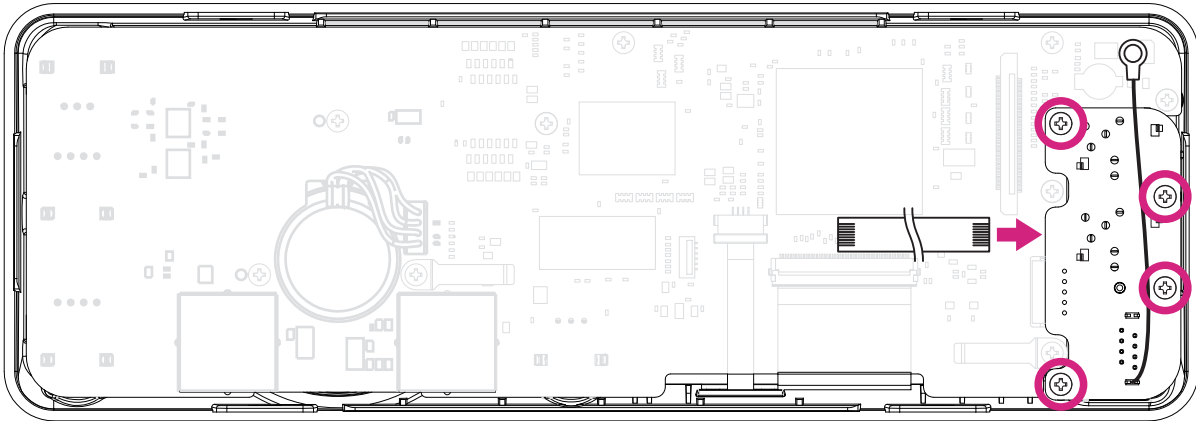
33. Connect the cable and its screw.
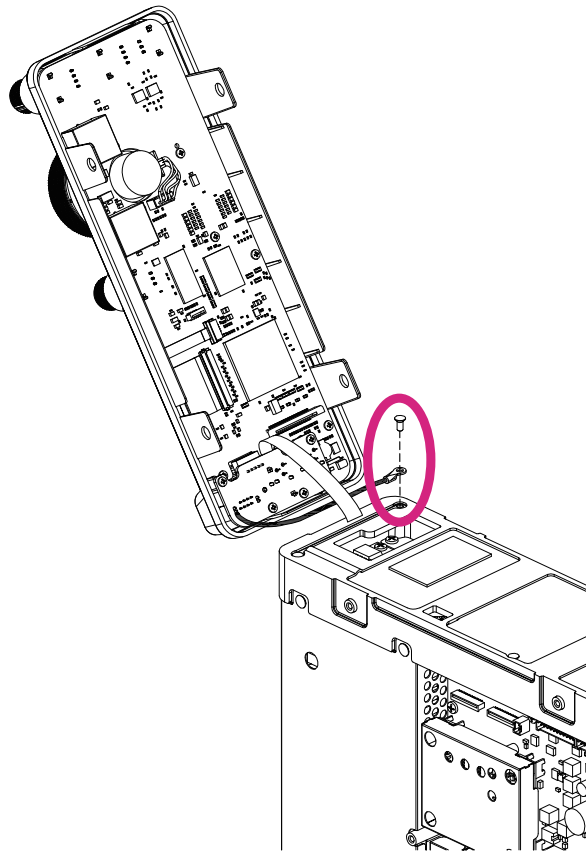
34. Reconnect the 3 cables to the connectors on the PANEL-Unit, JACK-Unit and CNTL-Unit.

Reconnect

Reconnect
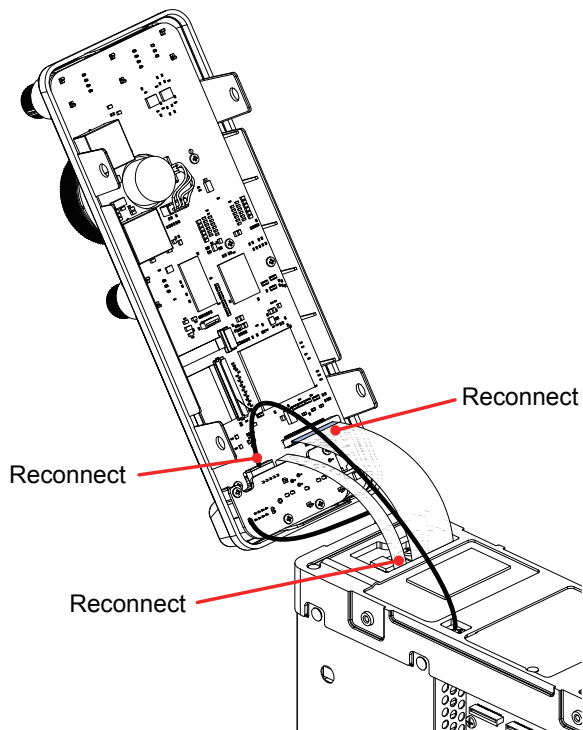
Reconnect

35. Reconnect the Front Panel to body of the transceiver.

36. VDD Meter Adjustment

❐ Connect the DC voltmeter to J4006 on the HF-PA-Unit.

❐ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❐ Rotate the [MULTI] dial knob to select the alignment menu item "01-01 VDD MTR".

❐ Press the [F(M-LIST)] key, then rotate the [CLAR/VFO-B] knob so the VDD meter reading is the same as the reading on the DC voltmeter (13.8 V).

❐ Press the [F(M-LIST)] key.

❐ Press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

37. COMP Meter Adjustment

❐ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❐ Rotate the [MULTI] Dial knob to select the alignment menu item "22-02 COMP MTR 10dB", then rotate the [CLAR/VFO-B] knob for "10 dB" on the COMP meter.

❐ Rotate the [MULTI] Dial knob to select the alignment menu item "22-03 COMP MTR 20dB", then rotate the [CLAR/VFO-B] knob for "20 dB" on the COMP meter.

❐ Rotate the [MULTI] Dial knob to select the alignment menu item "22-04 COMP MTR 30dB", then rotate the [CLAR/VFO-B] knob so the COMP meter deflects to full scale.

❐ Press and hold in the [MENU(SETUP)] button for one second to save the new settings and exit the alignment mode.

J4006
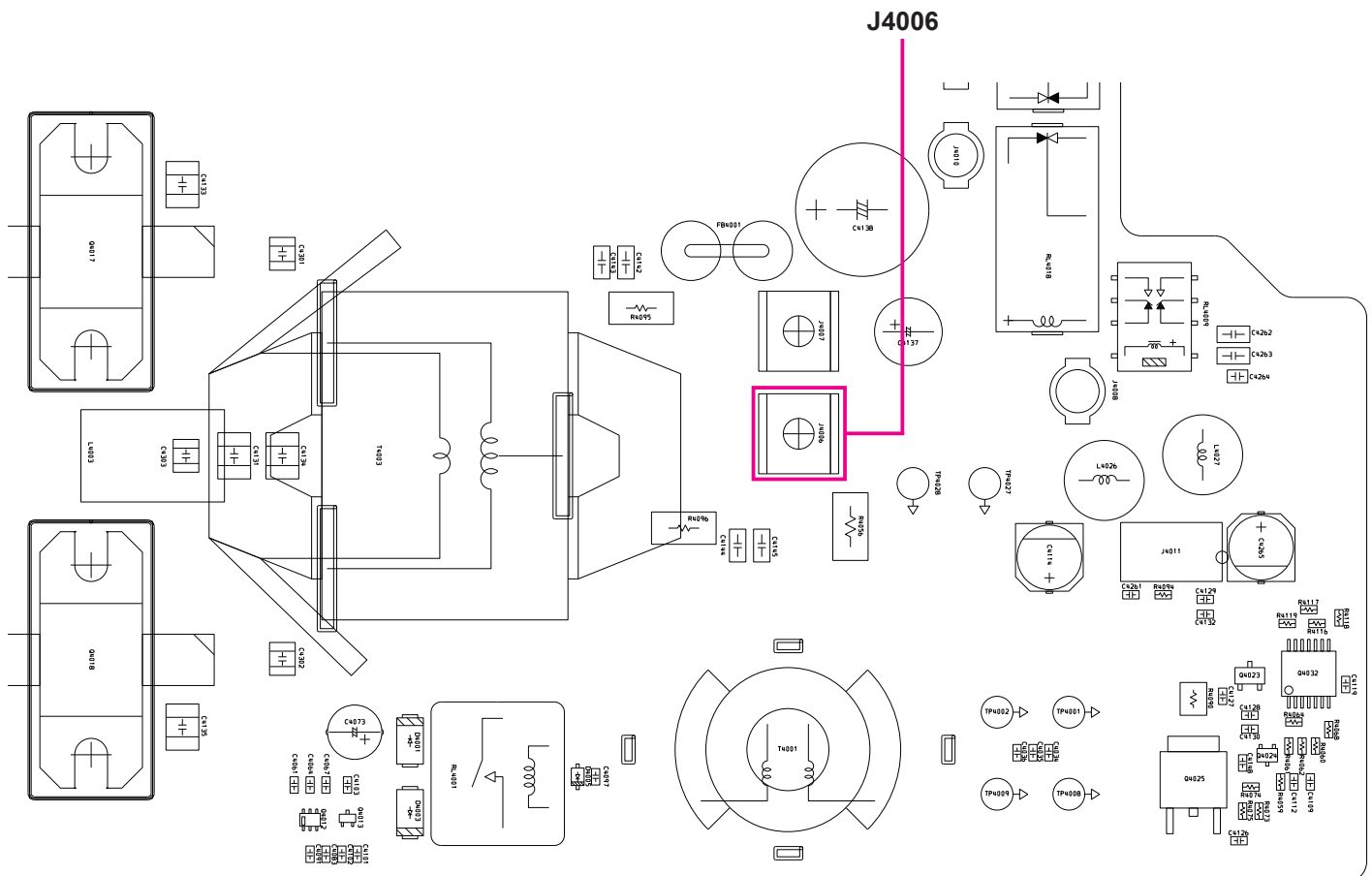
38. REF OSC Adjustment

❒ Connect the frequency counter to TP1025.

❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "01-04 REF FREQ".

❒ Rotate the [CLAR/VFO-B] knob so that the frequency counter reading is "60.450000 ±4 Hz".

❒ Disconnect the frequency counter from TP1025.

❒ Press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

TP1025

39. 1st Local Oscillator Adjustment

❒ Connect the 3.5 mm 3-contact Plug to KEY jack on the transceiver.

❒ Connect the RF millivoltmeter to TP1005 on the MAIN Unit.

❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "02-01 Local 1.8".

❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so that the RF millivoltmeter reading is at least +7 dBm.

❒ Release the PTT button.

TP1005
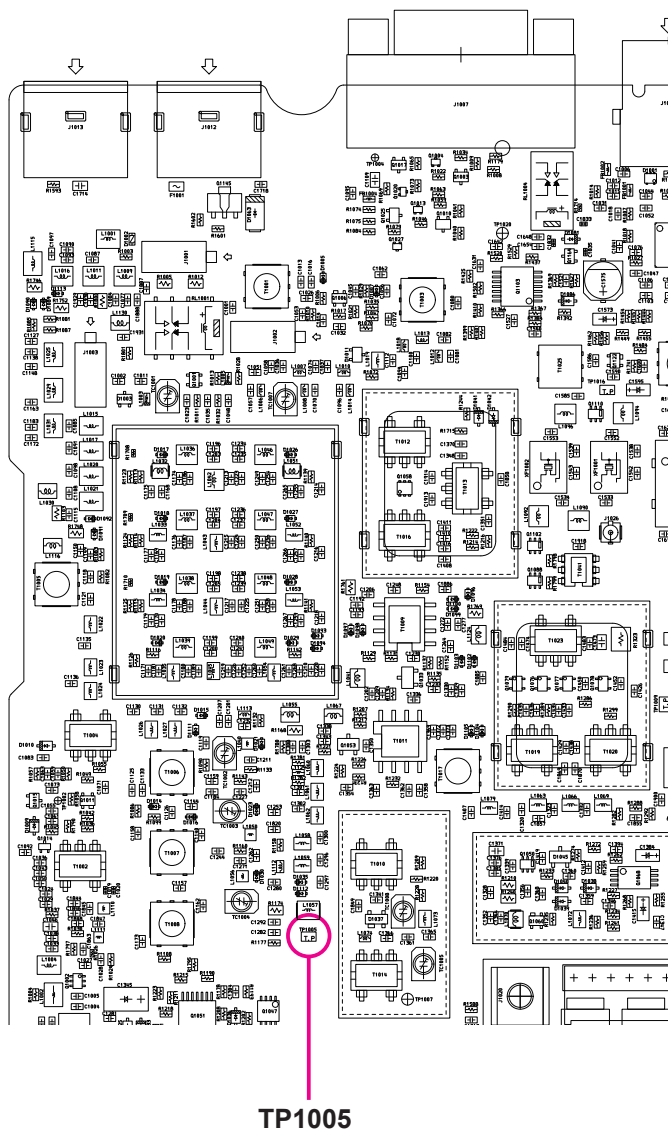
❒ Rotate the [MULTI] Dial knob to select the alignment menu item "02-02 Local HFL".

❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so that the RF millivoltmeter reading is at least +7 dBm.

❒ Release the PTT button.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "02-03 Local HFM".

❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so that the RF millivoltmeter reading is at least +6 dBm.

❒ Release the PTT button.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "02-04 Local HFH".

❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so that the RF millivoltmeter reading is at least +6 dBm.

❒ Release the PTT button.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "02-05 Local 50".

❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so that the RF millivoltmeter reading is at least +7 dBm.

❒ Release the PTT button.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "02-06 Local 144".

❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so that the RF millivoltmeter reading is at least +6 dBm.

❒ Release the PTT button.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "02-07 Local 430".

❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so that the RF millivoltmeter reading is at least +6 dBm.

❒ Release the PTT button.

Alignment Menu Item	RF millivoltmeter
02-01 Local 1.8	at least +7 dBm
02-02 Local HFL	at least +7 dBm
02-03 Local HFM	at least +6 dBm
02-04 Local HFH	at least +6 dBm
02-05 Local 50	at least +7 dBm
02-06 Local 144	at least +6 dBm
02-07 Local 430	at least +6 dBm

❒ Press and hold in the [MENU(SETUP)] button for one second to save the new settings and exit the alignment mode.
❒ Disconnect the 3.5 mm 3-contact Plug from KEY jack on the transceiver.

40. RF AGC Adjustment

❒ Set the VFO-A frequency to 14.200 MHz in the CW-USB mode.
❒ Set the following controls as indicated:
   [IPO] : AMP1
   [ATT] : OFF
   [AGC] : AUTO
   [RF GAIN] : Fully clockwise

❒ Connect the RF Signal Generator to the "HF/50 MHz" ANT jack, then set the output level to +76dBµ at the 14.200 MHz.
❒ Connect the Digital DC voltmeter (high-Z) to TP1016 on the MAIN Unit.
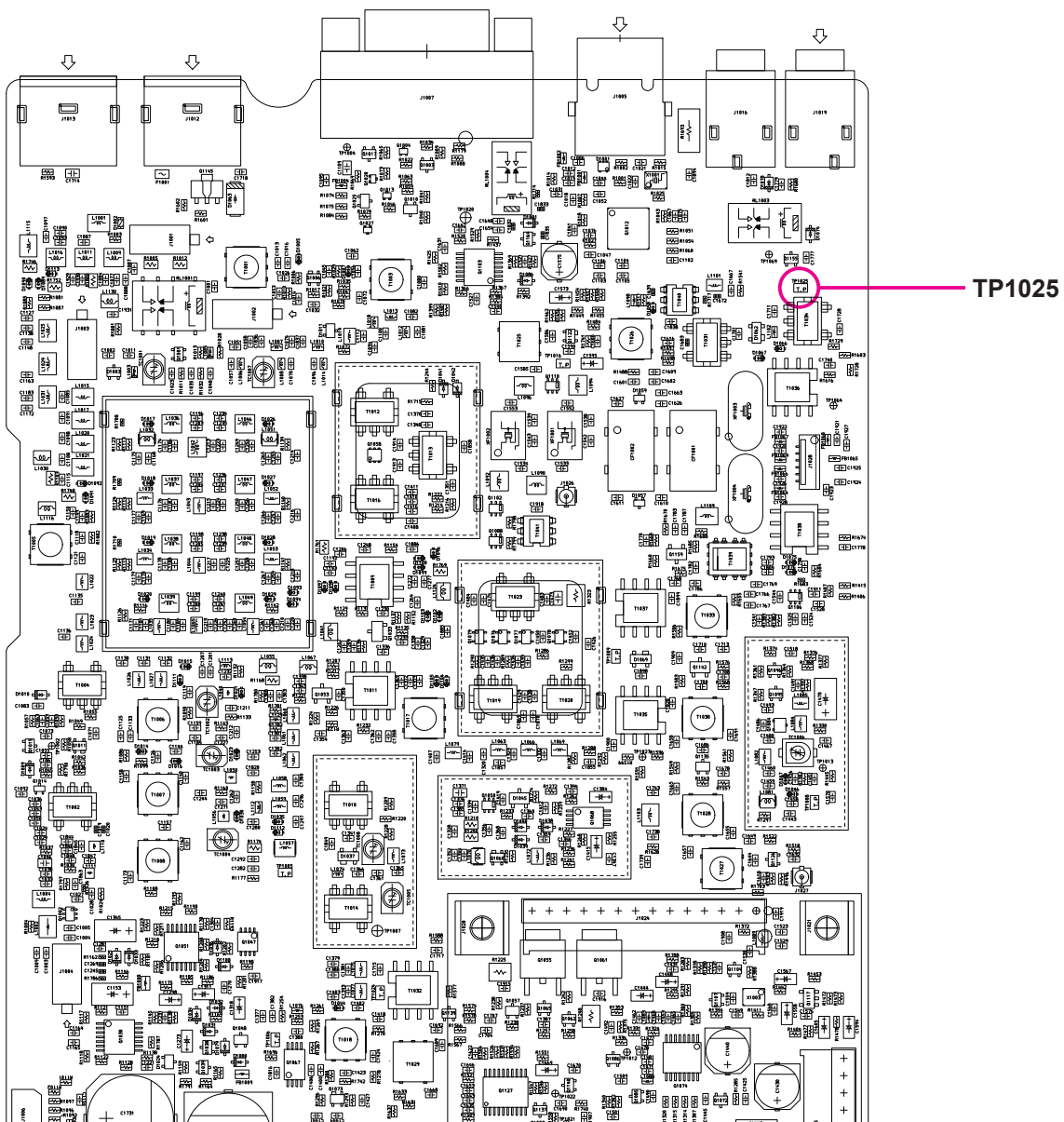❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.
❒ Rotate the [MULTI] Dial knob to select the alignment menu item "03-03 RF-AGC HFM".
❒ Adjusting the [CLAR/VFO-B] knob so the Digital DC voltmeter reading is "2.6 V ±0.2 V".
❒ Set to the same parameter of the alignment menu item "03-03 RF-AGC HFM" for the Alignment Menu items "03-01 RF-AGC 1.8", "03-02 RF-AGC HFL", "03-04 RF-AGC HFH", "03-05 RF-AGC 50", "03-06 RF-AGC 144" and "03-07 RF-AGC 430"
❒ Press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

TP1016

41. IF Gain Adjustment

❏ Set the following controls as indicated:
  [IPO] : AMP1
  [ATT] : OFF
  [AGC] : AUTO
  [RF GAIN] : Fully clockwise
❏ Connect the AF millivoltmeter and 4 Ohm dummy load to the EXT SP jack.
❏ Connect the RF Signal Generator to the "HF/50 MHz" ANT jack, then set the output level to +36 dBμ at 1.900 MHz.
❏ Set the VFO-A frequency to 1.900 MHz in the CW-USB mode.
❏ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❏ Adjust the [AF GAIN] knob so that the AF millivoltmeter reading is "0 dB".
❏ Set the RF Signal Generator output level to +10 dBμ.
❏ Adjust the [CLAR/VFO-B] knob so that the AF millivoltmeter reading is "-1.5 ± 0.5 dB".
❏ Select the appropriate "Alignment menu item" using the [MULTI] Dial knob per the chart below, then set the RF Signal Generator output to each frequency & level, and adjust the [CLAR/VFO-B] knob for the corresponding AF millivoltmeter reading at each frequency.
❏ Press and hold in the [MENU(SETUP)] button for one second to save the new settings and exit the alignment mode.

Alignment menu item	VFO-A Frequency	Mode	RF Signal Generator	Adjust	AF millivoltmeter
04-01 IGC 1.8	1.900 MHz	CW-USB	1.900 MHz, +36 dBμ	[AF GAIN] knob	0 dB
			1.900 MHz, +10 dBμ	[CLAR/VFO-B] knob	-1.5 dB (±0.5 dB)
04-02 IGC HFL	7.100 MHz	CW-USB	7.100 MHz, +36 dBμ	[AF GAIN] knob	0 dB
			7.100 MHz, +10 dBμ	[CLAR/VFO-B] knob	-1.5 dB (±0.5 dB)
04-03 IGC HFM	14.200 MHz	CW-USB	14.200 MHz, +36 dBμ	[AF GAIN] knob	0 dB
			14.200 MHz, +10 dBμ	[CLAR/VFO-B] knob	-1.5 dB (±0.5 dB)
04-04 IGC HFH	21.230 MHz	CW-USB	21.230 MHz, +36 dBμ	[AF GAIN] knob	0 dB
			21.230 MHz, +10 dBμ	[CLAR/VFO-B] knob	-1.5 dB (±0.5 dB)
04-05 IGC 50	51.900 MHz	CW-USB	51.900 MHz, +36 dBμ	[AF GAIN] knob	0 dB
			51.900 MHz, +7 dBμ	[CLAR/VFO-B] knob	-1.5 dB (±0.5 dB)
04-06 IGC 144	145.900 MHz	CW-USB	145.900 MHz, +30 dBμ	[AF GAIN] knob	0 dB
			145.900 MHz, -3 dBμ	[CLAR/VFO-B] knob	-1.5 dB (±0.5 dB)
04-07 IGC 430	439.900 MHz	CW-USB	439.900 MHz, +30 dBμ	[AF GAIN] knob	0 dB
			439.900 MHz, -3dBμ	[CLAR/VFO-B] knob	-1.5 dB (±0.5 dB)

42. S-meter Adjustment

❏ Set the VFO-A frequency to 14.200 MHz in the CW-USB mode.
❏ Set the following controls as indicated:
[IPO] : AMP1
[ATT] : OFF
[AGC] : AUTO
[RF GAIN] : Fully clockwise
❏ Connect the RF Signal Generator to the "HF/50 MHz" ANT jack, then set the frequency to 14.200 MHz.
❏ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.
❏ Refer to the chart below and select the appropriate "Alignment menu item" using the [MULTI] Dial knob. Set the RF Signal Generator output to each level, and adjust the [CLAR/VFO-B] knob for the corresponding S-meter reading. Press the [F(M-LIST)] key to save the new setting at each level.

Alignment menu item	RF Signal Generator	S-meter
05-01 S-MTR 0	OFF	S-0
05-02 S-MTR 1	+14 dBµ	S-1
05-03 S-MTR 5	+24 dBµ	S-5
05-04 S-MTR 7	+30 dBµ	S-7
05-05 S-MTR 9	+36 dBµ	S-9
05-06 S-MTR +10	+46 dBµ	S-9+10dB
05-07 S-MTR +20	+56 dBµ	S-9+20dB
05-08 S-MTR +30	+66 dBµ	S-9+30dB
05-09 S-MTR +40	+76 dBµ	S-9+40dB
05-10 S-MTR +50	+86 dBµ	S-9+50dB
05-11 S-MTR +60	+96 dBµ	S-9+60dB

❏ Press and hold in the [MENU(SETUP)] button for one second to save the new settings and exit the alignment mode.

43. FIL Gain Adjustment

❏ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.
❏ Rotate the [MULTI] Dial knob to select the alignment menu item "06-01 R. FIL 3k".

❏ Rotate the [CLAR/VFO-B] knob to set the parameter to "180".
❏ Rotate the [MULTI] Dial knob to select the alignment menu item "06-02 R. FIL 15k".
❏ Rotate the [CLAR/VFO-B] knob to set the parameter to "180".
❏ Press and hold in the [MENU(SETUP)] button for one second to save the new settings and exit the alignment mode.

44. S-meter Adjustment (FM)

❏ Set the VFO-A frequency to 145.900 MHz in the FM mode.
❏ Connect the RF Signal Generator to the "144/430 MHz" ANT jack, then set the output level to 0 dBµ at the 145.900 MHz with ±3.5 kHz deviation FM modulation of a 1 kHz audio signal.
❏ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.
❏ Rotate the [MULTI] Dial knob to select the alignment menu item "07-01 FM S1".
❏ Rotate the [CLAR/VFO-B] knob so that the S-meter reading is "S-1".
❏ Press the [F(M-LIST)] button to save the new setting.
❏ Set the RF Signal Generator to +20 dBµ.
❏ Rotate the [MULTI] Dial knob to select the alignment menu item "07-02 FM S9".
❏ Rotate the [CLAR/VFO-B] knob so that the S-meter reading is "S-9".
❏ Press the [F(M-LIST)] button to save the new setting.
❏ Set the RF Signal Generator to +40 dBµ.
❏ Rotate the [MULTI] Dial knob to select the alignment menu item "07-03 FM S60".
❏ Rotate the [CLAR/VFO-B] knob so that the S-meter reading is "S-9+60".
❏ Press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

45. FM Squelch Adjustment

❒ Set the VFO-A frequency to 145.900 MHz in the FM-WIDE mode.

❒ Connect the RF Signal Generator to the "144/430 MHz" ANT jack, then set the output level to -14 dBµ at the 145.900 MHz with ±3.5 kHz deviation FM modulation of a 1 kHz audio signal.

❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "08-01 FM SQL THW".

❒ Press the [F(M-LIST)] button to save the new setting.

❒ Press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

❒ Set the FM-NARROW mode.

❒ Set the RF Signal Generator output level to -14 dBµ at the 145.900 MHz with ±1.75 kHz deviation FM modulation of a 1 kHz audio signal.

❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "08-02 FM SQL THN".

❒ Press the [F(M-LIST)] button to save the new setting.

❒ Press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

❒ Set the FM-WIDE mode.

❒ Set the RF Signal Generator output level to +3 dBµ at the 145.900 MHz with ±3.5 kHz deviation FM modulation of a 1 kHz audio signal.

❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "08-03 FM SQL TI".

❒ Press the [F(M-LIST)] button to save the new setting.

❒ Press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

46. FM Center Stop Adjustment

❒ Set the VFO-A frequency to 145.900 MHz in the FM-WIDE mode.

❒ Connect the RF Signal Generator to the "144/430 MHz" ANT jack, then set the output level to +10 dBµ at the 145.900 MHz with ±3.5 kHz deviation FM modulation of a 1 kHz audio signal.

❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❒ Set the RF Signal Generator to 145.897 MHz.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "09-01 FM CTR-L".

❒ Press the [F(M-LIST)] button to save the new setting.

❒ Set the RF Signal Generator to 145.903 MHz.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item "09-02 FM CTR-H".

❒ Press the [F(M-LIST)] button to save the new setting.

❒ Press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

47. Current ALC Adjustment

❏ Connect the Microphone to the front panel MIC jack.

❏ Connect the 50-Ohm Dummy Load and Wattmeter to the "HF/50 MHz" ANT jack.

❏ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❏ Rotate the [MULTI] Dial knob to select the alignment menu item "10-01 I-ALC 1.8" for the 1.8 MHz amateur band's ALC Adjustment.

❏ Set the VFO-A frequency to 1.90 MHz in the CW mode.

❏ Press the PTT button, then adjust the [CLAR/VFO-B] knob for 100 W on the Wattmeter.

❏ Release the PTT button, then rotate the [CLAR/VFO-B] knob so that the parameter indication "5" in-crease.

❏ Rotate the [MULTI] Dial knob to select the alignment menu item "10-02 I-ALC HFL" for the 7 MHz amateur band's ALC Adjustment.

❏ Set the VFO-A frequency to 7.10 MHz in the CW mode.

❏ Press the PTT button, then adjust the [CLAR/VFO-B] knob for 100 W on the Wattmeter.

❏ Release the PTT button, then rotate the [CLAR/VFO-B] knob so that the parameter indication "5" in-crease.

❏ Rotate the [MULTI] Dial knob to select the alignment menu item "10-03 I-ALC HFM" for the 14 MHz amateur band's ALC Adjustment.

❏ Set the VFO-A frequency to 14.20 MHz in the CW mode.

❏ Press the PTT button, then adjust the [CLAR/VFO-B] knob for 100 W on the Wattmeter.

❏ Release the PTT button, then rotate the [CLAR/VFO-B] knob so that the parameter indication "5" in-crease.

❏ Rotate the [MULTI] Dial knob to select the alignment menu item "10-04 I-ALC HFH" for the 21 MHz amateur band's ALC Adjustment.

❏ Set the VFO-A frequency to 21.240 MHz in the CW mode.

❏ Press the PTT button, then adjust the [CLAR/VFO-B] knob for 100 W on the Wattmeter.

❏ Release the PTT button, then rotate the [CLAR/VFO-B] knob so that the parameter indication "10" in-crease.

❏ Rotate the [MULTI] Dial knob to select the alignment menu item "10-05 I-ALC 50" for the 50 MHz amateur band's ALC Adjustment.

❏ Set the VFO-A frequency to 51.90 MHz in the CW mode.

❏ Press the PTT button, then adjust the [CLAR/VFO-B] knob for 100 W on the Wattmeter.

❏ Release the PTT button, then rotate the [CLAR/VFO-B] knob so that the parameter indication "5" in-crease.

❏ Connect the 50-Ohm Dummy Load and Wattmeter to the "144/430 MHz" ANT jack.

❏ Rotate the [MULTI] Dial knob to select the alignment menu item "10-06 I-ALC 144" for the 144 MHz amateur band's ALC Adjustment.

❏ Set the VFO-A frequency to 145.90 MHz in the CW mode.

❏ Press the PTT button, then adjust the [CLAR/VFO-B] knob for 100 W on the Wattmeter.

❏ Release the PTT button, then rotate the [CLAR/VFO-B] knob so that the parameter indication "5" in-crease.

❏ Rotate the [MULTI] Dial knob to select the alignment menu item "10-07 I-ALC 430" for the 430 MHz amateur band's ALC Adjustment.

❏ Set the VFO-A frequency to 439.00 MHz in the CW mode.

❏ Press the PTT button, then adjust the [CLAR/VFO-B] knob for 50 W on the Wattmeter.

- ❒ Release the PTT button, then rotate the [CLAR/VFO-B] knob so that the parameter indication "3" in-crease.
- ❒ Press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

48. ALC Meter Adjustment

- ❒ Connect the Microphone to the front panel MIC jack.
- ❒ Connect the 50-Ohm Dummy Load and Wattmeter to the "HF/50 MHz" ANT jack.
- ❒ Set the VFO-A frequency to 14.20 MHz in the CW mode.
- ❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.
- ❒ Rotate the [MULTI] Dial knob to select the alignment menu item "13-03 100W TXG HFM".
- ❒ Rotate the [CLAR/VFO-B] knob to set the parameter to "255".
- ❒ Rotate the [MULTI] Dial knob to select the alignment menu item "18-01 TX CAR USB".
- ❒ Rotate the [CLAR/VFO-B] knob to set the parameter to "255".
- ❒ Rotate the [MULTI] Dial knob to select the alignment menu item "13-01 100W FALC HFM".
- ❒ Rotate the [CLAR/VFO-B] knob to set the parameter to "0".
- ❒ Press the PTT button, then adjust the [CLAR/VFO-B] knob for 100 W ±2.5 W on the Wattmeter.
- ❒ Release the PTT button.
- ❒ Set the USB mode.
- ❒ Set the MIC GAIN to "50".
- ❒ Connect the Audio Generator to pin 8 of the MIC jack (pin 7: GND).
- ❒ Rotate the [MULTI] Dial knob to select the alignment menu item "20-01 ALC-MTR".
- ❒ Press the PTT button, then adjust the Audio Generator output level to the position where RF Power output to 88 - 92 W on the Wattmeter.

- ❒ Release the PTT button.
- ❒ Increase the Audio Generator output level by "+10 dB".
- ❒ Press the PTT button, then press the [F(M-LIST)] key while pressing and holding in the PTT button.
- ❒ Release the PTT button.
- ❒ Rotate the [CLAR/VFO-B] knob for maximum deflection on the ALC meter zone (S9 +10 dB), then press the [F(M-LIST)] key, while pressing and holding in the PTT button.
- ❒ Release the PTT button, then press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

49. TX Output Power/PO Meter/TXG Adjustment

- ❒ Referring to table below, tune the transceiver to each frequency listed.

Band	VFO-A Frequency	Mode
1.8 MHz Band	1.90 MHz	CW-USB
7 MHz Band	7.10 MHz	CW-USB
14 MHz Band	14.20 MHz	CW-USB
21 MHz Band	21.20 MHz	CW-USB
50 MHz Band	51.90 MHz	CW-USB
144 MHz Band	145.900 MHz	CW-USB
430 MHz Band	439.900 MHz	CW-USB

- ❒ Connect the 50-Ohm Dummy Load and Wattmeter to the "HF/50 MHz" and "144/430 MHz" ANT jack.
- ❒ Connect the Microphone to the front panel MIC jack.
- ❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.
- ❒ Rotate the [MULTI] Dial knob to select the alignment menu item to "11-01 100W FALC 1.8".
- ❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 100 W ±3W on the Wattmeter.
- ❒ Release the PTT button.

FT-991A Version Update Kit

- ❐ Rotate the [MULTI] Dial knob to select the alignment menu item to "11-02 MTR 1.8".
- ❐ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 100 W on the PO meter.
- ❐ Release the PTT button.
- ❐ Rotate the [MULTI] Dial knob to select the alignment menu item to "11-03 TXG 1.8".
- ❐ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for "S9+10dB" on the ALC meter zone.
- ❐ Release the PTT button.
- ❐ Perform the same procedures for the Alignment Menu Items "11-04 50W FALC 1.8" through "11-15 5W TXG 1.8" per the chart at the below.

Alignment Menu		Operation	WATT Meter (Adjust to)	PO Meter (Adjust to)	ALC Meter Zone (Adjust to)
1.9 MHz	11-01 100W FALC 1.8	Rotate the [CLAR/VFO-B] knob	100 W (+3 W / -3 W)	–	–
	11-02 100W MTR 1.8		–	100 W	–
	11-03 100W TXG 1.8		–	–	S9 +10dB (or 205)
	11-04 50W FALC 1.8		50 W (+3 W / -3 W)	–	–
	11-05 50W MTR 1.8		–	50 W	–
	11-06 50W TXG 1.8		–	–	S9 +10dB (or 205)
	11-07 20W FALC 1.8		20 W (+2 W / -2 W)	–	–
	11-08 20W MTR 1.8		–	20 W	–
	11-09 20W TXG 1.8		–	–	S9 +10dB (or 205)
	11-10 10W FALC 1.8		10 W (+1 W / -1 W)	–	–
	11-11 10W MTR 1.8		–	10 W	–
	11-12 10W TXG 1.8		–	–	S9 +10dB (or 205)
	11-13 5W FALC 1.8		5 W (+1 W / -1 W)	–	–
	11-14 5W MTR 1.8		–	5 W	–
	11-15 5W TXG 1.8		–	–	S9 +10dB (or 205)

❐ Perform the same procedures for the Alignment Menu Items "12-01 100W FALC HFL" through "17-12 5W TXG 430" per the below chart.

Alignment Menu		Operation	WATT Meter (Adjust to)	PO Meter (Adjust to)	ALC Meter Zone (Adjust to)
7 MHz	12-01 100W FALC HFL	Rotate the [CLAR/VFO-B] knob	100 W (+3 W / -3 W)	–	–
	12-02 100W MTR HFL		–	100 W	–
	12-03 100W TXG HFL		–	–	S9 +10dB
	12-04 50W FALC HFL		50 W (+3 W / -3 W)	–	–
	12-05 50W MTR HFL		–	50 W	–
	12-06 50W TXG HFL		–	–	S9 +10dB
	12-07 20W FALC HFL		20 W (+2 W / -2 W)	–	–
	12-08 20W MTR HFL		–	20 W	–
	12-09 20W TXG HFL		–	–	S9 +10dB
	12-10 10W FALC HFL		10 W (+1 W / -1 W)	–	–
	12-11 10W MTR HFL		–	10 W	–
	12-12 10W TXG HFL		–	–	S9 +10dB
	12-13 5W FALC HFL		5 W (+1 W / -1 W)	–	–
	12-14 5W MTR HFL		–	5 W	–
	12-15 5W TXG HFL		–	–	S9 +10dB
14 MHz	13-01 100W FALC HFM	Rotate the [CLAR/VFO-B] knob	100 W (+3 W / -3 W)	–	–
	13-02 100W MTR HFM		–	100 W	–
	13-03 100W TXG HFM		–	–	S9 +10dB
	13-04 50W FALC HFM		50 W (+3 W / -3 W)	–	–
	13-05 50W MTR HFM		–	50 W	–
	13-06 50W TXG HFM		–	–	S9 +10dB
	13-07 20W FALC HFM		20 W (+2 W / -2 W)	–	–
	13-08 20W MTR HFM		–	20 W	–
	13-09 20W TXG HFM		–	–	S9 +10dB
	13-10 10W FALC HFM		10 W (+1 W / -1 W)	–	–
	13-11 10W MTR HFM		–	10 W	–
	13-12 10W TXG HFM		–	–	S9 +10dB
	13-13 5W FALC HFM		5 W (+1 W / -1 W)	–	–
	13-14 5W MTR HFM		–	5 W	–
	13-15 5W TXG HFM		–	–	S9 +10dB

FT-991A Version Update Kit

Alignment Menu		Operation	WATT Meter (Adjust to)	PO Meter (Adjust to)	ALC Meter Zone (Adjust to)
21 MHz	14-01 100W FALC HFH	Rotate the [CLAR/VFO-B] knob	100 W (+3 W / -3 W)	–	–
	14-02 100W MTR HFH		–	100 W	–
	14-03 100W TXG HFH		–	–	S9 +10dB +2※ or S9 + more than 1 dot
	14-04 50W FALC HFH		50 W (+3 W / -3 W)	–	–
	14-05 50W MTR HFH		–	50 W	–
	14-06 50W TXG HFH		–	–	S9 +10dB +3※
	14-07 20W FALC HFH		20 W (+2 W / -2 W)	–	–
	14-08 20W MTR HFH		–	20 W	–
	14-09 20W TXG HFH		–	–	S9 +10dB +2※
	14-10 10W FALC HFH		10 W (+1 W / -1 W)	–	–
	14-11 10W MTR HFH		–	10 W	–
	14-12 10W TXG HFH		–	–	S9 +10dB +2※
	14-13 5W FALC HFH		5 W (+1 W / -1 W)	–	–
	14-14 5W MTR HFH		–	5 W	–
	14-15 5W TXG HFH		–	–	S9 +10dB +2※
50 MHz	15-01 100W FALC 50	Rotate the [CLAR/VFO-B] knob	96 W (+1 W / -1 W)	–	–
	15-02 100W MTR 50		–	100 W	–
	15-03 100W TXG 50		–	–	S9 +10dB +3※
	15-04 50W FALC 50		50 W (+3 W / -3 W)	–	–
	15-05 50W MTR 50		–	50 W	–
	15-06 50W TXG 50		–	–	S9 +10dB +3※
	15-07 20W FALC 50		20 W (+2 W / -2 W)	–	–
	15-08 20W MTR 50		–	20 W	–
	15-09 20W TXG 50		–	–	S9 +10dB +3※
	15-10 10W FALC 50		10 W (+1 W / -1 W)	–	–
	15-11 10W MTR 50		–	10 W	–
	15-12 10W TXG 50		–	–	S9 +10dB +2※
	15-13 5W FALC 50		5 W (+1 W / -1 W)	–	–
	15-14 5W MTR 50		–	5 W	–
	15-15 5W TXG 50		–	–	S9 +10dB +2※

Alignment Menu		Operation	WATT Meter (Adjust to)	PO Meter (Adjust to)	ALC Meter Zone (Adjust to)
144 MHz	16-01 50W FALC 144	Rotate the [CLAR/VFO-B] knob	50 W (+3 W / -3 W)	–	–
	16-02 50W MTR 144		–	50 W	–
	16-03 50W TXG 144		–	–	S9 +10dB +3※
	16-04 20W FALC 144		20 W (+2 W / -2 W)	–	–
	16-05 20W MTR 144		–	20 W	–
	16-06 20W TXG 144		–	–	S9 +10dB +2※
	16-07 10W FALC 144		10 W (+1 W / -1 W)	–	–
	16-08 10W MTR 144		–	10 W	–
	16-09 10W TXG 144		–	–	S9 +10dB +1※
	16-10 5W FALC 144		5 W (+1 W / -1 W)	–	–
	16-11 5W MTR 144		–	5 W	–
	16-12 5W TXG 144		–	–	S9 +10dB +1※
430 MHz	17-01 50W FALC 430	Rotate the [CLAR/VFO-B] knob	50 W (+3 W / -3 W)	–	–
	17-02 50W MTR 430		–	50 W	–
	17-03 50W TXG 430		–	–	S9 +10dB +3※
	17-04 20W FALC 430		20 W (+2 W / -2 W)	–	–
	17-05 20W MTR 430		–	20 W	–
	17-06 20W TXG 430		–	–	S9 +10dB +2※
	17-07 10W FALC 430		10 W (+1 W / -1 W)	–	–
	17-08 10W MTR 430		–	10 W	–
	17-09 10W TXG 430		–	–	S9 +10dB +1※
	17-10 5W FALC 430		5 W (+1 W / -1 W)	–	–
	17-11 5W MTR 430		–	5 W	–
	17-12 5W TXG 430		–	–	S9 +10dB +1※

※: Rotate the [CLAR/VFO-B] Dial knob so that the parameter of the alignment menu item "+n" increase.

❒ Release the PTT button, then press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

50. AM-TXG Adjustment

❒ Connect the 50-Ohm Dummy Load and Wattmeter to the "HF/50 MHz" ANT jack.
❒ Connect the Microphone to the front panel MIC jack.
❒ Set the VFO-A frequency to 52.000 MHz in the AM mode.
❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item to "18-02 TX CAR AM".
❒ Press and hold the PTT button without microphone input, then rotate the [CLAR/VFO-B] knob to adjust this parameter such that "200" is displayed.
❒ Release the PTT button, then press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

51. REV-ALC Adjustment

- ❑ Connect the 16.6-Ohm Dummy Load and Wattmeter to the "HF/50 MHz" ANT jack.
- ❑ Connect the Microphone to the front panel MIC jack.
- ❑ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.
- ❑ Rotate the [MULTI] Dial knob to select the alignment menu item to "19-01 REV ALC 1.8".
- ❑ Set the VFO-A frequency to 1.900 MHz in the CW mode.
- ❑ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 40 W ±10 W on the Wattmeter.
- ❑ Release the PTT button.
- ❑ Rotate the [MULTI] Dial knob to select the alignment menu item to "19-02 REV ALC HFL".
- ❑ Set the VFO-A frequency to 7.100 MHz in the CW mode.
- ❑ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 40 W ±10 W on the Wattmeter.
- ❑ Release the PTT button.
- ❑ Rotate the [MULTI] Dial knob to select the alignment menu item to "19-03 REV ALC HFM".
- ❑ Set the VFO-A frequency to 14.200 MHz in the CW mode.
- ❑ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 40 W ±10 W on the Wattmeter.
- ❑ Release the PTT button.
- ❑ Rotate the [MULTI] Dial knob to select the alignment menu item to "19-04 REV ALC HFH".
- ❑ Set the VFO-A frequency to 21.200 MHz in the CW mode.
- ❑ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 40 W ±10 W on the Wattmeter.
- ❑ Release the PTT button.

- ❑ Rotate the [MULTI] Dial knob to select the alignment menu item to "19-05 REV ALC 50".
- ❑ Set the VFO-A frequency to 52.000 MHz in the CW mode.
- ❑ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 40 W ±10 W on the Wattmeter.
- ❑ Release the PTT button.
- ❑ Connect the 16.6-Ohm Dummy Load and Wattmeter to the "144/430 MHz" ANT jack.
- ❑ Rotate the [MULTI] Dial knob to select the alignment menu item to "19-06 REV ALC 144".
- ❑ Set the VFO-A frequency to 145.90 MHz in the CW mode.
- ❑ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 25 W ±5 W on the Wattmeter.
- ❑ Release the PTT button.
- ❑ Rotate the [MULTI] Dial knob to select the alignment menu item to "19-07 REV ALC 430".
- ❑ Set the VFO-A frequency to 439.90 MHz in the CW mode.
- ❑ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 15 W ±3 W on the Wattmeter.
- ❑ Release the PTT button, then press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

52. FM MAX Deviation Adjustment

- ❑ Connect the Dummy Load, Wattmeter, and Deviation Meter to the "144/430 MHz" ANT Jack.
- ❑ Set the MIC GAIN to "50".
- ❑ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.
- ❑ Rotate the [MULTI] Dial knob to select the alignment menu item to "20-02 FM DEV".
- ❑ Set the VFO-A frequency to 145.90 MHz in the FM mode.

- ❒ Connect the Audio Generator to pin 8 of the MIC jack (pin 7: GND), then set the output level to 5.0 mV @1 kHz.
- ❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 4.5 kHz ±0.2 kHz on the Deviation Meter.
- ❒ Release the PTT button.
- ❒ Rotate the [MULTI] Dial knob to select the alignment menu item to "20-03 FM-N DEV".
- ❒ Set the VFO-A frequency to 439.90 MHz in the FM-N mode.
- ❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 2.25 kHz ±0.1 kHz on the Deviation Meter.
- ❒ Release the PTT button.
- ❒ Rotate the [MULTI] Dial knob to select the alignment menu item to "20-04 C4FM DEV".
- ❒ Set the VFO-A frequency to 439.90 MHz in the C4FM mode.

- ❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob for 4.5 kHz ±0.2 kHz on the Deviation Meter.
- ❒ Release the PTT button, then press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

53. IDD Meter Adjustment

- ❒ Connect the 50-Ohm Dummy Load and Wattmeter to the "HF/50 MHz" ANT jack.
- ❒ Remove the jumper that is connected between J4006 and J4007 on the HF-PA-Unit, then connect the DC ammeter (20-A range) between J4006 and J4007.
- ❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.
- ❒ Rotate the [MULTI] Dial knob to select the alignment menu item to "22-01 IDD MTR".
- ❒ Set the VFO-A frequency to 14.200 MHz in the CW mode.
- ❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so the IDD meter reading is the same as the DC ammeter.
- ❒ Press the PTT button, then press the [F(M-LIST)] key while pressing and holding in the PTT button.
- ❒ Release the PTT button, then press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

J4007

J4006
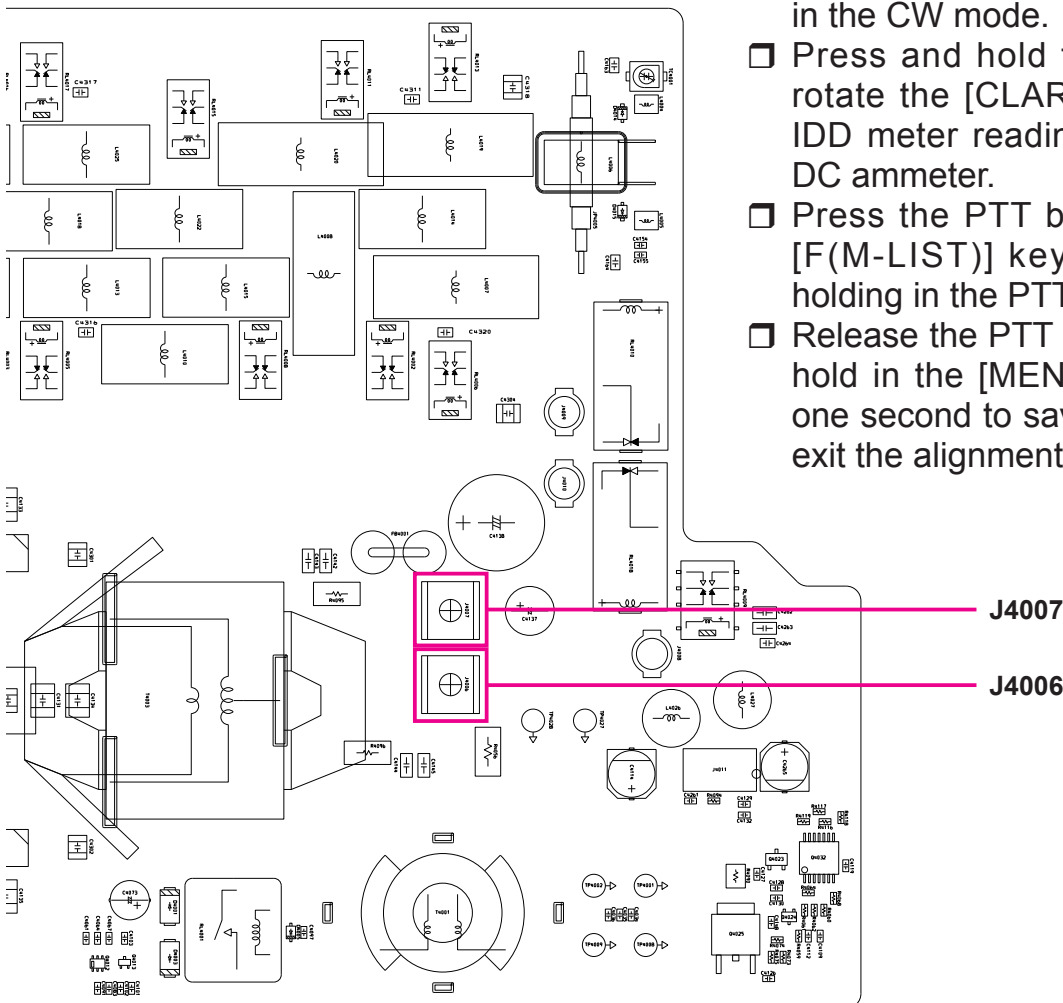
54. SWR Meter Adjustment

❒ Set the VFO-A frequency to 1.850 MHz in the USB mode.

❒ Connect the 50-Ohm Dummy Load and Wattmeter to the "HF/50 MHz" and "144/430 MHz" ANT jack.

❒ Disconnect the 3-pin plug from J1006 on the MAIN Unit, then apply a 4.20 ±0.05 V DC voltage to pin 3 of J1006, and 0.84 ±0.05 V DC to pin 2 of J1006.

❒ Set the MIC GAIN to "Minimum".

❒ Press and hold in the [A=B], [A/B], and [FAST] keys, while turning the radio on, to enter the alignment mode.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item to "21-01 SWR-MTR1.5 1.8".

❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so that the SWR meter reading is "1.5". The SWR meter reading (1.5) is broad (few points). Therefore, set the [CLAR/VFO-B] knob to the center of this broad range.

❒ Release the PTT button.

❒ Apply a 4.20 ±0.05 V DC voltage to pin 3 of J1006, and 1.40 ±0.05 V DC to pin 2 of J1006.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item to "21-02 SWR-MTR2.0 1.8".

❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so that the SWR meter reading is "2.0." The SWR meter reading (2.0) is broad (few points). Therefore, set the [CLAR/VFO-B] knob to the center of this broad range.

❒ Release the PTT button.

❒ Apply a 4.20 ±0.05 V DC voltage to pin 3 of J1006, and 2.10 ±0.05 V DC to pin 2 of J1006.

❒ Rotate the [MULTI] Dial knob to select the alignment menu item to "21-03 SWR-MTR3.0 1.8".

❒ Press and hold the PTT button, then rotate the [CLAR/VFO-B] knob so that the SWR meter reading is "3.0." The SWR meter reading (3.0) is broad (few points). Therefore, set the [CLAR/VFO-B] knob to the center of this broad range.

❒ Release the PTT button.

❒ Perform the same procedures for the Alignment Menus "21-05 SWR-MTR1.5 14" through "21-07 SWR-MTR3.0 14", "21-09 SWR-MTR1.5 50" through "21-11 SWR-MTR3.0 50", "21-13 SWR-MTR1.5 144" through "21-15 SWR-MTR3.0 144" and "21-17 SWR-MTR1.5 430" through "21-19 SWR-MTR3.0 430".


J1006
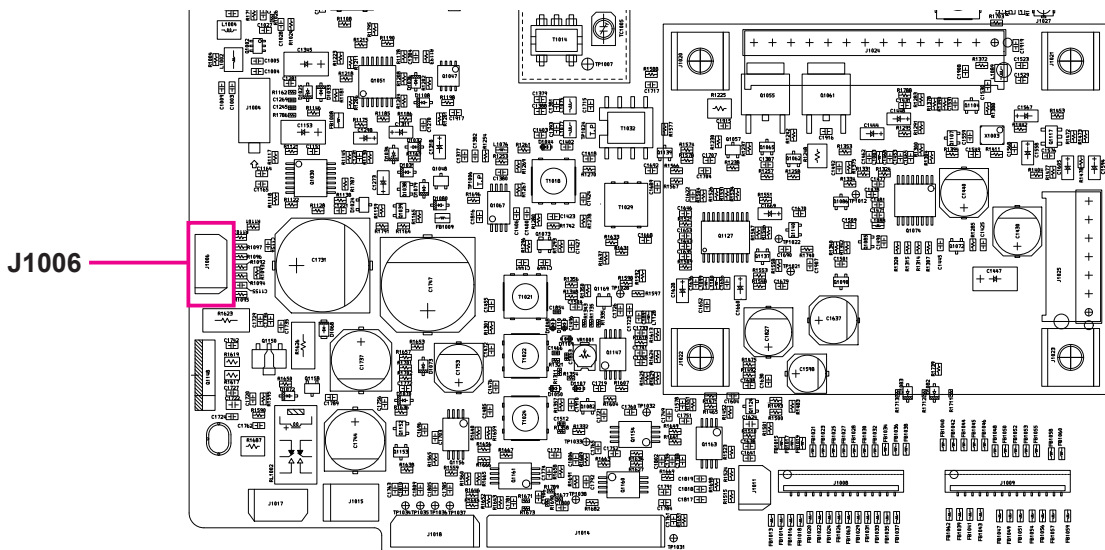
Note: Do not change the Alignment Menus "21-04 SWR-MTR CO 1.8", "21-08 SWRMTR CO 14", "21-12 SWRMTR CO 50", "21-16 SWRMTR CO 144" and "21-20 SWR-MTR CO 430".

These parameters are always 128.

❒ This completes the internal alignment routine.

❒ Press and hold in the [MENU(SETUP)] button for one second to save the new setting and exit the alignment mode.

❒ Connect the 3-pin plug to J1006 on the MAIN Unit.

Important Notice: If the transceiver is placed in transmit mode without connecting the 3-pin plug to J1006, there is a possibility that a final transistor may be damaged.

55. Replace the shield cover and its 11 screws.

Shield cover

FT-991A Version Update Kit
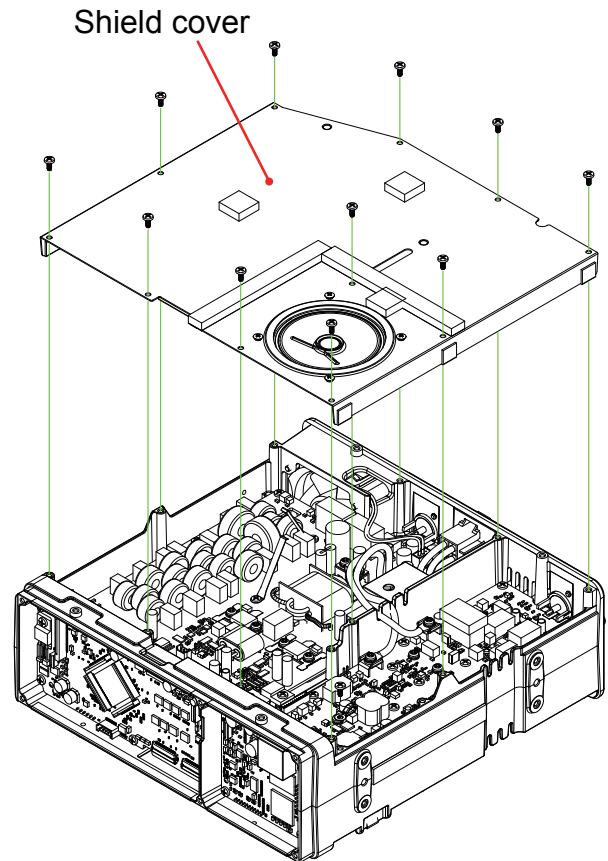
56. Connect the *supplied* Cable to the J1026 and J1028 connectors on the MAIN-Unit.
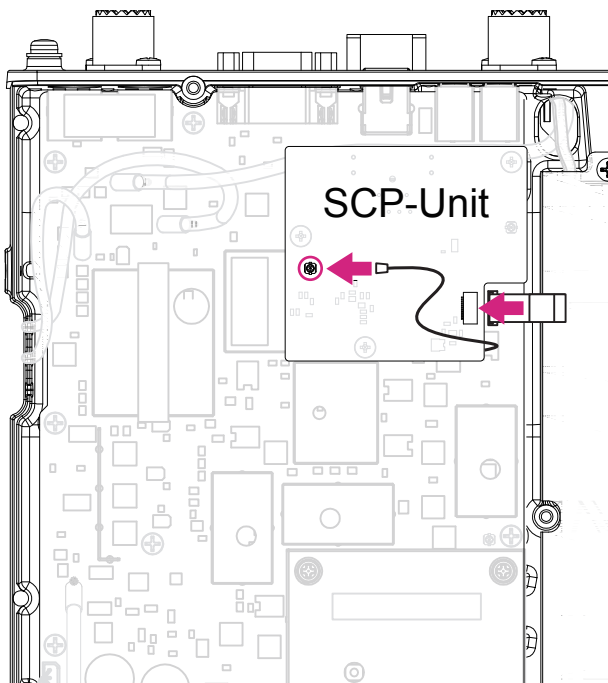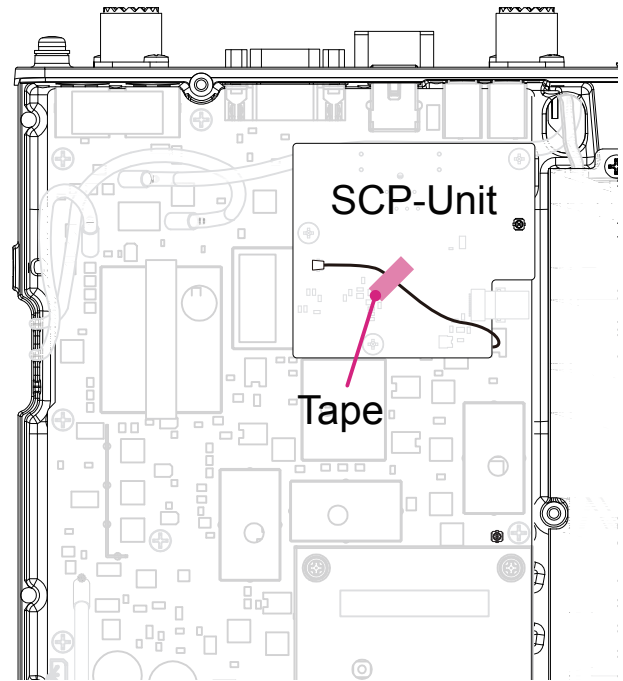

MAIN-Unit   Supplied Cable
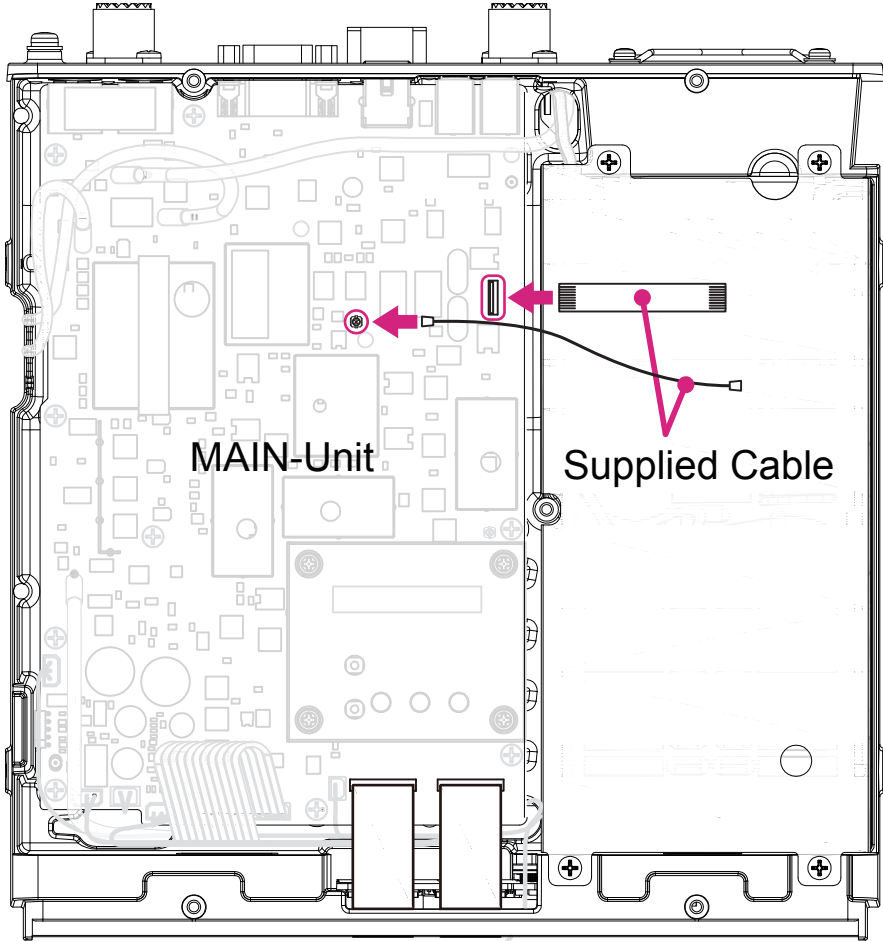
57. Attach the supplied SCP-Unit to the MAIN-Unit using the 3 spacers and 3 screws.
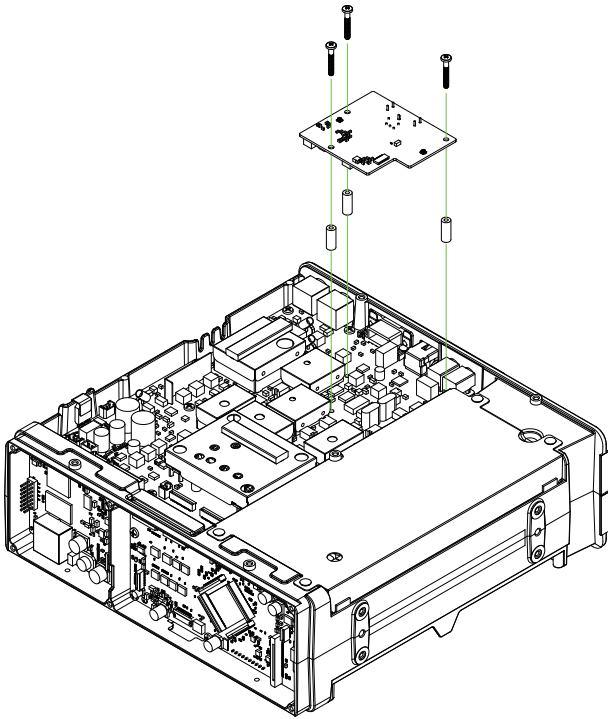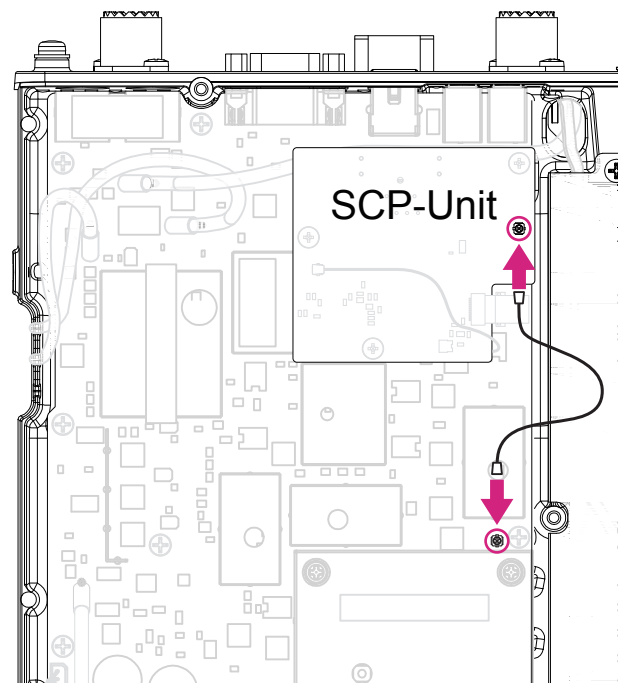

58. Connect the *supplied* Cable to the J6501 and J6503 connectors on the SCP-Unit.

SCP-Unit

59. Fasten the cable with tape.
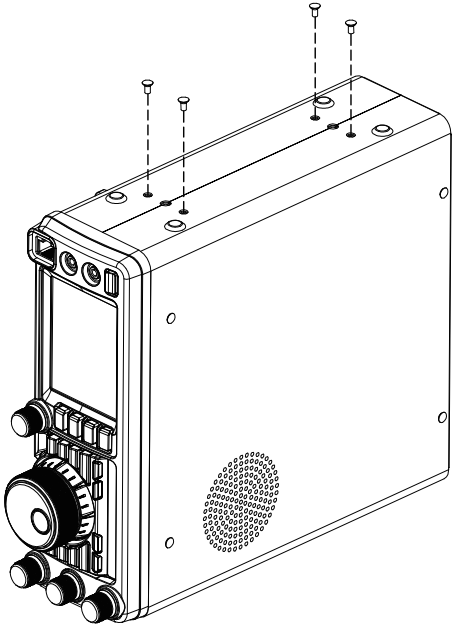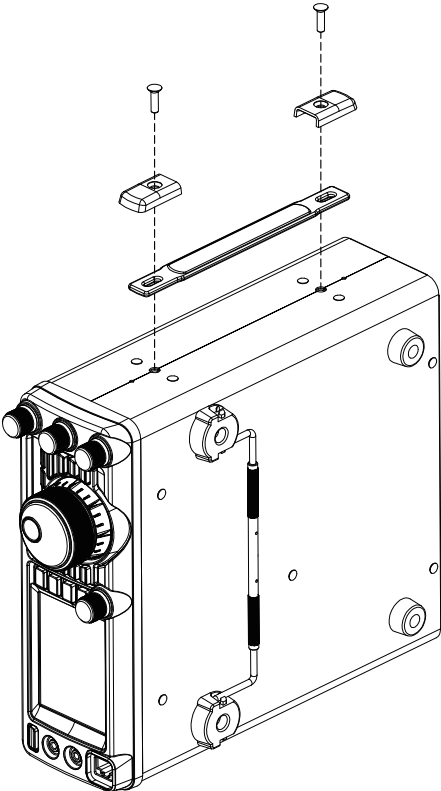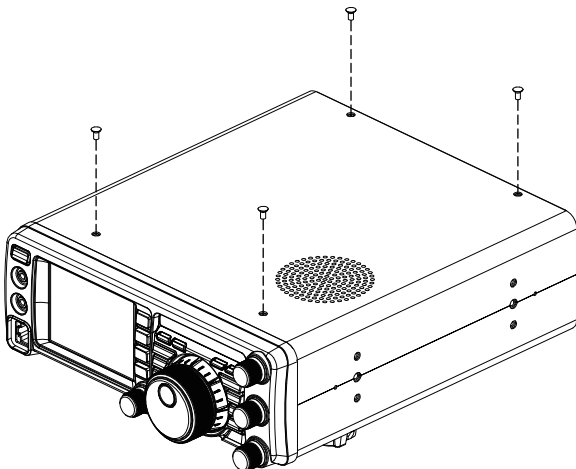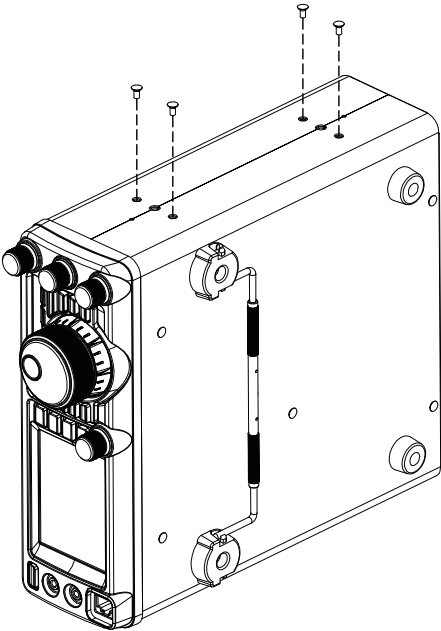   *Ex:* Tape #900 (P/N: V9000058)

SCP-Unit

Tape

60. Connect the *supplied* Cable to the J6502 and J1027 connectors on the SCP-Unit.

SCP-Unit

61. Scope Adjustment

❒ Set the VFO-A frequency to 14.200 MHz in the CW mode.
❒ Set the following controls as indicated:
   [IPO] : AMP1
   [ATT] : OFF
   [AGC] : AUTO
   [RF GAIN] : Fully clockwise.
❒ Connect the RF Signal Generator to the "HF/50 MHz" ANT jack, then set the output level to +60 dB at the 14.200 MHz.
❒ As shown in the figure below, adjust VR6501 so the waveform matches the second line from the top on the scope display.

VR6501

62. Remove the Gasket on the bottom case.

63. Attach the supplied Gasket to the bottom case.
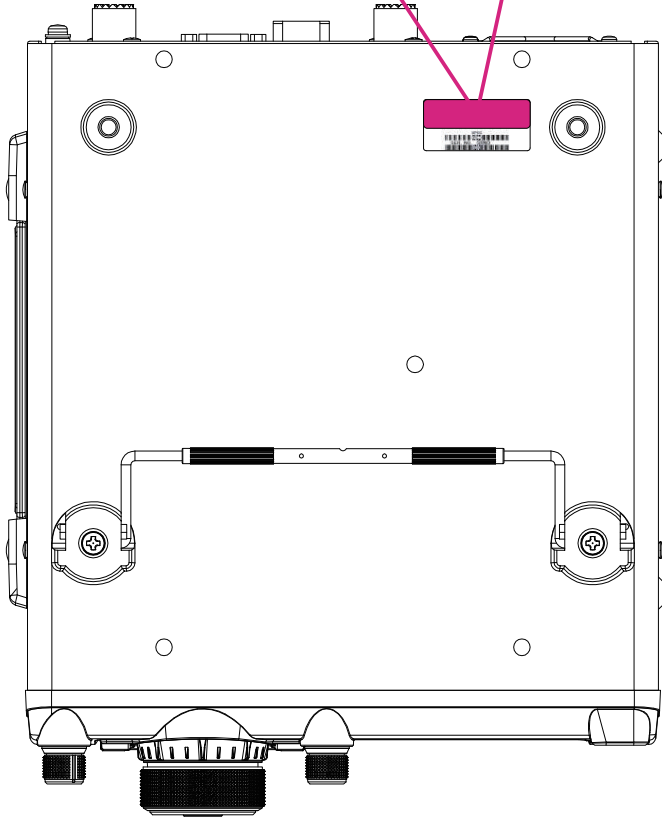
64. Replace the top and bottom case and its 19 screws.
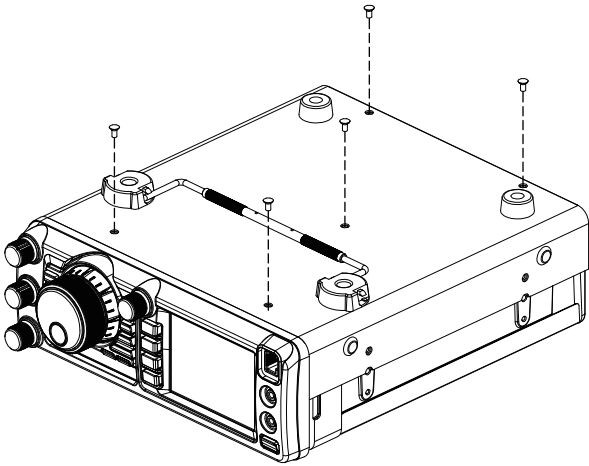
65. Attach the new *supplied* label onto the original label as shown, (do not cover the serial number).

USA Version

European Version
Asian Version

Model : FT-991A
YAESU MUSEN CO., LTD. MADE IN JAPAN
FCC ID:K6620575X50
IC:511B-20575X50

FT-991A
YAESU MUSEN CO., LTD. MADE IN JAPAN

YAESU
The radio