SECTION 5 ADJUSTMENT PROCEDURES

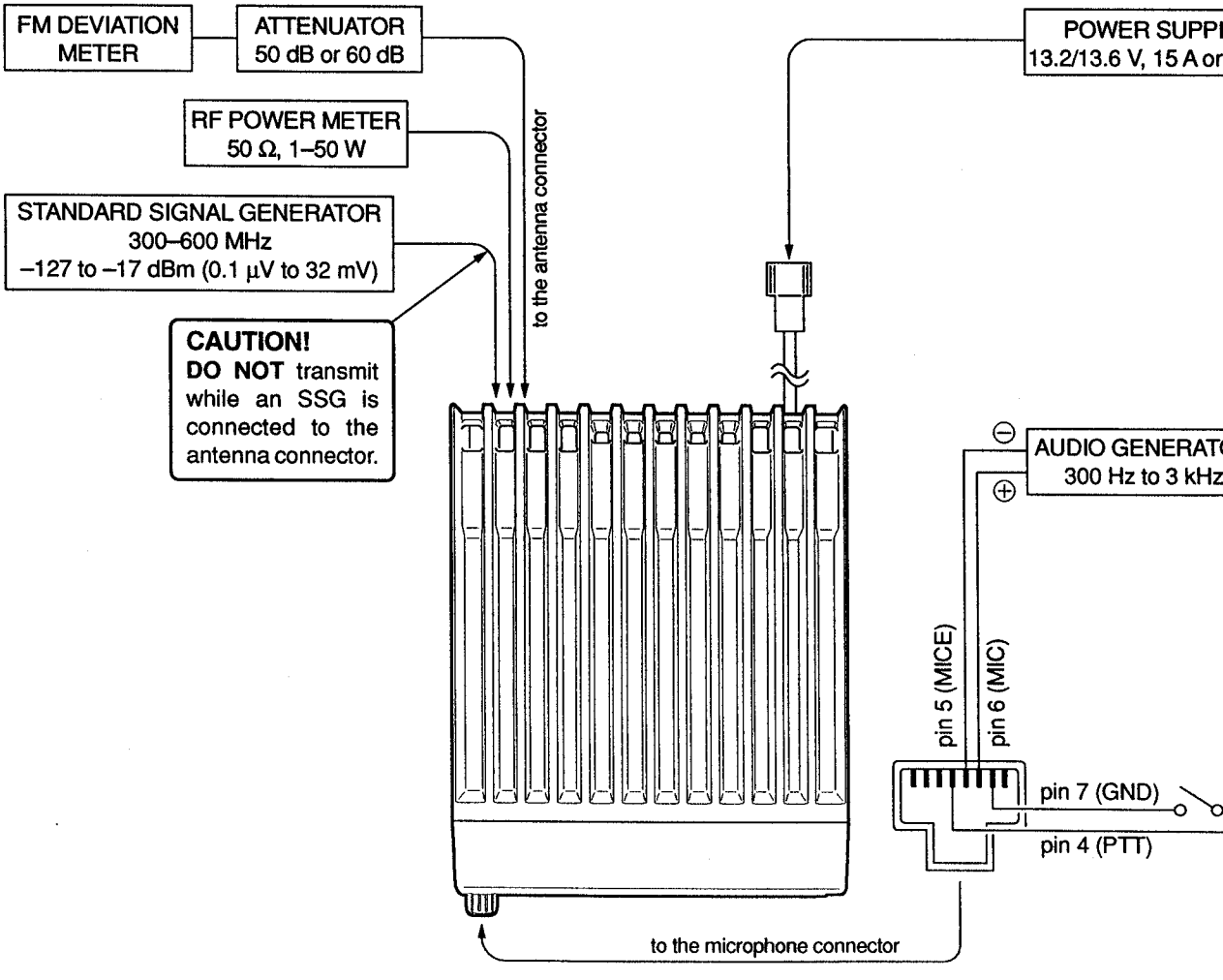
5-1 PREPARATION

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE
DC power supply	Output Voltage : 13.2 V DC (IC-F2010) 13.6 V DC (IC-F2020) Current capacity : 15 A or more
RF power meter (terminated type)	Measuring range : 1–50 W Frequency range : 300–600 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1
Frequency counter	Frequency range : 0.1–600 MHz Frequency accuracy: ±1 ppm or better Sensitivity : 100 mV or better
RF voltmeter	Frequency range : 0.1–600 MHz Measuring range : 0.01–10 V
FM deviation meter	Frequency range : DC–600 MHz Measuring range : 0 to ±10 kHz
Audio generator	Frequency range : 300–3000 Hz Measuring range : 1–500 mV

EQUIPMENT	GRADE AND RANGE
Standard signal generator (SSG)	Frequency range : 0.1–600 MH Output level : 0.1 µV –32 m (–127 to –17
Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
DC voltmeter	Input impedance : 50 kΩ/V DC better
Digital multimeter	Measuring range : 10 mV –10 V
AC millivoltmeter	Input impedance : 10 MΩ/V DC better
External speaker	Input impedance : 4 Ω Capacity : 5 W or more
Attenuator	Power attenuation : 50 dB or 60 Capacity : 50 W or mor
Terminator	Impedance : 50 Ω Capacity : 50 W or mor

■ CONNECTION



5-2 INITIAL SET MODE

The following items can be adjusted via ***Initial Set Mode*** without opening the transceiver's case.

■ ENTERING INITIAL SET MODE

① Turn the transceiver power OFF.

② While pushing [△] and [▽], turn power ON.
- Bank number appears regardless of the channel separation type, 'bank' or 'free'.

③ Push [P0] to cycle through the initial set mode items.

NOTE: Initial Set Mode access can be inhibited through PC programming. In such case, [P0] cannot be used and only 'DISPLAY' setting is available. Ask your Dealer or Icom Service Center for PC programming.

■ SELECTABLE ITEMS

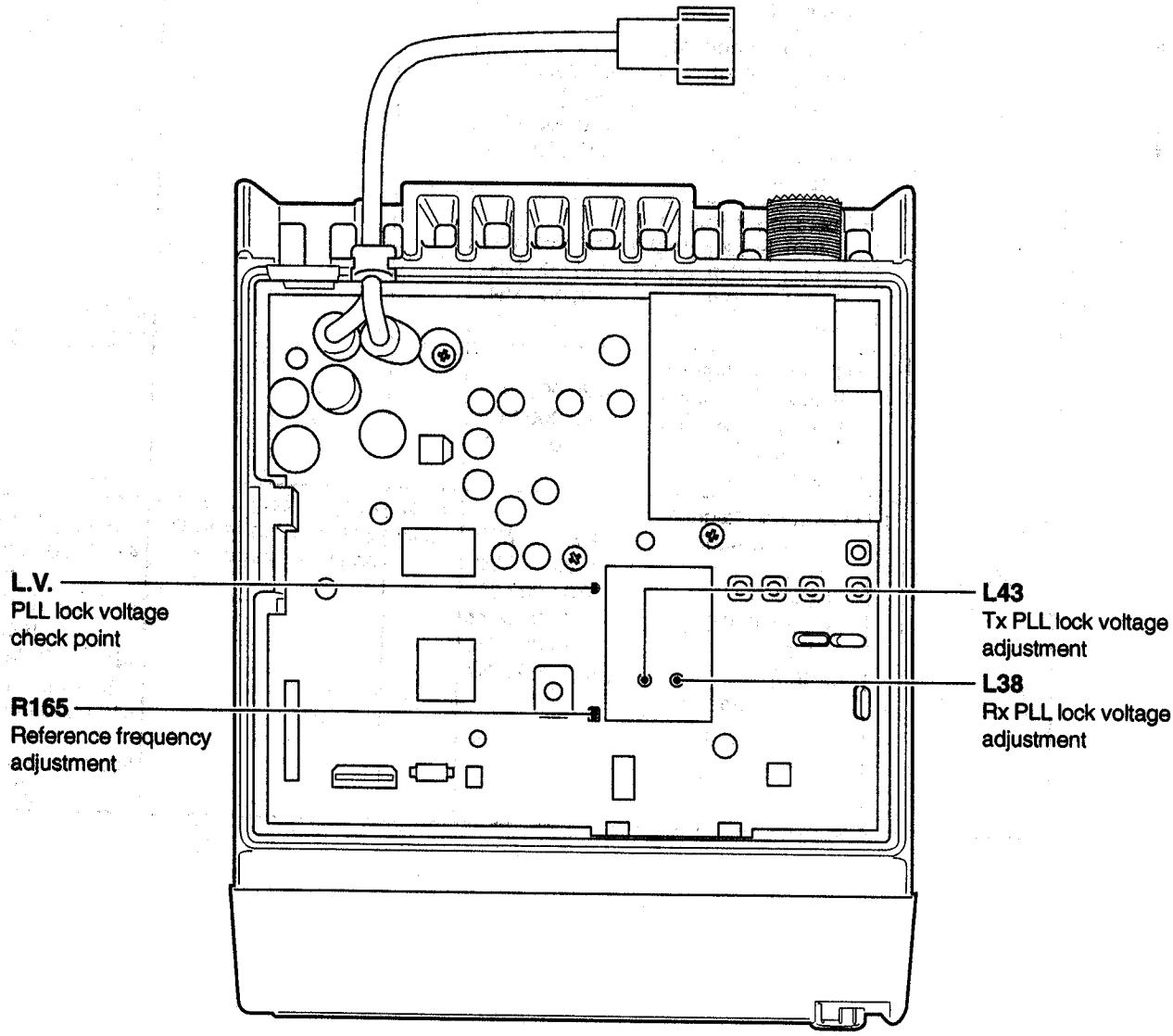
No.	ITEM	SELECTABLE CONDITIONS		
		[P1]	[P2]	[P3]
1	DISPLAY	Backlight	—	Contrast
2	AF/SQUELCH	—	Squelch level	Minimum AF level
3	BEEP TONES	Link ON/OFF	Beep tones ON/OFF	Beep level
4	DEVIATION	DTCS balance	Tone deviation	Max. voice deviation
5	S-METER	Indicate the received signal level regardless of [P1] to [P3] keys.		
6	TX POWER	Low 1	Low 2	High

■ SELECTION METHOD

MODE No.	ITEM	METHOD	NOTE
1	Display backlight	Push [P1] to select 'dark' or 'bright'.	
	Display contrast	Rotate the volume control while pushing [P3].	
2	Squelch level	Rotate the volume control while pushing [P2].	
	Minimum AF level	Rotate the volume control while pushing [P3].	
3	Link/unlink beep tones with the volume control	Push [P1] to select 'link' or 'unlink'.	2 beeps: link 1 beep: unlink
	Beep ON/OFF	Push [P2] to turn beeps ON and OFF.	2 beeps: ON 1 beep: OFF Effective after exiting Initial Set Mode
	Maximum beep level	Rotate the volume control while pushing [P3].	
4	DTCS balance	Rotate the volume control while pushing [P1].	Automatic transmission while pushing the key.
	CTCSS/DTCS Tone deviation	Rotate the volume control while pushing [P2].	Automatic transmission while pushing the key. Separate setting for CTCSS and DTCS depending on the programmed tone system.
	Maximum voice deviation	Rotate the volume control while pushing [P3].	Automatic transmission while pushing the key.
5	S-meter level	—	Received signal level is shown in the display
6	Transmit low power (L1)	Rotate the volume control while pushing [P1].	Automatic transmission while pushing the key
	Transmit low power (L2)	Rotate the volume control while pushing [P2].	Same as above.
	Transmit high power (H)	Rotate the volume control while pushing [P3].	Same as above.

5-3 PLL ADJUSTMENT

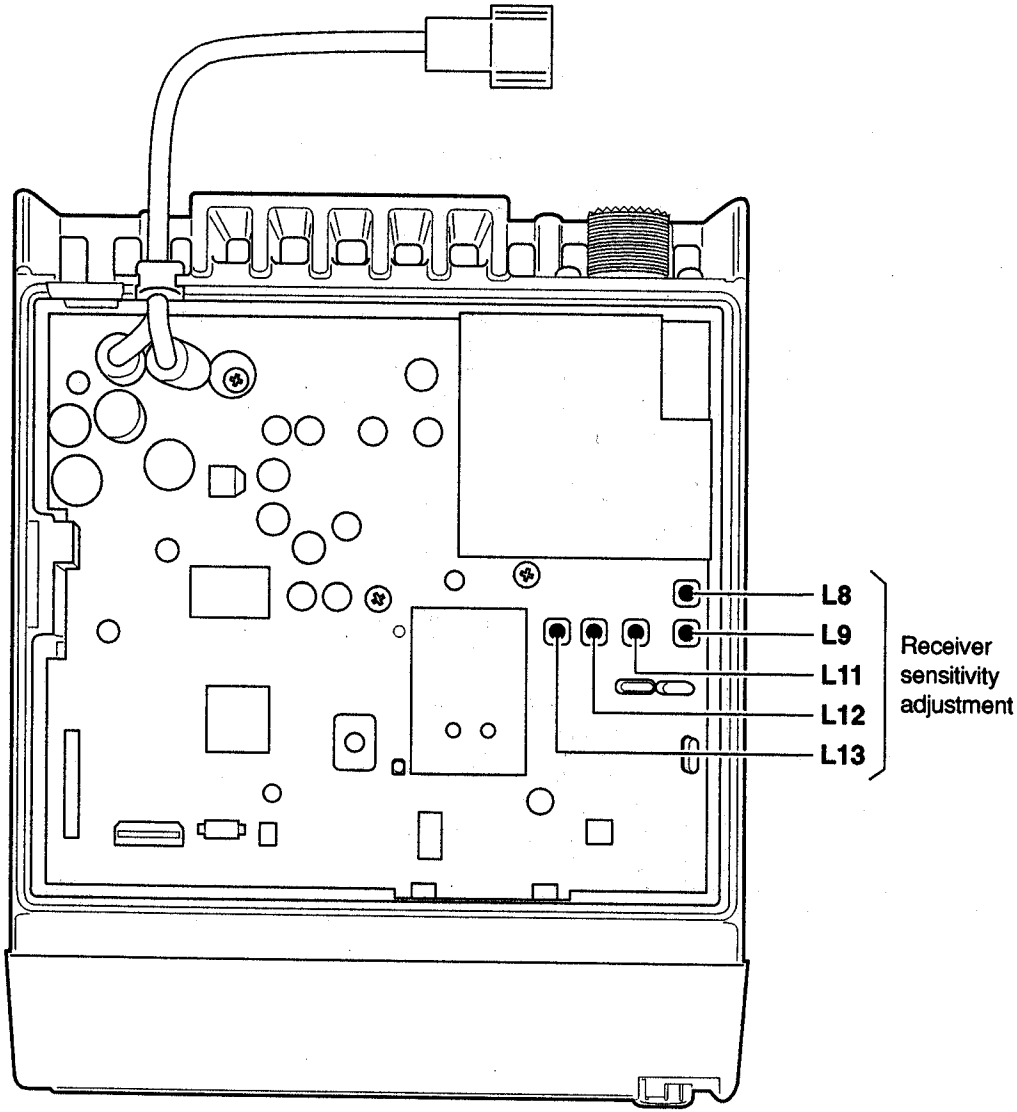
ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT	
			UNIT	LOCATION		UNIT	ADJUST
PLL LOCK VOLTAGE	1	• Operating frequency [L400], [P400] : 390.000 MHz [P425], [P440], [L450], [L470] : 440.000 MHz [L490], [P490] : 480.000 MHz • Receiving	MAIN or MAIN-A	Connect a digital multi-meter or an oscillo-scope to the check point, "LV".	2.0 V	MAIN or MAIN-A	L38
	2	• Operating frequency [L400], [P400] : 430.000 MHz [P425], [P440], [L450], [L470] : 490.000 MHz [L490], [P490] : 520.000 MHz • Receiving			7.0–13.0 V		Verify
	3	• Operating frequency [L400], [P400], [P425] : 390.000 MHz [P440], [L450], [L470] : 440.000 MHz [L490], [P490] : 480.000 MHz • Transmitting			2.0 V		L43
	4	• Operating frequency [L400], [P400], [P425] : 430.000 MHz [P440], [L450], [L470] : 490.000 MHz [L490], [P490] : 520.000 MHz • Transmitting			7.0–13.0 V		Verify
PLL REFERENCE FREQUENCY	1	• Operating frequency [L400], [P400] : 430.000 MHz [P425] : 432.000 MHz [L450] : 470.000 MHz [P440], [L470] : 490.000 MHz [L490] : 512.000 MHz [P490] : 520.000 MHz • Transmitting	Rear panel	Loosely couple a fre-quency counter to the antenna connector.	430.00000 MHz [L400], [P400] 432.00000 MHz [P425] 470.00000 MHz [L450] 490.00000 MHz [P440], [L470] 512.00000 MHz [L490] 520.00000 MHz [P490]	MAIN or MAIN-A	R165


L.V.
PLL lock voltage check point
R165
Reference frequency adjustment
L43
Tx PLL lock voltage adjustment
L38
Rx PLL lock voltage adjustment

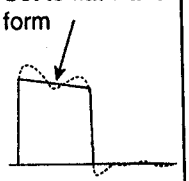
5-4 RECEIVER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT METHOD	ADJUSTMENT	
				VALUE	ADJUST
RECEIVER SENSITIVITY	1	• Operating frequency [L400], [P400] : 400.000 MHz [P425], [P440] : 440.000 MHz [L450] : 450.000 MHz [L470] : 470.000 MHz [P490] : 490.000 MHz [L490] : 520.000 MHz • Connect an SSG to the antenna connector and set as: Level : 5.6 μV* (–92 dBm) Modulation : OFF • Connect a 4 Ω load to the external speaker jack. • Enter ***Initial Set Mode*** No. 5. Refer to page 5-2 for details. • Receiving	Number digits in the LCD 	Maximum indication	Adjust in sequence L8, L9, L11, L12, L13 on the MAIN/MAIN-A unit
NOISE SQUELCH THRESHOLD POINT	1	• Make sure no signal is being applied to the antenna connector. • Enter ***Initial Set Mode*** No. 2. Refer to page 5-2 for details. • Operating frequency : Any • Receiving	Speaker output	At the point where the noise audio just disappears.	Rotate volume control while pushing [P2].
	2	• Connect an SSG to the antenna connector and set as: Level : 0.25 μV* (–119 dBm) Deviation : ±3.5 kHz [Wide] and [Wide/Narrow] ±2.8 kHz [Middle] ±1.75 kHz [Narrow] Modulation : 1 kHz • Receiving		Squelch opens	Verify
BEEP LEVEL	1	• Enter ***Initial Set Mode*** No. 3. Refer to page 5-2 for details. • Operating frequency : Any • Receiving	Speaker output	Desired level	Rotate volume control while pushing [P3].

*This output level of the standard signal generator (SSG) is indicated as SSG's open circuit.


L8
L9
L11
L12
L13
Receiver sensitivity adjustment

5-5 TRANSMITTER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT METHOD	ADJUSTMENT	
				VALUE	ADJUST
OUTPUT POWER	1	• Operating frequency : [L400], [P400], [P425] : 400.000 MHz [P440] : 440.000 MHz [L450] : 450.000 MHz [L470] : 470.000 MHz [L490], [P490] : 490.000 MHz • Enter ***Initial Set Mode*** No. 6. Refer to page 5-2 for details.	Connect an RF power meter to the antenna connector.	25 W or 10 W (IC-F2010 according to versions) 35 W (IC-F2020)	Rotate volume control while pushing [P3].
				10 W or 5 W (IC-F2010 according to versions) 10 W (IC-F2020)	Rotate volume control while pushing [P2].
				2.5 W (IC-F2010) 3.5 W (IC-F2020)	Rotate volume control while pushing [P1].
			NOTE: When the RF output power cannot be set with this procedure, cloning may be necessary to cancel the output power setting.		
FM DEVIATION	1	• Operating frequency : [L400], [P400], [P425] : 400.000 MHz [L450] : 450.000 MHz [L470] : 470.000 MHz [P440], [L490], [P490] : 490.000 MHz • Enter ***Initial Set Mode*** No. 4. Refer to page 5-2 for details. • Connect an audio generator to the microphone connector and set as: 1 kHz/35 mV (IC-F2010) 1 kHz/50 mV (IC-F2020) • Set an FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • Wide/Narrow setting : Wide [Wide/Narrow] types only	Connect an FM deviation meter to the antenna connector through an attenuator.	±4.1 kHz [Wide/Narrow] and [Wide] ±3.4 kHz [Middle] ±2.1 kHz [Narrow]	Rotate volume control while pushing [P3].
	2	• Wide/Narrow setting : Narrow [Wide/Narrow] types only		±1.75–±2.2 kHz	Verify
DTCS WAVE FORM AND DEVIATION	1	• Operating frequency : [L400], [P400], [P425] : 415.000 MHz [P440] : 465.000 MHz [L450] : 460.000 MHz [L470] : 480.000 MHz [L490] : 500.000 MHz [P490] : 505.000 MHz • Enter ***Initial Set Mode*** No. 4. Refer to page 5-2 for details. • No AF signals are applied to the microphone connector.	Connect an FM deviation meter with an oscilloscope to the antenna connector through an attenuator.	Maximum wave form	Rotate volume control while pushing [P2].
	2			Set to flat wave form 	Rotate volume control while pushing [P1].
	3	• Set an FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • Wide/Narrow setting : Wide [Wide/Narrow] types only • DTCS code : 007		±0.7 kHz [Wide/Narrow] and [Wide] ±0.55 kHz [Middle] ±0.35 kHz [Middle]	Rotate volume control while pushing [P2].
	4	• Wide/Narrow setting : Narrow [Wide/Narrow] types only		±0.25–±0.5 kHz	Verify

5-5 TRANSMITTER ADJUSTMENT— continued

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT METHOD	ADJUSTMENT	
				VALUE	ADJUST
CTCSS TONE DEVIATION	1	• Operating frequency [L400], [P400], [P425] : 415.000 MHz [P440] : 465.000 MHz [L450] : 460.000 MHz [L470] : 480.000 MHz [L490] : 500.000 MHz [P490] : 505.000 MHz • Enter ***Initial Set Mode*** No. 4. Refer to page 5-2 for details. • No AF signals are applied to the microphone connector. • Set an FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • Wide/Narrow setting : Wide [Wide/Narrow] types only • CTCSS tone frequency: 67.0 Hz	Connect an FM deviation meter to the antenna connector through an attenuator.	±0.7 kHz [Wide/Narrow] and [Wide] ±0.55 kHz [Middle] ±0.35 kHz [Narrow]	Rotate volume control while pushing [P2].
	2	• Wide/Narrow setting : Narrow [Wide/Narrow] types only		±0.25–±0.5 kHz	Verify