SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

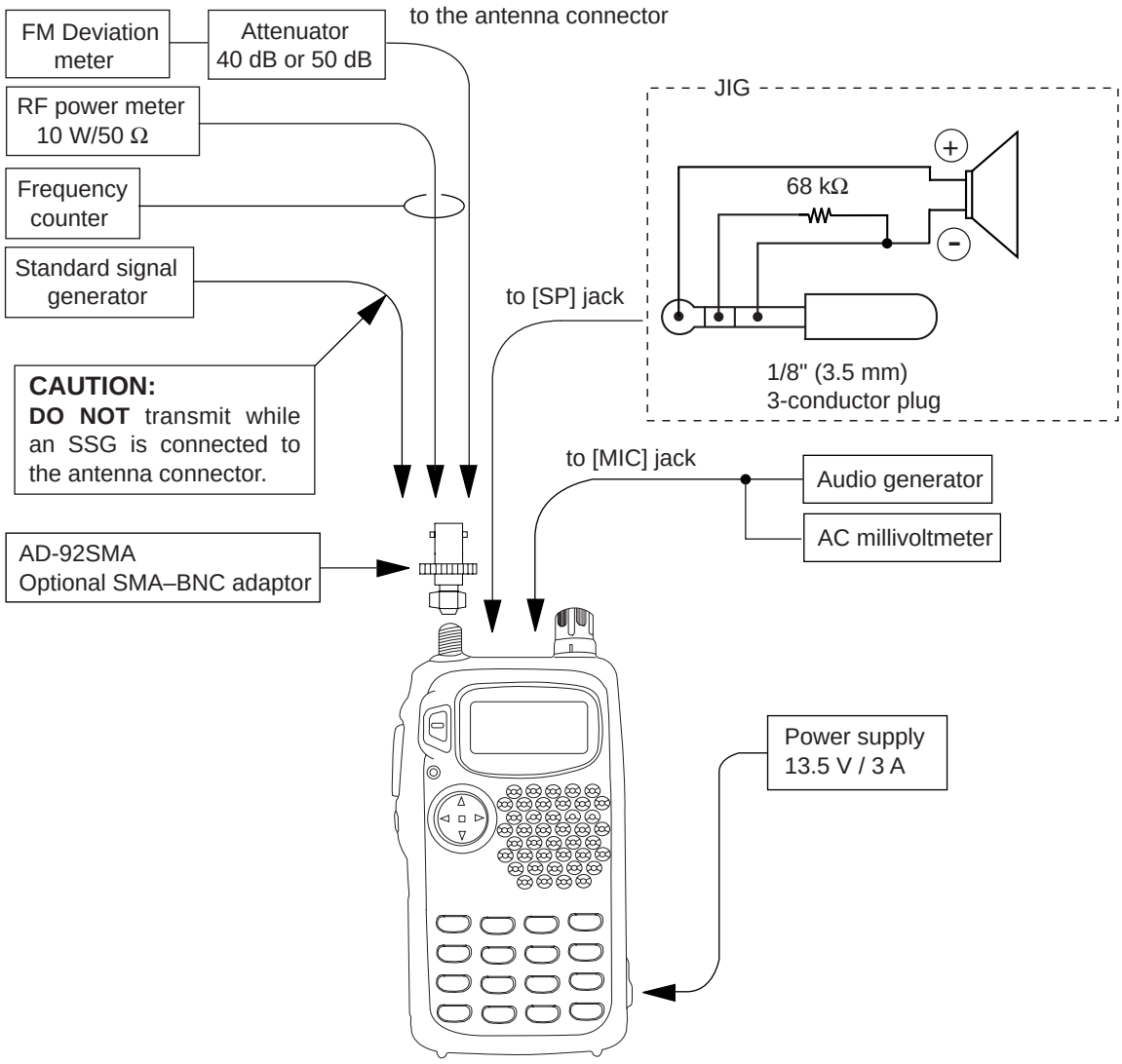
■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 13.5 V DC Current capacity : 3 A or more	DC voltmeter	Input impedance : 50 kΩ/V DC or better
RF power meter (terminated type)	Measuring range : 1–10 W Frequency range : 28–1500 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Audio generator	Frequency range : 300–3000 Hz Measuring range : 1–500 mV
Frequency counter	Frequency range : 0.1–1500 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Standard signal generator (SSG)	Frequency range : 28–1300 MHz Output level : 0.1 µV–32 mV (–127 to –17 dBm)
FM deviation meter	Frequency range : 30–1500 MHz Measuring range : 0 to ±10 kHz	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
		AC millivoltmeter	Measuring range : 10 mV–10 V
		Attenuator	Power attenuation : 40 or 50 dB

■ ENTERING THE ADJUSTMENT MODE

① Connect a 68 kΩ terminator to the [SP] jack.
② Push and hold the [SQL] key, and then turn power ON.
Note: The frequency of wide range appears at the display using this operation.

■ CONNECTION



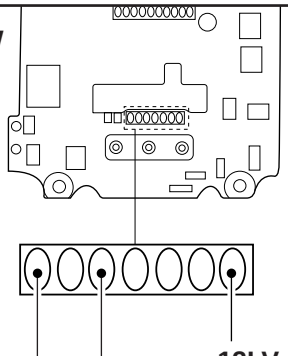
5-2 PLL ADJUSTMENT

The following adjustment must be performed at “ADJUSTMENT MODE”.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
PLL LOCK VOLTAGE	1	• Displayed frequency : 51.000 MHz • Receiving	RF	Connect the DC voltmeter or an oscilloscope to VLV.	0.8 V – 1.8 V		Verify
	2	• Transmitting		Connect the DC voltmeter or an oscilloscope to 6MLV.	1.8 V – 2.8 V		
	3	• Displayed frequency : 88.000 MHz • Receiving		Connect the DC voltmeter or an oscilloscope to VLV.	1.4 V – 2.4 V		
	4	• Displayed frequency : 145.000 MHz • Receiving			1.5 V – 2.5 V		
	5	• Transmitting			1.5 V – 2.5 V		
	6	• Displayed frequency : 440.000 MHz • Receiving		Connect the DC voltmeter or an oscilloscope to ULV.	2.0 V – 2.5 V		
	7	• Transmitting			2.0 V – 2.5 V		
	8	• Displayed frequency : 1270.000 MHz • Receiving		Connect the DC voltmeter or an oscilloscope to 12LV.	1.9 V – 2.9 V		
		• Transmitting					
REFERENCE FREQUENCY	1	• Displayed frequency : 1270.000 MHz • Transmitting	Top Pannel	Loosely couple the frequency counter to the antenna connector.	1270.0000 MHz	Top panel	Push and hold the [SQL] key, then turn the [DIAL]
DETECTER OUTPUT VOLTAGE	1	• Displayed frequency : 445.000 MHz [USA-1] only 435.000 MHz [ohter] • Connect an SSG to the antenna connector and set as: Level : 1 mV* (–47dBm) Modulation : OFF • Receiving	LOGIC	Connect a digital-voltmeter to the check point Q.	1.0 V	LOGIC	L702

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

• **RF UNIT BOTTOM VIEW**

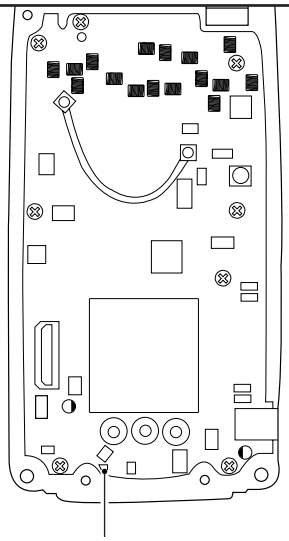


12LV
PLL lock voltage check point
(for 1200 MHz)

ULV
PLL lock voltage check point
(for 440 MHz)

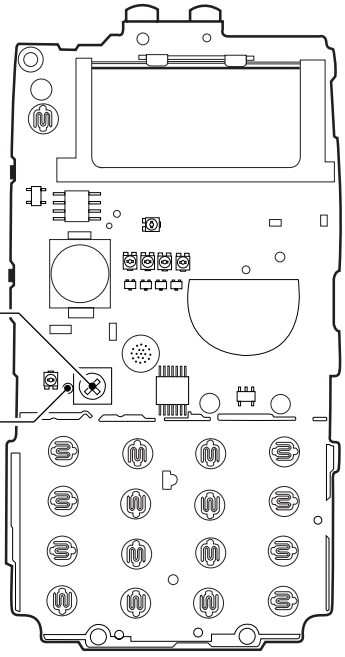
VLV
PLL lock voltage check point
(for 50 MHz RX, WFM and 144 MHz)

• **RF UNIT TOP VIEW**



6MLV
PLL lock voltage check point
(for 50 MHz TX)

• **LOGIC UNIT TOP VIEW**



L702
Detector Output voltage adjustment

Q
Detector Output voltage check point

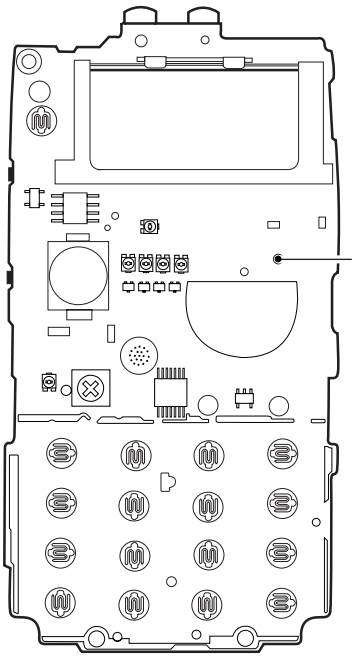
5-3 RECEIVER ADJUSTMENT

The following adjustment must be performed at “ADJUSTMENT MODE”.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
50 MHz SENSITIVITY	1	• Displayed frequency : 50.000 MHz • Connect an SSG to the antenna connector and a SINAD meter with an 8 Ω load to the [SP] jack. • Set an SSG as : Level : 1 µV* (–107 dBm) Deviation : ± 3.5 kHz Modulation : 1 kHz • Receiving	LOGIC	Connect a multimeter to check point SD.	Maximum voltage	Top panel	[DIAL]
	2	• Displayed frequency : 54.000 MHz [EUR], [UK], [ITA] • Receiving					
WFM SENSITIVITY	1	• Displayed frequency : 76.000 MHz [SEA], [USA-1] 88.000 MHz [EUR], [UK], [ITA], [AUS] • Set an SSG as : Level : 3.2 µV* (–97 dBm) Deviation : ± 52.5 kHz Modulation : 1 kHz • Receiving	LOGIC	Connect a multimeter to check point SD.	Maximum voltage	Top panel	[DIAL]
	2	• Displayed frequency : 107.000 MHz • Receiving					
AM SENSITIVITY	1	• Displayed frequency : 108.000 MHz • Set an SSG as : Frequency : 108.000 MHz Level : 1.0 µV* (AM) (–107 dBm) Modulation : 1 kHz Mod. depth : 30 % • Receiving	LOGIC	Connect a multimeter to check point SD.	Maximum voltage	Top panel	[DIAL]
	2	• Displayed frequency : 135.980 MHz • Set an SSG as : Frequency : 135.980 MHz • Receiving					
VHF SENSITIVITY	1	• Displayed frequency : 136.000 MHz • Set an SSG as : Level : 3.2 µV* (–97 dBm) Deviation : ± 3.5 kHz Modulation : 1 kHz • Receiving	LOGIC	Connect a multimeter to check point SD.	Maximum voltage	Top panel	[DIAL]
	2	• Displayed frequency : 160.000 MHz • Receiving					

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

• LOGIC UNIT TOP VIEW



SD
50 MHz, WFM BAND, AIR BAND and 145 MHz
Sensitivity check point

RECEIVER ADJUSTMENT (Continued)

The following adjustment must be performed on the normal mode after “SENSITIVITY ADJUSTMENT” in SECTION 5-3.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT
			UNIT	LOCATION		
S-METER (50 MHz band)	1	• Displayed frequency : 51.000 MHz [EUR], [UK], [ITA] 52.000 MHz [AUS], [SEA], [USA-1] • Connect the SSG to the antenna connector and set as: Level : 1 µV* (– 107 dBm) Modulation : 1 kHz Deviation : ± 3.5 kHz • Connect a terminator to the [SP] jack. • Receiving	Top panel			Push and hold the [SQL] key
	2	• Set an SSG output level for the S-meter to S3. • Receiving			0.56 µV – 1.8 µV (-112dBm – -102 dBm)	Verify
	3	• Increase an SSG output level. • Receiving	Front panel	S-meter	Full scale	Verify
(WFM band)	4	• Displayed frequency : 92.000 MHz [SEA], [USA-1] 98.000 MHz [EUR], [UK],[ITA], [AUS] • Connect the SSG to the antenna connector and set as: Level : 2 µV* (– 101 dBm) Modulation : 1 kHz Deviation : ± 52.5 kHz • Connect a terminator to the [SP] jack. • Receiving	Top panel			Push and hold the [SQL] key
	5	• Increase an SSG output level. • Receiving	Front panel	S-meter	Full scale	Verify
(144 MHz band)	6	• Displayed frequency : 145.000 MHz [EUR], [UK] 146.000 MHz [ITA], [AUS], [SEA], [USA-1] • Connect the SSG to the antenna connector and set as: Level : 0.5 µV* (– 113 dBm) Modulation : 1 kHz Deviation : ± 3.5 kHz • Connect a terminator to the [SP] jack. • Receiving	Top panel			Push and hold the [SQL] key
	7	• Set an SSG output level for the S-meter to S3. • Receiving	SSG	Output level	0.28 µV – 0.89 µV (-118dBm – -108 dBm)	Verify
	8	• Increase an SSG output level. • Receiving	Front panel	S-meter	Full scale	Verify

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

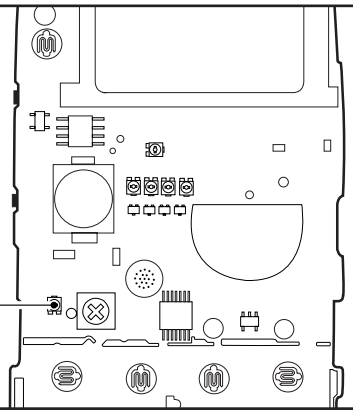
RECEIVER ADJUSTMENT (Continued)

The SQUELCH LEVEL adjustment must be performed on the normal mode after “S-METER ADJUSTMENT”.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
S-METER (440 MHz band)	9	• Displayed frequency : 445.000 MHz [USA-1] 435.000 MHz [other] • Connect the SSG to the antenna connector and set as: Level : 0.63 µV* (– 111 dBm) Modulation : 1 kHz Deviation : ± 3.5 kHz • Connect a terminator to the [SP] jack. • Receiving	Top panel			Push and hold the [SQL] key	
	10	• Set an SSG output level for the S-meter to S3. • Receiving	SSG	Output level	0.35 µV – 1.1 µV (-116dBm – -106 dBm)	Verify	
	11	• Increase an SSG output level. • Receiving	Front panel	S-meter	Full scale	Verify	
(1200 MHz band)	12	• Displayed frequency : 1270.000 MHz • Connect the SSG to the antenna connector and set as: Level : 1 µV* (– 107 dBm) Modulation : 1 kHz Deviation : ± 3.5 kHz • Connect a terminator to the [SP] jack. • Receiving	Top panel			Push and hold the [SQL] key	
	13	• Set an SSG output level for the S-meter to S3. • Receiving	SSG	Output level	0.56 µV – 1.8 µV (-102dBm – -112 dBm)	Verify	
	14	• Increase an SSG output level. • Receiving	Front panel	S-meter	Full scale	Verify	
SQUELCH LEVEL	1	• Displayed frequency : 445.000 MHz [USA-1] 435.000 MHz [other] • Connect the SSG to the antenna connector and set as: Level : 0.1 µV* (– 127 dBm) Modulation : 1 kHz Deviation : ± 3.5 kHz • Pre-set the R733 to maxmum clock-wise. • Receiving	Speaker		At the point where the AF signal just disappears	LOGIC	R733

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

• LOGIC UNIT TOP VIEW



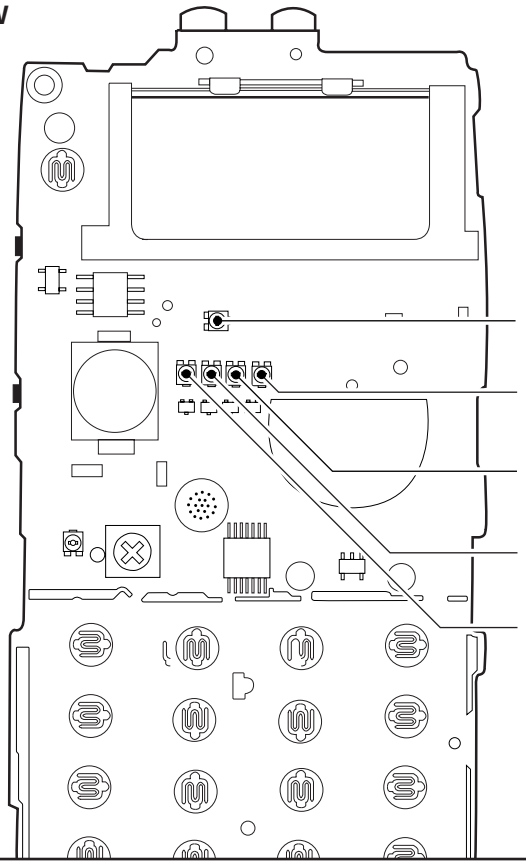
R733
Squelch level adjustment

5-4 TRANSMITTER ADJUSTMENT

The following adjustment must be performed at “ADJUSTMENT MODE”.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT
			UNIT	LOCATION		
OUTPUT POWER (50 MHz)	1	• Displayed frequency : 51.000 MHz [EUR], [UK], [ITA] 52.000 MHz [AUS], [SEA], [USA-1] • Output power : High • transmitting	Top panel	Connect an RF power meter to the antenna connector.	more than 5 W	[DIAL]
	2	• Output power : Low • Transmitting			0.5 W	
(144 MHz)	3	• Displayed frequency : 145.000 MHz [EUR], [UK] 147.000 MHz [ITA], [AUS], [SEA], [USA-1] • Output power : High • Transmitting	Top panel	Connect an RF power meter to the antenna connector.	more than 5 W	[DIAL]
	4	• Output power : Low • Transmitting			0.5 W	
(440 MHz)	5	• Displayed frequency : 445.000 MHz [USA-1] 435.000 MHz [Other] • Output power : High • Transmitting	Top panel	Connect an RF power meter to the antenna connector.	more than 5 W	[DIAL]
	6	• Output power : Low • Transmitting			0.5 W	
(1200 MHz)	7	• Displayed frequency : 1270.000 MHz • Output power : High • Transmitting	Top panel	Connect an RF power meter to the antenna connector.	more than 5 W	[DIAL]
	8	• Output power : Low • Transmitting			0.5 W	

• LOGIC UNIT TOP VIEW



R322
DTMF or TONE CALL deviation adjustment

R326
440 MHz FM deviation adjustment

R327
50 MHz BAND FM deviation adjustment

R338
1200 MHz FM deviation adjustment

R325
144 MHz BAND FM deviation adjustment

TRANSMITTER ADJUSTMENT (Continued)

The following adjustment must be performed after “REFERENCE FREQUENCY ADJUSTMENT” in SECTION 5-2.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
FM DEVIATION (50 MHz)	1	• Displayed frequency : 51.000 MHz [EUR], [UK], [ITA] 52.000 MHz [AUS], [SEA], [USA-1] • Connect the audio generator to the [MIC] connector and set as: 95 mV/1.0 kHz. • Set the FM deviation meter as : HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • Output power : High • Transmitting	Top panel	Connect an FM deviation meter to the antenna connector through an attenuator.	4.5 kHz	LOGIC	R327
(144 MHz)	2	• Displayed frequency : 145.000 MHz [EUR], [UK] 146.000 MHz [ITA], [AUS], [SEA], [USA-1] • Transmitting					R325
(440 MHz)	3	• Displayed frequency : 445.000 MHz [USA-1] 435.000 MHz [Other] • Transmitting					R326
(1200 MHz)	4	• Displayed frequency : 1270.000 MHz • Transmitting					R338
DTMF DEVIATION (AUS, SEA, USA-1 only)	1	• Displayed frequency : 445.000 MHz [USA-1] only 435.000 MHz [AUS], [SEA] only • Push [D] key while transmitting. • Transmitting	Top panel	Connect an FM deviation meter to the antenna connector through an attenuator.	3.5 kHz	LOGIC	R322
TONE CALL DEVIATION (EUR, UK, ITA only)	1	• Displayed frequency : 435.000 MHz • Push [center of the multi-function] key while transmitting. • Transmitting	Top panel	Connect an FM deviation meter to the antenna connector through an attenuator.	3.5 kHz	LOGIC	R322
CTCSS DEVIATION (50 MHz)	1	• Displayed frequency : 51.000 MHz [EUR], [UK], [ITA] 52.000 MHz [AUS], [SEA], [USA-1] • Tone frequency : 88.5 Hz • Set an FM deviation meter as : LPF : 3 kHz • Apply no audio signal to the [MIC] jack. • Transmitting	Top panel	Connect an FM deviation meter to the antenna connector through an attenuator.	0.5 – 1.0 kHz		Verify
(144 MHz)	2	• Displayed frequency : 145.000 MHz [EUR], [UK] 146.000 MHz [ITA], [AUS], [SEA], [USA-1] • Transmitting					
(440 MHz)	3	• Displayed frequency : 445.000 MHz [USA-1] 435.000 MHz [other] • Transmitting					
(1200 MHz)	4	• Displayed frequency : 1270.000 MHz • Transmitting					