Adjustment

Required Test Equipment

Stabilized Power supply
1. The supply voltage can be changed between 5V and 8V, and the current is 3A or more.
2. The standard voltage is 7.5V.

DC Ammeter
1. Class 1 ammeter (17 ranges and other features).
2. The full scale can be set to either 300mA or 3A.
3. A cable of less internal loss must be used.

Digital Voltmeter
1. Voltage range: FS=18V or so
2. Input resistance: 1MΩ or more

Oscilloscope
1. Measuring range: DC to 30MHz
2. Provides highly accurate measurements for 5 to 25MHz.

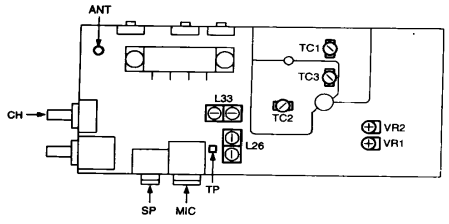
Dummy Load
8Ω 3W or more

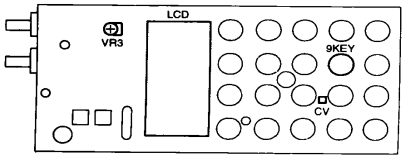
RADIO COMMUNICATION TESTER
2955B

Spectrum Analyzer
SG815

Note:
1. Use a non-conductive rod such as a Bakelite rod for adjustment (especially of trimmers and coils)
2. You can substitute a **RADIO COMMUNICATION TEST SET** (**2955B**) for Frequency Counter, Power Meter, RF VTVM, Linear Detector, AF Voltmeter and Standard Signal Generator.
3. You can use a **Spectrum Analyzer** substituting Tracking Generator.

TC1: Frequency adjustment
TC2: Transmit lock voltage adjustment
TC3: Receive lock voltage adjustment
VR1: CDCSS waveform adjustment
VR2: DEV adjustment
L24: ┐
L26: ├ Band-pass filter waveform adjustment
L32: ┘
ANT: Antenna connector
SP: Speaker jack
MIC: Microphone jack
CH: Channel selector
VR3: DTMF DEV adjustment
9 Key: DTMF key terminal
CV: Lock voltage test terminal





Alignment Mode (Alignment procedure used during radio repairing)

Operation
1. Turn POWER ON while pressing [LAMP] and [TA], in about 2 seconds, the radio enters the Test Mode.
2. Press [TA] in Test Mode, frequency is displayed on LCD. After selecting the frequency, press [LAMP] and [LO] simultaneously, radio enters Adjustment Mode, and ” tUnE” is displayed on LCD.

Adjusting Transmit Power

Use this procedure to adjust the transmit High Power or Low Power level.

1. Connect the power meter to the radio.
2. Set the frequency and then set the "tUnE" display.
3. Transmission is performed automatically at High Power when the [PTT] key is pressed. The display "H XXX" now appears. (XXX=0 to 255)
4. Adjust the [CHANNEL SELECTOR] while observing the power meter in order to obtain the transmit power needed. Turn the control clockwise for an increase in power, and turn counterclockwise for a decrease in power.
5. Pressing any key other than [PTT] stores the alignment value into the memory and returns to the "tUnE" display. Pressing the [PTT] key stores the alignment value into the memory and switches to Low Power for transmit.
   The display "L XXX" appears at this time.
6. Adjust the [CHANNEL selector] while observing the power meter in order to obtain the transmit power needed. Turn the control clockwise for an increase in power and turn counterclockwise for a decrease in power.
7. Pressing any key stores the alignment value into the memory and returns to the "tUnE" display.

Aligning the Battery Reference Value

Use this procedure to adjust the reference value for issuing battery low voltage alarms.

1. Using an external power supply feed in the reference value at which you wish to trigger the alarm.
2. Set the frequency and then set the "tUnE" display.
3. Transmission is performed automatically at High Power when the [TA] key is pressed. The display "B XXX" now appears. (XXX=1 to 255).
4. Adjust by turning the [CHANNEL SELECTOR] counterclockwise when the red LED is lit, and by turning clockwise when the red LED is flashing. The point where the red LED is flashing indicates detection of the low voltage.
5. Pressing any key stores the reference value into the memory and returns to the "tUnE" display.

Storing the BUSY Reference Value

Use this procedure to align squelch values for 3 and 9. Other squelch levels are set based on these values.

1. Connect the signal generator to the radio.
2. Set the frequency and then set the "tUnE" display.
3. Input a signal at the level at which you want squelch 9 to open.
4. Press [MONI] to let the radio receive this signal. The display "9 XXX" now appears. (XXX =1 to 255)
5. Turn [CHANNEL SELECTOR] knob to the position where you want the squelch to open.
6. Pressing any key other than [MONI] stores this value into the memory and returns to the "tUnE" display. Press [MONI] to store the alignment value and to switch to the alignment of squelch 3, and now "3 XXX" displays. (XXX=1 to 255)
7. Next output a signal from the signal generator at which you want squelch 3 to open. Align by using the [CHANNEL SELECTOR] just as with squelch 9.
8. Pressing any key stores these values into the memory and returns to the "tUnE" display.

Adjusting CTCSS Deviation

Use this procedure to adjust the transmit CTCSS deviation.

1. Connect the modulation analyzer to the radio.
2. Select the frequency and CTCSS, and then set the "tUnE" display.
3. Press [SCN] to automatically start transmission and send the preset CTCSS. If the CTCSS was set to OFF, then 67.0Hz is sent.
4. While observing the modulation analyzer, adjust the deviation with the [CHANNEL SELECTOR].
5. Pressing any key stores these values into the memory and returns to the "tUnE" display.

Use the jig for adjustment to stabilize electrical operations. The frequency (TC1) and deviation (VR2) can be adjusted without using the jig.

Use the jig as the following:

1. Insert the coaxial antenna connector into the jig.
2. Place the unit on the jig and fix it with four screws.
3. Solder the antenna terminal to the terminal of the unit.

Notes:

1. Do not install the Ni-Cd battery when using the jig for adjustment, repair, or checking. If the Ni-Cd battery is installed, the relay terminal (+) may be damaged).
2. Using an external power supply as the radio power.

VCO adjustment

Item	Condition	Measurement		Adjustment		Specifications/Remarks
		Test equipment	Terminal	Parts	Method	
1.Setting	Power supply voltage Battery terminal: 7.5V					
2.VCO lock voltage	1) TX HI	Digital voltmeter	CV	TC3	3.8 ±0.05V	
	2)TX LOW	Digital voltmeter	CV	TC3	≥0.7V	
	3)RX HI	Digital voltmeter	CV	TC2	3.8 ±0.05V	
	4)RX LOW	Digital voltmeter	CV	TC2	≥0.8V	

Receiver adjustment

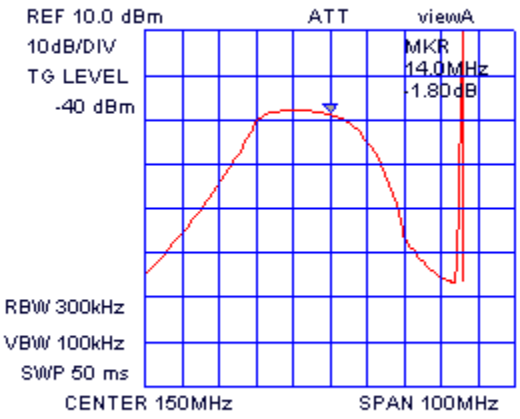


Fig.9

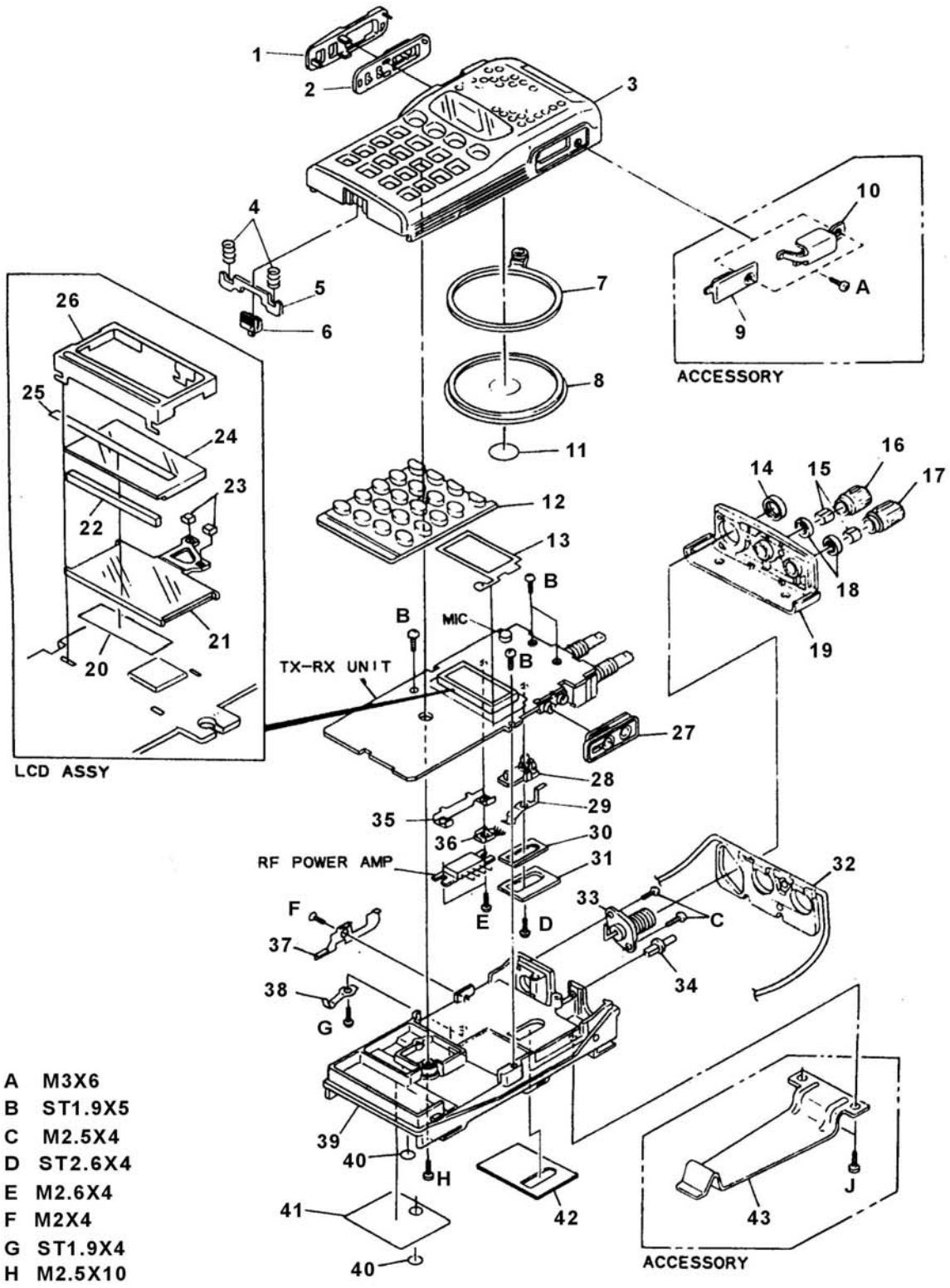
Item	Condition	Measurement		Adjustment		Specifications/Remarks
		Test equipment	Terminal	Parts	Method	
1.Band-pass filter	1) Given frequency 2) Trapezium generator output – 40 dBm Connect the spectrum analyzer to the T.P terminal.	Trapezium generator Spectrum analyzer	TNT TP	L24 L26 L32	Adjust the frequency so that it becomes the spectrum waveform shown above Fig.(See Fig. 9)	
2.Sensi-tivity	CH: RX LO CH: RX center CH: RX HI At each frequency: SSG output: -121dBm MOD: 1kHz DEV:±3kHz	SSG Oscilloscope AF.V.M Distortion meter	ANT SP		Check	SINAD: 12dB or higher
3. Signal-to-Noise	SSG output□66dBμV				Check	≥40 dB
4.Squelch	1) Level 9 CH:RX center SSG output: -117dBm	SSG Oscilloscope AF.V.M Distortion meter	ANT SP	Channel selector	Level 9 Set of "244" with the channel selector. Adjust to close the squelch with the channel selector.	
	2) Level 3 CH: RX center SSG output:-128dBm				Level 3 Up the data (+10) then point that squelch is closed. Adjust to close the squelch with the channel selector.	The squelch must be closed SET OF "244"
	3) See Adjustment mode					

Transmitter adjustment

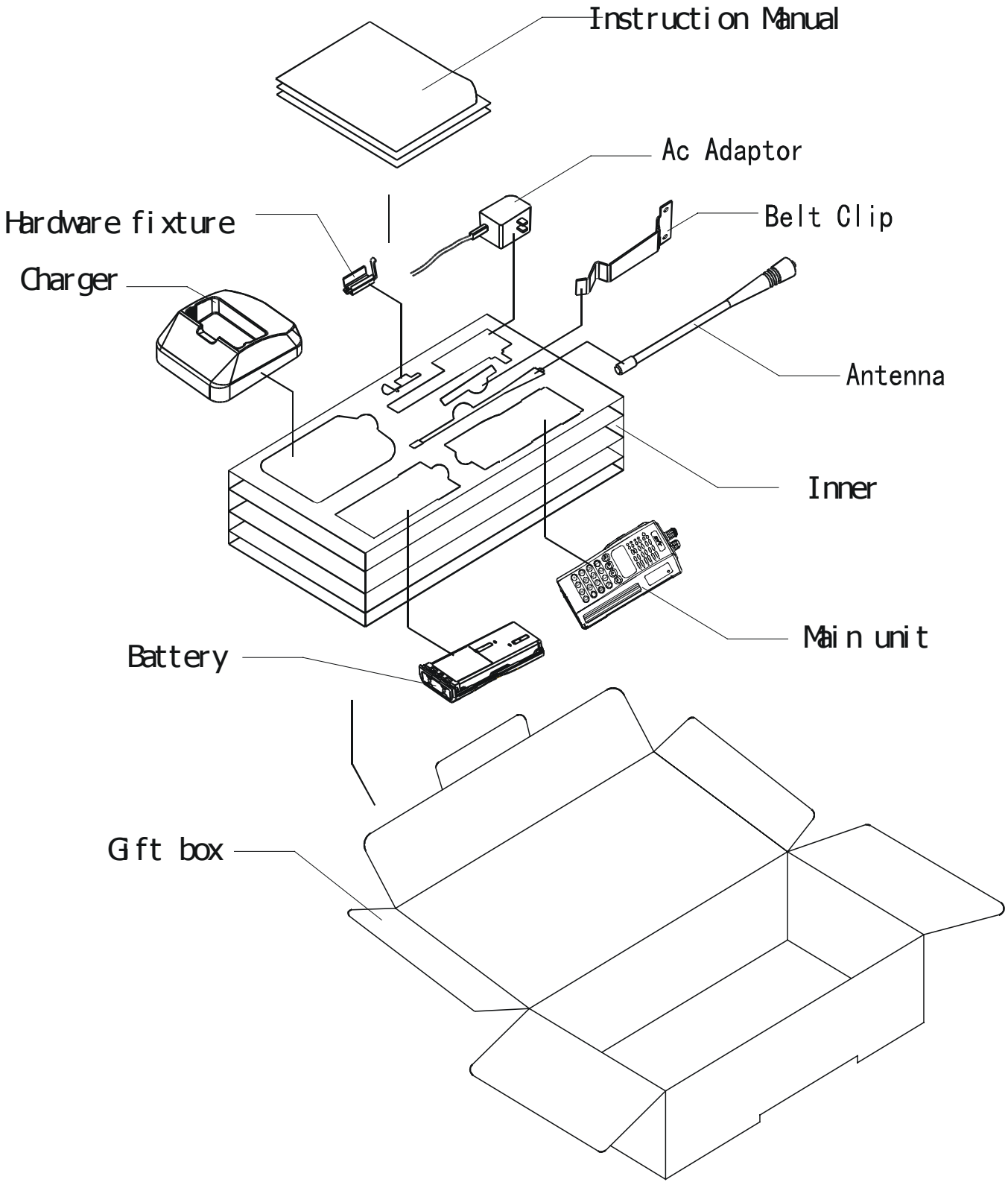
Item	Condition	Measurement		Adjustment		Specifications/Remarks
		Test equipment	Terminal	Parts	Method	
1.Transmit frequency	1) CH: TX center PTT: ON	Frequency counter	ANT	TC1	Adjust to ±200 Hz.	Within ±200Hz
2. CDCSS/ Balance	CH: TX Center Adjust the frequency of CTCSS to 67Hz and 250.3Hz separately	Synthetical test LPF: 300Hz	ANT	VR1	Confirm that the frequency deviation of 67Hz CTCSS is equal to that of 250.3Hz CTCSS	Identify both CTCSS frequency deviation is accordant with CTCSS DEV specification
3. Full Power	1) CH: TX Center Battery terminal: 7.5V PTT: ON	Power meter Ammeter	ANT	Channel selector	Turn the channel selector to increase the value. Verify that it is 5W or higher	5W or higher
	2) Adjustment mode					
4. High Power	1) CH: TX Center Battery terminal: 7.5V PTT: ON	Power meter Ammeter	ANT	Channel selector	Adjust it to 5W ± 0.1W with the channel selector.	5W± 0.1W 2.0A or lower
	2) Adjustment mode					
	3) CH: TX HI, Lo Battery terminal: 7.5V PTT: ON				Check	≥4.8W 5. 0A or lower

5.Low power	1) CH: TX center, LO PTT: ON	Power meter Amperometer	ANT	Channel selector	Adjust it to 1.0W ± 0.1W with the channel selector.	1.0±0.1W 1.0A or lower
	2) See adjustment mode					
	3) CH: TX HI, Lo PTT: ON				Check	0.5~1.5W
6.Modulation	1) CH: TX HI	Modulation analyzer or linear detector Oscilloscope Low-frequency oscillator AF.V.M.	ANT MIC	VR2	Adjust it to±4.8kHz±100H MOD METER L.P.F 15kHz	±4.8kHz ±100Hz
	2) Low-frequency oscillator output: 1 kHz 50mV PTT:ON					
	3) CH: TX center Low-frequency oscillator output 20 dBm 1kHz: 5mV				Check	±2.2kHz ~±3.6kHz
7, Modulation disortion	Low-frequency oscillator output 1kHa:5mV				Check	≤3.5%
8.Transmit S/N	CH: TX center HPF: 300Hz LPF: 3kHz DEMP: 750μs	Modulation analyzer or linear detector Oscilloscope Low-frequency oscillator AF.V.M	ANT MIC		Check	40dB or higher
9.CTCSS DEV	1) CH: TX center	Modulation analyzer or linear detector Oscilloscope Low-frequency oscillator AF.V.M	ANT MIC	Channel selector	Adjust it to 0.85kHz±50Hz with the channel selector.	0.85kHz ±50Hz
	2) CTCSS: 250.3Hz					
	3) See adjustment mode Press the [SCN] key. LPF: 3 kHz					
10.DTMF DEV	1) CH: TX center	Modulation analyzer or linear detector Oscilloscope	ANT	VR3	Adjust it to 3.5kHz±0.5 kHz	3.5kHz ±0.5kHz
	2) Set as following using the [9] key: PTT: ON LPF: 15kHz					
11.Battery warning	1) Battery terminal: 5.8V			Channel selector	Adjust so that the LED flashes using the channel selector.	The LED must flash.
	2) See Adjustment mode Press the [TA] key.					
	3) Battery terminal: 6.3V PTT: ON				Verify that the LED lights.	Check

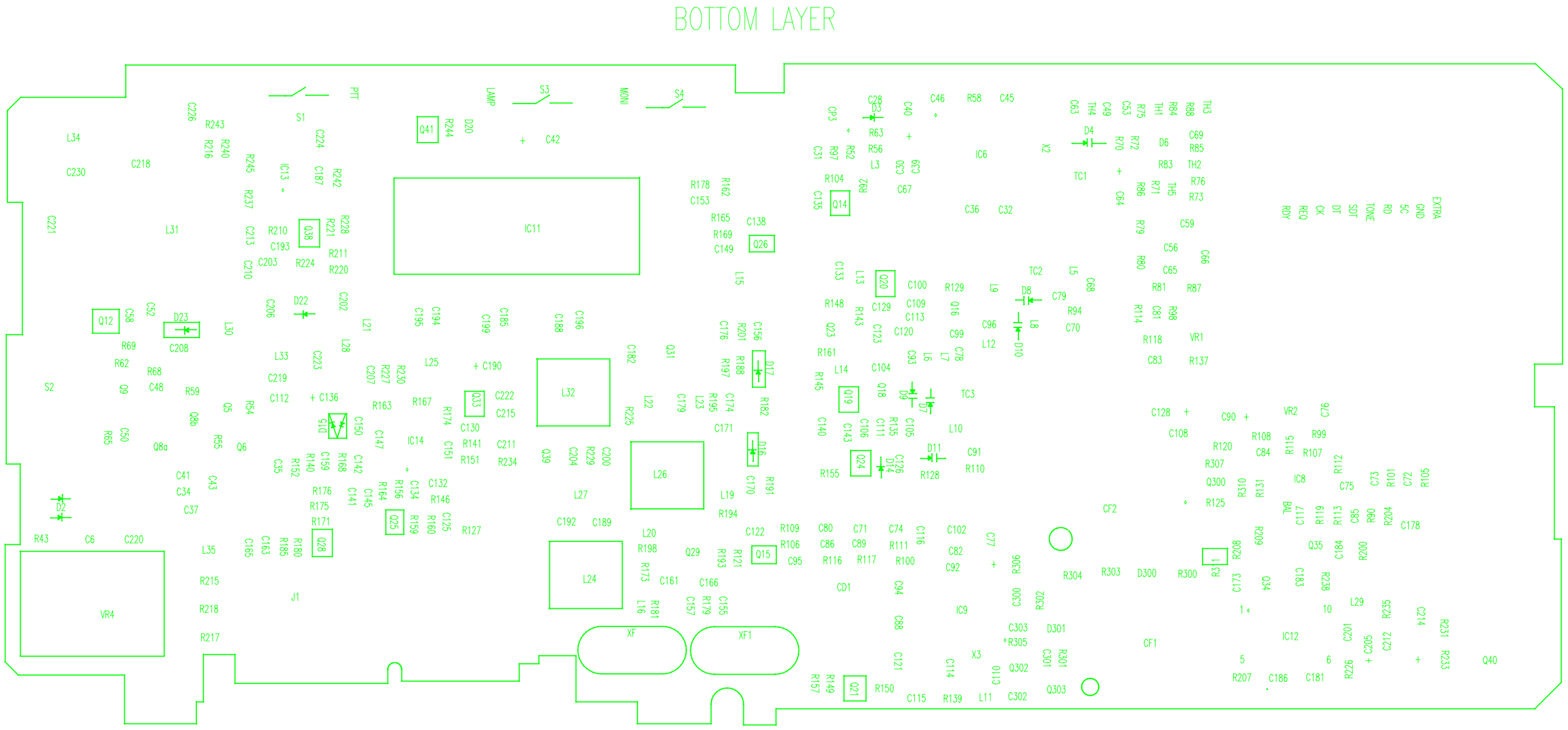
Exploded View



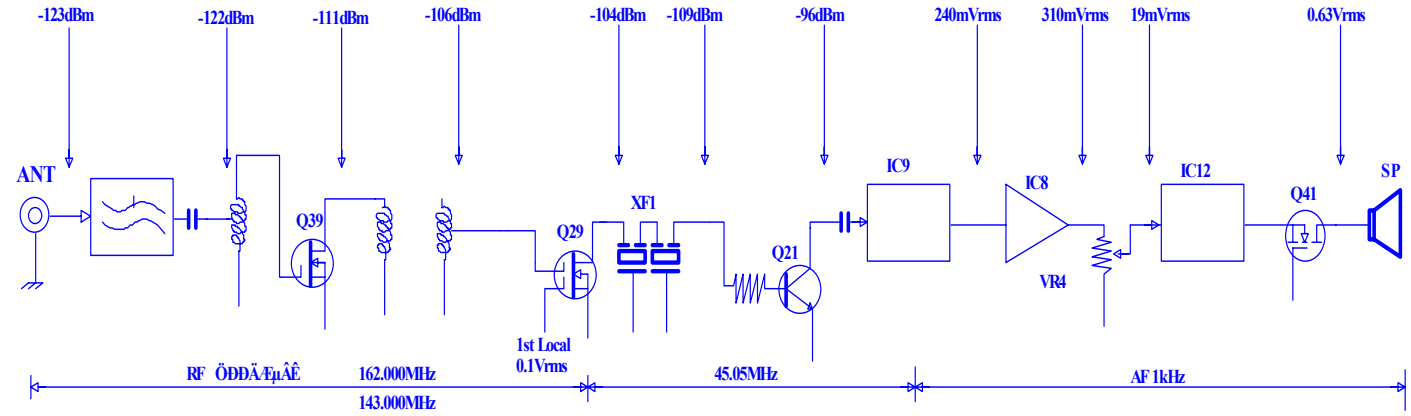
Packing


Instruction Manual
Ac Adaptor
Hardware fixture
Belt Clip
Charger
Antenna
Inner
Main unit
Battery
Gift box

Parts Placement



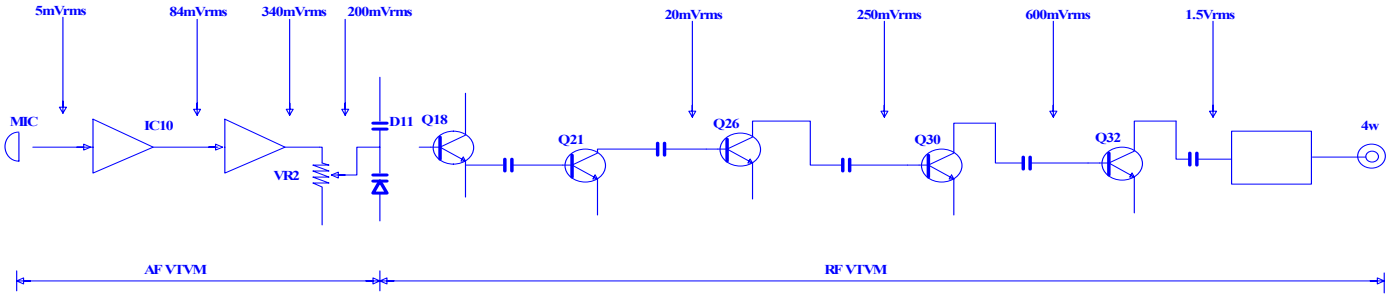
Level Diagram



Rx Section

The supply voltage is 7.5V. The input signal in an RF level is set of f=1kHz and ±3kHzDEV, and the output signal in an AF level is adjusted to 0.63V in a load of 8Ω. The RF and IF level are a SINAD input level of 12dB in which signal are input from SSG to each point through a 1000pF capacitor.

Tx Section



The AF level is measured by an AF VTAM. The RF level is measured by an RF VTAM. Each of levels measured at high impedance. The transmitting frequency is 162.000MHz and 143.000MHz. The audio generator is controlled so that the input signal at MIC pin has a deviation of ±3kHz for a modulation frequency of 1kHz.