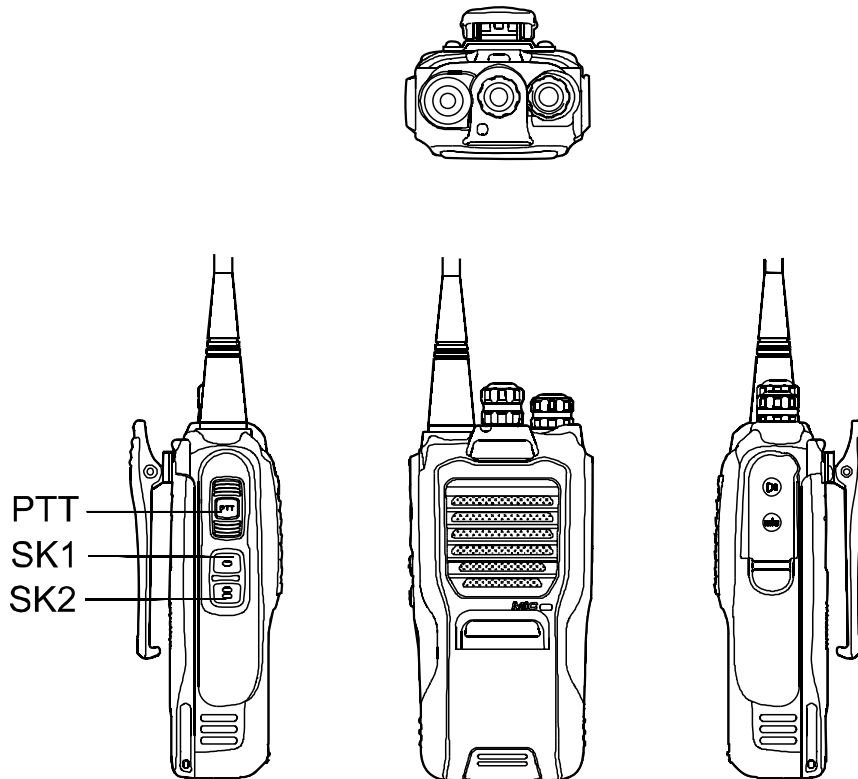


Adjustment Description

I Diagram of Operation Key (Take BR250 for example)



II Instrument

Radio Communication Test Set (HP8921)	1 set
10V/3A DC Regulated Power Supply	1 set
Digital Voltmeter	1 set
Ammeter	1 set

III Preparation Before Adjustment

Put the board to be tested on the test clamp and turn the power on.

Note: Each test point must be in good contact with the clamp.

IV Adjustment Steps

1. Operations Before Adjustment

1) Adjustment of PCB Board

After program is downloaded onto the PCB board and EEPROM is initialized with the configuration file (program is downloaded with the test frame and initialization can be done through the programming software or wired clone), check relative specifications at each

position. If adjustment is required, connect the programming cable and enter the adjustment mode for PC adjustment

2) Adjustment of Radio Unit

1. Rotate to CH1. Power on the radio while holding down the PTT key and SK2 key for 2s at least. The orange LED (red LED + green LED) lights, indicating the entry into the adjustment mode. Release the keys to enter the corresponding Tx adjustment item (preset power) of the adjustment mode. The red LED lights. Adjust each specification according to the operation instructions.

2. Or connect the programming cable for real time adjustment in PC mode.

2. Description of Adjustment Items

TC-610/620 Adjustment Items											
Channel	Adjustable Freq.	Wide					Narrow				
		Freq. 1	Freq. 2	Freq. 3	Freq. 4	Freq. 5	Freq. 1	Freq. 2	Freq. 3	Freq. 4	Freq. 5
Tx Section											
1	Adjust Preset RF Power			Y							
2	Tx Low Power	Y	Y	Y	Y	Y					
3	Reserved Channel (not adjust)										
4	Tx High Power	Y	Y	Y	Y	Y					
5	CDCSS Deviation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6	CTCSS (67Hz) Deviation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	CTCSS (151.8Hz) Deviation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8	CTCSS (254.1Hz) Deviation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9	VOX 1			Y							
10	VOX 2			Y							
11	VOX 3			Y							
12	VOX 4			Y							
13	VOX 5			Y							
14	Tx Low Voltage Threshold			Y							
Rx Section											
1	Carrier SQL Level 1 ON	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	Carrier SQL Level 5 ON	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3	Carrier SQL Level 9 ON	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4	Carrier SQL Level 1 OFF	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5	Carrier SQL Level 5 OFF	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6	Carrier SQL Level 9 OFF	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	Tx Low Voltage Threshold			Y							
8	Bandpass Filter	Y	Y	Y	Y	Y					

Note: Y indicates the valid adjustment frequency. The rest channels are idle and have no adjustment items.

1) Switch between Tx Adjustment Items and Rx Adjustment Items

Rotate the Channel Selector knob to CH16. Hold down the PTT key for 1.5s at least to toggle between Tx Adjustment Items and Rx Adjustment Items. If the LED lights red upon key press, the radio switches to Tx Adjustment Items. If the LED lights green upon key press, the radio switches to Rx Adjustment Items.

The LED glows red for Tx Adjustment Items.

The LED glows green for Rx Adjustment Items.

2) Wide/Narrow Band Switch and Frequency Switch in an Adjustment Item

In an adjustment item, hold down the PTT key for 1.5s at least to switch between wide band and narrow band cyclically. The adjustment point is regarded as the first frequency of the current band by default. Hold down the PTT key for less than 1.5s to switch frequencies cyclically.

3) Adjustment Items

Tx

Tx frequency tolerance, VCO lock voltage, maximum deviation and modulation sensitivity

Note: These items are adjusted outside the adjustment mode (unnecessary to enter the adjustment mode) via hardware.

Tx low power, Tx high power, CDCSS waveform, CDCSS deviation, CTCSS deviation (low), CTCSS deviation (medium), CTCSS deviation (high) and Tx low voltage threshold.

Note: These items are adjusted inside the adjustment mode via software.

Rx

VCO lock voltage (outside the mode), squelch, Rx bandpass filter, Rx low voltage threshold.

3. Specific Operations and Requirements

Conventional Adjustment Items (outside the adjustment mode): Tx frequency tolerance, VCO lock voltage, maximum deviation, modulation sensitivity.

Note: The configuration file has preset CH1, CH2 and CH3 as wide band with low, medium and high frequency respectively and CH4, CH5 and CH6 as narrow band with low, medium and high frequency respectively. Make sure the antenna or load is connected before adjustment.

BR250 VHF

Item	Condition	Measurement		Adjustment		Specifications /Remarks
		Test Equipment	Test Point	Parts	Method	
Tx frequency tolerance	Rotate to CH2. Press PTT to transmit.	Radio communication test set	Antenna	VR300	Adjust VR300 with a ceramic tuning tool to limit the center	≤150Hz

					frequency to the error range.		
Tx VCO lock voltage	Rotate to CH3. Press PTT to transmit.		Digital voltmeter	CV	TC100	Adjust TC100 with a ceramic tuning tool until the lock voltage is within the required range.	2.8~2.9V
	Rotate to CH1. Press PTT to transmit.					Check	≥0.8
Rx VCO lock voltage	Rotate to CH3.				TC101	Adjust TC101 with a ceramic tuning tool until the lock voltage is within the required range.	2.7~2.9V
	Rotate to CH1.					Check	≥0.8
Max. Deviation	W	Rotate to CH1, CH2 and CH3 respectively. Press PTT to transmit.	Radio communication test set BPF: <20Hz~15kHz AF: 1kHz 150mV	Antenna Accessory jack	VR200	Adjust VR200 with a ceramic tuning tool to limit the deviation to the specified range.	3.8~4.5KHz (It is recommended to adjust to 4.2KHz at the maximum deviation end.)
	N	Rotate to CH4, CH5 and CH6 respectively. Press PTT to transmit.				Check	1.8~2.3KHz
Modulation Sensitivity	W	Rotate to CH1, CH2 and CH3 respectively. Press PTT to transmit.	Radio communication test set BPF: 0.3 KHz~3KHz AF: 1KHz			Adjust the output audio signal of the radio communication test set to get the deviation to 3.0KHz.	8~15mV
	N	Rotate to CH4, CH5 and CH6 respectively. Press PTT to transmit.				Adjust the output audio signal of the radio communication test set to get the deviation to 1.5KHz.	8~15mV

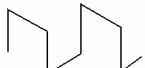
BR250 UHF

Item	Condition	Measurement		Adjustment		Specifications /Remarks
		Test Equipment	Test	Parts	Method	

			Point			
Tx frequency tolerance	Rotate to CH2. Press PTT to transmit.	Radio communication test set	Antenna	VR300	Adjust VR300 with a ceramic tuning tool to limit the center frequency to the error range.	≤150Hz
Tx VCO lock voltage	Rotate to CH1. Press PTT to transmit.	Digital voltmeter	CV	TC100	Adjust TC100 with a ceramic tuning tool until the lock voltage is within the required range.	0.7V (+0.1V)
	Rotate to CH3. Press PTT to transmit.				Check	≥2.3V
Rx VCO lock voltage	Rotate to CH1.			TC101	Adjust TC101 with a ceramic tuning tool until the lock voltage is within the required range.	0.7V (+0.1V)
	Rotate to CH3.				Check	≥2.3V
Max. Deviation	W Rotate to CH1, CH2 and CH3 respectively. Press PTT to transmit.	Radio communication test set BPF: <20Hz~15kHz AF: 1kHz 150mV	Antenna	VR200	Adjust VR200 with a ceramic tuning tool to limit the deviation to the specified range.	3.7~4.3KHz
	N Rotate to CH4, CH5 and CH6 respectively. Press PTT to transmit.				Check	1.7~2.2KHz
Modulation Sensitivity	W Rotate to CH1, CH2 and CH3 respectively. Press PTT to transmit.	Radio communication test set BPF: 0.3-3KHz AF: 1KHz	Accessory jack		Adjust the output audio signal of the radio communication test set to get the deviation to 3.0KHz.	8~18mV
	N Rotate to CH4, CH5 and CH6 respectively. Press PTT to transmit.				Adjust the output audio signal of the radio communication test set to get the deviation to 1.5KHz.	8~18mV

2) Adjustments in the adjustment mode

Note: The antenna or load must be connected before adjustment.

Item	Condition	Measurement		Adjustment		Specifications /Remarks		
		Test Equipment	Test Point	Parts	Method			
Tx Power	H Rotate to CH4. Press PTT to enable the function. Low frequency	Radio communication test set Ammeter	Antenna port	SK1 SK2	Press SK1/SK2 to increase/decrease the output power and rotate the Channel Selector knob to save.	4.5-5W I≤1.7A		
							Short press PTT to switch frequencies cyclically (refer to the adjustment list)	
	L Rotate to CH2. Press PTT to enable the function. Low frequency				Short press PTT to switch frequencies cyclically (refer to the adjustment list)		Press SK1/SK2 to increase/decrease the output power and rotate the Channel Selector knob to save.	2W±0.3W I≤1.2A
CDCSS Waveform	Rotate to CH5. Press PTT to enable the function. Wide band Low frequency	Radio communication test set BPF: <20Hz~300Hz	Antenna	VR260	Adjust VR260 with a ceramic tuning tool to make the waveform approximate to the rectangular			

					wave.	
		Short press PTT to switch frequencies cyclically and long press PTT to switch between wide band and narrow band.			Check	
CDCSS Deviation	W	Rotate to CH5. Press PTT to enable the function. Wide band Low frequency			Adjust VR601 with a ceramic tuning tool and check each frequency. Enter the mode to adjust finely with SK1/SK2 to limit the CDCSS deviation to the required range if necessary.	500~900Hz (It is recommended to adjust to 550-650Hz)
		Press PTT to switch to other frequencies (medium-low, medium, medium-high and high).				
	N	Long press PTT (≥1.5s) to enter narrow band. Low frequency			Enter the mode to adjust finely with SK1/SK2 to limit the CDCSS deviation to the required range if necessary.	300~500Hz
		Press PTT to switch to other frequencies (medium-low, medium, medium-high and high).				

CTCSS Deviation	W	Rotate to CH6, CH7 and CH8 respectively and CTCSS is set to low, medium and high respectively. Press PTT to enable this function. Wide band Short press PTT to switch frequencies on each channel.	Radio communication test set BPF: <20Hz~300Hz	Antenna	VR601 SK1 SK2	Adjust VR601 with a ceramic tuning tool and check each frequency. Enter the mode to adjust finely with SK1/SK2 to limit the CTCSS deviation to the required range if necessary.	500~900Hz (It is recommended to adjust to 550-650Hz)
	N	Long press PTT (≥1.5s) to enter narrow band on CH6, CH7 and CH8 and short press PTT to switch frequencies.				Enter the mode to adjust finely with SK1/SK2 to limit the CTCSS deviation to the required range if necessary.	300~500Hz

VOX	Rotate to CH9. VOX 1 Press SK1 or SK2 to enable the function.	Radio communication test set BPF: <20Hz~15kHz AF:1kHz 10mV	Antenna Accessory jack	SK1 SK2	Adjust with SK1/SK2 and rotate the Channel Selector knob to save after one-point adjustment	
	Rotate to CH10. VOX 2 Press SK1 or SK2 to enable the function.	Radio communication test set BPF: <20Hz~15kHz AF:1kHz 6mV			Adjust with SK1/SK2 and rotate the Channel Selector knob to save after one-point adjustment	

	Rotate to CH11. VOX 3 Press SK1 or SK2 to enable the function.	Radio communication test set BPF: < 20Hz~15kHz AF:1kHz 4.5mV				Adjust with SK1/SK2 and rotate the Channel Selector knob to save after one-point adjustment	
	Rotate to CH12 VOX 4 Press SK1 or SK2 to enable the function.	Radio communication test set BPF: < 20Hz~15kHz AF:1kHz 3.5mV				Adjust with SK1/SK2 and rotate the Channel Selector knob to save after one-point adjustment	
	Rotate to CH13. VOX 5 Press SK1 or SK2 to enable the function.	Radio communication test set BPF: < 20Hz~15kHz AF:1kHz 2mV				Adjust with SK1/SK2 and rotate the Channel Selector knob to save after one-point adjustment	
Tx Low Voltage Threshold		Digital voltmeter	Power supply port	Power supply	Adjust the output voltage of the power supply and check the alarm level	6.2V-7.0V (≤7.0V: LED flashes; ≤6.2V: a warning tone is heard and transmission is suspended)	
Rx Sensitivity (bandpass)	Rotate to CH8. Low frequency Short press PTT to switch to other frequencies	Radio communication test set SSG: -119dBm MOD: 1KHz DEV: 3.0KHz Filter: 0.3~3KHz	Antenna Accessory jack	SK1 SK2	Check bandwidth waveform. Adjust with SK1/SK2. Rotate the Channel Selector knob to save after five-point adjustment.	Check: Rotate the Volume Control knob to an appropriate position to make the output unlimited. SINAD: ≥12dB	

SQL ON	W	<p>Rotate to CH1 and SQL level 1 ON is set. Press SK1 or SK2 to enable the function.</p> <p>The channel spacing is wide band.</p> <p>Low frequency Short press PTT to switch frequencies.</p>	<p>Radio communication test set</p> <p>SSG: -122dBm</p> <p>MOD: 1KHz</p> <p>DEV: 3KHz</p> <p>Filter: 0.3~3KHz</p>	Antenna Accessory jack	SK 1 SK 2	<p>Adjust the output signals of SSG to squelch level.</p> <p>Rotate the Channel Selector knob to save after five-point adjustment.</p>	Squelch Level 1: -122±1dB
		<p>Rotate to CH2 and SQL level 5 ON is set. Press SK1 or SK2 to enable the function.</p> <p>The channel spacing is wide band.</p> <p>Low frequency Short press PTT to switch frequencies.</p>	<p>Radio communication test set</p> <p>SSG: -119dB</p> <p>MOD: 1KHz</p> <p>DEV: 3KHz</p> <p>Filter: 0.3~3KHz</p>				Squelch Level 5: -119±1dB
		<p>Rotate to CH3 and SQL level 9 ON is set. Press SK1 or SK2 to enable the function.</p> <p>The channel spacing is wide band.</p> <p>Low frequency Short press PTT to switch frequencies.</p>	<p>Radio communication test set</p> <p>SSG: 114dBm</p> <p>MOD: 1KHz</p> <p>DEV: 3KHz</p> <p>Filter: 0.3~3KHz</p>				Squelch Level 9: -114±1dB
	N	Long press PTT	Radio			Same as above	Squelch

			<p>communicati on test set SSG: -121dBm MOD: 1KHz DEV: 1.5KHz Filter: 0.3~3KHz</p>				<p>Level 1: -121±1d B</p>
		<p>(≥1.5s) to enter narrow band on the above three channels. Press SK1 or SK2 to enable this function. Short press PTT to switch frequencies.</p>	<p>Radio communicati on test set SSG: -118dBm MOD: 1KHz DEV: 1.5KHz Filter: 0.3~3KHz</p>				<p>Squelch Level 5: -118±1d B</p>
			<p>Radio communicati on test set SSG: -113dBm MOD: 1KHz DEV: 1.5KHz Filter: 0.3~3KHz</p>				<p>Squelch Level 5: -113±1d B</p>

SQL OFF	W	<p>Rotate to CH4 and SQL level 1 OFF is set. Press SK1 or SK2 to enable the function.</p> <p>The channel spacing is wide band.</p> <p>Low frequency Short press PTT to switch frequencies.</p>	<p>Radio communication test set</p> <p>SSG: -124dBm</p> <p>MOD: 1KHz</p> <p>DEV: 3KHz</p> <p>Filter: 0.3~3KHz</p>	Antenna Accessory jack	SK1 SK2	Adjust the output signals of SSG to the squelch level. Rotate the Channel Selector knob to save after five-point adjustment.	Squelch Level 1: -124±1dB
		<p>Rotate to CH5 and SQL level 5 OFF is set. Press SK1 or SK2 to enable the function.</p> <p>The channel spacing is wide band.</p> <p>Low frequency Short press PTT to switch frequencies.</p>	<p>Radio communication test set</p> <p>SSG: -121dBm</p> <p>MOD: 1KHz</p> <p>DEV: 3KHz</p> <p>Filter: 0.3~3KHz</p>				Squelch Level 5: -121±1dB
		<p>Rotate to CH6 and SQL level 9 OFF is set. Press SK1 or SK2 to enable the function.</p> <p>The channel spacing is wide band.</p> <p>Low frequency Short press PTT to switch frequencies.</p>	<p>Radio communication test set</p> <p>SSG: -116dBm</p> <p>MOD: 1KHz</p> <p>DEV: 3KHz</p> <p>Filter: 0.3~3KHz</p>				Squelch Level 9: -116±1dB
	N	<p>Long press PTT (≥1.5s) to enter narrow band on the above three channels. Press SK1 or SK2 to enable this function. Short press PTT to switch frequencies.</p>	<p>Radio communication test set</p> <p>SSG: -123dBm</p> <p>MOD: 1KHz</p> <p>DEV: 1.5KHz</p> <p>Filter: 0.3~3KHz</p>	Antenna Accessory jack	SK1 SK2	Same as above	Squelch Level 1: -123±1dB
<p>Radio communication test set</p> <p>SSG: -120dBm</p> <p>MOD: 1KHz</p> <p>DEV: 1.5KHz</p> <p>Filter: 0.3~3KHz</p>	Squelch Level 5: -120±1dB						

			Radio communication test set SSG: -115dBm MOD: 1KHz DEV: 1.5KHz Filter: 0.3~3KHz				Squelch Level 9: -115±1dB
Rx Low Voltage Threshold			Digital voltmeter	Power supply port	Power supply	Adjust the output voltage of the power supply and check the alarm level (LED flashes red and a warning tone is heard)	≤6.50V

Appendix 1: Reference Software Values for BR250 Source Radio

Test Items	Wide					Narrow				
	Freq. 1	Freq. 2	Freq. 3	Freq. 4	Freq. 5	Freq. 1	Freq. 2	Freq. 3	Freq. 4	Freq. 5
Adjust Preset Tx Power			446							
Tx Low Power	742	714	692	676	672					
Tx High Power	1111	1076	1055	1047	1072					
CDCSS Deviation	66	67	67	67	69	38	38	39	40	39
CTCSS (67Hz) Deviation	121	125	128	131	135	69	72	72	75	77
CTCSS (151.8Hz) Deviation	121	124	126	128	131	68	70	72	73	75
CTCSS (254.1Hz) Deviation	133	135	137	140	143	75	77	78	78	81
VOX 1			55							
VOX 2			45							
VOX 3			25							
VOX 4			19							
VOX 5			15							
Tx Low Voltage Threshold			158							

Squelch Level 1 ON	27	25	27	25	24	18	18	17	17	20
Squelch Level 5 ON	21	19	19	18	19	14	13	13	13	14
Squelch Level 9 ON	9	9	9	9	9	7	7	7	7	7
Squelch Level 1 OFF	39	30	31	32	32	27	26	24	25	26
Squelch Level 5 OFF	28	25	25	25	26	21	21	19	17	19
Squelch Level 9 OFF	12	11	12	11	13	8	8	8	8	8
Rx Low Voltage Threshold			166							
Bandpass Filter	353	401	428	470	500					

Appendix 2: Reference Voltage Setting of Battery Power

Check in transmit mode		
Green LED (70%-100%)	>7.35V	18min
Orange LED (50%-70%)	7.15V - 7.35V	12min
Red LED (30%-50%)	7.00V - 7.15V	12min
LED flashes red (<30%)	6.20V - 7.00V	18min
LED flashes red with a warning tone	5.80V - 6.20V	

Halt	<5.80V	
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Check in transmit and standby modes (or press the battery power check key).		
Green LED (70%-100%)	>7.55V	18min
Orange LED (50%-70%)	7.35V - 7.55V	12min
Red LED (30%-50%)	7.00V - 7.35V	20min
LED flashes red (<30%)	6.50V - 7.00V	18min
LED flashes red and a warning tone is heard every 40 seconds	5.80V - 6.50V	