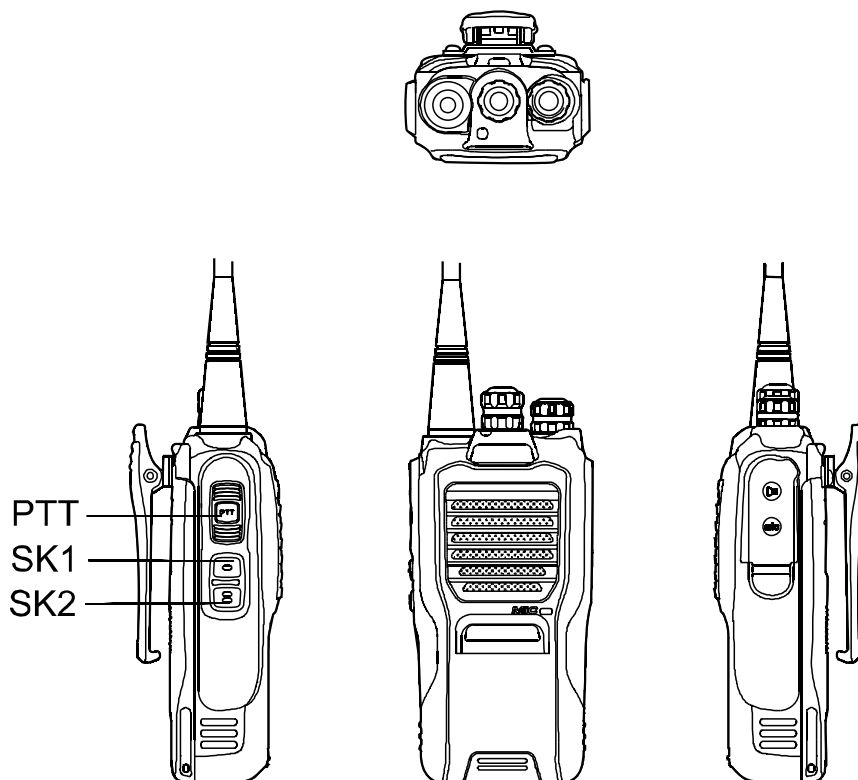


Adjustment Description

I Diagram of Operation Key (Take TC-610 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.

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 alignment screwdriver 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 ($\geq 1.5s$) 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

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 alignment screwdriver 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 ($\geq 1.5s$) 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	Radio communication test set SSG: -119dBm MOD: 1KHz DEV: 3.0KHz Filter: 0.3~3KHz	Antenna Accessory jack	SK1 SK2	Check bandpass 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
	Short press PTT to switch to other frequencies.					

SQL ON	W	Rotate to CH1 and SQL level 1 ON is set. Press SK1 or SK2 to enable the function. The channel spacing is wide band. Low frequency Short press PTT to switch frequencies.	Radio communication test set SSG: -122dBm MOD: 1KHz DEV: 3KHz Filter: 0.3~3KHz	Antenna Accessory jack	SK1 SK2	Adjust the output signals of SSG to squelch level. Rotate the Channel Selector knob to save after five-point adjustment.	Squelch Level 1: -122±1dB
		Rotate to CH2 and SQL level 5 ON is set. Press SK1 or SK2 to enable the function. The channel spacing is wide band. Low frequency Short press PTT to switch frequencies.	Radio communication test set SSG: -119dB MOD: 1KHz DEV: 3KHz Filter: 0.3~3KHz				Squelch Level 5: -119±1dB
		Rotate to CH3 and SQL level 9 ON is set. Press SK1 or SK2 to enable the function. The channel spacing is wide band. Low frequency Short press PTT to switch frequencies.	Radio communication test set SSG: 114dBm MOD: 1KHz DEV: 3KHz Filter: 0.3~3KHz				Squelch Level 9 -114±1dB
	N	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.	Radio communication test set SSG: -121dBm MOD: 1KHz DEV: 1.5KHz Filter: 0.3~3KHz			Same as above	Squelch Level 1: -121±1dB
			Radio communication test set SSG: -118dBm MOD: 1KHz DEV: 1.5KHz Filter: 0.3~3KHz				Squelch Level 5: -118±1dB
			Radio communication test set SSG: -113dBm MOD: 1KHz DEV: 1.5KHz Filter: 0.3~3KHz				Squelch Level 5: -113±1dB

SQL OFF	W	Rotate to CH4 and SQL level 1 OFF is set. Press SK1 or SK2 to enable the function. The channel spacing is wide band. Low frequency Short press PTT to switch frequencies.	Radio communication test set SSG: -124dBm MOD: 1KHz DEV: 3KHz Filter: 0.3~3KHz	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
		Rotate to CH5 and SQL level 5 OFF is set. Press SK1 or SK2 to enable the function. The channel spacing is wide band. Low frequency Short press PTT to switch frequencies.	Radio communication test set SSG: -121dBm MOD: 1KHz DEV: 3KHz Filter: 0.3~3KHz				Squelch Level 5: -121±1dB
		Rotate to CH6 and SQL level 9 OFF is set. Press SK1 or SK2 to enable the function. The channel spacing is wide band. Low frequency Short press PTT to switch frequencies.	Radio communication test set SSG: -116dBm MOD: 1KHz DEV: 3KHz Filter: 0.3~3KHz				Squelch Level 9: -116±1dB
	N	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.	Radio communication test set SSG: -123dBm MOD: 1KHz DEV: 1.5KHz Filter: 0.3~3KHz	Antenna Accessory jack	SK1 SK2	Same as above	Squelch Level 1: -123±1dB
			Radio communication test set SSG: -120dBm MOD: 1KHz DEV: 1.5KHz Filter: 0.3~3KHz				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 TC-610/620 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					

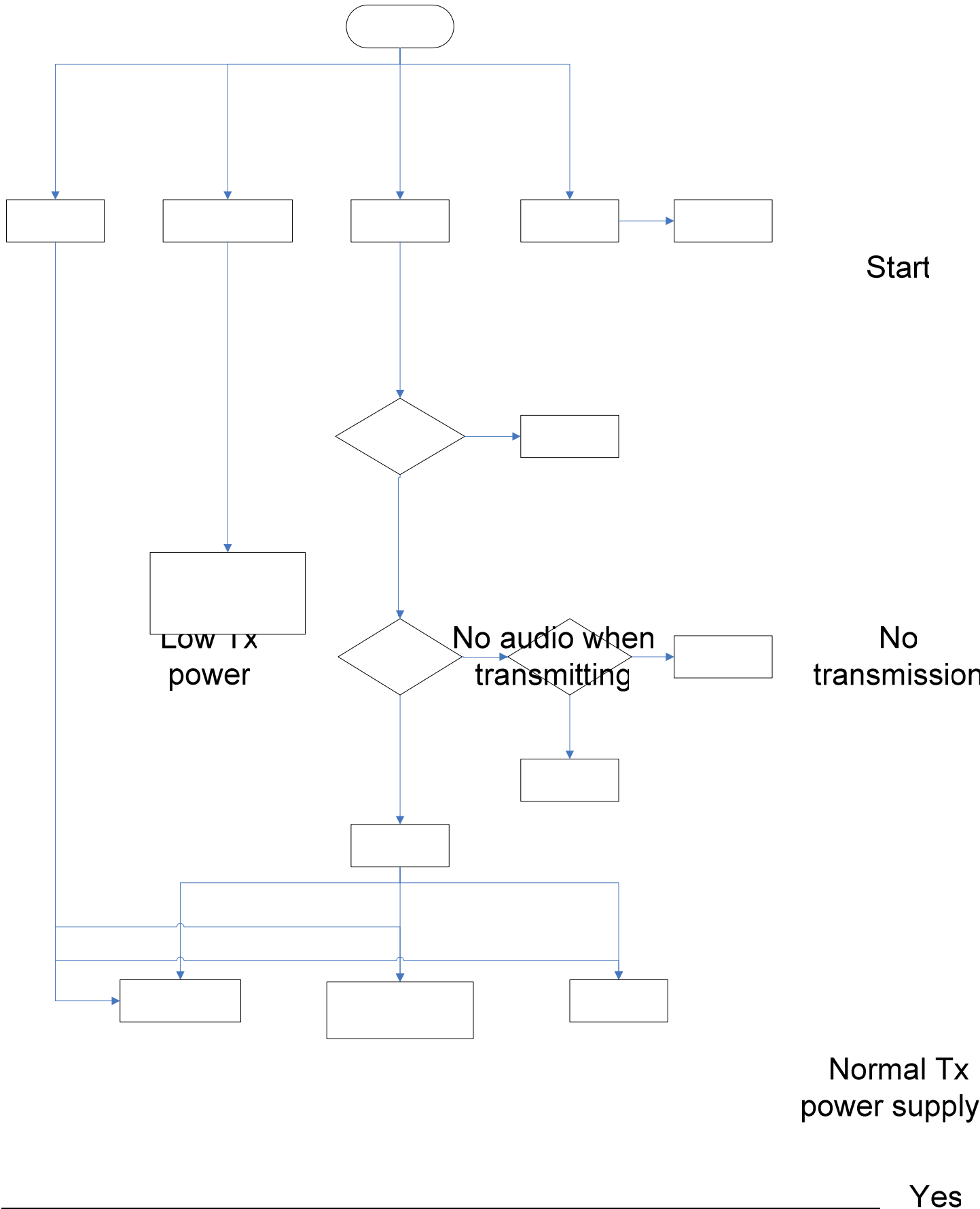
Appendix 2: Reference Voltage Setting of Battery Capacity

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	

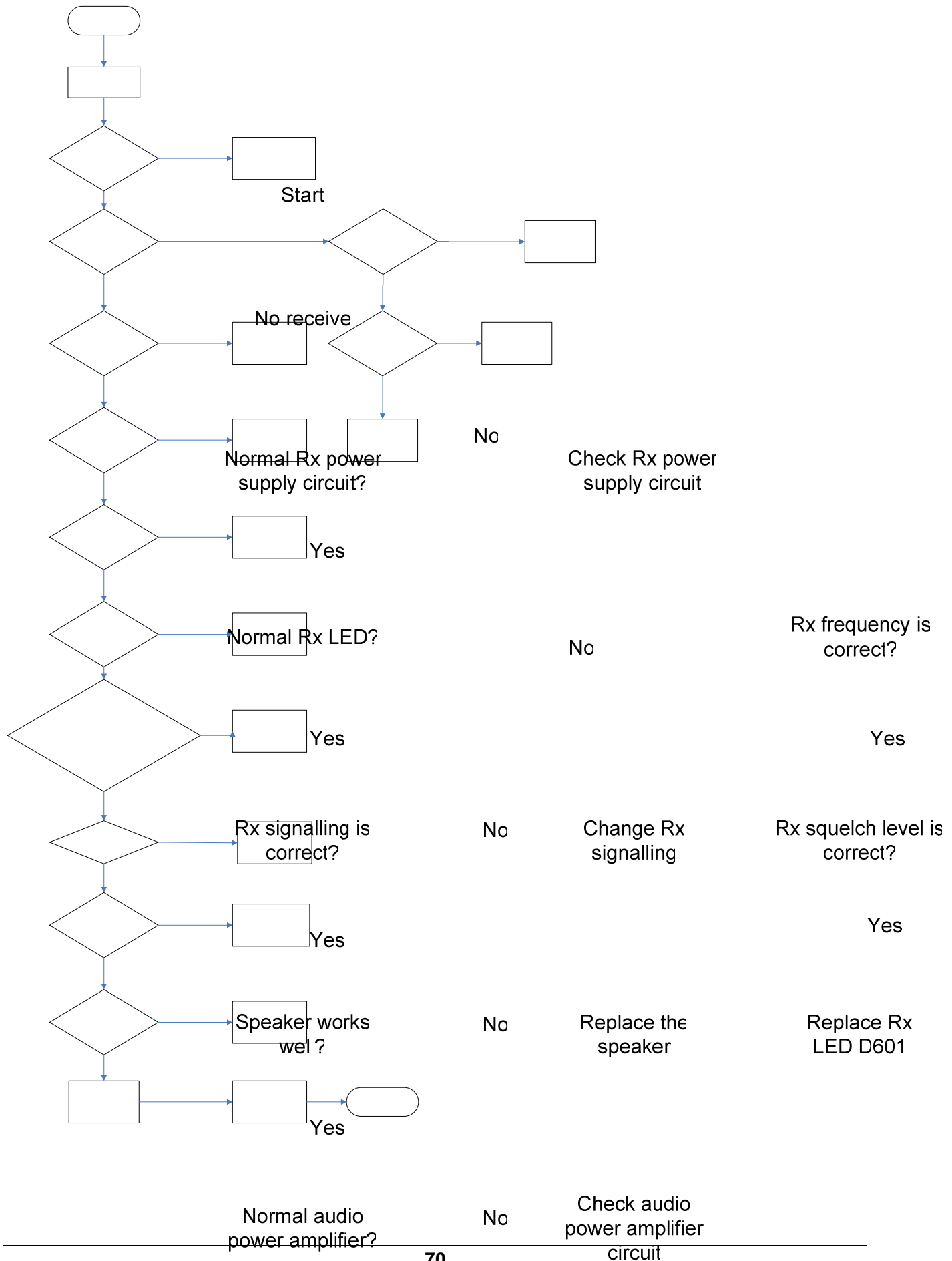
Check in transmit and standby modes (or press the battery capacity check key.		
Green LED (70%-100%)	>7.55V	18min
Orange LED (50%-70%)	7.35V - 7.55V	12min
Red LED (30%-50%)	7.00V - 7.35V	20min
LED flashes red (<30%)	6.50V - 7.00V	18min
LED flashes red and a warning tone is heard every 10 seconds.	5.80V - 6.50V	

Troubleshooting Flow Chart

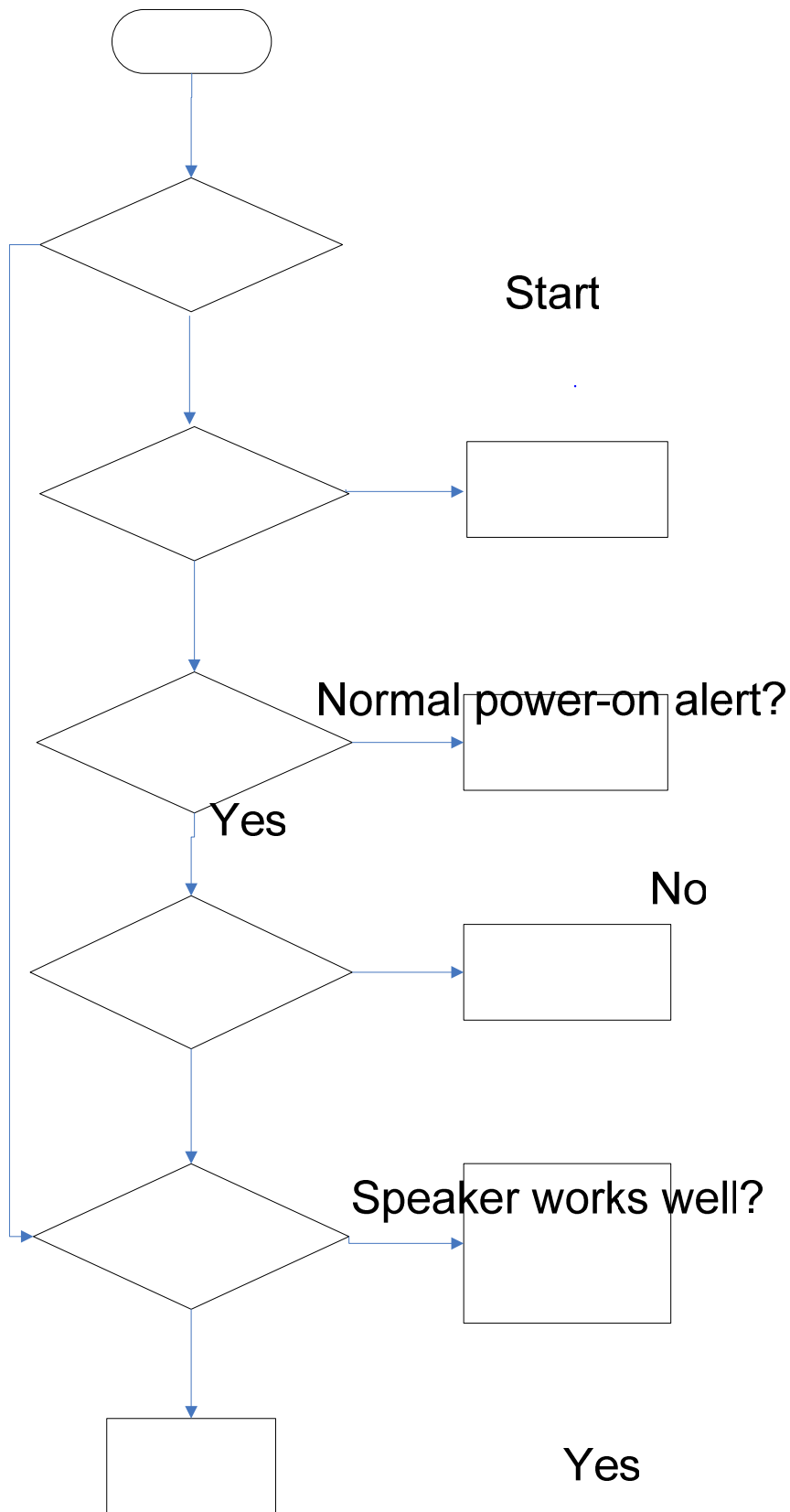
Tx Section



Rx Section



MCU



Repla
spe

No

MCU operating voltage
VCC works well?

No

Chec