ADJUSTMENT

1 Required Test Equipment

Table 1

Number	Name	Parameter requirements
1	Computer	Above P2, compatible IBM PC, WINDOWS 98/ME/2000/XPOperating System
2	Programming software	CCP560
3	Programming cable	
4	Dubbing cable	CPL-01
5	DC regulator	Output voltage:7.4V, output electric current:≥ 5A
6	RF power meter	Test range: 0.5---10W Frequency range: 100MHz—500MHz Resistance: 50Ω SWR≤1.2
7	Frequency meter	Frequency range: 0.1—600MHz Frequency accuracy: higher than±1×10^{-6} Sensitivity: higher than 100mV
8	Frequency deviator	Frequency range: DC—600MHz Test range: 0--±5kHz
9	DMM	Input resistance: above 10MΩ/V DC, capable of measuring voltage, electric current and resistance.
10	Audio signal generator	Frequency range:2---3000Hz Output level: 1---500mV
11	RF power attenuator	Decrement: 40db or 50db Receive power : higher than10W
12	Standard signal source	Frequency range:10MHz---1000MHz Output level:0.1uV~32mV (-127dBm~-17dBm)
13	Oscillograph	Frequency range: DC~20MHz Test range: 10mV~20V
14	Audio Frequency voltmeter	Test range: 10mV~10V

Recommend how to use: item 6, 7, 8, 10, 11 and 12 which listed in the table can be substituted by integrated tester HP8920/HP8921.
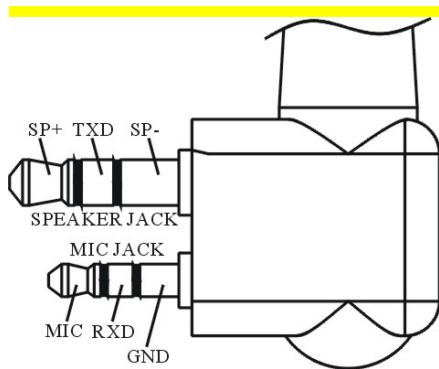
Figure 1 External Speaker/microphone   Interface Definition

2 Adjustment Items

Some detection and adjustment shall be made to the station technical data after changing the components during the maintenance. The debugging introduction of some related circuits goes as follows:

Some parameters of the product can be adjusted ("Interphone Performance Tuning") by use of CCP560 Programming Software of our company. The adjustable parameters are as follows：

1)   Frequency stability"
2)   Transmitting power
3)   Alarm threshold for battery low-voltage
4)   Squelch level
5)   QT frequency offset
6)   DCS frequency offset
7)   Receiving sensitivity

Steps for adjustment：

a、Enter Computer Test Mode by selecting "Test Mode" in main menu of CCP560 Programming Software.

b、Select the items to be adjusted in choice menus, and then adjust the parameters by function keys on the computer keyboard.

c、Exit Computer Test Mode after adjustment.

3 Adjustment

3.1 PLL frequency calibration

Double-click to enter "Frequency Stability" in "Interphone Performance Tuning" to achieve the rated transmitting frequency by adjusting the number from 0 to 255 (Error<200Hz).

3.2 Transmitting frequency adjustment

Double-click to enter "Transmitting High Power" in "Interphone Performance Tuning" to adjust the five frequency points including "Lowest", "Low", "Mid", "High" and "Highest" respectively and set transmitting power to over 4W by adjusting the number from 0 to 255 and observe the operating current (≤1.6A) at the same time.

Double-click to enter "Transmitting Low Power" in "Interphone Performance Tuning" to adjust the five

frequency points including "Lowest", "Low", "Mid", "High" and "Highest" respectively and set transmitting power to over 1W by adjusting the number from 0 to 255.

3.3 Transmitting low-voltage alarm

Adjust power voltage to 5.8V and double-click to enter "Transmitting Low Voltage" in "Interphone Performance Tuning" Mode for automatic detection of the software, and then click "Save" for exit after no or little variation in numbers.

3.4 Frequency offset adjustment

Input audio signal (12mV, 1000Hz) at MIC jack of interphone. Adjust the potentiometer VR501 and set frequency offset to ±4.2kHz.

3.5 DCS transmitting signal waveform and frequency offset adjustment

Double-click to enter "DCS frequency offset" in "Interphone Performance Tuning" Mode, adjust potentiometer VR1 to observe demodulated signal (the waveform shall be smooth and similar to square wave), and then click "Broadband" to adjust all points including "Lowest", "Low", "Mid", "High" and "Highest" respectively for frequency offset of 0.8kHz. After that, click "Narrowband" to adjust the frequency offset to 0.4kHz.

3.6 CTCSS frequency offset adjustment

Double-click to enter "QT(67) frequency offset" in "Interphone Performance Tuning" Mode and click "Broadband" to adjust the five frequency points including "Lowest", "Low", "Mid", "High" and "Highest" respectively to 0.75kHz and then click "Narrowband" to adjust the frequency offset to 0.35kHz.
Select "QT(254) frequency offset" in "Interphone Performance Tuning" Mode, and the debugging method is the same as that of "QT(670) frequency offset".

3.7 Receiving Sensitivity

Double-click to enter "Receiving Sensitivity" in "Interphone Performance Tuning" Mode to adjust the five frequency points including "Lowest", "Low", "Mid", "High" and "Highest" respectively and the number from 0 to 255 for setting max sensitivity of all points.

3.8 Receiver Squelch setting

Double-click to enter "SQL9 open" in "Interphone Performance Tuning" Mode and click "Broadband" to make the frequency of the transmitting signal corresponding to the receiving frequency (level of -116dBm, modulation signal of 1kHz and frequency offset of 3kHz) showed at each frequency point of the software. Enter all points including "Lowest", "Low", "Mid", "High" and "Highest" respectively for automatic adjustment of software and then press next point after no big change to numbers. After that, adjust "Narrowband", the debugging method is the same as that of "Broadband" except the input modulation signal is changed to frequency of 1kHz and frequency offset of 1.5kHz.
Select "SQL9 open" in "Interphone Performance Tuning" Mode and click "Broadband" to make the frequency of the transmitting signal corresponding to the receiving frequency (level of -118dBm, modulation signal of 1kHz and frequency offset of 3kHz) showed at each frequency point of the software. Enter all points including "Lowest", "Low", "Mid", "High" and "Highest" respectively for automatic adjustment of software and then press next point after no big change to numbers. After that, adjust "Narrowband", the debugging method is the same as that of "Broadband" except the input modulation signal is changed to frequency of 1kHz and frequency offset of 1.5kHz.

Select "SQL1 open" and "SQL1 close" respectively in "Interphone Performance Tuning" Mode, and adjust by the same method except the open level of transmitting signal changed to 123dBm and the close level to 125dBm.

4 Receiving Low-voltage Alarm

Adjust power voltage to 5.8V and double-click to enter "Receiving Low Voltage" in "Interphone Performance Tuning" Mode for automatic detection of the software, and then click "Save" for exit after no or little variation in numbers.

5 Adjusting explanation

Table 4 Receiving part

Item	Test condition	Instrumentation	Test point	Correcting member	Requirement	Remarks
Audio Power	Test frequency: Intermediate Frequency Point Antenna Interface Input: RF OUT ： -53dBm(501μV) MOD：1kHz DEV：±3.0kHz Audio load: 16Ω	RF signal generator Oscillograph Audio frequency voltmeter distortion tester	Speaker Interface		(Volume knob clockwise to the end) Audio Power>0.3W	Power of the internal speaker：>1.2W
Sensitivity	CH: Low Frequency Point CH: Intermediate Frequency Point CH: High Frequency Point RF OUT:-119dBm(0.25μV) MOD: 1kHz DEV: ±3.0kHz	/Integrated tester		Computer Adjustment	SINAD：12dB or higher	
Squelch Enable Sensitivity	CH: Receiving Center Frequency Point			Computer Test Mode		
	Level-9 RF OUT output:-116dBm				Normal squelch opening after adjustment	
	Level-1 RF OUT output:-123dBm				Normal squelch opening after adjustment	

Table 5 Transmitting part

Item	Test condition	Instrumentation	Test point	Correcting member	Requirement	Remarks
RF rate		Frequency Counter / Integrated Tester	Antenna	Computer Test Mode	Within ±200Hz	
DCS waveform (balance)		Oscillograph / Integrated Tester		VR501	Nearly flat waveform Square wave	
Power	Power 7.4V	Power Tester / Integrated Tester Ammeter		Computer Test Mode	Adjust to 4W	Within ±0.2W
Max Modulation Frequency Offset	CH：Transmitting Center Frequency Point AG：1kHz/120mV	Frequency deviator/Integration Tester		VR2	Adjust to ±4.2kHz	±200Hz
Modulation Sensitivity	CH：Transmitting Center Frequency Point AG：1kHz/12mV				Check Frequency Offset 2.2kHz~3.6kHz	
CTCSS DEV	CTCSS：67Hz	Frequency deviator/Integration Tester		Computer Test Mode	Adjust to ±0.75kHz	±50Hz
DCS DEV	DCS：023N	Frequency deviator/Integration Tester		Computer Test Mode	Adjust to ±0.75kHz	±50Hz
Battery Warning	Battery Terminal: 5.8V			Computer Test Mode	Indicator light twinkles after adjustment	