

Detail Test Item for Each Function

Model: 2271-US

(Production reference document)

Item	Test Function	Alignment Method	Equipment Requirement
PCB			
	Enter Test Mode	1. Push PTT and Power buttons together to enter Test-mode program.	Test Fixture: DC supply (0 ~ 15V)
1.	LCD display (open short test)	1. Press Power button to turn on the unit. 2. Use normal function to check Icon and segment for LCD open short test.	Test Fixture: DC supply (0 ~ 15V)
2.	Current Consumption a. Stand by current b. RX Save ON current c. RX Save OFF current d. TX current	1. Set to test-mode, CH-1. 2. Check RX Current. (a) Press [LAMP] button one time to test-mode RX ON. (b) Check the RX Save ON current < 50mA. (c) Press [LAMP] button one more time to test-mode RX OFF. (d) Check the RX Save OFF current < 1mA. 3. Check TX current (a) Press PTT to TX mode. (b) Check TX talk ON current < 300mA.	Test Fixture: DC supply (0 ~ 15V)
3.	TX VCO RX VCO	1. Set to CH-14 and press PTT switch to TX mode. (a) Adjust L1 to get 1V DC at test point TP7. (b) Release PTT switch to check RX VCO DC on CH-14. 2. Set to CH-1 and press PTT switch. (a) Check CH-1 to DC voltage. (b) Release PTT switch and check RX VCO DC on CH-1.	Test Fixture: DC supply (0 ~ 15V) Digital Multi-meter (for DC voltage test)
4.	TX Part a. TX Power b. TX Frequency Transmission Power Tune Up Procedure	1. Set to CH-1 and press PTT switch to TX mode. (a) Check transmit power within 28.5dBm ERP / 31.5dBm conducted. 2. Set to CH-8 and press PTT switch to TX mode. (b) Check transmit power within 19.4dBm ERP. 3. Set to CH-1 and press PTT switch to TX mode. (a) Adjust VC1 to get 462.5625 MHz $\pm$ 300Hz on CH-1. Set to CH-14 and press PTT switch to TX mode. (a) Check the frequency around 467.7125MHz $\pm$ 300Hz.	Test Fixture: DC supply (0 ~ 15V) RF Power Meter - LODESTAR-340
5.	TX Modulation & Distortion	1. Maximum Deviation: (a) Output 80mV 1KHz audio signal to Mic input and press [PTT] switch. (b) Check maximum deviation is around 2.2KHz. 2. Normal Deviation: (a) Output 8mV 1KHz audio signal Mic input and press [PTT] switch. (b) Check normal deviation is around 1.5KHz. 3. Check TX audio distortion < 5%.	Test Fixture: DC supply (0 ~ 15V) Audio Signal Generator Modulation Analyzer (1) (HP8901B) test function as: - TX deviation - TX audio distortion

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6.	RX Part a. RX Alignment b. RX Distortion c. RX Current d. RX Sensitivity	- Set to CH-4. - Set RF signal generator to -50dBm with 1.5KHz modulation signal. - Adjust T1 to get minimum distortion. - Check audio distortion < 5%. - Check audio output > 100mV at TP4. - Check RX current < 70mA. - Set RF signal generator output level to -118dBm on TP9. - Check SINAD sensitivity $\leq$ 118dBm / 12dB SINAD on TP4. - Repeat procedure 6.4 to 6.8 action on CH-11.	Test Fixture: DC supply (0 ~ 15V) Shield Room (1) RF Signal Generator (1) (HP8656B) test function as: - output RF signal - output modulating signal Audio Analyzer (1) (HP8903B) test function as: - SINAD reading Digital Multi-meter - for RX current test
7.	RX Audio SQ Detection	- Set to CH-7. - Set RF signal generator to -50dBm with 1.5KHz modulation signal. - Adjust T1 to get minimum distortion. - Check audio output > 100mV at TP4. - Audio Level: (a) Set RF SG level to -50dBm with 1.5KHz deviation at 1KHz audio frequency. (b) Adjust volume button to the position, which give an output 200mV $\pm$ 5mV at TP4. - Maximum and Minimum audio output power: (a) Set RF SG level to -50dBm with 1.5KHz deviation at 1KHz audio frequency. (b) Adjust volume to the position, which give a maximum output with distortion 10%. (c) Check the voltage at TP4 = 1V $\pm$ 100mV. (d) Set maximum audio output to 0 dB, adjust the volume to the position, which give a minimum output. (e) Check the minimum voltage -35dB $\pm$ 5dB at TP4. - Set to CH-4 (a) Set signal generator to -119dBm with 1.5KHz deviation, 1KHz tone. (b) Adjust VR1 for 7 to 8dB SINAD. (c) Check low sensitivity side 8 to 12dB SINAD. (d) Check high sensitivity side 4 to 7dB SINAD. - Repeat 7.7 on CH-11.	Test Fixture: DC supply (0 ~ 15V) Shield Room (2) RF Signal Generator (2) (HP8656B) test function as: - output RF signal - output modulating signal - audio bandwidth frequency level output. Audio Analyzer (2) (HP8903B, op 011 or 051) test function as: - audio level - distortion - audio bandwidth frequency and level measurement. Oscilloscope
8.	Battery Detection	- Low battery 6.30V (speaker output beep tone and LCD flash). - Dead battery 5.25V.	Test Fixture: DC supply (0 ~ 15V) Multi-voltage output equipment (self-made)
Casing			
1.	Current Consumption	- Press POWER to turn on the unit. - Press POWER to turn off the unit. (a) Check off mode current < 350 uA. - Set Test-mode RX (a) Check the RX SCAN ON current < 30 mA. (b) Check the RX SCAN OFF current < 1 mA. - TX current (a) Press PTT button and check TX current.	Fix unit Fixture: DC supply (0 ~ 15V) Multi-Meter (for current test)

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2.	TX Frequency TX Power TX Audio	- Set to CH-1 and press PTT switch to TX mode. - Check the frequency = $462.5625 \text{ MHz} \pm 300\text{Hz}$. - Set to CH-14 and press PTT switch to TX mode. - Check the frequency = $467.7125 \text{ MHz} \pm 300\text{Hz}$. - Check the radiated power reference to Golden Sample. - Standard TX deviation. - Set unit to CH-4. - Put checked unit on test fixture, make sure the unit MIC is face to fixture speaker to get maximum pick up audio signal. - Press PTT switch to TX mode, unit can pick up the audio sound level from test fixture's speaker. - Check the normal TX deviation at a range of 1.5KHz that should compare to Golden sample. - Check the maximum TX deviation at a range of 2.2KHz.	Special Test Fixture: DC supply (0 ~ 15V) Audio Signal Generator. Frequency Country - HOODI CN-201A Spectrum Analyzer (1 end) (HAMEG HM5010) test function as - radiation output power - second harmonic - third harmonic Modulation Analyzer (2 end) (HP8901B) test function as - TX deviation - TX audio distortion
3.	Squelch Detection	- Set unit to CH-8. - Set the distance of 0.3 meter between antenna of signal generator and checked unit. - The antenna of signal generator and checked unit should be parallel to get max field strength power. - Set RF signal generator to -90dBm with 1.5KHz deviation, 1KHz tone, make sure the unit still on squelch mute status (no voice can be heard) - Adjust RF signal generator to -85dBm, it will change to squelch off status (voice can be heard) - Repeat above action on CH-7.	Fix unit Fixture: DC supply (0 ~ 15V) Shield Room (3) RF Signal Generator (3) (HP8656B) test function as - output RF signal Telescope Antenna.
4.	Audio RX Path	- Set unit to CH-4. - Plug the dummy speaker into audio jack. - Check the radiated sensitivity reference to the Golden Sample. - Audio Level: - Set RF SG level to -35dBm with 0.5KHz deviation at 1KHz audio frequency. - Select volume to the position, which give an output $100\text{mV} \pm 5\text{mV}$. - Maximum and Minimum audio output power. - Set RF SG level to -35dB with 1.5KHz deviation at 1KHz audio frequency. - Select volume to the position, which give a maximum output with distortion < 5%. - Check the voltage on dummy speaker > 750mV. - Check the voltage pick up from speaker. - Compare the voltage difference between dummy speaker and speaker. - Set maximum audio output to 0 dB, adjust volume to the position, which give a minimum output. - Check the voltage on dummy speaker > 350mV. - Check the voltage pick up from speaker. - Compare the voltage difference between dummy speaker and speaker.	Special Test Fixture: DC supply (0 ~ 15V) Shield Room (4 end) RF Signal Generator (4 end) (HP8656B) test function as - output RF signal - output modulating signal - audio bandwidth frequency level output Audio Analyzer (3 end) (HP8903B) test function as - audio level - distortion - audio bandwidth frequency and level measurement. Audio Amplifier (to pick up speaker 1KHz signal)
5.	Battery Detection	- Low battery 4.12V (speaker output beep tone and LCD flash) - Dead battery 3.79V.	DC supply (0 ~ 15V) Multi-voltage output equipment (self-made).