

Appendix F: Manufacturer Radio Test Report

November 19, 2018

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8000 W. Sunrise Blvd,
Plantation, FL 33322

To: Fire Chief Daniel G. Merson
Captain Daniel S. Dushanko
Howard County MD Fire and Rescue
[6751 Columbia Gateway Drive Suite 400](#)
[Columbia MD 21046](#)

RE: Radio Testing for Howard County Fire Department

Dear Daniel:

Please find below the test results of equipment samples that were picked up by me on Oct 26th, 2018 at Motorola Solution Plantation receiving. The test results are per test protocols identified below.

The equipment samples picked up from Receiving are:

Radio Model#	Radio S/N	Radio Name	Remote Speaker microphone	Battery	Antenna
H91TGD9PW7AN	581CST1697	8XE F3-F1-BT	PMMN4106	PMNN4504A	Whip

1. All radio tests were carried out on Nov 07, 2018 at Motorola Solutions located at 8000 West Sunrise Blvd. Plantation FL 33322, unless otherwise noted.
2. Captain Dushanko from Howard County was present during all testing.
3. Electrical performance radio tests were carried out using a battery eliminator with a nominal 7.5V supply.
4. Talk/Listen test was carried out using battery and RSM that came with the radio. The Talk/Listen test was performed using a conventional talk-around channel, "A11-FDELK".
5. All testing was completed on November 7th. The equipment was sealed and shipped back to Detective Corporal Gregory.

Test Protocol 1:

Visual inspection of radio exterior carried out by Steve Dash

1. Examine the radio for any physical damage to the exterior
2. Check radio buttons for tactility and function
3. Check radio with GCAI accessory for fitment
4. Check radio with battery for fitment.

Test Protocol 2:

Download and review of software logs carried out by Scott Greven. Retrieved error log entries and reset captures to better understand the software behavior. The error logs are used by developers to detect potential issues, the logs are used for debugging only.

Equipment used:
PMKN4013C Data Cable
Windows based Workstation
DebugDataExtractor (proprietary log extractor software running on windows machine)
1. Use data cable to attach radio GCAI to computer usb
2. Run DebugDataExtractor on computer to extract logs.

Test Protocol 3:

Auto Test of receiver and transmitter parameters (using Aeroflex 3920 test set) carried out by Mario Phang

Equipment used:
PMKN4013C Data Cable
AeroFlex 3920 Test Set (w calibrated rf cable)
66009254001 APX Battery Adapter
Motorola Programmable Power Supply
1. Use data cable to attach radio GCAI to AeroFlex usb
2. Run "Motorola APX Autotest" on AeroFlex to test radio rf performance.

Test Protocol 4:

Talk and listen (functional) testing Carried out by Steve Dash and Mario Phang

In addition to the radio performance tests specified above, talk and listen test shall be conducted. Two people are needed. Follow these steps:

1. Locate one conventional talk around personality that is common to both radios.
2. Set the volume knob to approximately 75% of the maximum position on both units.
3. Position the radios at approximately 10 feet apart.
4. Key up on the first radio and proceed to count out loud from one to ten while facing the radio's microphone, keeping it approximately two inches away from your face. Verify that the count is intelligible and that all numbers are heard on the second radio's speaker.
5. Repeat steps three and four from the secondary radio.

Test results of Test Protocol 1:

External visual inspection showed signs of exposure to very high temperatures

- partially melted volume knob, channel selector knob and antenna
- burn marks on housing

RSM channel selector knob (switch shaft) was bent slightly

- most likely due to a high impact force
- however no loss of functionality or tactility

No other signs of physical damage observed

Radio and RSM button check revealed no anomalies

- all buttons, levers and switches had good tactility
- all buttons, levers and switches worked properly when actuated

Radio-to-RSM fit was good. No fit or functionality issues noted

Radio-to-battery fit was good. No fit or functionality issues noted

Test results of Test Protocol 2:

Analyze codeplug for suggested improvements.

The County's codeplug configuration was analyzed.

Below are the observations:

1. Mandown was not configured to automatically transmit with mic enabled, instead the user needs to press PTT
2. Emergency "FindMe" Tx/Rx was not enabled. This is a feature which will send an emergency signal directly to adjacent radios when either the mandown emergency or manually triggered emergency is activated. Along with the notification a range indicator is provided to help identify the radio location.
3. Setup the emergency revert was not enabled to utilize a monitored talkgroup.
4. Recommendation: "End Tx on Voice Absence" was not enabled. This is to prevent a case where the microphone wires are shorted which could continuously cause the PTT to be activated.

Test results of Test Protocol 3:

Electrical performance was within factory specifications

Reference Oscillator Test : PASS
Allowable Specs (< 250 Hz from 869.8875 MHz)

Broadband Power Test : PASS
Allowable Specs(< 0.65W for VHF, < 0.55W for UHF, < 0.3W for 700MHz, <0.4W for 800MHz)

P25 Rx BER Test : PASS
Allowable Specs(< 5% BER at -116 dBm)

P25 Tx Tests : PASS
Allowable Specs(MOD Fidelity < 5% and Symbol DEV <180 Hz from 1800)

Raw Test Data:

Test Freq	BER (%)	MOD Fidelity (%)	Sym DEV (Hz)	PWR (W)	Osc Dev (Hz)
F1	0	0.6	-12.6	0.05	
F2	0	0.42	-9.1	0.10	
F3	0	0.59	-12.2	0.24	
F4	0.004	0.7	-13.1	0.00	
F5	0	0.71	-13.8	0.01	

F6	0.227	0.61	-11.7	0.18	
F7	0.349	0.59	-12	0.20	
F8	0.336	0.77	-15.2	0.16	
F9	0.32	0.55	-10.9	0.13	
F10	0.803	0.67	-11.7	0.07	
F11	0.755	0.43	-9.1	0.03	
F12	0.629	0.63	-13	-0.06	
F13	0.528	0.6	-11.7	-0.03	
F14	0.554	0.81	-14.3	-0.02	-110
AVG =	0.321786	0.62	-12.17142857	0.08	
STDEV =	0.295501	0.110731831	1.738004413	0.094276	

Test results of Test Protocol 4:

Talk and listen test results was clear and intelligible for both transmit and receive.