



DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
1333 ISAAC HULL AVE SE
WASHINGTON NAVY YARD DC 20376-0001

IN REPLY REFER TO
9070
Ser 05Z/535
15 Jul 16

From: Commander, Naval Sea Systems Command (SEA 05Z34)
To: President, Naval Postgraduate School (J. Gibson)

Subj: LITHIUM BATTERY SAFETY CERTIFICATION; BREN-TRONICS BB-2590/U BATTERY
FOR NAVAL POSTGRADUATE SCHOOL OPERATIONS IN THE HARRIS RF-7800M-
MP041 RADIO

Ref: (a) NPS ltr 9310 Ser 00AA/151 of 8 Mar 16
(b) NAVSEAINST 9310.1C
(c) NAVSEA ltr 5400 Ser 05B2/118 of 29 Sep 15

Encl: (1) NSWCCD ltr 9077 Ser 63/16-063 of 05 Jul 16

1. In response to your request of reference (a), as the Lithium Battery Certification Authority in accordance with reference (b) and authorized by reference (c), the Naval Sea Systems Command (Code 05Z34) concurs with your use of Bren-Tronics BB-2590/U batteries (Part Number (P/N) BT-70791A, NSN 6140-01-490-4316) with Harris RF-7800M-MP041 radios.

2. This lithium battery safety certification is based on the Technical Agent (Naval Surface Warfare Center, Carderock Division) safety evaluation provided in enclosure (1), and is limited to laboratory, field, and weather balloon operations conducted in accordance with FAA requirements and administered by Naval Postgraduate School (NPS) personnel. In addition, it assumes that all equipment is planned to be recovered from the weather balloon operations.

3. The NAVSEA point of contact is Joseph Vignali (SEA05Z34) at DSN 326-5412, commercial (202) 781-5412 or e-mail: joseph.vignali@navy.mil.


J. VIGNALI
By direction

Copy to:
NSWCCD (Code 636/J. Simmons)
NSWC Crane (GXS/M. Tisher)



DEPARTMENT OF THE NAVY
NAVAL SURFACE WARFARE CENTER CARDEROCK DIVISION
9500 MACARTHUR BOULEVARD
WEST BETHESDA, MD 20817-5700

IN REPLY REFER TO
9770
63/16-063
05 Jul 16

From: Commanding Officer, Naval Surface Warfare Center Carderock Division
To: Commander, Naval Sea Systems Command (SEA05Z34)

Subj: SAFETY REVIEW OF THE BREN-TRONICS BB-2590/U BATTERY
FOR NAVAL POSTGRADUATE SCHOOL (NPS) OPERATIONS IN THE HARRIS
RF-7800M-MP041 RADIO

Ref: (a) NPS ltr 9310, Ser 00AA/151 of 8 Mar 16
(b) NAVSEA INST 9310.1c of 12 Aug 15
(c) NAVSEA TM S9310-AQ-SAF-010 of 15 Jul 10
(d) NSWCCD ltr 9077 Ser 61/14-357 of 22 Dec 14
(e) NOSSA ltr 8020, Ser N841/1283 of 23 Aug 10
(f) NOSSA ltr 8020, Ser N841/185 of 14 Feb 05
(g) NOSSA ltr 8020, Ser N841/713 of 5 May 08
(h) NOSSA ltr 8020, Ser N841/160 of 4 Feb 15

1. As requested in reference (a), the Naval Surface Warfare Center, Carderock Division (NSWCCD), Advanced Power and Energy Branch (Code 636), has conducted a lithium battery safety review of the Bren-Tronics BB-2590/U battery (Part Number (P/N) BT-70791A, NSN 6140-01-490-4316) for use with the Harris RF-7800M-MP041 radio. This review was conducted in accordance with (IAW) references (b) and (c) and conveys our recommendation to grant lithium battery safety certification for use of this battery with the RF-7800M-MP041 radio. This recommendation is applicable to laboratory, field, and weather balloon operations conducted in accordance with Federal Aviation Administration (FAA) requirements and administered by Naval Postgraduate School (NPS) personnel. This recommendation assumes all equipment is planned to be recovered from weather balloon operations.

2. The RF-7800M-MP041 radio is a portable, multiband, man-pack radio that provides voice and high-speed networked data services. It is capable of fixed-site, vehicular and man-portable battery powered operation. When battery powered, it will be powered by a Bren-Tronics BB-2590/U (P/N BT-70791A). A Bren-Tronics BB-2590/U has a capacity of 7.2 Ampere-hours (Ah) at 28.8 volts (V) and is comprised of 24 E-One Moli 18650-size lithium-ion cells. It has two (2) halves, each with a three (3)-in-parallel and four (4)-in-series configuration (3P4S), and is capable of producing 28.8 V or 14.4 V, depending on how the receiving connector is wired.

3. Two (2) additional batteries are also present in the radio: a Saft P/N LS14250 battery and a BR2325 coin cell. The Saft P/N LS14250 battery is a lithium/thionyl chloride (Li/SOCl₂) cell used as a Hold Up Battery (HUB) for retention of programmed data. It is a ½AA-size cell with a nominal voltage of 3.6 V and capacity of 1.0 Ah. The BR2325 battery is a 3 V coin cell with a

ENCLOSURE (1)

Subj: SAFETY REVIEW OF THE BREN-TRONICS BB-2590/U BATTERY FOR NAVAL POSTGRADUATE SCHOOL (NPS) OPERATIONS IN THE HARRIS RF-7800M-MP041 RADIO

capacity of 0.165 Ah. As it meets the specifications outlined in section 3-3 of reference (c), the BR2325 battery is certified for all uses and no further authorization is required.

4. The LS14250 battery is Underwriters Laboratories (UL) component recognized per file # MH12609, is intended for this type of application, and has been previously safety certified for Navy use with communications equipment as per references (d) and (e). No safety incidents or recalls relating to this battery have been reported. On the basis of these attributes, by authority established by reference (c) section 3-2, NSWCCD Code 636 grants lithium battery safety certification to the Saft battery P/N LS14250 for use with the Harris RF-7800M-MP041 radio. This lithium battery safety certification is for laboratory, field, and weather balloon operations conducted in accordance with FAA requirements and administered by NPS personnel. All equipment shall be planned to be recovered from weather balloon operations.

5. The BT-70791A version of the Bren-Tronics BB-2590/U was developed, manufactured, and qualified under contract with the U.S. Army, Communications Electronics Command (CECOM). It is identical to their previous version in terms of component lithium-ion cells and battery safety electronics. Qualification testing (First Article Tests (FAT)), required by MIL-PRF-32052/1, was completed at the manufacturer's facility and accepted by the Army. Lithium battery safety testing IAW reference (c) was also completed on an earlier version of the BB-2590/U that was granted Navy safety certification for use in a number of applications, including communication radios (reference (f)). This certification was supported by test results documenting the reliable and repeatable functioning of the battery level internal safety devices in response to overcharge and over-discharge attempts, the benign response of the battery to overcharge and short circuit abuses, and an acceptable level of tolerance to thermal abuse. The addition of the Systems Management Bus (SMBus) capability to the battery in the BT-70791A version did not change the safety characteristics of the battery as determined during the safety evaluation of the previous battery version, so it too was granted Navy lithium battery safety certification as documented in reference (g). BB-2590/U's of various manufacturers and part numbers have also been granted safety certification for use with radio equipment as documented in references (e) and (h).

6. Based on the presence of validated battery safety devices, previous acceptable Navy safety testing of a similar BB-2590/U version, and previous safety certifications of several BB-2590/U versions for use with communications equipment, including the Bren-Tronics P/N BT-70791A, NSWCCD recommends granting a lithium battery safety certification for the Bren-Tronics BB-2590/U (P/N BT-70791A) as used with the Harris RF-7800M-MP041 radio. This recommendation applies to laboratory, field, and weather balloon operations conducted in accordance with FAA requirements and administered by NPS personnel and assumes all equipment is planned to be recovered from weather balloon operations.

Subj: SAFETY REVIEW OF THE BREN-TRONICS BB-2590/U BATTERY FOR NAVAL
POSTGRADUATE SCHOOL (NPS) OPERATIONS IN THE HARRIS RF-7800M-
MP041 RADIO

7. The Naval Surface Warfare Center, Carderock Division, Advanced Power and Energy
Branch, Code 636 point of contact is Ms. Julie Simmons, commercial (301) 227-1853, e-mail:
julie.simmons@navy.mil or Mr. Paul Jawlik, commercial (301) 227-1601, e-mail:
paul.jawlik@navy.mil.

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By direction

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DEPARTMENT OF THE NAVY
NAVAL POSTGRADUATE SCHOOL
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MONTEREY, CA 93943-5000

IN REPLY REFER TO:

9310
Ser 00AA/151
8 March 2016

From: President, Naval Postgraduate School
To: Commander, Carderock Division, Naval Surface Warfare Center (616)

Subj: AUTHORIZATION REQUEST FOR THE BREN-TRONICS BB-2590/U BATTERY
FOR NPS OPERATIONS IN THE HARRIS RF-7800M-MP041 RADIO

Ref: (a) NAVSEA 9310.1C 12 Aug 2015
(b) NPS Safety and Usage Procedures for Lithium Polymer Batteries V1.4b Jan 2016
(c) REVISION TWO to NAVSEA Technical Manual S9310-AQ-SAF-010, 18 Oct 2010

Encl: (1) Data sheet of the Harris RF-7800M-MP041 Radio
(2) Data sheet of the Bren-Tronics BB-2590/U Battery

1. In accordance with Reference (a), NPS requests concurrence for use of the Bren-Tronics BB-2590/U battery (Part Number BT-70791A, NSN 6140-01-490-4316) battery for operations in the Harris RF-7800M-MP041 radio. Operations are planned for the laboratory, field, and weather balloon environment. Data sheets for the Radio and Battery are Enclosures (1) and (2).

3. The system will be used for laboratory, field, and weather balloon operations conducted in accordance with FAA requirements and controls. All equipment is planned to be recovered from weather balloon operations.

4. All aspects of the batteries are planned to be managed in accordance with NPS best practices for Lithium Batteries which are codified in Reference (b), and used by researchers trained to the details of the Navy Lithium Battery Safety Program. These practices align with the guidance put forth in Reference (c), and further emphasize deliberate isolated storage in metal cabinets or protective bags with ceramic tile protection, charging controls, disposal guidance, and emergency procedures in case of a cook-off.

5. We appreciate your technical review and consideration for the laboratory and field application of this battery pack. Please contact Mr. John Gibson (831) 656-2902 or Mr. Scott Giles (831) 656-7568 if any questions can be fielded.

A.J. COLÓN
By direction

REFERENCIA (a)

TRANSFORMING HF
COMMUNICATIONS
FOR THE MODERN
BATTLEFIELD



Harris Falcon III® RF-7800H-MP

Wideband HF/VHF Tactical Radio System

KEY BENEFITS

- › Smallest, lightest, fastest wideband HF manpack radio
- › Wideband data up to 120 kbps
- › Interoperable with Falcon II radios and accessories

The next step in HF technology, the Harris Falcon III RF-7800H-MP Wideband HF/VHF Tactical Radio System leverages breakthrough wideband data performance—and interoperability with fielded Falcon II HF radios—to deliver information superiority on today's battlefields. It provides continuous coverage from 1.5 to 60 MHz, 20 watts HF and 10 watts VHF on the power of a single battery, and bandwidths from 3 to 24 kHz—with data rates of up to 120 kbps.

No matter the deployment scenario, the RF-7800H-MP ensures the transmission and receipt of critical communications. With its Falcon II interoperability, it easily integrates into existing networks to deliver secure voice and data. It provides extended range, operating over degraded communication channels. And with ultra-robust 3G waveforms, it provides last-ditch voice and SMS messaging in channels where legacy waveforms don't work.

Incorporating enhanced anti-jamming measures and embedded Citadel® and AES encryption, all RF-7800H-MP transmissions are completely secure and reliable. The radio also features high-performance automatic link establishment and data link protocols to provide fast, reliable linking and error-free data transfer—even under the most challenging channel conditions.

In addition to its array of embedded capabilities—which also include an internal GPS receiver and telephony—the RF-7800H-MP features a Software-Defined Radio (SDR) architecture, which allows it to host future capabilities. Combined with its incredible processing power, this ensures it will continue to be state-of-the-art well into the future.

Providing all of these features in a form factor that's more compact and 20% lighter than previous HF manpacks, the RF-7800H-MP enables today's warfighter to take on tomorrow's missions.

HARRIS
assuredcommunications®

Specifications for: Harris Falcon III® RF-7800H-MP Wideband HF/VHF Tactical Radio System

GENERAL

Frequency Range	1.5-59.999 MHz
Net Presets	75, fully programmable
Frequency Stability	±1x10 ⁻⁶
Emission Modes	J3E (single sideband, upper or lower, suppressed carrier telephony) H3E (compatible AM single sideband plus full carrier) A1A, J2A (compatible CW), selectable, F3E (FM)
RF Input/Output Impedance	50 ohm nominal, unbalanced
Power Input	26 VDC (21.5-32 VDC)
Data Interfaces	USB, synchronous or asynchronous (RS-232C)

SPECIFICATIONS

Dimensions	3.3 H x 7.9 W x 9.2 D in. (8.3 H x 20 W x 23.4 D cm)
Weight	8.7 lbs (3.9 kg) without batteries

RECEIVER

Sensitivity	SSB -113 dBm (0.5 µV) for 10 dB SINAD
Audio Output	12 mW at 1000 ohm to external handset
Squelch	Front panel adjustable, active squelch selectable
IF Rejection	Greater than 80 dB
Image Rejection	Greater than 80 dB (1st IF image)
AGC	Mode dependent, automatically selected
Intermodulation Distortion	-80 dB or better for two -30 dBm signals separated 30 kHz or more
Overload Protection	Receiver protected to 32 VRMS

TRANSMITTER

Power Output	HF 1, 5, 20 watts PEP, -1/+1 dB VHF 1, 5, 10 watts FM
Audio Input	1.5 mV at 150 ohm or 0 dBm at 600 ohm for full rated output
Carrier Suppression	Greater than 60 dB below PEP output (J3E mode)
Undesired Sideband Suppression	Greater than 60 dB below PEP output

LEARN MORE

To learn more about the Harris Falcon III RF-7800H-MP Wideband HF/VHF Tactical Radio System and its advanced features, contact Harris at RFComm@harris.com.

Harris is dedicated to developing best-in-class *assured communications*® products, systems and services.



ENVIRONMENTAL

Test Method	Per MIL-STD-810G
Vibration	Ground tactical
Immersion	1 meter of water (3 ft.)
Temperature	-40°C to +71°C

SECURITY

Encryption Modes	AES, Citadel I
Key Length	Citadel: 128, AES: 128/256 bit
Key Fill Device	Windows-based programming application

FEATURES

Wideband HF Data	MIL-STD-188-110C Appendix D
Automatic Link Establishment (ALE)	STANAG 453B FLSU, MIL-STD-188-141B Appendix A, Appendix B (Linking Protection, AL-1)
Frequency Hopping	Serial Tone ECCM Falcon II interoperable
Encrypted Data	HF US MIL-STD-188-110C App. D, App. C, and Main Body Serial-tone Waveforms, STANAG 4285; STANAG 4415, STANAG 4539 VHF: WBFsk (16 kbps)
Vocoder	HF: LPC-10-52E (600/2400), MELP (600/1200/2400), VHF: CVSD

ADAPTERS

RF-7800H-AD020	Adapter for the RF-5800H-V006 20W Vehicular System
RF-7800H-AD125	Adapter for the RF-5832H 125W Power Amplifier
RF-7800H-AD150	Adapter for the RF-5833H 150W Power Amplifier
RF-7800H-AD400	Adapter for the RF-5834H 400W Power Amplifier

SUPPORTED BATTERIES

BA-5590B/U	Non-rechargeable LiSO ₂ battery
BA-5390/U	Non-rechargeable LiMnO ₂ battery
BB-390B/U	Rechargeable NiMH battery
BB-2590/U	Rechargeable Li Ion battery

RF-7800H ANCILLARY KIT

10515-0413-6000	RF-7800H e-Pub CD documentation 10515-0413-4200 Operator's Manual 10515-0413-4000 Operator's Card 10515-0413-4100 Field Reference Guide 10515-6648 Instruction Sheet, Dismount Dipole Adapter
10515-0413-4000	Operator's Card
10515-0413-4100	Field Reference Guide
RF-7800H-SW001	Communications Programming Application
RF-6551H	Tactical Chat Communications Software
12006-0017-02	GPS Antenna
10372-0240-02	OE-505 Manpack Antenna Kit
10372-1260-01	Antenna Assembly Adapter
10372-1270-01	Dismount Dipole Adapter
10075-1399	H-250U Lightweight Handset (Modified)
12043-4800-01	Battery Box
10303-1008-01	Ground Stake Kit
12043-2850-A006	Cable Assembly Program / Data (USB)

BATTERY, RECHARGEABLE, LITHIUM ION (BB-2590/U)	
	TAMCN: N/A
	ID: N/A
	NSN: 6140-01-490-4316
Functional Description	
<p>The BB-2590/U is a Lithium Ion rechargeable battery with a "state of charge display." This battery is used for various military communications and electronic applications. Performs well in high temperatures compared to other rechargeable batteries. No conditioning is required prior to use. The PP-8497/U discharge cap should only be used as a quick check of the BB-2590/U. There is no requirement to discharge the BB-2590/U.</p>	
Technical Description	
<p>Battery Manufacturer: Bren-Tronics Model: BB-2590/U Color: Tan Warranty: 4 years from MFG (for rechargeables) date Shelf life: N/A</p>	<p>Dimensions Depth (in): 4.40 Width (in): 2.45 Height (in): 5.00 Weight (lbs): 3.20</p>
<p>Performance Data Voltage: - Maximum: One 33V or two 16.5V sections - Nominal: One 28.8V or two 14.4V sections Cut-off Voltage: 20V or 10V Capacity: 6.2Ah @ 33V 12.4Ah @ 16.5V Self discharge rate: 10% per month</p>	<p>Specifications Temperature: - Optimum Charging: 40°F to 100°F - Extreme Charging: -4°F to 122°F - Operating: -4°F to 131°F - Storage: -40°F to 104°F Thermal cut-offs: - Resettables: 158°F ± 5°F resets @122°F - Permanent (dead battery): 194°F ± 5°F Complete discharge device: N/A</p>
<p>Recommended Chargers PP-8498/U (SPC) PP-8481B/U (VMC/VMBC)</p>	<p>Interchangeable with BA-5590/B, BB-390B/U BA-5390/U</p>
<p>Adapters required J-6358B/P – SPC</p>	<p>J-6581/U, J-6583/U, J-6586/U, J-6585/U and J-6520/U – VMC/VMBC</p>
<p>NOTE: This battery has a higher initial voltage than the BB-5590/U or the BB-390B/U batteries, which may cause problems in some equipment items. Replaces the BB-590/U and BB-690/U. This battery cannot be charged using the UPC (PP-8444A/U) battery charger. The BB-2590/U is not approved for use in the Javelin Command Launch Unit.</p>	
<p>Storage at high temperatures permanently degrades battery capacity of all batteries.</p>	
<p>Check the manufactures MSDS for disposal information.</p>	