PERFORMANCE SPECIFICATION SHEET

BATTERY, RECHARGEABLE, SEALED, LITHIUM-ION, BB-2580/U

The requirements for acquiring the product herein shall consist of this specification sheet and MIL-PRF-32383.

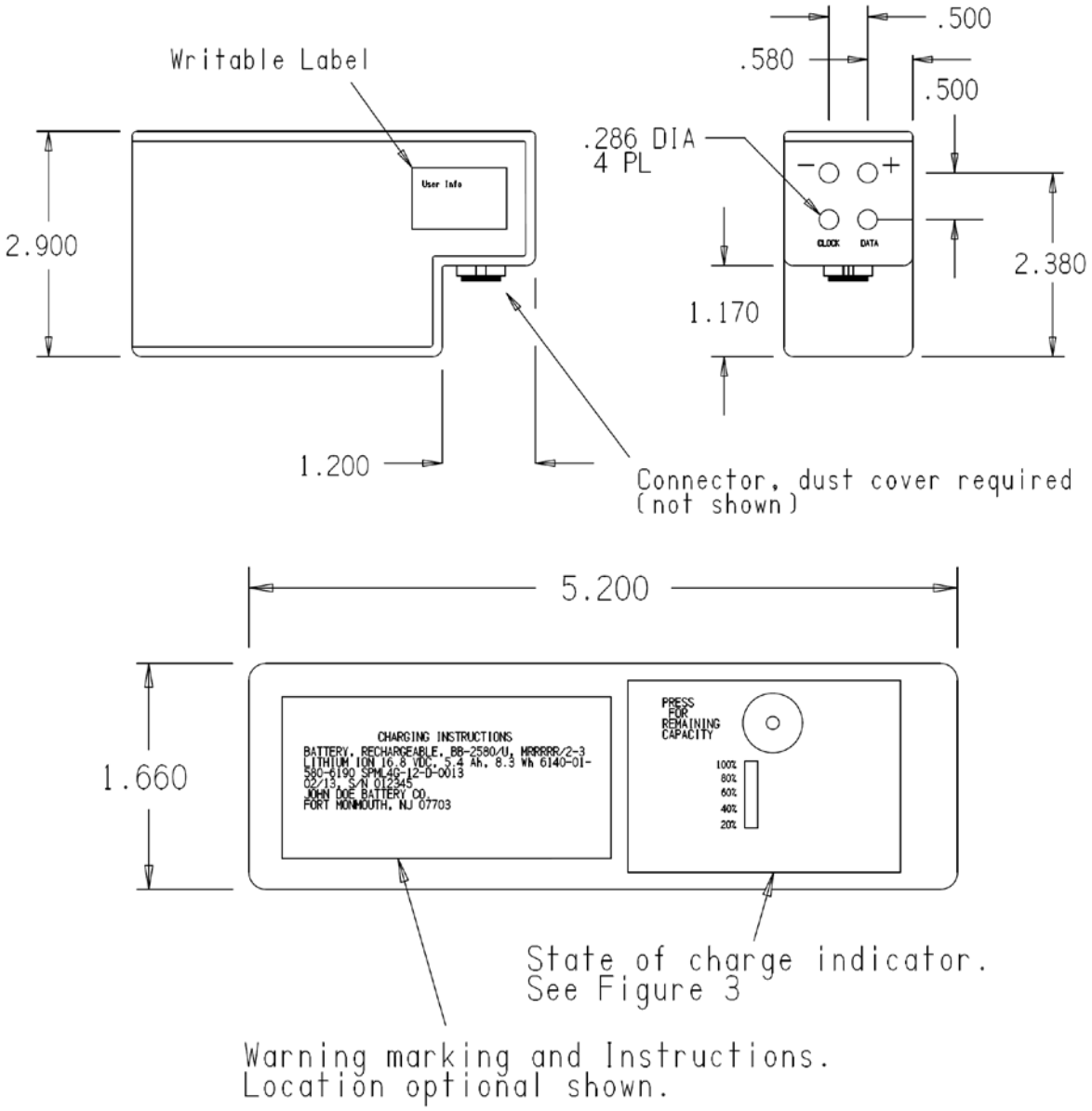

FIGURE 1. M32383/2-3 (BB-2580)

FIGURE 1 NOTES:
All dimensions are in inches.

Tolerance for all is ± 0.031 inches.

REQUIREMENTS

Type – III (see 1.2 for classification)
PIN – M32383/2-3 (see 1.3 for PIN)

Specification requirements and test methods: The following requirements and test methods of MIL-PRF-32383, identified therein as "when specified", are applicable as indicated below:

Inspection	Requirement Paragraph	Test Method Paragraph	Applicability
Mulitlayer finish	3.4.4.1.3	Certification	Yes
Gold plating	*3.4.4.1.4*	*Certification*	*No*
Motor inrush current	*3.5.5*	*4.7.2.12*	*No*
Charge enable 1/	3.5.6	4.7.2.6	Yes
SMBus 1/	3.5.9	4.7.2.14, 4.7.2.15	Yes
Immersion, shallow 1/	3.6.6	4.7.3.8.1	Yes
Immersion, deep	*3.6.6*	*4.7.3.8.2*	*No*
Transit drop, normal	3.6.7	4.7.3.9.1	Group C only
Transit drop, severe	3.6.7	4.7.3.9.2	Yes
Drop while mated	*3.6.7*	*4.7.3.9.2*	*No*
Nail penetration, cell	3.7.1.2	4.7.4.4	Yes
Crush, cell	3.7.1.3	4.7.4.5	Yes
Projectile	3.7.2.6	4.7.4.11	Yes
Lithium Battery Safety Program (US Navy) Tests (Group 4)	3.7.2.7	4.7.5	Yes
Electromagnetic interference (Group 2)	3.8	4.7.7	Yes

1/ As modified herein

Details: The following are detals specific to M32383/2-3 including those referenced in MIL-PRF-32383 as "specified".

1. Dimensions and weight (3.4.3)
   Dimensions: See FIGURE 1
   Maximum weight: 1.14 lbs (517 grams)

2. Battery connector and electrical interfaces (3.4.4)
   Connector : Glenair Part Number 807 216 07ZNU6 6DY
   Mating connector: Glenair Part Number 807 162 06ZNU6 6PYB
   Multilayer finish: Flat contacts shall be brass with multilayer finish
   Gold plating: N/A
   Battery charger adapter: N/A

3. Battery case vent (3.4.5.3)
   Location is optional

4. Markings (3.4.6)
   See figures 1, 2, and 3

5. Instructions / notes (3.4.6.5)
   The following charging instructions shall be marked on each battery:

   Preferred charging method: Constant potential of 16.8 volts with a current limit of 2.3 amperes to 350 milliamperes charge cut off.

   Alternate charging method: Constant current of 540 milliamperes to 16.8 volts cut off.

6. Simplified battery label (3.4.6.6)
   The simplified battery label location is optional. It shall be sized to remain legible.

7. Battery condition for shipping (3.4.8)
   The instruction card shall at a minimum contain operation, storage, handling, maintenance, and warranty (if applicable) information.

8. Battery voltage (3.5.2)

   Battery open circuit voltage: Min 10.0 volts, Max 16.8 volts

9. Capacity (3.5.3)

   Minimum final voltage: 10 volts
   Each battery, discharged at the specified rate to minimal final voltage, shall have the following minimum capacity:

Test	Requirement Paragraph	Test Method Paragraph	Discharge Rate	Minimum Capacity
Capacity discharge	3.5.3	4.7.2.3	See detail 17	83 WH
Cycle life (224th cycle)	3.5.3.1	4.7.2.4	See detail 18	66 WH
High rate discharge	3.5.3	4.7.2.5	5 A	4.3 AH
Low temperature discharge	3.5.3	4.7.2.7	18 W	41 WH
High temperature discharge	3.5.3	4.7.2.8	18 W	83 WH
Motor inrush current	*3.5.5*	*4.7.2.12*	*N/A*	*N/A*
Charge acceptance	3.5.10.1	4.7.2.9	18 W	59 WH
Retention of charge	3.5.6	4.7.2.10	18 W	78 WH
Pulse discharge	3.5.3	4.7.2.11	See detail 19	3.4 AH
Extreme low temperature discharge	3.6.1	4.7.3.2	18 W	30 WH
Extreme high temperature discharge	3.6.1	4.7.3.3	18 W	80 WH
Thermal shock (post-test)	3.6.3	4.7.3.5	18 W	83 WH
Mechanical shock (post-test)	3.6.3	4.7.3.6	18 W	83 WH
Vibration (during test)	3.6.5	4.7.3.7	1 A	5.4 AH
Battery storage life	3.6.8	4.7.3.10	See detail 17	76 WH
Overcharge/electric leakage (post-test)	3.7.2.2	4.7.4.7	See detail 20	83 WH
Short circuit protection (post-test)	3.7.2.3	4.7.4.8	18 W	83 WH
High temperature temporary cut off	3.7.2.4	4.7.4.9	18 W	59 WH

1/ As modified herein

10. Motor inrush current (3.5.5).
    N/A

11. Charge enable (3.5.6)
    See Variance A below

12. High temperature temporary cut off devices (3.7.5).
    There shall be not less than one temporary cut off devices complying with 3.7.5.

13. High temperature permanent cut off devices (3.7.6).
    There shall be not less than one permanent cut off devices complying with 3.7.6.

14. Electromagnetic compatibility (3.8):
    The M32383/2-3 battery shall be electromagnetically compatible with the Ground Soldier System

15. Constant potential, current limited (4.6.1).
    A constant potential of 16.8 volts shall be applied with current limited to 2.3 amperes, to a charge cut off of 350 milliamperes.

16. Constant current (4.6.2).
    N/A

17. Alternate charging (4.6.3).
    The following charger may be used whenever the general specification allows use of alternate charging:

	PART NUMBER	NSN	CAGEC
Charger	CH0012	6130-01-545-1981	0UU59

18. Capacity discharge (4.7.2.3).
    Apply a pulse load of 36W for 2 milliseconds followed by 17.6W for 98 milliseconds, cycled continuously to final voltage.

19. Cycle life test (4.7.2.4).
    Cycles 1 – 26: Discharge with a constant 18W load to final voltage
    Cycle 27: Discharge with a constant load of 2 amperes to final voltage
    Cycle 28: Discharge with a pulse load of 36W for 2 milliseconds followed by 17.6W for 98 milliseconds, cycled continuously to final voltage.
    Repeat above loads until the required number of cycles is complete.

20. Pulse discharge (4.7.2.11).
    Discharge with 15 amperes for 915 microseconds. Apply fifty pulses every second. Continue discharge to final voltage.

21. Overcharge/electric leakage (4.7.4.7).
    Charge at 2.36 amperes with a charge voltage limit of 40 volts during the 21-hour overcharge period of 4.7.4.7b. Discharge batteries at a constant 18W load to final voltage in step 4.7.4.7e.

22. Electromagnetic interference (4.7.7).
    Batteries shall be tested connected to the Ground Soldier System. See notes below for contact information on system availability.

VARIANCES: Each battery shall comply with MIL-PRF-32383 except as follows.

A. Certifications (3.2.1). Add the following:

REQUIREMENT	PARAGRAPH
State-of-charge display characteristics	3.5.8j”

B. Charge enable (3.5.4) Delete in it’s entirety and replace with the following:

3.5.4 Charge enable. The charge enable socket, or Smart Battery Identity (SBID) socket (see figure 2), shall comply with the following:

a. Smart Battery Data (SBData) Specification v1.1 – accumulating battery information to support active battery management.

b. SMBus v1.1 - for the communication of SBData to a System Management Bus (SMBus) compliant host device to support active battery management.

Notes:

i. SMBus to enable and disable sleep mode

ii. PEC – Packet Error Checking to improve reliability and communication robustness

iii. Data and clock series resistance output of < 200 ohms

iv. VCELL1-4, cell or cell string voltage readings implemented

v. Must accommodate both Level 2 and Level 3 chargers

C. Dust cap or cover (3.4.8.1) The dust cap shall be secured to the battery with a flexible lanyard having a length not less than 1 inch.

D. State-of-charge indicator (SOCI) (3.5.8). Delete in it's entirety and replace with the following:

3.5.8 State-of-charge display characteristics. The display shall have the following characteristics:

a. No part or component of the device shall protrude beyond the surface of the battery.

b. The load applied by the device on the battery shall be not greater than 50 micro-amperes in the non-operating mode.

c. The device shall be designed to compensate for usage temperature and discharge rate and shall monitor and adjust for changes in both during battery use.

d. In the event that an open-circuit condition should occur in a battery, the SOCI shall indicate no remaining capacity.

e. The SOCI shall display five distinct ranges of remaining capacity in the battery, one range for each of five LEDs. The five ranges are listed in para 3.5.8i below.

f. The SOCI shall consist of a single row of green Light Emitting Diodes (LEDs) of equal size and an actuator button. The LEDs and the actuator shall be located in accordance with the applicable specification sheet. The output of each Light Emitting Diode (LED) at full intensity, measured in a direction normal to the State of Charge Indicator display, shall be 1.0 to 6.0 millicandelas. The LEDs shall be capable of providing the correct state of charge indication in a temperature range of −30 to 55ºC and be capable of surviving temperature extremes of −40ºC and 93ºC. Certification to the full intensity output and storage temperature range requirements is required.

g. The SOCI display shall normally be in the 'off' mode and shall require a push-button actuator to activate the LED display. The push-button shall be capable of actuation by finger. It shall be protected from inadvertent actuation. The words "PRESS FOR REMAINING CAPACITY" shall appear in close proximity to the actuator. The push-button actuator shall comply with the following displacement and resistance requirements:

	DISPLACEMENT	*RESISTANCE*
Not less than	*0.008 in.*	*0.25 lbs*
Not greater than	*0.050 in.*	*5.50 lbs*

h. The LEDs shall start at an initial intensity of not greater than 0.5% of the full intensity. The output of the LEDs shall increase in not less than five steps in a time span of one to two seconds when the actuator is held down; the increase in output steps shall be in steps of equally perceived brightness ratio. At full intensity, The LEDs shall only illuminate the state of charge level appropriate to its usage level when viewed from a direction normal to the indicator (i.e., no light bleed-through to levels/spaces meant for higher states of charge). The LEDs shall remain at full intensity for not less than 3 seconds and shall self-extinguish in not greater than 7 seconds of actuation when the actuator is held down. The LEDs shall extinguish any time the actuator is released. Certification of the initial intensity of not greater than 0.5% of full intensity is required.

i. During testing in accordance with 4.7.2.14, the SOCI shall indicate the correct state of charge at each stage of discharge. The actuator shall comply with displacement and resistance values stated above in 3.5.8g. Time to full light intensity shall be not less than one second and shall be not greater than two seconds. Time for the LEDs to remain at full intensity shall be not less than 3 seconds; Time until the lights extinguish while the actuator is depressed shall be not greater than 7 seconds. The indicator shall not illuminate when the battery face including the actuator is pressed against a transparent flat surface. SOC indications obtained during testing shall comply with the table below. After discharge to final voltage, the indicator shall indicate no remaining capacity.

SOC Thresholds	*Test Points*	*Required SOC Readings*
100%	*90%*	*5 LEDs*
80%	*70%*	*4 LEDs*
60%	*50%*	*3 LEDs*
40%	*30%*	*2 LEDs*
20%	*10%*	*1 LEDs*
	0%	*0 LEDs*

j. In accordance with the state of charge requirements herein, the following require certification (see 3.2.1).

Load limit (not greater than 50 micro-amperes)

LED full intensity of 1.0-6.0 millicandelas in a direction normal to display

Storage temperature range capability

Initial intensity not greater than 0.5% of full intensity

E. State of charge indicator (4.7.2.14). Delete in it's entirety and replace with the following:

"4.7.2.14 State of charge indicator. The following test shall be performed.

"a. Charge each battery in accordance with 4.6; use of 4.6.3 is permitted.

"b. Verify location and marking.

"c. Press and hold the SOCI actuator. Measure and record the following to the nearest tenth of the second: (1) time from actuation to full intensity of the lights; (2) time from reaching full intensity until the lights extinguish; and (3) the total time from actuation until the lights extinguish.

"d. Measure displacement and resistance values for the actuator and record the results.

"e. Press each sample against a flat, transparent surface with not less than 5 lbs of force, with the face including the actuator against the surface.

"f. Observe whether or not the LEDs illuminate; record the response.

"g. Discharge batteries at the C/10 rate as follows: one battery at −10 ± 2ºC (+14ºF) and one at 55 ± 2ºC (130ºF).

"h. Continuously discharge batteries to the following approximate states of charge, stopping the discharge at each state: 90%; 70%; 50%; 30%; 10%.

"i. Obtain the SOCI readings while the test battery is not subject to discharge. Observe the indication of the state of charge indicator, read the SMBus data output, and record both indications after each partial discharge. Environmental chambers may be paused or shut off while accessing batteries to obtain the SOCI readings. For samples tested at −10°C, care is needed to limit the freezing of condensation at the battery to test circuit interface.

"j. Once the SOCI readings have been obtained, restart the environmental chamber and restart the discharge in not less than 15 minutes after return to the required test temperature (for samples tested at −10°C, allow sufficient time to clear the frost if condensation has frozen on batteries).

"k. Discharge the batteries to final voltage.

"l. Observe the indication of the state of charge indicator, read the SMBus data output, and record the indications. Batteries shall meet the requirements of 3.5.8."

F. Immerison, shallow (4.7.3.5): Delete in it's entirety and replace with the following:

4.7.3.5 Immersion, shallow. When specified (see 3.1) batteries shall be tested as follows. Weigh batteries and record their weight. The test samples shall be configured as follows: half in operating configuration (with sealed mating connector attached) and half with dust cap removed.

Immerse the batteries to a depth of not less than 3 feet in salt water substitute conforming to ASTM D-1141 for not less than 2 hours. Prior to the start of the test, the battery temperature shall be no less than 27°C (81°F) above the water temperature and the battery shall be at a full state of charge. Install a sealed mating connector to the battery connector. The battery shall be completely immersed, in an upright orientation. Once immersed, the batteries in operating configuration shall be loaded with a constant 18-watt load and shall remain loaded for the duration of the immersion.After immersion, remove the batteries and dry exterior surfaces. , Reweigh batteries and visually examine batteries for the criteria of TABLE VII. Batteries shall meet the requirements of 3.6, 3.65, and the applicable specification sheet (see 3.1). For conformance testing (see 4.5.2), deionized water may be substituted for salt water.

ADDITIONAL FIGURES

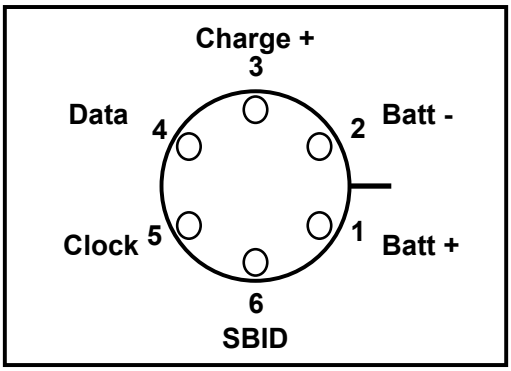

FIGURE 2. Terminal marking detail

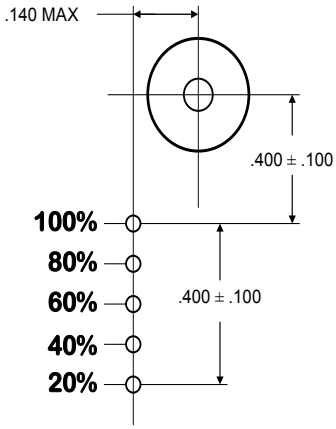

FIGURE 3. State of charge indicator dimensions

FIGURE 3 NOTE:
All dimensions are in inches.

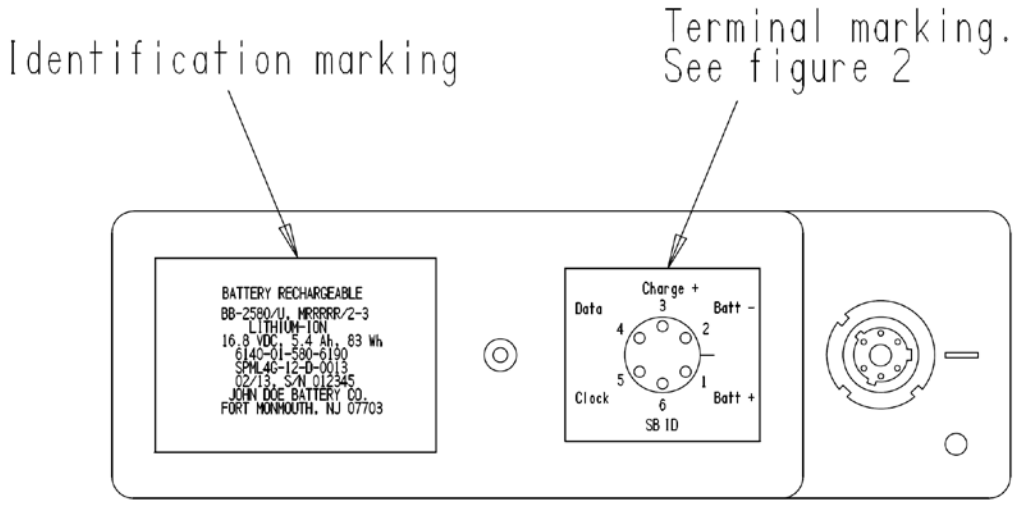

FIGURE 4. Additional views and dimensions

NOTES:

(This section contains information of a general nature which may be helpful, but is not mandatory)

Intended use: This battery is intended for use in the Ground Soldier System. Please note that this battery must be electromagnetically compatible with the Ground Soldier System. Such compatibility is no guarantee of similar compatibility with any other system. Electromagnetic

compatibility with any other system needs to be evaluated separately, and in the case of failure, either that system will need to adjust to this battery or another battery will need to be developed.

Electromagnetic interference testing. Verification requirements include electromagnetic interference tests of MIL-STD-461 with the battery connected to the system. Battery vendors will need to coordinate with the Project Manager, Soldier Warrior (SWAR), in order to arrange to have their products evaluated in the system. Their address is: Project Manager, Soldier Warrior, ATTN: SFAE-SDR-SWAR, 10125 Kingman Road, Building 317, Fort Belvoir, VA 22060-5820.

Nominal ratings: The following are the nominal ratings for the battery described by this specification sheet. They are provided for information purposes.

Battery PIN:	**M32383/2-3 (LiIon)**
Type Classification:	BB-2580/U
Chemistry:	Li-Ion
Color:	"Desert tan"
Weight (max):	1.14 lbs (517 grams)
Voltage Range:	10.0-16.8
Nominal Voltage:	14.4
Nominal Capacity:	5.4 Ah
Nominal Energy (new battery):	83 Wh
Battery Life:	≥ 224 cycles, ≥ 3 years
Rated power output:	≤ 50 W
Continuous load rating:	≤ 5.0 A
Pulse load rating:	≤ 15 A (915 μSEC)
Charge temperature range:	-4 to 122ºF (-20 to 50ºC)
Operating temperature range:	-22 to 140ºF (-30 to 55ºC)
Storage temperature range:	-4 to 122ºF (-20 to 50ºC)
MAX abusive temperature (non-operating):	199ºF (93ºC)
Connector:	Glenair Part Number 807 216 07ZNU6 6DY
Overall Dimensions:	5.2 in. x 1.66 in. x 2.9 in.
Non-rechargeable equivilent:	N/A
Note 1: Battery requirements were structured around 2.9Ah 18650 cells.	
Note 2: Maximum charge current for connector is 5A and 8A for flat contacts	

Other data:

Navy safety tests of NAVSEA S9310-AQ-SAF-010 are required for this battery during first article testing. The test data provided from the testing will be used to evaluate applications for specific using devices and Navy platforms. Devices using this battery will require US Navy Safety Approval prior to use by Department of Navy users unless such approval has already been granted. Please consult with NAVSEA Instruction 9310.1 for further information.

Custodians:
Army – CR
Navy – MC
Air Force – 99

Preparing activity:
Army – CR
(Project Number 6140-2010-011)

Review activities:
Navy – AS, SH
Air Force – 71
DLA – CC

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.daps.dla.mil or https://assist.daps.dla.mil/quicksearch/.