NATO STANDARD

AEP-4851

COMBINED POWER AND DATA ACCESSORY CONNECTOR FOR DISMOUNTED SOLDIER SYSTEMS (DSS)

Edition A, Version 1

JUNE 2022

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED ENGINEERING PUBLICATION

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

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NATO LETTER OF PROMULGATION

21 June 2022

1. The enclosed Allied Engineering Publication AEP-4851, Edition A, Version 1, COMBINED POWER AND DATA ACCESSORY CONNECTOR FOR DISMOUNTED SOLDIER SYSTEMS (DSS), which has been approved by the nations in the NATO ARMY ARMAMENTS GROUP, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 4851.

2. AEP-4851, Edition A, Version 1, is effective upon receipt.

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4. This publication shall be handled in accordance with C-M(2002)60.

Dimitrios SIGOULAKIS
Major General, GRC (A)
Director, NATO Standardization Office

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
DNK	It is concerning, that the STANAG refers to a connector and a system from a specific manufacturer (Glen Air) with also develops the Star-Pan Systems. That can exclude other manufacturers that can produce power/data cables with other connectors from obtaining the same NATO accreditation.

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.

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CHAPTER 1. FOREWORD

The Allied Engineering Publication AEP- 4851 defines the NATO standard interface between a nation's dismounted soldier systems and (another) nation's ancillary devices such as loaned radios, sensors, GPS, Night Vision Goggles (NVG), Laser Range Finder (LFR) etc. (Figure 1).

It defines the connector physical characteristics and the electrical and data format characteristics to allow interoperability.

This interface provides both data and power interconnectivity.

In this context it is unlikely that one nation will connect their host device to another nation's soldier system. The primary aim is to allow interoperability of devices wishing to share data, however it is possible to use this interface to provide power only to a device if required.

It should be noted that this AEP-4851 interface uses the same physical connector as AEP-4695 (SOLDIER POWER CONNECTOR - ELECTRICAL CONNECTIVITY STANDARDS BETWEEN NATO POWER SOURCES AND DISMOUNTED SOLDIER SYSTEMS (DSS)). The two differ in the pin assignments only.

The primary purpose of the AEP-4851 interface is to allow sharing of data although it can also provide power to ancillary devices. It can therefore be used to provide power only to ancillary devices using either the 5 V or 10-20 V power lines described later if required.

AEP-4695 is designed specifically for the sharing of power sources between nations.

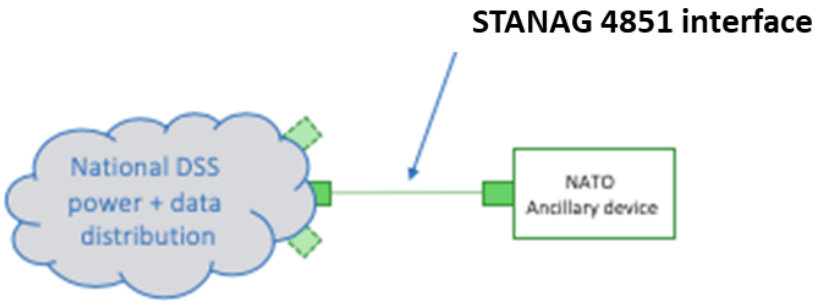

Figure 1: Schematic overview of the DSS to Ancillary Device.

CHAPTER 2. DEFINITIONS

Ancillary	For the purpose of this AEP an ancillary is an additional device requiring connection to the soldier power and data system e.g. global positioning system (GPS), night vision goggles (NVG), laser range finder (LRF), radio etc.
Battery	A device that stores electrical energy through an electrochemical reaction
Commonality:	The state achieved when the same doctrine, procedures or equipment are used.
Compatibility:	The suitability of products, processes or services for use together under specific conditions to fulfil relevant requirements without causing unacceptable interactions
Dismounted Soldier System:	Everything the soldier wears, carries and consumes to fulfil the soldier's tasks as individuals, as members of fighting teams and as parts of higher-level operational units. Applies to both the mounted and dismounted roles.
Interoperability	The ability to act together coherently, effectively and efficiently to achieve Allied tactical, operational and strategic objectives.
PAN (Personal Area Network)	The system by which the electronic devices worn by the dismounted soldier are interconnected.
USB	Universal Serial Bus is an industry standard that establishes specifications for cables and connectors and protocols for connection, communication and power supply (interfacing) between computers, peripherals and other computers.

EESI	External Energy Source Interface. The interface that enables a STANAG 4695 compliant energy source to connect to an external interface.

CHAPTER 3. RELATED MILITARY AND COMMERCIAL STANDARDS

STANAG 4370 (Edition 6)	Environmental Testing
AEP-4695 (Edition 2)	SOLDIER POWER CONNECTOR - ELECTRICAL CONNECTIVITY STANDARDS BETWEEN NATO POWER SOURCES AND DISMOUNTED SOLDIER SYSTEMS (DSS)
STANAG 4677	DISMOUNTED SOLDIER SYSTEMS STANDARDS AND PROTOCOLS FOR COMMAND, CONTROL, COMMUNICATIONS AND COMPUTERS (C4) INTEROPERABILITY
USB 2.0 specification	https://www.usb.org/document-library/usb-20-specification
NWPAN-WP-01112013	Nett Warrior Interconnect Architecture White Paper (this document is publicly available from the Defence Technical Information Centre (https://apps.dtic.mil/docs/citations/AD1011122, https://apps.dtic.mil/dtic/tr/fulltext/u2/1011122.pdf

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CHAPTER 4. PERFORMANCE REQUIREMENTS

4.1 GENERAL REQUIREMENTS

The mechanical interface is the push-pull connector defined in table 2 and table 3, AEP-4695 and the Nett Warrior Interconnect Architecture White Paper[1].
The DSS side of the interface is a receptacle with sockets. National variations would require an adapter to convert the connectivity as necessary.
The ancillary side of the interface shall be a plug with pins. National variations would require an adapter to convert the connectivity as necessary.
The correct assignment of receptacles and sockets allows the systems to distinguish between a power connector (AEP-4695) and a data and power connector (AEP-4851)
All connecting cables conforming to this AEP shall be clearly marked with the wording AEP-4851. Outlines of the in line push pull, 6 pin connector are shown in Figure 2.

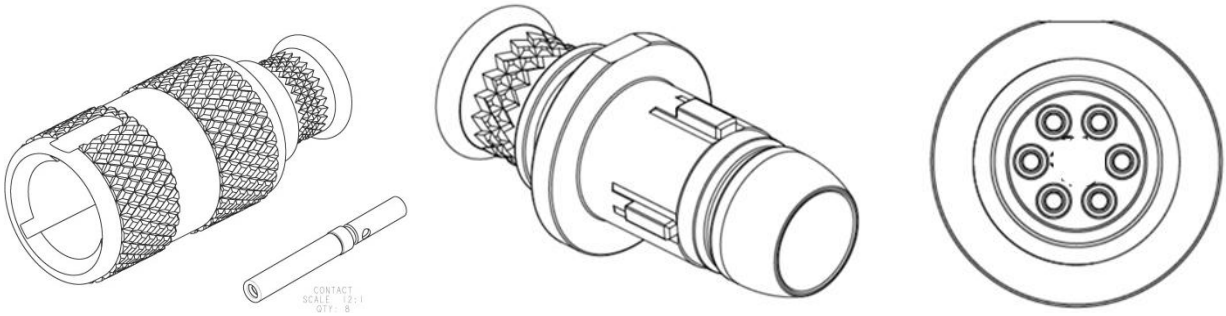

Figure 2: The receptacle is shown on the left, the plug in the centre and the pin layout on the right.

The assignment and description of the connector pins is defined in Table 1 for a push-pull in-line (cable) plug with 6 pins.

[1] https://apps.dtic.mil/dtic/tr/fulltext/u2/1011122.pdf

Table 1: Mandatory Pin Reservations for NATO DSS Data and Power Connector

CONTACT LOCATION	PAN FUNCTION
1	Power (10-20 VDC, 5 A max)
2	Ground – extended pin
3	Power (5 VDC, 250 mA min 2 A max)
4	USB + (data)
5	USB – (data)
6	No connect (or reserved for National Implementation[2])

The nation's soldier system, ancillaries and energy source shall self-protect against foreseeable abuse through the EESI. Especially USB devices powered via pin 3 (battery charge pin in AEP-4695) are susceptible to damage if supplied with a higher voltage than 5 VDC when connected to some AEP-4695 compliant power sources directly instead of through a hub. It is recommended to have a protection circuit which limits the damage done by accidentally having higher voltage than 5 VDC on pin 3. Additional protection at the charging pin 3 of the power source (battery) is recommended in AEP-4695.
Qualified suppliers for this connector are listed in the Nett Warrior whitepaper which is updated by the Nett Warrior program office when new suppliers are qualified. Those part numbers listed in Table 2 and Table 3 below and referenced in the Nett Warrior whitepaper shall be backwards compatible with previous versions. For those nations that may choose to develop another source of supply, it is that nation's responsibility to assure that the connector is interoperable with those listed below.

Table 2: Part numbers for Connector Plug with Pins[3]

Connector Type	Glenair Inc.	TE Connectivity
Cable Mount Plug (angled)	8070-1676-06ZNU6-6PY	-
Cable Mount Plug (in line) Solder cup	807-309-06ZNU6-6PY	-
Cable Mount Plug (in line) crimped	807-871-06ZNU6-6PY	2226910-1
Bulkhead Mount Plug	8070-1153-XX[4]ZNU6-6ZZ[5]	-

[2] Pin 6 is either not connected or reserved for national implementations such as USB-ID or USB-CC to enable USB host mode. It is accepted that due to differences in USB implementations that at this time it may not be possible to share host devices and have them function correctly. This should not affect the sharing of USB client/slave devices.
[3] Part numbers denote the specific keying of connectors (Y key configuration as used by Nett Warrior).
[4] denotes either Front (00) or Rear (07) chassis mounting
[5] denotes either PC Tail (PC) or Solder Cups (EC) for internal connection

Table 3: Part description for Connector Receptacle with Sockets[6]

Connector Type	Glenair Inc.	TE Connectivity
Cable Mount Receptacle (in line) solder cup	8070-1675-01ZNU6-6SY	-
Cable Mount Receptacle (in line) crimped	807-348-01ZNU6-6SY	2226920-1
Bulkhead Mount Receptacle	807-216-07ZNU6-6DY	-
Cable Mount Receptacle (in line) crimped	807-874-XX[7]-ZNU6-6SY	-

[6] Part numbers denote the specific keying of connectors (Y key configuration as used by Nett Warrior).
[7] denotes either Front (00), In-line [cable] (01), or Rear (07) mounting options

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CHAPTER 5. Electrical Performance

5.1 POWER REQUIREMENTS

An AEP-4851 compliant soldier system side of the interface shall:

- Provide DC power at a voltage between 10 and 20 V and be capable of providing at least 1 A. For soldier systems with limited power output, a too high current draw shall taper the voltage to below 10 V and/or be protected.
- Provide 5 V DC USB power as defined in table 1.

An AEP-4851 compliant ancillary side of the interface shall:

- Cope with the supplied DC power within the 10 to 20 V voltage window and shall draw no more than 5 A, or must feature a void socket on pin 1 position (e.g. if they only require USB power).
- Cope with the supplied 5 V DC USB power, or shall feature a void socket for pin 3 if USB power is not used.
- It is advised, although not mandated (as this is not a requirement in the USB standard), that over voltage protection be implemented on the 5 V USB voltage line of any ancillary to prevent accidental damage by connection of a high voltage source.

5.2 MINIMUM DATA REQUIREMENTS

The soldier system side shall provide a downstream facing port as defined by USB 2.0. The ancillary side shall have an upstream facing port and adhere to the requirements for USB devices in the USB 2.0 or USB 1.X specifications.

5.3 ELECTRICAL-MECHANICAL INTERFACE

The electrical interface is provided through the 6 contacts in the mechanical interface as shown in **Table 1**.

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CHAPTER 6. ENVIRONMENTAL SPECIFICATION

6.1 ELECTROMAGNETIC COMPATIBILITY (EMC)

The AEP-4851 system interface shall not prevent the soldier system and ancillary device meeting the requirements for army ground applications. tailored for proximity to transmitting and receiving antennas. (for example land class A in UK Defence standard 59-411; land mobile mil std 461G, NATO AECTP 501, test NRE02, limit A or equivalent national standard.).

6.2 ENVIRONMENTAL CONDITIONS

The AEP-4851 system interface connector shall have environmental performance such that it is interoperable with the connectors specified in Table 2 and Table 3 under expected operational conditions e.g. C1 (cold) to A1 (hot dry) as described through NATO STANAG 4370 in Allied Environmental Conditions and Test Publication, AECTP-500, MIL-STD-810 or equivalent national standard.

AEP-4851(A)(1)