



DEFENSE LOGISTICS AGENCY

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IN REPLY
REFER TO

DSCC-VAI (Mrs. Lisa Hoffer/614-692-7702)

24 February 2009

MEMORANDUM FOR MILITARY/INDUSTRY DISTRIBUTION

SUBJECT: Final Report; Engineering Practices Study (EPS), MIL-DTL-83538,
Proposal for Additional Specification Sheets, including Reverse Buffer and Adapter.
Project number: 5935-2008-202.

This memorandum is a final report notice on the subject Engineering Practice Study (see attached document). The EPS evaluated the need for two new specification sheets, including a standardized reverse buffer plug and standardized launcher adapter. The proposed connectors were intended to allow connection of other standardized MIL-DTL-83538 connectors to launchers that utilize AIM-120 interfaces. This report concludes that standardization of a one piece reverse buffer, rather than the proposed two piece reverse buffer system, will provide the most useful product for connection with the above referenced AIM-120 interfaces. This conclusion is based in part on the understanding that a commercial version of a one piece reverse buffer is already in development and has undergone testing by military users.

The final report of this document is available for viewing or downloading from our website at the following address:

<http://www.dsccl.dla.mil/Programs/MilSpec/DocSearch.asp>

If you have any questions, please contact Mrs. Lisa Hoffer at the following phone numbers or email address: 614-692-7702, fax: 614-692-6939, e-mail: Lisa.Hoffer@dla.mil.

Sincerely,

/ SIGNED /

ABDONASSER M. ABDOUNI
Chief,
Interconnection Branch

Attachment

Engineering Practice Study

Subject: Proposed New Specification Sheets; MIL-DTL-83538 Reverse Buffer

Project Number: 5935-2008-202

24 February 2009

FINAL REPORT

Prepared by:

Lisa Hoffer
Project Engineer
Circular Connectors Team
DSCC-VAI

- I. **OBJECTIVES:** In order to evaluate a proposal for two new specification sheets for a two piece reverse buffer system for connecting missiles with MIL-STD-1760 interfaces to aircraft launcher systems with AIM-120 interfaces, this office has solicited input from custodians, users and manufacturers to support a project to produce standardized documents.
- II. **BACKGROUND:** A standardized connector (or connectors) that would allow connection of modern missiles with MIL-STD-1760 interfaces to launchers that utilize AIM-120 interfaces is currently unavailable. A proposal was submitted to this office to meet this need. The proposal included a two piece reverse buffer system consisting of an adapter (a connector intended to be permanently attached to the launcher) and a reverse buffer plug.
- III. **RESULTS:** Comments have been received and reviewed and are provided as attachment 1. MBDA Missile Systems, with the support of the UK Ministry of Defense (MoD), have been working with two connector manufacturers to produce a one piece reverse buffer. The project has progressed to testing both in the laboratory and in the field. A one piece reverse buffer offers several advantages over a two piece reverse buffer. Fewer components and interconnections of a one piece subcomponent would potentially provide fewer chances of electrical failure due to connection problems, and it would be lighter in weight. A one piece buffer that easily detaches from a launch rail would also be more versatile than the permanently attached adapter which was proposed as part of a two piece system, allowing both types of launch rail connector interfaces to be utilized more easily during the same mission.
- IV. **CONCLUSIONS:** Since a project to produce a one piece reverse buffer connector for use by the military is already well underway, this office will pursue standardization of a one piece connector.
- V. **RECOMMENDATIONS:** Recommend that this office prepare and publish an initial draft of a one piece reverse buffer. This office will coordinate production of the proposed initial draft with QinetiQ. It is anticipated that the proposed initial draft will be published during the third quarter of fiscal year 2009.

Attachment 1, Final Report, Engineering Practices Study 5935-2008-202, Comments:

Comment (technical) # 1

Comment Originator: QinetiQ

DSCC Note: Per DSCC-VAI policy, this office has removed the names of the actual personnel referenced in the comment below.

1A. Notes of a meeting held on 17th October at MOD Fort Halstead to discuss the DSCC Engineering Practice Study (EPS) Mil DTL 83538, Proposal for Additional specification sheets including reverse buffer and adaptor – Project number 5935-2008-202

Attendees included representatives of the following interested parties:

MBDA,
Amphenol Ltd,
Deutsch UK,
Glenair,
and QinetiQ.

Notes of meeting

Following introductions QinetiQ gave an overview of the situation where DSCC have issued an EPS, which has its origins in Glenair USA who have put forward a proposal for a 2-part buffer system to be used with Mil DTL 83538 parts.

The initiative has been given support by Alenia who has sent an e-mail to DSCC supporting the initiative. E-mails (2) have also been received by DSCC from Glenair USA which contain some rationale for the proposal. It was proposed that this rationale form the basis of an agenda for the meeting. The rationale makes comparison with the one piece design that has been developed by MBDA and a number of UK connector manufacturers.

Glenair Rationale	Summary of comments during meeting
- The configuration of the older AIM-120 Launcher Receptacles is that they have a fixed center threaded insert (acting like a jackpost), for attaching the fixed-side of the buffer, but no bayonet pins (as the current 1760 Launcher has).	Agreed
- A one piece buffer for the AIM-120 Launcher receptacle, that couples to the 1760 arrangement in the missile, requires a rotatable jackscrew on the AIM-120 side (to fix the buffer to the Launcher); but on the 1760 side, this same area contains some of the center signal contacts (contacts 1, 4, 6 and 7 per the current /11 pin out would be the most problematic). The access for a rotatable jackscrew on the AIM-120 side would interfere with some of these contacts on the 1760 side.	Agreed The access to the jackscrew does interfere with the location of some contacts and 2 contacts are missing on the one-piece design (contacts W and 5) but this still give more contacts than the 83538/11

Glenair Rationale	Summary of comments during meeting
<p>- In addition, the design of the rotatable jackscrew needs to include a "torque-limiter" to avoid ever damaging the fixed threaded insert within the insulator in the Launcher Receptacle. This design detail is very important and requires a little bit more space and complexity than a jackscrew that might cause damage if over-torqued (this is also true for the adapter in the two-piece design, which we've already accommodated).</p>	<p>The one piece design does not incorporate a torque limiting design; instead users employ a torque limiting screwdriver without difficulty.</p> <p>Glenair commented that a customer OEM would prefer a torque limiter in the buffer</p>
<p>- The AIM-120 side needs to be securely attached to the launcher, so that it stays with the launcher and simply pulls out of the store receptacle. However this is achieved (we would expect that it would not be via the jackscrew, but by some other method) needs to be well defined in the slash sheet. If this is achieved by simply making the total contact withdrawal forces on the AIM-120 side (much) greater than on the 1760 side, it would then become a simple push-pull on both sides; this concept though, can exhibit the following performance issues: If the consistency of the forces to retain the one piece buffer in the Launcher changes such that the missile retention forces become greater than the Launcher retention forces, then the one piece buffer may stay with the missile and cause damage to the launcher receptacle or launch tube.</p>	<p>Existing one-piece design does employ a jackscrew to retain it with the launcher receptacle</p>
<p>- If the buffer ever disengages with the Launcher (for any reason) it may expose the launcher receptacle interface to the missile exhaust flames and cause damage, etc.</p>	<p>See comment above</p>
<p>- Relying on contact forces during vibration and shock is very problematic, as these forces would not be predictable nor very controllable in a dynamic environment; this would be highly variable, driven by wear on the contacts throughout all of the connector interfaces during repeated flights and exercises.</p> <p>- It's critical that the Launcher receptacle be well protected by the buffer plug or the Launcher receptacle will be exposed to a great deal of wear as a result of replacement due to the spent missiles. The longevity of the launch rail receptacle would then be reduced (incurring a huge cost and downed aircraft).</p>	<p>See comment above</p>

Glenair Rationale	Summary of comments during meeting
<p>- If the Launcher receptacle ever does become damaged and needs maintenance, then the choice would be to either upgrade to the 1760 interface (which is quite extensive), or to simply replace it with another old style AIM-120 Launcher receptacle (much less drastic alternative). This, however, puts it back into a sole-source condition in very limited production quantities (and hence, quite expensive and difficult to procure).</p>	
<p>- Advantages of Glenair proposed 2-piece adapter / buffer: - Aim-120 Launch rails equipped with the Glenair style 2-piece adapter (with the center jack screw / torque limiter) and buffer (bayonet coupled to the adapter) will always protect the AIM-120 launcher receptacle and launch tube as the adapter would be "permanently" attached to it</p>	<p>The concept of the "permanent fix" is considered to be flawed. Discussions prior to the meeting by QinetiQ with RAF service personnel and Project Office staff. It is concluded that an operational aircraft would likely require any given rail to accommodate and "AIM120" weapon or "1760" weapon on any mission.. The fitting of the adaptor would be an obstacle if the AIM120 role was needed for that station.</p>
<p>- This new Launcher adapter can be installed on the existing launchers (basically a one-time event) and the buffer can be easily replaced using the same M83538/12-1 installation tool and protected by the same protective cover.- The launcher adapter becomes a (essentially) permanent fixture and now provides a familiar bayonet coupled interface found in the similar M83538/3-1 and the M83538/11-1 buffers.- The adapter will act as a connector saver and will remain on the aircraft for its life; if the adapter is ever damaged (for whatever reason), a new adapter can be easily fitted in its place protecting the Launcher receptacle. - In this scenario, we would expect that these older AIM-120 launcher receptacles would never be required for replacement due to wear or damage (in these rare cases, the user would upgrade to the 1760 interface).</p>	<p>Adaptor cannot be permanently attached due to operational requirements.</p> <p>It is also perceived that the removal of the adaptor could be difficult in operational conditions, especially if users were wearing gloves. They would also be faced with the problem of what to do with the adaptor when not in use. It is understood that weapons will be delivered with the buffers in the box.</p> <p>Sealing of the one piece design was discussed and there are no sealing donuts around contact areas W and 5.</p>
<p>- The newly fitted AIM-120 adapter and attached buffer will interface with the missile in the same way that the M83538/1, /3 and /5 interface together, using this common technology and well defined connector system - We would expect that the buffer is a stocked item in some reasonable quantities (since they become the sacrificial component) and these buffers would now be smaller and lighter in weight than a one-piece buffer (simply optimizing the inventory of these buffers)</p>	<p>See comment above</p>

Glenair Rationale	Summary of comments during meeting
<p>- This buffer appears to be specific to Meteor and in Meteor the missile receptacle is a filtered low profile special (not IAW the slash sheets of the D83538).</p>	<p>The Meteor connector is not filtered. The Meteor connector is low profile and low weight, but complies in every other respect to MIL Dtl 83538/1. (it does not employ the relatively bulky 83538/5 component).</p> <p>The relative positions of the interfaces are all exactly the same as for any other configuration and are dictated by the position of the launcher receptacle and the rail.</p>
<p>- For this "special", the coax is not used in the AIM 120 electrical scheme therefore there is no need for them. The meteor receptacle most likely does not have cavities for these 2 positions, and therefore the contact pin seals are not needed here.</p>	<p>During discussion it was stated that the one piece design employs 2 of the AIM 120 coaxial connections.</p> <p>The point is valid but testing has shown that other seals are sufficient – the application does not need sealing anyway</p>
<p>- This buffer cannot be used with a true 1760 designed missile because there is no provision to seal the open holes of missiles using the standard missile receptacle /1 interface. A closed raised contact seal for these positions cannot be provided, due to the center screw access hole.</p>	<p>This can be achieved</p>
<p>- For this application, a special missile receptacle will be required; this will be a special 1760 style interface and not per the D83538 slash sheets.</p>	<p>Not agreed</p>
<p>- Our 2 piece adapter and buffer will attach to a standard 1760 /1 receptacle equipped missile used in any AIM 120 connector launch rail. The raised contact seal in the buffer will provide interface sealing for the standard /1 missile receptacle. Only one style missile buffer for any AIM 120 launch rail application is required.</p>	

General discussions:

1. MBDA were surprised by the existence of the EPS since they have already developed and test fired a 1760 weapon (Meteor) from a Gripen aircraft. The one piece reverse buffer design has also been fitted to Eurofighter Typhoon aircraft (Has flown although not yet fired) and is in the process of being fitted to Tornado aircraft. 2. The QinetiQ representative reported that discussions with UK Ministry of Defence Project staff for the Eurofighter Typhoon project and the BVRAAM office responsible for the Meteor weapon and had resulted in similar comments querying the need for the EPS. 3. BAE System has commented that a Meteor Change proposal Decision sheet (ref BVRAAM/01/02/03 dated 13/3/2006) has been accepted by Eurofighter Typhoon and they cannot understand why this EPS proposal is being introduced. 4. MBDA have already introduced a counter proposal and would prefer the one piece design to go forward as a Mil DTL 83538 slash sheet. Their proposal would also include the "low profile" missile connector. 5. The QinetiQ representative agreed to take the results of the discussions to DSCC since he was having face to face meeting with DSCC staff the following week.

Resolution for Comment 1A: See Final Report, Results and Conclusions, of the subject EPS study.