DEPARTMENT OF THE NAVY
NAVAL SURFACE WARFARE CENTER
CARDEROCK DIVISION

NAVAL SHIP SYSTEMS
ENGINEERING STATION
PHILADELPHIA, PA 19112-5083

IN REPLY REFER TO

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28 APR 2000

From: Commanding Officer, Naval Ship Systems Engineering Station,
Carderock Division, Naval Surface Warfare Center
To: Commander, Space and Naval Warfare Systems Command
Headquarters San Diego (Code PMW-152-3)

Subj: OUTSTANDING FIBER OPTIC ISSUES FOR PIERSIDE CONNECTIVITY APPLICATIONS

Ref: (a) Naval Training Center Mtg, Purpose: Update Fiber Optic Course, of 5-6 Apr 2000

Encl: (1) Approaches to Umbilical Assembly Repair For the Fiber Optic Pierside Connectivity Application of 30 Oct 99
(2) Umbilical Assembly Storage On Shore Versus On Ship of 11 Oct 99
(3) Navy, Fiber Optic, User Community Request for Points of Contact of 31 Jan 00

1. Purpose

This letter addresses three outstanding topics for pierside connectivity with enclosures to provide details for each topic. These three topics are:

a. Approaches to umbilical assembly repair.
b. Umbilical assembly storage on shore versus on ship.
c. Request for Navy, fiber optic, user community points of contact.

Entities in the Navy fiber optics community need to have these outstanding issues resolved to perform their function. The Naval Sea Systems Command (NAVSEA) needs these issues resolved to do logistics planning for ships, change documentation, etc. An action item that arose from reference (a) was to identify the entity responsible for connecting the pierside umbilical assembly from the shore to the ship. Once identified, the need for Fleet fiber optic training requirements for pierside connectivity could be determined. Ownership and maintenance of the fiber optic umbilical assembly (for connecting the ship to the shore) must be determined prior to several organizations proceeding with their tasking or planning efforts.

2. Approaches to umbilical assembly repair

Enclosure (1) addresses a maintenance philosophy taking into account Total Ownership Cost (TOC) and Life-Cycle Support Plans. A central versus local/regional umbilical repair facility is recommended. Different options for a central facility are provided. One roadblock is identification of a funding source. One option that offers partial relief is utilizing the Bureau of Prisons. The AEGIS Program is using this option to fabricate cable assemblies for test sites (not a tactical application). The Naval Surface Warfare Center, Dahlgren Division (NSWD DD) controls and coordinates the effort for the AEGIS Program. They stated a substantial ongoing effort is needed to make things work smoothly. One option is to see if NSWC DD would be willing to expand their role for pierside connectivity umbilical repair. The big advantage is that the Navy would only pay for parts/material, training, shipping and NSWC coordination, but no labor! This option can be pursued if a determination is made to use a cost effective, central facility for umbilical assembly repair.

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3. Umbilical assembly storage on shore versus on ship.

Enclosure (2) addresses three concerns with umbilical assembly storage on the ship versus on the shore. As discussed during the second Pierside Connectivity DEWG, the type umbilical assembly cable, selected by Pierside Connectivity DEWG members, was not intended for shipboard storage.

4. Request for Navy, fiber optic, user community points of contact.

Enclosure (3) requests that points of contact be provided for pierside connectivity field/installation personnel to obtain comments for draft of MIL-STD-2042, Part 7; and to expand the database of the Navy, fiber optic, user community for receipt of Parts List updates, defective component alerts, etc. Complete summary of user type, notifications/alerts to be provided and information requested is in the enclosure.

5. Points of contact.

Please direct questions or responses to the Naval Surface Warfare Center Carderock Division, Ship Systems Engineering Station (NSWCCD-SSES) point of contact for fiber optic component testing, E. Bluebond. He can be contacted by FAX: (215) 897-8509 or E-mail: bluebond@spawar.navy.mil. The NSWC DD point of contact for fiber optic specification requirements is G. Brown. He can be contacted by telephone: (540) 653-1579, FAX: (540) 653-8673 or E-mail: browngd@nswc.navy.mil.

J. A. DOLAN
By direction

Copy to:
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[redacted]G. Brown)
SPAWAR. PMW-152 (R. Evans)
SPAWAR PD 15Q2 (J. Bachrach)
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SPAWAR 04N-43A (D. Zsutty)
SPAWAR 051 (C. Suggs)
NAVSEA 05J2 (J. Moschopolous)
NAVSEA 53Z (H. Lewis)
DSCC-VQP (A. Eschmeyer)

Subject: Approaches to umbilical assembly repair for the fiber optic pierside connectivity application.

1. Background. The umbilical assembly used to connect the ship and shore fiber optic cable plants is considered a repairable item. Model maintenance philosophy on the various Navy Logistics Support Management Support Plans require that Total Ownership Cost (TOC) and Life-Cycle Support Plans be among the considerations addressed for a repairable item. Different repair options must be evaluated while addressing these two considerations.

2. Level of proficiency required. The most involved repair will be connector termination onto the end of the pierside umbilical cable. The Navy has a good history of connector termination since the MIL-C-28876 connector termination, using the same termini and similar fabrication, has been done since 1986. Field terminations occur with 4 and 8 channel MIL-C-28876 connectors. Fiber lengths on all termini must be the same (dissimilar fiber lengths will cause high optical attenuation losses). If one terminus is bad (will not allow adequate transmission of optical power), then all termini on that end of the cable must be cut-off and replaced. Personnel must maintain an adequate level of proficiency/competency by performing connector terminations on a routine basis.

3. Central versus local/regional facilities. Connector termination could be performed by dedicated personnel at a central facility. The other alternative is to have personnel perform this type termination on an occasional basis at local/regional facilities. A central facility may include a cable assembly fabrication house (at the connector manufacturer or other site) that would perform this connector terminations using MIL-T-29504/14 and /15 termini on a regular basis. Such cable assembly fabrication houses were found to successfully terminate 31 channel connectors in a successful (the termini allow adequate level of light transmission) and expeditious manner. Any re-termination due to bad terminus is on the onus of the cable assembly fabrication house. Due to lower volume and only being established to service one program (pierside connectivity), local/regional facilities would be performing terminations on an occasional basis. Successful termination of a 4-channel connector on an occasional basis is the norm; an 8-channel connector is "pushing the envelope". Successful termination of a 12-channel connector on an occasional basis, where 8 fibers are multimode and 4 fibers are single mode, without any re-terminations is not considered likely most of the time. Termination time will be increased due to loss of proficiency caused by lack of performing the procedure. Number of termini, consumable items used in the termination process, etc. will increase on a per termination basis.

4. Alternative to local facility in outlying areas. Outlying areas, such as Japan, may determine the necessity of having a repair capability due to its location. An alternative would be to provide those sites with additional spares of umbilical assemblies. These additional spares would allow the time required for damaged umbilical assemblies to be shipped back to a central facility. Once a reliable rate of umbilical assembly repair can be determined, the appropriate number of spares can be reallocated for umbilical assemblies/spares at other sites.

5. Different repair options. Recommend that the appropriate SPAWAR Office establish a central repair facility. Options for a central facility are provided below.

a. ViViD IT-Umbrella Contract. Efforts to add umbilical assembly repair to the ViViD contract have been initiated. A list of umbilical assembly repair scenarios have been prepared and submitted to the VIViD prime contractors. Further action by the Navy has not been taken on this effort due to uncertainly of which Navy entity would fund the umbilical assembly repair and if the funding allocations through the ViViD contract was feasible for this purpose.

b. Bureau of Prisons. NSWC DD (Naval Surface Warfare Center, Dahlgren Division) has established a fiber optic, cable assembly fabrication capability within the Bureau of Prisons. This capability includes the termination of MIL-C-27786 connectors with use the same termini as the pierside connectivity umbilical assembly. With minimal training, additional tools and provisioning of parts; this capability could be expanded to the umbilical assembly. This is a particularly cost effective option for the Navy. Repair costs to the Navy would be limited to parts and shipping. Personnel proficiency would be maintained since other multiple termini connector terminations are performed.

c. Existing cable assembly house. A central repair facility can be set up to work under the funding constraints of the Navy entity responsible for funding these repairs. The repair facility selected should have demonstrated:
(1) Successful cable assembly fabrications using multiple termini connectors with the same type termini as used in the pierside umbilical assembly.
(2) Continuous cable assembly fabrications using multiple termini connectors with the same type termini as used in the pierside umbilical assembly to maintain proficiency with this type operation.
(3) Personnel proficiency with successful umbilical assembly repair and connector termination in particular.
(4) Record of performing cable assembly fabrications/repairs in a timely manner.
(5) Commitment to inventory parts.

Subj: Umbilical Assembly Storage On Shore Versus On Ship.

1. Cable jacket material. One senario considered was to store the pierside connectivity umbilical assembly within the skin of the ship while not being used. The Pierside Connectivity DEWG specified the requirement for a double jacketed, polyurethane cable for the pierside connectivity umbilical assembly. The polyurethane material does not meet low smoke, toxicity requirements for ships and may have to be handled as a hazardous material. The umbilical assembly could not be stored within the skin of the ship without HAZMAT analysis and approval.

2. Placement of the umbilical assembly on the skin of the ship. The hand-cranked, spooling device for the pierside connectivity umbilical assembly comes in two configurations, one for placement on a pier/deck use and the other for wall/bulkhead mounting. The hand-cranked, spooling device could be mounted on the skin of the ship and the pierside connectivity umbilical assembly stored on the spooling device. This would require that the hand-cranked, spooling device with the pierside connectivity umbilical assembly be mechanically shock tested as a unit and meet stringent salt spray requirements (1000's of hours on skin of ship versus 500 hours for shore). Also required are considerations for such items as effect on ship's radar signature with the approvals that must be sought prior do this solution implementation.

3. Cost factor. Number of the pierside connectivity umbilical assembly required are fewer if stored on shore instead of on the ship. Not every ship is in port at the same time per ships assigned to the same homeport. A number of the pierside connectivity umbilical assemblies to be provided by SPAWAR PMW-152 per site are based on a percentage of ships at each home port/site.

31 January 2000

Navy, Fiber Optic, User Community
Request for Points of Contact

1. Purpose. Request for update to and further points or contact for the Navy, fiber optic, user community. Users include: NAVSEA, SPAWAR, & their field activities (Program Managers, engineering, installation [including FTSC, SUPSHIP and Shipyards], contracting); Government contractors (installers, ship integrators, designers, procurement, warehousing, quality control, specification development, manufacturing), other Navy, DoD and Service entities.

2. Background. A database is maintained of the Navy, fiber optic, user community to:
   a. Alert them of a problem with a fiber optic component (one that is a part of the fiber optic cabling system such as cable, connectors, interconnection boxes, accessories, tools & kits).
   b. Notify them that an updated version of the Navy Recommended Fiber Optic Components Parts List is posted on the Fiber Optic Web Site (www.it-umbrella.navy.mil; click on the word "Fiber" at the bottom of the home page).
   c. Notify of fiber optic policies posted on the Fiber Optic Web Site (such as initial points of contact and approval process if vendor wants their product considered for Navy wide use, i.e., placed on the Navy Recommended Fiber Optic Components Parts List).
   d. Notify of fiber optic technical notes and clarifications posted on the Fiber Optic Web Site (such as guidance for component selection, test and installation).
   e. Notify of documentation posted on the Fiber Optic Web Site (such as military specifications and standards, QPL's, NAVSEA Drawings, technical manuals, etc.).

   This database needs to be updated and expanded. Other intended uses include:
   a. Review of fiber optic documentation. Part 7 of Installation Standard MIL-STD-2042 is for the Pierside Connectivity application. This part of the standard has been circulated for review in draft form. User input is required to update the draft to reflect actual installations currently being performed.
   b. Identify other entities/users that are a part of the Navy, fiber optic user community that we have no past interface (including those not receiving past versions of the Navy Recommended Fiber Optic Components Parts List). Inform these entities/users of the Activities and points of contact that are responsible for determining requirements, ascertaining applicability of new products/sources, testing applicable candidates, evaluation of test results and placement of suitable components on the Navy Recommended Fiber Optic Components Parts List.

3. Information requested. Please provide the following data on each user:
   a. Activity/Company name.
   b. Code/Mail Stop.
   c. Address.
   d. City.
   e. State.
   f. Zip Code.
   g. Telephone.
   h. FAX.
   i. Last Name.
   j. First Name.
   k. Type (such as: contractor, Installer, DoD, ForGovt, ForGovtContr, NASA, USAF, USArmy, USCG, User, USN. Note: Vendors or suppliers are on separate listing).
   l. E-mail.

DOC: WhoUser.doc Enclosure (3)