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NAVSEA
STANDARD ITEM

FY-06

ITEM NO: 009-73
DATE: 29 JUL 2004
CATEGORY: I

1. SCOPE:

1.1 Title: Shipboard Electrical/Electronic/Fiber Optic Cable; remove, relocate, repair, and install

2. REFERENCES:

2.1 Standard Items

2.2 DOD-STD-2003, Electric Plant Installation Standard Methods for Surface Ships and Submarines

2.3 MIL-STD-2042, Fiber Optic Topology Installation Standard Methods for Naval Ships

2.4 S9300-A6-GYD-010, Electrical Workmanship Inspection Guide for Surface Ships and Submarines

2.5 SE000-01-IMB-010, Navy Installation and Maintenance Book (NIMB), Section IX, Installation Standards (Source CD: N0002400003)

2.6 MIL-STD-1310, Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety

2.7 SE000-01-IMB-010, Navy Installation and Maintenance Book (NIMB), Section VII, Industrial Electromagnetic Compatibility (IEMC) Work Process Instructions (Source CD: N0002400003)

2.8 IA PUB-5239/31, Information Assurance Shipboard Red/Black Installation Publication

2.9 NSTISSAM TEMPEST/2-95, Red/Black Installation Guidance (FOUO)

3. REQUIREMENTS:

3.1 Isolate and remove each cable designated for removal or replacement by the individual Work Items.

3.1.1 Remove each cable in its entirety.

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3.1.1.1 Blank each bulkhead, deck penetration, and multi-cable transit device from which cable was removed and which will not be reused, in accordance with Section 3 of 2.2 and Part 3 of 2.3.

3.1.1.2 Blank each hole not required to be used in equipment from which cable was removed.

3.1.1.3 Remove unused hangers from which cable was removed and which will not be reused, and grind areas flush in way of removals.

3.1.1.4 Install new banding for cableways affected by cable removals, in accordance with Section 4 of 2.2 and Part 4 of 2.3.

3.2 Identify and isolate each cable to be pulled back, rerouted, relocated, or reused to support work required by the individual Work Items.

3.2.1 Inspect each cable end to be disconnected for correct identification sleeving, including size, type, and legible lettering in accordance with referenced drawings. Ensure lugs are secured to leads and are of correct size and type, and the insulation is not damaged. Ensure optical connectors are secured to the cable, the correct type, and the cable jacket is not damaged. Accept and reject criteria for lugs and sleeving for non-fiber optic cables shall be in accordance with Chapters 3 and 4 of 2.4.

3.2.1.1 Submit one legible copy, in hard copy or electronic media, of a report listing results of the requirements of 3.2.1 to the SUPERVISOR.

3.2.2 Disconnect each cable. Record and retain electrical and optical hook-up data.

3.2.2.1 Accomplish the requirements of 009-22 of 2.1 for disconnected non-fiber optic cables.

3.2.2.2 Accomplish the requirements of Method 6D1 of Part 6 of 2.3 for fiber optic cable.

3.2.3 Remove each cable from equipment and pull back to predetermined locations. Coil each cable and secure to prevent damage.

3.2.3.1 Protect disconnected connectors and wiring from the environment.

3.2.4 Install each cable to equipment or component in accordance with 2.2 and 2.5 for non-fiber optic cable, and 2.3 for fiber optic cable.

3.2.5 Band disturbed cable in accordance with Section 4 of 2.2 for non-fiber optic cable, and Part 4 of 2.3 for fiber optic cable.

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3.2.6 Bond and ground non-fiber optic cable in accordance with 2.6.

3.2.7 Accomplish the requirements of 009-22 of 2.1 for non-fiber optic cables upon completion of banding and prior to reconnecting.

3.2.8 Accomplish the requirements of Method 6D1 of Part 6 of 2.3 for fiber optic cables upon completion of banding and prior to reconnection.

3.2.9 Connect each cable, using referenced drawings or retained hook-up data.

3.2.10 Prepare each cable end and serve the lead bundles in accordance with 2.2 and 2.5 for non-fiber optic cable and 2.3 for fiber optic cable.

3.2.11 Install new cable identification tags in accordance with 2.2 and Part 4 of 2.3, using 2.5 for guidance.

3.3 Isolate and splice non-fiber optic cables in accordance with Section One, Group E of 2.2, to support work required by the individual Work Items. Fiber optic cables shall not be spliced.

3.3.1 Accomplish the requirements of 009-22 of 2.1 for each spliced non-fiber optic cable.

3.3.2 Accomplish the requirements of 3.2.5 through 3.2.11.

3.4 Isolate and repair **non-fiber optic cables** in accordance with Section One, Group **A through D** of 2.2, and **fiber optic cable in accordance with** Part One of 2.3, to support work required by the individual Work Items.

3.4.1 Accomplish the requirements of 009-22 of 2.1 for each non-fiber optic cable.

3.4.2 Accomplish the requirements of Method 6D1 of Part 6 of 2.3 for each fiber optic cable.

3.4.3 Accomplish the requirements of 3.2.5 through 3.2.11.

3.5 Install each new cable, cableway, penetration, lug, and connector in accordance with 2.2, 2.5, and 2.6 for non-fiber optic cable and 2.3 for fiber optic cable, and referenced drawings, to support work required by the individual Work Items.

3.5.1 New cable shall conform to MIL-DTL-24643 (low smoke), and MIL-DTL-24640 (lightweight) in lieu of MIL-C-915. New Radio Frequency (RF) cables shall conform to MIL-C-17 (Rev) low smoke. New fiber optic cable shall conform to MIL-PRF-85045.

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3.5.1.1 Preserve the cable data package provided with new fiber optic cable. Retain the original cable data package with the unused portion of the cable.

3.5.1.2 Submit one legible copy, in hard copy or electronic media, of a report containing copies of the cable data packages obtained in 3.5.1.1 and cable number listings of the cables taken from each reel to the SUPERVISOR.

3.5.2 Accomplish a visual and continuity test of each fiber optic cable in accordance with Method 6A1 and Method 6D1 of 2.3.

3.5.2.1 Submit one legible copy, in hard copy or electronic media, of a report listing the results of the requirements of 3.5.2 to the SUPERVISOR.

3.5.3 Use existing cableways and penetrations wherever possible. Penetrations shall be correct size in accordance with 2.2 and 2.3.

3.5.4 For hard-wired cables, install new wire markers conforming to SAE-AMS-DTL-23053, Class One, white, marked with indelible ink.

3.5.4.1 Mark in accordance with the referenced drawings and/or equipment technical manual.

3.5.4.2 Install new lugs of correct size and shape conforming to MIL-T-16366 or SAE-AS7928. Do not cut off strands of copper to reduce size of lead to fit lug. Use correct barrel and hole size.

3.5.4.3 Install new fiber optic connectors of the correct size and type conforming to MIL-C-83522 or MIL-C-28876.

3.5.5 Accomplish the requirements of 009-22 of 2.1 upon completion of lugging, connector attachment, and banding of non-fiber optic cables.

3.5.6 Accomplish the requirements of Method 6C1 of Part 6 of 2.3 upon the completion of connector attachment, slack management, and banding for fiber optic cables.

3.5.6.1 Submit one legible copy, in hard copy or electronic media, of a report listing the requirements of 3.5.6 to the SUPERVISOR, using Attachment A.

3.5.7 Connect leads to terminal boards and connectors to equipment using referenced drawings.

3.6 Weatherproof and seal connectors exposed to the weather in accordance with 2.7.

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3.7 Submit a written procedure to the SUPERVISOR for review and approval prior to the initiation of production work for the installation of multipin, coaxial, and fiber optic connectors, using 2.2, 2.3, and 2.5 for the minimum requirements.

3.7.1 This procedure only requires a one-time submittal/approval unless the Standard Items change and/or references change or are updated, and shall contain the following minimum information:

3.7.2 Reference the appropriate fabrication document for which the procedure is applicable.

3.7.3 Qualification requirements for the personnel performing the work.

3.7.4 Inspection and documentation forms.

3.7.5 Acceptance and rejection criteria.

3.8 Provide written designation of the Qualified Persons who will prepare electrical/fiber optic cable endings to receive connectors, assemble connector parts on the cable endings, and attach the connectors to the cable endings. Provide written designation of the Qualified Person or Persons who will supervise and inspect the execution of the process.

3.8.1 Provide written substantiation of the credentials of the Qualified Persons to the SUPERVISOR prior to the start of work.

3.8.2 Any additions or modifications of the information provided in 3.8 shall be provided in writing to the SUPERVISOR prior to the start or continuation of work.

3.9 Inspect existing cableways affected as a result of work required by the individual Work Items and interferences within the first 25 percent of contract completion. Ensure that cableways, penetrations, hangers, and associated hardware are in accordance with 2.2.

3.9.1 Submit one legible copy, in hard copy or electronic media, of a report of cableway conditions not in compliance with 2.2 to the SUPERVISOR, using Attachment B, within 72 hours of completion of inspections.

3.10 Install new fasteners conforming to MIL-DTL-1222, Type One, Grade 316, stainless steel, for areas exposed to weather and high moisture areas, and Type One, Grade 2 or 5, carbon steel, zinc plated, for other areas to support work required by the individual Work Items.

3.11 Remove, install, and relocate cables which are part of the secure electrical information processing systems or are located within a secure

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processing space in accordance with 2.8 and 2.9 to support work required by the individual Work Items.

3.12 Accomplish the requirements of 009-25 of 2.1 for the local air hose test of each disturbed multi-cable transit device.

3.13 Accomplish the requirements of 009-32 of 2.1 for new and disturbed surfaces.

4. NOTES:

4.1 Pulled-back cables are those which are disconnected and physically removed from a wireway, conduit, or cableway to protect the cable from industrial work.

4.2 Reused cables are those cables disconnected from the equipment to facilitate equipment removal.

4.3 Electrical connector fabrication is the preparation of cable endings to receive multipin connectors, coaxial connectors, fiber optic connectors, assembly of connector parts on cables, and securing connectors to cables.

4.4 A Qualified Person is defined as a person who has successfully completed connector fabrication training and meets the qualification requirements stated below.

4.4.1 Emphasizes the importance of connector fabrication to the performance and long-term reliability of shipboard combat systems.

4.4.2 Uses 2.2 through 2.5 for basic instructional material supplemented by connector manufacturer's instructional material as desired.

4.4.3 Requires classroom lecture, study, and demonstration of each topic in Group A of the Table of Contents of 2.2 and 2.3.

4.4.4 Requires individual student practice in the use of specified tools and performance of connector fabrication techniques and procedures described in Groups B through H of the Table of Contents of 2.2, Parts One through 6 of 2.3, and Paragraph 2-20.2 of 2.5.

4.4.5 Requires a minimum of 32 hours of combined classroom lecture and laboratory practice in the type of connectors to be fabricated, either electrical/electronic or fiber optic.

4.5 Connector fabrication qualifications consist of:

4.5.1 Connector Fabricator Qualification requirement: Successful completion of the training course required in 4.4.5 plus successful completion of 40 hours on-the-job training under the tutelage of a qualified connector

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fabricator or a qualified connector fabrication supervisor in the type of connectors to be fabricated, either electrical/electronic or fiber optic.

4.5.2 Connector Fabrication Supervisor Qualification requirement: Successful completion of the classroom training required in 4.4.5 plus be the incumbent of a supervisory electrical or electronic mechanic position.

4.5.3 Connector Fabrication Quality Assurance Inspector Qualification requirement: Successful completion of the classroom training required in 4.4.5 plus be the incumbent of a quality assurance specialist or inspector position.

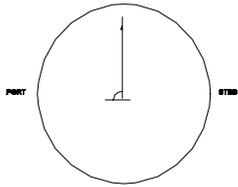
ATTACHMENT A
OPTICAL MEASUREMENT RECORD

DATE _____ HULL NUMBER _____
 INSPECTED BY _____ CODE _____ INSPECTING ORGANIZATION _____ TELEPHONE _____
 ENDPOINT LOCATIONS OR EQUIPMENT NAME: SOURCE _____ DETECTOR _____
 INSTALLATION/CONFIGURATION DRAWING _____ CABLE SERIAL NUMBER _____
 CABLE TYPE¹ _____ REFRACTIVE INDEX OF FIBER² _____ ATTENUATION/KM³ @1300 NM _____ @850 NM _____
 CONNECTOR TYPE(S)¹ _____ TEST EQUIPMENT MANUFACTURER/MODEL NO. _____
 SERIAL NO. _____ CALIBRATION DUE DATE _____ SOURCE WAVELENGTH(S)(NM) _____ / _____

SOURCE CABLE NO. ⁴	DETECTOR CABLE NO. ⁴	1300NM/850NM WINDOW (CIRCLE ONE)									
		ACCEPTABLE LOSS (dB)	FORWARD REFERENCE POWER	FORWARD MEASURED POWER	FORWARD LOSS (dB)	FORWARD RETURN LOSS (dB)	REVERSE REFERENCE POWER	REVERSE MEASURED POWER	REVERSE LOSS (dB)	REVERSE RETURN LOSS (dB)	CABLE/LINK LENGTH (M)

NOTES: ¹RECORD MIL-SPEC NUMBER IF APPLICABLE. ⁴FOR LINK MEASUREMENTS ONLY.
²RECORD VALUE FROM CABLE REEL DATA SHEET, IF UNAVAILABLE DEFAULT TO 1.490. ⁵STANDARD COLORS: BLUE, ORANGE, GREEN, BROWN, SLATE, WHITE,
³RECORD VALUES FROM CABLE REEL DATA SHEET. RED, BLACK, YELLOW, VIOLET, PINK, TAN

CONNECTOR END FACE QUALITY: _____
 CONNECTION LIST: _____
 REMARKS: _____
 SIGNATURE: _____



ATTACHMENT B
ELECTRICAL CABLEWAY INSPECTION FORM

DATE _____ HULL NUMBER _____

INSPECTED BY _____ INSPECTING ORGANIZATION _____

SER #	COMPT	DECK	FRAME	P/S	POS	CABLE CIRCUIT DESIG	CABLE TYPE	*CAT	*NAVSEA DWG NO.	EQUIPMENT
DESCRIPTION										
DESCRIPTION										
DESCRIPTION										
DESCRIPTION										

* TO BE FILLED IN BY THE SUPERVISOR.