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By kempr on Sep 02, 2025

Department of Defense
OFFICE OF PREPUBLICATION AND SECURITY REVIEW

Fiber Optic Strategy

JSWAG

DECEMBER 2025

Blayne Lum



OUTLINE



- **Wiring Systems Branch**
- **Why Fiber**
- **Current Platforms with Fiber**
- **Point of Contacts**
- **Problem**
- **Efforts/ Roadmap**
 - **Specifications**
 - **Maintainability**
 - **Training**
 - **S&T**
- **Way Forward**





WIRING SYSTEMS BRANCH



- **Standards, Specifications and General Series Manuals for Aerospace Wiring**
- **S&T**
- **Qualified Parts Laboratory**
- **Compliant Wiring System Designs and Installations**
 - **New Aircraft Acquisition, Upgrades, & Modifications**
 - **Requirements Definition**
 - **Technical Interchange Meetings**
 - **Systems Engineering Technical Reviews (Design Reviews)**
 - **Production Reviews and Compliance Assessments**
 - **Evaluate Installations for Safety of Flight (SOF)/ Airworthiness and Maintenance Issues**
 - **Adherence to the contracted wiring design specifications and aircraft model/drawings, covering critical areas such as proper routing, clearances, primary support, terminations, shielding effectiveness, grounding integrity, and overall system integrity.**
 - **Process Flight Clearance Requests**
- **Aircraft Wiring System Integrity**
 - **Monitor and Analyze Data**
 - **Perform Aging Wiring System Assessments**
 - **Provide EWIS Awareness Training**
 - **Recommend Technology Solutions To Meet Fleet Needs**
 - **Provide Input/ Recommendations To COMNAWCADFORINST 4790.2**



WHY FIBER?



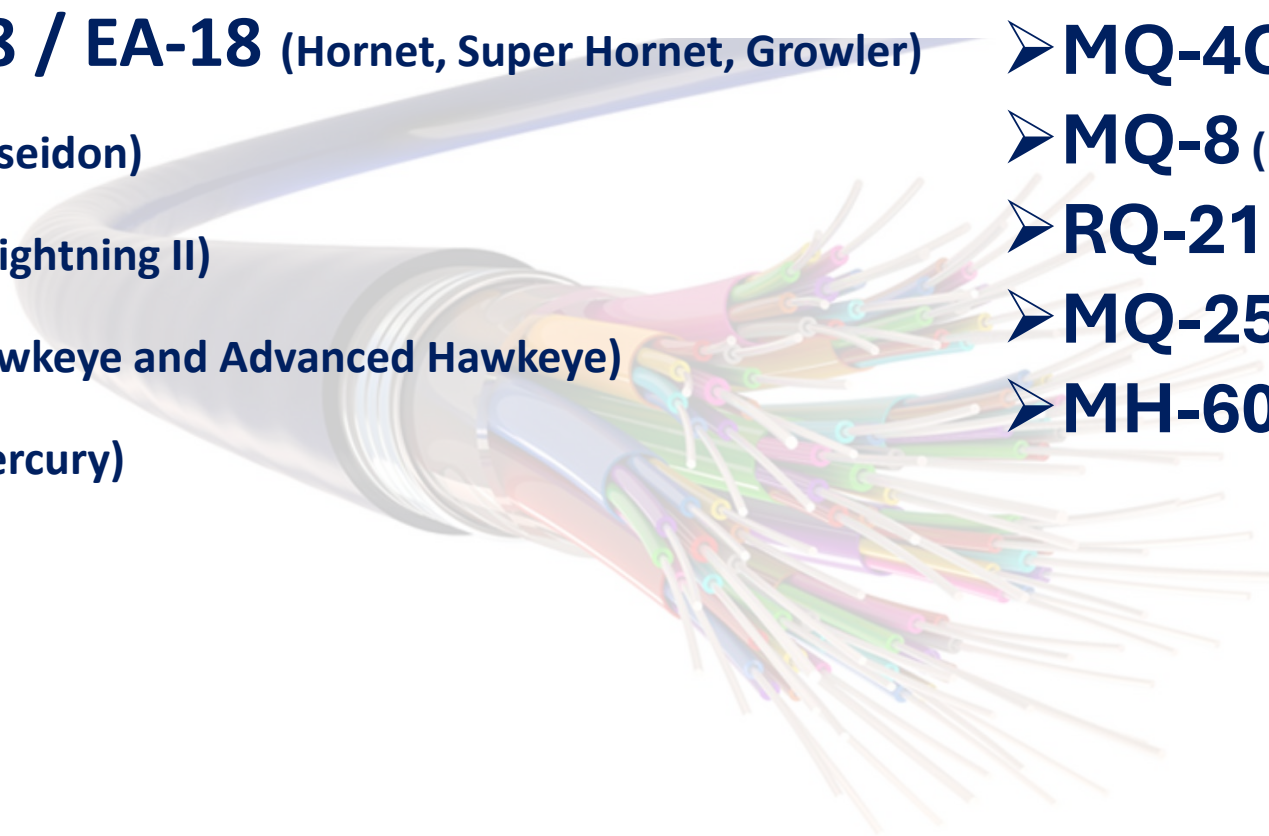
- Transmits data using light pulses, enabling vastly higher bandwidths (reaching terabits per second) and significantly faster speeds, often approaching the speed of light. This allows for massive data transfer, critical for high-resolution video streaming, cloud computing, and real-time applications.
- Made of glass or plastic, fiber optic cables do not conduct electricity and are completely immune to electromagnetic interference (EMI) and radio-frequency interference (RFI). This ensures stable and reliable data transmission, even in electrically noisy environments
- Experiences extremely low signal loss (attenuation) over long distances, allowing data to be transmitted over several kilometers without the need for signal boosters or repeaters.
- Considerably smaller and lighter than copper cables with comparable data capacity.
- Does not emit electromagnetic signals, making it extremely difficult to "tap" into the data transmission without physically cutting the cable, which is easily detectable
- Resistant to temperature changes, moisture, and corrosion, leading to a longer operational lifespan and lower maintenance requirements over time.



CURRENT NAVY PLATFORMS



- **F/A-18 / EA-18** (Hornet, Super Hornet, Growler)
- **P-8** (Poseidon)
- **F-35** (Lightning II)
- **E-2** (Hawkeye and Advanced Hawkeye)
- **E-6** (Mercury)
- **MQ-4C** (Triton)
- **MQ-8** (Firescout)
- **RQ-21** (Blackjack)
- **MQ-25** (Stingray)
- **MH-60** (Seahawk)





NAVY FIBER POINT OF CONTACTS



➤ Wiring Systems Branch

➤ Blayne Lum

➤ Mark Logan

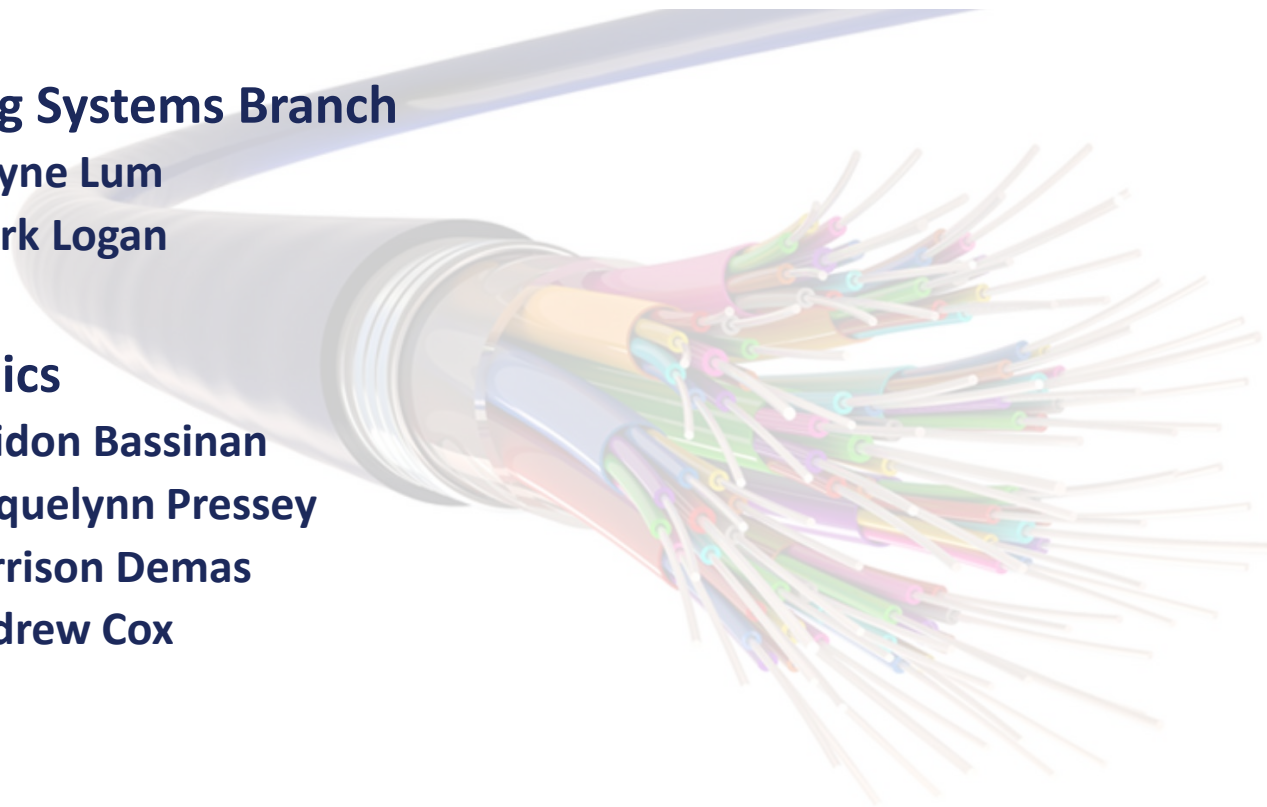
➤ Avionics

➤ Obidon Bassinan

➤ Jacquelynn Pressey

➤ Harrison Demas

➤ Andrew Cox





PROBLEM



➤ Fiber Optical Repair General Series Manual NA 01-1A-505-4

- Best practices are outdated
- New technologies (splices)/ parts need to be added

➤ ABDR Manual NA 01-1A-39

- Last updated 15 Feb 1993

➤ Specifications and Standards

- MIL-STD-1678 requires updating
- NAMP 4790 requires updating
- Create new Specifications for new technologies (unqualified parts) employed on aircraft
 - MT Ferrules
- Lack of Qualified Parts

➤ Support Equipment

- Due to lack of standardization some platforms have an excess of 50 connector adapters
- Some platforms have Fiber Optic Repair sets that aren't being used

➤ Training

- Fiber Optic Awareness training is outdated
- Commercial vendor (Kitco) provides Fiber Optic Repair Training to the fleet
- Fiber Optical Repair Certification Course
- Should Fiber Optic Maintainers be a separate career field/ shop



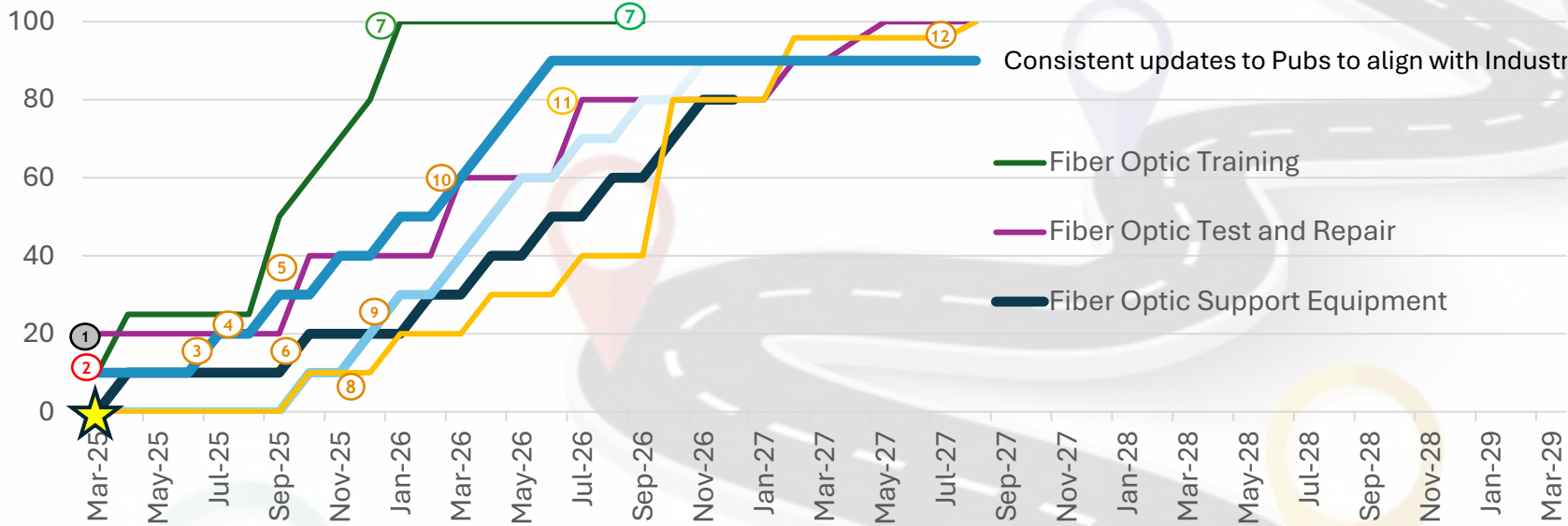


FIBER ROADMAP



Focus on capability to increase availability at an affordable cost with sustained knowledge and training.

- Increased repair velocity through I-Level efficiency with an affordable cost
- Sustain and train knowledgeable technicians
- Provide up to date publication to ensure success



Consistent updates to Pubs to align with Industry

— Fiber Optic Training
 — Fiber Optic Test and Repair
 — Fiber Optic Support Equipment

- ① FRCSE DET Jacksonville NAVAIR first fully qualified FOTR site
- ② Fiber Optics Training
- ③ Update publications to include Fiber Optics
- ④ Proposed Fiber Optics Training
- ⑤ FRCNW FOTR Capability
- ⑥ Integrate Fiber Optics SE
- ⑦ Fiber Optics Training Achieved/Sustained
- ⑧ Establish Fiber Optics Splicing/Jumper/Buddy connectors
- ⑨ Establish standards for Fiber Optics Cables and Connectors
- ⑩ FRC SW FOTR Capability
- ⑪ FRCMA FOTR Capability
- ⑫ Establish CVN FOTR Capability

- # On Track
- # Taking Action
- # Leadership/Fiscal Support Needed
- # Complete

- Fiber Optics Training (FOT) - Currently in training gap
- Fiber Optics Test and Repair (FOTR) - Single site
- Fiber Optics supporting publication updates - 505/4790/FO handbook
- Establish Fiber Optics cabling and connector standards
- Fully Integrate Fiber Optics Support Equipment
- Fiber Optic Splices/Fiber Optics Jumpers/Buddy cables
- Reestablish Navy Fiber Optics Working Group (NFOWG)



SPECIFICATIONS

Relevant MIL Optical Fiber and Fiber Optic Cable Specifications for 100 Gbps and RFoF



Single Mode Optical Fiber

METRIC

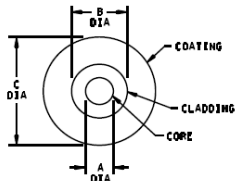
MIL-PRF-49291/11B
w/Amendment 3
17 July 2019
SUPERSEDING
MIL-PRF-49291/11B
w/Amendment 2
19 July 2016

PERFORMANCE SPECIFICATION SHEET

FIBER, OPTICAL, TYPE II, CLASS 5, SIZE II, COMPOSITION A, WAVELENGTH D, RADIATION RESISTANT, ENHANCED PERFORMANCE CHARACTERISTICS (METRIC)

This specification is approved for use by all departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-49291.



PIN	Dimensions		
	A (µm)	B (µm)	C (µm)
M49291/11-01 M49291/11-01A	1/	3/	125 ± 0.7 2/
M49291/11-02 M49291/11-02A	1/	125 ± 0.7	245 ± 10 4/

Multimode Optical Fiber

METRIC

MIL-PRF-49291/12B
w/AMENDMENT 2
17 July 2019
SUPERSEDING
MIL-PRF-49291/12B
w/AMENDMENT 1
19 July 2016

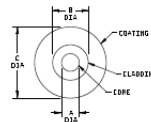
PERFORMANCE SPECIFICATION SHEET

FIBER, OPTICAL, TYPE I, CLASS I, SIZE III, COMPOSITION A, WAVELENGTH B, RADIATION RESISTANT, ENHANCED PERFORMANCE CHARACTERISTICS/AIRCRAFT APPLICATIONS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-49291.

For legacy use only. For new platforms using multimode fiber, the Joint Fiber Optic Working Group (JFOWG) has imposed standardization with MIL-PRF-85045/31 fiber optic cable containing MIL-PRF-49291/10 multimode optical fiber. This specification sheet applies to existing platforms (ones in which the contract has been awarded) where the fiber optic portion of the network uses 50/125 micron fiber size.



PIN	Dimensions		
	A (µm)	B (µm)	C (µm)
M49291/12-01 M49291/12-01A	50 ± 2.5	125 ± 1	500 ± 25 1/ 2/
M49291/12-02 M49291/12-02A	50 ± 2.5	125 ± 1	245 ± 7 2/

Optical Fiber Cable

METRIC

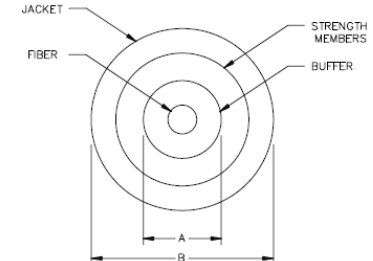
MIL-PRF-85045/31A
w/AMENDMENT 2
17 July 2019
SUPERSEDING
MIL-PRF-85045/31A
w/AMENDMENT 1
22 June 2016

PERFORMANCE SPECIFICATION SHEET

CABLE, FIBER OPTIC, SINGLE (ONE) FIBER, CABLE CONFIGURATION TYPE 2 (OFCC), CLASS SM AND MM, TEMPERATURE RANGE AND OTHER PERFORMANCE CHARACTERISTICS (METRIC)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-85045.



µm	Inches
900	.035
50	.002

mm	Inches
2.2	.087
1.8	.070

Dimensions	
A µm	B mm
900 ± 50	1.8 – 2.2

NOTES:

- Dimensions are in millimeters.
- Inch equivalents are given for reference purposes.

Need DLA Qualified 1st and 2nd Sources for both Fiber and Cable. May Need Custom Fiber Developed for 100 Gbps and/or RFoF.



SPECIFICATIONS



- **Update MIL-STD-1678**
- **MT fiber optic connector Mil Spec (NAVSEA)**
- **Monitor MT and ODU connector status with industry**
- **Derive multifiber connector qualification test requirements**
- **Impose NAVAIR connector requirements on Tier I and II WRA developers**
- **Standardize Short Wavelength Division Multiplexing (SWDM) technology and support equipment**
- **Develop and qualify multifiber cable specifications**



MAINTAINABILITY



- **Update NAMP**
- **Update NA 01-1A-505-4**
 - **Implement Fiber Optic Repair Strategy**
- **Re-establish Navy Fiber Optic Working Group**
 - **Incorporate Community of Practice**



TRAINING



- **Appoint and fund a Naval Aviation Fiber Optic Training Lead to create a Training Roadmap**
- **PMA training (acquisition, fleet, support equipment, schoolhouse)**
- **FST / FRC training (instill uniform manufacturing engineering principles)**
- **Fleet training (Triton, F/A-18, F-35, P-8, E-2, E-6, etc.) – Document**
- **Instructor training**
- **Document, monitor and improve O-I-D capability across Naval Aviation Enterprise**
- **Monitor and improve CeTARS**
- **Harmonize fleet training with fleet support equipment**



S&T



- **N24A-T001, High-Bandwidth Multimode Fiber Optic Cabling**
- **N242-080, Portable Test Equipment for Wavelength Division Multiplexed (WDM) Optical Interconnects**
- **N242-D08, Fiber-Optic Filter Integration**
- **N23A-T002, DIGITAL ENGINEERING - Integration of Fiber Optics Systems Design, Supportability, and Maintainability**

Questions



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