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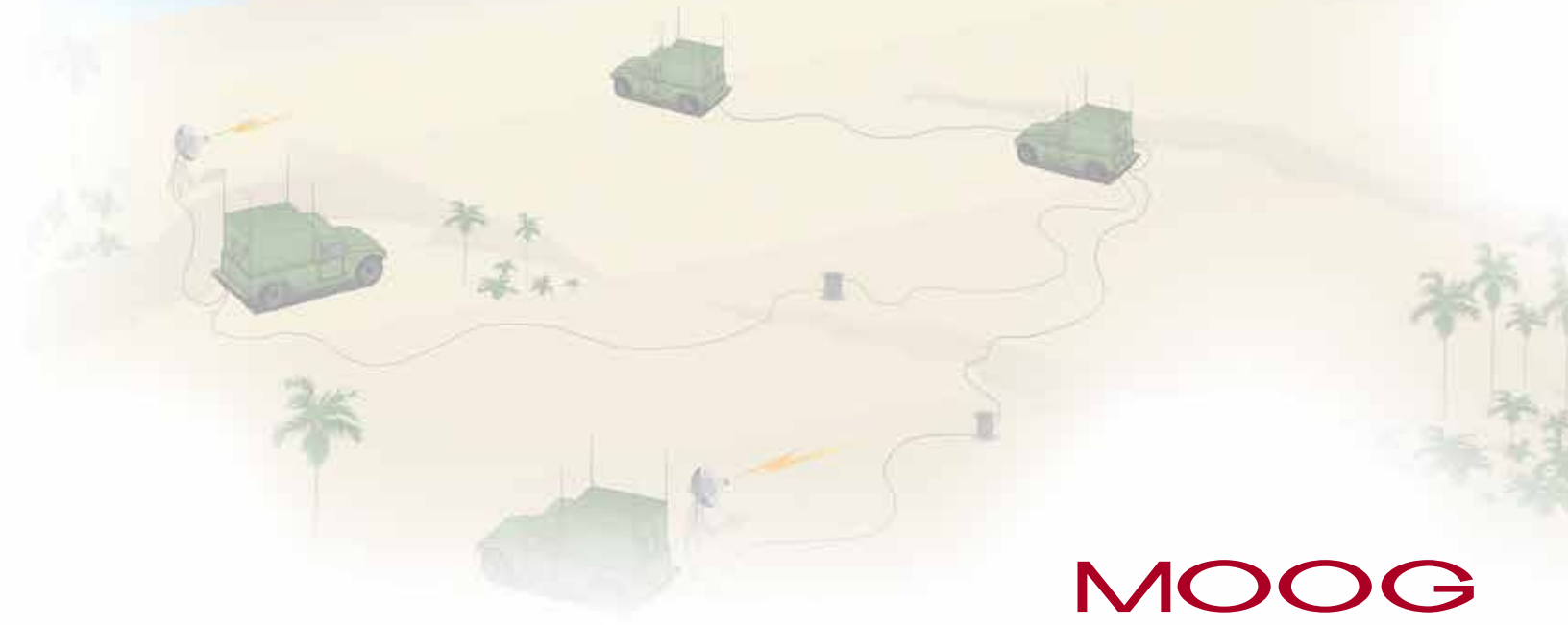
TACTICAL FIBER OPTIC MODEMS

U.S. Army and ANSI Standards



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PROTOKRAFT

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Overview

The family of Fiber Optic Modems (FOMs) provide electrical to optical conversion of electronic communication and data signals for transmission using tactical fiber optic cable assemblies. The FOMs simultaneously receive incoming optical signals and converts them back to the original electronic signal allowing for full duplex transmission.

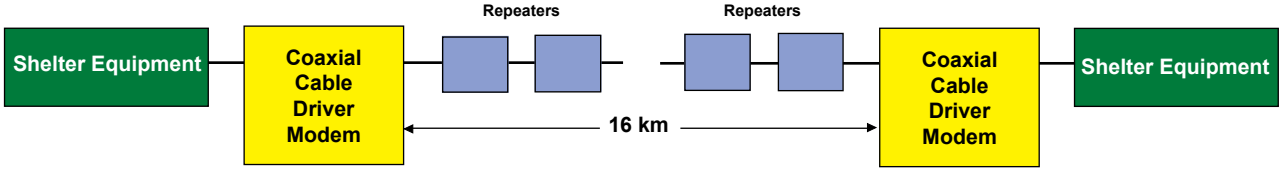
Together with the tactical fiber optic cables, the FOMs provide a rugged, secure and easily deployable optical link. The FOM is available in both single channel and multi-channel configurations and can be mounted on the signal entry panel (SEP) of tactical shelters, in 19 inch racks or placed on the ground (multi-channel versions only).

Benefits of Optical Fiber over Coaxial Implementation

- **Lighter weight and smaller size for much quicker deployment**
- **Higher bandwidth for increased throughput**
- **Lower loss for long distance repeaterless communication up to 16 kilometers**
- **Better quality - safe from electromagnetic interference from any source**
- **More secure - no electromagnetic signature**
- **Less expensive**

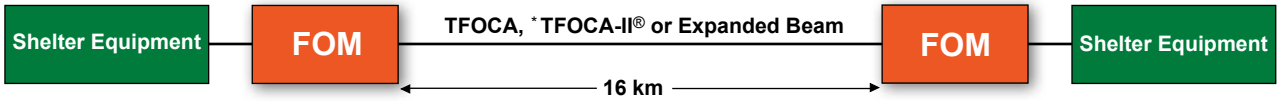
All of the above enhance defense mobility and rapid deployment capabilities.

Coax Implementation (OLD WAY)



- 16-Kilometer Link Weighs 6,173 lbs
- 16-Kilometer Link Requires 37 Repeaters
- Five Links Require Five 2.5 Ton Trucks

Optical Fiber Implementation (NEW WAY)



- 16-Kilometer Link Weighs 1,411 lbs
- Eliminates Requirement for Coax Modems
- 16-Kilometer Link is Repeaterless
- Five Links Require a Single 2.5 Ton Truck

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Single channel FOMs

The single channel FOM is currently available in four standards based communications interfaces: Standard NRZ, Conditioned Diphase, DS3, and IP (Internet Protocol). These modems transmit up to 16 km without a repeater using multimode fiber and use less than 5 watts of power. The single channel FOMs are designed to mount on the Signal Entry Panel (SEP) of the tactical communication shelters or they can be installed in a rack mount panel. FOMs are available with various tactical fiber optic connectors, including TFOCA, *TFOCA-II® and Expanded Beam.

General Specifications

- Up to 16 km repeaterless communication
- Light Emitting Diode (LED) light source
- Designed for tactical environment
- 3.75 Watts maximum power consumption
- Typical optical output power:
  - Minimum (at +52° C) = -21.7 dBm
  - Maximum (at -35° C) = 7.5 dBm
- Received optical power:
  - Minimum = -44.5 dBm
  - Maximum = -7.5 dBm

Physical Characteristics:

- Weight (lbs): 2.2
- Dimensions (in): 4.0 x 4.0 x 3.75

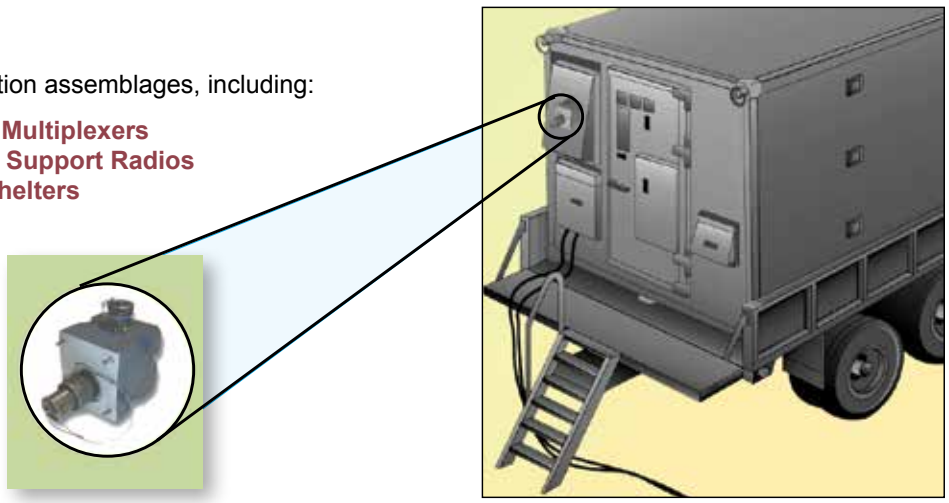
Description	MD1272/G	DS3/1	Integrated IP/MD1272/G	IP/1 10/100
TFOCA Part Number	A3099781	107900	N/A	110100-202
TFOCA-II Part Number	109500-202	107900-202	110800-201	110100-201
Power Requirement	5 VDC	5 VDC	5 VDC or 28 VDC	5 VDC or 28 VDC
Electrical Signal	Balanced NRZ Conditioned Diphase	ANSI T1.102	Balanced NRZ Conditioned Diphase, IEEE 802.3-2000	IEEE 802.3-2000
Optical Signal	JTC2A 9109C	JTC2A 9109C	JTC2A 9109C	JTC2A 9109C
Electrical Interface	MS27468T17B35A	MS27505E15B15P 75 Ohm BNC	MS27468T17B35A Shielded RJ45	MS27505E15B15P Shielded RJ45
Alarms	Summary (LOS, BER, RAI)	Summary (LOS, BPV, EXZ)	Summary (LOS, BPV, EXZ) Optical and Electrical Signal Speeds	Optical and Electrical Signal Speeds
Environmental Specifications	Tested to Meet	Designed to Meet	Designed to Meet	Designed to Meet
Fiber	Multimode	Multimode	Multimode	Multimode

Applications

- Interconnect tactical communication assemblages, including:

Radio Terminals
Radio Repeaters
Tactical Switches
Circuit Switches
Tactical Multiplexers
Satellite Support Radios
TACC Shelters

- Tactical communication sytems
- Down the hill links
- Intra-node cabling
- Dispersed command post
- Disaster relief



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Integrated 10/100Mb and MD1272/G (Single Channel FOM)

The FOM-IP/1 integrates the MD1272/G and IP/1 10/100 Mbps fiber optic modems that provide a ruggedized optical link between mobile shelter equipment and remote sites for tactical communications. This unit provides electrical to optical conversion of IP (Internet Protocol) data and electro-optical conversion for full duplex transmission of digital communications signals between tactical shelters using multimode tactical fiber optic cable assemblies and is designed for use in harsh environments.

The interface at each end of the multimode optical cable converts between electronic and optical transmission modes for repeaterless communication at distances of up to 2 kilometers. The FOM IP/1 automatically configures itself for 10 or 100 Mbps operation and is available with various tactical fiber optic connectors, including *TFOCA-II® and Expanded Beam.

Product Features

- 10/100 Mbps auto configuring
- IEEE 802.3 compliant
- Fully transparent Ethernet link
- Ruggedized RJ 45 connector
- Conditioned Diphase (CDP) or NRZ clock and data
- Full MD1272/G functionality
- Repeaterless communications up to 2 kilometers
- Powered from 5 VDC or 28 VDC
- Weighs less than 3.9 lbs
- TFOCA-II® 4 fiber tactical connector

Physical Characteristics:

- Weight (lbs): 3.9
- Dimensions (in): 4.0 x 4.0 x 3.7

General Specifications (both models)

- Up to 2 kilometer communication
- Light Emitting Diode (LED) light source
- 3.75 Watts maximum power consumption
- Typical Optical Output Power:
  - Minimum = -19 dBm
  - Maximum = -14 dBm
- Received Optical Power:
  - Minimum = -31 dBm
  - Maximum = -14 dBm
- Discrete Status outputs provided:
  - Optical signal speed (10/100)
  - Electrical signal speed (10/100)
  - Optical signal (packets) received
  - Electrical signal speed (packets) received
- Power Requirement: 5 VDC or 28 VDC
- Electrical Signal: IEEE802.3-2000

Single Channel 10/100 Mbps FOM

The FOM-IP/1 Fiber Optic Modem provides an all weather optical link between mobile shelter equipment and remote sites for tactical communications. It is the interface at each end of the multimode optic cable, converting between electronic and optical transmission modes for repeaterless communication at distances of up to 2 kilometers. The FOM IP/1 automatically configures itself for 10 or 100 Mbps operation and is available with various tactical fiber optic connectors, including TFOCA, TFOCA-II® and Expanded Beam.

Power Requirement: 5 VDC or 28 VDC

Electrical Interface: Shielded RJ45

Alarms:

Discrete Status outputs provided:
- Optical signal speed (10/100)
- Electrical signal speed (10/100)
- Optical signal (packets) received
- Electrical signal speed (packets) received

Environmental Specifications: Designed to Meet

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DualFOM / DualFOM-II

DualFOM and DualFOM-II are ideal solutions for up grading to fiber optic communications without the need for expensive upgrading of shelter equipment.

The DualFOM and DualFOM-II are rugged, field-exposed units that facilitate replacement of CX-11230 coaxial cable assemblies with long distance Tactical Fiber Optic Cable Assemblies (TFOCAs). They are designed to carry all standard conditioned diphase group rates from 72 kbps through 4.608 Mbps in the tactical communications environment without shelter or equipment modification. Both versions connect to standard CX-11230 cable on the shelter side and standard fiber optic cables on the line side. The DualFOM interfaces with the U.S. Military standard 2-fiber TFOCAs while the DualFOM-II interfaces with the newer *TFOCA-II® connectors and either will provide repeaterless transmission up to 16 km and up to 32 km when used with an additional DualFOM or DualFOM-II serving as a repeater. Both versions provide two separate and independent channels for full duplex transmission of voice and data signals and conform to JTC3A technical interface specification 9109c which ensures compatibility with other standards compliant fiber optic equipment, including the MD-1272/G single channel FOM.

Mechanical Specifications

- Power Connector Interface: 5 pin 16 gauge contacts (MS27474E14B5P) per MIL-C-38999
- Optical Signal Interface:
  - DualFOM (M83526/13-01) per MIL-C-83526
  - DualFOM-II (M83526/XX-01) per MIL-C-83526
- Electrical Signal Interface: UG-1837 / U Dual Twinax Connector
- Human Interface and Safety:
  - Designed to meet requirements of MIL-STD-1472 and MIL-STD 454

Reliability: MTBF > 30,000 hours

Two Channels in One Unit

The DualFOM provides double the capability by housing two fiber optic modems (FOMs) in a single ruggedized case. Each FOM functions independently providing the capability to remote two discrete channels from the same unit.

Multiple Roles / Quick Deployment

The DualFOM and DualFOM-II both support multiple roles in the tactical environment. In site-to-site communications, both versions provide a quick deployment capability up to 16 km. As a Fiber Optic Repeater, both dual FOMs can be used to extend fiber optic links up to 32 km.

Physical Characteristics:

- Weight (lbs): 20.0 (in transportation configuration)
- Dimensions (in): 13.0 x 11.0 x 9.0 (L x W x H) (excluding handle, latches, or other protrusions)

Versatile Power

Both DualFOM and DualFOM-II can be powered by an AC power source (120 VAC and 220 VAC, 50/60 Hz) or a DC power source (28 VDC). Power cables are provided within the top cover of the transit case.

Applications

- Interconnect tactical communications assemblages including:

Radio Terminals
Radio Repeaters
Tactical Switches
Circuit Switches
Tactical Multiplexers
Satellite Support Radios
TACC Shelters

- Tactical communication systems
- Down the hill links
- Intra-node cabling
- Dispersed command post
- Digital orderwire equipment

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Multimode and Singlemode Tactical Fiber Optic Cable Assembly (TFOCA)

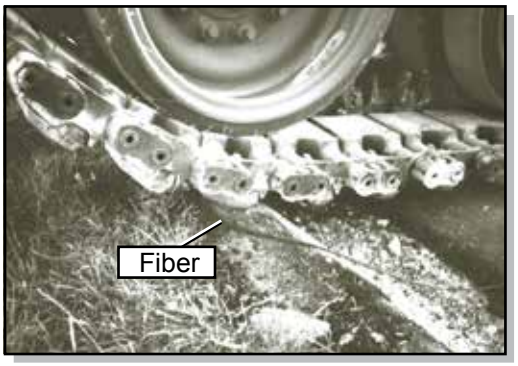
Overview

The Tactical Fiber Optic Cable Assembly (TFOCA) provides the physical connection between Fiber Optic Modems (FOMs), repeaters or other equipment capable of electronic to optical conversion. The TFOCA is a ruggedized, lightweight and tactically superior fiber optic cable that replaces existing CX-11230 coaxial cable.

Description

The TFOCA was specifically designed for quick and easy deployment in rugged, harsh environments. It was engineered to satisfy the stringent environmental and mechanical requirements for United States military tactical operations.

The cables consist of radiation-hardened multimode or singlemode optical fibers enclosed in an outer jacket of flame retardant polyurethane. An inner strength laid of aramid yarn ensures superior tensile loading and crush resistant properties.



Fiber Cable Specifications

- Optical Fiber Bandwidth @ 1300nm: ≥ 500 Mhz-km multimode, singlemode N/A
- Attenuation: ≤ 2.75 dB nominal (1km length w/2 connectors)
- Operating Temperature Range: -55° C to +85° C
- Tensile Load: (Newtons)
  - Deployment: 1780
  - Long Term: 500
- Corner Bend: 500 Newtons
- Knot: 500 Newtons

Available Lengths

Multimode

- 300 meters, 1 km, 2 km and custom lengths

Singlemode

- 2 km and custom lengths

Available Connectors

- TFOCA and *TFOCA-II®
- Expanded Beam

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