

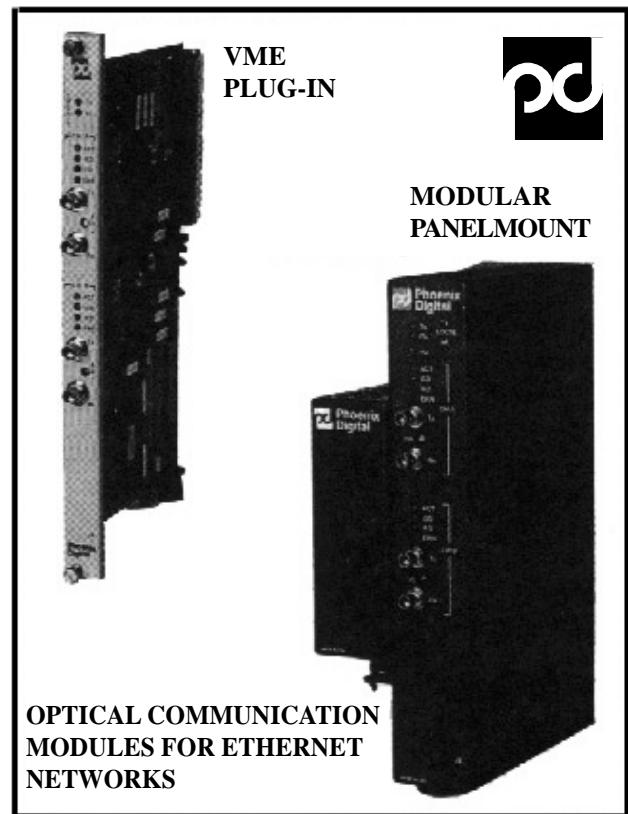


OPTICAL COMMUNICATION For ETHERNET Networks

Phoenix Digital now provides Multidrop Fiber Optic Ethernet Communications. Optical Communication Modules (OCMs) are available for VME system chassis installation, or in modular Standalone Enclosures for Panelmount Installation. . . with integral 120/220 VAC, 24 VDC, or 125 VDC power supplies.

FEATURES

- Fiber Optic Communications. . .
 - Noise Immunity
 - Intrinsically Safe
- Dependable Data Communications. . .
 - On-Line Error Checking
 - Fault Prediction
 - Fault Location
 - Fault Tolerant
 - Redundant Fiber Media
- Network-Wide Diagnostics. . .
 - Locates Fault and Impending Fault Conditions
- Supports Ethernet TCP/IP Communications. . .
 - IEEE 802.3 CSMA/CD Networks
- Integral Ethernet Repeater Function
- 10 Base-T, 10 Base-2, 10 Base-5 Media Options. . .
 - Connect via Twisted Pair, Thin-Net, or Thick-Net Coax
- Selectable Wavelengths. . .
 - 850 nanometers, 1300 nanometers
- Compatible with Both Singlemode and Multimode Fiber, and with Industrial Fiber



DESCRIPTION

Phoenix Digital's family of Optical Communication Modules for Ethernet networks provide the most advanced, comprehensive, fiber optic communication capabilities on the market today. Phoenix Digital's OCMs provide optical communication media, transparent to the communication protocol and configurable for distribution by the user in ring, bus, star, tree, or point-to-point network installations. Fiber optic cable is now the media of preference for harsh industrial network environments due to the inherent benefits of high reliability, electrical noise immunity, and intrinsic safety.

Phoenix Digital's OCMs provide continuous on-line error checking for jitter, pulsewidth distortion, carrier symmetry, and optical signal strength. All of this, together with comprehensive self-test diagnostics, optimizes the overall integrity of Ethernet communication networks at-large, providing Dependable Data Communications.

Optical communication network options include features not found in even the most expensive communication network installations:

- On-line Diagnostic Monitoring
- Self Healing Communication Recovery
- In-line Signal Monitoring
- Locates Fault and Impending Fault Conditions
- Fully Compatible with Ethernet IEEE 802.3
- Ethernet Preamble Regeneration with Signal Retiming and Restoration
- Annunciation of Low Signal Level
- Wavelength Selection
- Extended Communication Distances

Phoenix Digital's OCMs may be used together in the same physical network to connect Programmable Logic Controllers (PLCs), Distributed Control Systems (DCS), Host Computers, Workstations, Operator Interface Panels, etc. Phoenix Digital makes all of this possible, in the price range of a conventional communication modem, through application of its patented self healing communication switch and advanced optical technologies.

OPERATION

FAULT PREDICTIVE... Phoenix Digital's OCMs provide fault prediction thru diagnostic monitoring and detection of impending communication failures resulting from gradual degradation of the communication link itself. The OCM monitors for impending fault conditions by continuously measuring the actual in-line signal strength (optical power) of the

data communications at the receive data inputs on the module. The OCM continuously compares these actual in-line measurements to preset optical power reference thresholds. If the actual in-line data communication signal strength degrades below these power thresholds the OCM will detect and announce the impending failure condition via indicators on the front of the module. The OCM also provides hardwired diagnostic outputs (discrete and analog) for detecting and locating impending fault conditions, and for on-line optical power measurement. Thus, communication network status is continuously monitored, and impending failure conditions are announced and located before the communication failure actually occurs. This enables maintenance personnel to perform Predictive Maintenance on fiber optic Ethernet communication networks at-large!

FAULT MANAGEMENT... Phoenix Digital's OCMs provide fault tolerant, self healing communications through diagnostic monitoring of the communication signal waveforms at each node on the network, and ultra-high speed detection and isolation of points of communication failure anywhere on the network. OCM modules self heal around communication failures in ring, bus, star, tree, or point-to-point network configurations. The OCMs automatically redirect network traffic around points of failure until the failure conditions are corrected, and then automatically restore the communication network to its original traffic patterns. Thus, communication continuity is unconditionally maintained by the OCM module in the event of either node or media failure! In addition, the OCM provides diagnostic outputs to locate network fault conditions, enabling maintenance personnel to splice/terminate/replace fiber media, add/delete nodes, etc. on-line, without disrupting network communications! All of this is transparent to the operation of Ethernet communication networks.

INTERACTIVE DIAGNOSTICS... Phoenix Digital's OCMs provide advanced, system-level

interactive diagnostics. These diagnostics may be used to assist in troubleshooting a wide variety of different types of network problems:

- Detect and Locate Fault Conditions Throughout the Network
- Trap-and-Hold, and Locate Intermittent Communication Failures
- Detect and Locate Impending Fault Conditions Throughout the Network

These advanced diagnostics provide the user with a powerful set of tools, greatly simplifying network start-up and on-line maintenance of Ethernet communication networks.

FIBER MEDIA COMPATIBILITY... Phoenix Digital's OCMs provide optional wavelength selection for universal compatibility with all types of fiber optic cable. Wavelength options include 850 nanometer/multimode, 1300 nanometer/multimode, and 1300 nanometer/singlemode.

The IEEE 802.3 Ethernet communication standard limits the maximum distance (without bridging) on any single multidrop Ethernet communication network. The maximum allowable distance is 1.9 miles (3 kilometers. . . including fiber and wire) between the two furthest points on the network. However, longer distances are possible. Consult the factory for more information.

INSTALLATION

Phoenix Digital's Ethernet Optical Communication Modules are available as VME plug-in modules or in modular Standalone Enclosures. Plug-in OCMs install directly into VME Chassis (including VME compatible PLC chassis). Standalone OCMs may be Panelmounted. Ethernet devices may be cabled directly to OCMs using twisted pair wire (10 Base-T), RG-58 Thin-Net coax cable (10 Base-2), or thru the AUI port (Access Unit Interface) to Thick-Net coax cable transceivers (10 Base-5). (Twisted pair interface is provided via an

RJ45 connector. Thin-Net interface is provided via a BNC Connector. Thick-Net AUI transceiver interface is provided via a 15-pin D-subminiature connector.)

OCMs may be interconnected on the fiber optic network in an active bus configuration, using either multimode or singlemode fiber optic cable (See Figure on Page 7). Channel A Receive Data inputs and Transmit Data outputs should be interconnected sequentially from OCM to OCM in one direction, and Channel B Receive and Transmit Data inputs and outputs interconnected sequentially in the opposite direction. This configuration may be made fault tolerant by cross-connecting end-to-end Channel A (Ch A Transmit to Ch A Receive) and Channel B (Ch B Transmit to Ch B Receive) on the OCMs on either end of the active bus (See Figure on Page 8). This effectively transforms it into a counter-rotating ring Ethernet network configuration without requiring any other action by the user.



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SPECIFICATIONS

Fiber Optic Cable Type	: Multimode or Singlemode
Mating Connector	: ST or SMA
Transmit Launch Power	: -15 dbm (Typical, Multimode); -18 dbm (Singlemode)
Receive Sensitivity	: -32 dbm
Power Supply	
Plug-In Modules	: +5 VDC (1.8 Amps), +12 VDC (100 Milliamps)
Standalone, Panelmount Modules	: 120/220 VAC, 24 VDC, or 125 VDC.... 10 Watts
Environmental	
Operating Temperature	: 0° to 60° C (32° to 140° F)
Storage Temperature	: -40° to 85° C (-40° to 185° F)
Relative Humidity	: 0 to 95% RH, non-condensing
Dimensions	
Plug-In Modules	: Single-Wide VME 6U Module
Standalone, Panelmount Modules	: 10.38" H x 3.50" W x 7.00" D (26.36cm H x 8.90cm W x 17.78cm D)

ORDERING INFORMATION

Model Number ⁽¹⁾	Description
OCM-ETH-85	OCM For Ethernet Networks (850 nanometer multimode wavelength)
OCM-ETH-13	OCM For Ethernet Networks (1300 nanometer multimode wavelength)
OCM-CBL-AUI-10	10 Base-T PLC to OCM Interconnect Cable (10 ft/3 mtr length)

- (1) Add suffix “-P” for Standalone, Panelmount Module Enclosure.
 Add suffix “-D” for Real Time Diagnostic Outputs.
 Add suffix “-ST” for ST Fiber Optic Connector Style.
 Add suffix “-SMA” for SMA Fiber Optic Connector Style. (Available with 850 Nanometer Wavelength Only.)
 Add suffix “-24V” for 24 VDC Operation.
 Add suffix “-125V” for 125 VDC Operation.
 Add suffix “-ACV” for 120/220 VAC Operation.
 Add suffix “-A1” for Integral 10 Base-T Transceiver.
 Add suffix “-A2” for Integral 10 Base-2 Transceiver.
 Add suffix “-EXT” for Networks with 10 or more OCM-ETH modules.
 Add suffix “-SM” for Singlemode Operation. (Available with 1300 Nanometer Wavelength and ST Connector Options Only.)
 Add suffix “-HUB” to cable model number OCM-CBL-AUI-10 for direct connection to 10 Base -T Hub.

Consult factory for additional information on fiber optic modules for all major PLC and DCS communication networks; 19" Rackmount/Panelmount Modems and Industrial Fiber Optic Cable (indoor, outdoor, aerial, burial, etc.); termination and splice tool kits; fiber optic video (CCTV) and telephone communications; fiber optic modules, multiplexers, network servers, and communication controllers for MODBUS communication networks; and on-site installation support, training, and network commissioning services.

INDUSTRIAL FIBER OPTIC CABLE

Phoenix Digital provides fiber optic cable specifically designed for rugged industrial applications. Phoenix Digital's Industrial Fiber Optic Cable provides a full range of superior optical performance, rugged packaging and protection, and the physical integrity the industrial user wants and needs for ease of installation and handling.



FEATURES

- **INDUSTRIAL PACKAGING OPTIONS. . .**
 - Rugged Industrial Construction - Life Expectancy Exceeds 20 Years
 - Double Jacketing, High Tensile Strength
 - Extended Temperature and Humidity Range
 - Oil, Chemical, Moisture, Abrasion, and UV Sunlight Resistant
 - Riser Rated (OFNR) and CSA FT-4, Passes Stringent UL 1666 Flame Test
 - Plenum Rated (OFNP) and CSA FT-6, Passes Stringent UL 910 Flame Test

- **WIDE VARIETY OF INSTALLATION OPTIONS. . .**
 - Gel Filled Loose Tube Construction for both Indoor and Outdoor Installation
 - Self Supporting, All Dielectric Cable for Aerial Installation
 - Direct Burial, Armored Cable for Underground Installation
 - Low Smoke, Zero Halogen Cable for Premise Installation
 - Ultra Strong, Non-Armored Cable for Deep Mine Applications



- **SUPERIOR OPTICAL PERFORMANCE. . .**
 - Multiple Fibers per Cable (2 to 36 Fibers)
 - 9/125, 50/125, 62.5/125, and 200/230 Micron Sizes
 - Multiple Wavelengths - Multimode and Singlemode Capability

- **FULLY COMPATIBLE WITH PHOENIX DIGITAL'S COMPLETE LINE OF INDUSTRIAL OPTICAL COMMUNICATION MODULES.**

- **WHEN PHOENIX DIGITAL PROVIDES BOTH THE FIBER OPTIC MODULES AND THE FIBER OPTIC CABLE IT WARRANTS NETWORK PHYSICAL LAYER COMPATIBILITY!**



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OPTICAL PERFORMANCE

FIBER OPTIC CABLE MODEL # FOC-EXP, FOC-SSA, FOC-DBA, FOC-LSZHB, AND FOC-USNA

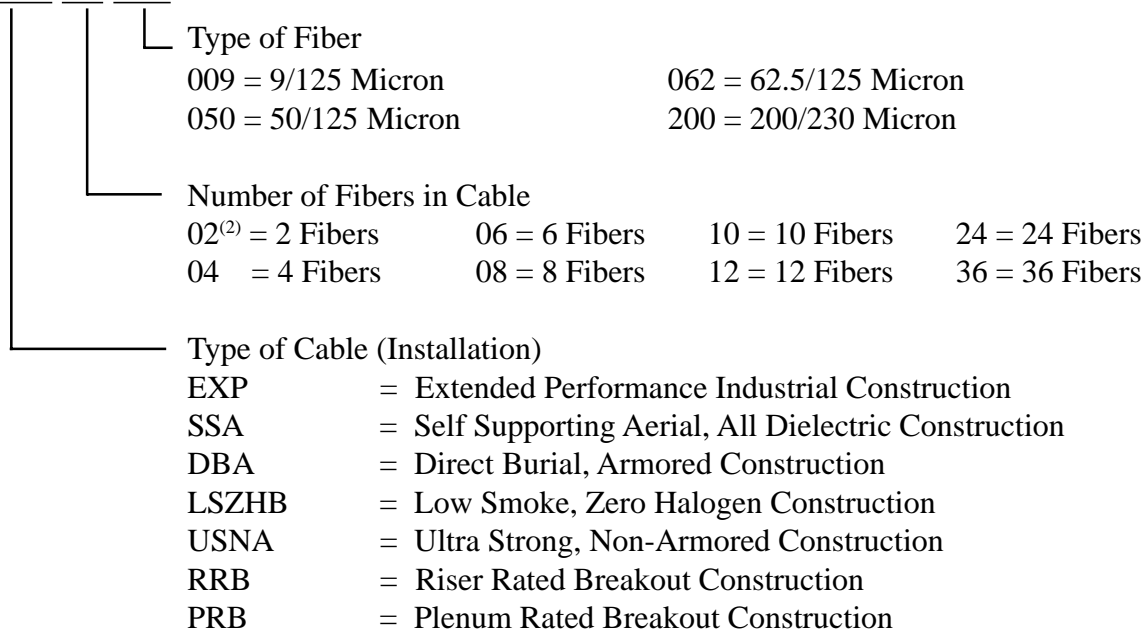
Fiber Type (Core/Cladding size...microns)	Mode Type	Max. Attenuation (db/km)		Min. Bandwidth (MHz-km)		Numerical Aperture
		850 nm	1300 nm	850 nm	1300 nm	
9/125	Singlemode	N/A	.4	N/A	N/A	N/A
50/125	Multimode	3.00	1.00	800	800	0.200
62.5/125	Multimode	3.75	1.50	160	500	0.275
200/230	Multimode	7.0	N/A	15	N/A	0.370

FIBER OPTIC CABLE MODEL # FOC-RRB AND FOC-PRB

Fiber Type (Core/Cladding size...microns)	Mode Type	Max Attenuation (db/km)		Min Bandwidth (MHz-km)		Numerical Aperture
		850 nm	1300 nm	850 nm	1300 nm	
9/125	Singlemode	N/A	.7	N/A	N/A	N/A
50/125	Multimode	3.50	1.50	800	800	0.200
62.5/125	Multimode	3.75	1.50	160	500	0.275
200/230	Multimode	12.0	N/A	15	N/A	0.370

FIBER OPTIC CABLE ORDERING INFORMATION⁽¹⁾

Model # FOC-XXX-YY-ZZZ



(1) Consult the factory for other types of cable constructions, types of optical fibers, quantities of bundled fibers, and custom cables.

(2) Specify "02F" for Flat Zipcord Breakout Construction.

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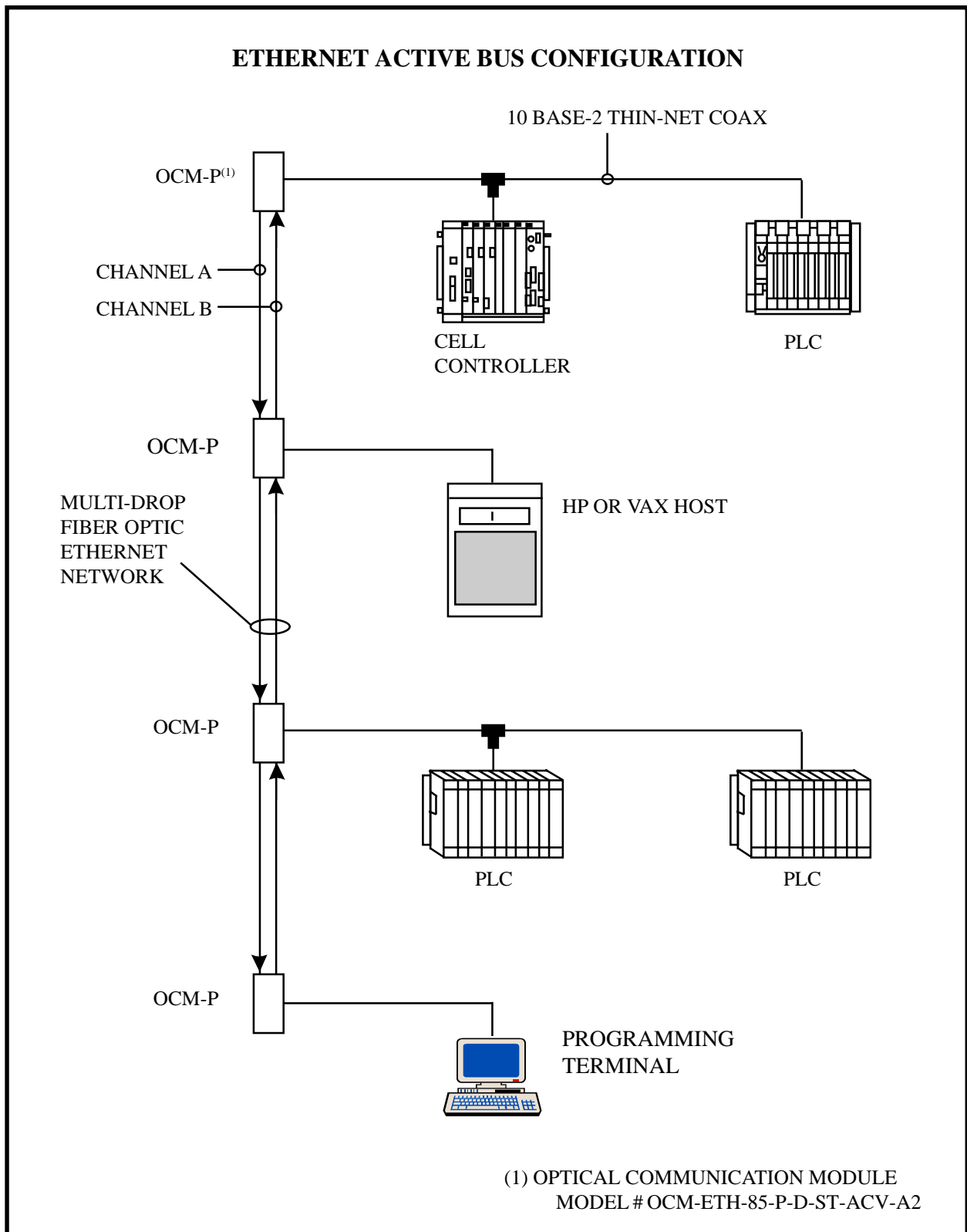
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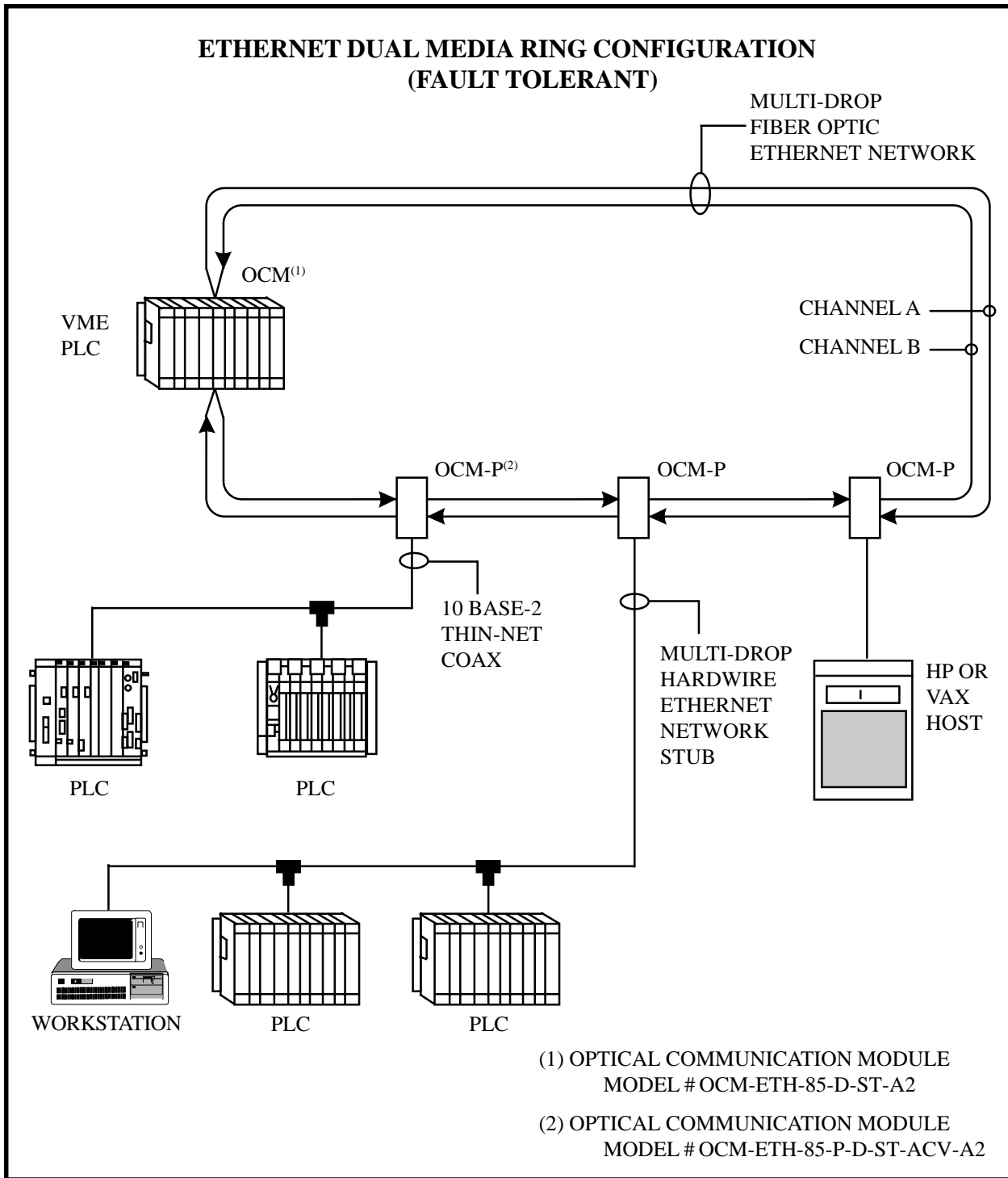
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TYPICAL ETHERNET OCM INSTALLATION CONFIGURATION



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