

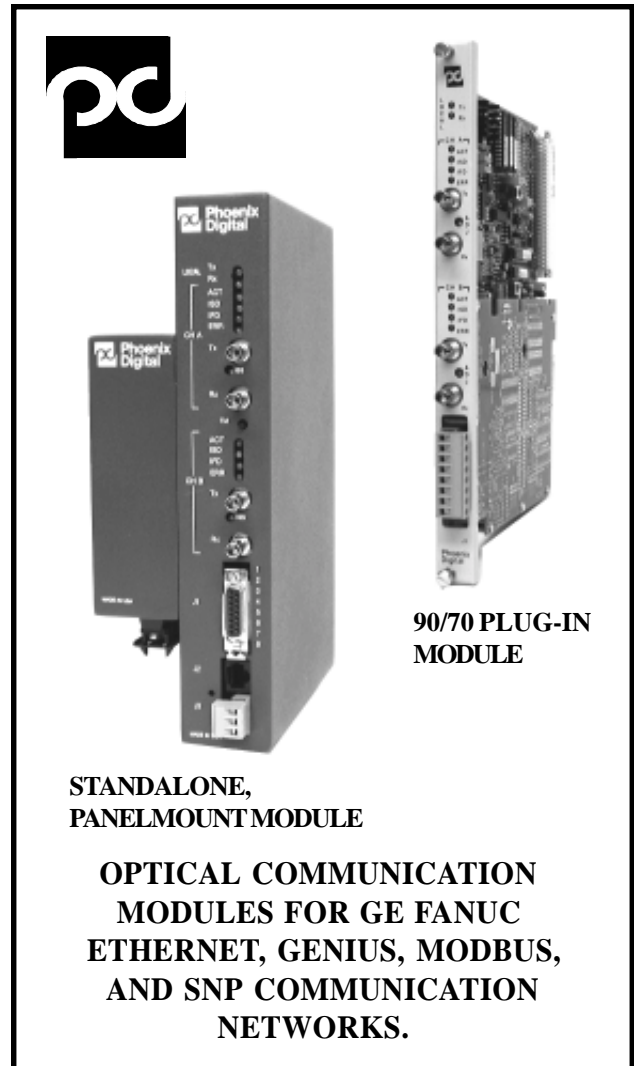


# OPTICAL COMMUNICATION For GE FANUC ETHERNET, GENIUS, MODBUS, and SNP Networks

Phoenix Digital provides Redundant, Fault Tolerant, Multidrop Fiber Optic Communications for GE Fanuc **Ethernet, Genius™, Modbus, and Series 90™ Protocol (SNP)** Communications. Optical Communication Modules (OCMs) are available for GE FANUC Series 90-70 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.
- Ethernet Modules Support TCP/IP Communications. . .
  - IEEE 802.3 CSMA/CD Networks.
- Extended Capacity Fiber Optic Ethernet. . .
  - Multidrop over 30 Fiber Optic Modules on a Single Bus or Ring Network.
- Mix and Match Etherent 10 Base-T, 10 Base-2, 10 Base-5 Media Options. . .
  - Connect via Twisted Pair, Thin-Net, or Thick-Net Coax
- Genius Modules Support Extended Data Rate. . . 153K Extended.
- Plugs Directly Into GE FANUC 90/70 Chassis for Genius, Modbus, and SNP Protocols.
- Short or Long Distance. . .
  - 6 Feet (2 Meters) to 6 Miles (10 Kilometers) Apart - Multimode Operation.
  - Over 16 Miles (25 Kilometers) Apart - Singlemode Operation.
- Selectable Wavelengths. . .
  - 850 nm, 1300 nm, 1550 nm.
- Compatible with Both Singlemode and Multimode Fiber, and with Industrial Fiber.
- Ruggedized Industrial Fiber Optic Cable. . .
  - Available only from Phoenix Digital.



## DESCRIPTION

Phoenix Digital's family of Optical Communication Modules for GE Fanuc Ethernet, Genius, Modbus, and SNP 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, Genius, Modbus, and SNP 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.
- Ethernet Modules Fully Compatible with IEEE 802.3.
- Connect over 30 Ethernet Fiber Optic Modules on a Single Multidrop Bus or Redundant Ring Network.
- Each Ethernet Module Provides Integral Hub Functionality... Extra Ports for On-Line Programming, Monitoring, and Diagnostics.
- Ethernet Modules provide Preamble Regeneration with Signal Retiming and Restoration.
- Full Duplex Ethernet Communications.
- Genius, Modbus, and SNP Modules Fully Compatible with Network Protocols.

- Genius Modules Support Extended Genius Data Rate.
- Full Duplex Modbus Communication.
- Modbus Modules Compatible with Phoenix Digital's complete line of Modbus Port Expanders, Network Servers, and Communication Controllers.
- 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 GE Fanuc PLCs, Genius I/O Blocks, Host Computers, Honeywell DCS, 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 annunciate 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 annunciated and located before the communication failure actually occurs. This

enables maintenance personnel to perform Predictive Maintenance on fiber optic Ethernet, Genius, Modbus, and SNP 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, Genius, Modbus, and SNP 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, Genius, Modbus, and SNP networks.

**EXTENDED DISTANCES...** Phoenix Digital's OCMs provide optional wavelength selection for extended distance applications. The economical 850 nanometer wavelength may be selected for data communication networks with less than 12,000 feet (3,650 meters) between nodes. The higher performance 1300 and 1550 nanometer multimode wavelengths may be selected for longer distance applications, extending communication distances between nodes to over 6 miles (10 kilometers). The 1300 and 1550 nanometer singlemode wavelengths may be selected for extended distance applications, extending communication distances between Genius, Modbus, and SNP nodes to over 16 miles (25 kilometers)! (Consult the factory for extended distance Ethernet applications exceeding 2 miles/3 kilometers.)

## INSTALLATION

Phoenix Digital's Ethernet, Genius, Modbus, and SNP Optical Communication Modules are available in modular Panelmount, Industrial Enclosures. Plug-in OCMs, which install directly into GE FANUC Series 90-70 Chassis, are also available for Genius, Modbus, and SNP Communications.

OCMs may be interconnected on the fiber optic network in an active bus configuration, using either multimode or singlemode fiber optic cable (See Figures on Pages 5 and 6.) 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 Figures on Pages 7 and 8.) This effectively transforms it into a counter-rotating ring Ethernet, Genius, Modbus, or SNP network configuration without requiring any other action by the user.

## ORDERING INFORMATION

Model Number <sup>(1)</sup>	Description
OCM-ETH	ETHERNET Optical Communication Module <sup>(2)</sup>
OCM-GEN	GENIUS Optical Communication Module <sup>(3)</sup>
OCM-MOD	MODBUS Optical Communication Module <sup>(3)</sup>
OCM-SNP	SNP Optical Communication Module <sup>(3)</sup>
OCM-CBL-A1-10	Ethernet 10 Base-T PLC to OCM Interconnect Cable (10 ft/3 mtr length)
OCM-AUI-A1	Ethernet 10 Base-T Transceiver

- (1) Add suffix “-85” for 12,000 feet/3,650 meters between nodes (850 nm Multimode Wavelength).  
 Add suffix “-13” for 32,000 feet/10 kilometers between nodes (1300 nm Multimode Wavelength).  
 Add suffix “-15” for 43,000 feet/13 kilometers between nodes (1550 nm Multimode Wavelength).  
 Add suffix “-P” for Standalone, Panelmount Module Enclosure. (Required for OCM-ETH modules.)  
 Add suffix “-D” for Real Time Diagnostic Option.  
 Add suffix “-ST” for ST Fiber Optic Connector Style.  
 Add suffix “-SMA” for SMA Fiber Optic Connector Style. (Available only with the 850 Nanometer Wavelength.)  
 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” to OCM-ETH Modules for 10 Base-T Operation. (Two “-A1” suffixes may be added to OCM-ETH model numbers for dual, integral 10 Base-T Transceiver Operation.)  
 Add suffix “-A2” to OCM-ETH Modules for 10 Base-2 Operation.  
 Add suffix “-EXT” for Networks with 10 or More OCM-ETH Modules.  
 Add suffix “-SM” for Singlemode Operation. (Available with 1300 Nanometer Wavelength, 1550 Nanometer Wavelength, and ST Connector Options Only.)  
 Add suffix “-422” to OCM-MOD Modules for RS-422 Modbus communications.  
 Add suffix “-485” to OCM-MOD Modules for RS-485 Modbus communications.  
 Add suffix “-FD” to OCM-ETH (10 Base-T only) and OCM-MOD Modules for Full Duplex, Point-to-Point Communications.
- (2) Consult factory for more information on Ethernet communication networks with distances over 2 miles/3 kilometers.

- (3) 90/70 Plug-In Modules. (Add suffix “-P” for Standalone, Panelmount Enclosure.)

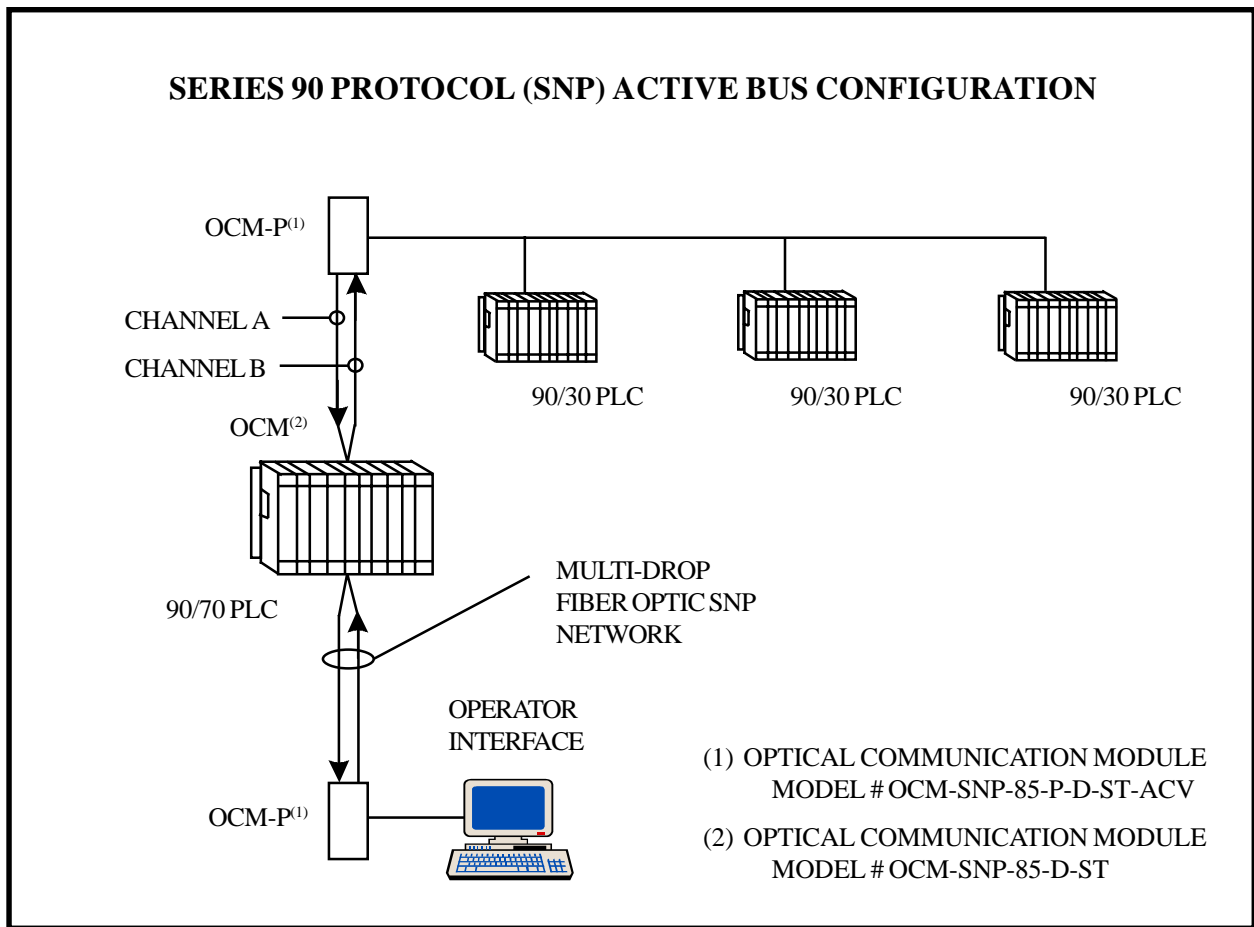
Phoenix Digital provides ruggedized fiber optic solutions to integrate **GE Fanuc/Cisco** Industrial Network Designs into both new and existing factory and process networks. Phoenix Digital’s Multidrop, Topology Independent fiber optic products provide significant savings in wiring cost and installation, minimize workflow disruption, and maintain the full integrity of the GE Fanuc Communication and Control Networks at-large.

Consult the factory for additional information on fiber optic modules for other Open Standard Networks; other Open and Proprietary Control Networks; 19” Rackmount/Panelmount Modems; Industrial Fiber Optic Cable (indoor, outdoor, aerial, burial, etc.); termination and splice tool kits; **MODBUS PORT EXPANDERS**, multiplexers, network servers, and communication controllers for MODBUS networks; and on-site installation support, training, and network commissioning services.

Genius and Series 90 are registered trademarks of GE FANUC Automation

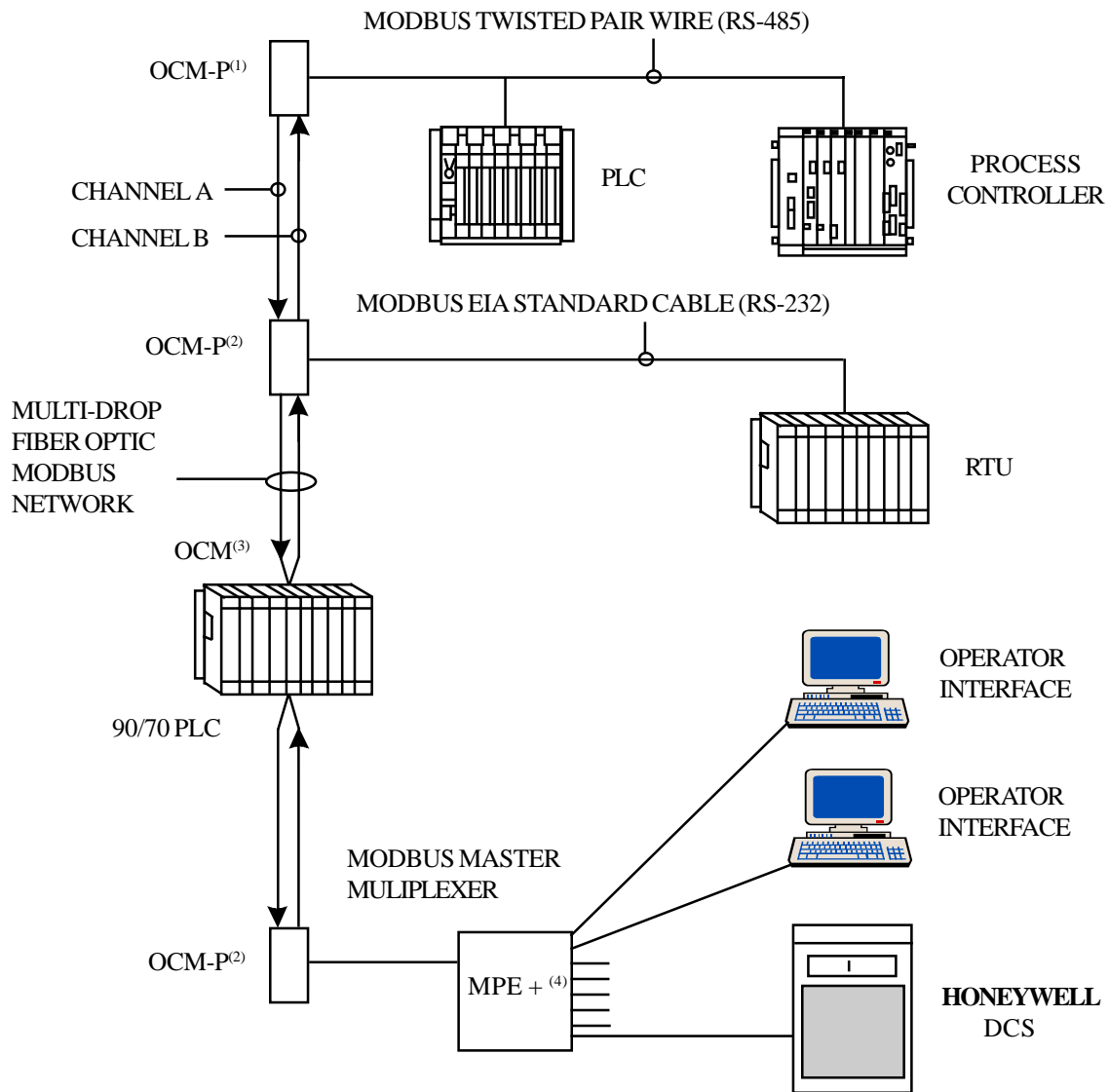
### SPECIFICATIONS

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	: 120/220 VAC, 24 VDC, or 125 VDC.... 15 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	
Series 90-70 Plug-In Modules	: Single Slot, GE Fanuc Series 90-70 Module
Standalone, Panelmount Modules for Genius, SNP, Modbus	: 10.38" H x 3.50" W x 7.00" D (26.36cm H x 8.90cm W x 17.78cm D)
Standalone, Panelmount Modules for Ethernet	: 10.38" H x 3.50" W x 6.14" D (26.36cm H x 8.90cm W x 15.60cm D)



**TYPICAL SNP OCM INSTALLATION CONFIGURATION**

**MODBUS ACTIVE BUS CONFIGURATION**



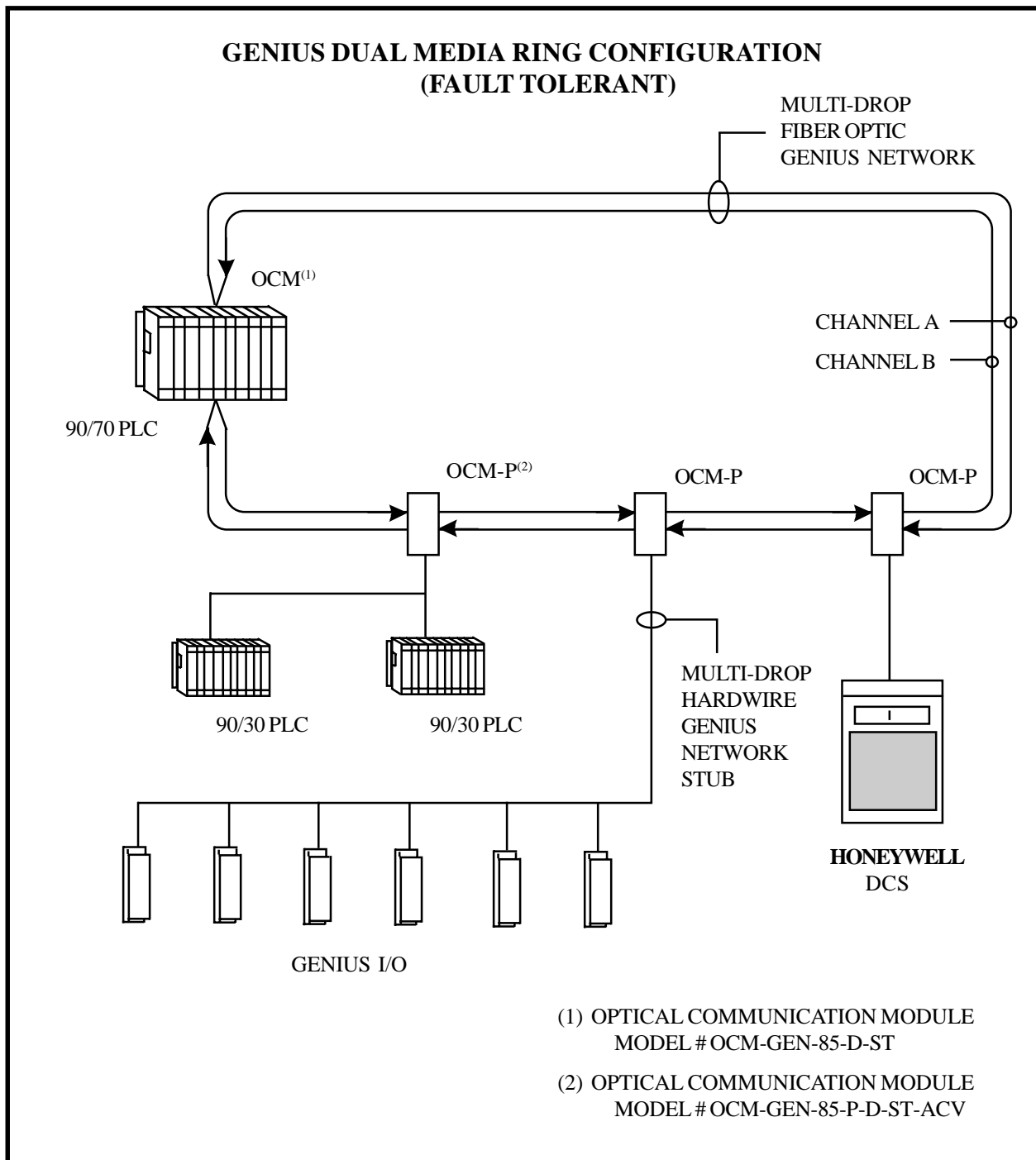
(1) OPTICAL COMMUNICATION MODULE  
MODEL # OCM-MOD-85-P-D-ST-ACV-485

(2) OPTICAL COMMUNICATION MODULE  
MODEL # OCM-MOD-85-P-D-ST-ACV

(3) OPTICAL COMMUNICATION MODULE  
MODEL # OCM-MOD-85-D-ST

(4) MODBUS PORT EXPANDER PLUS  
MODEL # MPE + - ACV  
(Consult the factory for more information on Phoenix Digital's complete line of Modbus Port Expanders, Network Servers, and Communication Controllers.)

**TYPICAL MODBUS OCM and MPE+ INSTALLATION CONFIGURATION**

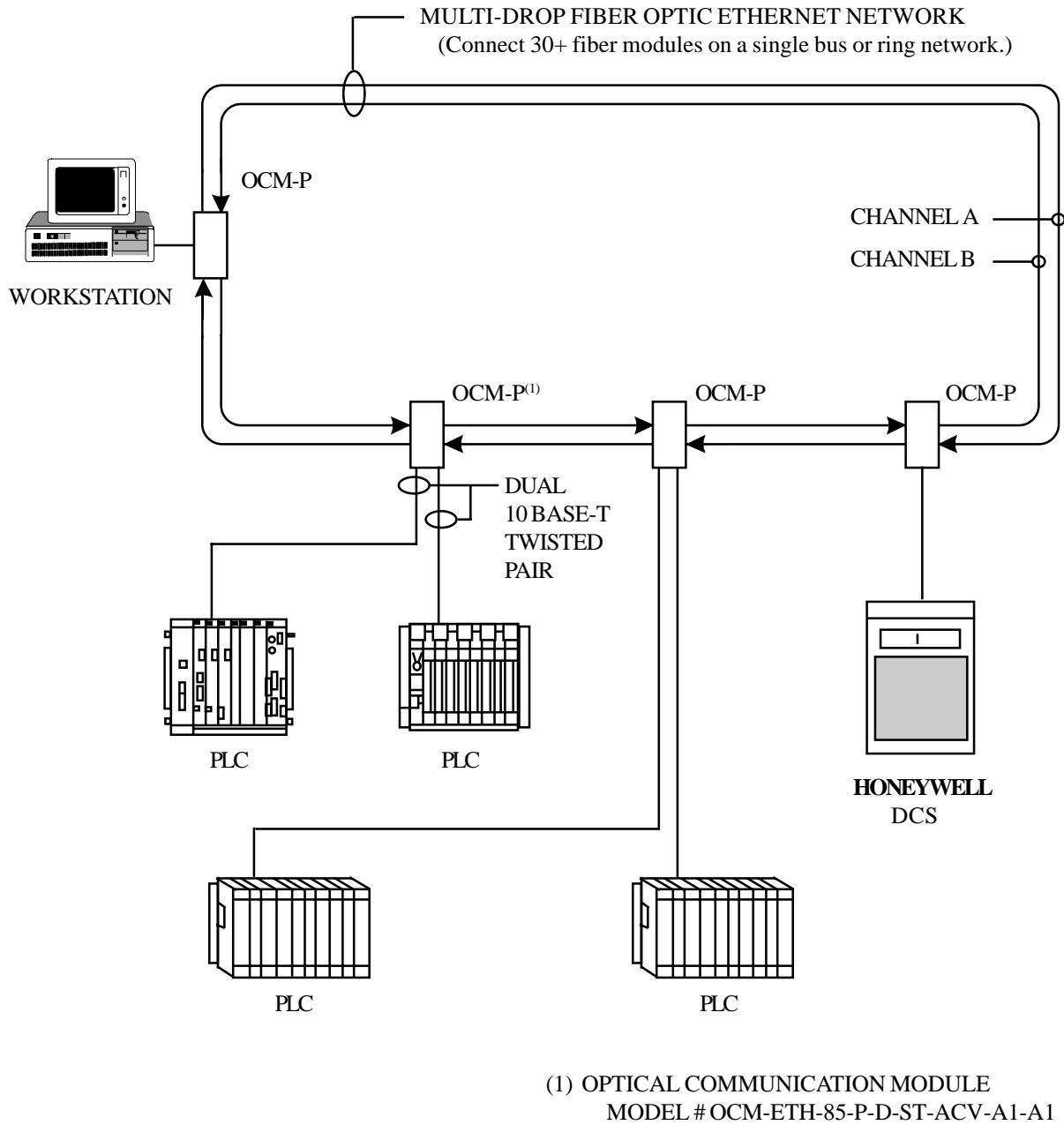


**TYPICAL GENIUS OCM INSTALLATION CONFIGURATION**



7650 East Evans Rd., Bldg. A  
 Scottsdale, AZ 85260  
 (480) 483-7393 Phone  
 (480) 483-7391 Fax  
 email: phxdigital@aol.com  
 internet: <http://www.phoenixdigitalcorp.com>

### ETHERNET DUAL MEDIA RING CONFIGURATION (FAULT TOLERANT)



### TYPICAL ETHERNET OCM INSTALLATION CONFIGURATION



7650 East Evans Rd., Bldg. A  
 Scottsdale, AZ 85260  
 (480) 483-7393 Phone  
 (480) 483-7391 Fax  
 email: phxdigital@aol.com  
 internet: <http://www.phoenixdigitalcorp.com>