PHOENIX DIGITAL CORPORATION

ALLEN-BRADLEY DATA HIGHWAY, DATA HIGHWAY PLUS, REMOTE I/O, AND SLC 500 DH-485 OPTICAL COMMUNICATION MODULES

Users Manual

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ALLEN-BRADLEY DATA HIGHWAY, DATA HIGHWAY PLUS,
REMOTE I/O, AND SLC 500 DH-485 OPTICAL COMMUNICATION MODULES USERS MANUAL

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CHAPTER 1

DESCRIPTION AND SPECIFICATION

1.1 INTRODUCTION

Phoenix Digital's family of Allen-Bradley Data Highway, Data Highway Plus, Remote I/O, and SLC 500 DH-485 Optical Communication Modules (OCMs) and Optical Link Couplers (OLCs) provide the most advanced, comprehensive, state-of-the-art fiber optic communication capabilities on the market today. Phoenix Digital's OCM/OLC modules translate Data Highway, Data Highway Plus, Remote I/O, and SLC 500 DH-485 hardwire networks into an optical network medium, 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 network options include features not found in even the most expensive communication network installations; on-line diagnostic monitoring with high speed self healing communication recovery around points of failure (Fault Tolerant), in-line signal strength monitoring with annunciation of impending communication failures (Fault Predictive), interactive diagnostics to locate fault and impending fault conditions (accessible by the user program), and wavelength selection for matching fiber media characteristics to enable communication over extended distances. Phoenix Digital makes all of this possible through application of its patented self healing communication switch and advanced optical measurement technologies.

The following table provides correspondence between OCM/OLC Model # and Allen-Bradley network compatibility. The user should check the OCM/OLC Model # label located on the side of the OCM/OLC module cover to verify network interface compatibility.

OCM/OLC Model #	Network Compatibility
OCM-DHY-xx(1)-(2)-(3)-(4)-(5)-(6)	Data Highway Communications
OCM-DPR-xx(1)-(2)-(3)-(4)-(5)-(6)	Data Highway Plus and Remote I/O Communications (1771 Plug-In and Standalone, Panelmount Modules
OLC-DPR-xx-(1)-(3)-(4)-(6)	Data Highway Plus and Remote I/O Communications (1746 Plug-In Modules Only)
OLC-DSL-xx(1)-(2)-(3)-(4)-(5)-(6)	SLC 500 DH-485 Communications
OLC-CBL-SC-(7)	SLC 500 Controller to OLC Interconnect Cable (1 Foot/.3 Meter Length... See Appendix B)
OCM-PSM-ACV	Standalone Auxiliary AC Power Supply (120/220 VAC, 50/60 Hz Input; +5 VDC Output)
OCM-PSM-125V	Standalone Auxiliary 125 VDC Power Supply (+125 VDC Input; +5 VDC Output)

(1) "xx" = 85 for 850 nanometer wavelength selection
= 13 for 1300 nanometer wavelength selection (extended distance)
(2) "P" = Standalone Panelmount Enclosure
blank = 1771 Plug-In Module (OCM), 1746 Plug-In Module (OLC)
(3) "D" = Interactive Diagnostics
blank = No Diagnostics
(4) "ST" = ST Fiber Optic Connector Style
"SMA" = SMA Fiber Optic Connector Style
(5) "24V" = 24 VDC Operation
"ACV" = 120/220 VAC, 50/60 Hz Operation
"125V" = 125 VDC Operation
blank = +5 VDC Operation
(6) "SM" = Singlemode Fiber Compatibility (Available with 1300nm Wavelength and ST Connector options only)
blank = Multimode Fiber Compatibility
(7) "10" = 10 Foot/3 Meter Length
blank = 1 Foot/.3 Meter Length

A summary of selected OCM/OLC features is given below:

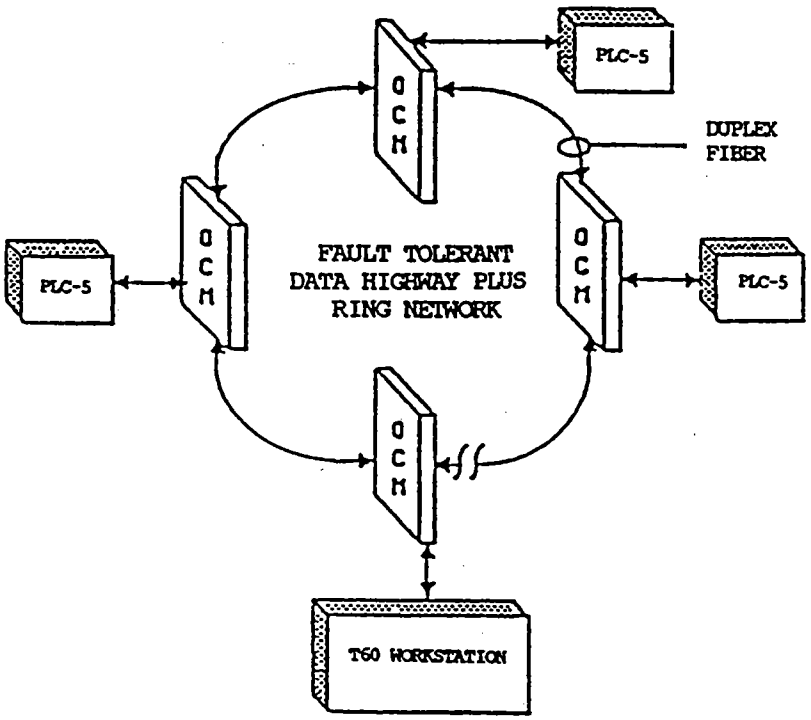
- o Supports a Wide Range of Communication Distances (beyond 6 miles/10 kilometers between nodes using multimode fiber, beyond 16 miles/25 kilometers between nodes using singlemode fiber)
- o Fault Tolerant Communication: Provides On-line Diagnostic Monitoring and High Speed, Self Healing Communication Recovery
- o Fault Predictive Communication: Provides In-line Optical Signal Strength Monitoring and Annunciation of Impending Communication Failures
- o Interactive Diagnostics (User Program Accessible): Locates and Traps Fault and Impending Fault Conditions Throughout the Network
- o Selectable Wavelengths: 850 nanometer, 1300 nanometer (multimode), 1300 nanometer (singlemode)
- o Easy to see, visual indication of Communication Diagnostic Status

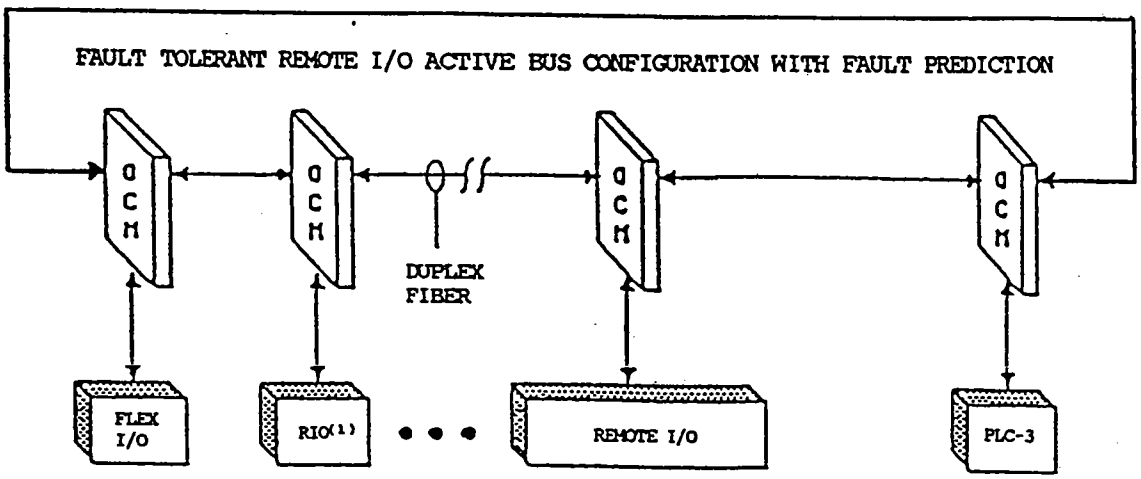
1.2 PRODUCT DESCRIPTION

1.2.1 FAULT TOLERANT, SELF HEALING COMMUNICATION

Phoenix Digital's Fault Tolerant, Self Healing Communication technology provides diagnostic monitoring of the communication signal waveforms at each node on the network, and ultra-high speed detection, isolation, and correction of points of communication failure anywhere on the network grid. OCM/OLC modules will self heal around communication failures in ring, bus, star, tree, or point-to-point network configurations. Figures 1 and 2 illustrate Examples of Typical OCM/OLC Network Configurations.

The ultra-high speed, self healing communication technology on each OCM/OLC module will automatically redirect network traffic around points of failure (wrapback communication). In a failed condition the OCM/OLC communication network will self heal around a fault by redirecting data communications around the point of failure. This is accomplished by wrapping back network communications at the communication nodes on either side of the point of failure, through the use of a high-speed, combinational wrapback communication switch (hardware pass-thru, non-software interactive) built into the front-end optical interface of each OCM/OLC communication module. Examples of how OCM/OLC networks provide self healing communication wrapback are illustrated in Figures 3 and 4. Diagnostic monitoring circuitry at each node will continuously monitor the integrity of the communication carriers present at the receive inputs of each communication channel. This high speed combinational diagnostic monitoring circuitry will monitor and detect communication failures

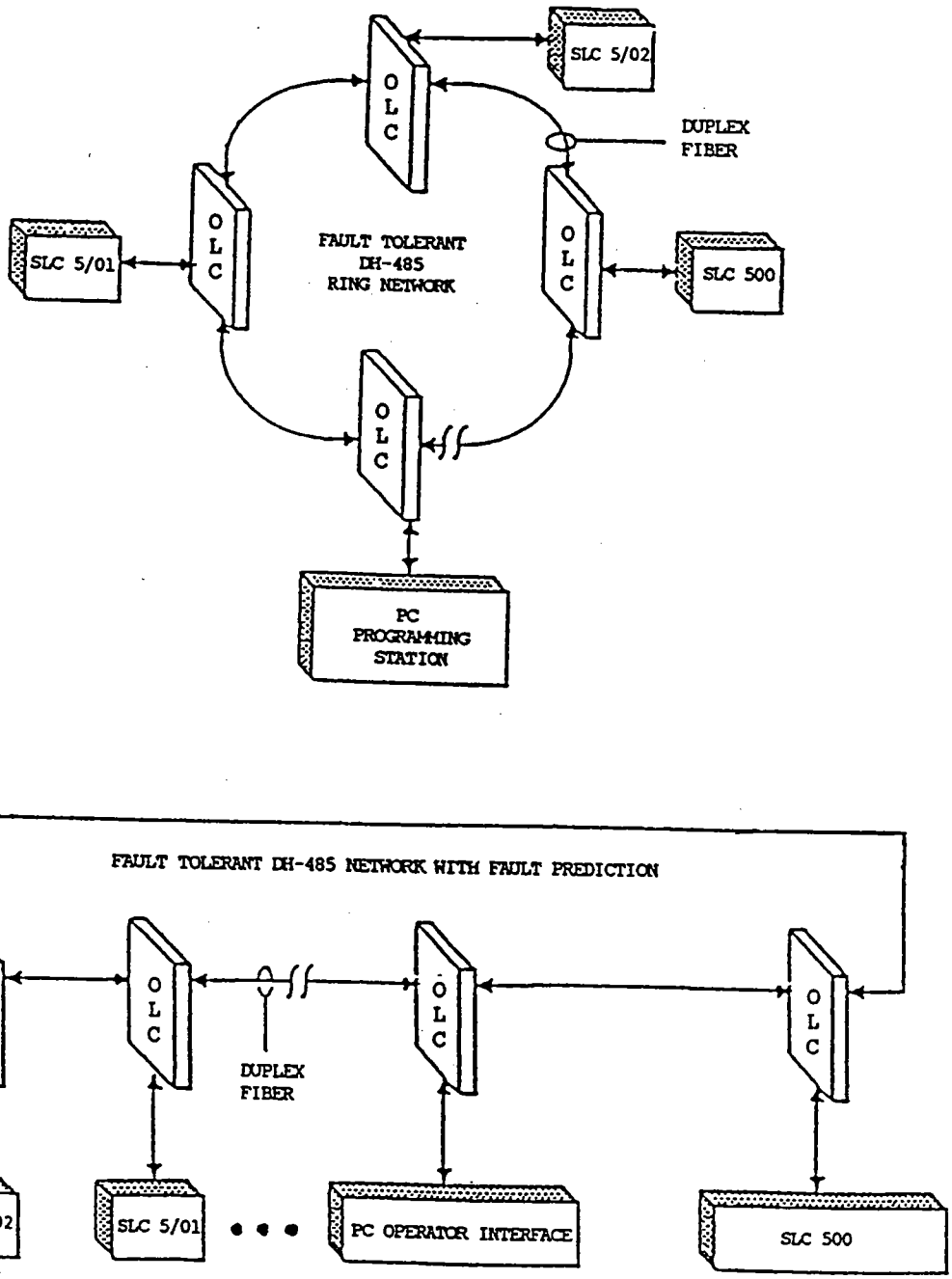




(1) RIO = REMOTE I/O

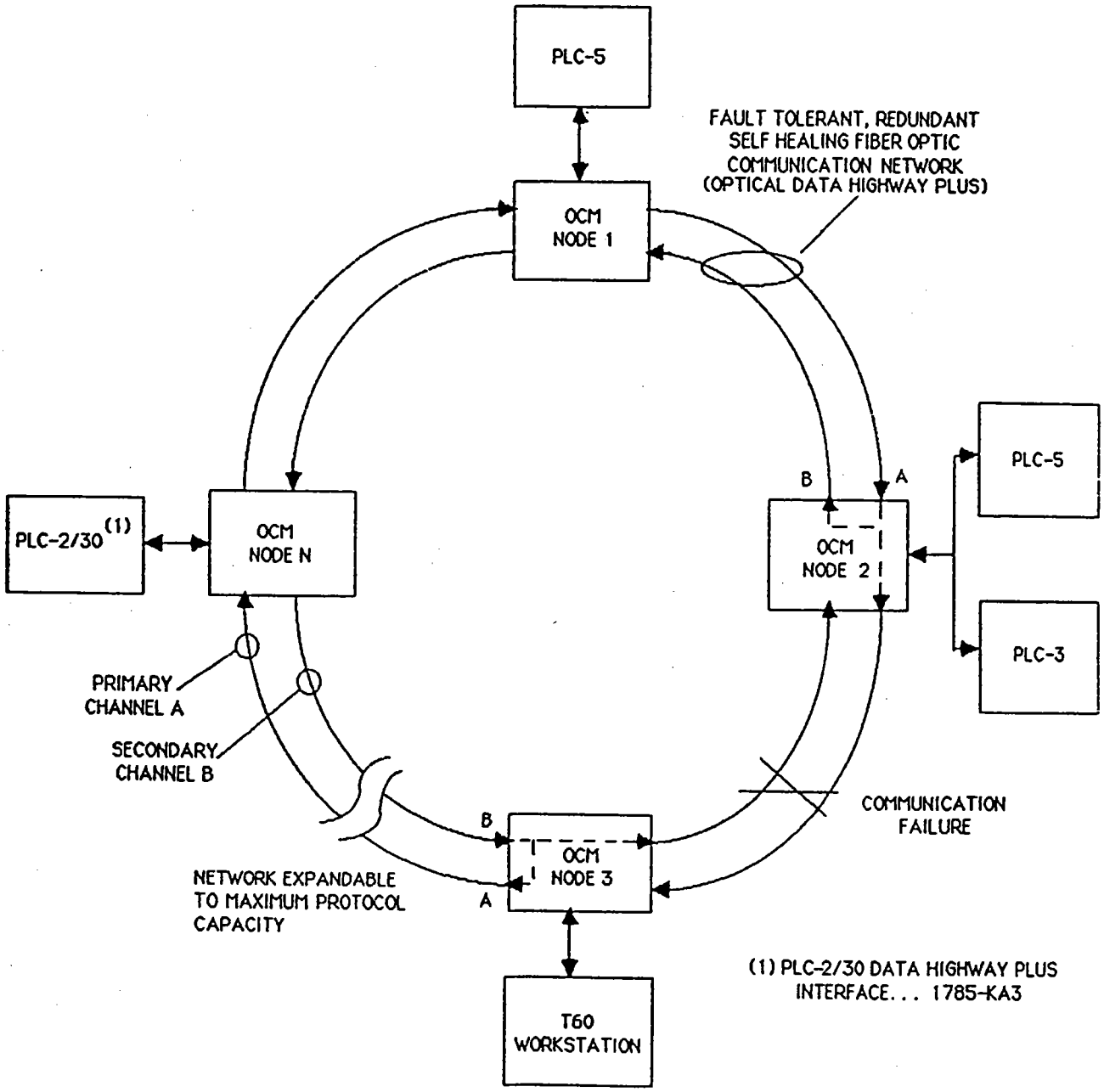
EXAMPLES OF TYPICAL OCM NETWORK CONFIGURATIONS

FIGURE 1



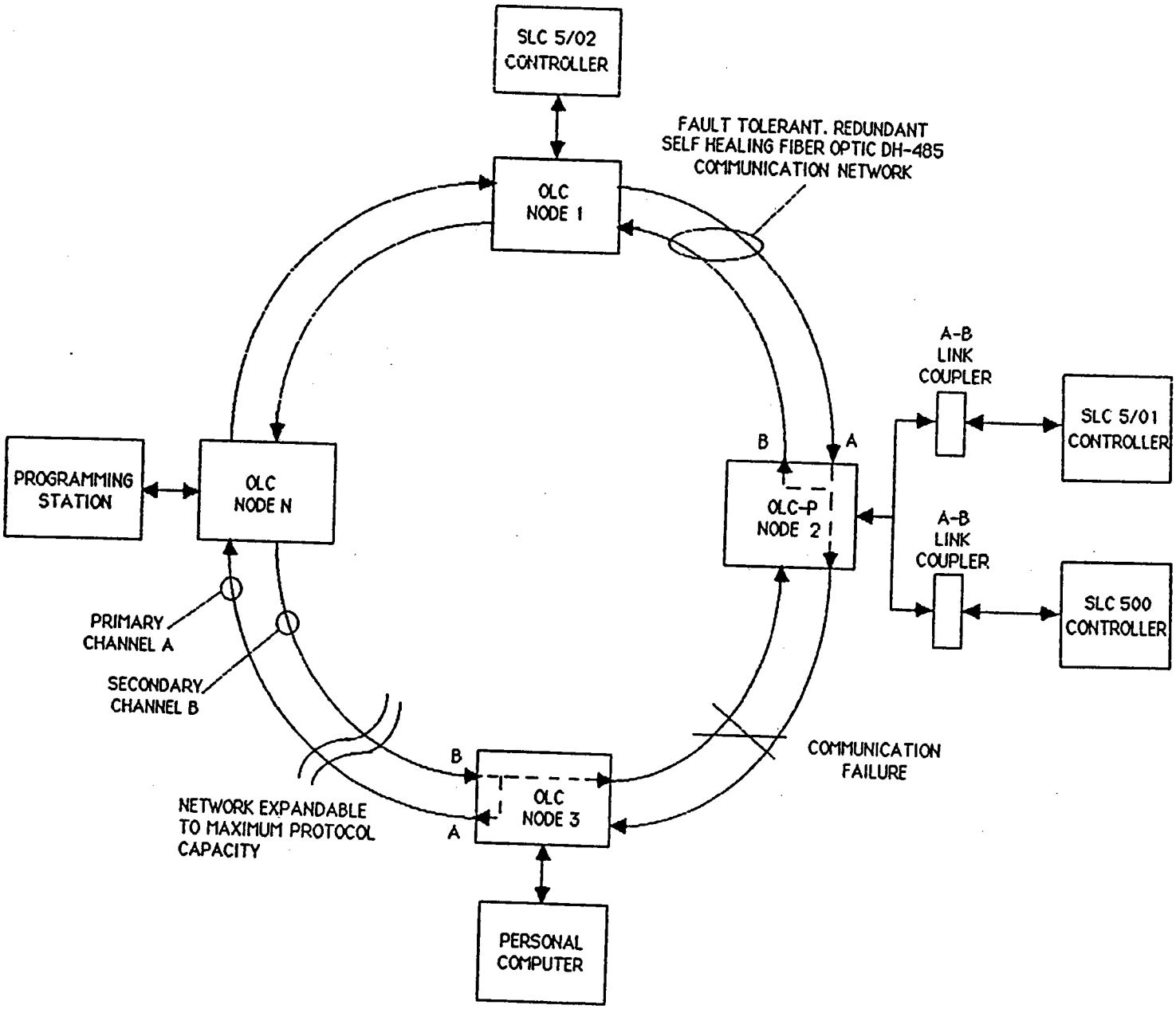
EXAMPLES OF TYPICAL OLC NETWORK CONFIGURATIONS

FIGURE 2



OCM DATA HIGHWAY PLUS NETWORK ILLUSTRATING
SELF HEALING COMMUNICATION WRAPBACK

FIGURE 3



OLC DH-485 NETWORK ILLUSTRATING
SELF HEALING COMMUNICATION WRAPBACK

FIGURE 4

in carrier symmetry, jitter, amplitude, and babble. In the event a fault condition is diagnosed on the primary communication channel receive input (Figures 3, 4... Node 3/Channel A) the high speed, self-healing communication switch will immediately redirect communication by retransmitting data received from the secondary receive input (Node 3/Channel B) on both the primary and secondary transmit outputs. Analogously, when a fault is detected on the secondary communication channel receive input (Node 2/Channel B) the self-healing communication switch will redirect communication by retransmitting data received from the primary receive input (Node 2/Channel A) on both transmit outputs. The fault condition simulated between nodes 2 and 3 is effectively isolated on one side by node 2 which redirects channel A data back via channel B, and on the other side by node 3 which redirects channel B data back via channel A. Essentially the network dynamically reconfigures to form a new ring from node 2 to node 3, away from the point of failure (the long way around the network), thus insuring communication network continuity and fault isolation. In addition to providing network fault tolerance, OCM/OLC modules enable maintenance personnel to locate fault conditions (interactive diagnostics... remote status monitoring), add/delete nodes, and splice/terminate/replace media on-line, without disrupting network communications.

Communication continuity will be unconditionally maintained by OCM/OLC modules in the event of either node or media failure. When the source of the network failure is corrected, OCM/OLC modules will automatically restore the communication network to its' original traffic patterns. Data Highway, Data Highway Plus, Remote I/O, and SLC 500 DH-485 networks may be implemented in any combination of hardwire multi-drop and fiber optic daisychain network configurations.

1.2.2 FAULT PREDICTIVE COMMUNICATION

Phoenix Digital's Fault Predictive Communication Technology provides diagnostic monitoring and detection of impending communication failures resulting from gradual degradation of the communication link itself. The OCM/OLC module monitors impending fault conditions by continuously measuring the actual in-line signal strength (optical power) of the data communications at each receive input on the module. The OCM/OLC module continuously compares these actual in-line measurements to preset optical power reference thresholds, which are normalized to power levels where valid network communications will still be assured but impending communication failures can be accurately predicted. If the actual in-line data communication signal strength degrades below these power thresholds (resulting from one or more sources of link degradation) the OCM/OLC module will automatically detect and annunciate the impending failure condition via visual indicators on the front of the module. The OCM/OLC also provides User Program Accessible, Interactive Diagnostics (1771 Plug-In OCM/1746 Plug-In OLC) and Hardwired Diagnostic Outputs (Standalone, Panelmount OCM/OLC) for remote monitoring, detecting, and locating impending fault conditions (remote status monitoring). In addition, the OCM/OLC module provides a linear DC voltage representation (analog) of the

actual in-line signal strength (normalized for a 0 to +3.5 volt range) for more precise monitoring of communication link status (on-line optical power metering). Thus, communication link status is continuously monitored and impending failure conditions are annunciated by the OCM/OLC module before the communication failure actually occurs, enabling maintenance personnel to perform Predictive Maintenance on the fiber optic communication network at-large. (The Impending Fault Monitoring feature is available only on multimode fiber optic modules with the "-D" Diagnostic Option.)

1.2.3 WAVELENGTH SELECTION FOR LONG DISTANCE COMMUNICATION

The OCM/OLC module provides three options for wavelength selection. The economical 850 nanometer multimode wavelength may be selected for data communication networks with less than 12,000 feet (3,650 meters) between communication nodes. The higher performance 1300 nanometer multimode wavelength may be selected for longer distance applications, extending communication distances between nodes to over 6 miles (10 kilometers). For maximum distance, the ultra-high performance 1300 nanometer singlemode wavelength may be selected, extending communication distances to over 16 miles (25 kilometers) between communication nodes!

1.3 PRODUCT SPECIFICATIONS

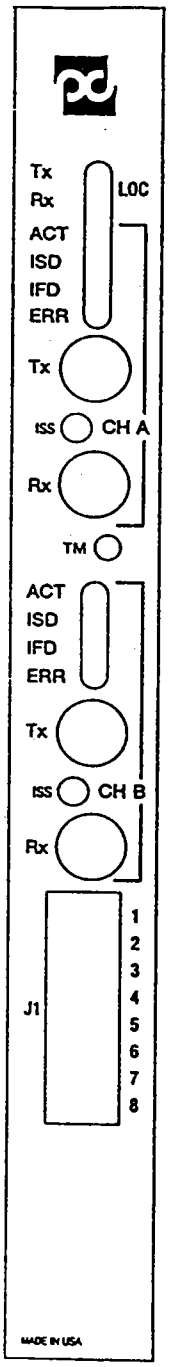
OCM/OLC Mounting Dimensions and Connector Designations are provided in Figures 5, 6, and 7.

1.3.1 DEVICE INTERFACE SPECIFICATIONS

1.3.1.1 Data Highway, Data Highway Plus, and Remote I/O

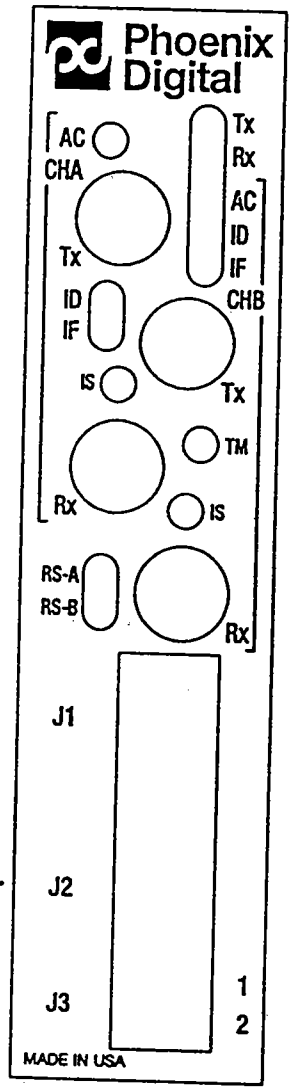
1.3.1.1.1 1771 Plug-In and Standalone, Panelmount OCM-DHYs and OCM-DPRs (Optical Communication Modules for Data Highway, Data Highway Plus, and Remote I/O)

OCM Device Interface Port connections are provided on the front of the OCM module (designated as J1 - see Figures 5 and 7). Specifications detailing the OCM device interface port pin-out are given below:



ALLEN-BRADLEY DATA HIGHWAY, DATA HIGHWAY PLUS, AND REMOTE I/O 1771 PLUG-IN OCM CONNECTOR DESIGNATIONS

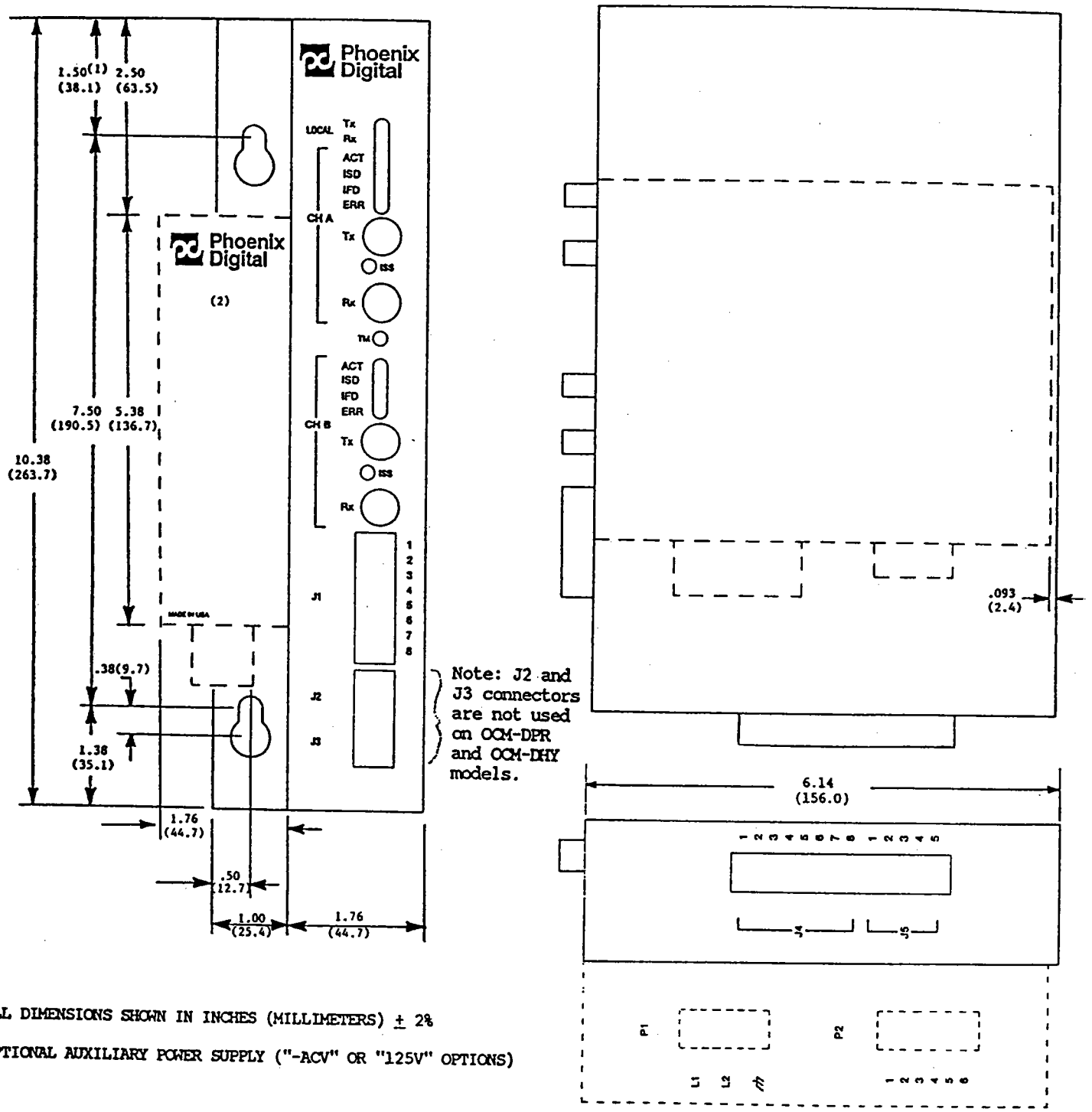
FIGURE 5



Note: J2 and J3 connectors are not used on OLC-DPR modules

ALLEN-BRADLEY SLC 500 DH-485, DATA HIGHWAY PLUS, AND REMOTE I/O 1746 PLUG-IN OLC CONNECTOR DESIGNATIONS

FIGURE 6



(1) ALL DIMENSIONS SHOWN IN INCHES (MILLIMETERS) ± 2%

(2) OPTIONAL AUXILIARY POWER SUPPLY ("-ACV" OR "125V" OPTIONS)

ALLEN-BRADLEY DATA HIGHWAY, DATA HIGHWAY PLUS, REMOTE I/O, AND DH-485 STANDALONE, PANELMOUNT OCM/OLC MOUNTING DIMENSIONS AND CONNECTOR DESIGNATIONS

FIGURE 7

J1 Connector Pin Numbers(1)	Data Highway (DH), Data Highway Plus (DH+), Remote I/O (RIO) Signal Name
1(2)	ChA Receive Signal Strength (RSS)
2	RSS Signal Ground
3(2)	ChB Receive Signal Strength
4	Shield In
5	Shield Out
6(3,4)	Serial 2/Blue (DH, DH+), Serial 1/Blue (RIO)
7(3,4)	Serial 1/Clear (DH, DH+), Serial 2/Clear (RIO)
8(3)	Termination

OCM-DHY, OCM-DPR DEVICE INTERFACE PIN DEFINITIONS

TABLE 1

(1) Orientation - Top to bottom on front of module (Pins 1 thru 8 respectively). (Note: All unused connector screw terminals should be fully seated.)

(2) Channel A and B RSS provide DC voltage outputs proportional to the optical signal strength on fiber optic channels A and B respectively (multimode only). See Interactive Diagnostics in Section 1.3.3 for more detailed information.

(3) Each end of the electrical Data Highway, Data Highway Plus, or Remote I/O network stub must be terminated with either an 82 ohm, 5%, 1/4 watt resistor (Remote I/O "Extended Node" and 230.4K baud networks), or a 150 ohm, 5%, 1/4 watt resistor (57.6K baud and 115.2K baud networks... excluding Remote I/O "Extended Node" networks).

A 150 ohm, 5%, 1/4 watt termination resistor is internally provided in every OCM. This resistor may be connected across Serial 1 and Serial 2 by jumpering together pins 7 and 8 on the OCM J1 connector (Factory Default). If the OCM is located on either end of the net work stub and a 150 ohm termination resistor is required then a termination jumper must be provided on the OCM. If it is not on the end of the network stub then the OCM should not be terminated. If an 82 ohm, 5%, 1/4 watt termination resistor is required at the OCM then this resistor must be connected externally on the J1 connector, across pin numbers 6 and 7 (Serial 1 and Serial 2, respectively). In this case J1 connector pins 7 and 8 should NOT be jumpered together. (An external 82 ohm resistor is provided with every OCM-DPR.)

If the OCM is not connected to any Allen-Bradley devices (i.e. used as a fiber optic repeater on the network) it should have the J1 Connector Local Interface disabled. See Interactive Diagnostics in Section 1.3.3 for more information.

Consult Allen-Bradley Data Highway, Data Highway Plus, and Remote I/O Network Installation Guidelines for more information on network installation and wiring procedures.

(4) All Data Highway, Data Highway Plus, and Remote I/O devices on the hardwired network stub must be interconnected Serial 1 to Serial 1, Serial 2 to Serial 2. Cross-connecting Serial 1 and Serial 2 will cause communication failures.

OCM model number OCM-DHY provides fiber optic Data Highway communications at 57.6K baud. OCM model number OCM-DPR provides fiber optic Data Highway Plus communications at 57.6K baud; and fiber optic Remote I/O communications at 57.6K baud, 115.2K baud, or 230.4K baud. (See Configuration Instructions in Section 2.7 for more information.) The user must follow all Allen-Bradley wire installation and cable termination procedures for cabling from Allen-Bradley modules to OCMs.

1.3.1.1.2 1746 Plug-In OLC-DPR (Optical Link Couplers for Data Highway Plus and Remote I/O)

OLC-DPR Device Interface Port connections are provided on the front of the OLC-DPR module (designated as J1 - see Figure 6). Specifications detailing the OLC-DPR device interface port pin-out are given below:

J1 Connector Pin Numbers(1)	Data Highway (DH), Data Highway Plus (DH+), Remote I/O (RIO) Signal Name
1(2,3)	Serial 2/Blue (DH, DH+), Serial 1/Blue (RIO)
2(2,3)	Serial 1/Clear (DH, DH+), Serial 2/Clear (RIO)
3(2)	Termination
4	Shield In
5	Shield Out
6	Chassis Ground
7(4)	+5 VDC Input
8(4)	Signal Ground

OLC-DPR DEVICE INTERFACE PIN DEFINITIONS

TABLE 2

(1) Orientation - Top to bottom on front of module (Pins 1 thru 8 respectively). (Note: All unused connector screw terminals should be fully seated.)

(2) Each end of the electrical Data Highway, Data Highway Plus, or Remote I/O network stub must be terminated with either an 82 ohm, 5%, 1/4 watt resistor (Remote I/O "Extended Node" and 230.4K baud networks), or a 150 ohm, 5%, 1/4 watt resistor (57.6K baud and 115.2K baud networks... excluding Remote I/O "Extended Node" networks).

A 150 ohm, 5%, 1/4 watt termination resistor is internally provided in every OLC-DPR. This resistor may be connected across Serial 1 and Serial 2 by jumpering together pins 2 and 3 on the OLC J1 connector. If the OLC is located on either end of the network stub and a 150 ohm termination resistor is required than a termination jumper must be provided on the OLC. If it is not on the end of the network stub then the OLC should not be terminated. If an 82 ohm, 5%, 1/4 watt termination resistor is required at the OLC then this resistor must be connected externally on the J1 connector, across pin numbers 1 and 2 (Serial 1 and Serial 2, respectively). In this case J1 connector pins 2 and 3 should NOT be jumpered together. (An external 82 ohm resistor is provided with every OLC-DPR.)

If the OLC is not connected to any Allen-Bradley devices (i.e. used as a fiber optic repeater on the network) it should have the J1 Connector Local Interface disabled. See Interactive Diagnostics in Section 1.3.3 for more information.

Consult Allen-Bradley Data Highway, Data Highway Plus, and Remote I/O Network Installation Guidelines for more information on network installation and wiring procedures.

(3) All Data Highway, Data Highway Plus, and Remote I/O devices on the hardwired network stub must be interconnected Serial 1 to Serial 1, Serial 2 to Serial 2. Cross-connecting Serial 1 and Serial 2 will cause communication failures.

(4) Input for External Power Option. See Section 1.3.4.1 for more information.

OLC model number OLC-DPR provides fiber optic Data Highway Plus communications at 57.6K baud; and fiber optic Remote I/O communications at 57.6K baud, 115.2K baud, or 230.4K baud. (See Configuration Instructions in Section 2.7 for more information.) The user must follow all Allen-Bradley wire installation and cable termination procedures for cabling from Allen-Bradley modules to OLCs.

1.3.1.2 SLC 500 DH-485 Data Highway

OLC-DSLs (Optical Link Couplers for DH-485) may be directly connected to Allen-Bradley SLC 500 Controllers, Hand-Held Terminals, PC Interface Converters, or connected to Allen-Bradley Link Couplers on multi-drop hardwired

DH-485 networks. DH-485 communication networks may be configured for operation at one of four different baud rates... 19.2K baud, 9600 baud, 2400 baud, and 1200 baud. The Allen-Bradley factory default baud rate for all SLC 500 devices is 19.2K baud.

Phoenix Digital OLC-DSLs may be switch selected for operation at any one of the DH-485 network baud rates (see Configuration Instructions in Section 2.7). The OLC factory default baud rate is 19.2K baud. The user must follow all Allen-Bradley wire installation, cable termination, and network configuration procedures for cabling from Allen-Bradley SLC 500 devices to OLCs.

OLC-DSL Device Interface Port connections are provided on the front of the OLC module (connectors designated as J1 and J2 in Figure 6, and J1, J2, and J3 in Figure 7). Specifications detailing the OLC device interface port functionality and connector pin-out are given below. (See Appendices A and B for recommended wiring diagrams.)

1.3.1.2.1 1746 Plug-In OLC-DSL (Optical Link Couplers for DH-485)

1.3.1.2.1.1 1746 Plug-In OLC-DSL J1 Connector Functionality

The 1746 Plug-In OLC-DSL J1 Port (RJ45 - Female Connector) provides direct connectivity to the Allen-Bradley Hand-Held Terminal (Catalog# 1747-PT1) and PC Interface Converter (Catalog# 1747-PIC). The J1 connector is active only when NO Link Coupler is used for hardwire connection to the corresponding OLC AND either an SLC Controller or Allen-Bradley Modular Power Supply is powered and attached to the OLC J2 connector. Allen-Bradley Interconnect Cables (Catalog# 1747-C10... used for direct connection from the Hand-Held Terminal to SLC Controllers and direct connection from the PC Interface Converter to the A-B Link Coupler) may be used for direct connection from the Hand-Held Terminal or PC Interface Converter to the OLC J1 connector.

Both the Allen-Bradley Hand-Held Terminal and PC Interface Converter require that 24 VDC power be provided via the Interconnect Cable. This power is normally provided from the Allen-Bradley Link Coupler, SLC Controller, or Modular Power Supply. If an A-B Link Coupler is present then DH-485 network attachment to either the Hand-Held Terminal or PC Interface Converter should be made via the A-B Link Coupler, which will serve to provide the necessary DC power source. However, if a Link Coupler is not present then the OLC will provide the necessary DC power (via the J1 connector) by passing-thru the 24 VDC output power source from the SLC Controller or Modular Power Supply... which must be attached and powered at the OLC J2 connector.

1.3.1.2.1.2 1746 Plug-In OLC-DSL J2 Connector Functionality

The 1746 Plug-In OLC-DSL J2 Port (RJ45 - Female Connector) provides connectivity to Allen-Bradley SLC Controllers. In addition, if an Allen-Bradley Hand-Held Terminal or PC Interface Converter is attached to the OLC J1 connec-

tor then either an SLC Controller or an Allen-Bradley Modular Power Supply must be connected to the OLC J2 connector (with power applied). All J2 connections may be made via Phoenix Digital's SLC Interconnect Cable Model# OLC-CBL-SC, or via a cable constructed per the cable drawing provided in Appendix B.

1.3.1.2.1.3 1746 Plug-In OLC-DSL J3 Connector Functionality

The 1746 Plug-In OLC-DSL J3 connector provides optional connection for an external power supply. The 1746 OLC is shipped from the factory configured to operate from the 1746 system chassis power supply. In this case, no external power is required. However, the OLC also offers the option (jumper selectable) for operation from an external +5 VDC power supply. See Section 1.3.4 for more detailed information on connector pin designations, jumper selection, and auxiliary power supply specifications.

1.3.1.2.2 Standalone, Panelmount OLC-DSL (Standalone, Panelmount Optical Link Couplers for DH-485)

1.3.1.2.2.1 Standalone, Panelmount OLC J1 Connector Functionality

The Standalone, Panelmount OLC-DSL J1 Port (pluggable barrier strip connector) provides hardwire (twisted pair) connectivity to Allen-Bradley Link Couplers in either single or multidrop hardwire network configurations. J1 connector pin definitions are given below:

J1 Connector Pin Numbers(1)	DH-485 Signal Name
1	ChA Receive Signal Strength (RSS)(2)
2	RSS Signal Ground
3	ChB Receive Signal Strength(2)
4	Shield(3)
5	Common(4)
6	B(+)(5)
7	A(-)(5)
8	Termination(5,6)

STANDALONE, PANELMOUNT OLC-DSL J1 CONNECTOR DEVICE INTERFACE PIN DEFINITIONS

TABLE 3

(1) Orientation - Top to bottom on front of module (Pins 1 thru 8 respectively). (Note: All unused connector screw terminals should be fully seated.)

(2) Channel A and B RSS provide DC voltage outputs proportional to the optical signal strength on fiber optic channels A and B respectively (multimode only). See Interactive Diagnostics in Section 1.3.3 for more detailed information.

(3) If Allen-Bradley Link Couplers are used to multi-drop multiple SLC 500 devices from a single OLC-DSL (on a hardwired, multi-drop net work stub) all of the devices on the multi-drop DH-485 network stub (including the OLC) should have their Shield signals interconnected via the shielded cable drain wire... but only the OLC or Allen-Bradley Link Coupler at one end of the hardwired DH-485 network stub should have Shield and Chassis Ground jumpered together. (To connect Shield to Chassis Ground at the OLC, J1 Pin 4 should be wired to the nearest Earth Ground/Chassis Ground connection.)

(4) If Link Couplers are installed then OLC-DSL Common (J1 Pin 5) must be connected to the Common wire which is interconnected between Link Couplers (hardwired multi-drop DH-485 network installations).

(5) All SLC 500 devices on multi-drop hardwired network stubs (connected to OLC-DSLs) must be interconnected "B(+)" to "B(+)", "A(-)" to "A(-)" (via Link Couplers). Cross-connecting "B(+)" and "A(-)" will cause communication failures. (See Appendix A for OLC-DSL to Allen-Bradley Link Coupler Wire List).

(6) When using Allen-Bradley Link Couplers to hardwire multi-drop SLC 500 devices, termination resistors must be installed at each end of the multi-drop hardwire cable. If the OLC-DSL is located at one end of the multi-drop cable (multi-drop DH-485 network stub), then OLC J1 Pin 8 (Termination Resistor) must be hardwire jumpered to OLC J1 Pin 7 ("A(-)"). This will provide the necessary Termination Resistor at the OLC (across "B(+)" and "A(-)"), at one end of the hardwire multi-drop cable. If the OLC is not located at one end of the DH-485 network stub, the Termination Resistor should NOT be jumpered at the OLC (i.e. J1 Pin #s 7 and 8 should NOT be jumpered together).

Whenever any Allen-Bradley device is connected to either the OLC J2 or J3 connector, J1 pin #s 7 and 8 must be jumpered together to provide the necessary OLC internal termination resistor. (Note: J1 pin #s 7 and 8 are jumpered together at the factory... factory default.)

If the OLC is not connected to any Allen-Bradley devices (i.e. used as a fiber optic repeater on the network) it should have the J1 Connector Local Interface disabled. See Interactive Diagnostics in Section 1.3.3 for more information.

Consult Allen-Bradley SLC 500 DH-485 Network Installation Guidelines for more information on network installation and wiring procedures.

1.3.1.2.2.2 Standalone, Panelmount OLC J2 Connector Functionality

The Standalone, Panelmount OLC-DSL J2 Port (RJ45 - Female Connector) provides direct connectivity to the Allen-Bradley Hand-Held Terminal (Catalog# 1747-PT1) and PC Interface Converter (Catalog# 1747-PIC). The J2 connector is active only when NO Link Coupler is used for hardwire connection to the corresponding OLC **AND** either an SLC Controller or Allen-Bradley Modular Power Supply is powered and attached to the OLC J3 connector. Allen-Bradley Interconnect Cables (Catalog# 1747-C10... used for direct connection from the Hand-Held Terminal to SLC Controllers and direct connection from the PC Interface Converter to the A-B Link Coupler) may be used for direct connection from the Hand-Held Terminal or PC Interface Converter to the OLC J2 connector. (Note: If an Allen-Bradley device is connected to either the OLC J2 or J3 connectors then OLC J1 Pin #s 7 and 8 must be jumpered together in the J1 connector to provide the necessary internal OLC termination resistor.)

Both the Allen-Bradley Hand-Held Terminal and PC Interface Converter require that 24 VDC power be provided via the Interconnect Cable. This power is normally provided from the Allen-Bradley Link Coupler, SLC Controller, or Modular Power Supply. If an A-B Link Coupler is present then DH-485 network attachment to either the Hand-Held Terminal or PC Interface Converter should be made via the A-B Link Coupler, which will serve to provide the necessary DC power source. However, if a Link Coupler is not present then the OLC will provide the necessary DC power (via the J2 connector) by passing-thru the 24 VDC output power source from the SLC Controller or Modular Power Supply... which must be attached and powered at the OLC J3 connector.

1.3.1.2.2.3 Standalone, Panelmount OLC J3 Connector Functionality

The Standalone, Panelmount OLC-DSL J3 Port (RJ45 - Female Connector) provides connectivity to Allen-Bradley SLC Controllers. In addition, if an Allen-Bradley Hand-Held Terminal or PC Interface Converter is attached to the OLC J2 connector then either an SLC Controller or an Allen-Bradley Modular Power Supply must be connected to the OLC J3 connector (with power applied). All J3 connections may be made via Phoenix Digital's SLC Interconnect Cable Model# OLC-CBL-SC-10, or via a cable constructed per the cable drawing provided in Appendix B. (Note: If an Allen-Bradley device is connected to either the OLC J2 or J3 connector then OLC J1 Pin #s 7 and 8 must be jumpered together in the J1 connector to provide the necessary internal OLC termination resistor.)

1.3.2 OPTICAL NETWORK INTERFACE SPECIFICATIONS

The Optical Network Interface is designated as ChA Tx/Rx and ChB Tx/Rx on the OCM/OLC faceplate (see Figures 5, 6, and 7). The OCM/OLC module is compatible with either SMA 905/906 or ST style fiber optic connectors (mating connector which is terminated to the fiber media). (Alignment sleeves should be provided on all SMA Style 906 connectors for optical alignment.) Detailed specifications describing optical network transmit and receive capabilities at the 850nm multimode, 1300nm multimode, and 1300nm singlemode wavelengths are provided below:

Optical Transmitter (850nm Multimode)

Electro-Optical Characteristics

Parameter	Test Condition	SYM.	MIN.	TYP.	MAX.	UNITS
Fiber Coupled Power	50/125 μm, Graded, 0.20NA	P_{oc}	10/-20.0	20/-17.0		μW/dBm
	62.5/125 μm, Graded, 0.28NA		21.9/-16.6	45/-13.5		μW/dBm
	100/140 μm, Graded, 0.29NA		58.0/-12.4	115/-9.4		μW/dBm
	200/230 μm, Graded, 0.37NA		320/-4.9			μW/dBm
Peak Wavelength		λ_P		850		nm
Spectral Bandwidth		$\Delta\lambda$		50		nm

TABLE 4

Optical Transmitter (1300nm Multimode)

Electro-Optic Characteristics

Parameter	Test Condition	SYM.	MIN.	TYP.	MAX.	UNITS
Fiber Coupled Power	50/125 μm, Graded, 0.20NA	P_{oc}	25/-16.0			μW/dBm
	62.5/125 μm, Graded, 0.28NA		50/-13.0			μW/dBm
Wavelength		λ	1290		1350	nm
FWHM		$\Delta\lambda$			160	nm

TABLE 5

Optical Transmitter (1300nm Singlemode)

Electro-Optic Characteristics

Parameter	Test Condition	SYM.	MIN.	TYP.	MAX.	UNITS
Fiber Coupled Power	9/125 μ m	P_{oc}	16/-18.0			μW/dBm
Wavelength		λ	1270		1340	nm
Spectral Width		$\Delta\lambda$	70		90	nm

TABLE 6

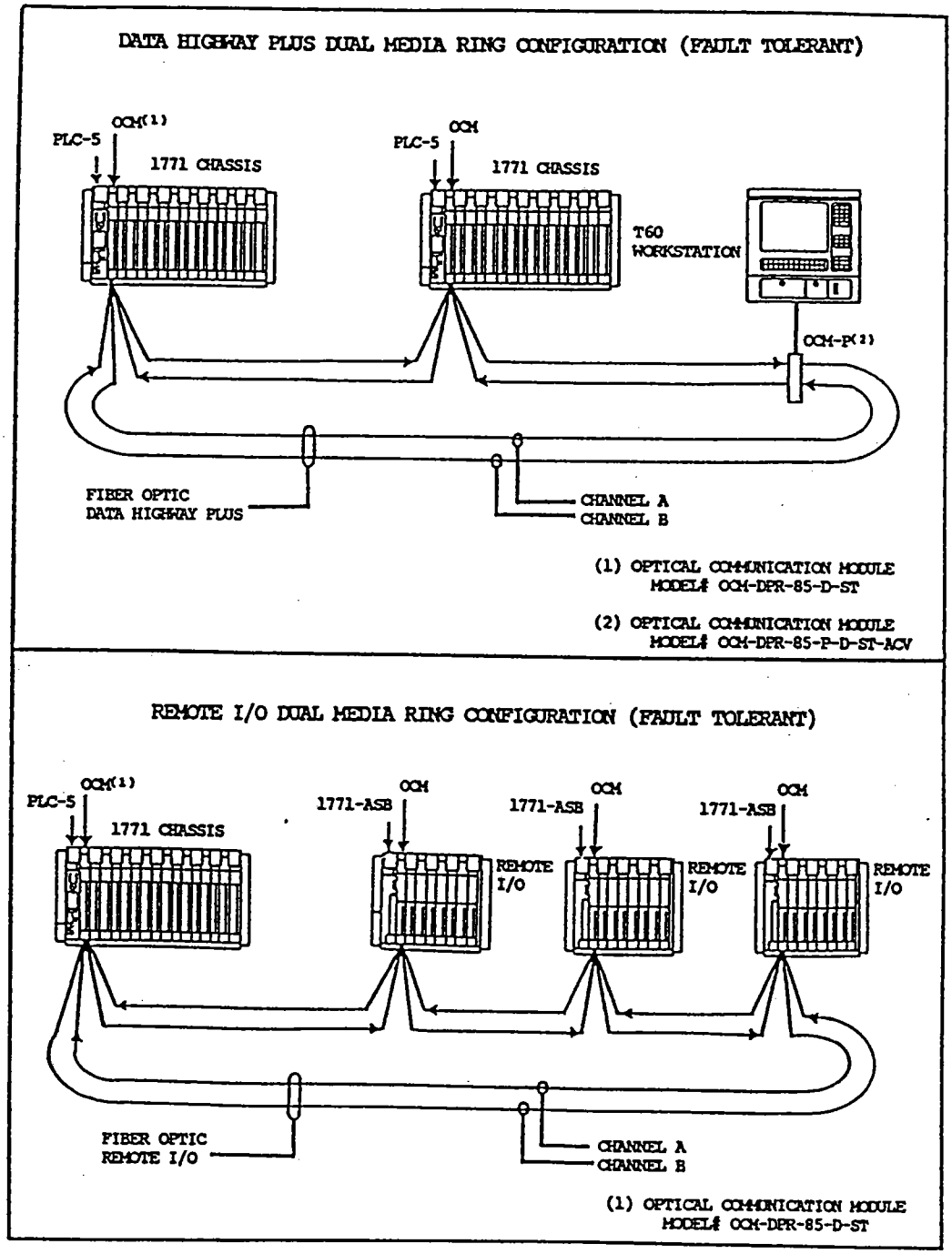
Optical Receiver (850nm multimode, 1300nm multimode, and 1300nm singlemode)

Receiver Sensitivity: -32dbm

OCMs/OLCs may be interconnected on the fiber optic network in an active bus configuration. Network Channel A Receive Data inputs and Transmit Data outputs should be interconnected sequentially from OCM/OLC to OCM/OLC 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 Channel A (Ch A Transmit to Ch A Receive) and Channel B (Ch B Transmit to Ch B Receive) on the OCMs/OLCs on either end of the active bus (See Figures 8 and 9). This effectively transforms the network into a Data Highway, Data Highway Plus, Remote I/O, or SLC 500 DH-485 counter-rotating ring network configuration.

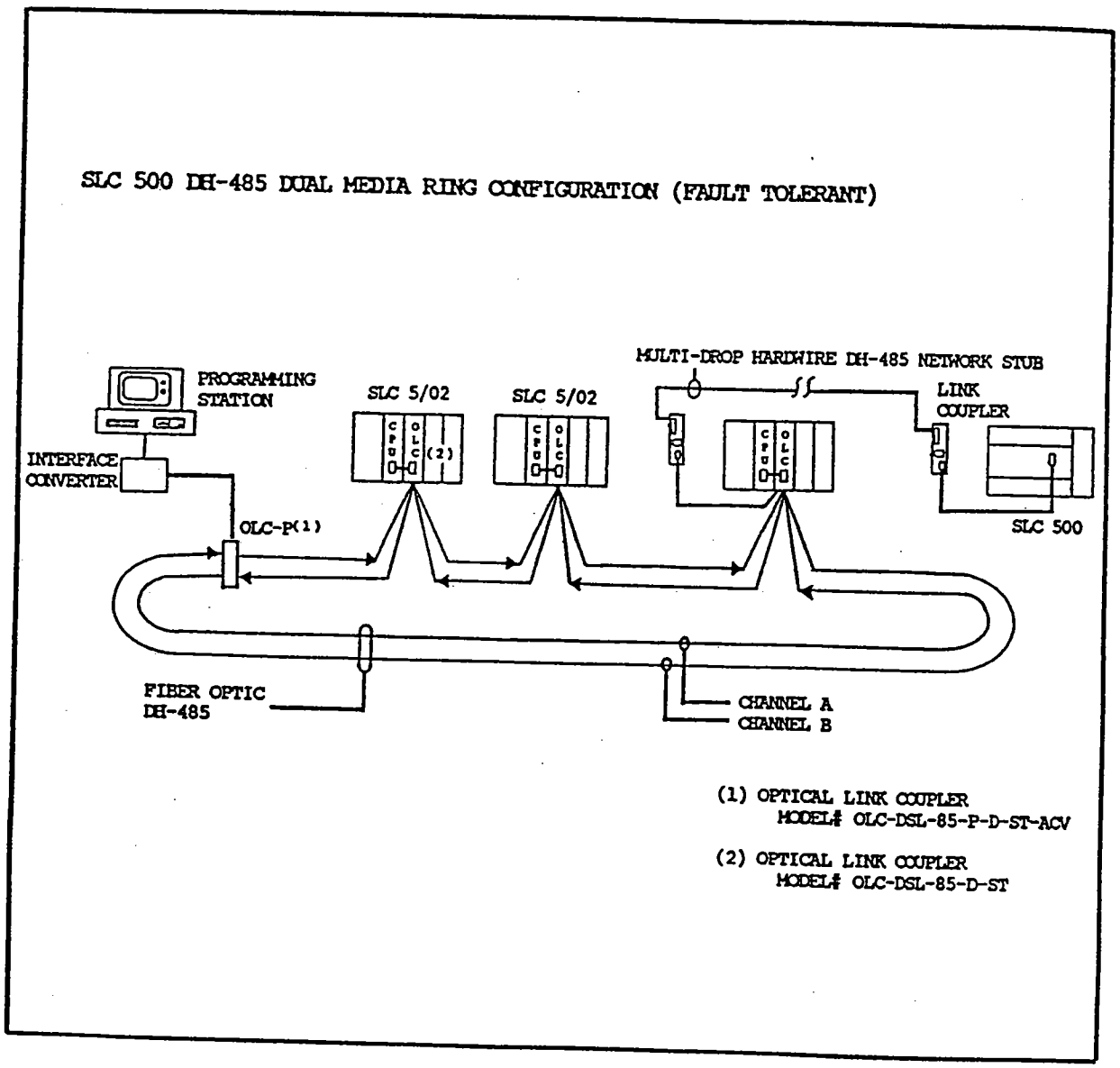
1.3.3 INTERACTIVE DIAGNOSTICS

Phoenix Digital's OCMs and OLCs provide advanced, interactive, system-level diagnostics. (OCMs/OLCs must be ordered with the "-D" Option for Interactive Diagnostics.) These diagnostics may be accessed thru the PLC User Program (1771 Plug-In OCM and 1746 Plug-In OLC) or via Discrete Contact Outputs (Standalone, Panelmount OCM/OLC) to validate network integrity and to assist in troubleshooting network problems...



TYPICAL OCM INSTALLATION CONFIGURATIONS

FIGURE 8



TYPICAL OLC INSTALLATION CONFIGURATION

FIGURE 9

- 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
- Simulate Network Fault Conditions
- Verify Fault Management and Overall Network Integrity
- Local Interface Disable
- Optical Power Metering

These advanced interactive diagnostics provide the user with a powerful set of tools, greatly simplifying network start-up and on-line maintenance of Data Highway, Data Highway Plus, Remote I/O, and SLC 500 communication networks.

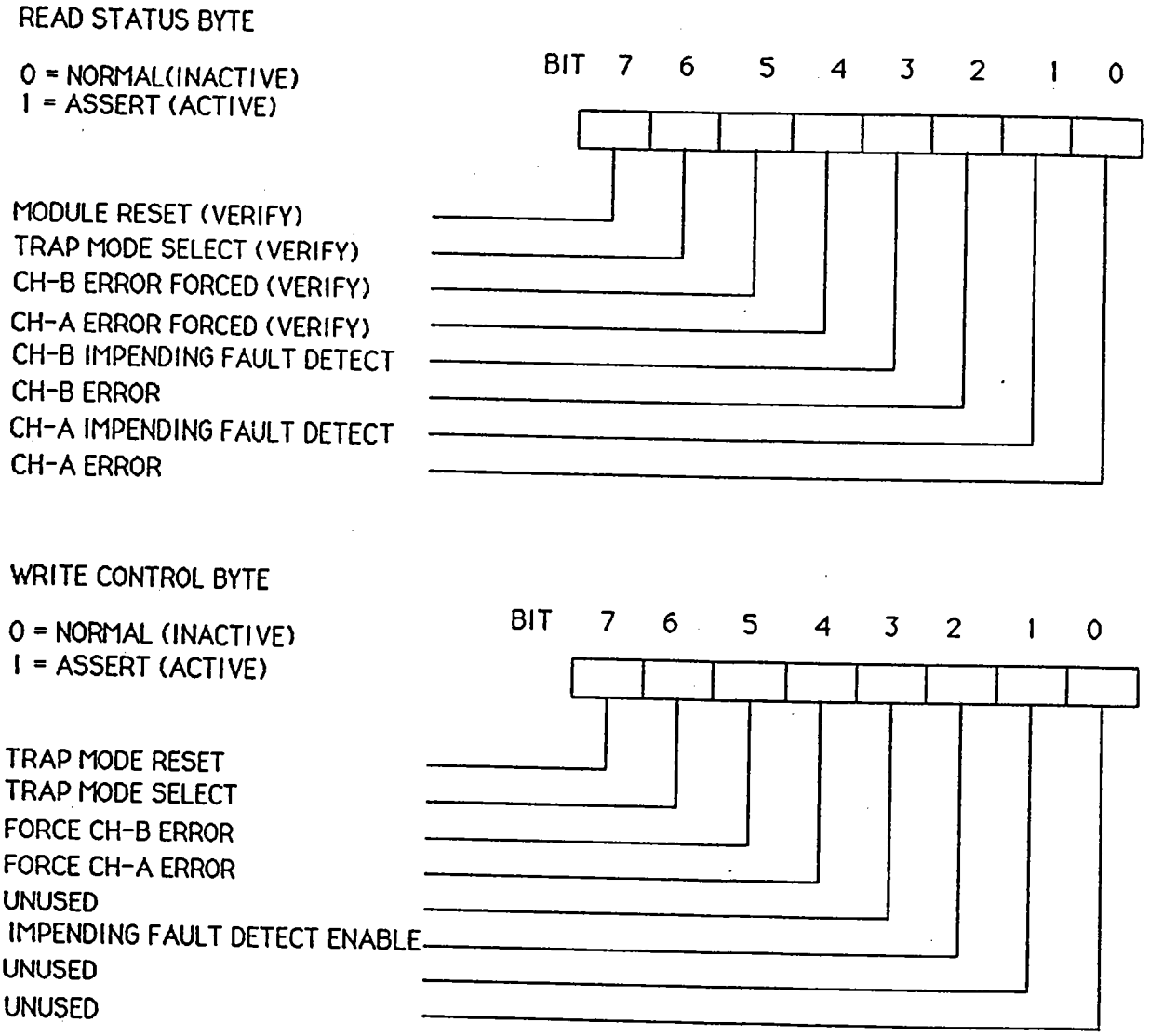
1.3.3.1 1771 Plug-In OCMs, 1746 Plug-In OLCs

Activation, control, and monitoring of 1771 Plug-In OCM and 1746 Plug-In OLC diagnostics is provided under program control thru read/write status and control bytes in the PLC I/O Image Table, and is also provided under manual control via Diagnostic Select Switch Configuration. The 1771 Plug-In OCM and 1746 Plug-In OLC (with "-D" Option) each occupy a single I/O module slot, and simulate an 8 bit bi-directional I/O module, addressable to the 1771/1746 I/O module slot it occupies. The 1771 I/O module slot addressing density (2-slot, 1-slot, and 1/2-slot I/O Group) is switch selectable on the backplane of the 1771 chassis. The 1746 I/O module designation, density, and type are program configurable and must be configured to match the I/O modules in the system... prior to programming. The 1746 Plug-In OLC designation is "OTHER", I/O Mix Code = 19 (8 bit in/8 bit out module), and I/O Type Code = 35 (Example: If the 1746 Plug-In OLC is in I/O slot 1 then the correct configuration for this slot would be "Slot 1 = OTHER 1935". Note: User should consult Allen-Bradley Hardware Installation Manual for more information on addressing modes and program configuration for I/O Groups, Chassis, and Racks.)

Read/Write Diagnostic Status and Control functions are given in the Diagnostic I/O Bit Map illustrated in Figure 10 (Figure 10(A)... 1771 Plug-In OCM; Figure 10(B)... 1746 Plug-In OLC). Definitions of Diagnostic Select Switch Settings are provided in Tables 7 and 8. Specifications and further explanation of OCM/OLC diagnostic functions are provided in Sections 1.3.3.3 - 1.3.3.8.

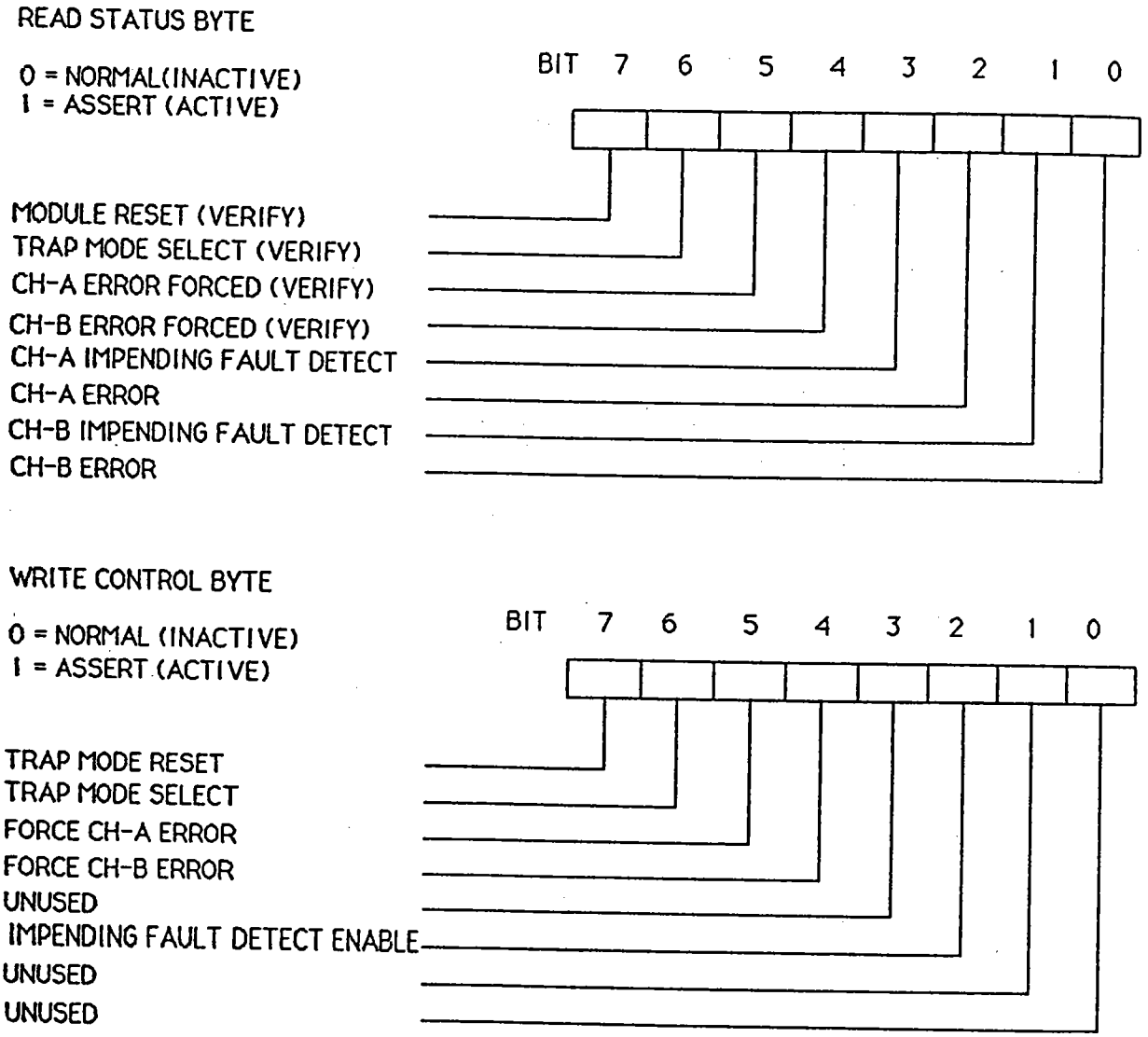
1.3.3.2 Standalone OCMs/OLCs

Activation and control of Standalone OCM/OLC Diagnostics is provided thru Diagnostic Select Switch Configuration. Diagnostic Select Switch Settings are provided in Table 9. Monitoring of Standalone, Panelmount OCM/OLC diagnostics is provided using reed relay contact outputs. These outputs are provided on standalone OCMs/OLCs (with the "-D" Option) and are accessible on the J4 connector. Specifications detailing J4 connector pin-out are provided in Table 10. Specifications and further explanation of OCM/OLC diagnostic functions are provided in Sections 1.3.3.3 - 1.3.3.8.



1771 PLUG-IN OCM DIAGNOSTIC STATUS AND CONTROL FUNCTIONS

FIGURE 10(A)



1746 PLUG-IN OLC DIAGNOSTIC STATUS AND CONTROL FUNCTIONS

FIGURE 10(B)

Switch(1)	Position(1)	Function(2)	Factory Configuration (Default)
Switch 4 (SW4)	1	Unused	OFF
	2	Unused	OFF
	3(3)	Enable Impending Fault Detection	OFF
	4	Disable Local Interface (J1,J2, J3 Connectors)	OFF
	5(3)	Force Channel A Error	OFF
	6(3)	Force Channel B Error	OFF
	7(3)	Trap Mode Select	OFF
	8	Unused	OFF
	9	Enable Processor Read/Write	OFF
	10	Unused	OFF

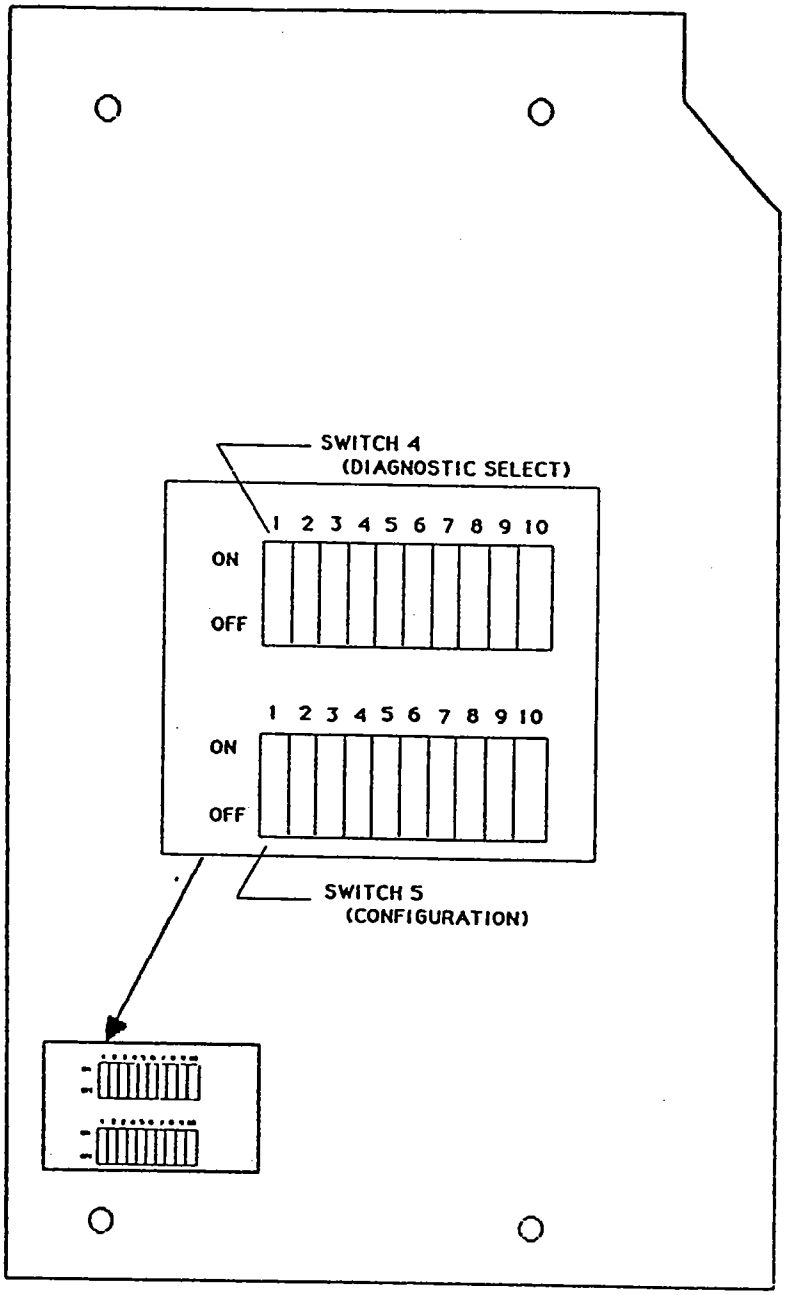
(1) See Figure 11 for designated switch locations.

(2) ON = Assert (Active, Switch Closed)
OFF = Inactive (Switch Open)

(3) ON (Assert) overrides corresponding (complimentary) bit of Write Control Byte for 1771 Plug-In OCMs.

1771 PLUG-IN DIAGNOSTIC SELECT SWITCH DESIGNATIONS

TABLE 7



1771 PLUG-IN OCM DIAGNOSTIC SELECT AND CONFIGURATION SWITCH DESIGNATIONS

FIGURE 11

Switch(1)	Position(1)	Function(2)	Factory Configuration (Default)
Switch 3 (SW3)	1(3)	Enable Impending Fault Detection	OFF
	2	Disable Local Interface (J1,J2 Connectors)	OFF
	3(3)	Force Channel A Error	OFF
	4(3)	Force Channel B Error	OFF
	5(3)	Trap Mode Select	OFF
	6	Unused	OFF
	7	Enable Processor Read/Write	ON
	8	Unused	OFF

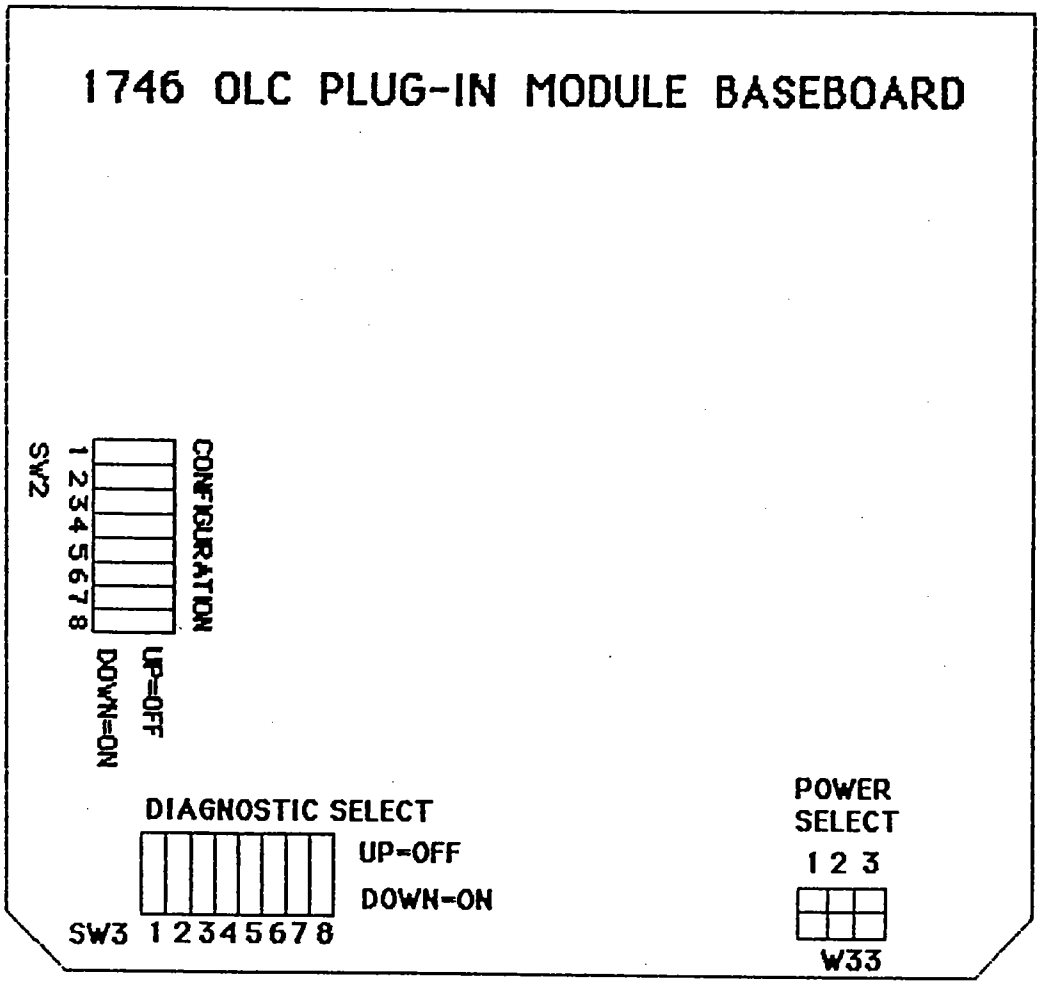
(1) See Figure 12 for designated switch locations.

(2) ON = Assert (Active, Switch Closed)
OFF = Inactive (Switch Open)

(3) ON (Assert) overrides corresponding (complimentary) bit of Write Control Byte for 1746 Plug-In OLCs.

1746 PLUG-IN DIAGNOSTIC SELECT SWITCH DESIGNATIONS

TABLE 8



1746 PLUG-IN OLC DIAGNOSTIC SELECT, CONFIGURATION SWITCH, AND POWER SELECT JUMPER DESIGNATIONS

FIGURE 12

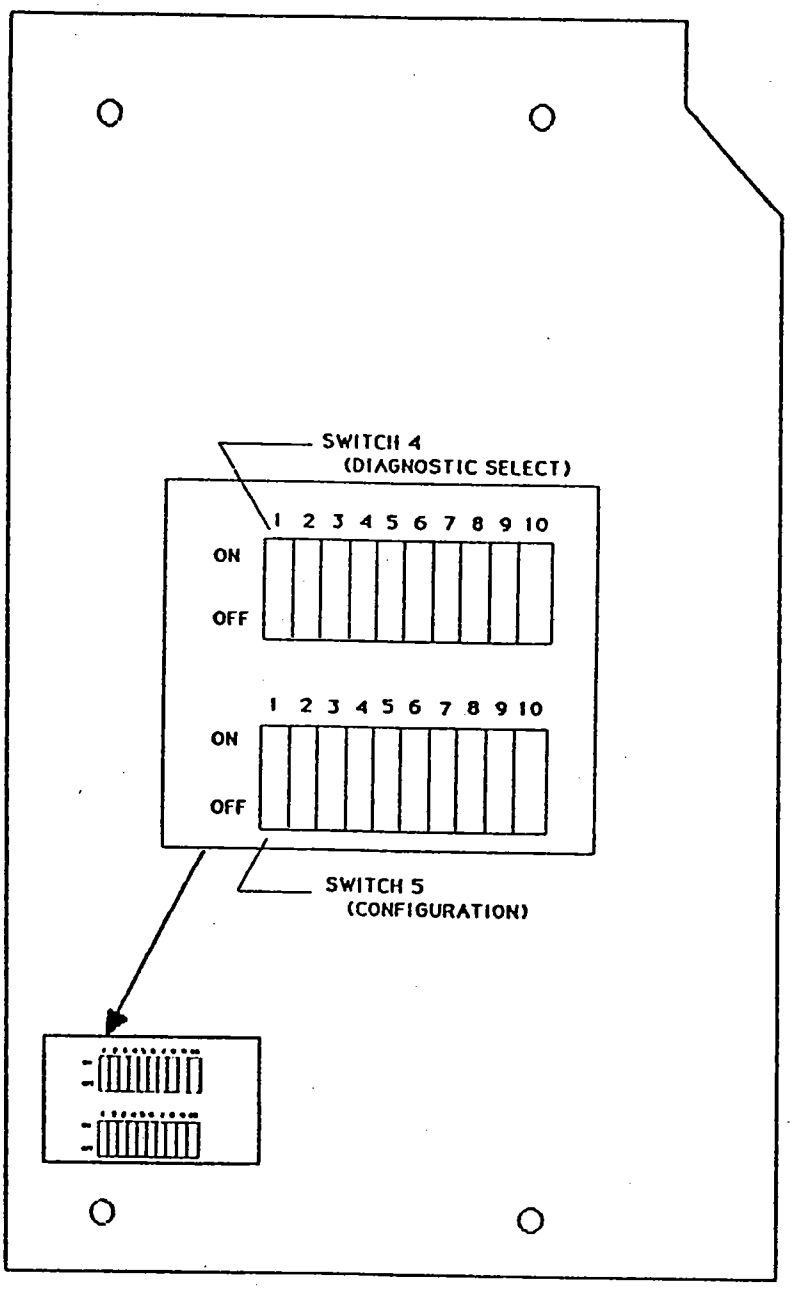
Switch(1)	Position(1)	Function(2)	Factory Configuration (Default)
Switch 4 (SW4)	1	Enable Diagnostic Relay Outputs	OFF
	2	Unused	OFF
	3	Enable Impending Fault Detection	OFF
	4	Disable Local Interface (J1,J2, J3 Connectors)	OFF
	5	Force Channel A Error	OFF
	6	Force Channel B Error	OFF
	7	Trap Mode Select	OFF
	8	Unused	OFF
	9	Unused	OFF
	10	Unused	OFF

(1) See Figure 13 for designated switch locations.

(2) ON = Assert (Active, Switch Closed)
OFF = Inactive (Switch Open)

STANDALONE, PANELMOUNT OCM/OLC DIAGNOSTIC SELECT SWITCH DESIGNATIONS

TABLE 9



STANDALONE, PANELMOUNT OCM/OLC DIAGNOSTIC
SELECT AND CONFIGURATION SWITCH DESIGNATIONS

FIGURE 13

J4 Connector Pin #	OCM/OLC Diagnostic Output(1)
1,2	Channel A Error (ERR)
3,4	Channel A Impending Fault Detect (IFD)
5,6	Channel B ERR
7,8	Channel B IFD

(1) Each diagnostic output is provided as a normally open FORM A contact on the designated pair of J4 pin numbers. When a diagnostic function is asserted (i.e. error or impending fault) the corresponding contact will close.

Diagnostic Select Switch SW4-1 must be set ON (active) to enable diagnostic relay outputs.

STANDALONE, PANELMOUNT OCM/OLC J4 CONNECTOR DIAGNOSTIC OUTPUT PIN DEFINITIONS

TABLE 10

Electrical specifications for diagnostic relay outputs are given below:

Diagnostic Relay Contacts

Arrangement	1a
Initial contact resistance, max.	30 Meg Ohm
Rating (resistive)	
Max. switching voltage	380 VAC, 125 VDC
Max. switching current	.5A
Initial breakdown voltage	
Between open contacts	1,000 Vrms
Between contact sets	2,000 Vrms
Between contacts and coil	3,000 Vrms
Initial insulation resistance	1,000m ohm at 500 VDC
FCC surge voltage between open contacts	1,500 V

(Note: Standalone OCMs/OLCs are shipped from the factory with Diagnostic Relays disabled. To enable Diagnostic Relay outputs Diagnostic Select Switch SW4-1 must be set ON by the user.)

1.3.3.3 Detect and Locate Network Failures

Fiber optic network fault conditions are reported by 1771 Plug-In OCMs and 1746 Plug-In OLCs on diagnostic status bits 0 and 2... for OCM fiber optic receive Channels A and B respectively, and OLC fiber optic receive Channels B and A respectively (see Figures 10(A) and 10(B)). Fault conditions are reported by standalone, panelmount OCMs/OLCs on reed relay contact outputs on J4 connector pin #s 1,2 and 5,6... for fiber optic channels A and B respectively. (Diagnostic Select Switch SW4-1 must be set ON (active) to enable diagnostic relay outputs.) If an OCM/OLC detects a communication failure on the fiber optic receive data inputs on either Channel A or B (due to either a media failure or failure of an adjacent OCM/OLC) it will assert the corresponding diagnostic status bit or contact output. These bits and contact outputs may be used to locate the precise fiber where the failure is occurring.

1.3.3.4 Trap-and-Hold, and Locate Intermittent Network Failures

When a fiber optic communication failure occurs it normally causes the network to remain in a failed condition until the source of the failure is identified and corrected (solid failure). Diagnostic status bits on 1771 Plug-In OCMs and 1746 Plug-In OLCs (bits 0 and 2), and contact outputs on Standalone OCMs/OLCs (J4 Pin# 1,2 and 5,6) enable network maintenance personnel to quickly locate this type of failure. However, occasionally an intermittent communication failure may occur, causing the network to briefly fail and then automatically recover. This type of failure can be very difficult to locate because it does not remain in the failed condition long enough for maintenance personnel to locate the source of the problem.

In the factory default configuration OCMs/OLCs provide automatic recovery from communication failures. In the Auto-Recovery Mode of operation OCMs/OLCs automatically detect, isolate, and correct communication failures by switching the network around the points of failure, and then automatically restore the network to its original configuration when the source of the failure is corrected. However, as an alternative to Auto-Recovery Mode, OCMs/OLCs may be configured by the user for Trap Mode Operation. This configuration may be selected on 1771 Plug-In OCMs by setting Diagnostic Select Switch SW4-9 ON (assert... Enable Processor Read/Write) and setting Diagnostic Control Byte Bit 6 ON (assert... Trap Mode Select), on 1746 Plug-In OLCs by setting Diagnostic Select Switch SW3-7 ON (assert... Enable Processor Read/Write) and setting Diagnostic Control Byte Bit 6 ON (assert... Trap Mode Select), and on Standalone, Panelmount OCMs/OLCs by setting Diagnostic Select Switch SW4-7 ON (assert... Trap Mode Select). See Figures 11, 12, 13 and Tables 7, 8, 9 for more information.

In Trap Mode, OCMs/OLCs will continue to automatically detect, isolate, and correct communication failures, just as in Auto-Recovery mode. But when the source of the failures is corrected the Trap Mode OCMs/OLCs will NOT automatically restore the network to its original configuration. Instead, the network will remain trapped in the failed condition until the source of the failures is corrected AND the trapping OCMs/OLCs are reset. Thus, intermittent failures will be continuously trapped by the OCMs/OLCs (latched), providing maintenance personnel with the necessary time to locate and correct the source of the network failures.

When Trap Mode is selected (Assert Diagnostic Select Switch SW4-9 and Diagnostic Control Byte Bit 6 on 1771 Plug-In OCMs, or Diagnostic Select Switch SW3-7 and Diagnostic Control Byte Bit 6 on 1746 Plug-In OLCs... for user program control. Assert Diagnostic Select Switch SW4-7 on 1771 Plug-In OCMs or Switch SW3-5 on 1746 Plug-In OLCs for manual control. Assert Diagnostic Select Switch SW4-7 on Standalone, Panelmount OCMs/OLCs for manual control). OCMs/OLCs must be initialized for network communications in the following manner:

1. Install and interconnect all OCMs/OLCs on the network with fiber optic cable, in the appropriate network configuration. (Note that if the OCMs/OLCs on the fiber optic network are not properly interconnected with fiber optic cable the OCMs/OLCs will assume that the improper connection is an intermittent failure and trap the failure accordingly.)

2. Apply power to all of the OCMs/OLCs on the network. (At this point OCMs/OLCs configured for Trap Mode operation may indicate a failed condition on both channels... ChA ERR, ChB ERR).

3. Reset each Trap Mode OCM/OLC on the network by either toggling bit 7 of the OCM/OLC control byte ON (assert) and then OFF (inactive) (1771 Plug-in OCM and 1746 Plug-In OLCs only), or by depressing the TM (Trap Mode) Pushbutton on the front of each Trap Mode OCM/OLC. This will switch the OCM/OLC into an active, on-line, error free mode of operation, until such time as an intermittent communication failure occurs and the OCM/OLC traps the failure. (See Figures 5, 6 and 7 for the OCM/OLC TM Pushbutton front panel designations.)

4. Trap Mode OCMs/OLCs may be subsequently reset (after trapping an intermittent failure) by either toggling the Trap Mode Reset bit (bit 7... 1771 Plug-In OCMs and 1746 Plug-In OLCs only) or by depressing the TM Pushbutton.

1.3.3.5 Detect and Locate Impending Network Failures (Multimode Only)

The OCM/OLC module provides the unique capability to detect impending optical communication faults on the fiber optic network before they actually occur. Impending Fault Monitoring may be selected on 1771 Plug-In OCMs by setting Diagnostic Select Switch SW4-9 ON (assert) and Diagnostic Control Byte Bit 2 ON (assert) (see Figures 10(A), 11, and Table 7), on 1746 Plug-In OLCs by

setting Diagnostic Select Switch SW3-7 ON (assert) and Diagnostic Control Byte Bit 2 ON (assert) (see Figures 10(B), 12, and Table 8), and on Standalone, Panelmount OCMs/OLCs by setting Diagnostic Select Switch SW4-3 ON (assert) (see Figure 13 and Table 9). The impending fault initialization procedure may then be performed through the simple adjustment of two potentiometers, one per optical network communication channel, located on the front of the OCM/OLC module (labeled "ISS" or "IS"... see front panel designations in Figures 11, 12, and 13). No meters, gauges, or any other type of electrical or optical measurement equipment is required for OCM/OLC initialization.

The OCM/OLC Impending Fault Initialization procedure is accomplished by first connecting the module optical receive inputs to the optical transmit outputs of adjacent OCM/OLC module(s) (adjacent on the fiber optic network), with the actual fiber optic cable to be used in the final installation. (It is recommended that this initialization be accomplished post-installation in order to match the OCM/OLC impending fault monitoring circuitry to the final communication link characteristics.) The adjacent OCMs/OLCs (adjacent on the fiber optic network) must be powered during the initialization process to provide a receive signal reference (communication data carrier) to the OCM/OLC undergoing initialization. OCMs/OLCs must be powered for at least 15 minutes prior to initialization in order to stabilize all internal references. (The initialization procedure may also be performed on-line with actual network data transmissions, and will be totally transparent to network operation.) While visually observing the OCM ISD or OLC ID indicators on the front of the OCM/OLC module the OCM ISS or OLC IS (Initial Signal Set) potentiometers should be turned counterclockwise if the corresponding green OCM ISD or OLC ID indicators are off, or clockwise if they are on, until the ISD/ID indicators switch state (either turning on to off or off to on). Then, as the final step, the Initial Signal Set potentiometers should be turned 1/4 turn counter-clockwise, at which point the corresponding ISD/ID indicators should be maintained continuously on.

The OCM/OLC initialization procedure normalizes the impending fault monitoring detection thresholds to the attenuation characteristics of the final network installation. (It should be noted that the OCM ISD and OLC ID indicators may occasionally flash on or off, or turn off entirely over time. This is a normal operating condition and should be ignored post installation.) After initialization any optical network fault condition which causes the optical network receive power level to drop by more than 1.5 decibel-milliwatts (optical power) relative to the initialization power level will cause the corresponding Impending Fault Detect (OCM IFD or OLC IF) indicator (red) to illuminate, and will be reported on the corresponding Diagnostic Status Bit(s) or Relay Output(s).

No additional calibration adjustments will be required for the lifetime of the network installation, unless the network characteristics are changed. Changes affecting either the optical characteristics of the network media (media

replacement, splice, new terminations, etc.), or replacement of one or more OCMs/OLCs will require that the initialization procedure be repeated for each OCM/OLC which has one or more of its' optical network receive inputs affected by the change. (The initialization procedure may be done on-line, post installation, and will not affect real time network data transmissions.)

Impending fiber optic network fault conditions are reported by 1771 OCMs and 1746 OLCs on Diagnostic Status Bits 1 and 3... for OCM fiber optic receive Channels A and B respectively, and OLC fiber optic receive Channels B and A respectively (see Figures 10(A) and 10(B)). Impending fault conditions are reported by standalone, panelmount OCMs/OLCs thru reed relay contact outputs on J4 connector pin #s 3,4 and 7,8... for fiber optic channel A and B respectively (see Table 10). (Diagnostic Select Switch SW4-1 must be set ON (active) to enable diagnostic relay outputs.) If an OCM/OLC module detects an impending communication failure on the fiber optic receive data inputs on Channel A and/or B (due to either a media failure or failure of an adjacent OCM/OLC) it will assert the corresponding diagnostic status bit or relay output. These bits and relay outputs may be used to locate the precise fiber where the failure is occurring. (Note: Impending Fault Monitoring is not available on OCMs/OLCs configured for singlemode operation.)

1.3.3.6 Simulate Network Fault Conditions

After a fault tolerant fiber optic communication network becomes operational it is important to verify the network is correctly configured for fault management. This may be done by deliberately introducing single points of failure throughout the network and verifying communication continuity after each failure.

Fiber optic network faults may be simulated by OCMs/OLCs by forcing errors on the Channel A or B transmit outputs. This may be accomplished on 1771 Plug-In OCMs by setting ON Diagnostic Select Switch SW4-9 (assert... Enable Processor Write) and setting ON (assert) Diagnostic Control Byte bits 4 and 5 for fiber optic Channels A and B respectively, and verifying forced error conditions on the corresponding bits 4 and 5 of the Diagnostic Status Byte (OCM Channels A and B respectively). Similarly, this may be accomplished on 1746 Plug-In OLCs by setting ON Diagnostic Select Switch SW3-7 (assert... Enable Processor Write) and setting ON (assert) Diagnostic Control Byte bits 4 and 5 for fiber optic Channels B and A respectively, and verifying forced error conditions on the corresponding bits 4 and 5 of the Diagnostic Status Byte (Channels B and A respectively). These errors may also be simulated by setting ON (assert) Diagnostic Select Switches SW4-5 and SW4-6 on 1771 Plug-In OCMs, SW3-3 and SW3-4 on 1746 Plug-In OLCs, and SW4-5 and SW4-6 on Standalone, Panelmount OCMs/OLCs... for fiber optic network channels A and B respectively.

1.3.3.7 Local Interface Disabled

On certain occasions it may be necessary to segment or partition the communication network in order to isolate one or more problems on the network grid. These problems may range from improper termination and/or cross-wiring on individual OCM/OLC hardwired network stubs to duplicate node address settings, incompatible baud rate settings, etc. on one or more devices on the network. In order to find these types of problems it is often necessary to start-up the overall network one part at a time... after the fiber optic network grid is installed and operational.

OCMs/OLCs enable the user to selectively disable the Local Interface on the J1, J2, and J3 connectors at one or more locations on the network grid, by setting ON (assert) Diagnostic Select Switch SW4-4 for 1771 Plug-In OCMs, SW3-2 for 1746 Plug-In OLCs, and SW4-4 for Standalone, Panelmount OCMs/OLCs. When this switch is set ON the OCM/OLC will still function as an active repeater on the fiber optic network, but will disable all communications (read/write) on the J1, J2, and/or J3 connectors. Thus, if an unknown problem exists somewhere on the network, individual network stubs leading from OCMs/OLCs may be taken off-line until the source location of the problem is isolated and the problem itself is identified and corrected.

The Local Interface Disable switch should be set ON (assert) continuously whenever the OCM/OLC is used only as an active repeater (i.e. No connection to the J1, J2, and/or J3 ports).

1.3.3.8 Optical Power Metering ("-D" Option... Multimode Only)

OCMs/OLCs provide two linear voltage outputs (1771 Plug-In OCM J1 Connector Pin #s 1,2,3; 1746 Plug-In OLC Test Points RSS-A (RSS Channel A) and RSS-B (RSS Channel B); Standalone, Panelmount OCM/OLC J1 Connector Pin #s 1,2,3... see Tables 1 and 2 for OCM/OLC Device Interface J1 Connector Pin Definitions), one per optical network receive input, proportional to the receive optical signal strength at the module. These outputs provide an absolute +DC voltage representation of the optical power level or Receive Signal Strength (RSS) for each network receive input. The RSS outputs are buffered for increased drive current capability. RSS output specifications are the following:

Linear Outputs (ChA RSS, ChB RSS)

Voltage Range (V_{out}) = 0 to +3.5 VDC

Drive Current (I_{out}) = 20 ma (max)

Network Optical Power-In Versus RSS Voltage-Out (Analog)

RSS $V_{(out)}$*	Optical Power In (dbm @ 850nm, multimode)	Optical Power In (dbm @ 1300nm, multimode)
3.5	-18.0	-20.0
3.0	-18.6	-21.0
2.5	-19.4	-21.9
2.0	-20.4	-23.3
1.5	-22.0	-24.5
1.0	-24.0	-27.0
0.5	-28.0	-33.0
0.3	-33.2	

*Proportional Accuracy: ± .3 volt

TABLE 11

RSS Return connections are provided on the 1771 Plug-In OCM and Standalone, Panelmount OCM/OLC J1 connector (Pin #2... RSS Signal Ground), on the 1746 Plug-In OLC-DPR J1 Connector (Pin #8... Signal Ground), and on the 1746 Plug-In OLC-DSL J3 connector (Pin #2... Signal Ground). It is recommended that RSS Return/Signal Ground be used as the common reference RSS analysis. (It can also be used as the negative signal reference for differential analysis of RSS.)

Since the RSS diagnostic outputs on the OCM/OLC are active outputs the user must insure electrical compatibility before connection to external device. (Note: Optical Power Metering is not available on OCMs/OLCs configured for singlemode operation.)

1.3.4 POWER SUPPLY AND GROUNDING SPECIFICATIONS

1.3.4.1 1771 Plug-In OCM, 1746 Plug-In OLC Power Supply and Grounding Specifications

Backplane (system chassis) power supply requirements for 1771 Plug-In OCMs and 1746 Plug-In OLCs are the following:

Input Voltage(1) : +5 VDC

Input Current(1) : 1.8 Amps

(1) Supplied by 1771 or 1746 Chassis Power Supply

The 1746 Plug-In OLC may also be powered from an external auxiliary +5 VDC power supply (see Section 1.3.4.2.3 for Auxiliary Power Supply Specifications). The OLC-DPR J1 connector and OLC-DSL J3 connector (pluggable barrier strips) provide optional connection (jumper selectable) for powering the OLC module from an external +5 VDC power supply. The following table provides J3 connector pin designations:

OLC-DPR J1 Connector Pin Numbers	OLC-DSL J3 Connector Pin Numbers	Signal Name
7	1	+5 VDC, 1.8 Amps (Input)
8	2	Signal Ground

1746 PLUG-IN OLC CONNECTOR
DEVICE INTERFACE PIN DEFINITIONS

TABLE 12

Jumper selection for the 1746 Plug-In OLC power option is provided by jumper location W33. (See OLC Diagnostic Select, Configuration Switch, and Power Select Jumper Designations in Figure 12). Table 13 provides jumper options for power supply selection:

Power Supply	Jumper Setting W33 1-2	Jumper Setting W33 2-3
1746 Chassis Power Supply(1) (Provided via backplane interface)	IN	OUT
External Power Supply	OUT	IN

(1) Factory Default Setting

1746 PLUG-IN OLC POWER SUPPLY SELECTION

TABLE 13

1.3.4.2 Standalone, Panelmount OCM/OLC Power Supply and Grounding Specifications

Standalone OCMs/OLCs may be operated from either a +5 VDC, +24 VDC, 110/220 VAC, or 125 VDC input power source (subject to Power Option specified at time of ordering... see Ordering Information).

Standalone OCM/OLC +5 VDC and +24 VDC Power Supply J5 Connector Pin Designations are provided in Table 14. Specifications detailing +5 VDC and +24 VDC power supply requirements are provided in Sections 1.3.4.2.1 and 1.3.4.2.2.

J5 Connector Pin # (1)	Power Connection - +5 VDC Option	Power Connection - 24 VDC Option
1	NC(2)	+24 VDC
2	NC(2)	+24 VDC Return (Signal Ground)
3	Chassis Ground (Earth Ground)	Chassis Ground (Earth Ground)
4	+5 VDC	NC(2)
5	+5 VDC Return (Signal Ground)	NC(2)

(1) See Figure 7 for J5 Connector Designations
(2) No Connection

STANDALONE OCM/OLC +5 VDC AND +24 VDC POWER SUPPLY J5 CONNECTOR PIN DEFINITIONS

TABLE 14

The OCM/OLC module may also be ordered with an Auxiliary 120/220 VAC or 125 VDC power supply. The Auxiliary Power Supply will be attached to the side of the Standalone OCM/OLC enclosure when ordered as an integral option to the OCM/OLC module, and will be provided as a standalone unit for detached installation when ordered as a separate piece (OCM-PSM-ACV/125V). The Auxiliary

Power Supply will provide +5 VDC power to a maximum of two Standalone OCM/OLC modules. Auxiliary Power Supply specifications are provided in Section 1.3.4.2.3.

1.3.4.2.1 +5 VDC OCM/OLC Power Supply Requirements (Specified at the +5 VDC, +5 VDC Return Input Power Connections on the 1746 Plug-In OLC-DPR J1 connector, 1746 Plug-In OLC-DSL J3 connector, and the Standalone, Panelmount OCM/OLC J5 connector):

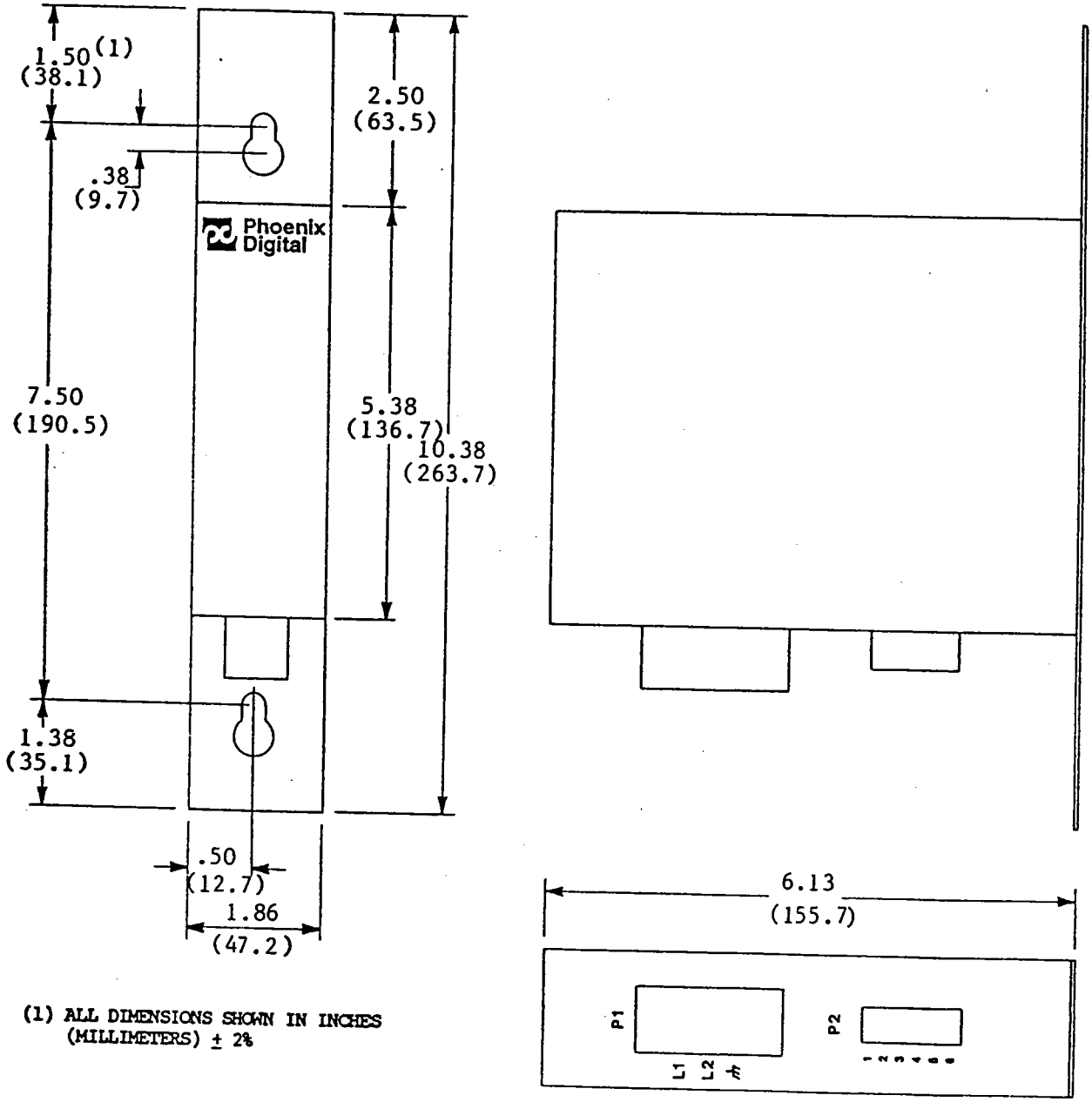
Input Voltage	:	+5 VDC
Input Current	:	1.8 Amps
Regulation (Load and Line)	:	0.15% (min)
Ripple and Noise	:	7mV rms (max)

1.3.4.2.2 +24 VDC OCM/OLC Power Supply Requirements (Specified at the +24 VDC, +24 VDC Return Input Power Connections on the Standalone, Panelmount OCM/OLC J5 connector):

Input Voltage Range	:	+18 VDC to +30 VDC
OCM Input Current	:	.6 Amps
Regulation (Load and Line)	:	.6% (min)

1.3.4.2.3 Auxiliary Power Supply Specifications

The Auxiliary Power Supply may be ordered as an option to the Standalone, Panelmount OCM/OLC module (attached to the side of the OCM/OLC, as shown in Figure 7), as a standalone unit for detached mounting (as shown in Figure 14) to accommodate physical installation requirements... as needed, or as an external power supply for the 1746 Plug-In OLC. When the auxiliary power option is ordered with the Standalone, Panelmount OCM/OLC module, the OCM/OLC will be configured to operate from a +5 VDC input power source (on the J5 connector), which will be prewired at the factory to the Auxiliary Power Supply. The Auxiliary Power Supply can provide sufficient power to support a maximum of two Standalone OCM/OLC and/or 1746 Plug-In OLC modules.



(1) ALL DIMENSIONS SHOWN IN INCHES (MILLIMETERS) ± 2%

OCM-PSM-ACV AND OCM-PSM-125V AUXILIARY POWER SUPPLY MOUNTING SPECIFICATIONS

FIGURE 14

Table 15 provides input power pin definitions for the Auxiliary Power Supply P1 barrier strip (see Figures 7 and 14):

P1 Barrier Strip Pin Designation	Signal Name (Pin Definition) 110/220 VAC, 50/60 Hz	125 VDC
L1	AC Power In (High Line)	+125 VDC
L2	AC Power In (Neutral)	+125 VDC Return
⏚	Chassis Ground	Chassis Ground

OCM-PSM-ACV AND OCM-PSM-125V AC INPUT BARRIER STRIP PIN DEFINITIONS

TABLE 15

Auxiliary 110/220 VAC Power Supply input specifications are the following:

Input Voltage Range : 85 VAC to 264 VAC

Input Frequency Range: 47 Hz to 440 Hz

Conducted RFI (Input Line Filter) : FCC limit B and VDE limit A

Hold-Up Time : 12 milliseconds

Power Consumption : 10 watts per OCM (approximate)
UL, CSA, VDE Approved

Fuse(1) : 2 AMP, 250 VAC, SLO BLO (.8 inch/20 millimeter)

(1) The Fuse is mounted on the internal printed circuit board of the Auxiliary Power Supply. For fuse access the user must either remove the Auxiliary Power Supply from the side of the Standalone OCM/OLC enclosure (when the power supply is provided as an option to the base module), or remove the Standalone Auxiliary Power Supply cover (when the power supply is provided as a standalone unit... Model #s OCM-PSM-ACV, OCM-PSM-125V).

Auxiliary 125 VDC Power Supply input specifications are the following:

Input Voltage Range : 120 VDC to 370 VDC

Power Consumption : 10 watts per OCM (approximate)
UL, CSA, VDE Approved

Fuse(1) : 2 AMP, 250 VAC, SLO BLO (.8 inch/20 millimeter)

(1) The Fuse is mounted on the internal printed circuit board of the Auxiliary Power Supply. For fuse access the user must either remove the Auxiliary Power Supply from the side of the Standalone OCM/OLC enclosure (when the power supply is provided as an option to the base module), or remove the Standalone Auxiliary Power Supply cover (when the power supply is provided as a standalone unit... Model #s OCM-PSM-ACV, OCM-PSM-125V).

Table 16 provides DC output power pin definitions for the Auxiliary Power Supply P2 connector (see Figures 7 and 14):

P2 Connector Pin Designations(1)	Signal Name (Pin Definitions)
1	Chassis Ground
2	+5 VDC Out
3	Common
4	Chassis Ground
5	+5 VDC Out
6	Common

(1) Pins 4-6 should be used for OCM/OLC DC power wiring when only one OCM/OLC is connected. Pins 1-3 should be used for OCM/OLC DC power wiring to a second OCM/OLC... if required.

OCM-PSM-ACV/125V DC OUTPUT CONNECTOR PIN DEFINITIONS

TABLE 16

If the Auxiliary Power Supply is detached from the OCM/OLC enclosure, the cable providing +5 VDC power to the +5 VDC input on the Standalone OCM/OLC J5 connector or 1746 Plug-In OLC J3 connector should be constructed from 16 gauge wire and not exceed a maximum length of 5 feet (1.5 meters)... measured from the Auxiliary Power Supply.

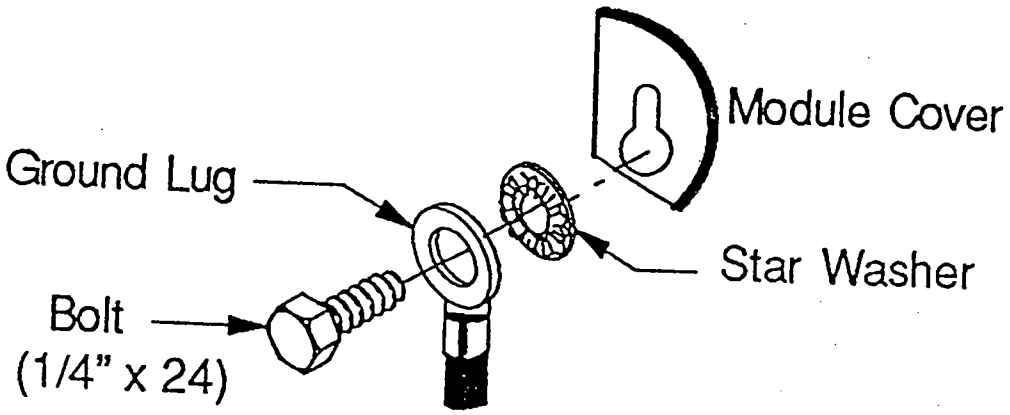
1.3.4.3 Electrical Grounding

The Standalone, Panelmount OCM/OLC and Auxiliary Power Supply enclosures must be electrically connected to earth ground. This may be accomplished by connecting the Chassis Ground on either the base Standalone, Panelmount OCM/OLC J5 connector or Auxiliary Power Supply P1 connector to earth ground, or by attaching a ground electrode directly to the chassis or module cover. Figure 15 illustrates how to attach a ground lug to the module cover by using one of the module mounting bolts. To ensure a good electrical connection between the ground lug and the module, remove paint from the cover where the lug makes contact. Connect the ground lug to earth ground with an adequate grounding electrode.

1.3.5 MECHANICAL AND ENVIRONMENTAL SPECIFICATIONS

OCM/OLC Module Dimensions

1771 Plug-In Module	: Single Slot, 1771 Chassis Installation
1746 Plug-In Module	: Single Slot, 1746 Chassis Installation
Standalone OCM/OLC Module	: 10.38" H x 1.76" W* x 6.14" D (26.37cm H x 4.47cm W* x 15.60cm D) *Add 1.00" (2.54cm) for rear panel flange
Temperature	: Operating 0°to 60°C Storage -40°C to +85°C
Relative Humidity	: 0 to 95% (non-condensing)



STANDALONE, PANELMOUNT OCM/OLC AND AUXILIARY POWER SUPPLY ENCLOSURE ELECTRICAL GROUNDING PROCEDURE

FIGURE 15

CHAPTER 2
CONFIGURATION AND INSTALLATION INSTRUCTIONS

This chapter provides preparation for use and installation instructions (including unpacking and inspection instructions), and a functional description of indicators, diagnostics and configuration instructions.

2.1 UNPACKING INSTRUCTIONS

The OCM/OLC is shipped from the factory in shock absorbing materials. Remove the OCM/OLC from the packing material and refer to the packing list to verify that all items are present. Save the packing materials for future storage or reshipment.

NOTE: If the shipping carton is damaged upon receipt, request that the carrier's agent be present while the unit is being unpacked and inspected.

2.2 INSPECTION

The OCM/OLC should be inspected visually for damage upon removal from the shipping container.

2.3 INSTALLATION MOUNTING PROCEDURE

Standalone OCMs/OLCs should be panelmounted per the mounting specifications provided in Figure 7. OCMs/OLCs are convection cooled, requiring no fan or forced air cooling. An unobstructed air space must be maintained above and below the OCM/OLC (6 inches minimum) to insure adequate convection airflow. The air at the bottom of the OCM/OLC enclosure may not exceed 60 degrees celsius (140 degrees F).

The user should follow Allen-Bradley Installation and Mounting Procedures for 1771 and 1746 Chassis Installation.

2.4 DIAGNOSTIC STATUS INDICATOR DEFINITION (REFERENCE FIGURES 5, 6, AND 7 FOR OCM/OLC NOMENCLATURE AND DESIGNATIONS).

(i) Tx (Local) - Illuminates when the transmit data output (transmit data from the OCM/OLC Device Interface J1 J2, and/or J3 to the local device) is active.

(ii) Rx (Local) - Illuminates when the receive data input (transmit data from the local device to the OCM/OLC Device Interface J1, J2, and/or J3) is active.

(iii) ACT or AC (ChA, B) - Illuminates when the corresponding optical network receive input is receiving valid data.

(iv) ISD or ID (ChA, B Initial Signal Detect) - Illuminates when the corresponding optical network receive input is initialized for Impending Fault Detection (see Section 1.3.3.5 for Initialization Procedure).

(v) IFD or IF (ChA, B Impending Fault Detect) - Illuminates when the corresponding optical network receive input power level drops 1.5 decibel-milliwatts (optical) below the Initial Signal Strength (see Section 1.3.3.5 for Initialization Procedure).

(vi) ERR (ChA, B Communication Error) - Illuminates when the corresponding optical network receive input fails to detect valid data communications.

2.5 INITIAL SIGNAL SET POTENTIOMETERS

(i) ISS or IS (Initial Signal Set Potentiometers) - Initializes Impending Fault Detection thresholds for the corresponding optical network receive inputs (see Section 1.3.3.5 for Initialization Procedure).

2.6 DIAGNOSTIC STATUS OUTPUT CONNECTIONS

(i) IFD or IF (ChA, B Impending Fault Detect... Standalone OCMs/OLCs only) - Switches ON (closed contact) when the corresponding optical network receive input power level drops 1.5 decibel-milliwatts (optical) below the initial signal strength (see Section 1.3.3.5 for Initialization Procedure). (Diagnostic Select Switch SW4-1 must be set ON (active) to enable diagnostic relay outputs.)

(ii) ERR (ChA, B Communication Error... Standalone OCMs/OLCs only) - Switches ON (closed contact) when the corresponding optical network receive input fails to detect valid data communications. (Diagnostic Select Switch SW4-1 must be set ON (active) to enable diagnostic relay outputs.)

(iii) RSS (ChA, B Receive Signal Strength) - Provides a linear voltage representation (analog - scaled from 0 to +3.5 VDC) for the corresponding optical network receive input.

2.7 CONFIGURATION INSTRUCTIONS

2.7.1 OCM-DPR, OCM-DHY, and OLC-DPR Configuration Instructions (1771 Plug-In OCM-DPR/OCM-DHY, 1746 Plug-In OLC-DPR, and Standalone, Panelmount OCM-DPR/OCM-DHY)

Each OCM-DPR, OCM-DHY, and OLC-DPR must be configured (switch selectable) prior to installation for the network characteristics described below:

(i) Network Baud Rate Selection for Remote I/O (i.e. 57.6K, 115.2K, or 230.4K);

(ii) Network Baud Rate vs Maximum Overall Fiber Optic Network Distance and Maximum Number of OCMs/OLCs Selection.

OCM-DPR/OCM-DHY, and OLC-DPR Configuration Switch locations are identified on the overview of the OCM and OLC modules depicted in Figures 11, 12, and 13. Specifications detailing OCM/OLC network configuration switch designations are provided below in Table 17(A and B). (The user should remove the switch access cover on the side of the OCM enclosure to obtain access to configuration switch locations.)

OCM-DPR/OCM-DHY Switch(1)	Position(1)	Function
Switch 5 (SW5)	1	Baud Rate Select
	2	Baud Rate Select
	3	Baud Rate Select
	4	Baud Rate Select
	5	Baud Rate Select
	6	Baud Rate Select
	7	Configuration Select
	8	Configuration Select
	9	Configuration Select
	10	Unused

(1) See Figures 11 and 13 for designated switch locations

OCM NETWORK CONFIGURATION SWITCH DESIGNATIONS

TABLE 17(A)

OLC-DPR Switch(1)	Position(1)	Function
Switch 2 (SW2)	1	Baud Rate Select
	2	Baud Rate Select
	3	Configuration Select
	4	Baud Rate Select
	5	Baud Rate Select
	6	Baud Rate Select
	7	Configuration Select
	8	Configuration Select

(1) See Figure 12 for designated switch locations

OLC NETWORK CONFIGURATION SWITCH DESIGNATIONS

TABLE 17(B)

2.7.1.1 Network Baud Rate Selection

OCM-DPRs and OLC-DPRs must be configured by the user for the network baud rate required... for Remote I/O Communication. Network Baud Rate Select Switch settings are given in Table 18:

Network Baud Rate (k baud)	OCM-DPR Switch Settings(1)						OLC-DPR Switch Settings(1)					
	SW5-1	SW5-2	SW5-3	SW5-4	SW5-5	SW5-6	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6
57.6(2)	ON	OFF	OFF	OFF	OFF	ON	ON	OFF	(3)	OFF	OFF	ON
115.2	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	(3)	OFF	ON	OFF
230.4	ON	OFF	OFF	OFF	ON	ON	ON	OFF	(3)	OFF	ON	ON

(1) See Figures 11, 12, and 13, and Table 17(A and B)
(2) Factory Default Setting
(Baud Rate must be set to 57.6K baud for Data Highway and Data Highway Plus networks)
(3) See Tables 22 and 23 for Configuration Selection

OCM/OLC BAUD RATE SWITCH SETTINGS

TABLE 18

2.7.1.2 Network Baud Rate vs Maximum Overall Network Distance and Maximum Number of OCM-DPRs, OCM-DHYs, and OLC-DPRs

The maximum overall fiber optic network distance possible with OCM-DPRs, OCM-DHYs, and OLC-DPRs, and the maximum number of OCMs/OLCs per network depends upon network baud rate, and the particular type of Allen-Bradley equipment and Series/Revision level of the equipment which is connected to the network. Tables 19-23 provide configuration options for selection of network baud rate versus maximum overall network distance and maximum number of OCMs/OLCs per network, assuming a worst case network installation. The options provided in these tables are compatible with all Allen-Bradley equipment. However, much longer distances may be possible. Consult the factory for more information.

Network Baud Rate (k baud)	Maximum Overall Network Distance... miles (km)	Maximum Number of OCMs per Network	OCM-DPR Switch Settings(1) SW5-7	SW5-8	SW5-9
57.6	6.0 (9.6)	4	ON	OFF	ON
57.6(2)	5.0 (8.0)(2)	8(2)	ON	OFF	OFF
57.6	4.0 (6.4)	12	OFF	ON	ON

(1) See Figures 11 and 13, and Table 17(A)
(2) Factory Default Setting

DATA HIGHWAY MAXIMUM OVERALL NETWORK DISTANCE
VS MAXIMUM NUMBER OF OCMS PER NETWORK

TABLE 19

Network Baud Rate (k baud)	Maximum Overall Network Distance... miles (km)	Maximum Number of OCMs per Network	OCM-DPR Switch Settings(1) SW5-7	SW5-8	SW5-9
57.6	8.0 (12.8)	4	ON	OFF	ON
57.6(2)	7.0 (11.2)(2)	8(2)	ON	OFF	OFF
57.6	6.0 (9.6)	12	OFF	ON	ON

(1) See Figures 11 and 13, and Table 17(A)
(2) Factory Default Setting

DATA HIGHWAY PLUS MAXIMUM OVERALL NETWORK DISTANCE
VS MAXIMUM NUMBER OF OCMS PER NETWORK

TABLE 20

Network Baud Rate (k baud)	Maximum Overall Network Distance... miles (km)	Maximum Number of OCMs per Network	OCM-DPR Switch Settings(1) SW5-7	SW5-8	SW5-9
57.6	6.0 (9.6)	4	ON	OFF	ON
57.6(2)	5.0 (8)(2)	8(2)	ON	OFF	OFF
57.6	4.0 (6.4)	12	OFF	ON	ON
115.2	7.0 (11.2)	4	ON	ON	OFF
115.2	6.0 (9.6)	7	ON	OFF	ON
115.2(2)	5.0 (8.0)(2)	11(2)	ON	OFF	OFF
115.2	4.0 (6.4)	15	OFF	ON	ON
230.4	7.0 (11.2)	5	ON	ON	OFF
230.4	6.0 (9.6)	8	ON	OFF	ON
230.4(2)	5.0 (8.0)(2)	12(2)	ON	OFF	OFF
230.4	4.0 (6.4)	16	OFF	ON	ON

(1) See Figures 11 and 13, and Table 17(A)
(2) Factory Default Setting

REMOTE I/O NETWORK BAUD RATE VS MAXIMUM OVERALL NETWORK DISTANCE AND MAXIMUM NUMBER OF OCMS PER NETWORK

TABLE 21

Network Baud Rate (k baud)	Maximum Overall Network Distance... miles (km)	Maximum Number of OLCs per Network	OLC-DPR Switch Settings(1) SW2-3	SW2-7	SW2-8
57.6	8.0 (12.8)	4	ON	OFF	ON
57.6(2)	7.0 (11.2)(2)	8(2)	ON	OFF	OFF
57.6	6.0 (9.6)	12	OFF	ON	ON

(1) See Figure 12 and Table 17(B)
(2) Factory Default Setting

DATA HIGHWAY PLUS MAXIMUM OVERALL NETWORK DISTANCE
VS MAXIMUM NUMBER OF OLCS PER NETWORK

TABLE 22

Network Baud Rate (k baud)	Maximum Overall Network Distance... miles (km)	Maximum Number of OLCs per Network	OLC-DPR Switch Settings(1)		
			SW2-3	SW2-7	SW2-8
57.6	6.0 (9.6)	4	ON	OFF	ON
57.6(2)	5.0 (8)(2)	8(2)	ON	OFF	OFF
57.6	4.0 (6.4)	12	OFF	ON	ON
115.2	7.0 (11.2)	4	ON	ON	OFF
115.2	6.0 (9.6)	7	ON	OFF	ON
115.2(2)	5.0 (8.0)(2)	11(2)	ON	OFF	OFF
115.2	4.0 (6.4)	15	OFF	ON	ON
230.4	7.0 (11.2)	5	ON	ON	OFF
230.4	6.0 (9.6)	8	ON	OFF	ON
230.4(2)	5.0 (8.0)(2)	12(2)	ON	OFF	OFF
230.4	4.0 (6.4)	16	OFF	ON	ON

(1) See Figure 12 and Table 17(B)
(2) Factory Default Setting

REMOTE I/O NETWORK BAUD RATE VS MAXIMUM OVERALL NETWORK DISTANCE AND MAXIMUM NUMBER OF OLCS PER NETWORK

TABLE 23

2.7.2 OLC-DSL CONFIGURATION INSTRUCTIONS

2.7.2.1 1746 Plug-In OLC-DSL Configuration Instructions

Configuration switches must be set for OLC-DSL baud rate configuration (bit rate). Figure 12 provides an overview of the 1746 Plug-In OLC module, with designated Configuration Switch locations. OLC-DSL Baud Rate Select switch designations are provided below in Table 24. Table 25 provides switch settings for OLC baud rate selection.

Switch(1)	Position(1)	Function
Switch 2 (SW2)	1	Baud Rate Select
	2	Baud Rate Select
	3	Baud Rate Select
	4	Baud Rate Select
	5	Baud Rate Select
	6	Baud Rate Select
	7	Unused
	8	Unused

(1) See Figure 12 for designated switch locations

1746 PLUG-IN OLC BAUD RATE CONFIGURATION SWITCH DESIGNATIONS

TABLE 24

Network Baud Rate (baud)	Switch Settings(1)					
	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6
19.2K(2)	ON	OFF	OFF	OFF	ON	ON
9600	OFF	ON	OFF	OFF	ON	ON
2400	ON	OFF	OFF	ON	ON	ON
1200	OFF	ON	OFF	ON	ON	ON

(1) See Figure 12 and Table 24
(2) Factory Default Setting

1746 PLUG-IN OLC BAUD RATE SWITCH SETTINGS

TABLE 25

2.7.2.2 Standalone, Panelmount OLC-DSL Configuration Instructions

Configuration switches must be set for OLC-DSL baud rate configuration (bit rate). Figure 13 provides an overview of the Standalone, Panelmount OLC module, with designated Configuration Switch locations. OLC Baud Rate Select switch designations are provided below in Table 26. Table 27 provides switch settings for OLC baud rate selection.

Switch(1)	Position(1)	Function
Switch 5 (SW5)	1	Baud Rate Select
	2	Baud Rate Select
	3	Baud Rate Select
	4	Baud Rate Select
	5	Baud Rate Select
	6	Baud Rate Select
	7	Unused
	8	Unused
	9	Unused
	10	Unused

(1) See Figure 13 for designated switch locations

STANDALONE, PANELMOUNT OLC BAUD RATE CONFIGURATION SWITCH DESIGNATIONS

TABLE 26

Network Baud Rate (baud)	Switch Settings(1)					
	SW5-1	SW5-2	SW5-3	SW5-4	SW5-5	SW5-6
19.2K(2)	ON	OFF	OFF	OFF	ON	ON
9600	OFF	ON	OFF	OFF	ON	ON
2400	ON	OFF	OFF	ON	ON	ON
1200	OFF	ON	OFF	ON	ON	ON

(1) See Figure 13 and Table 26
(2) Factory Default Setting

STANDALONE, PANELMOUNT OLC BAUD RATE SWITCH SETTINGS

TABLE 27

APPENDIX A

SLC 500 LINK COUPLER TO STANDALONE, PANELMOUNT OLC WIRE LIST(1)

Standalone OLC J1 Connector Pin #	SLC 500 Link Coupler (1747 AIC) Connector Pin #, (Signal Name)	DH-485 Signal Name (OLC J1 Connector)
1	NC(2)	NC(2)
2	NC(2)	NC(2)
3	NC(2)	NC(2)
4(3)	2(3), (Shield)	Shield
5(4)	3, (Common)	Common
6	4, (B)	B(+)
7(4)	5, (A)	A(-)
8(4)	NC(2)	Termination

(1) Wire diagram for direct connection of Allen-Bradley SLC 500 Link Couplers to Phoenix Digital OLCs.

(2) All pin numbers designated as "NC" (No Connection) should remain isolated and unconnected. (Standalone, Panelmount OLC J1 connector pin numbers 1, 2, and 3 provide RSS outputs. See Section 1.3.3.8 for more information.)

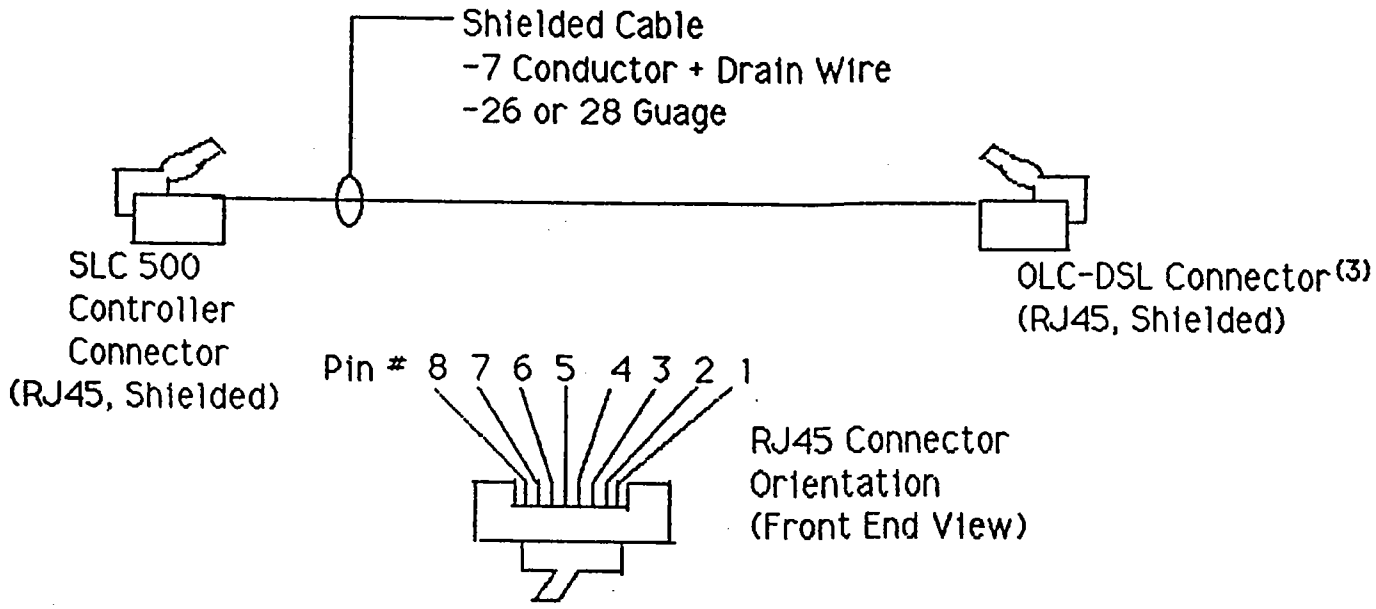
(3) OLC-DSL Pin #4 and Link Coupler connector Pin #2 should both be connected to the cable shield drain wire.

Only one device (OLC or A-B Link Coupler) at one end of each DH-485 multi-drop hardwired network stub should have Shield and Chassis Ground jumpered together. If Shield and Chassis Ground are not jumpered together at the OLC, then they must be jumpered at one of the Allen-Bradley Link Couplers on one end of the hardwire DH-485 network stub.

(4) Termination resistors must be installed on both ends of each DH-485 hardwired network stub. If the Standalone, Panelmount OLC-DSL is located at one end of a DH-485 network stub then OLC Pin #7 must be hardwire jumpered to OLC Pin #8 on the J1 Connector. Jumpering OLC Pin #s 7 and 8 provides the correct termination resistor across B(+) and A(-)... internal to the OLC. (J1 Pins 7 and 8 must always be jumpered together if either J2 or J3 is used, and J1 is not used.) The SLC 500 Link Coupler(s) located at one or both ends of each DH-485 network stub must have pin numbers 5 and 6 jumpered together (on the Link Coupler connector) in order to provide the correct termination resistor at the A-B Link Coupler.

APPENDIX B

OLC-CBL-SC CABLE DRAWING(1,2)



OLC-DSL J2/J3 Connector Pin #	SLC 500 Connector Pin #	DH-485 Signal Name (OLC J2/J3 Connector)
1	1	B(+)
2	2	A(-)
3	3	24 VDC In (Standalone, Panelmount OLC-DSL J3 Only, 1746 Plug-In OLC-DSL J2 Only)
4	4	Common
5	5	Unused (4)
6	6(5)	Shield
7	7	Common
8	8	24 VDC Out (Standalone, Panelmount OLC J2 Only, 1746 Plug-In OLC J1 Only)

(1) Cable for direct connection of Allen-Bradley SLC 500 Controllers or Modular Power Supplies to Phoenix Digital OLC-DSLs (via the 1746 Plug-In OLC-DSL J2 connector or the Standalone, Panelmount OLC-DSL J3 connector). (This cable may be ordered direct from Phoenix Digital... Order Cable Model #s OLC-CBL-SC or OLC-CBL-SC-10.)

(2) 1 Foot/.3 Meter Length... No Suffix
10 Foot/3 Meter Length... "-10" Suffix

(3) Standalone, Panelmount OLC-DSL Connector Designation... J3
1746 Plug-In OLC-DSL Connector Designation... J2

(4) All pin numbers designated as "Unused" are not used by the OLC.

(5) Connector pin #6 should be connected to the cable shield drain wire at both ends of the cable. (Cable shield foil or braid should be placed under RJ45 shield housing in order to make good electrical contact.)