



*The family of Focal™ Model 907 products provides compact and rugged video/data multiplexers and fiber-optic transmission systems.*

The Model 907 was designed for applications requiring the transmission of video and/or data over an optical link. A modular PC/104 form-factor and flexible design architecture supports reconfiguration and expansion of the multiplexer system to fit the specific data requirements of each application.

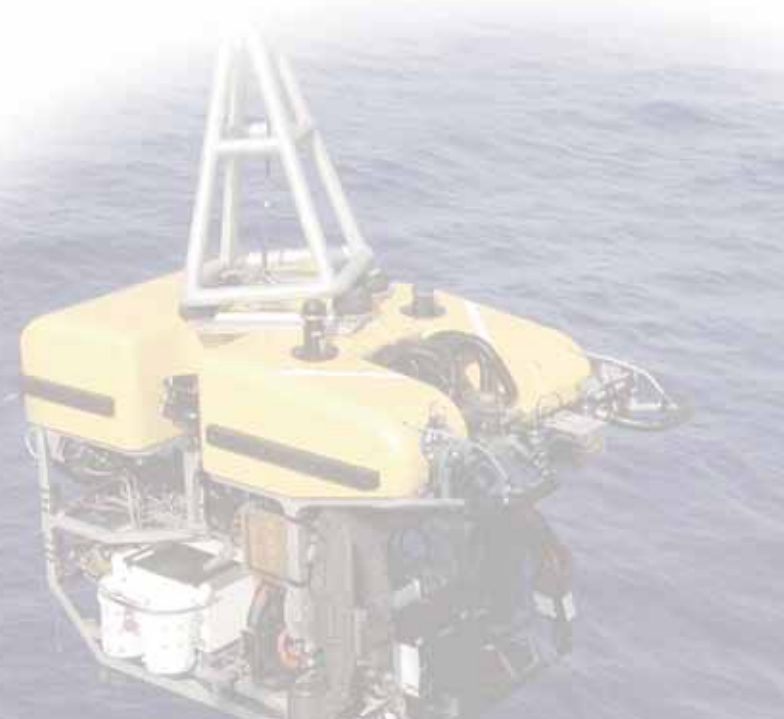
## Typical Applications

The Model 907 product family is suited particularly well to applications requiring small and ruggedized fiber-optic converters, such as:

- Remotely Operated Vehicles (ROVs)
- Explosive Ordinance Disposal (EOD) and pipe inspection robots
- Industrial automation equipment
- Wind energy turbines
- Video security networks
- Defense and other high reliability ruggedized applications including radar, ground vehicles, and Electro-Optic (EO) targeting and surveillance pods

Model 907 systems are assembled from four main categories of cards:

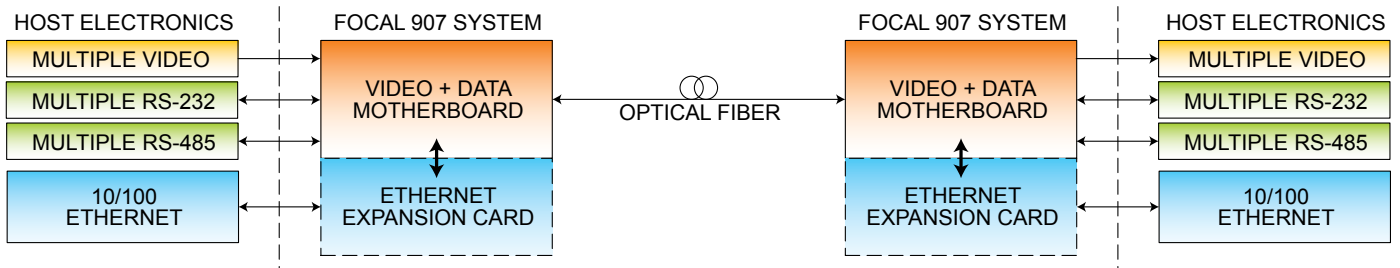
- Multiplexer motherboards
- Media converters
- Expansion cards
- System modules



# Model 907 Product Guide

## Multiplexer Motherboards

A Model 907 system consists, as a minimum, of a Model 907 remote motherboard (multiplexer), and a Model 907 console motherboard. Each motherboard can operate as a standalone multiplexer used to combine analog video, digital video, or Ethernet with on-board or backplane serial data such as RS-232 and high-speed RS-485/422. Motherboards can all be stacked together and communicate with expansion cards to send and receive data over the backplane for additional data capabilities.



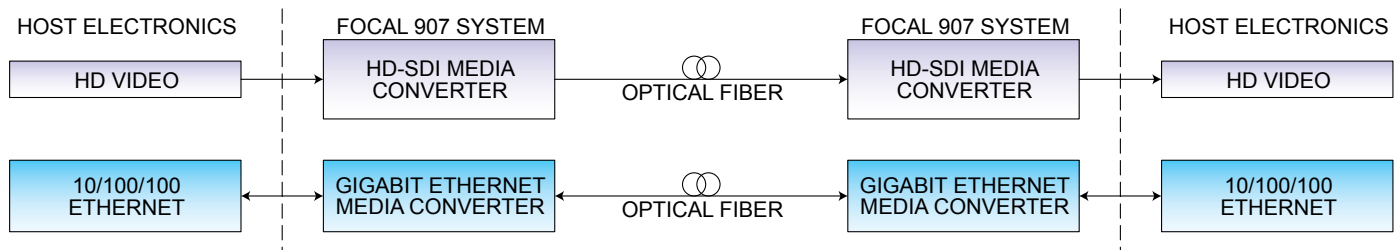
907 motherboards can be optically configured with Coarse Wave Division Multiplexer (CWDM) transceivers for use with passive 907 optical cards. High power transceivers are available for demanding optical systems, and low cost transceivers are available for cost sensitive applications.



Motherboard	907-R/C	907+	907V	907-HDM2	907-GEM
<b>Description</b>	3-Channel Video/Data Mux	4-Channel Video/Data Mux	6-Channel Video Mux	2-Channel HD-SDI/Data Mux	4-Channel Gigabit Ethernet Mux
<b>Part Number</b>	907-0001-XX (R) 907-0002-XX (C)	907-0025-XX (R) 907-0026-XX (C)	907-0023-XX (R) 907-0024-XX (C)	907-0050-XX (R) 907-0051-XX (C)	907-0060-XX
<b>Supported Video Formats</b>	NTSC, PAL, RGB, S-Video (Y/C)	NTSC, PAL, RGB, S-Video (Y/C)	NTSC, PAL, RGB, S-Video (Y/C)	HD-SDI (SMPTE-292)	GigE Vision
<b>Video Channels</b>	3	4	6	1-2 HD-SDI	4 max
<b>Supported Data Formats</b>	RS-232, RS-485/422, Backplane data	RS-232, RS-485/422, Backplane data	Backplane data	RS-232, RS-485/422, Backplane data	10/100/1000 Base-T Ethernet, Backplane Data
<b>On-board Data Channels</b>	6	6	None	2	4 Ethernet
<b>Support for E-Diagnostics</b>	No	Yes	Yes	Yes	Yes

## Media Converter Cards

Media converter cards provide direct electrical to optical signal conversion and transmit over one or two dedicated optical fibers. A number of signal formats are supported, including ECL/PECL signals for Cypress HOTLink™ and multi-beam sonar links; high-definition digital video (SMPTE-292); and one, two, or four isolated channels of Gigabit Ethernet.



Media converters may be deployed as standalone cards running on their own dedicated optical fiber or configured to support CWDM optical transceivers that allow for optical multiplexing of multiple cards using one of the passive 907-CWDM optical cards. High power transceivers are available for demanding optical systems, as well as, low cost transceivers for cost sensitive applications.



Media Converter	907-HDV	907-GBE	907-GBE2	907-GBES	907-ECL
<b>Description</b>	Single HD-SDI, SDI	Single Gigabit Ethernet Media Converter	Dual Gigabit Ethernet Media Converter	Quad Gigabit Ethernet Switch	Single ECL/PECL/ Hotlink Media Converter
<b>Part Number</b>	907-0022-XX	907-0021-XX	907-0030-XX	907-0027-XX	907-0019-XX
<b>Channel Direction</b>	Unidirectional	Bidirectional	Bidirectional	Bidirectional	Unidirectional
<b>NRZ Data Rate</b>	143 – 1485 Mbps	10/100/1000 Mbps	10/100/1000 Mbps	10/100/1000 Mbps	30 – 600 Mbps
<b>I/O Connectors</b>	2 x SMB In, 2 x SMB Out	1 x RJ-45	2 x RJ-45	4 x RJ-45	2 x SMB In, 2 x SMB Out
<b>Support for E-Diagnostics</b>	YES	NO	YES	YES	YES

# Model 907 Product Guide

## Expansion Cards

Up to six expansion cards may be stacked on a 907 motherboard using the backplane connector for power and signals. Each expansion card provides an increased number of data channels or added signal formats not supported by the motherboard directly. An Adaptable Interface Board (AIB) expansion card allows standard AIB plug-in daughter-card modules to be employed as well.



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Expansion Card	Description	Part Number	BP Channels used	Max. Data Rate	I/O Connectors
<b>907-232</b>	8-Channel RS-232 Card	907-0212-00	1	120 kbps	4 x 8 pin Molex
<b>907-485</b>	8-Channel RS-485/422 Card	907-0217-00	1, 2, 4	250 kbps to 2.5 Mbps <sup>1</sup>	4 x 8 pin Molex
<b>907-SER</b>	8-Channel RS-232/485/422 Card <sup>5</sup>	907-0242-00	1, 2, 4	250 kbps to 2.5 Mbps	4 x 8 pin Molex
<b>907-ADC/DAC</b>	8-Channel, 8/12-bit ADC/DAC <sup>3</sup> Card	ADC: 907-0218-00 DAC: 907-0219-00	1	50 kHz Bandwidth	2 x 8 pin Molex
<b>907-AUDIO</b>	4-Channel, 24-bit Audio Card	907-0228-00	1	20 kHz Bandwidth	4 x 2 pin WAGO 2 x 3 pin WAGO
<b>907-CIB</b>	4-Channel Control Interface <sup>4</sup> Card	907-0231-00	1	50 kHz Updates	4 x 2-Pin WAGO 2 x 3-Pin WAGO
<b>907-AIB</b>	Dual Socket AIB Adaptor	907-0204-00	1, 2	Up to 2.5 Mbps <sup>2</sup>	2 x 4-Pin WAGO
<b>907-EIBS</b>	10 Mbps Ethernet Switch Card	907-0222-00	1	10 Mbps	3 x RJ-45

1. Maximum NRZ data rate increases with number of backplane channels used on the motherboard
2. Maximum NRZ data rate or analog bandwidth depends on the AIB plug-in modules installed.
3. Use 907-ADC Analog Input Card, P/N 907-0218-00 with complementary 907-DAC Analog Output Card, P/N 907-0219-00
4. CIB inputs are individually configurable as switch or voltage controlled; CIB outputs are all solid state relays, max. current 250 mA.
5. 907-SER supports Ethernet diagnostics when used with the 907-DIAG-E

## Adaptable Interface Boards (AIB)

AIB plug-in modules are compatible with the Model 903, the Model 907, and the Model 914 product lines. The 907-AIB has two sockets for separate AIB plug-in modules. AIB plug-in modules are available for a variety of low speed data signals.



**907-AIB Supports Two AIB Plug-in Modules**

AIB plug-in modules are used to convert the signal interface format to a TTL format, which is then accessed through the expansion port on the 907 motherboard. AIB plug-ins support standard serial data interfaces (RS-232/485/422), hydrophone and other audio signals, various digital and analog sonar telemetry, and control networks, such as CAN Bus and Profibus.



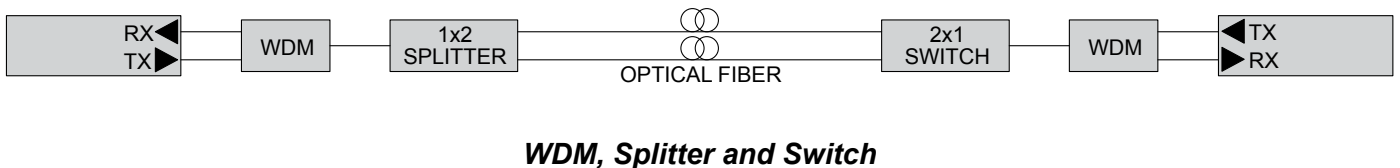
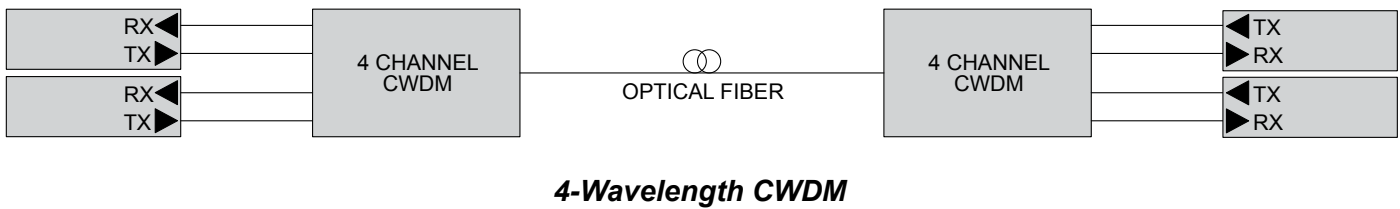
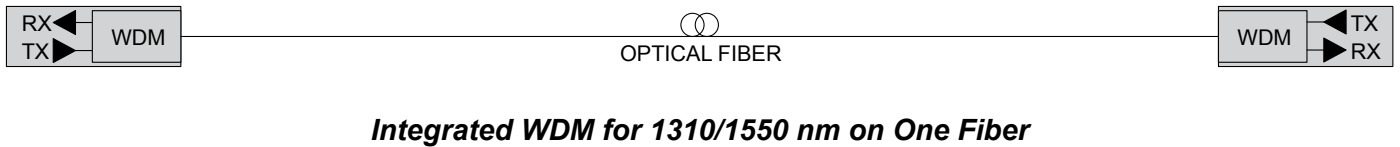
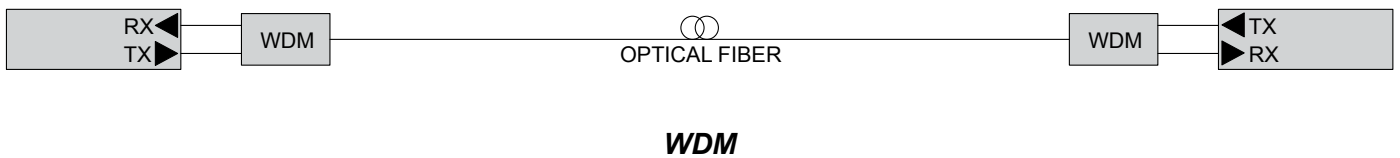
AIB Card	AIB-232	AIB-485	AIB-HYDRO	AIB-ARCNET	AIB-MS900	AIB-CAN Bus
<b>Description</b>	1 x RS-232	1 x RS-485/422	1 x Hydrophone	1 x Tritech ARCNET	1 x MS-900 Analog Sonar	1 x CAN Bus Bridge
<b>Part Number</b>	903-0251-00	903-0252-00	903-0244-00	903-0261-00	903-0250-00	903-0297-00
<b>Channel Direction</b>	Bidirectional	Bidirectional	Unidirectional	Bidirectional	Bidirectional	Bidirectional
<b>NRZ Data Rate</b>	120 kbps	2.5 Mbps	30 Hz - 30 kHz BW	156 kbps/78 kbps	5 - 30 kHz, 380 - 580 kHz	62.5 kbps - 1 Mbps
<b>I/O Connectors</b>	4-pin WAGO headers on 907-AIB adapter card					
<b>Options</b>	Responder Trigger	AC-Coupled 485, TTL	IRIG-B, Audio	Terminations	Low Speed Telemetry (LF)	Repeater Mode

## Optical Cards

Systems with only one motherboard or media converter typically transmit at an optical wavelength of 1310 nm for uplink and 1550 nm for downlink. In larger systems with multiple 907 motherboards, media converters and expansion cards, fiber-optic signals may be combined on a single fiber using a Coarse Wavelength Division Multiplexer (CWDM) to take advantage of the high bandwidth of optical fiber. CWDM optical wavelengths are separated by 20 nm and range from 1471 nm to 1611 nm. Bidirectional optical signals occupy two distinct wavelengths. For example a 907-GBE Media Converter using CWDM wavelengths may use 1471 nm for uplink traffic and 1491 nm for downlink traffic.

To provide redundant communications between host electronics in the case of a fiber-optic cable failure, one system may be fitted with a fiber-optic splitter, while the other system is fitted with a fiber-optic switch. All optical traffic from the splitter system is transmitted along both fiber-optic cables. The switch system can manually or digitally (TTL) select one of the two fibers for communication.

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## Optical Cards



Optical Card	Description	Part Number	Features/Options
<b>907-WDM</b>	WDM Optics Card, 1310/1550 nm, Singlemode	907-0015-35	Card-mounted, PC/104
<b>907-CWDM</b>	CWDM Optics Card, 1471/1491 nm with 1310/1550 nm Bypass, Singlemode	907-0015-00	1310/1550 nm bypass port for easy upgrade of existing 1310/1550 nm system
<b>907-CWDM-MM</b>	CWDM Optics Card, 1471/1491 nm with 1310/1550 nm Bypass, Multimode	907-0015-02	1310/1550 nm bypass port for easy upgrade of existing 1310/1550 nm system
<b>907-CWDM-4R1</b>	CWDM Optics Card, 1471 - 1531 nm, Singlemode, 20 nm Spacing	907-0015-03	Optional 1310 nm Bypass Port
<b>907-CWDM-8R</b>	CWDM Optics Card, 1471 - 1611 nm, Singlemode, 20 nm Spacing	907-0015-20	Optional 1310 nm Bypass Port
<b>907-SPLIT-SM</b>	1 x 2 Fiber Splitter Card, Singlemode	907-0015-05	Provides redundant fiber operation
<b>907-FOS-SM</b>	1 x 2 Fiber Switch Card, Singlemode	907-0015-06	Provides fiber-optic switch with manual or remote digital control (TTL)

# Model 907 Product Guide

## Oil Filled/Pressure Tolerant

Standard Model 907 products require a 1 atmosphere (ATM) enclosure when used in subsea applications. However, specific 907 products are available in pressure tolerant versions for use in Pressure Balanced Oil Filled (PBOF) applications. Refer to application note AN-03 for a detailed analysis of pressure tolerant electronics.

Card	Card Type	Description	Part Number	Pressure Rating <sup>2</sup>
907+P	Multiplexer Motherboard	4-Channel Video/Data Mux	907-0035-XX <sup>1</sup>	6000 psi
907V-P	Multiplexer Motherboard	6-Channel Video Mux With Bidi Transceiver	907-0033-03	3000 psi
907V-P	Multiplexer Motherboard	6-Channel Video Mux	907-0033-XX <sup>1</sup>	6000 psi
907-GBE-P	Media Converter	Single Gigabit Ethernet Media Converter	907-0043-XX <sup>1</sup>	6000 psi
907-GBE2-P	Media Converter	Dual Gigabit Ethernet Media Converter	907-0031-XX <sup>1</sup>	6000 psi
907-GBES-P	Media Converter	Quad Gigabit Ethernet Switch	907-0028-XX <sup>1</sup>	6000 psi
907-232-P	Expansion Card	8-Channel RS-232 Card	907-0212-02	6000 psi
907-485-P	Expansion Card	8-Channel RS-485/422	907-0217-01	6000 psi
907-SER-P	Expansion Card	8-Channel RS-232/485/422	907-0242-02	6000 psi
907-CIB-P	Expansion Card	4-Channel Control Interface	907-0231-01	6000 psi
907-AIB-P	Expansion Card	Dual Socket AIB Adaptor	907-0204-01	6000 psi
907-EIBS-P	Expansion Card	10 Mbps Ethernet Switch Card	907-0222-01	6000 psi
907-CWDM-4R1-P	Optical Card	CWDM Optics Card, 1471-1531 nm, Singlemode, 20 nm Spacing	907-0015-32	6000 psi
907-CWDM-8R-P	Optical Card	CWDM Optics Card, 1471-1611 nm, Singlemode, 20 nm Spacing	907-0015-21	6000 psi
907-WDM-P	Optical Card	WDM Optics Card, 1310/1550 nm, Singlemode	907-0015-36	6000 psi
907-SPLIT-SM-P	Optical Card	1 x 2 Fiber Splitter Card, Singlemode	907-0015-05	6000 psi

1. XX – CWDM wavelength (47 = 1471, 49 = 1491, 51 = 1511, 53 = 1531, 55 = 1551, 57 = 1571, 59 = 1591, 61 = 1611 nm). Other wavelengths available by request.

2. 6000 psi = 412 bar = 4 km ocean depth and 3000 psi = 206 bar = 2 km ocean depth

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## System Cards

System cards provide the support functions required to adapt the Model 907 architecture to many different applications. These cards provide mechanical integration of the 907 into Eurocard form-factor, electrical interoperability with the standardized PC/104 backplane, operation with 18-30 VDC input, and 907 diagnostics.

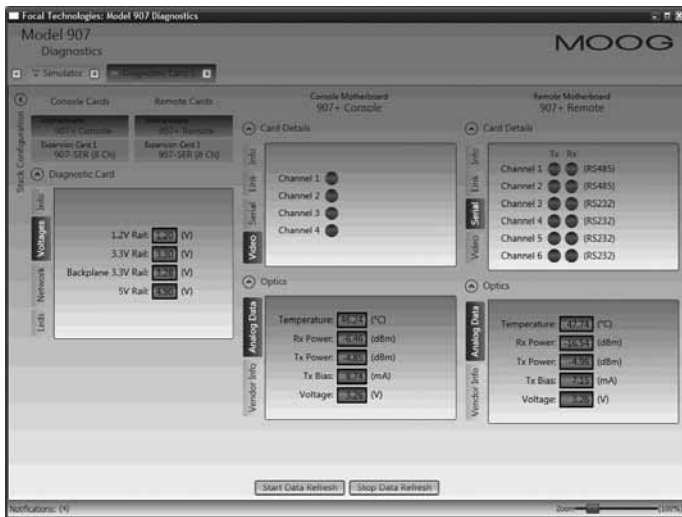
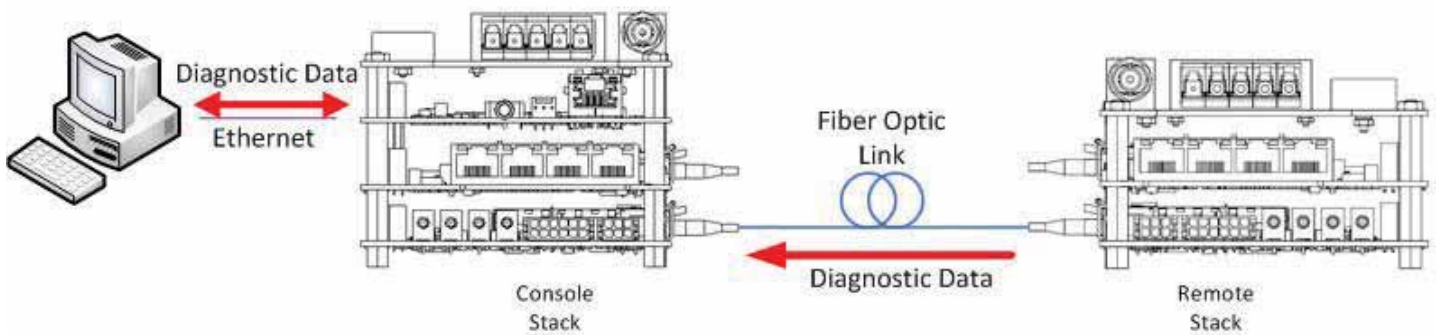


System Card	907-DIAG-E	907-DC-24	907-EURO
<b>Description</b>	Ethernet Diagnostic Card	Isolated DC-DC Power Supply Card for 18-30 VDC Input	Eurocard Adaptor
<b>Part Number</b>	907-0238-00	907-0233-00	907-0005-xx 907-0006-xx
<b>Features/Options</b>	Ethernet Output. API and sample GUI available. Reads diagnostics from compatible cards in 907 stacks.	Supports 18-30 VDC input, provides multiple +5 VDC outputs	4 HP and 8 HP options available, typically supplied assembled with 907 card

# Model 907 Product Guide

## Ethernet Diagnostics

Specific 907 products are compatible with the 907 Ethernet diagnostics. The 907-DIAG-E system card combined with the diagnostics .NET graphical user interface (GUI) allow for real time diagnostics of both remote and console multiplexer motherboards, media converters and expansion cards. Parameters include optical transmit power, optical receive power, optical transmitter temperature, voltages, and many more. The GUI can be configured to provide alarms on conditions and log data. An application programming interface (API) is available to provide a simple interface for customer developed software.



## Model 907 Ethernet Diagnostics Compatible Cards

Card	Card Type
907+	Multiplexer Motherboard
907V	Multiplexer Motherboard
907-HDM2	Multiplexer Motherboard
907-GEM	Multiplexer Motherboard
907-HDV	Media Converter
907-GBE2	Media Converter
907-GBES	Media Converter
907-ECL	Media Converter
907-SER	Expansion Card

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## Key Specifications



### Form Factor and Mounting

- Model 907 cards use the standard PC/104 form factor of 3.55 x 3.775 inches (90 x 96 mm)
- The cards are outfitted with a PC/104 connector to provide backplane connectivity between multiple cards assembled in a vertical stack
- Cards stack one on top of the other, supported by 0.625 inch standoffs fitted into mounting holes on the corners of the card, and are electrically connected via the PC/104 connector
- Some stack configurations require fiber pigtailed to optically connect one card to another
- 19-inch EIA rack mount enclosures and custom enclosures available upon request

### Analog Video

- Formats supported: NTSC or PAL, RGB, S-Video (Y/C), YPbPr
- 8-10-bit digitization, 6 MHz bandwidth
- Voltage: 1.2 V<sub>p-p</sub> maximum
- Impedance: 75 Ω

### Digital HD-SDI Video

- Format supported: HD-SDI (SMPTE-292)
- Electrical Data Rate: 1.485 Gbps (3 Gbps option)
- Voltage: 800 mV<sub>P-P</sub> nominal
- Impedance: 75 Ω

### Ethernet Options

- Support for full duplex 10/100/1000 Base-T(X) Ethernet
- Physical-layer (PHY) media converters for low latency
- GigE vision cameras supported
- Switched Ethernet for additional port count
- Multiplexed options for multiple isolated channels

### Data Options

- RS-232: bidirectional channels, 120 kbaud maximum
- RS-422/485: 5 Mbps NRZ
- AIB plug-in cards support additional channels of RS-232, RS-422/485, CAN Bus, Tritech ARCNET, and MS900 Sonar
- Other signals such as TTL, On/Off, and support for Profibus

# Model 907 Product Guide

## Power

- Input Voltage: +5 VDC  $\pm$  10%, regulated, 0.5-1.0 A typical (2.5 W to 5.0 W), per card
- Input Protection: over-voltage, reverse polarity, over-current
- Model 907 motherboards obtain power through a 2-pin Molex power connector and are capable of providing power to other cards in the stack through the backplane PC/104 interface
- If regulated +5 VDC power supplies are not available, the 907-DC-24 PSU card can be added to a 907 stack to generate multiple +5 VDC supplies from 18-30 VDC input

## Pressure Tolerant

- Pressure tolerant versions of multiplexer motherboards, media converters and expansion cards are available for pressures up to 6000 psi

## Optical Options

- Optical Fiber: 1 or 2 singlemode (9/125  $\mu$ m), 1 or 2 multimode (50/125  $\mu$ m and 62.5/125  $\mu$ m)
- Wavelengths: 1310/1550 nm standard, CWDM options available
- Flux Budget: 20 dB minimum standard (others available)
- Connectors: LC or ST, depending on card (others available)

## Diagnostics Support

- Diagnostics extracted from compatible cards in both remote and console stacks using 907-DIAG-E card. Diagnostic data is accessible over a 10/100 Base-T(X) Ethernet link to the 907-DIAG-E
- Optical transceiver data including Tx/Rx power, bias current, temperature, voltage, and more
- Card identity, serial number
- Motherboard data-channel activity
- Ethernet port link speed and activity indicators
- Sample .NET GUI and full API is available
- LED diagnostics also available on board

**Call or email our knowledgeable Application Engineers for more information:  
902-468-2263 or [focal@moog.com](mailto:focal@moog.com)**