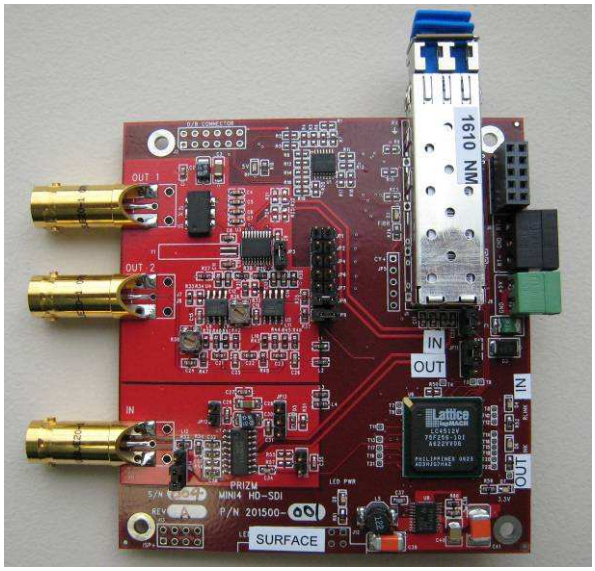
Mini4 HD-SDI Interface Board
(P/N 201500-xxx)

User's Manual
And
Troubleshooting Guide



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Rev B

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MANUAL REVISION HISTORY

REVISION NUMBER	DATE	BY	REASON FOR REVISION
A	4/16/07	GSG	ORIGINAL
B	02/23/09	IB	Updated contact information to reflect Moog Components Group

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1 Mini4 HD-SDI Interface Board, P/N: 201500-xxx

The Prizm Mini4 HD-SDI Interface Board provides a fiber optic link to remote an HD-SDI SMPTE digital camera at any camera data rate from 170Mbps to 1.485Gbps. The HD-SDI Interface Board has the circuitry for both the subsea input side (camera signal is input to the board) and the HD-SDI monitor surface side (signal is output to the monitor). A single jumper selects whether the board is physically configured as an Input or an Output board.

Note 1: The HD-SDI camera must have a SMPTE 292M/296M digital HD-SDI output to work with this Interface board. This board will not work with an HD analog camera.

Note 2: The Kongsberg oe14-500 HDTV Colour Zoom and Digital Camera has been tested to work with this Interface board. The oe14-500 camera has a 1080/50i format.

This board only provides for the HD-SDI camera's uplink (subsea to surface) data link, the downlink (surface to subsea) control link must be handled through another separate multiplexer, such as the Mini4. The control link for the camera may require specific electrical protocols (i.e. RS-232, RS-485, RS-422 or other) and the camera manufacturer's interface manual should be consulted.

The HD-SDI Interface Board can be jumper configured to operate as either a subsea or surface interface board, so can be used as spare for either location. The optical modules used on the board (pluggable small-form-factor (SFP)) are inherently bi-directional and care must be taken to ensure the correct optical port (either TX or RX) is connected, depending on the board configuration and system location. While the optical module's receiver will operate on all of the 16 CWDM wavelengths (1270 to 1610nm), the module's transmitter only emits at a single wavelength so care must be taken to ensure the correct wavelength is used.

The HD-SDI Interface Board supports PMON II diagnostics through the RS-485 diagnostics cable. Diagnostics will display the optical parameters from both of the SFP modules and will also show the HD-SDI camera's activity (both into and out of the board) on PMON II.

Note: to acquire diagnostics from the remote HD-SDI Interface Board, the board must be either stacked on top of a Mini4 Video Input or Output board or have its 3-pin Phoenix diagnostics cable connected to a Mini4 Video Input or Output board.

1.1 Mini4 HD-SDI Interface Board Revision History:

The Mini4 HD-SDI Interface Board has gone through the following printed circuit board (PCB) and Assembly revisions:

PCB Revision A/Assembly Revision A Original design..

1.2 Mini4 HD-SDI Interface Board Dash (-) Number Definitions

The Mini4 HD-SDI Interface Board has a Dash Number appended to the part number. This Dash Number identifies the specific board configurations:

-001A original configuration.

1.3 Mini4 HD-SDI Interface Board Operation:

The HD-SDI Interface board has three 75-ohm BNC coaxial connectors – but optionally SMB connectors may be placed. One connector (labeled as "IN" at J10/11) is the camera signal input. Two connectors (labeled "OUT 1" or "OUT 2" at J4/5 and J7/8) are the HD-SDI outputs. Both connectors carry the same HD-SDI video signal but are driven through independent cable drivers. The signal level for both output signals can be independently adjusted using the on-board trimpots, R36 for "OUT 1" and R38 for "OUT 2".

There is single green 2-pin Phoenix connector on the on the right side of the board for supplying the board with +5VDC. Pin 1 is the +5VDC input and pin 2 is the ground.

There is single black 3-pin Phoenix connector on the on the right side of the board for RS-485 diagnostics. Pin 1 is the RT+ signal, pin 2 is the ground/shield and pin 3 is the RT- signal. A Prizm Diagnostics cable can be connected directly to this 3-pin connector or through a stacked Mini4 Video Input or Output board.

NOTE: To complete the RS-485 diagnostics link from the surface to the subsea boars, the HD-SDI Interface Board must be stacked onto a Mini4 Video Input or Output board to complete the link over the multiplexer's fiber.

1.3.1 HD-SDI Interface Board Indicators and Controls:

LEDS:
There are 6 surface mount vertical LED indicators on the top of the board and 3 surface mount vertical LED indicators on the bottom of the board.

Top of Board

LED	Indication
D1 (Green)	Located at the top left of the board serves as an indicator that +5V DC is available to the board. Supply voltage 5V to the board is selected via the placement of fuse F1 (or F2 or F3).
D2 (Green)	Located on the top center of the board, labeled 'FIBR', provides an indication that the transceiver module has detected the presence of an input signal on the fiber link. When 'ON' indicates that this board has a good level of received optical power from the remote unit. NOTE: IF BOARD IS CONFIGURED AS AN INPUT, THEN THIS LED WILL BE OFF.
D4 (Green)	Labeled "IN", located at the bottom right edge of the board serves as an indicator that an HD-SDI signal in being input from the "IN" connector on the board.

	NOTE: THIS INDICATOR DOES NOT FUNCTION ON THE REV A PCB VERSION.
D5 (Green)	Labeled " ", located at the bottom center of the board serves as an indicator that an HD-SDI signal in being input from the "IN" connector on the board. **NOTE: THIS INDICATOR DOES NOT FUNCTION ON THE REV A PCB VERSION.**
D6 (Green)	Labeled "OUT", located at the bottom right edge of the board serves as an indicator that an HD-SDI signal in being output fro the "OUT 1/OUT 2" connectors on the board.
D8 (Green)	Located at the bottom right of the board serves as an indicator that +5V DC is being sourced to the LED header on the board.

Bottom of Board

LED	**Indication**
D9 (Green)	Labeled "BLINK", Blinks 'ON' when with diagnostics accesses to the board.
D10 (Green)	Labeled "TX", 'ON' diagnostics data is being sent from the board to the diagnostics PC.
D11 (Green)	Labeled "RX", 'ON' when diagnostics data is being received from the diagnostics PC.

FUSES:
There are three fuses for this board, all fuses are the self-resetting PTC type and will not require replacement by the user.

F1: 2.6 Amp PTC, +5VDC input fuse at J9

F2: 2.6 Amp PTC, +5VDC input fuse for "DIAG HEADER" header at J3

F3: 2.6 Amp PTC, +5VDC input fuse for Daughterboard header at J2 – NOT PLACED

F4: 1.0 Amp PTC, +5VDC output fuse for LED header at J12 – NOT PLACED

SWITCHES:
There are no switches on this board.

TRIMPOTS:
There are two trimpots on this board for adjusting "OUT 1" and "OUT 2" signal levels. R36 adjusts "OUT 1" while R38 adjusts "OUT 2".

CONNECTORS:
There are three BNC coaxial connectors on the left side of the board for connecting the HD-SDI camera or monitor coaxial cables.

J4/5: "OUT 1", output of HD-SDI signal to monitor.

J7/8: "OUT 2", output of HD-SDI signal to monitor.

J10/11: "IN", input of HD-SDI signal from camera.

There are two daughterboard stacking connectors.

J2: D/B Connector – not used

J2	Daughterboard Header				
VDC Supply	1	o	o	2	VDC Supply
RXD_DB	3	o	o	4	TXD_DB
GND	5	o	o	6	GND
RXC_DB	7	o	o	8	TXC_DB
RCV LINK	9	o	o	10	Future
RXD_DB2	11	o	o	12	TXD_DB2

J3: Diagnostics Header

J3	Diagnostics Header				
RT+	1	o	o	2	RT-
GND	3	o	o	4	GND
GND	5	o	o	6	GND
+5V	7	o	o	8	+5V
+5V	9	o	o	10	+5V

There are two Phoenix pluggable connectors

J6: 3-pin Phoenix, RS-485 Diagnostics

J6	Diagnostics Connector
o 1	RT+
o 2	GND
o 3	RT-

J9: 2-pin Phoenix, +5VDC power entry

J9	+5VDE Power 2-pin Phoenix Connector
o 1	+5VDC
o 2	GND

There is one 16-pin ribbon header for remote LED diagnostics display

J12: 16-pin ribbon, LED diagnostics

J12	Led Status Connector				
GND	1	o	o	2	PTC FUSE with +5VDC
FIBER_LED	3	o	o	4	NOT USED
* IN_CD_LED	5	o	o	6	NOT USED
OUT_LOCK_LED	7	o	o	8	NOT USED
NOT USED	9	o	o	10	NOT USED
NOT USED	11	o	o	12	NOT USED
NOT USED	13	o	o	14	NOT USED
RDIAG_LED	15	o	o	16	TDIAG_LED

NOTE 1: J12 header is located at the bottom center side of the board.
Pin 1 is the upper right pin – as identified by a square pad.
NOTE 2 : Signals are active low.
NOTE *: Signal not active on this PCB version.

"FIBER_LED" = low if fiber optic module receiving optical signal.
"IN_CD_LED" = low if input HD-SDI signal is available at input connector – NOT ACTIVE
"OUT_LOCK_LED" = low if HD-SDI signal available at output connectors
"RDIAG_LED" = low if diagnostic serial data detected going into board from diagnostics PC
"TDIAG_LED" = low if diagnostic serial data going out of board in response to diagnostics PC request

There is one header for programming the Lattice programmable device

J13: ISP programming header, do not use

J13	ISP Header				
+3.3V	1	o	o	2	TMS
TCK	3	o	o	4	TDI
N/C	5	o	o	6	TDO
GND	7	o	o	8	

NOTE: J13 to be used only by PRIZM.

JUMPER POSTS:

The board contains jumper posts to allow the user to configure board for input or output of HD-SDI signals. Other jumpers are used for factory programming or testing and should not be move or changed.

JP1: RATE0 select for U3 – do not place shunt

2 o o 1

JP2: RATE1 select for U3 – do not place shunt

2 o o 1

JP3: AUTO MUTE select for U3 –place shunt for Auto Mute

2 o 2 o
| for Auto Mute to disable Auto Mute
1 o 1 o

JP4: BYPASS select for U3 – do not place shunt

2 o o 1

JP5: Programming header for U10 – do not use

JP6: MUTE select for U3 – do not place shunt

1 o o 2

JP7: CLOCK OUTPUT select for U3 – do not place shunt

2 o o 1

JP8: HD select for U5 – place shunt

1 o== o 2

JP9: HD select for U4 – place shunt

1 o==o 3

JP10: Laser Enable select for J1 – place shunt Enable Laser

2 o 2 o
| to Enable Laser to disable Laser
1 o 1 o

JP11: Input/Output Selection for Diagnostics – place shunt as appropriate

1 o 1 o
|
2 o Selects Input 2 o Selects Output
|
3 o 3 o

JP12: Cable Length Indicator (CLI) test point for U7 – do not place shunt

2 o GND

1 o CLI signal

JP13: CD-/MUTE for U7 – do not place shunt

3 o S
|
2 o to MUTE input

1 o D

3 o S

2 o disable MUTE

1 o D

JP14: Enable Equalizer/Bypass selection for U7 –place shunt enable Equalizer

1 o
|
2 o to BYPASS input

3 o

1 o

2 o Enable cable equalizer
|
3 o

JP15: Muting analog level test point – do not place shunt

2 o GND

1 o Mute Analog Level

1.3.2 Mini4 HD-SDI Interface Board Specifications:

Number of HD-SDI links:	1 per board
Sonar type supported:	Reson 8xxx or Simrad EM3002
Data rates supported:	Depends on sonar
Maximum Sonar data rate:	600Mbps

1.3.3 Mini4 HD-SDI Interfac Board Dimensions:

Printed circuit board (PCB): 3.55 in x 3.775 in x 0.60 in board-to-board
(90.1mm x 95.88 mm x 15.24 mm)

1.3.4 HD-SDI Interface Board Power Requirements:

The HD-SDI Interface Board utilizes approximately 440mA @ 5VDC.

1.3.5 Power Section Testing

NOTE: The connectors on the bottom of the HD-SDI Interface Board have pins that are connected to +5VDC and ground. If these pins are inadvertently shorted together or to a common chassis ground, the board fuse (F1) will trip/reset.

If both the +5V Power LED +3.3V Power LED are out:
- Check for continuity of PTC fuse F1 with an ohmmeter.
- Replace PTC fuse if open.

If only the +5V Power LED is out:
- Verify +5V DC is present at the source
  - At J9 if powered off of external power
  - At J2 or J3 if powered off of the stacking connectors.
- If +5V is not available replace the board with a spare.
- If +5V is available check the display LED (D1).

If only the +3.3V Power LED is out:
- Verify +5VDC at F1 or J9 (replace board if +5VDC is not available)
- Verify +3.3VDC across C39 on the bottom edge of board
  - If +3.3V is not available replace the board with a spare.
  - If +3.3V is available check the display LED (D75).

1.3.6 Optical Section Testing

For surface boards, if the "FIBR" LED is off or flickering, one or more of the following conditions is likely:
- The fiber is broken or damaged.
- The optical transceiver module is defective at either the surface or subsea board.
- Excessive light loss (low received optical power) is being experienced.
- The Mini4 board (not the optical transceiver module) is malfunctioning.
- There is not enough attenuation in the optical link and the receiver is saturating.

If excessive optical loss is being experienced, the following conditions may be present:
- May have sonar data errors.
- Check the optical level with an optical power meter and inspect all fiber optic connections including CWDMs and slip rings.

To determine if the fiber is broken, a laser module is out, or the board is malfunctioning, first:
- Verify that the optical transceiver is tight in its socket.
- Verify that shunts (jumpers) are placed per system jumper configuration.
- Check all fiber optic connections including CWDMs and slip rings to make sure that they are not causing the problem.

- Check that the optical fiber cable is straight at connectors on board for minimum optic loss.

1.3.7 HD-SDI Testing

If the HD-SDI camera link is out or has errors:

- Attach a HD-SDI camera and insert this signal into "IN" connector (J10/11) of the channel being tested. The test signal should be input into subsea (vehicle) HD-SDI Interface board.
- On the other end of the link, connect an HD-SDI monitor to the "OUT 1" or "OUT 2" connector (J4/5 or J7/8). Verify that the video signal is not distorted or has glitches (noise) in the signal.
- If the channel is not operating correctly, first check the field wiring. If the wiring appears correct, then first replace the subsea HD-SDI Interface board with a spare and check the sonar link again. If the problem is still there, replace the surface HD-SDI Interface board, with a spare and check the link again.

1.4 Stack Mini4 System Installation Checkout Procedure

NOTE: The HD-SDI Interface Board will work in a stand-alone configuration without stacking the boards above a Mini4 Video Input or Output board. Without a Mini4 Video board, the subsea diagnostics will not work but the board will still carry an HD-SDI signal.

For this PC/104 stack Mini4 System installation checkout procedure, it is assumed that the Mini4 System is composed of a Video Input board mounted in the vehicle and a Video Output board on the surface. +5VDC power for the Mini4 boards is supplied by the user's DC power supply powering the PC/104 stack and should be verified to be between +4.75VDC and +5.25VDC at the 2-pin Phoenix power connector.

1.4.1 Diagnostics Overview

The HD-SDI InterfaceBoard has been designed to include hardware and firmware for monitoring various parameters of interest. This capability is accessed via a 3-pin Phoenix connector on the board that carries bi-directional RS-485 telemetry. The diagnostics will typically be used in conjunction with a user-supplied PC on the surface, which has been loaded with PRIZM Modem Monitoring S/W (PMON II).

For the HD-SDI Interface board, the Diagnostics feature requires that there be a functioning multiplexer system for connectivity between the topside Diagnostic PC and the remote multiplexer. The Mini4 Video Input and Output board have a transparent link for carrying the Diagnostics across the fiber link and does not require a user's RS-485 channel. If the HD-SDI Interface board is stacked on a Mini4 Video Input or Output board diagnostics is automatically connected.

NOTE: The diagnostics feature in no way interferes with normal operation of the modem – it is not necessary to be running the diagnostics software for any of the Mini4 boards to work.

1.4.2 Required Communications Hardware for Diagnostics

The diagnostics capability is accessed via the 3-pin Phoenix connector on the Mini4 boards, which provides the RS-485 connectivity to the on-board processor for diagnostics communications. RS-485 was used because of its multi-drop capability, which in this case allows all the Mini4 boards to be communicated with via a single channel. In this configuration, no RS-485 multiplexer channel is needed.

The user is required to communicate with the Mini4 boards of the system via RS-485. A typical installation is shown in the following drawing. This details a diagnostic connection from a Windows PC running PMON II to a Mini4 board stack.

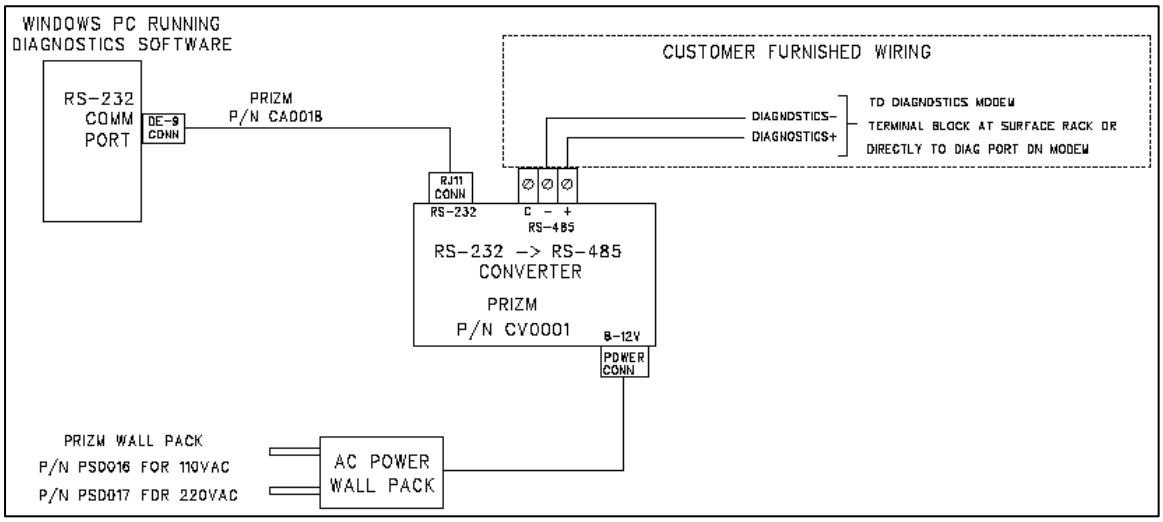

Figure 1- Typical Cabling/Wiring for Back plane Diagnostics Telemetry