RS-485 to Fiber Solutions
01/14/20

Mini Bit-Driver®
Stand Alone Bit-Driver®
Ruggedized Bit-Driver®

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RS-485 PRODUCTS
FIELD BUSES

A Field Bus is a digital, serial, two-way multi-drop communication link among controllers and remote I/Os, sensors, actuators, and internet working components. In comparison to local area network (LAN), field buses are specialized for rugged industrial environment, determinism, bus powering and so on.

Field buses are covered by IEC Standards. Some of the more popular field buses are:

- Profibus: IEC IS 61158 type 1/3/10. Over 50% of process industry applications use Profibus
- Foundation Fieldbus: IEC IS 61158 Type 1/9
- MOD Bus: Developed by Modicon Inc. Now backed by Schneider Electric
- Inter Bus: IEC IS 61158 Type 8
- CAN Bus: IEC under development

Electric industry association (EIA), RS485 standard bus is used in many of these field buses.
RS-485 PRODUCTS

1. Point to Point:

2. User Clusters:

3. Proprietary Networks Using Other Bus Architecture:

4. RS-485 Multidrop:

5. RS-485 Multiplexer:

Note: For RS485 bus, end of line termination is required (typically 120 ohm resistor).
RS-485 (EIA-485) is a standard using twisted pair for extended distance communications and is used on process control, energy management, clustered computers, and security systems.

RS-485 is used as a 2 wire or 4 wire systems. In a 2 wire system, 2 wires (twisted pair) are used for both transmit and receive, thereby requiring communication in half-duplex mode. For example, data is sent from Point A to Point B and then the line is turned around (also called time out) to send data from Point B to Point A.

Data rates most commonly used range from 4800 bps all the way to 12 Mbps. As the data rate is increased data goes from Point A to Point B in less time so the line can be turned around much faster.

RS-485 is used for distributed data communication in a bus topology or “daisy chain”. Star, tree, or branch configurations are generally not recommended.

RS-485 BUS

PLC=Programmable Logic Controller

For all RS-485 applications line termination is necessary – typically 100 to 120 ohms can terminate a line. Many manufacturers provide line termination in their equipment (auto terminating).

EIA-485 specifies generators and receivers capable of operating in balanced digital multipoint systems. The parameter values specified in this Standard are similar to those in TIA/EIA-422-B. These values allow generators and receivers to be designed that can be used to meet the requirements of both standards, (EIA-422 and 485).


This Standard specifies the electrical characteristics of generators and receivers that may be employed when specified for the interchange of binary signals in multipoint interconnection of digital equipment. When implemented within the guidelines of this Standard, multiple generators and receivers may be attached to a common interconnecting cable.

An interchange system includes one or more generators connected by a balanced interconnecting cable to one or more receivers and terminating resistors.

RS485 CONNECTORS

Please refer to the RS-422 section for discussion of data connectors.
### TABLE F
RS-485 TO FIBER BIT-DRIVERS (MODEMS)

<table>
<thead>
<tr>
<th>Package</th>
<th>Data Format</th>
<th>Multimedia Fiber</th>
<th>Singlemode Fiber</th>
<th>Daisy Chain Multidrop</th>
<th>Distance ***</th>
<th>Weight</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No.</td>
<td>Stand Alone</td>
<td>Dn Rail.</td>
<td>Min. Rack Mount Card</td>
<td>Rugg. Dired</td>
<td>Data Rate Up to Kbps</td>
<td>Async</td>
<td>Sync</td>
</tr>
<tr>
<td>2110 2110</td>
<td>√</td>
<td></td>
<td>1.8 M</td>
<td>6</td>
<td>ST/SMA</td>
<td>850</td>
<td></td>
</tr>
<tr>
<td>2126 2126</td>
<td>√</td>
<td></td>
<td>38.4</td>
<td>6</td>
<td>DB-9 M</td>
<td>880</td>
<td>ST</td>
</tr>
<tr>
<td>2127 2127</td>
<td>√</td>
<td></td>
<td>187.5</td>
<td>6</td>
<td>DB-9 F</td>
<td>850</td>
<td>ST</td>
</tr>
<tr>
<td>2128 2128</td>
<td>√</td>
<td></td>
<td>87.5</td>
<td>6</td>
<td>DB-9 F</td>
<td>850</td>
<td>ST</td>
</tr>
<tr>
<td>2145 2145</td>
<td>√</td>
<td></td>
<td>12M</td>
<td>10</td>
<td>DB-9 F</td>
<td>820</td>
<td>ST/FC</td>
</tr>
<tr>
<td>2228 2228</td>
<td>√</td>
<td></td>
<td>187.5</td>
<td>4</td>
<td>DB-9 F</td>
<td>850</td>
<td>ST</td>
</tr>
<tr>
<td>2310 2310</td>
<td>√</td>
<td></td>
<td>9.6</td>
<td>1.2</td>
<td>RJ4S</td>
<td>820</td>
<td>ST</td>
</tr>
<tr>
<td>2316 2316</td>
<td>√</td>
<td></td>
<td>115</td>
<td>1.2</td>
<td>RJ4S</td>
<td>820</td>
<td>ST</td>
</tr>
<tr>
<td>2345 2345</td>
<td>√</td>
<td></td>
<td>9.6</td>
<td>1.2</td>
<td>RJ4S</td>
<td>820</td>
<td>ST</td>
</tr>
<tr>
<td>2365 2365</td>
<td>√</td>
<td></td>
<td>38.4</td>
<td>1.2</td>
<td>RJ4S</td>
<td>820</td>
<td>ST</td>
</tr>
<tr>
<td>2562 2562</td>
<td>√</td>
<td></td>
<td>115</td>
<td>1.2.3.10</td>
<td>DB-25 F</td>
<td>820</td>
<td>ST/FC</td>
</tr>
<tr>
<td>2563 2563</td>
<td>√</td>
<td></td>
<td>115</td>
<td>1.2.3.10</td>
<td>DB-25 F</td>
<td>820</td>
<td>ST/FC</td>
</tr>
<tr>
<td>2610 2610</td>
<td>√</td>
<td></td>
<td>9.6</td>
<td>6</td>
<td>DB-25 F</td>
<td>880</td>
<td>ST</td>
</tr>
<tr>
<td>2618 2618</td>
<td>√</td>
<td></td>
<td>115</td>
<td>6</td>
<td>DB-25 F</td>
<td>820</td>
<td>ST/FC</td>
</tr>
<tr>
<td>2852 2852</td>
<td>√</td>
<td></td>
<td>1 M</td>
<td>1.2</td>
<td>Terminal Block</td>
<td>820</td>
<td>ST/FC/SC</td>
</tr>
<tr>
<td>212110</td>
<td>√</td>
<td></td>
<td>256</td>
<td>6</td>
<td>DB-9/USB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Power Options: See "Power Options and How to Order" sheet (p. 106) for options and ordering instructions.

** Pin outs are specified in data sheets.

*** Use one wavelength throughout system except if WDM is used.

- Unisys is a trademark of Unisys Corp
- Johnson Controls is a trademark of Johnson Controls Inc
- Omron is a trademark of Omron Electronics Inc
- Texas Instruments is a trademark of Texas Instruments Inc
- Omninet is a trademark of Corbus Systems Inc

Temperature range 0 - 50 degrees C unless otherwise noted.

Extended Temperature (ET) range available on some products.

**Distance: 2 km - STD, 5 km - L, 10 km - XL, 20 km - UL

### HOW TO ORDER

<table>
<thead>
<tr>
<th>Base Model</th>
<th>Number</th>
<th>Power*</th>
<th>Data Connector**</th>
<th>Distance***</th>
<th>Fiber and Connector</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXX</td>
<td>1. 110 VAC - STD</td>
<td>2. 230 VAC - V</td>
<td>M or F (If STD on most models)</td>
<td>2 Km - STD</td>
<td>Multimode (MM-STD)</td>
<td>0 - 50 °C - STD</td>
</tr>
<tr>
<td>2126</td>
<td>2. 230 VAC - V</td>
<td>4.6 &amp; See Chart</td>
<td>Other - Specify</td>
<td>Other - Specify</td>
<td>Singlemode (SM-Std)</td>
<td>0 to +80 °C - ET</td>
</tr>
</tbody>
</table>

e.g. 2852 = RS-485 to Fiber Bit-Driven, 110 VAC, Terminal Block, 2 Km, Multimode, ST Connectors, 0 - 50 °C
2126 = RS-485 to Fiber Bit-Driven, Needs S.I. Tech #2121 Power Supply, DB-9M, 2 Km, Multimode, ST Connectors, 0 - 50 °C

Specifications subject to change without notice.
RS-485 TO FIBER OPTIC BIT-DRIVERS®

2110
- Mini Asynchronous Half-Duplex Optical Bit-Driver®
- Data Rate up to 56 Kbps must be set at factory
- Designed for Johnson Controls System – N2 Bus and Bacnet
- Available in Eurocard format as Model 2345 for use in S.I. Tech Model 3000A Card Cage
- Standard Input/Output Interface is DB-9F Female Connector
- Din Rail Option is 2110-DIN
- Multimode or Single mode

21210*
- USB to Serial RS-485
- Can be used to connect legacy RS-485 interface to new PCs with only USB ports
- Supplied with Virtual Comport Drivers
- Can be used with S.I.Tech #2110 RS-485 to Bit-Driver®

2110-DIN
- Mini Asynchronous Half-Duplex Optical Bit-Driver®
- Data Rate up to 56 Kbps must be set at factory
- Designed for Johnson Controls System – N2 Bus and Bacnet
- Din rail version of 2110

2126
- Mini Synchronous Half Duplex Optical Bit-Driver®
- Data Rate is Switchable from 0.3 to 38.5 Kbps in 6 steps
- Input/Output Interface is RS-485 DB-9M Male Connector
- External Power Supply S.I. Tech Model 2121 (110 VAC) or 2164 (230 VAC)

2127
- Mini Synchronous Half Duplex Optical Bit-Driver®
- Data Rate is 187.5 Kbps
- Custom Designed to work with Omron PLC
- Input/Output Interface is RS-485 DB-9F Female Connector
- External Power Supply S.I. Tech Model 2121 (110 VAC) or 2164 (230 VAC)

2128
- Mini Synchronous Half Duplex Optical Bit-Driver®
- Data Rate is 187.5 Kbps
- Customized units available with different data rates
- Fiber Ports Repeat Data through the 2128 and Drop/Insert Data on the RS-485 Port (DB-9F Female Connector)
- RS-485 Port Inserts Data onto both Fiber Ports and gets Data dropped from either Fiber Port
- External Power Supply S.I. Tech Model 2121 (110 VAC) or 2164 (230 VAC)
2128/2228
- 2128 is Commercial Equipment/2228 is Mil-Spec.
- Mini Synchronous Half Duplex Optical Bit-Driver®
- Data Rate is 256 Kbps
- Fiber Ports Repeat Data through the 2128/2228 and Drop/Insert Data on the RS-485 Port (DB-9F Female Connector)
- RS-485 Port Inserts Data onto both Fiber Ports and gets Data dropped from either Fiber Port
- Host Powered (+12VDC on Pins 8 and 9 of DB-9F connector)
- Extended Temperature Range -40°C to +80°C
- Used with Military Systems

2140*
- RS485 – 2 or 4 Wire Multidrop Bit Driver
- Fiber in, Fiber out, RS485 Drop
- Up to 230 Kbps Data Rate
- Multimode or Single mode
- Repeater with RS485 Drop/ADD
- Used with Security Systems, Sensors

2145*
- RS485 – 2 Wire Profibus - DP
- Fiber in, Fiber out, RS485 Drop
- Data Rates, Switch Selectable to 12 Mbps
- Multimode, Single mode, or Plastic Fiber
- One or two fiber ports
- Used for Process Control
- Din Rail Mounting
- IFC 61168-2, EIA RS485A
- RS485 – 2 wire Modbus

2310
- Card Cage Mounted Asynchronous Half Duplex Optical Bit-Driver®
- Data Rate up to 56 Kbps must be set at factory
- Designed to Work with Johnson Controls System and with S.I. Tech Model 2110 Mini Bit-Driver®
- Eurocard Format, Fits S.I. Tech Model 3000A 19 inch Rack & 3520 Motherboard Bus
- Designed for RS485 Bus

2316*
- Up to 115.2 Kbps, Async, 2 Wire, RS485
- Card Version of S.I.Tech 2616, Eurocard Size
- Multimode or Single mode
- Designed to Work with Siemens Systems or Other PLCs
- Card Cage Mounted Asynchronous Half Duplex Optical Bit- Driver®
- Data Rate up to 56 Kbps must be set at factory
- Designed to Work with Johnson Controls System and with S.I. Tech Model 2110 Mini Bit- Driver®
- Input/Output Interface is 8-pin RJ-45 Female Connector
- Eurocard Format, Fits S.I. Tech Model 3000A 19 inch Rack

- Up to 115.2 Kbps, Async Operation, Switch Selectable
- Extended Temp Range -40°C to +80°C
- Ruggedized Enclosure, Panel Mounting
- Complies with IEEE C37-90-1
- IEC 801 Surge Protection
- Conformal Coated – Environmental
- Various AC/DC Power Option

- “Three in One” Design RS/232/422/485 to Fiber Bit- Driver
- Max Data Rate is 115.2 Kbps, Switch Selectable
- Multimode or Single mode
- Din Rail Option

- Mini Asynchronous Half Duplex Optical Bit- Driver®
- Data Rate up to 56 Kbps must be set at factory
- Designed to work with Johnson Controls System-N2 Bus or other PLC
- Standard Input/Output Interface is DB-9M Male Connector
- Extended Temperature Range (-40°C to +80°C) Version of Model 2110

- Up to 115.2 Kbps, Async, 2 Wire, RS485
- Extended Temp Range -40°C to +80°C
- Multimode or Single mode
- Designed to work with Siemens System or Other PLCs

- Synchronous Simplex or Half Duplex Optical Bit- Driver®
- Normal Operating Data Rate is 1 Mbps
- Designed to work with Omninet by Corvus Systems Inc and MODBUS+
- Stand Alone – 110 VAC or 230 VAC power cord
- Input/Output Interface RS-485 2-wire + Ground Terminal Block
Kit #10

- Din Rail Option
- Energy Management System Kit for Plug and Play Consist of:
  - 2 – 2110 Mini Bit Driver
  - 2 – 2121 Power Supply
  - 2 – 7110 Cable Assemblies
### TABLE G
RS-485 TO FIBER OPTIC MULTIPLEXERS

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Stand Alone</th>
<th>Rack Mount</th>
<th>Max. Data Rate Mbps</th>
<th>Async</th>
<th>Sync</th>
<th>Control Signals</th>
<th>Power Option*</th>
<th>Data Connector**</th>
<th>Number of Channels</th>
<th>Point to Point</th>
<th>Multidrop</th>
<th>Distance Km</th>
<th>** Weight (280 nm)/Singame (1300 nm)</th>
<th>Trunk*** Fiber Connector</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2454</td>
<td>√ Option 256</td>
<td>√</td>
<td>1,2 DB37 F</td>
<td>4</td>
<td>√</td>
<td>√</td>
<td>MM/SM</td>
<td>ST/SMA</td>
<td>uses 1 to 4 cable 7054</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2458</td>
<td>√ Option 76.8</td>
<td>√</td>
<td>1,2 DB37 F</td>
<td>8</td>
<td>√</td>
<td>√</td>
<td>MM/SM</td>
<td>ST/SMA</td>
<td>uses 1 to 8 cable 7058</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Power Options: See "Power Options and How to Order" sheet (p. 106) for options and ordering instructions.
** Pin outs are specified on data sheets
*** Distance: 2 km - STD, 5 km - L, 10 km - XL, 20 km - UL.
**** Other connector options for singlemode are SC and FC.
Temperature range 0 - 50 degrees C unless shown otherwise.

### HOW TO ORDER

<table>
<thead>
<tr>
<th>Base Model Number</th>
<th>Power*</th>
<th>Data Connector**</th>
<th>Distance***</th>
<th>Fiber and Connector</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXX</td>
<td>110V-STD</td>
<td>M or F (F is STD on most models.)</td>
<td>2 Km - STD</td>
<td>Multimode (MM) - STD</td>
<td>0 - 50° C - STD</td>
</tr>
<tr>
<td>230VAC-V</td>
<td>Other - Specify</td>
<td>L, XL, or UL</td>
<td>Other - Specify</td>
<td>Singlemode (SM) - Specify</td>
<td>Other - Call S.I. Tech</td>
</tr>
</tbody>
</table>

e.g. 2454 - RS-485 Async, 4 CH Fiber Multiplexer, 110VAC, DB37 F, 2Km, Multimode ST, 0-50° C

Specifications subject to change without notice.
RS-485 TO FIBER MULTIPLEXERS

2454

- Four Channel Asynchronous Half Duplex Time Division Multiplexer Optical Bit-Driver®
- Data Rate up to 256 Kbps must be set at factory
- Powered through 110 VAC line cord
- 230 VAC version available as S.I. Tech Model 2454V
- Each unit requires 4-to-1 RS-485 cable S.I. Tech #7054

2458

- Eight Channel Asynchronous Half Duplex Time Division Multiplexer Optical Bit-Driver®
- Data Rate up to 76.8 Kbps must be set at factory
- Powered through 110 VAC line cord
- 230 VAC version available as S.I. Tech Model 2458V
- Each unit requires 8-to-1 RS-485 cable S.I. Tech #7058
Optical Asynchronous Mini Bit-Driver® Point to Point

Operation Mode: Asynchronous, bi-directional, half duplex
Input/Output Interface: RS485, 9 pin type D, asynchronous at 0 to 56 Kbps**, connects directly to terminal (RS485 cable not required)
Transmission Line Interface: ST connector is standard for interfacing with fiber optic cable (SMA option)
Transmission Distance: See distance chart
Optical Power into a 50 Micron Core Optical Fiber: 0.5 microwatt, 10 dB power budget* @ 880 nanometers
Receiver Sensitivity: 50 nanowatts at less than 10^-9 bit error rate
Operating Temperature: 0 °C to 50 °C
Metal Enclosure: 1.75 x 3 x 0.625 in (4.5 x 7.5 x1.6 cm) Panel or DIN rail mounting option
Weight: 0.25 lb (100 grams)
Input Power: External with power supply (S.I. Tech #2121 - 110VAC to 12 Volt DC)
230V Version: Use S.I.Tech 2122 power supply

** Data rate must be set at factory


Features:
- 0 to 56 Kbps asynchronous, RS-485 half duplex operation
- 6600 ft. (2Km) maximum distance capability
- 0 °C to + 50 °C operating range
- ST connector receptacle (SMA option)
- Designed to work with Johnson Controls System - N2 Bus and Bacnet (2110BAC)
- For card version use 2310 (N2 Bus) or 2345 (point to point)
- Cable assembly use 7110 (2110 to N2 Bus)
- Data speed set at the factory

RS-485 9 PIN CONNECTOR - FEMALE
PINS UTILIZED BY 2110 MINI BIT-DRIVER®

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal Ground</td>
<td>SG</td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Data (+)</td>
<td>D+</td>
</tr>
<tr>
<td>4</td>
<td>Signal Ground</td>
<td>SG</td>
</tr>
<tr>
<td>5</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Termination (+)</td>
<td>T+</td>
</tr>
<tr>
<td>7</td>
<td>Termination (-)</td>
<td>T-</td>
</tr>
<tr>
<td>8</td>
<td>Data (-)</td>
<td>D-</td>
</tr>
</tbody>
</table>

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>200</td>
<td>100</td>
<td>330</td>
</tr>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>8 SM**</td>
<td>1.0</td>
<td>7000</td>
<td>23000</td>
</tr>
</tbody>
</table>

** High power option available
1000 Micron is plastic fiber (uses SMA connectors) option

Termination Resistors provided in Bit-Driver

Model Numbers
2110 RS485 to Fiber, Multimode, ST Connector, N2 Bus
2110BAC RS485 to Fiber, Multimode, ST Connector, Bacnet
2610 RS485 to Fiber, Multimode, ST, High Temp.
2110-SM RS485 to Fiber, Single Mode, ST
2110-SMA RS485 to Fiber, Multimode, SMA Connector
2110-660 RS485 to Plastic Fiber, SMA Connector
2110-L RS485 to Fiber, Multimode, High Power (5Km), ST
2110-DIN RS485 to Fiber, Multimode, High Power (5Km), ST, Dinrail Unit
2110-SM-DIN RS485 to Fiber, Single mode, ST, Dinrail Unit

Notes:
1. Power Supply # 2121 is required for all models (110VAC to 12 VDC).
2. Power Supply #2122 is for 230VAC applications.
3. For 2110 rack mounted, use version 2310 (or 2345) Card with 3000 Rack, 4000 Power Supply, and 3520 (or 3500) Motherboard.

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**Model 2110-DIN**

**Optical Asynchronous Bit-Driver® Point to Point and Bus**

**Features:**
- Asynchronous, RS-485 half duplex operation
- 6600 ft. (2Km) maximum distance capability
- 0°C to +50°C operating range
- ST connector receptacle (SMA option)
- Works with Johnson Controls System - N2 Bus and Bacnet
- For card version use 2310 (N2 Bus) or 2345 (point to point)
- Data speed set at the factory

**Data speed set at the factory**

**Asynchronous, RS-485 half duplex operation**

**Operating Distance for Fiber Optic Cable**

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation (dB/Km)</th>
<th>Distance (Meters*)</th>
<th>Distance (Feet*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>200</td>
<td>100</td>
<td>330</td>
</tr>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>8 SM**</td>
<td>1.0</td>
<td>7000</td>
<td>23000</td>
</tr>
</tbody>
</table>

* High power option available  ** Single mode option

**Military Standard 10832**

**Ordering Information**

- Model Numbers
  - 2110
  - 2110BAC
  - 2610
  - 2110-SM
  - 2110-SMA
  - 2110-660
  - 2110-L
  - 2110-DIN
  - 2110-SM-DIN
  - 2110-DIN-ET

**Notes:**
1. Power Supply # 2121 is required for all models (110VAC to 12 VDC).
2. Power Supply #2164 is for 230VAC applications
3. For 2110 rack mounted, use version 2310 (or 2345) Card with 3000 Rack, 4000 Power Supply, and 3520 (or 3500) Motherboard.
4. ET-Extended temperature range -40°C to +70°C

Model 2110-BAC (Bacnet)

Optical Asynchronous Mini Bit-Driver® Point to Point

Operation Mode: Asynchronous, bi-directional, half duplex

Input/Output Interface: RS485, 9 pin type D, asynchronous at 0 to 76.8 Kbps**, connects directly to terminal (RS485 cable not required)

Transmission Line Interface: ST connector is standard for interfacing with fiber optic cable

Transmission Distance: See distance chart

Optical Power into a 50 Micron Core Optical Fiber: 0.5 microwatt, 10 dB power budget* @ 880 nanometers - 950 nanowatts at less than 10^-9 bit error rate

Receiver Sensitivity: 0°C to + 50°C operating range

Metal Enclosure: 1.75 x 3 x 0.625 in (4.5 x 7.5 x 1.6 cm)

Weight: 0.25 lb (100 grams)

Input Power: External with power supply (S.I. Tech #2121 - 110 VAC to 12 Volt DC)

230V Version: Use S.I.Tech 2164 power supply

** Data rate must be set at factory

Specifications subject to change without notice.

Features:
• 0 to 76.8 Kbps asynchronous, RS-485 half duplex operation
• 6600 ft. (2Km) maximum distance capability
• 0°C to + 50°C operating range
• ST connector receptacle
• Designed to work with 2110-BAC (Bacnet) @ 38.4 Kbps or 2110-BAC(T) @ 76.8 Kbps
• For card version use 2310-BAC
• Cable assembly use 7110
• Data speed set at the factory

RS - 485 9 PIN CONNECTOR - FEMALE

PINS UTILIZED BY 2110 MINI BIT - DRIVER®

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal Ground</td>
<td>SG</td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Data (+)</td>
<td>D+</td>
</tr>
<tr>
<td>4</td>
<td>Signal Ground</td>
<td>SG</td>
</tr>
<tr>
<td>5</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Termination (+)</td>
<td>T+</td>
</tr>
<tr>
<td>7</td>
<td>Termination (-)</td>
<td>T-</td>
</tr>
<tr>
<td>8</td>
<td>Data (-)</td>
<td>D-</td>
</tr>
</tbody>
</table>

Operating Distance for Fiber Optic Cable

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>8 SM**</td>
<td>1.0</td>
<td>10,000</td>
<td>33,000</td>
</tr>
</tbody>
</table>

* High power option available  ** Single mode option

Termination Resistors provided in Bit-Driver

ORDERING INFORMATION

Model Numbers
2110-BAC  Bacnet @ 38.4 Kbps, RS-485 to Multimode Fiber, ST
2110-BAC(T)  Bacnet @ 76.8 Kbps, RS-485 to Multimode Fiber, ST
2110-BAC(SM) Bacnet @ 38.4 Kbps, RS-485 to Single Mode Fiber, ST
2110-BAC(T)-SM Bacnet @ 76.8 Kbps, RS-485 to Single Mode Fiber, ST
2110-DIN-BAC Bacnet @ 38.4 Kbps, RS-485 to Multimode Fiber, DIN Rail, ST
2110-DIN-BAC(T) Bacnet @ 76.8 Kbps, RS-485 to Multimode Fiber, DIN Rail, ST
2110-DIN-BAC(SM) Bacnet @ 38.4 Kbps, RS-485 to Single Mode Fiber, DIN Rail, ST
2110-DIN-BAC(T)-SM Bacnet @ 76.8 Kbps, RS-485 to Single Mode Fiber, DIN Rail, ST

Notes:
1. Power Supply # 2121 is required for all models
   (110VAC to 12 VDC).
2. Power Supply #2164 is for 230VAC applications

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**Model 2126**

**Optical Synchronous Mini Bit-Driver® Point to Point**

**Features:**
- 0 to 38.4 Kbps synchronous half duplex operation
- 6600 ft. (2Km) maximum distance capability
- 0 °C to + 50 °C operating range
- ST connector receptacle (SMA option)
- Switch selectable speeds

**Operation Mode:** Synchronous half duplex

**Input/Output Interface:** RS-485, 9 pin type D, asynchronous at 0 to 38.4 Kbps, connect directly to terminal (RS 485 cable not required)

**Transmission Line Interface:** ST connector is standard for interfacing with fiber optic cable (SMA option)

**Optical Power into a 50 Micron Core Optical Fiber:**
- 0.5 microwatt, 10 dB power budget* @ 880 nanometers
- 50 nanowatts

**Receiver Sensitivity:**
- Bit Error rate: 10^-9

**Operating Temperature:**
- 0 °C to 50 °C

**Metal Enclosure:**
- 1.75 x 3 x 0.625 in (4.5 x 7.5 x1.6 cm)
- Panel or DIN rail mounting option

**Weight:** 0.25 lb (100 grams)

**Input Power:**
- External with power supply (S.I. Tech #2121 - 110 VAC to 12 Volt DC)
- 230V Version: Use S.I.Tech 2122 power supply

**RS - 485 DB-9M MALE CONNECTOR**

**PINS UTILIZED BY 2126 MINI BIT - DRIVER®**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Data -</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>Data +</td>
</tr>
</tbody>
</table>

**OPERATING DISTANCE FOR FIBER OPTIC CABLE**

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
</tbody>
</table>

* High power option available

Specifications subject to change without notice.

---

**Typical Application**


©2005 S.I. Tech, Inc.
Model 2128
Optical Mini Multidrop Bit-Driver

Operation Mode:
Asynchronous half duplex

Input/Output Interface:
RS-485, 2 wire port operating up to 200 Kbps or DB-9 Connector

Transmission Line Interface:
ST connectors are standard for interfacing with fiber optic duplex cable (SMA option)

Optical Power into a 62.5 Micron Core Optical Fiber:
10 microwatts, 13 dB power budget @ 850 nanometers (1300 nm option)

Receiver Sensitivity:
500 nanowatts at less than 10^-9 bit error rate, 10 microwatts max.

Operating Temperature:
0 °C to 50 °C (-40 to +70 °C option-MM Fiber)

Metal Enclosure:
5.5 x 2.3 x 1.0 in (with flange)
Panel or DIN rail mounting option

Weight:
0.4 lbs (182 grams)

Input Power:
External with power supply (S.I. Tech #2121 - 110 VAC to 12 VDC)

230 Volt Version:
Use S.I.Tech 2164 power supply


Features:
• RS-485 Multidrop
• Various speed options up to 200 Kbps
• Flange Mounting
• Multimode or single mode
• Asynchronous, simplex, half, full duplex

Fiber ports repeat data through the 2128 and drop/insert data on the RS-485 port. The RS-485 port inserts data onto both fiber ports and gets data dropped from either fiber port.

RS - 485 CONNECTOR

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
</tr>
<tr>
<td>2</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Data +</td>
</tr>
<tr>
<td>4</td>
<td>Data -</td>
</tr>
</tbody>
</table>

DB-9 OPTION

Pin 1 2 3 4

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM</td>
<td>1.0</td>
<td>10000</td>
<td>33000</td>
</tr>
</tbody>
</table>

* High power option available
SM - Single Mode (1300nm) option (Temp -20 to +60 °C)

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2128</td>
<td>Multimode to Multimode, ST Connectors</td>
</tr>
<tr>
<td>2128-MM-SM</td>
<td>Multimode to Single Mode, ST Connectors</td>
</tr>
<tr>
<td>2128-SM-SM</td>
<td>Single Mode to Single Mode, ST Connectors</td>
</tr>
</tbody>
</table>

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Model 2140
Optical Mini Bit-Driver®

Operation Mode: RS-422/485 Full duplex, Async
Input/Output Interface: RS-422/485, 4 wire port operating 110 bps to 230 Kbps (Factory set)
Transmission Line Interface: ST connectors are standard for interfacing with fiber optic duplex cable (SMA option)

Optical Power into a 62.5 Micron Core Optical Fiber: 30 microwatts, 13 dB power budget @ 850 nanometers (1300 nm option)
Receiver Sensitivity: 1 microwatt at less than 10^-9 bit error rate.
Operating Temperature: 0 °C to 50 °C (-40 to +85 °C option for Multimode, -20 to +60 °C - SM)
Relative Humidity: 10 to 95% Non-condensing
Metal Enclosure: Panel or DIN rail mounting option
Weight: 0.4 lbs (182 grams)
Input Power: External with power supply (S.I. Tech #2121 - 110 VAC to 12 VDC)

230 Volt Version: Use S.I.Tech 2164 power supply


**Features:**
- RS-422/485 Multipoint operation with up to 32 nodes
- Various speeds - 110 bps to 230 Kbps, 4 Wire (Speed set at the factory)
- Flange Mounting
- Multimode or single mode options
- Repeater with 4-wire RS-422/485 Add/Drop

Fiber ports repeat data through the 2140 and drop/insert data on the RS-422/485 port. The RS-422/485 port inserts data onto both fiber ports and drops data from both fiber ports.

**Typical Application**

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Model 2145

Transmission Line Interface:
For application engineering

2145-0
2145-MM-MM
2145-MM-SM
2145-SM-SM
2145-00
2145-MM
2145-MM-MM
2145-MM-SM
2145-SM-SM
2145-0

2 PORT
1 PORT

Operation Mode: RS485 - 2 wire
Profibus - DP
Input/Output Interface: EIA RS485A 2 wire
9600bps to 12Mbps
IEC 61158-2, Async, NRZ, 11 Bits
DB9 female

Features:
• Meets PROFIBUS-DP specification. Tested & approved by PROFIBUS Lab
• Modbus - RS485
• Multimode or single mode, plastic or glass fiber
• 2 port optical repeater, optical T-connector, optical to electrical converter
• 9600 bps to 12 Mbps - switch selectable
• DIN rail mounting
• Status indicators: power, TxD, RxD, invalid switch setting
• Conformal coated boards

The Model 2145 Bit-Driver used in a PROFIBUS-DP application is a two optic port repeater with single TIA/EIA-485-A electrical port. The 2145 operates at rate 9600 baud to 12 Mbaud in linear bus topology. The 2145 can be used as an optical repeater between the fiber optic segments, an optical to electrical converter between an fiber optic segment and electrical station(s), or T-connector/repeater between two fiber optic segments and electrical station(s). The 2145 is transparent and does not evaluate the PROFIBUS data exchange.

Using fiber optics over the physical layer, the 2145 provides longer segment distances, electromagnetic noise immunity and ground potential difference independence in the linear bus topology. The 2145 optics can be optionally equipped with optics of different characteristics.

The 2145 retimes the received optical signal and can link up to 32 fiber optic segments in series. The electrical port supports up to 31 stations.

The 2145 Termination switch can select an internal cable type-A termination. External terminations can derive power from the sub-D connector between pins 6 and 5.

The 2145 unit attaches to EN50022 (35mm DIN) mounting rail. Power is applied through screw terminals and data rate selection made through internal DIP switches.

TYPICAL APPLICATION

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Model 2146

Optical Mini Bit-Driver

Operation Mode: Half duplex
Input/Output Interface: RS-485, 2 wire port operating up to 1.0Mbps
Transmission Line Interface: ST connector is standard for interfacing with fiber optic duplex cable (SMA option)

Optical Power into a 62.5 Micron Core Optical Fiber: 30 microwatts, 13 dB power budget @ 850 nanometers
Receiver Sensitivity: 1.0 microwatts at less than $10^{-9}$ bit error rate
Operating Temperature: 0°C to 50°C
Metal Enclosure: Panel or DIN rail mounting option
Weight: 0.25 lb (100 grams)
Input Power: 9 to 32VDC
230V Version: Use S.I.Tech 2164 power supply

Features:
- RS-485 to Fiber Bit-Driver
- Works with Honeywell PLCs
- Access control system
- High Speed RS-485

TERMINALS UTILIZED BY 2146 BIT-DRIVER

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Terminals Left to Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D+</td>
</tr>
<tr>
<td>2</td>
<td>D-</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
</tr>
<tr>
<td>4</td>
<td>PWR-</td>
</tr>
<tr>
<td>5</td>
<td>PWR+</td>
</tr>
</tbody>
</table>

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>3.5</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 (SM)</td>
<td>1.0</td>
<td>10000</td>
<td>33000</td>
</tr>
</tbody>
</table>

* High power option available
** SM - Single mode option (1310 nm)

Specifications subject to change without notice.

© 2011 S.I. Tech, Inc.
Model 2147
Profibus - DP Fiber Optic Ring Bit-Driver

Features:
- Meets PROFIBUS-DP specification. Tested & approved by PROFIBUS Lab
- Multimode and single mode
- Plastic or glass fiber
- 2 port optical repeater, optical T-connector, optical to electrical converter
- 9600 bps to 12 Mbps - Auto Negotiation - visual indicators
- DIN rail mounting
- Status indicators: Activity and Error Condition on each port
- Redundant ring
- Data speed display
- Auto negotiation

The Model 2147 Bit-Driver used in a PROFIBUS-DP application is a two fiber optic port repeater with single TIA/EIA-485-A electrical port. The 2147 operates at rate 9600 baud to 12 Mbaud in linear bus topology. The 2147 can be used as an optical repeater between the fiber optic segments, an optical to electrical converter between a fiber optic segment and electrical station(s), or T-connector/repeater between two fiber optic segments and electrical station(s). The 2147 is transparent and does not evaluate the PROFIBUS data exchange. Model 2147 can be configured to operate in redundant ring topology.

Using fiber optics over the physical layer, the 2147 provides longer segment distances, electromagnetic noise immunity, and ground potential difference independence in the linear bus topology. The 2147 can be optionally equipped with optics of different characteristics.

The 2147 retimes the received optical signal and can link up to 32 fiber optic segments in series. The electrical port supports up to 31 stations.

The 2147 Termination switch can select an internal cable type-A termination. External terminations can derive power from the sub-D connector between pins 6 and 5.

The 2147 unit attaches to EN50022 (35mm DIN) mounting rail. Redundant power is applied through screw terminals and data rate selection made automatically with visual indicator of speed display.

TABLE 1

<table>
<thead>
<tr>
<th>Model</th>
<th>Wavelength (nm)</th>
<th>Fiber Diameter (Micron)</th>
<th>Fiber Type</th>
<th>Connector</th>
<th>TR PWR (-dBm)</th>
<th>REC SEN (-dBm)</th>
<th>Attenuation (dB/Km)</th>
<th>Distance Meters</th>
<th>Distance Feet</th>
<th>OPT Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2147-0</td>
<td>660/860</td>
<td>200</td>
<td>Plastic</td>
<td>BFOC/2.5 (SMA)</td>
<td>10</td>
<td>22</td>
<td>10/7</td>
<td>700/1000</td>
<td>2000/3000</td>
<td>2 PL</td>
</tr>
<tr>
<td>2147-MM</td>
<td>850</td>
<td>50 or 62.5</td>
<td>Multimode</td>
<td>BFOC/2.5 (ST)</td>
<td>12</td>
<td>24</td>
<td>3.0</td>
<td>3000</td>
<td>10000</td>
<td>1 MM</td>
</tr>
<tr>
<td>2147 or</td>
<td>850</td>
<td>50 or 62.5</td>
<td>Multimode</td>
<td>BFOC/2.5 (ST)</td>
<td>12</td>
<td>24</td>
<td>3.0</td>
<td>3000</td>
<td>10000</td>
<td>2 MM</td>
</tr>
<tr>
<td>2147-MM-MM</td>
<td>850/1300</td>
<td>50 or 62.5/9</td>
<td>MM/SM</td>
<td>BFOC/2.5 (ST)</td>
<td>12/15</td>
<td>24/27</td>
<td>3.0/1.0</td>
<td>3000/10000</td>
<td>10000/33000</td>
<td>1 MM, 1 SM</td>
</tr>
<tr>
<td>2147-MM-SM-MM</td>
<td>1300</td>
<td>9</td>
<td>SM/SM</td>
<td>BFOC/2.5 (ST)</td>
<td>15</td>
<td>27</td>
<td>0.25</td>
<td>10000</td>
<td>33000</td>
<td>2 SM</td>
</tr>
<tr>
<td>2147-MM-SM-MM</td>
<td>1300</td>
<td>9</td>
<td>Single Mode</td>
<td>BFOC/2.5 (ST)</td>
<td>15</td>
<td>27</td>
<td>0.35</td>
<td>10000</td>
<td>33000</td>
<td>1 SM</td>
</tr>
</tbody>
</table>

Note: Plastic fiber can be used for short distance applications.

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Model 2228

Optical Mini Bit-Driver®

Features:
- Wide temperature range Multi-drop RS-485 to fiber Mini Bit-Driver.
- Multimode is standard, Single mode optional.

Fiber ports repeat data through the 2228 and drop/insert data on the RS-485 port. The RS-485 port inserts data onto both fiber ports and gets data dropped from either fiber port.

**RS - 485 CONNECTOR**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>3</td>
<td>Data (+)</td>
</tr>
<tr>
<td>4</td>
<td>Data (-)</td>
</tr>
<tr>
<td>2</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>Data (-)</td>
</tr>
</tbody>
</table>

**OPERATING DISTANCE FOR FIBER OPTIC CABLE**

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM</td>
<td>1.0</td>
<td>10000</td>
<td>33000</td>
</tr>
</tbody>
</table>

* High power option available (20dB)
SM - Single Mode (1300nm) option

Model Number | Description
-------------|-------------
2228         | Multimode to Multimode, ST Connectors
2228-MM-SM   | Multimode to Single Mode, ST Connectors
2228-SM-SM   | Single Mode to Single Mode, ST Connectors


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Optical Asynchronous Ruggedized Mini Bit-Driver

Operation Mode:
- Asynchronous, half duplex

Input/Output Interface:
- RS-485, DB25F connector
- Metal ST connector is standard for interfacing with fiber optic duplex cable (SMA option, SC and FC option for SM)

Transmission Line Interface:

Transmission Distance:
- See Chart

Optical Power into a 62.5 Micron Core Optical Fiber:
- 30 microwatts, 10 dB power budget @ 820 nanometers (1300 nm Option)

Receiver Sensitivity:
- 3 microwatts at less than 10^-9 bit error rate

Operating Temperature:
- -40 °C to +80 °C for Multimode
- -20 °C to +60 °C for Single mode

Humidity:
- 0 to 90% Non Condensing

Metal Enclosure:
- 7.25 X 2.28 X 1.3 in (18.4 X 5.8 X 3.3 cm)
- Weight: 0.9 lb. (400 grams)

Input Power:
- 85 V to 265 V AC or DC (+24 VDC and -48 VDC Option)

Card Version:
- S.I.Tech #2362 with Series 3000 Rack

Features:
- Up to 115 Kbps asynchronous operation on fiber optic cable, half duplex operation
- -40 °C to +80 °C operating range**
- Metal ST connector receptacle (SMA option)
- LED indicators for power, transmit, and receive data
- Female DB25 connector
- Complies with IEEE C37.90.1
- IEC 801 Surge Protection
- Panel Mounting Brackets, two mounting locations
- Conformal coating
- See distance chart

RS - 485 CONNECTOR PINS UTILIZED BY 2562 MINI BIT - DRIVER (FEMALE)

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Protective Ground</td>
<td>Chassis GND</td>
</tr>
<tr>
<td>7</td>
<td>Signal Ground</td>
<td>Sig. GND</td>
</tr>
<tr>
<td>14</td>
<td>Data +</td>
<td>D+</td>
</tr>
<tr>
<td>15</td>
<td>Data -</td>
<td>D-</td>
</tr>
</tbody>
</table>

Operating Distance for Fiber Optic Cable

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance* Meters</th>
<th>Distance* Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM**</td>
<td>1.0</td>
<td>10000</td>
<td>33000</td>
</tr>
</tbody>
</table>

* High power option available. SM - Single mode (1300nm) option

Optical unit connection: Connect the optical transmission line to the T and R receptacles. Note which cable channel goes to T or R by noting cable imprint. On the other end, reverse the connection.

** SM - Temperature Rating: -20 °C to +60 °C


Specifications subject to change without notice.


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Optical Asynchronous (Three In One) Mini Bit-Driver

**Features:**
- Concurrent, fully-independent RS232, RS422, and RS485 communication channel over a one duplex fiber optic cable (data is multiplexed over fiber link)
- Up to 115kbps asynchronous operation
- Full duplex RS232 and RS422 - Optional tri-state control for bus RS422 systems
- Half duplex RS485
  - Rotary switch sets the RS485 bit rate
- Metal ST connector receptacle (SMA option)
- Female DB25 connector RS232 wired as DCE device
- LED indicators for power, optical link status, transmit and receive data
- Optical link status pin
- Multimode or single mode
- DIN rail mounting option

S.I.Tech 2563 is a unique Bit-Driver allowing simultaneous communication using RS232, RS422, and RS485. Each electrical interface is totally independent and share a combined fiber link. This way equipment with different interfaces can be connected over the same fiber i.e. in a manufacturing plant.

**Model 2563**

**Operation Mode:** Asynchronous, simplex or full duplex

**Input/Output Interface:** Fully independent RS232/RS422/RS485, asynchronous concurrent. DB25 connector

**Transmission Line Interface:** Metal ST connector is standard for interfacing with fiber optic duplex cable (SMA option, SC and FC option for SM)

**Transmission Distance:** See Distance Chart

**Optical Power into a 62.5 Micron Core Optical Fiber:** 20 microwatts, 10 dB power budget @ 820 nanometers (1300 nm Option)

**Receiver Sensitivity:** 2 microwatts at less than 10⁻³ bit error rate

**Operating Temperature:** 0°C to 50°C (Extended Temp. Option -20°C to 70°C)

**Metal Enclosure:** 3.6" X 2.3" X 1.2" (9.1 X 5.84 X 3.0 cm)

**Weight:** 0.4 lb. (185 grams)

**Input Power:** 9 to 12VDC, 200mA

**OPERATING DISTANCE FOR FIBER OPTIC CABLE**

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance* Meters</th>
<th>Distance* Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM</td>
<td>1.0</td>
<td>5000</td>
<td>16000</td>
</tr>
</tbody>
</table>

* High power option available. SM - Single Mode option

Optical unit connection: Connect the optical transmission line to the T and R receptacles. Note which cable channel goes to T or R by noting cable imprint. On the other end, reverse the connection.

**DB25 Female Connector Pinout**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chassis GND</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>RS232 TXD</td>
<td>Input</td>
</tr>
<tr>
<td>3</td>
<td>RS232 RXD</td>
<td>Output</td>
</tr>
<tr>
<td>4</td>
<td>RTS</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CTS</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Signal GND</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Link Optical Detect</td>
<td>Output</td>
</tr>
<tr>
<td>10</td>
<td>RS485 D+</td>
<td>Bidir</td>
</tr>
<tr>
<td>11</td>
<td>Signal GND</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>RS485 TX+</td>
<td>Input</td>
</tr>
<tr>
<td>13</td>
<td>RS485 RX+</td>
<td>Output</td>
</tr>
<tr>
<td>20</td>
<td>DTR</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>RS485 D-</td>
<td>Bidir</td>
</tr>
<tr>
<td>23</td>
<td>Chassis GND</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>RS485 TX-</td>
<td>Input</td>
</tr>
<tr>
<td>25</td>
<td>Rs422 RX-</td>
<td>Output</td>
</tr>
</tbody>
</table>

4-5 connected together 6-20 connected together


Specifications subject to change without notice.


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**Model 2610**

**Optical Asynchronous Mini Bit-Driver® Point to Point**

- **Operation Mode:** Asynchronous, bi-directional, half duplex
- **Input/Output Interface:** RS-485, 9 pin type D, asynchronous at 0 to 115.0 Kbps*** connects directly to terminal (RS 485 cable not required)
- **Transmission Line Interface:** ST connector is standard for interfacing with fiber optic cable (SMA option)
- **Transmission Distance:** See distance chart
- **Optical Power into a 50 Micron Core Optical Fiber:** 0.5 microwatt, 10 dB power budget* @ 880 nanometers
- **Receiver Sensitivity:** 50 nanowatts at less than 10^-9 bit error rate
- **Operating Temperature:** -40 °C to +80 °C (-20 °C to +60 °C SM) operating range
- **Metal Enclosure:** 1.75 x 3 x 0.625 in (4.5 x 7.5 x 1.6 cm) Panel or DIN rail mounting options
- **Weight:** 0.25 lb (100 grams)
- **Input Power:** External with power supply (S.I. Tech #2121 - 110VAC to 12 Volt DC)
- **230V Version:** Use S.I.Tech 2122 power supply
- ***** Data rate must be set at factory**

Specifications subject to change without notice.

---

**Features:**
- 0 to 115.0 Kbps asynchronous, RS-485 half duplex operation
- 6600 ft. (2Km) maximum distance capability
- -40 °C to +80 °C (-20 °C to +60 °C SM) operating range
- Multimode is standard, Single mode optional
- ST connector receptacle (SMA option)
- Designed to work with Johnson Controls System - N2 Bus or other PLC
- High temperature version of 2110
- For BACNET - order 2610-BAC

---

**RS - 485 9 PIN CONNECTOR - FEMALE PINS UTILIZED BY 2610 MINI BIT - DRIVER®**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal Ground</td>
<td>SG</td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td>D+</td>
</tr>
<tr>
<td>3</td>
<td>Data (+)</td>
<td>D-</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>SG</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td>D-</td>
</tr>
<tr>
<td>7</td>
<td>Termination (+)</td>
<td>T+</td>
</tr>
<tr>
<td>8</td>
<td>Termination (-)</td>
<td>T-</td>
</tr>
<tr>
<td>9</td>
<td>Data (-)</td>
<td>D-</td>
</tr>
</tbody>
</table>

---

**OPERATING DISTANCE FOR FIBER OPTIC CABLE**

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM**</td>
<td>1.0</td>
<td>7000</td>
<td>23000</td>
</tr>
</tbody>
</table>

* High power option available
** Single mode (1300nm) option

Termination Resistors provided in Bit-Driver

---

**TYPICAL APPLICATION**

Model 2616

Optical Asynchronous Mini Bit-Driver® Point to Point

Features:
- 0 to 115.2 Kbps asynchronous, RS-485 half duplex operation
- 6600 ft. (2Km) distance capability
- -40 °C to +80 °C (-20 °C to +60 °C SM) operating range
- ST connector receptacle (SMA option)
- Designed to work with Siemens Systems or other PLC

Operation Mode: Asynchronous, bi-directional, half duplex
Input/Output Interface: RS-485, 9 pin type D, asynchronous at 0 to 115.2 Kbps*** connects directly to terminal (RS 485 cable not required)
Transmission Line Interface: ST connector is standard for interfacing with fiber optic cable (SMA option)
Transmission Distance: See distance chart
Optical Power into a 50 Micron Core Optical Fiber: 10 microwatts, 10 dB power budget* @ 850 nanometers (1300nm option)
Receiver Sensitivity: 1 microwatt at less than 10^-9 bit error rate
Operating Temperature: -40 °C to +80 °C (-20 °C to +60 °C SM)
Metal Enclosure: 1.75 x 3 x 0.625 in (4.5 x 7.5 x1.6 cm) Panel or DIN rail mounting options
Weight: 0.25 lb (100 grams)
Input Power: External with power supply (S.I. Tech #2121 - 110VAC to 12 Volt DC)
230V Version: Use S.I.Tech 2122 power supply
*** Data rate must be set at factory

Specifications subject to change without notice.

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2616</td>
<td>RS485 to Multimode Fiber, ST</td>
</tr>
<tr>
<td>2616-SM</td>
<td>RS485 to Single Mode Fiber, ST</td>
</tr>
<tr>
<td>2616-DIN</td>
<td>Multimode, ST, Dinrail Unit</td>
</tr>
<tr>
<td>2616-SM-DIN</td>
<td>Single Mode, ST, Dinrail Unit</td>
</tr>
</tbody>
</table>

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Model 2424/2454 is a 4 channel communication system providing 4 Bit-Driver links using one optical cable interface.

The 2424 provides 4 full duplex RS422 channels for any data rate on any channel(s) up to 256 Kbps.

The 2454 provides 4 half duplex RS485 channels. The data rate must be set at the factory for data rate up to 256 Kbps.

**PIN ASSIGNMENT FOR THE DB37 CONNECTOR**

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>CHANNEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX+</td>
<td>37 35 33 31</td>
</tr>
<tr>
<td>TX-</td>
<td>19 17 15 13</td>
</tr>
<tr>
<td>RX+</td>
<td>36 34 32 30</td>
</tr>
<tr>
<td>RX-</td>
<td>18 16 14 12</td>
</tr>
</tbody>
</table>

**Operating Distance for Fiber Optic Cable**

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation (dB/Km)</th>
<th>Distance (Meters)</th>
<th>Distance (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM*</td>
<td>1.0</td>
<td>7000</td>
<td>23000</td>
</tr>
</tbody>
</table>

* Single mode (1300nm) option
(High power option available for longer distance)

---

**TYPICAL APPLICATION**

Model 2428/2458 is an 8 channel communication system providing 8 Bit-Driver links using one optical cable interface.

The 2428 provides 8 full duplex RS422 channels for any data rate on any channel(s) up to 76.8 Kbps.

The 2458 provides 8 half duplex RS485 channels. The data rate must be set at the factory for data rate up to 76.8 Kbps.

**PIN ASSIGNMENT FOR THE DB37 CONNECTOR**

<table>
<thead>
<tr>
<th>CHANNEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>TX+</td>
</tr>
<tr>
<td>TX-</td>
</tr>
<tr>
<td>RX+</td>
</tr>
<tr>
<td>RX-</td>
</tr>
</tbody>
</table>

**Operating Distance for Fiber Optic Cable**

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance (Meters)</th>
<th>Distance (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>125</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>150</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>50</td>
<td>1.0</td>
<td>7000</td>
<td>23000</td>
</tr>
</tbody>
</table>

* Single mode (1300nm) option


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Model 2566

Optical Asynchronous Multiplexer

Operation Mode: Asynchronous, simplex or half duplex
Input/Output Interface: 2 CH RS-485 Multiplexer DB25 connector
Transmission Line Interface: Metal ST connector is standard for interfacing with fiber optic duplex cable (SMA option, FC option for SM)
Transmission Distance: See Distance Chart
Optical Power into a 62.5 Micron Core Optical Fiber: 20 microwatts, 10 dB power budget @ 820 nanometers (1300 nm Option)
Receiver Sensitivity: 2 microwatts at less than 10^-9 bit error rate
Operating Temperature: -40 °C to 85 °C (-20 °C to 60 °C Single Mode)
Metal Enclosure: 3.6" X 2.3" X 1.2" (9.1 X 5.84 X 3.0 cm)
Weight: 0.4 lb. (185 grams)
Input Power: 9 to 12VDC, 200mA

Features:
- 2 Channel RS-485 Multiplexer
- Up to 115.2 Kbps asynchronous operation, each channel
- Half duplex RS-485 - 2 Wire
- Metal ST connector receptacle (SMA option)
- LED indicators for power, optical link status, transmit and receive data
- Multimode or single mode
- DIN rail or panel mounting option

S.I.Tech 2566 is a unique Bit-Driver. The two channel RS-485 electrical interfaces are totally independent and share combined fiber link.

DB25 Female Connector Pinout

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,7</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>2</td>
<td>D1+</td>
</tr>
<tr>
<td>3</td>
<td>D1-</td>
</tr>
<tr>
<td>16</td>
<td>Term1+</td>
</tr>
<tr>
<td>17</td>
<td>Term1-</td>
</tr>
<tr>
<td>14</td>
<td>D2+</td>
</tr>
<tr>
<td>15</td>
<td>D2-</td>
</tr>
<tr>
<td>6</td>
<td>Term2+</td>
</tr>
<tr>
<td>20</td>
<td>Term2-</td>
</tr>
</tbody>
</table>

Shell Chassis

RS-485 Data Rate

<table>
<thead>
<tr>
<th>Data Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
</tbody>
</table>

Specifications subject to change without notice.

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance* Meters</th>
<th>Distance* Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
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<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
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</tr>
<tr>
<td>10 SM</td>
<td>1.0</td>
<td>5000</td>
<td>16000</td>
</tr>
</tbody>
</table>

* High power option available. SM - Single Mode option
Optical unit connection: Connect the optical transmission line to the T and R receptacles. Note which cable channel goes to T or R by noting cable imprint. On the other end, reverse the connection.

TYPICAL APPLICATION

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