PROLINK ROUTER 605X/615X (PLR605X & PLR615X)

OPERATION MANUAL

P1525 & P1706

DD1735784
Rev 15
29 November 2022

DAKTRONICS

DAKTRONICS

Table of Contents

This page intentionally left blank.

1   Introduction

This manual is intended to help Daktronics customers operate the ProLink Router (PLR) 605X and 615X. Use this document only under the guidance of Daktronics personnel.

Product Information

The PLR605X is a component mounted on a plate inside the display. It receives a ProLink6 signal from the display control system and converts it to a ProLink5 or ProLink8 signal that is sent out to a node. This manual refers to nodes as modules but they could also be ProPixel® freeform elements. For information on specific PLRs, refer to **PLR6050 (p.2)**, **PLR6051 (p.5)**, **PLR6052 (p.7)**, **PLR6053 (p.10)**, or **PLR6054 (p.13)**. For a PLR6055, refer to the **ProLink Router PLR62XX Operation Manual** as this PLR uses PLR625X hardware.

The PLR615X operates in the same way as the PLR605X except that it uses dual coax cable connectors for the ProLink6 interface instead of dual fiber cable connectors. Refer to **Figure 2** and **PLR615X (p.16)**.
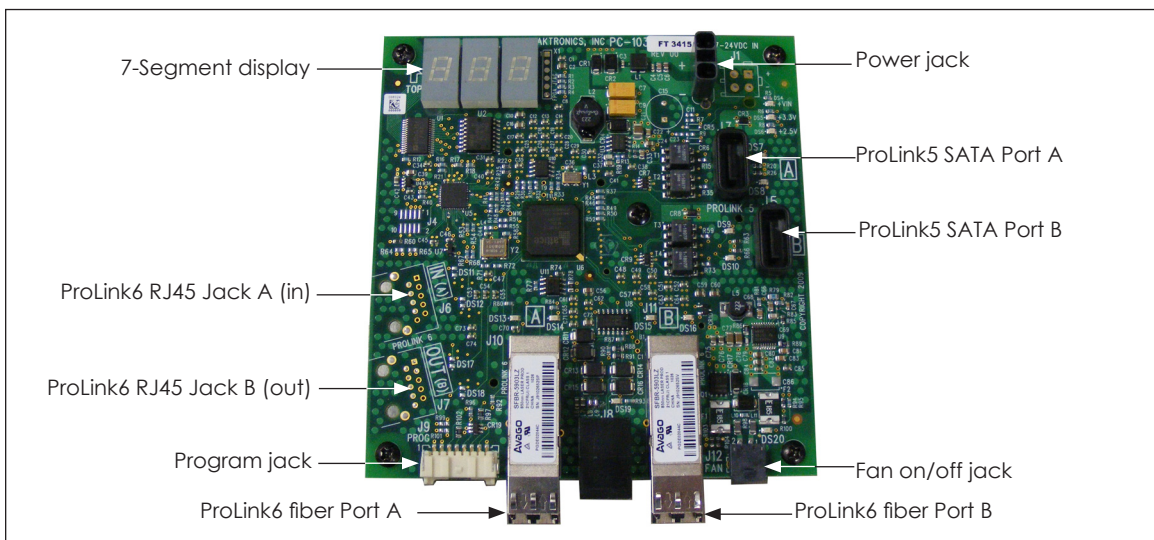
Figure 1: PLR6052 ProLink Router
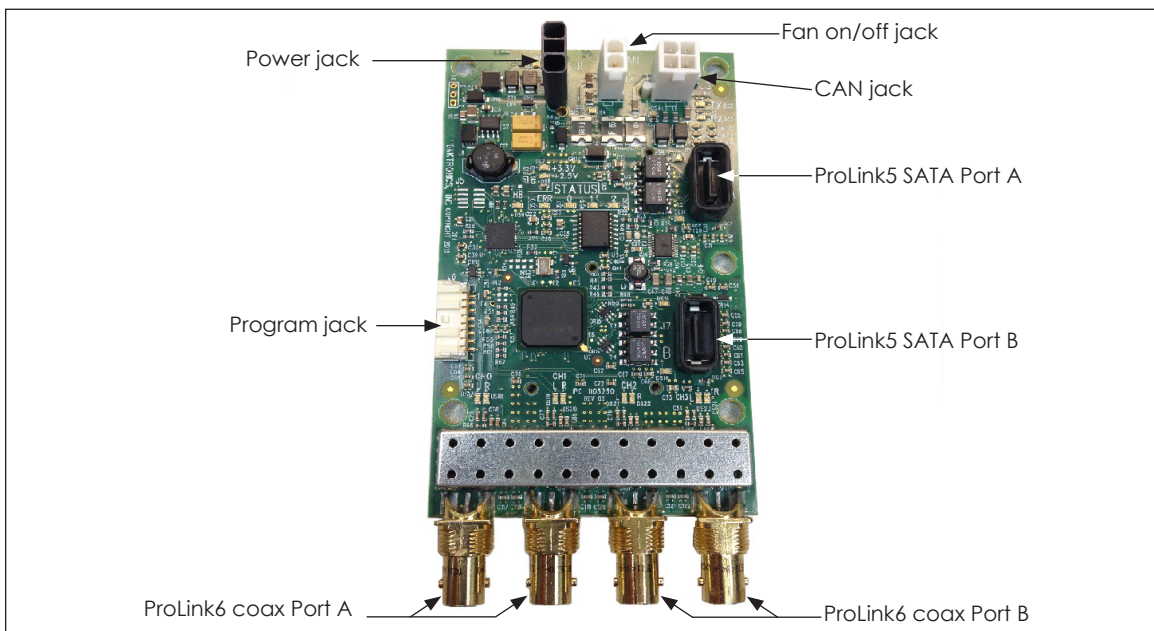
Figure 2: PLR615X ProLink Router

PLR6050

The following tables list the functions of the PLR6050 jacks and indicators. Refer to
Figure 3.
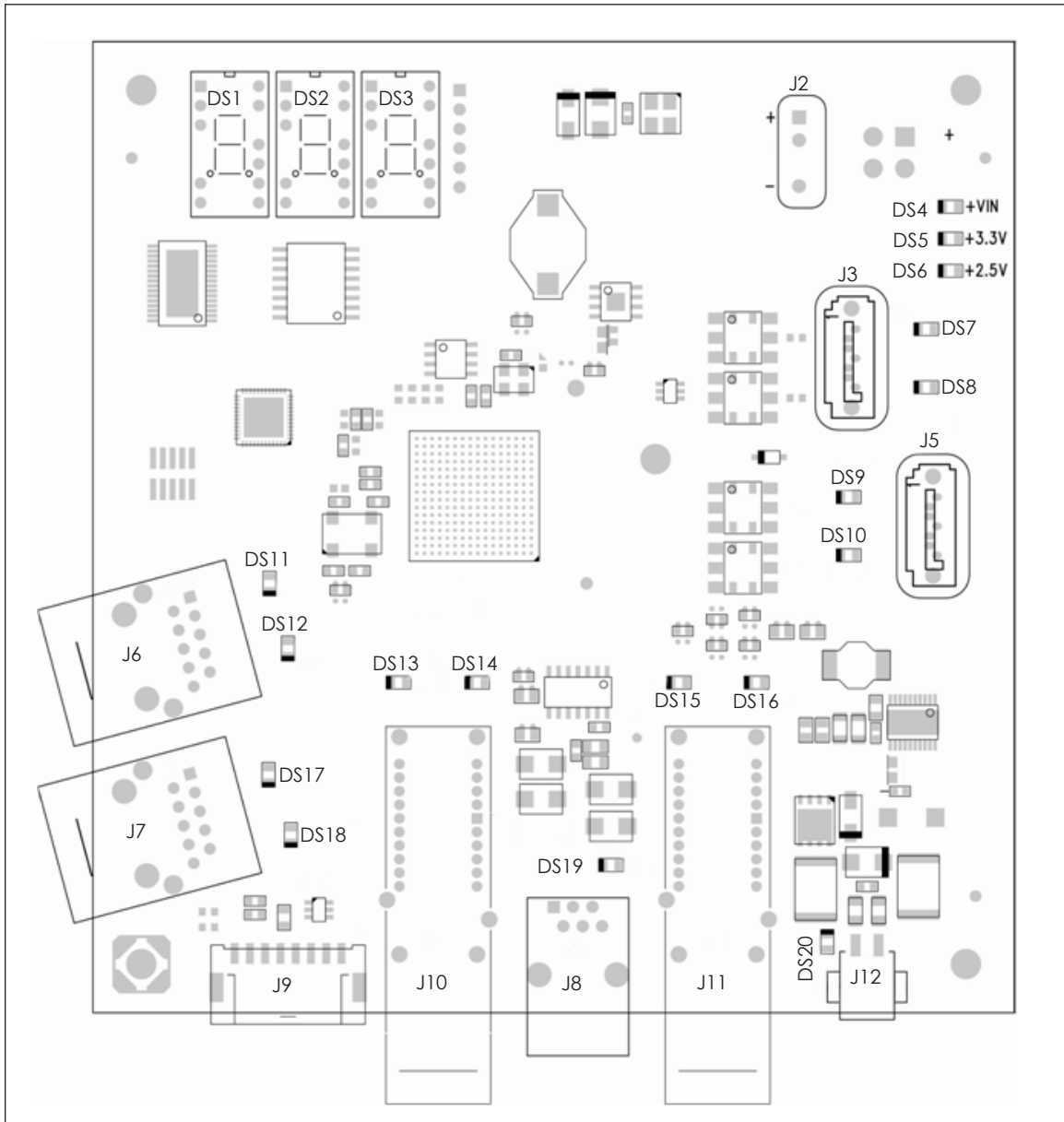
Figure 3: *PLR6050 Jacks & Indicators*

Jack	Function
J2	Power jack
J3	ProLink5 (SATA) Port A
J5	ProLink5 (SATA) Port B
J6	ProLink6 (RJ45) Port A (not used)
J7	ProLink6 (RJ45) Port B (not used)

Jack	Function
J8	ISAC jack (not used)
J9	Program jack
J10	ProLink6 (fiber) Port A
J11	ProLink6 (fiber) Port B
J12	Fan on/off jack

Introduction

2

Indicator	Description
DS1-3	7-Segment display
DS4	VIN power indicator
DS5	3.3V power indicator
DS6	2.5V power indicator
DS7	ProLink5 Port A transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS8	ProLink5 Port A receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
DS9	ProLink5 Port B transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS10	ProLink5 Port B receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
DS11	ProLink6 RJ45 Port A receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port
DS12	ProLink6 RJ45 Port A receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS13	ProLink6 fiber Port A receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port
DS14	ProLink6 fiber Port A receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS15	ProLink6 fiber Port B receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port

Indicator	Description
DS16	ProLink6 fiber Port B receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS17	ProLink6 RJ45 Port B receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port
DS18	ProLink6 RJ45 Port B receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS19	ISAC indicator toggles with ISAC activity
DS20	Fan jack indicator turns on when voltage is active

* The receive indicator toggles at the rate that the diagnostic requests are received at the port. When active, indicators that toggle with received/transmitted diagnostics may toggle at a $^1/_2$ interval, then remain idle for up to 60 seconds.

** This may be an acceptable state if any other ProLink6 receive Indicator 0 on the PLR is toggling.

*** This may be an acceptable state if any other ProLink6 receive Indicator 1 on the PLR is toggling.

PLR6051

The following tables list the functions of the PLR6051 jacks and indicators. Refer to **Figure 4**.
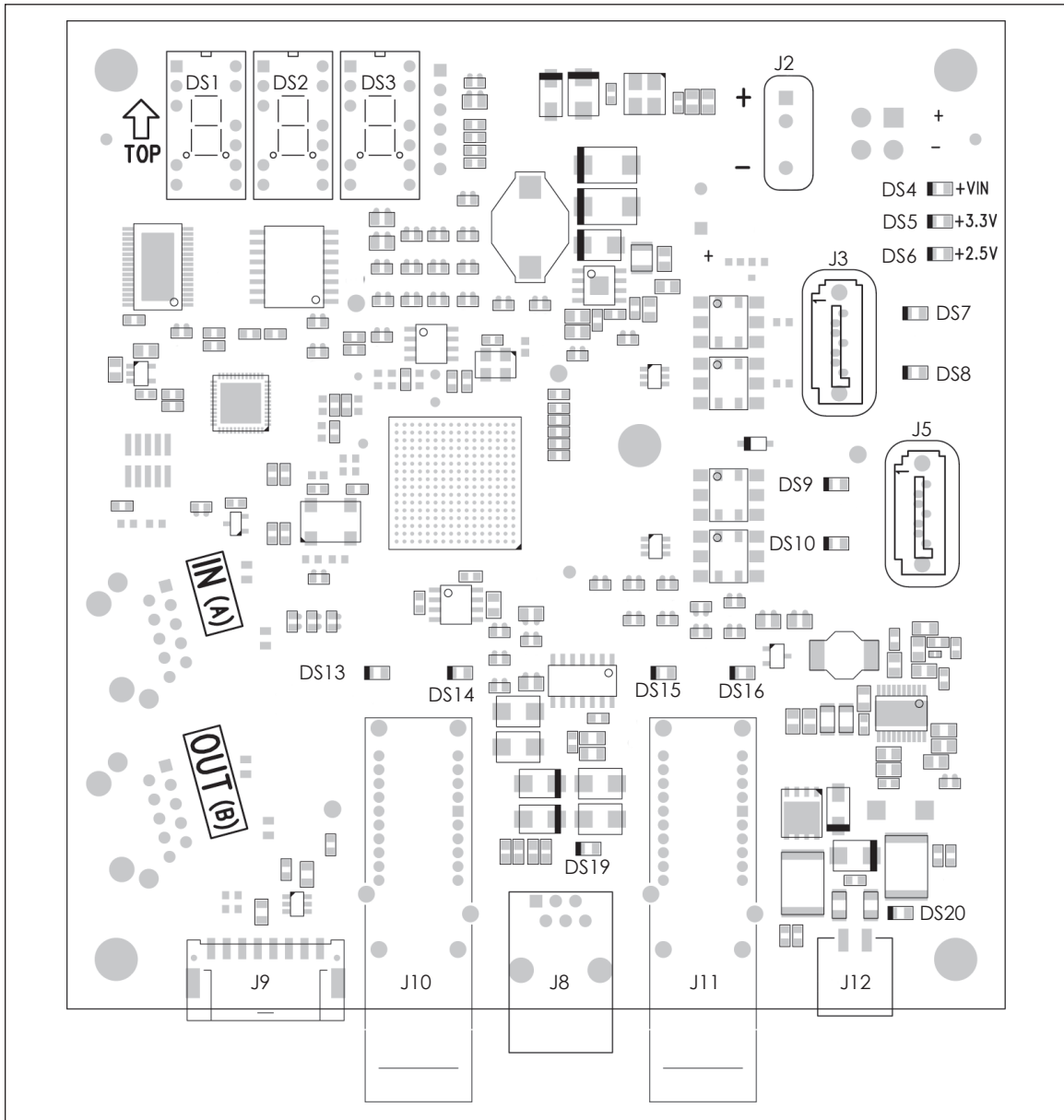
Figure 4: PLR6051 Jacks & Indicators

Jack	Function
J2	Power jack
J3	ProLink5 (SATA) Port A
J5	ProLink5 (SATA) Port B
J8	ISAC jack (not used)

Jack	Function
J9	Program jack
J10	ProLink6 (fiber) Port A
J11	ProLink6 (fiber) Port B
J12	Fan on/off jack

Indicator	Description
DS1-3	7-Segment display
DS4	VIN power indicator
DS5	3.3V power indicator
DS6	2.5V power indicator
DS7	ProLink5 Port A transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS8	ProLink5 Port A receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
DS9	ProLink5 Port B transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS10	ProLink5 Port B receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
DS13	ProLink6 fiber Port A receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port
DS14	ProLink6 fiber Port A receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS15	ProLink6 fiber Port B receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port
DS16	ProLink6 fiber Port B receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS19	ISAC indicator toggles with ISAC activity
DS20	Fan jack indicator turns on when voltage is active

* The receive indicator toggles at the rate that the diagnostic requests are received at the port. When active, indicators that toggle with received/transmitted diagnostics may toggle at a $^1/_2$ interval, then remain idle for up to 60 seconds.

Introduction

6

** This may be an acceptable state if any other ProLink6 receive Indicator 0 on the PLR is toggling.

*** This may be an acceptable state if any other ProLink6 receive Indicator 1 on the PLR is toggling.

PLR6052

The tables on pages 8-9 list the functions of the PLR6052 jacks and indicators. Refer to **Figure 5**.
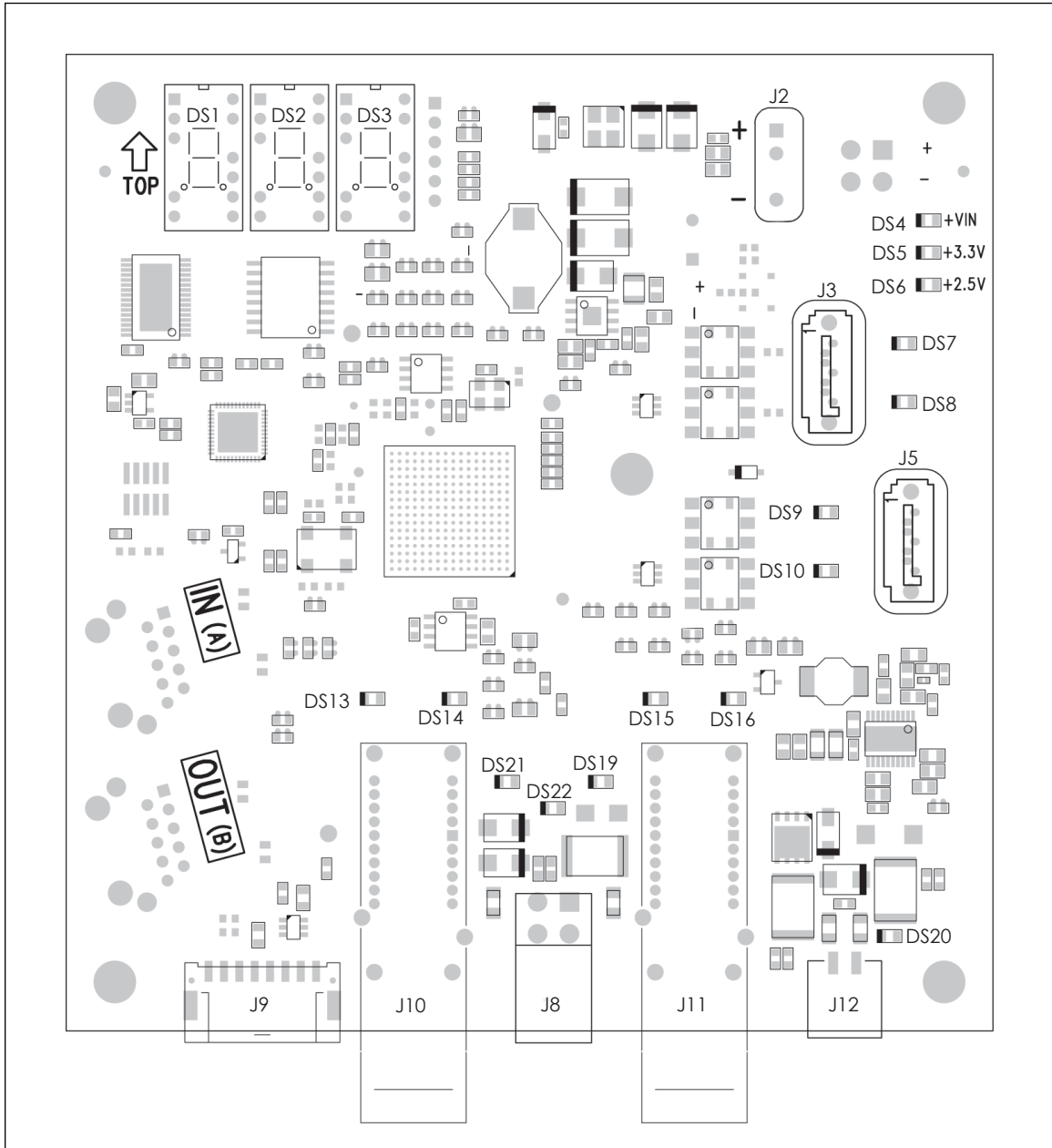
Figure 5: PLR6052 Jacks & Indicators

Jack	Function		Jack	Function
J2	Power jack		J9	Program jack
J3	ProLink5 (SATA) Port A		J10	ProLink6 (fiber) Port A
J5	ProLink5 (SATA) Port B		J11	ProLink6 (fiber) Port B
J8	CAN jack		J12	Fan on/off jack

Indicator	Description
DS1-3	7-Segment display
DS4	VIN power indicator
DS5	3.3V power indicator
DS6	2.5V power indicator
DS7	ProLink5 Port A transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS8	ProLink5 Port A receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
DS9	ProLink5 Port B transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS10	ProLink5 Port B receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
DS13	ProLink6 fiber Port A receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port
DS14	ProLink6 fiber Port A receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS15	ProLink6 fiber Port B receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port

Indicator	Description
DS16	ProLink6 fiber Port B receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS19	CAN jack transmitter indicator toggles when a packet is transmitted • Toggling 10 times per second with DS21 toggling at the same rate – normal operation • Toggling slowly (1 second on, 1 second off) with DS21 not toggling – PLR is transmitting but not receiving, a CAN node is detected but not responding to the PLR**** • Toggling 10 times per second with DS21 not toggling – PLR is unable to transmit, no CAN nodes are detected*****
DS20	Fan jack indicator turns on when voltage is active
D21	CAN jack receiver indicator toggles when a packet is received • Toggling 10 times per second with DS19 toggling at the same rate – normal operation • Not toggling with DS19 toggling slowly (1 second on, 1 second off) – PLR is transmitting but not receiving, a CAN node is detected but not responding to the PLR**** • Not toggling with DS19 toggling 10 times per second – PLR is unable to transmit, no CAN nodes are detected*****
D22	VCAN indicator turns on when voltage is present at the CAN connector

* The receive indicator toggles at the rate that the diagnostic requests are received at the port. When active, indicators that toggle with received/transmitted diagnostics may toggle at a $^1/_2$ interval, then remain idle for up to 60 seconds.

** This may be an acceptable state if any other ProLink6 receive Indicator 0 on the PLR is toggling.

*** This may be an acceptable state if any other ProLink6 receive Indicator 1 on the PLR is toggling.

**** The sensor's configuration may be wrong, compare the address with the dial on the sensor and all other sensor configuration parameters.

***** There is a problem with the CAN bus lines. The problem may be the sensor wiring harness, sensor hardware, or PLR hardware. Check wiring harness connections.

PLR6053

The following tables list the functions of the PLR6053 jacks and indicators. Refer to **Figure 6**.
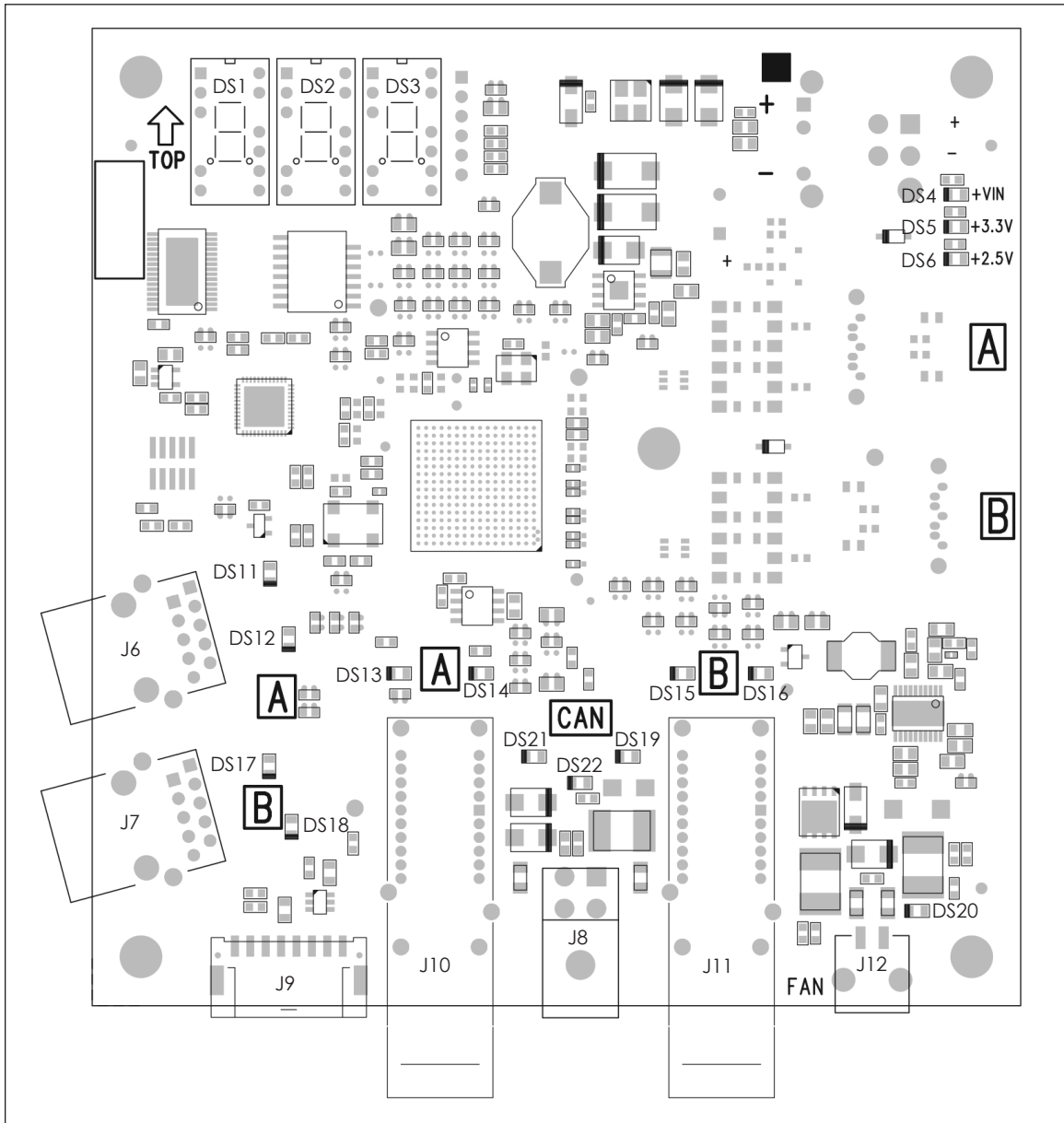
Figure 6: PLR6053 Jacks & Indicators

Jack	Function
J6	ProLink5 or ProLink8 (RJ45) Port A
J7	ProLink5 or ProLink8 (RJ45) Port B
J8	12 V DC power and CAN port
J9	Program jack

Jack	Function
J10	ProLink6 (fiber) Port A
J11	ProLink6 (fiber) Port B
J12	Fan on/off jack

Indicator	Description
DS1-3	7-Segment display
DS4	VIN power indicator
DS5	3.3V power indicator
DS6	2.5V power indicator
DS11	ProLink5 Port A transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS12	ProLink5 Port A receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
DS13	ProLink6 fiber Port A receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port
DS14	ProLink6 fiber Port A receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS15	ProLink6 fiber Port B receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port
DS16	ProLink6 fiber Port B receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS17	ProLink5 Port B transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS18	ProLink5 Port B receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*

Indicator	Description
DS19	CAN jack transmitter indicator toggles when a packet is transmitted • Toggling 10 times per second with DS21 toggling at the same rate – normal operation • Toggling slowly (1 second on, 1 second off) with DS21 not toggling – PLR is transmitting but not receiving, a CAN node is detected but not responding to the PLR**** • Toggling 10 times per second with DS21 not toggling – PLR is unable to transmit, no CAN nodes are detected*****
DS20	Fan jack indicator turns on when voltage is active
D21	CAN jack receiver indicator toggles when a packet is received • Toggling 10 times per second with DS19 toggling at the same rate – normal operation • Not toggling with DS19 toggling slowly (1 second on, 1 second off) – PLR is transmitting but not receiving, a CAN node is detected but not responding to the PLR**** • Not toggling with DS19 toggling 10 times per second – PLR is unable to transmit, no CAN nodes are detected*****
DS22	VCAN indicator turns on when voltage is present at the CAN connector

* The receive indicator toggles at the rate that the diagnostic requests are received at the port. When active, indicators that toggle with received/transmitted diagnostics may toggle at a $^1/_2$ interval, then remain idle for up to 60 seconds.

** This may be an acceptable state if any other ProLink6 receive Indicator 0 on the PLR is toggling.

*** This may be an acceptable state if any other ProLink6 receive Indicator 1 on the PLR is toggling.

**** The sensor's configuration may be wrong, compare the address with the dial on the sensor and all other sensor configuration parameters.

***** There is a problem with the CAN bus lines. The problem may be the sensor wiring harness, sensor hardware, or PLR hardware. Check wiring harness connections.

PLR6054

The following tables list the functions of the PLR6054 jacks and indicators. Refer to **Figure 7**.

Figure 7: *PLR6054 Jacks & Indicators*

Jack	Function	Jack	Function
J3	ProLink5 (SATA) Port A	J10	ProLink6 (fiber) Port A
J5	ProLink5 (SATA) Port B	J11	ProLink6 (fiber) Port B
J8	12 V DC power and CAN port	J12	Fan on/off jack
J9	Program jack		

Indicator	Description
DS1-3	7-Segment display
DS4	VIN power indicator
DS5	3.3V power indicator
DS6	2.5V power indicator
DS7	ProLink5 Port A transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS8	ProLink5 Port A receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
DS9	ProLink5 Port B transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS10	ProLink5 Port B receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
DS13	ProLink6 fiber Port A receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port
DS14	ProLink6 fiber Port A receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*
DS15	ProLink6 fiber Port B receive Indicator 0 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving data from a ProLink6 master** • Toggling once per second – port is connected to a primary ProLink6 master port • Toggling 10 times per second – port is connected to a secondary ProLink6 master port
DS16	ProLink6 fiber Port B receive Indicator 1 • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics*** • Toggling – port is receiving diagnostics requests*

Indicator	Description
DS19	CAN jack transmitter indicator toggles when a packet is transmitted • Toggling 10 times per second with DS21 toggling at the same rate – normal operation • Toggling slowly (1 second on, 1 second off) with DS21 not toggling – PLR is transmitting but not receiving, a CAN node is detected but not responding to the PLR**** • Toggling 10 times per second with DS21 not toggling – PLR is unable to transmit, no CAN nodes are detected*****
DS20	Fan jack indicator turns on when voltage is active
D21	CAN jack receiver indicator toggles when a packet is received • Toggling 10 times per second with DS19 toggling at the same rate – normal operation • Not toggling with DS19 toggling slowly (1 second on, 1 second off) – PLR is transmitting but not receiving, a CAN node is detected but not responding to the PLR**** • Not toggling with DS19 toggling 10 times per second – PLR is unable to transmit, no CAN nodes are detected*****
DS22	VCAN indicator turns on when voltage is present at the CAN connector

* The receive indicator toggles at the rate that the diagnostic requests are received at the port. When active, indicators that toggle with received/transmitted diagnostics may toggle at a $^1/_2$ interval, then remain idle for up to 60 seconds.

** This may be an acceptable state if any other ProLink6 receive Indicator 0 on the PLR is toggling.

*** This may be an acceptable state if any other ProLink6 receive Indicator 1 on the PLR is toggling.
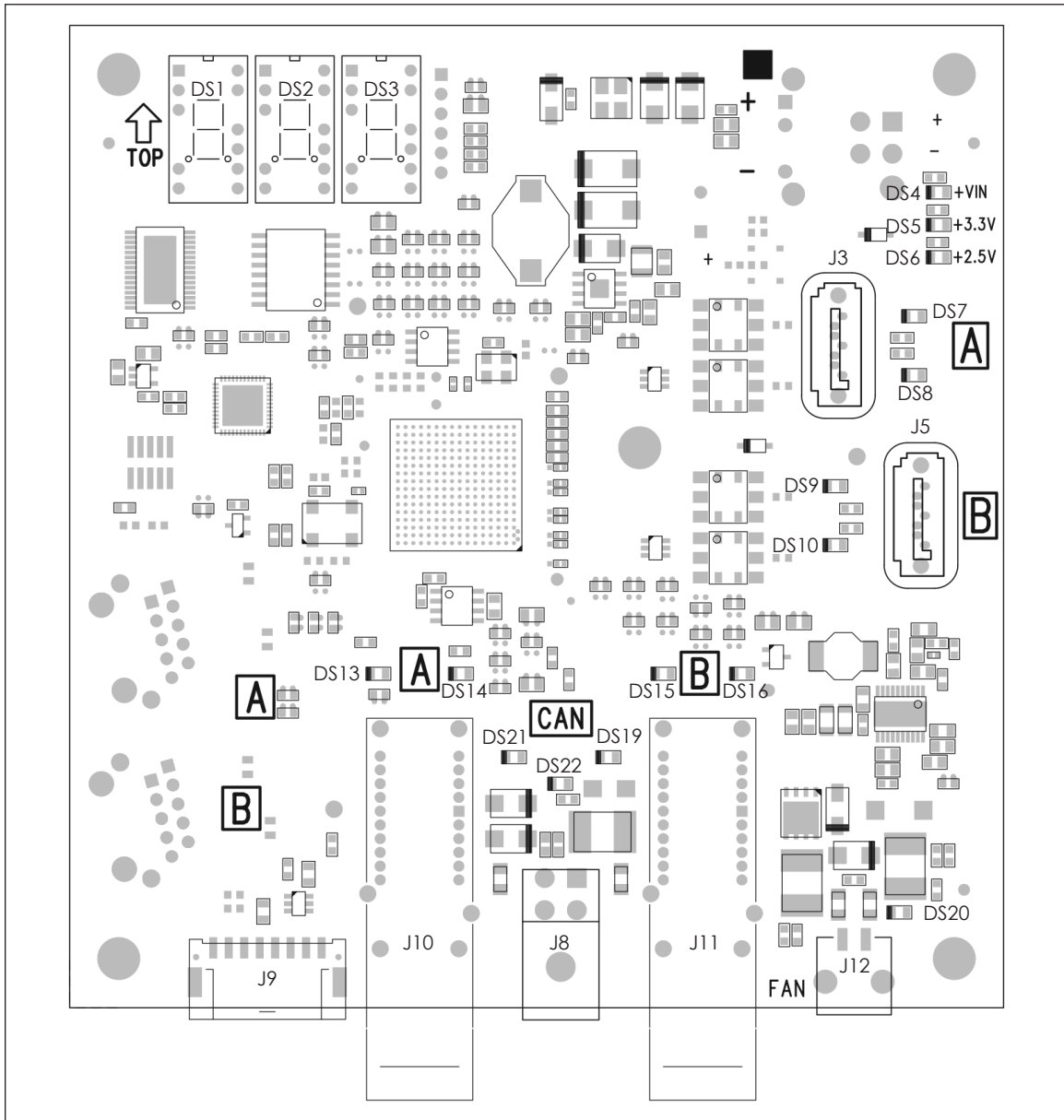
**** The sensor's configuration may be wrong, compare the address with the dial on the sensor and all other sensor configuration parameters.

***** There is a problem with the CAN bus lines. The problem may be the sensor wiring harness, sensor hardware, or PLR hardware. Check wiring harness connections.

PLR615X

The following tables list the functions of the PLR615X jacks and indicators. Refer to **Figure 8**.
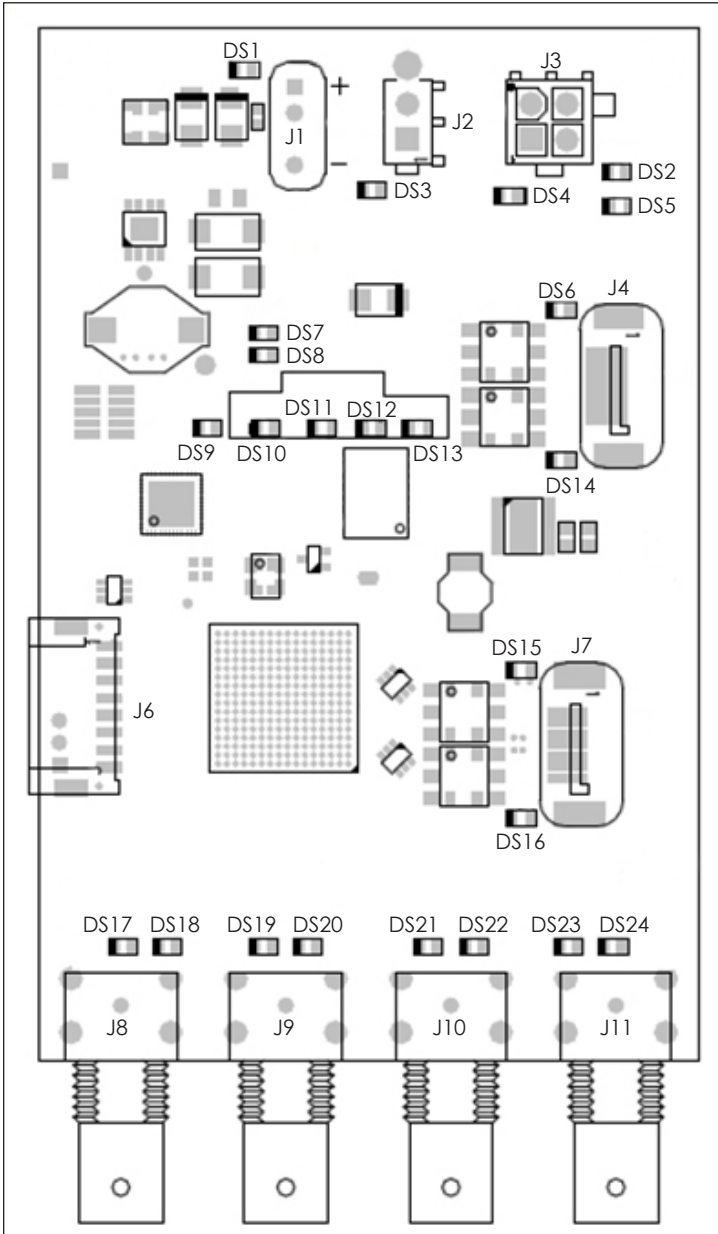
Figure 8: PLR6152 Jacks & Indicators

Jack	Function
J1	Power jack
J2	Fan on/off jack
J3	CAN jack
J4	ProLink5 (SATA) Port A
J6	Program jack

Jack	Function
J7	ProLink5 (SATA) Port B
J8	ProLink6 (coax) Channel 0
J9	ProLink6 (coax) Channel 1
J10	ProLink6 (coax) Channel 2
J11	ProLink6 (coax) Channel 3

Indicator	Description
DS1	VIN power indicator
DS2	CAN jack transmitter indicator
DS3	Fan jack indicator turns on when voltage is active
DS4	CAN jack indicator toggles with CAN activity
DS5	CAN jack receiver indicator
DS6	ProLink5 Port A transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS7	3.3V power indicator
DS8	2.5V power indicator
DS9	Heartbeat LED
DS10	Error Status LED
DS11-13	Status LEDs 0-2
DS14	ProLink5 Port A receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
DS15	ProLink5 Port B transmit indicator • On – port is not configured • Off – port is configured but not transmitting diagnostics • Toggling – port is transmitting diagnostics*
DS16	ProLink5 Port B receive indicator • On – port is not receiving valid signal • Off – port is receiving valid signal but not receiving diagnostics • Toggling – port is receiving diagnostics*
D17	ProLink6 Port A, Channel 0, Indicator L
D18	ProLink6 Port A, Channel 0, Indicator R
D19	ProLink6 Port A, Channel 1, Indicator L
D20	ProLink6 Port A, Channel 1, Indicator R
D21	ProLink6 Port B, Channel 2, Indicator L
D22	ProLink6 Port B, Channel 2, Indicator R
D23	ProLink6 Port B, Channel 3. Indicator L
D24	ProLink6 Port B, Channel 3, Indicator R

* The receive indicator toggles at the rate that the diagnostic requests are received at the port. When active, indicators that toggle with received/transmitted diagnostics may toggle at a $^1/_2$ interval, then remain idle for up to 60 seconds.

For each channel, the **L** and **R** indicators (DS17-DS24) work together to indicate the channel's operation. The following table describes each indicator's meaning:

Channel Indicators	Description
L - On R - On	Channel is not receiving valid signal. Channel may transmit a valid signal if the PLR receives a valid signal on the other ProLink6 port.
L - Off R - Off	Channel is receiving valid signal but not from ProLink6 Master.
L - Off R - On	Channel is transmitting a valid signal. L – Off indicates this transmit is paired with a receive connected to a valid signal but not to ProLink6 Master.
L - Toggles once/second R - Toggling is sporadic	Channel is receiving a valid signal from a Primary ProLink6 Master. R toggles at the rate of diagnostic requests.
L - Toggles ten times/second R - Toggling is sporadic	Channel is receiving a valid signal from a Secondary ProLink6 Master. R toggles at the rate of diagnostic requests.
L - Toggles once/second R - On	Channel is transmitting a valid signal. Toggling indicates this transmit is paired with the receive connected to Primary ProLink6 Master.
L - Toggles ten times/second R - On	Channel is transmitting a valid signal. Toggling indicates this transmit is paired with the receive connected to Secondary ProLink6 Master.

2 Mechanical & Electrical Installation

PLR605X Mounting

The PLR605X is attached to a metal mounting plate; this two-piece unit mounts inside the display cabinet with attachment screws. Refer to **Figure 9**.

The PLR605X assembly is mounted by lowering the unit's keyhole openings onto the attachment screws and then tightening the screws. The PLR should always be replaced as a full assembly. To access the PLR, refer to **Access the PLR (p.23)**.

PLR605X Signal Distribution

The ProLink6 control system sends ProLink6 signal through a dual LC fiber cable to the PLR605X. Refer to **Figure 10**.

The PLR605X receives ProLink6 signal and uses it to generate a ProLink5 or ProLink8 signal that is sent out to the modules.

Contract-specific drawings show the signal path between PLRs within the display and their respective ProLink6 master ports. **Figure 11** shows a typical signal routing diagram for a ProLink6 control system with redundant signal using dual LC fiber connections.

> **Note:** Arrangements vary with section or cabinet size and a ProLink6 controller may supply signal data to more than one display section.

Figure 9: PLR605X on Mounting Plate
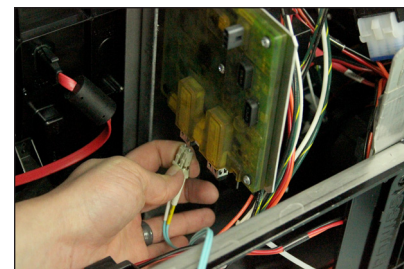
Figure 10: Dual LC Fiber Cable
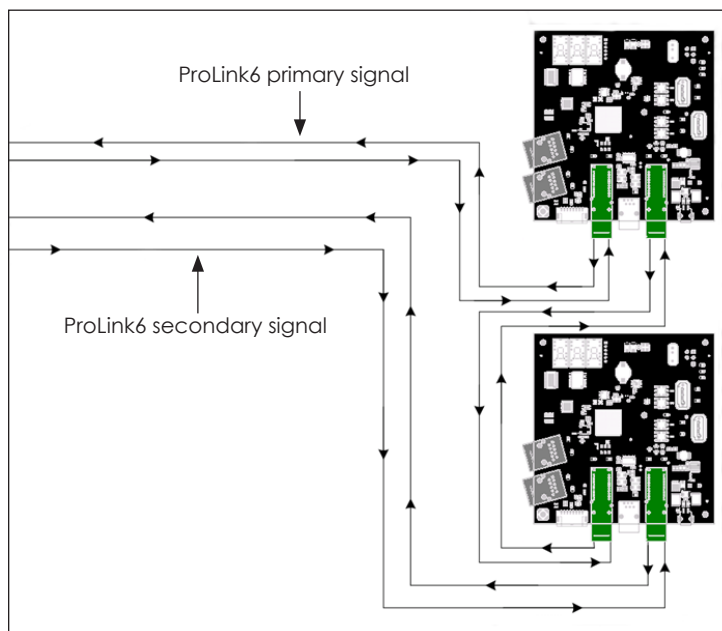
Figure 11: ProLink6 Redundant Signal Routing - PLR605X

The ProLink6 primary signal or secondary signal can be connected to either the Port A fiber jack or the Port B fiber jack. The PLR automatically detects if either the primary or secondary signal is connected to each port. Only one primary and secondary ProLink6 signal is allowed per PLR.

After receiving the ProLink6 signal, the PLR generates the ProLink5 or ProLink8 data signal to send out to the display modules.

Daktronics requires that the PLR ProLink5 SATA port connects to the designated modules with a Daktronics-specific crossover SATA cable. Refer to **Figure 12**.
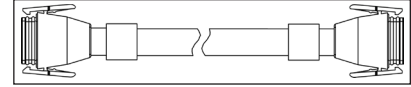
Figure 12: Crossover SATA Cable

In emergencies, a standard crossover SATA cable will work; however, Daktronics cannot guarantee the functionality of the standard cable. Using a Daktronics-specific crossover SATA cable ensures the highest quality signal reception.

Redundancy is not a system requirement. The number of modules and the PLR configuration varies depending on the installation. Refer to the appropriate contract-specific Config Drawing and Signal Interconnect Drawing for further information. Refer to **Figure 13** for an example of redundant routing.
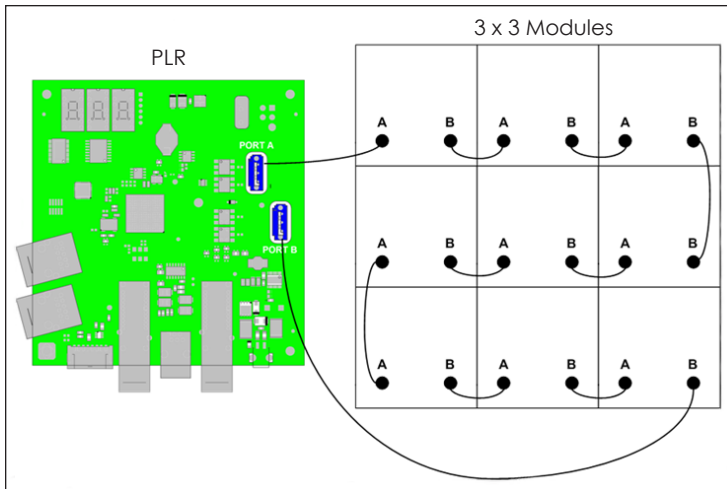
Figure 13: ProLink5 Redundant Signal Routing - PLR605X

PLR615X Mounting

The PLR615X is attached to a metal mounting plate; this two-piece unit mounts inside the display with attachment screws. Refer to **Figure 14**.

Mount the PLR by hanging the plate at the proper location in the cabinet and tightening the attachment screw. The PLR should always be replaced as a full assembly. To access the PLR, refer to **Access the PLR (p.23)**.
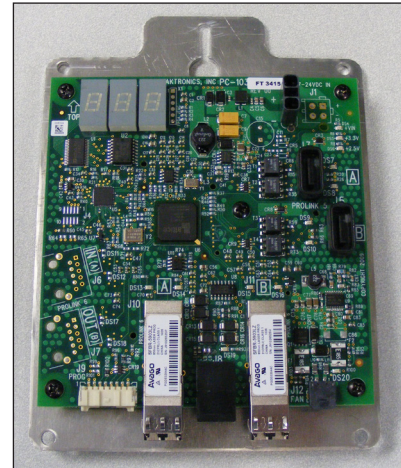

Figure 14: PLR615X on Mounting Plate

PLR615X Signal Distribution

The ProLink6 control system sends ProLink6 signal through a dual coax cable to the PLR615X. Refer to **Figure 15**.

The PLR615X receives ProLink6 signal and uses it to generate ProLink5 or ProLink8 signal that is sent out to the modules.

Contract-specific drawings show the signal path between PLRs within the display and their respective ProLink6 master ports.

Figure 15: Dual Coax Cable

Figure 16 shows a typical signal routing for a ProLink6 control system with redundant signal using dual coax connections.

> **Note:** Arrangements vary with section or cabinet size and a ProLink6 controller may supply signal data to more than one display section.
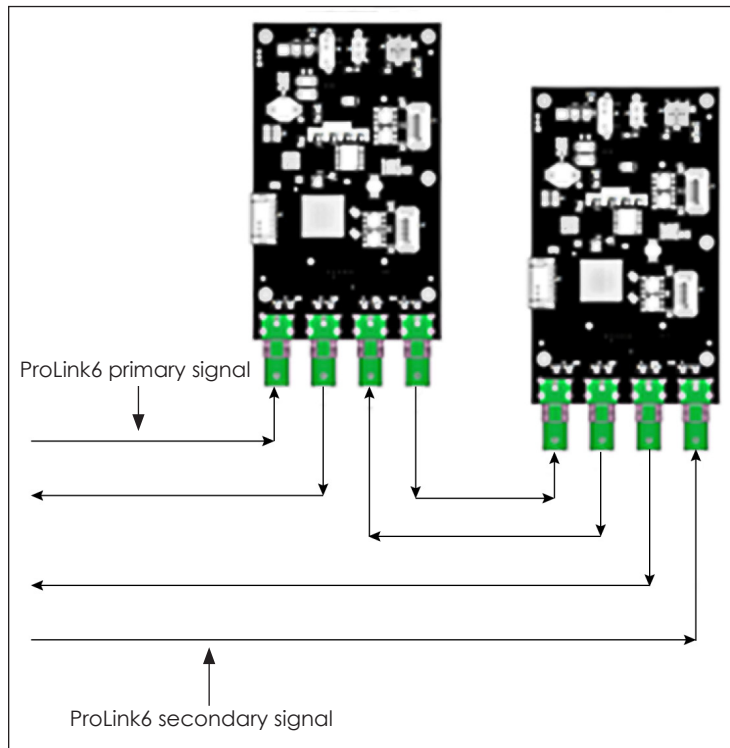
Figure 16: ProLink6 Redundant Signal Routing - PLR615X

The ProLink6 primary signal or secondary signal can be connected to either the Port A coax jack or the Port B coax jack. Port A consists of coax Channel 0 and Channel 1; Port B consists of coax Channel 2 and Channel 3. Refer to **Figure 17**.

Each port can support a receive/transmit (Rx/Tx) pair but Rx/Tx pairs cannot cross between ports. This is referred to as "auto-negotiation rules".
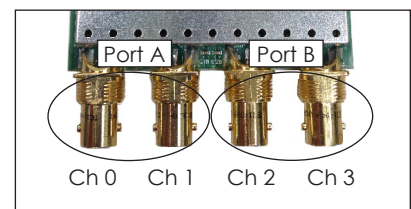
Figure 17: ProLink6 Coax Layout

ProLink6 is capable of determining which channel is receiving and which is transmitting data on each port. Because of this capability, it is possible to swap a ProLink6 master cable pair's transmit and receive on either port if the pair does not cross ports.

The auto-negotiation rules for Rx/Tx pairs are shown in **Figure 18** and **Figure 19**.
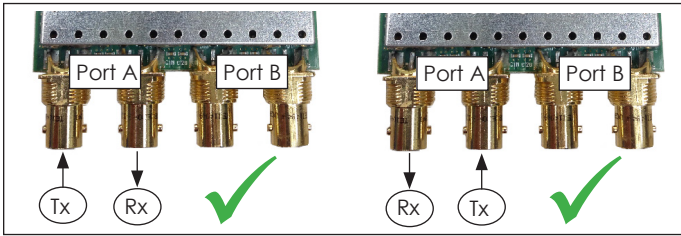
Figure 18: Acceptable Rx/Tx Configurations
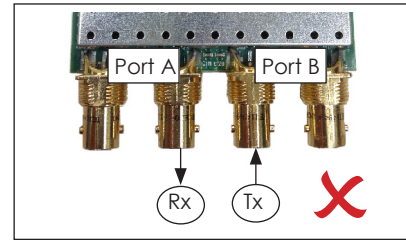
Figure 19: Unacceptable Rx/Tx Configuration

The PLR automatically detects if the signal is either the primary or secondary signal and which channels are designated Rx/Tx on each port. However, only one primary and one secondary ProLink6 signal is allowed per PLR.

After receiving the ProLink6 signal, the PLR generates a ProLink5 or ProLink8 data signal to send out to the display modules.

Daktronics requires that the PLR ProLink5 SATA port connects to the designated modules with a Daktronics-specific crossover SATA cable. Refer to **Figure 20**.
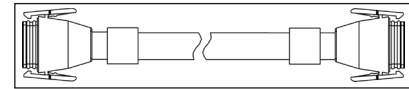
Figure 20: Crossover SATA Cable

In emergencies, a standard crossover SATA cable will work; however, Daktronics cannot guarantee the functionality of the standard cable. Using a Daktronics-specific crossover SATA cable ensures the highest quality of signal reception.

Redundancy is not a system requirement. The number of modules and the selected configuration varies depending on the installation. Refer to the appropriate contract-specific Config Drawing and Signal Interconnect Drawing for further information. Refer to **Figure 21** for an example of redundant routing.
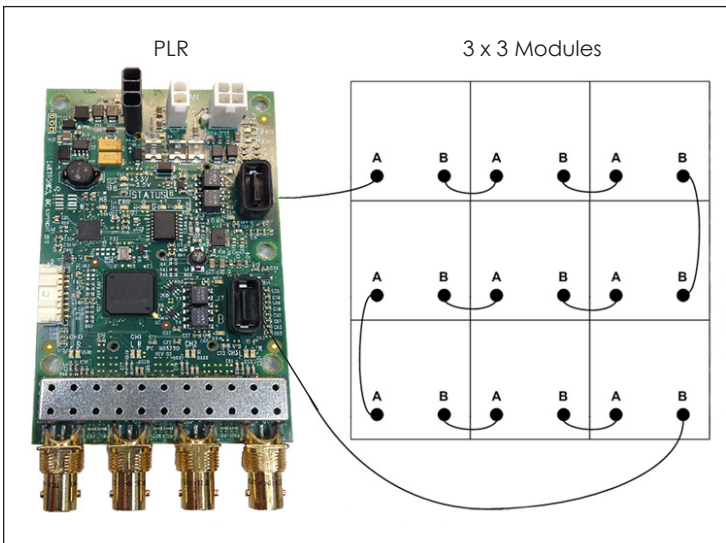
Figure 21: ProLink5 Redundant Signal Routing - PLR615X

Mechanical & Electrical Installation

3   Diagnostics & Troubleshooting

This section outlines the self-test operations, test pattern modes, and troubleshooting steps used to evaluate the PLRs (PLR605X and PLR615X).

Access the PLR

Both types of PLRs (PLR605Xs and PLR615Xs) are mounted inside the display cabinets on a mounting plate.

To remove the PLR, follow these steps:

1. Locate the PLR on the project's Layout Drawing.

2. Disconnect power to the display.

3. Open a rear-access display by removing the back sheets; open a front-access display by removing a module located adjacent to the PLR. Refer to the display access information in the appropriate display manual.

4. Disconnect all power and signal cables to the PLR. Refer to **Figure 22**.

5. Loosen the mounting attachment screws, slide the mounting plate keyholes off the screws, and lift the plate from the display. Refer to **Figure 23**.

Reverse these steps to install a new PLR in the display.
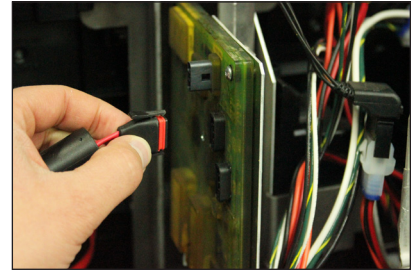
Figure 22: Disconnect SATA Cables
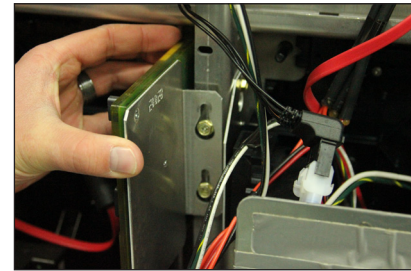
Figure 23: Lift Mounting Plate

PLR605X 7-Segment Display

Status information is shown on the 7-segment display after the PLR initially powers up and during operation. Status codes provide useful information about the PLR and display configuration. Refer to **Figure 24**.
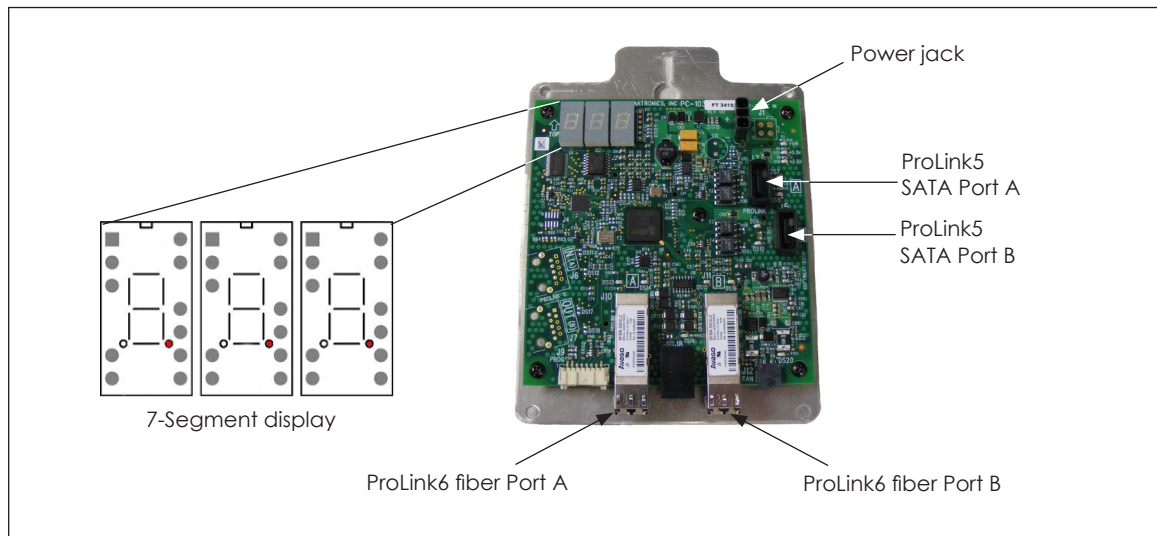
Figure 24: PLR605X

Power Up Sequence

The following table lists power up sequence codes shown on the 7-segment display.

Code			Description
8	8	8	7-segment display test (held for two seconds)
u	P	t	Micro firmware type to follow
		x	Micro firmware type, Digit 1
x	x	x	Micro firmware type, Digits 2-4
u	P	r	Micro firmware revision to follow
		x	Micro firmware revision, Digit 1
x	x	x	Micro firmware revision, Digits 2-4
u	P	b	Micro firmware build to follow
		x	Micro firmware build, Digit 1
x	x	x	Micro firmware build, Digits 2-4
E	P	t	EPLD firmware type to follow
		x	EPLD firmware type, Digit 1
x	x	x	EPLD firmware type, Digits 2-4
E	P	r	EPLD firmware revision to follow
		x	EPLD firmware revision, Digit 1
x	x	x	EPLD firmware revision, Digits 2-4
i	d		Hardware ID to follow
		x	Hardware ID, Digit 1
x	x	x	Hardware ID, Digits 2-4

Normal Operation

The following table lists codes that are shown on the 7-segment display during normal PLR operation.

Code			Description
			Blank
A	d	r	ProLink6 address to follow
		x	ProLink6 address, Digit 1
x	x	x	ProLink6 address, Digits 2-4
		t	PLR temperature to follow
	x	x	PLR temperature in degrees Celsius

Code			Description
P	6	A	ProLink6 Port A checksums to follow
x	x	x	ProLink6 Port A checksums
P	6	b	ProLink6 Port B checksums to follow
x	x	x	ProLink6 Port B checksums
P	5	A	ProLink5 Port A checksums to follow
x	x	x	ProLink5 Port A checksums
P	5	b	ProLink5 Port B checksums to follow
x	x	x	ProLink5 Port B checksums
F	r	t	Frame type to follow
		x	Frame type, Digit 1
x	x	x	Frame type, Digits 2-4
n	C	A	Port A slave node count to follow
x	x	x	Port A slave node count
n	C	b	Port B slave node count to follow
x	x	x	Port B slave node count
			Blank (held for two seconds)

The following table lists codes that can appear at any time during normal PLR operation.

Code			Description
	u		PLR unlocked
	o		Receiving Intel hex file
	P		Configuring EPLD
b	t	u	PLR currently bootloading ProLink5 node micro firmware
b	t	E	PLR currently bootloading ProLink5 node EPLD firmware
b	t	t	PLR currently bootloading ProLink5 node translation table

Decimal Point Indicator Messages

Figure 25 shows the decimal point indicators located on the 7-segment display. DS1 and DS2 correspond to Jack 6 and Jack 7, respectively. Refer to the following table for more information.

Code	Description
DS1	ProLink6 Port A data will transmit to ProLink5
DS2	Heartbeat toggles on/off once per second
DS3	ProLink6 Port B data will transmit to ProLink5

Decimal point indicators
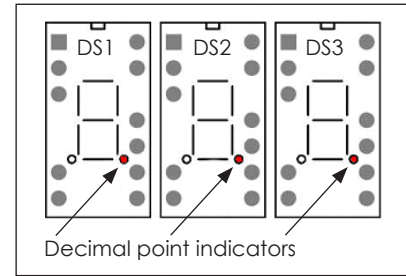
Figure 25: Indicators

Error Messages

The following table lists error codes that may be shown on the 7-segment display during PLR operation. In each case, the error message **E r r** is shown first for five seconds followed by one of the error codes.

Code			Description	Action
o	o	o	Thermal error	Lower sign temperature or run PLR self-test to verify hardware
i	d		Hardware ID error	Replace PLR
h	r	d	PLR hardware error	Replace PLR
P	L	6	Both ProLink6 ports are disconnected	Resolve ProLink6 connection issue or run PLR self-test to verify hardware
P	L	5	• A ProLink5 port is disconnected • A ProLink5 port is not configured for any modules but is detecting a module on that port • A ProLink5 port is configured for at least one module but is not detecting a module on that port • A ProLink5 port is configured for a chain of modules with redundancy, but is not detecting a ProLink5 master on the other end of the ProLink5 chain (may be caused by issues with the link or firmware) • A ProLink5 port is configured for a chain of modules with redundancy but is detecting a ProLink5 master on the other end of the ProLink5 chain that is not configured to the correct redundancy direction • A ProLink5 port is connected to a chain of modules with redundancy but has detected a larger or smaller number of connected modules	Resolve mismatch between physical ProLink5 connections and the translation table
d	h	F	Firmware hard fault	Replace PLR
d	n	E	Firmware memory manage error	Replace PLR

Code			Description	Action
d	b	E	Firmware bus fault	Replace PLR
d	u	E	Firmware usage fault	Replace PLR
	-		EPLD is not configured	Replace PLR
n	b	L	Micro bootstrap or EPLD bootstrap firmware not found	Replace PLR
b	L	L	Bootstrap firmware loaded; production firmware missing	Bootload PLR

PLR605X ProLink5 Display Test Patterns

To start the ProLink5 test pattern mode, loop the fiber cable from Port A to Port B on the ProLink6 ports, disconnect power, and reconnect power. The 7-segment display shows **t p t** to indicate it is in this mode. Refer to **Figure 26**.

Test patterns are sent out to the ProLink5 display elements in a repeating cycle as long as the PLR is powered on and the fiber loopback connection remains in place.

Figure 26: *ProLink5 Test Mode*

Test patterns are listed in the following table in the order they are displayed.

Test Pattern Color	Test Description
Solid red	Nodes connected to ProLink5 Port A and Port B
Solid green	Nodes connected to ProLink5 Port A and Port B
Solid blue	Nodes connected to ProLink5 Port A and Port B
Solid white	Nodes connected to ProLink5 Port A and Port B
Solid amber*	Nodes connected to ProLink5 Port A
Solid magenta*	Nodes connected to ProLink5 Port B
PLC51XX walking cyan pattern**	Nodes connected to ProLink5 Port A
Blank	Nodes connected to ProLink5 Port A and Port B

*All ProLink5 devices have a built-in redundancy feature, so the solid amber and solid magenta test patterns are used to detect breaks in redundant links. Solid amber is transmitted out of PLR Port A only and solid magenta is transmitted out of PLR Port B only.

**This sequence is shown only on PLC51XX ProLink5 nodes. The first PLC that is connected to ProLink5 Port A will show cyan, followed by the next PLC, and so on. The pattern will move to the next PLC at one-second intervals, up to 16 PLCs. This pattern is supported with PLR release 2013-12 RP00 and later.

To exit the ProLink5 test pattern mode, disconnect the fiber loopback connection.

PLR605X ProLink6 Display Test Patterns

The ProLink6 test pattern mode is used to light up a display for troubleshooting purposes or in cases when a ProLink6 controller, such as a VIP-5X6X, is not yet installed on site. It consists of a single PLR605X (transmitting PLR) sending frame commands to the other PLRs (receiving PLRs) in the ProLink6 signal chain.

When the receiving PLRs receive a frame command, they render the associated test pattern on the display by transmitting test pattern commands to the ProLink5 nodes. Refer to the following table for the test pattern frame sequence.

Before starting the test pattern mode, ensure that the PLR605X has the following minimum firmware versions:

- User Micro Revision 0x1050

- User EPLD Revision 0x1052

To put a PLR into transmit mode, loop a SATA cable from Port A to Port B on the ProLink5 ports, disconnect power, and reconnect power. The transmitting PLR shows **t 6 t** on the 7-segment display to indicate it is transmitting ProLink6 frame commands. Refer to **Figure 27**.

Figure 27: PLR in Transmit Mode

To put a PLR into receive mode, first disconnect any ProLink6 controllers and connect the transmitting PLR to the ProLink6 chain. All PLRs in the ProLink6 chain should enter receive mode within five seconds and begin displaying test pattern commands. The receiving PLRs show **t 6 r** on the 7-segment display to indicate they are receiving ProLink6 frame commands. Refer to **Figure 28**.

Figure 28: PLR in Receive Mode

> **Note:** The frame commands are not perfectly synchronous among PLRs. It is normal for PLRs to change test patterns slightly out of sync, but each PLR should update to a new frame within 1 second. If a receiving PLR takes longer than 1 second to switch to a new test pattern (compared to nearby PLRs), it indicates a problem with that PLR, ProLink6 signal to that PLR, or ProLink5 communication to that PLR's ProLink5 modules.

The test pattern frame sequence is listed in the following table. Each frame is held for approximately 10 seconds. The sequence will repeat as long as the transmitting PLR is powered on and connected to the receiving PLRs.

Frame	Test Pattern	Intensity	Test Description
1	Red	100%	Solid color for visual verification
2	Green	100%	Solid color for visual verification
3	Blue	100%	Solid color for visual verification
4	White	100%	Solid color for visual verification
5	Blank	N/A	Solid color for visual verification
6	Red	25%	Solid color for visual verification

Diagnostics & Troubleshooting

Frame	Test Pattern	Intensity	Test Description
7	Green	25%	Solid color for visual verification
8	Blue	25%	Solid color for visual verification
9	White	25%	Solid color for visual verification
10	Blank	N/A	Solid color for visual verification
11	PLR ProLink5 Link Check	50%	ProLink5 nodes indicate link health • Cyan - broken link in the ProLink5 chain • Blank - no broken links in the ProLink5 chain
12	PLR ProLink5 Node Link Health*	50%	ProLink5 nodes indicate link health • Red - broken link • Yellow - poor quality link • Green - good quality link
13	Blank	N/A	Solid color for visual verification
14	Amber - PLR Port A only**	50%	Amber is transmitted from PLR Port A only
15	Magenta - PLR Port B only**	50%	Magenta is transmitted from PLR Port B only
16	Blank	N/A	Solid color for visual verification

*Not all ProLink5 nodes support this pattern yet. If a node does not support it, the previous test pattern will continue to display during this frame. The following minimum firmware versions are required for this test pattern:

• ProLink 5.2/5.3 Modules: User Micro Revision 0x1051

• PLC51XX: User Micro Revision 0x1050

• MLC51XX: User Micro Revision 0x1053

• Display firmware package: dispfw_2016.12.5-c185743f

**These patterns are useful to detect breaks in a chain or ProLink5 nodes if there is only one PLR driving that chain.

If a receiving PLR stops receiving frame commands, it stops sending test pattern commands to the ProLink5 nodes. The test patterns are sent with an approximately 20-second timeout; the ProLink5 nodes will blank after approximately 20 seconds if a transmitting PLR is disconnected from ProLink6 or the receiving PLR is disconnected from its ProLink5 nodes.

To exit the ProLink6 test pattern mode, follow these directions:

• Transmitting PLR: disconnect the SATA loopback, disconnect and reconnect power.

• Receiving PLR: disconnect the transmitting PLR, reconnect to a ProLink6 controller.

PLR605X Self-Test Mode

The PLR self-test mode is a diagnostic mode used to test internal systems and I/O ports. During self-test mode, the PLR tests for correct operation and shows a pass/fail status on the 7-segment display. If any failures are detected, error codes are displayed to define the source of the failure.

To put the PLR605X into self-test mode, refer to **Figure 29** and follow these steps:

1. Loop the SATA cable from Port A to Port B on the ProLink5 jacks.

2. Loop the fiber cables from Port A to Port B on the ProLink6 jacks.

3. Disconnect the power and then reconnect the power.
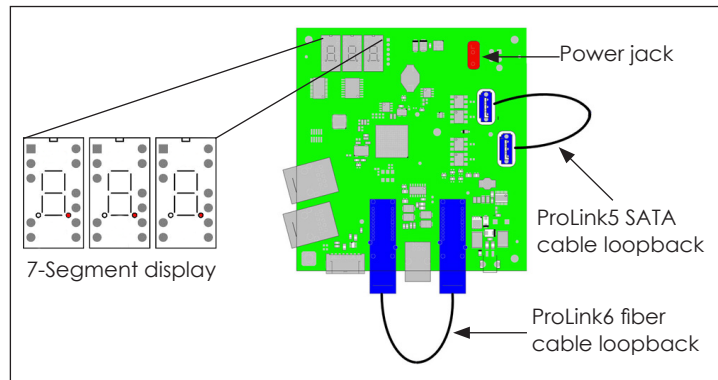
Figure 29: PLR605X Self-Test

When the self-test is complete, disconnect power, remove loopback connections, and restart power. Refer to **Self-Test Mode Messages (p.30)** and the following table for more information on the error messages.

Self-Test Mode Messages

During self-test mode, the PLR605X displays the messages listed in the following table on the 7-segment display. If any **E r r** message is displayed, the PLR should be sent in for repair. Daktronics field personnel may also reference the **ProLink Router 605X (PLR605X) Self-Test Manual (DD1750417)** for further information concerning the PLR self-test.

Code			Description
8	8	8	7-segment display test (held for two seconds)
t	s	t	Initial test in progress (held for 60 seconds)
P	A	S	All tests passed
E	r	r	Test failures reported
F	0	1	ProLink6 (fiber) Port A error
F	0	2	ProLink6 (fiber) Port B error
F	0	3	RJ45 In (Port A) error
F	0	4	RJ45 Out (Port B) error
F	0	5	ProLink5 (SATA) Port A error
F	0	6	ProLink5 (SATA) Port B error
F	0	7	ISAC error
F	0	8	Fan control error
F	0	9	Voltage error

Code			Description
F	0	A	Temperature error
F	0	B	ID error
F	0	C	Serial flash error
F	0	D	EPLD error
F	0	E	EPLD oscillator error
F	0	F	EEPROM error
F	1	0	Firmware error
F	1	1	ProLink5 configuration error
F	1	2	7-Segment display error
F	1	3	VIN voltage error
F	x	x	Other self-test error

PLR615X Status LEDs

Status information is shown on the four status LEDs labeled **ERR**, **0**, **1**, and **2**. To the left of the status LEDs, there is a heartbeat LED labeled **HB**. The **HB** indicator LED toggles at a rate of once per second when the PLR is in normal operation or self-test mode and toggles at a rate of 10 times per second when the PLR is in bootstrap mode. Refer to **Figure 30**.
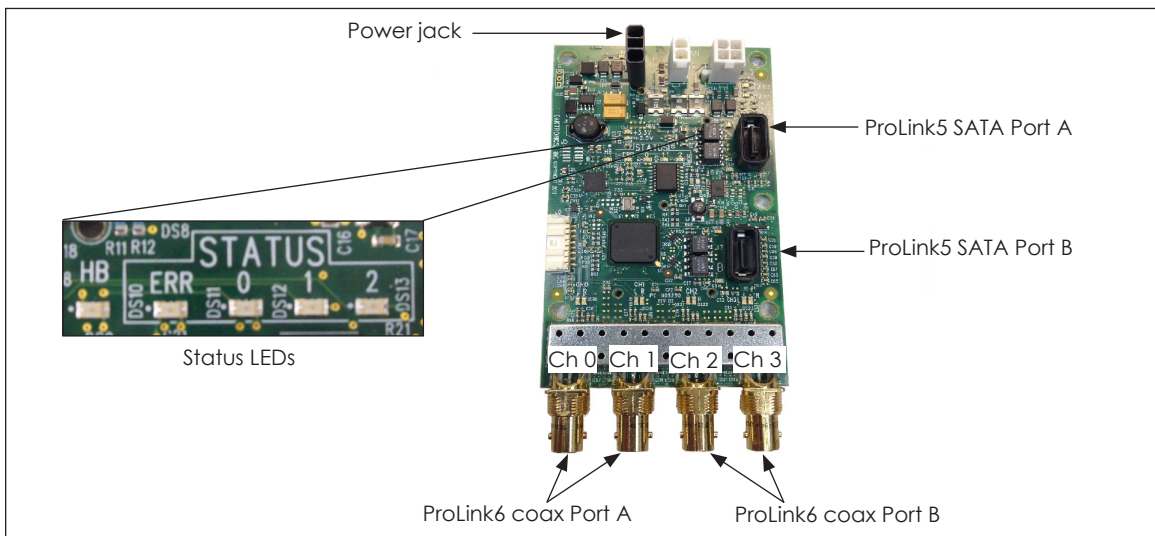
Figure 30: PLR615X

Power Up Sequence

After powering up the PLR, the **HB** LED indicator should toggle at a rate of 10 times per second and the four status LEDs should remain blank.

Bootstrap Messages

If the PLR is in bootstrap mode, the **HB** LED indicator will toggle at a rate of 10 times per second. If the PLR is in production mode, it will toggle at a rate of one time per second. Refer to **Figure 31** for the codes that are shown on the status LEDs during the bootstrap mode. If an error occurs, the **ERR** LED lights up along with the error code on the other three status LEDs.

Code	ERR	0	1	2	
0					bdb - waiting to receive valid bootload frame type
1				■	bnb - bootload file is not for this device (wrong node address, file type, etc.)
2			■		bhb - valid frame type received, waiting to receive valid bootload header
3			■	■	
4		■			bob - erasing flash memory prior to storing bootload file
5		■		■	
6		■	■		bbb - storing bootload file
7		■	■	■	bCb - bootload complete, successful
8	■				
9	■			■	
10	■		■		
11	■		■	■	
12	■	■			b-b - FPGA unable to configure
13	■	■		■	
14	■	■	■		bFb - error condition (usually a checksum error), PLR will retry up to 16 times before stopping
15	■	■	■	■	

Figure 31: PLR615X Bootstrap Mode Messages

Production Mode

If there are no errors or status messages to report, the status LEDs remain blank during production mode. Refer to **Figure 32** for messages that may be shown while the PLR is operating in production mode. If an error occurs, the **ERR** LED will light up along with the error code on the other three status LEDs.

Code	ERR	0	1	2	Message
0	⬜	⬜	⬜	⬜	No errors or status messages to report
1	⬜	⬜	⬜	🟥	u - unlocked
2	⬜	⬜	🟥	⬜	btu, bte, btt - bootloading PL5 node micro, EPLD, MDF
3	⬜	⬜	🟥	🟥	
4	⬜	🟥	⬜	⬜	
5	⬜	🟥	⬜	🟥	
6	⬜	🟥	🟥	⬜	tst - testpattern mode
7	⬜	🟥	🟥	🟥	bb - Big Blue PLR firmware
8	🟥	⬜	⬜	⬜	unable to configure FPGA
9	🟥	⬜	⬜	🟥	nbL - no bootloader loaded, bll - bootloader loaded
10	🟥	⬜	🟥	⬜	hrd err - PLR hardware/component error
11	🟥	⬜	🟥	🟥	id err - hardware ID error
12	🟥	🟥	⬜	⬜	PL6 err - ProLink6 error
13	🟥	🟥	⬜	🟥	PL5 err - ProLink5 error
14	🟥	🟥	🟥	⬜	Cod err - Firmware error
15	🟥	🟥	🟥	🟥	ooo - thermal error

Figure 32: *PLR615X Production Mode Messages*

PLR615X Display Test Patterns

To put the PLR615X into test pattern mode, loop a coax cable from Channel 0 to Channel 3 and a second cable from Channel 1 to Channel 2 on the ProLink6 ports, disconnect and reconnect power. Test patterns are sent out to the display in a repeating cycle as long as the PLR is powered on and the coax loopback connection remains in place.

To exit the test pattern mode, disconnect the coax loopback connection. Test patterns are listed in the following table in the order they are displayed.

Test Pattern Color	Test Description
Solid red	Nodes connected to ProLink5 Port A and Port B
Solid green	Nodes connected to ProLink5 Port A and Port B
Solid blue	Nodes connected to ProLink5 Port A and Port B
Solid white	Nodes connected to ProLink5 Port A and Port B
Solid amber*	Nodes connected to ProLink5 Port A
Solid magenta*	Nodes connected to ProLink5 Port B
Blank	Nodes connected to ProLink5 Port A and Port B

*All ProLink5 devices have a built-in redundancy feature, so the solid amber and solid magenta test patterns are used to detect breaks in redundant links. Solid amber is transmitted out of PLR Port A only and solid magenta is transmitted out of PLR Port B only.

Diagnostics & Troubleshooting

33

PLR615X Self-Test Mode

The PLR self-test mode is used to test internal systems and I/O ports. While in self-test mode, the PLR tests for correct operation and shows a pass/fail status on the four status LEDs as described in **PLR615X Status LEDs (p.31)**.

If any failures are detected, error codes are displayed to define the source of the failure.

The self-test connections are shown in **Figure 33**.
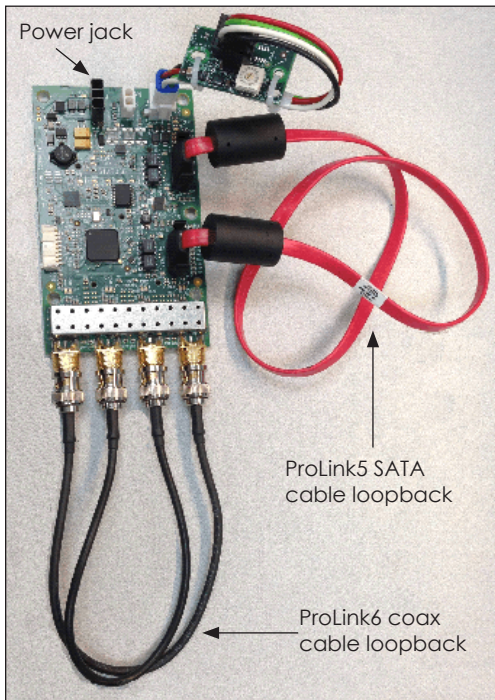
Figure 33: PLR615X Self-Test

To put the PLR615X into self-test mode, follow these steps:

1. Loop the SATA cable from Port A to Port B on the ProLink5 jacks.

2. Connect a coax cable from coax Channel 0 to coax Channel 3 and a second cable from coax Channel 1 to coax Channel 2.

3. Disconnect the power and then reconnect the power.

During the self-test, the **HB** LED toggles once per second. The four status LEDs light up for three seconds before initiating a repeating test-in-progress pattern. This alternating chase pattern may take up to 60 seconds to run. Refer to **Figure 34**.

When the self-test is complete, disconnect power, remove all loopback connections, reconnect cables, and restart power. Refer to **Figure 35** and **Self-Test Mode Messages** for further information on the error messages.

ERR	0	1	2
■			
	■		
		■	
			■
		■	
	■		
■			
	■		
		■	
			■
		■	
	■		

Code	ERR	0	1	2	
0					All tests passed
1				■	ISAC/CAN error
2			■		
3			■	■	
4		■			
5		■		■	
6		■	■		
7		■	■	■	
8	■				F0B, F09, F0A, F0C, F0D, F0E
9	■			■	F01, F02
10	■		■		F05, F06
11	■		■	■	F08
12	■	■			F13
13	■	■		■	F10, F0F
14	■	■	■		Unused, future use
15	■	■	■	■	Unused, future use
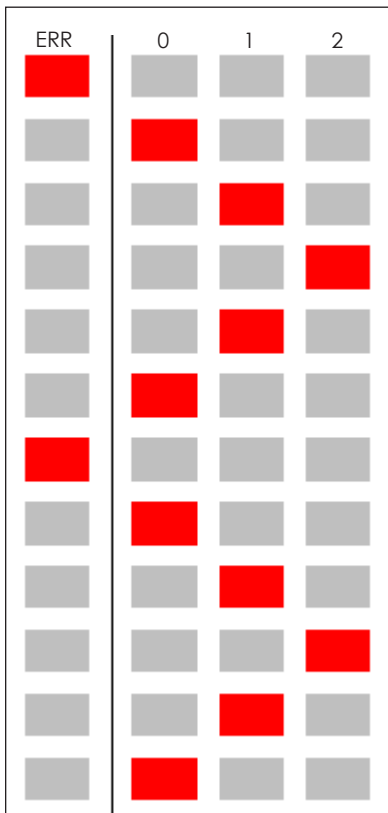
Figure 34: Test-in-Progress Pattern   *Figure 35:* PLR615X Self-Test Mode Messages
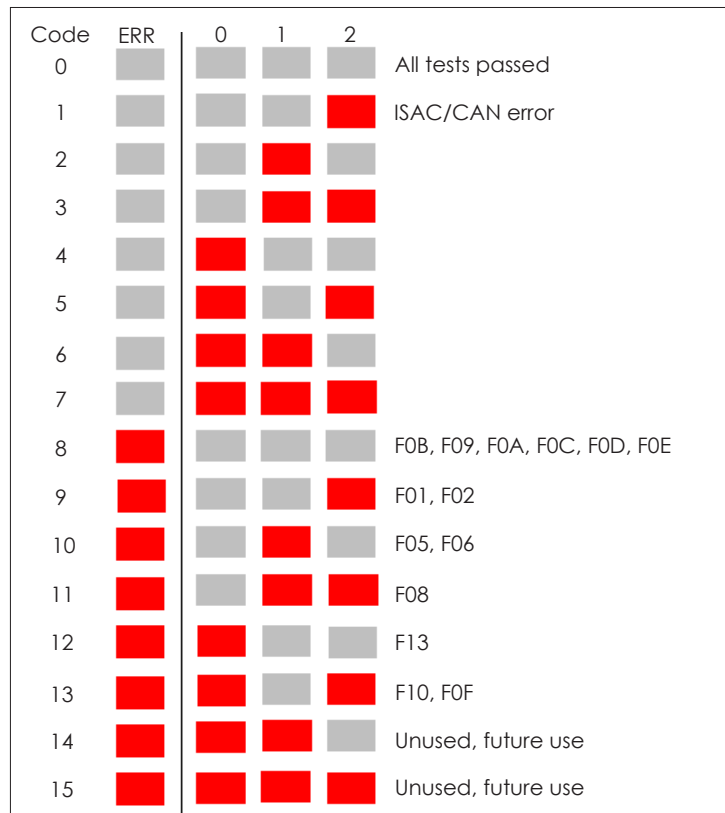
Self-Test Mode Messages

While in self-test mode, the PLR615X status LEDs may display a message listed in **Figure 35**. If the **ERR** LED lights up, the PLR should be sent in for repair. Daktronics field personnel may also reference the **ProLink Router 615X (PLR615X) Self-Test Manual (DD2469872)** for further information.

The error code descriptions are listed in the table below.

Code			Description
F	0	1	ProLink6 (coax) Port A error
F	0	2	ProLink6 (coax) Port B error
F	0	5	ProLink5 (SATA) Port A error
F	0	6	ProLink5 (SATA) Port B error
F	0	8	Fan control error
F	0	9	Internal voltage error
F	0	A	Temperature error
F	0	B	ID error
F	0	C	Serial flash error

Diagnostics & Troubleshooting

Code			Description
F	0	D	EPLD error
F	0	E	EPLD oscillator error
F	0	F	EPLD firmware is missing or corrupt
F	1	0	Firmware error
F	1	1	ProLink5 configuration error
F	1	2	PLR display error
F	1	3	VIN voltage error
F	x	x	Other self-test error

Note: If a CAN sensor is not available for field use, the CAN error can be ignored; the operator should fail the PLR only if the **ERR** LED is lit.

Troubleshooting via IDM

Daktronics Intelligent Device Management (IDM) is an internet-based diagnostic system that analyzes the data collected from Daktronics equipment to identify malfunctions, errors, and other issues. The IDM website is the primary source for accessing the diagnostic data. For more information on using IDM, refer to the **Daktronics Intelligent Device Management User Manual (DD2097912)**.

If a PLR-controlled display section shows either a blank module or incorrect data, follow these steps:

1. Open the IDM application.

2. Click any visible diagnostic errors. The status window opens on the right side. Refer to **Figure 36**. If IDM does not show any visible errors, proceed to **Troubleshooting at the PLR605X Display (p.37)** or **Troubleshooting at the PLR615X Display (p.38)**.

Figure 36: *IDM Troubleshooting*

Diagnostics & Troubleshooting

3. Click the **Help** icon in the status window. The **Notification Help** window opens. Refer to **Figure 37**.
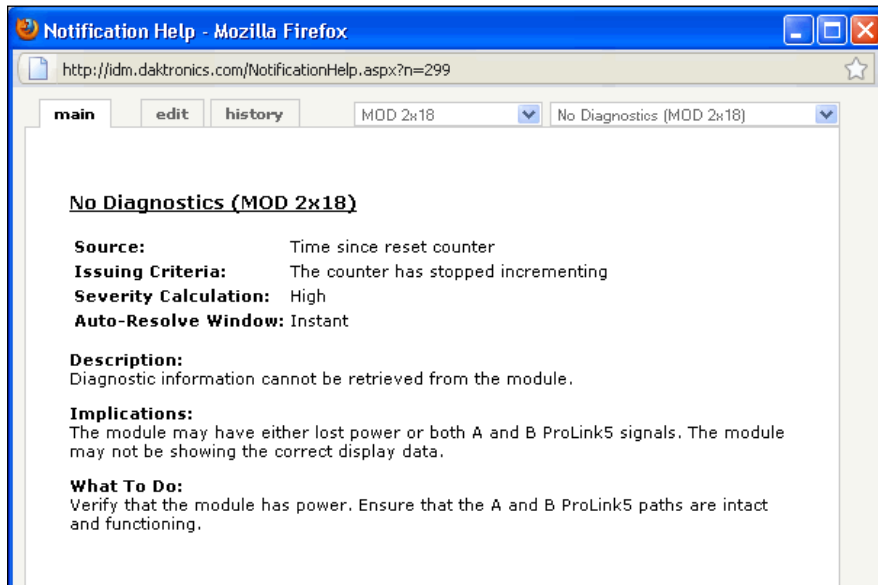
Figure 37: *IDM Notification Help Window*

4. Follow the instructions listed in the Notification Help window.

> **Note:** If these troubleshooting steps do not resolve the issue, refer to **Troubleshooting at the PLR605X Display (p.37)** for a PLR605X or **Troubleshooting at the PLR615X Display (p.38)** for a PLR615X.

Troubleshooting at the PLR605X Display

If a PLR-controlled display section shows either a blank module or incorrect data and if IDM is not available or does not show any visible display errors, follow these steps:

1. Check that all LEDs and the 7-segment display are illuminated. If not, check VIN power. If VIN is within 7-24V, the power is good and the PLR should be replaced.

2. Verify the DS4 (VIN), DS5 (3.3V), and DS6 (2.5V) power indicators are illuminated. If DS4 is not illuminated, check VIN power. If VIN is within 7-24V, the power is good and the PLR should be replaced. If DS5 or DS6 are not illuminated, replace the PLR.

3. Run the PLR test patterns as described in **PLR605X ProLink5 Display Test Patterns (p.27)**. If these do not display, there is a ProLink5 system error. Check the ProLink5 connections between the module and the PLR to verify that the module has power. Perform the module self-test to verify the module's status. Refer to the corresponding module manual for further information on the module self-test. If the ProLink5 test patterns do display, there is an issue either at the ProLink6 level or in the control room.

4. Run the PLR test patterns as described in **PLR605X ProLink6 Display Test Patterns (p.28)**. If these do not display, there is a ProLink6 system error.

5. Run the PLR self-test as described in **PLR605X Self-Test Mode (p.30)**. If the self-test is not completed successfully, replace the PLR.

6. Verify that either the Port A or Port B ProLink6 fiber indicator (DS13 or DS15) is toggling as detailed in **PLR6050 (p.2)**. If not, there is no ProLink6 feed from a master ProLink6 controller. Check fiber runs to previous PLRs to see if the link is broken. Ensure that the master ProLink6 controller is connected and operating properly.

7. Verify that the **E r r** message is not showing on the 7-segment display. Refer to **PLR605X 7-Segment Display (p.23)**. If an **E r r** message is displayed, perform the corresponding action listed in the table under **Error Messages (p.26)**.

8. Verify that the ProLink5 Port transmit indicator(s) for the active port(s) (DS7 and/or DS9) is toggling as detailed in **PLR6050 (p.2)**.

9. Verify the ProLink5 Port receive indicator(s) for the active port(s) (DS8 and/or DS10) is toggling as detailed in **PLR6050 (p.2)**.

> **Note:** If two PLRs are controlling the ProLink5 section, both PLRs should be verified independently. This can be done by having only one PLR connected to the ProLink5 chain at a time and removing the ProLink5 SATA connection from the other PLR.

Troubleshooting at the PLR615X Display

If a PLR-controlled display section shows either a blank module or incorrect data and if IDM is not available or does not show any visible display errors, follow these steps:

1. Check that all LEDs are illuminated. If not, check VIN power. If VIN is within 7-24V, the power is good and the PLR should be replaced.

2. Verify the DS1 (VIN), DS7 (3.3V), and DS8 (2.5V) power indicators are illuminated. If DS1 is not illuminated, check VIN power. If VIN is within 7-24V, the power is good and the PLR should be replaced. If DS7 or DS8 are not illuminated, replace the PLR.

3. Run the PLR test patterns as described in **PLR615X Display Test Patterns (p.33)**. If these do not display, there is a ProLink5 system error. Check the ProLink5 connections between the module and the PLR to verify that the module has power. The module self-test can be performed to verify the module's status. Refer to the corresponding module manual for further information on the module self-test. If the ProLink5 test patterns do display, there is an issue either at the ProLink6 level or in the control room.

4. Run the PLR self-test as described in **PLR615X Self-Test Mode (p.34)**. If the self-test is not completed successfully, replace the PLR.

5. Verify that each coax ProLink6 channel's pair of indicators is toggling as detailed in **PLR615X (p.16)**. If not, there is no ProLink6 feed from a master ProLink6 controller. Check coax cable runs to previous PLRs to see if the link is broken. Ensure that the master ProLink6 controller is connected and operating properly.

6. Verify that there are no error messages showing on the status LEDs. Refer to **PLR615X Status LEDs (p.31)**.

7. Verify that the ProLink5 port transmit indicator(s) for the active port(s) (DS6 and/or DS15) is toggling as detailed in **PLR615X (p.16)**. If the indicator is not toggling as described, an incorrect translation table is preventing the PLR from receiving the proper ProLink5 port configuration information.

8. Verify the ProLink5 port receive indicator(s) for the active port(s) (DS14 and/or DS16) is toggling as detailed in **PLR615X (p.16)** If the indicator is not toggling as described, a bad module connection to the first module may exist, or an incorrect translation table is preventing the PLR from receiving the proper ProLink5 port configuration information.

4 Exchange/Repair & Return Programs

To serve customers' repair and maintenance needs, Daktronics offers both an Exchange Program and a Repair & Return Program.

Exchange Program

Daktronics unique Exchange Program is a quick service for replacing key parts in need of repair. If a part requires repair or replacement, Daktronics sends the customer a replacement, and the customer sends the defective part to Daktronics. This decreases display downtime.

Before contacting Daktronics, identify these important part numbers:

Display Serial Number: _____

Display Model Number: _____

Contract Number: _____

Installation Date: _____

Sign Location: _____

Daktronics Customer ID Number: _____

To participate in the Exchange Program, follow these steps:

1. **Call Daktronics Customer Service.**

    United States & Canada: 1-800-DAK-TRON (325-8766)

    Outside the United States & Canada: +1-605-275-1040

2. **Mail the old part to Daktronics after receiving the new exchange part.**

    If the replacement part fixes the problem, send in the problem part which is being replaced.

    a. Package the old part in the same shipping materials in which the replacement part arrived.

    b. Fill out and attach the enclosed UPS shipping document.

    c. Ship the part to Daktronics.

    Daktronics will charge for the replacement part immediately, unless a qualifying service agreement is in place. In most cases, the replacement part will be invoiced at the time it is shipped.

3. **Return the part within 30 working days if the replacement part does not solve the problem, or Daktronics will charge the full purchase price.**

    If the part is still defective after the exchange is made, please contact Daktronics Customer Service immediately. Daktronics expects immediate return of an exchange part if it does not solve the problem. Daktronics also reserves the right to refuse parts that have been damaged due to acts of nature or causes other than normal wear and tear.

Repair & Return Program

For items not subject to exchange, Daktronics offers a Repair & Return Program. To send a part for repair, follow these steps:

1. **Call Daktronics Customer Service.**

    Refer to the telephone number listed on the previous page.

2. **Receive a Return Materials Authorization (RMA) number before shipping.**

    Refer to the telephone number listed on the previous page.

3. **Package and pad the item carefully to prevent damage during shipping.**

    Electronic components, such as printed circuit boards, should be placed in an antistatic bag before boxing. Daktronics does not recommend packing peanuts when shipping.

4. **Enclose the following information:**

    *   Name

    *   Address

    *   Phone number

    *   RMA number

    *   Clear description of symptoms

Shipping Address

Daktronics Customer Service
600 E 54th St. N.
Sioux Falls, SD 57104
Case#

Warranty & Limitation of Liability

The Daktronics Warranty & Limitation of Liability statement is independent of extended service agreements and is the authority in matters of service, repair, and display operation. Refer to **Appendix B: Daktronics Warranty & Limitation of Liability (p.45)**.

Glossary

Coax Cable: technology that uses an inner core and a flexible, braided outer tube of copper wire to transmit high-frequency data at high speeds. Coax (or coaxial) cables are often used to route signal to the PLR from the ProLink6 control system.

Fiber-Optic Cable: a technology that uses glass or plastic threads (fibers) to transmit data. Fiber-optic cables are often used to route signal to the PLR from the ProLink6 control system.

ProLink Router (PLR): display component that passes display data from the ProLink6 control system modules and other PLRs. The ratio of PLRs to modules varies with display application.

ProLink5: Daktronics communication protocol for distributing display data within a display. The protocol pertains chiefly to high-speed data for high-color-resolution displays. Typically, this signal runs on Daktronics proprietary SATA cable from a ProLink5 control system.

ProLink5 Control System: system that transmits ProLink5 protocol to the sign level ProLink5 nodes. An example of this control equipment is the DD4041 data distributor.

ProLink6 Control System: system that transmits ProLink6 protocol to the sign level ProLink6 nodes. An example of this control equipment is the DI-6000 series display interface.

This page intentionally left blank.

A Technical Specifications

Refer to the table below for the technical specifications for the PLR605X and PLR615X.

Specification	PLR605X	PLR615X
Environmental tolerance	-40 °C to 75 °C (-40 °F to 167 °F)	-40 °C to 75 °C (-40 °F to 167 °F)
ProLink5 ports	SATA ports @ 2	SATA ports @ 2
ProLink6 ports	Fiber-optic @ 2	Coax BNC @ 2
ProLink5 SATA cable length	10 m (32.8 ft) maximum	10 m (32.8 ft) maximum
ProLink5 pixels per port	80,000 pixels @ 60 fps, 24 bit color	100,000 pixels @ 60 fps, 24 bit color
ProLink5 maximum nodes per port	8,192 nodes, limited by node/module type	8,192 nodes, limited by node/module type
CAN jack ratings	9V-24V, 400mA maximum	9V-24V, 400mA maximum
Fan jack ratings	10V-13V, 400mA maximum	10V-13V, 400mA maximum
Power - no CAN sensor, no fan	9-14 VDC, 6W maximum, 3.5W typical	9-14 VDC, 6W maximum, 3.5W typical
Power - no CAN sensor, fan	12 VDC, 10.8W maximum, 8.3W typical	12 VDC, 10.8W maximum, 8.3W typical
Power - CAN sensor, no fan	12 VDC, 6W maximum, 3.5W typical + CAN sensor peripheral power	12 VDC, 6W maximum, 3.5W typical + CAN sensor peripheral power

This page intentionally left blank.

B   Daktronics Warranty & Limitation of Liability

This section includes the Daktronics Warranty & Limitation of Liability statement.

This page intentionally left blank.

This Warranty and Limitation of Liability (the "Warranty") sets forth the warranty provided by Daktronics with respect to the Equipment. By accepting delivery of the Equipment, Purchaser and End User agree to be bound by and accept these terms and conditions. Unless otherwise defined herein, all terms within the Warranty shall have the same meaning and definition as provided elsewhere in the Agreement.

DAKTRONICS WILL ONLY BE OBLIGATED TO HONOR THE WARRANTY SET FORTH IN THESE TERMS AND CONDITIONS UPON RECEIPT OF FULL PAYMENT FOR THE EQUIPMENT

1. **Warranty Coverage.**

    A. Daktronics warrants to the original end user (the "End User", which may also be the Purchaser) that the Equipment will be free from Defects (as defined below) in materials and workmanship for a period of one (1) year (the "Warranty Period"). The Warranty Period shall commence on the earlier of: (i) four weeks from the date that the Equipment leaves Daktronics' facility; or (ii) Substantial Completion as defined herein. The Warranty Period shall expire on the first anniversary of the commencement date.

    "Substantial Completion" means the operational availability of the Equipment to the End User in accordance with the Equipment's specifications, without regard to punch-list items, or other non-substantial items which do not affect the operation of the Equipment

    B. Daktronics' obligation under this Warranty is limited to, at Daktronics' option, replacing or repairing, any Equipment or part thereof that is found by Daktronics not to conform to the Equipment's specifications. Unless otherwise directed by Daktronics, any defective part or component shall be returned to Daktronics for repair or replacement. This Warranty does not include on-site labor charges to remove or install these components. Daktronics may, at its option, provide on-site warranty service. Daktronics shall have a reasonable period of time to make such replacements or repairs and all labor associated therewith shall be performed during regular working hours. Regular working hours are Monday through Friday between 8:00 a.m. and 5:00 p.m. at the location where labor is performed, excluding any holidays observed by Daktronics.

    C. Daktronics shall pay ground transportation charges for the return of any defective component of the Equipment. All such items shall be shipped by End User DDP Daktronics designated facility per Incoterms® 2020. If returned Equipment is repaired or replaced under the terms of this Warranty, Daktronics will prepay ground transportation charges back to End User and shall ship such items DDP End User's designated facility per Incoterms® 2020; otherwise, End User shall pay transportation charges to return the Equipment back to the End User and such Equipment shall be shipped Ex Works Daktronics designated facility per Incoterms® 2020. All returns must be pre-approved by Daktronics before shipment. Daktronics shall not be obligated to pay freight for any unapproved return. End User shall pay any upgraded or expedited transportation charges

    D. Any replacement parts or Equipment will be new or serviceably used, comparable in function and performance to the original part or Equipment and warranted for the remainder of the Warranty Period. Purchasing additional parts or Equipment from the Seller does not extend the Warranty Period.

    E. Defects shall be defined as follows. With regard to the Equipment (excepting LEDs), a "Defect" shall refer to a material variance from the design specifications that prohibit the Equipment from operating for its intended use. With respect to LEDs, "Defects" are defined as LED pixels that cease to emit light. Unless otherwise expressly provided, this Warranty does not impose any duty or liability upon Daktronics for partial LED pixel degradation. Notwithstanding the foregoing, in no event does this Warranty include LED pixel degradation caused by UV light. This Warranty does not provide for the replacement or installation of communication methods including but not limited to, wire, fiber optic cable, conduit, trenching, or for the purpose of overcoming local site interference radio equipment substitutions.

EXCEPT AS OTHERWISE EXPRESSLY SET FORTH IN THIS WARRANTY, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, DAKTRONICS DISCLAIMS ANY AND ALL OTHER PROMISES, REPRESENTATIONS AND WARRANTIES APPLICABLE TO THE EQUIPMENT AND REPLACES ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ACCURACY OR QUALITY OF DATA. OTHER ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY DAKTRONICS, ITS AGENTS OR EMPLOYEES, SHALL NOT CREATE A WARRANTY OR IN ANY WAY INCREASE THE SCOPE OF THIS LIMITED WARRANTY.

THIS LIMITED WARRANTY IS NOT TRANSFERABLE.

2. **Exclusion from Warranty Coverage**

    This Warranty does not impose any duty or liability upon Daktronics for any:

    A. damage occurring at any time, during shipment of Equipment unless otherwise provided for in the Agreement. When returning Equipment to Daktronics for repair or replacement, End User assumes all risk of loss or damage, agrees to use any shipping containers that might be provided by Daktronics, and to ship the Equipment in the manner prescribed by Daktronics;

    B. damage caused by: (i)the improper handling, installation, adjustment, use, repair, or service of the Equipment, or (ii) any physical damage which includes, but is not limited to, missing, broken, or cracked components resulting from non-electrical causes;

altered, scratched, or fractured electronic traces; missing or gauged solder pads; cuts or clipped wires; crushed, cracked, punctured, or bent circuit boards; or tampering with any electronic connections, provided that such damage is not caused by personnel of Daktronics or its authorized repair agents;

C. damage caused by the failure to provide a continuously suitable environment, including, but not limited to: (i) neglect or misuse; (ii) improper power including, without limitation, a failure or sudden surge of electrical power; (iii) improper air conditioning, humidity control, or other environmental conditions outside of the Equipment's technical specifications such as extreme temperatures, corrosives and metallic pollutants; or (iv) any other cause other than ordinary use;

D. damage caused by fire, flood, earthquake, water, wind, lightning or other natural disaster, strike, inability to obtain materials or utilities, war, terrorism, civil disturbance, or any other cause beyond Daktronics' reasonable control;

E. failure to adjust, repair or replace any item of Equipment if it would be impractical for Daktronics personnel to do so because of connection of the Equipment by mechanical or electrical means to another device not supplied by Daktronics, or the existence of general environmental conditions at the site that pose a danger to Daktronics personnel;

F. statements made about the product by any salesperson, dealer, distributor or agent, unless such statements are in a written document signed by an officer of Daktronics. Such statements as are not included in a signed writing do not constitute warranties, shall not be relied upon by End User and are not part of the contract of sale;

G. damage arising from the use of Daktronics products in any application other than the commercial and industrial applications for which they are intended, unless, upon request, such use is specifically approved in writing by Daktronics;

H. replenishment of spare parts. In the event the Equipment was purchased with a spare parts package, the parties acknowledge and agree that the spare parts package is designed to exhaust over the life of the Equipment, and as such, the replenishment of the spare parts package is not included in the scope of this Warranty;

I. security or functionality of the End User's network or systems, or anti-virus software updates;

J. performance of preventive maintenance;

K. third-party systems and other ancillary equipment, including without limitation front-end video control systems, audio systems, video processors and players, HVAC equipment, batteries and LCD screens;

L. incorporation of accessories, attachments, software or other devices not furnished by Daktronics; or

M. paint or refinishing the Equipment or furnishing material for this purpose.

3. **Limitation of Liability**

A. Daktronics shall be under no obligation to furnish continued service under this Warranty if alterations are made to the Equipment without the prior written approval of Daktronics.

B. It is specifically agreed that the price of the Equipment is based upon the following limitation of liability. In no event shall Daktronics (including its subsidiaries, affiliates, officers, directors, employees, or agents) be liable for any claims asserting or based on (a) loss of use of the facility or equipment; lost business, revenues, or profits; loss of goodwill; failure or increased cost of operations; loss, damage or corruption of data; loss resulting from system or service failure, malfunction, incompatibility, or breaches in system security; or (b) any special, consequential, incidental or exemplary damages arising out of or in any way connected with the Equipment or otherwise, including but not limited to damages for lost profits, cost of substitute or replacement equipment, down time, injury to property or any damages or sums paid to third parties, even if Daktronics has been advised of the possibility of such damages. The foregoing limitation of liability shall apply whether any claim is based upon principles of contract, tort or statutory duty, principles of indemnity or contribution, or otherwise

C. In no event shall Daktronics be liable for loss, damage, or injury of any kind or nature arising out of or in connection with this Warranty in excess of the Purchase Price of the Equipment. The End User's remedy in any dispute under this Warranty shall be ultimately limited to the Purchase Price of the Equipment to the extent the Purchase Price has been paid.

4. **Assignment of Rights**

A. The Warranty contained herein extends only to the End User (which may be the Purchaser) of the Equipment and no attempt to extend the Warranty to any subsequent user-transferee of the Equipment shall be valid or enforceable without the express written consent of Daktronics.

5. **Governing Law; Election of Remedies**

A. The rights and obligations of the parties under this Warranty shall not be governed by the provisions of the United Nations Convention on Contracts for the International Sales of Goods of 1980. The parties consent to the application of the laws of the State of South Dakota to govern, interpret, and enforce each of the parties' rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Warranty, without regard to conflict of law principles.

B. Any dispute, controversy or claim arising from or related to this Warranty, the parties shall first attempt to settle through negotiations. In the event that no resolution is reached, then such dispute, controversy, or claim shall be resolved by final and binding arbitration under the Rules of Arbitration of the International Chamber of Commerce. The language of the arbitration

shall be English. The place of the arbitration shall be Sioux Falls, SD. A single arbitrator selected by the parties shall preside over the proceeding. If a single arbitrator cannot be agreed upon by the parties, each party shall select an arbitrator, and those arbitrators shall confer and agree on the appointed arbitrator to adjudicate the arbitration. The arbitrator shall have the power to grant any provisional or final remedy or relief that it deems appropriate, including conservatory measures and an award of attorneys' fees. The arbitrator shall make its decisions in accordance with applicable law. By agreeing to arbitration, the Parties do not intend to deprive any court of its jurisdiction to issue a pre-arbitral injunction, pre-arbitral attachment, or other order in aid of arbitration proceedings and the enforcement of any award. Without prejudice to such provisional remedies as may be available under the jurisdiction of a court, the arbitrator shall have full authority to grant provisional remedies and to direct the Parties to request that any court modify or vacate any temporary or preliminary relief issued by such court, and to award damages for the failure of any Party to respect the arbitrator's orders to that effect.

6. Availability of Extended Service Agreement

A. For End User's protection, in addition to that afforded by the warranties set forth herein, End User may purchase extended warranty services to cover the Equipment. The Extended Service Agreement, available from Daktronics, provides for electronic parts repair and/or on-site labor for an extended period from the date of expiration of this warranty. Alternatively, an Extended Service Agreement may be purchased in conjunction with this Warranty for extended additional services. For further information, contact Daktronics Customer Service at 1-800-DAKTRONics (1-800-325-8766).

Additional Terms applicable to sales outside of the United States

The following additional terms apply **only** where the installation site of the Equipment is located outside of the United States of America.

1. In the event that the installation site of the Equipment is in a country other than the U.S.A., then, notwithstanding Section 5 of the Warranty, where the selling entity is the entity listed in Column 1, then the governing law of this Warranty is the law of the jurisdiction listed in the corresponding row in Column 2 without regard to its conflict of law principles. Furthermore, if the selling entity is an entity listed in Column 1, then the place of arbitration is listed in the corresponding row in Column 3.

Column 1 (Selling Entity)	Column 2 (Governing Law)	Column 3 (Location of Arbitration)
Daktronics, Inc.	The state of Illinois	Chicago, IL, U.S.A.
Daktronics Canada, Inc.	The Province of Ontario, Canada	Toronto, Ontario, Canada
Daktronics UK Ltd.	England and Wales	Bristol, UK
Daktronics GmbH	The Federal Republic of Germany	Wiesbaden, Germany
Daktronics Hong Kong Limited	Hong Kong, Special Administrative Region of the P.R.C.	Hong Kong SAR
Daktronics Shanghai Co., Ltd.	The Peoples Republic of China	Shanghai, P.R.C.
Daktronics France, SARL	France	Paris, France
Daktronics Japan, Inc.	Japan	Tokyo, Japan
Daktronics International Limited	Macau, Special Administrative Region of the P.R.C.	Macau SAR
Daktronics Australia Pad Ltd	Australia	Sydney, Australia
Daktronics Singapore Pte. Ltd	Singapore	Singapore
Daktronics Brazil LTDA	Brazil	São Paulo, Brazil
Daktronics Spain S.L.U.	Spain	Madrid, Spain
Daktronics Belgium N. V	Belgium	Kruibeke, Belgium
Daktronics Ireland Co. Ltd.	Ireland	Dublin, Ireland