Appendix B
External Power and RS-422 Communication

The PPS endcap has an 8-pin connector when optional external power and RS-422 communications are installed.

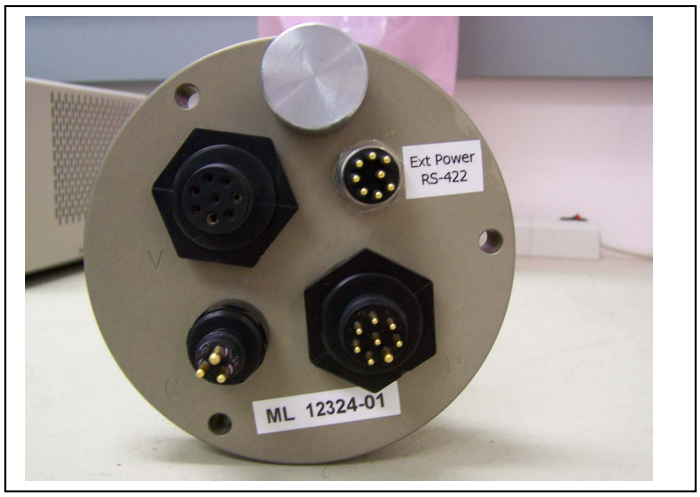

Figure B-1: Endcap with External Power and RS-422 Option

Electronics

The PPS electronics contain an additional circuit board with RS-422 and RS-232 sockets. A jumper controls which communication protocol is active.

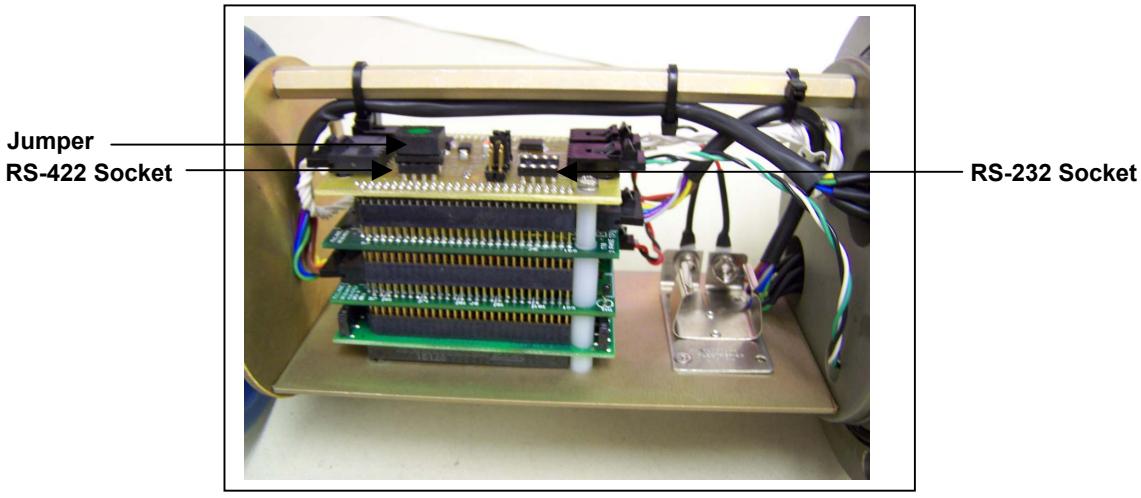

Figure B-2: Electronics with External Power/RS-422 Circuit Board

IMPORTANT
The PPS runs only one communication protocol at a time (do not connect both COM cables simultaneously). The connected COM cable must match the jumper setting.

Figure B-3 on the next page shows the wiring diagram for the External Communication/RS-422 cable.

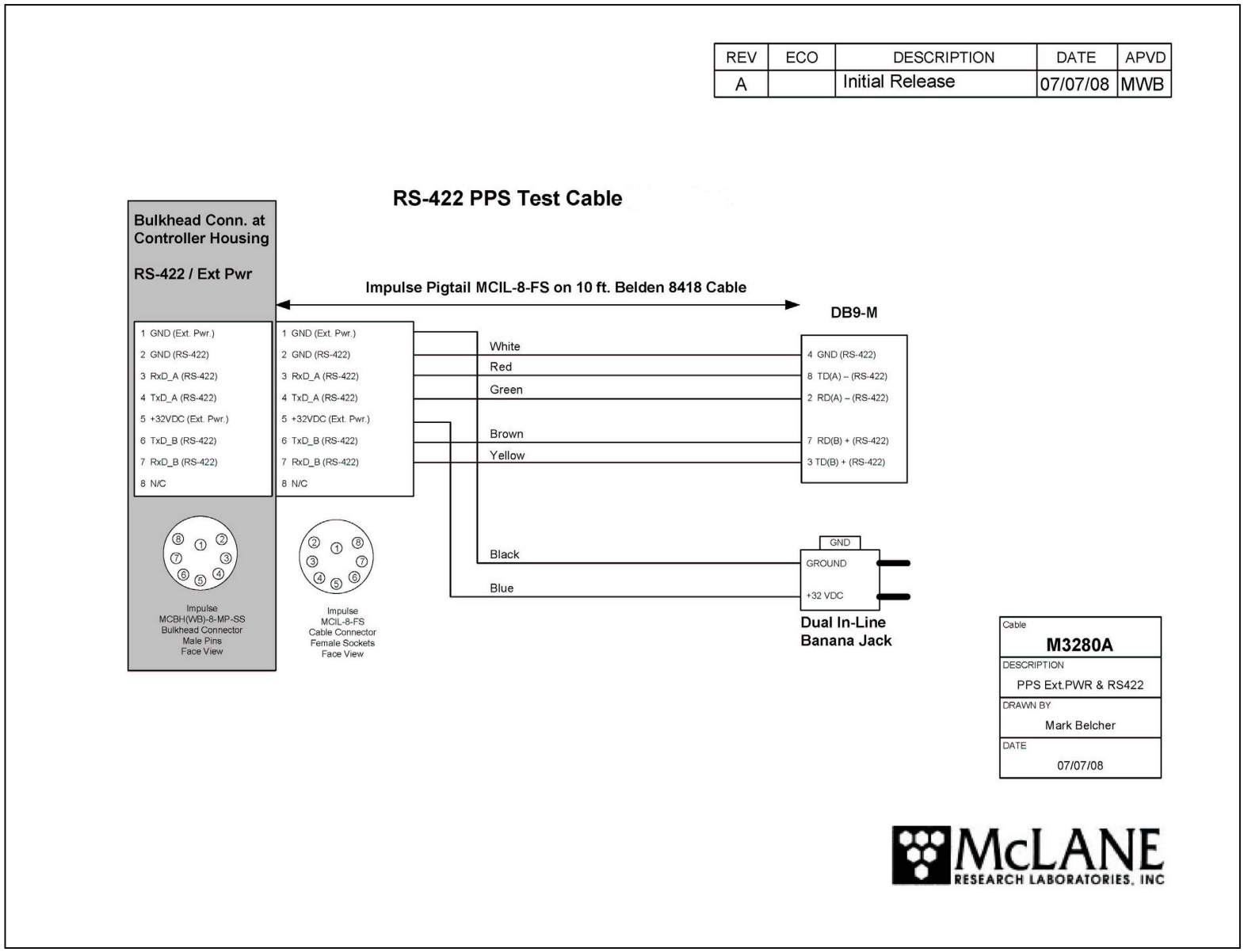

Figure B-3: RS-422 Cable Drawing

Power Requirements

The external power specification is 32 to 36 Volts DC. RS-422 communication is designed for use with external power. Using RS-422 communication with battery power is not recommended because the energy draw is 2.7 mA during lower power sleep. This draw is not an issue under external power, but places a significant drain on battery power (RS-232 communication draws .30 mA from the battery in low power sleep).

Estimated Battery Endurance Calculation with RS-422 Communication

Chapter 5 of this User Manual provides values for calculating an estimated battery endurance for RS-232 communication. The section that follows provides values and an estimated battery endurance calculation with RS-422 communication.

This example uses a one-year deployment. The values for pumping or moving the valve include the current drain of the controller, which is awake during valve rotation and pumping.

Controller unit	3.0 mA
Controller unit in low power sleep (LPS) mode	2.7 mA
Pumping	160 mA
Moving the valve from one port to the next	0.23 mAh (2.7 seconds)

Example of Determining Battery Life for One Year Deployment

Pre-deployment (loading filters)	
Controller unit (3 hours)	3 h x 3.00 mA = 9.0 mAh
Moving valve (25 ports twice around)	50 ports x 0.23 mAh = 11.5 mAh
Reverse pumping (0.5 hour)	0.5 h x 160 mA = 80.0 mAh
	Subtotal = 100.5 mAh
Deployment	
Controller (1 year)	8760 h x 2.7 mA = 23,652.0 mAh
Move valve (24 samples)	340 ports x 0.23 mAh = 78.2 mAh
Pumping (60 minutes per port)	24 h x 160 mA = 3840.0 mAh
	Subtotal = 27,570.2 mAh
Recovery (offload data/remove samples)	
Controller unit (2 hours)	2 h x 3.00 mA = 6.0 mAh
Move valve (once around)	25 ports x 0.23 mAh = 5.8 mAh
	Subtotal = 11.8 mAh
Total Battery Consumption	**100.5 + 27,570.2 + 11.8 = 27,682.5 mAh**

In this example, the total energy consumed exceeds the 10,000 mAh capacity of the battery. If using RS-422 communication with battery power, the proposed deployment would not have battery capacity for a one year deployment.

Changing the Communication Protocol

To switch between communication protocols, complete the following steps:

1. Unscrew the bolt/washer assemblies and remove the endcap.
2. Gently slide the electronics out and place on an electrostatically safe surface.

IMPORTANT
Take standard electrostatic discharge (ESD) precautions when handling electronics.

3. Using the circuit tool extractor (provided in the toolkit), gently lift the jumper from the current socket on the External Power/RS-422 circuit board (the RS-422 and RS-232 circuits are labeled, see Figure B-4).

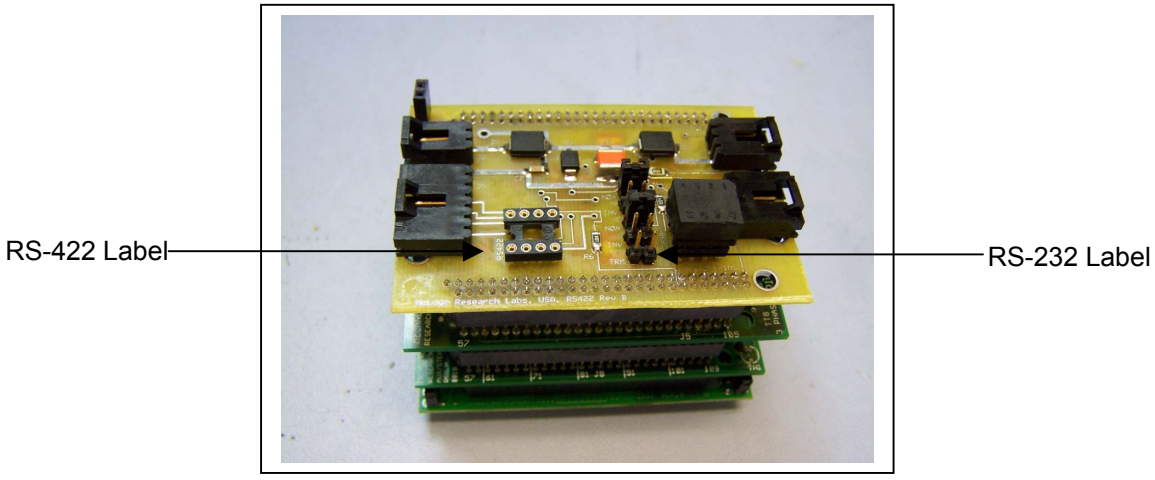

Figure B-4: RS-422 and RS-232 Labels on Circuit Board

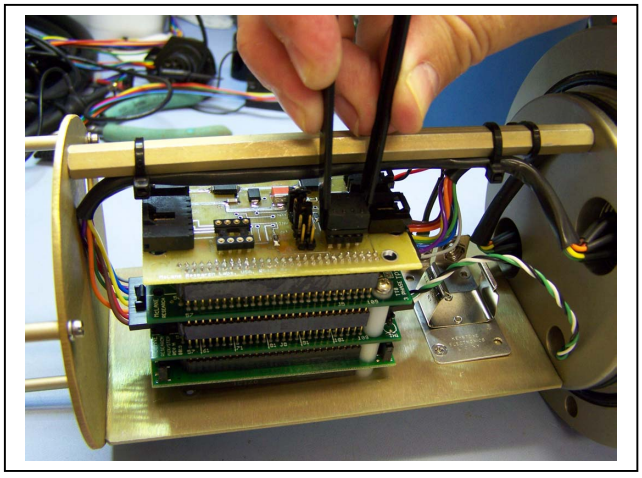

Figure B-5: Gently Grasp Jumper with Extractor

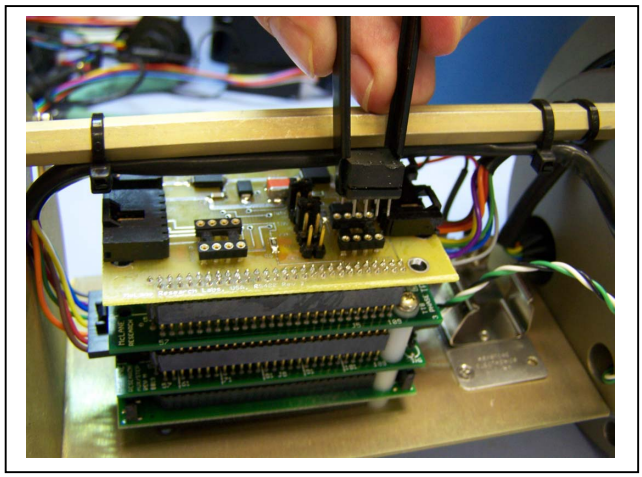

Figure B-6: Lift Jumper Out of Socket

4. Place the jumper in the other socket and press down firmly to secure in place.

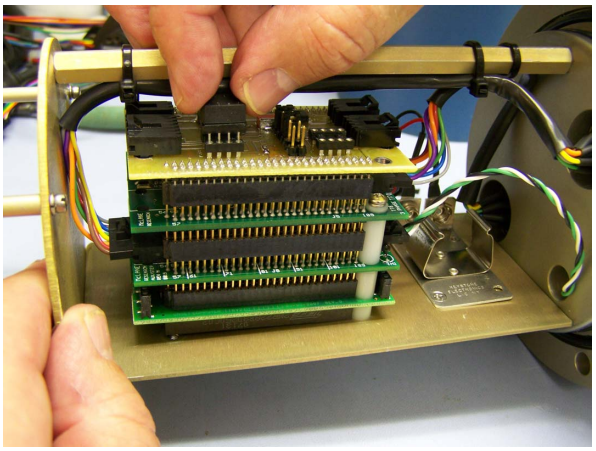

Figure B-7: Place the Jumper in Socket

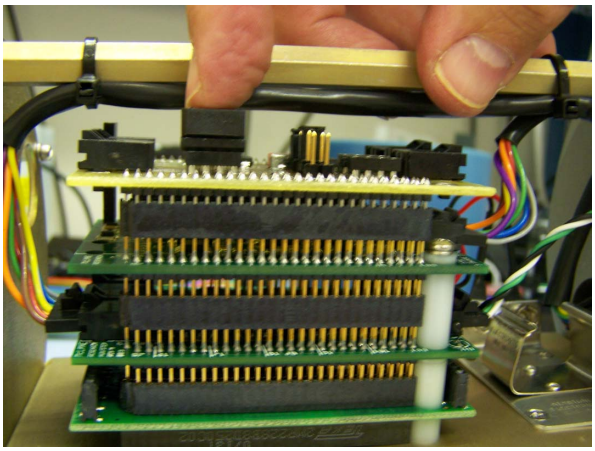

Figure B-8: Press to Secure Jumper

5. Slide the electronics chassis back into the controller housing and secure the endcap.

Notes