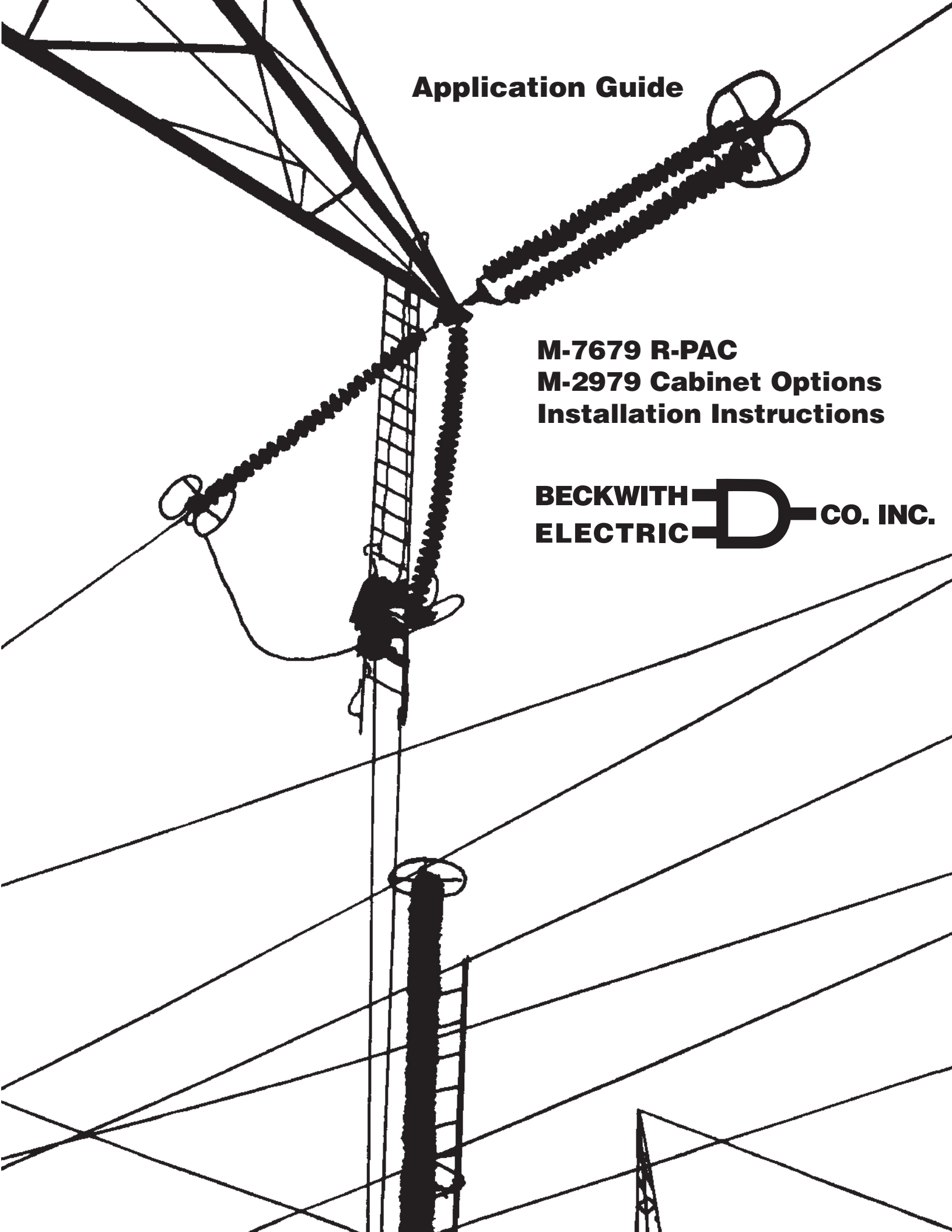
Application Guide

M-7679 R-PAC
M-2979 Cabinet Options
Installation Instructions



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BECKWITH ELECTRIC CO. INC.

M-2979
Recloser Control Cabinet

The M-2979 cabinet houses the M-7679 R-PAC and components, for complete recloser control replacement applications

- **Provides easy direct replacement of recloser controls for Cooper, G&W, Elastimold, SEL, ABB, Whip & Bourne, Joslyn, and Tavrida reclosers**
- **Eliminates the need for expensive rewiring of I/O signals accepting existing connector plugs for Power, Control, Voltages and Currents with the same pin sequence**
- **Accepts the existing communications connections for Serial TIA-232, TIA-485, Fiber Optic and IRIG-B**
- **Simplifies upgrading communications to optional true embedded Ethernet ports in the M-7679 R-PAC allowing for multi-user, multi-protocol access to the advanced metering, PQ and DFR information collected by the control**
- **Includes an on board smart 24 V battery charger with 12 V and 24 V outputs**

Industry Leader Since 1969
Made in the USA

Application

The M-2979 Recloser Control Cabinet, when combined with the M-7679 R-PAC, provides convenient direct replacement of the control and cabinet for the following reclosers:

- Cooper/Traditional Electronic
- Cooper NOVA with Control Power Interface
- G&W Viper ST/LT
- Cooper NOVA STS & TS
- ABB Gridshield
- Tavrida OSM
- Cooper NOVA with Auxiliary Input Power
- G&W Viper S
- Elastimold MVR
- ABB OVR3 & VR-3S
- Joslyn TriMod 600R
- Whip & Bourne GVR

The M-2979 includes the capability to change out the Recloser Control and Cabinet as one component. The M-2979 Recloser Control Cabinet and M-7679 R-PAC combination includes all the required interface connections and external communications capabilities that are necessary to replace an existing recloser control. The M-2979 Recloser Control Cabinet meets or exceeds NEMA 250, IEC 60529 and IEEE C37.60. Each M-2979 Recloser Cabinet can be configured with the optional support equipment to match the existing recloser control application and environment, or the cabinet can be supplied completely empty.

Figure 1 M-2979 R-PAC Cabinet

Construction

Available Cabinet Materials

- Aluminum (5052-H32 .090" thickness)
- Stainless Steel (Optional) (Type 316, 14 gauge)

Finish

- Polyester powder coat, exterior and interior color ANSI 70 Gray

Standard Features

- Metallic enclosures are all welded seam construction, ground smooth
- NEMA 3RX or IP 55 rated
- Single exterior gasketed door with:
  - Quarter turn 3 point latch with pad-locking handle (includes hole for 3/8" max lock hasp)
  - Large open angle > 120°
  - Hold open device
  - Integral document holder
  - Nameplate on inside of door
- Stainless steel hardware and hinges
- External ground stud
- Vented at bottom and upper back (fine mesh screens)
- All cabinet penetrations are sealed to prevent moisture and insect ingress
- Each cabinet includes the applicable connector layout in the bottom that replicates the specific recloser control cabinet being replaced. Also provides penetrations for options and future customer added accessories. Connector mounting hardware is only accessible from inside of cabinet.
- Two lifting eyes, 1.5" diameter holes, attached to sides of cabinet
- Interior swing panel with:
  - Flush mounted recloser control
  - Aluminum construction with class 3 chromate finish
  - Thumb latches
  - Ground strap
- Pole mounting bracket that includes:
  - 5/8" maximum bolt diameter with keyway at top
  - 5/8" bolt diameter slot at bottom
  - 3 pole banding slots
- 35 mm DIN rail mounted Terminal Blocks

Cabinet to Recloser Interface

- Main Control and Measurement
  - 14 Pin Cannon receptacle (Cooper Traditional/G&W Viper S)
  - 14 Pin Cannon receptacle with 2 Pin LV closing receptacle (Cooper Traditional, NOVA/G&W Viper S)
  - 14 Pin Cannon receptacle with 2 Pin LV closing receptacle and 6 Pin Dead Line (G&W Viper S)
  - 19 Pin Cannon receptacle (Cooper NOVA, G&W Viper S)
  - 24 Pin rectangular receptacle (ABB OVR3/VR-3S)
  - 24 Pin rectangular receptacle (Whip & Bourne GVR)
  - 26 Pin Cannon receptacle (Cooper NOVA TS/STS)
  - 32 Pin Cannon receptacle (G&W Viper ST/LT, Elastimold MVR)
  - 42 Pin rectangular receptacle (G&W Viper ST/LT, Tavrida OSM)

Cabinet to Recloser Interface (Cont.)

- Voltage Sensing
  - Direct Wiring
  - 4 Pin Cannon receptacle
  - 8 Pin Cannon receptacle (Threaded for 120 V)
  - 8 Pin Cannon receptacle (Quick Lock for LEAs)
- Power Supply
  - Direct Wired 1 Source
  - Direct Wired 2 Sources with AC Transfer Switch
  - 2 Pin Socket 1 Source
  - 3 Pin Socket 1 Source
  - Two, 2 Pin Sockets (2 Sources) with AC Transfer Switch
  - Two, 3 Pin Sockets (2 Sources) with AC Transfer Switch

M-2032B Battery Charger

■ **NOTE:** Refer to the M-2032B Specification sheet for more detailed information.

The M-2032B in conjunction with the M-7679 R-PAC includes smart battery charging features that are a result of the Beckwith Electric proprietary communication protocols employed between the M-2032B and the M-7679 utilizing a SATA cable connected via the Aux I/O port on the M-7679. The following features are provided when a M-2032B is connected to the M-7679:

- Receives commands to:
  - Turn-on/off battery test load
  - Turn-on/off 13.8 Vdc accessory supply
  - Turn battery supply off
- Communicates the following to the M-7679:
  - Charger state
  - Main power supply status
  - Battery Voltage
  - Battery Current
  - Recloser Gas Pressure (if recloser is equipped with sensor)
- Includes a Wakeup system that is initiated by the local panel pushbutton.

Inputs (AC or DC)

120 to 285 Vdc, 105 to 285 Vac 50/60 Hz

Burden of less than 90 VA

Transient protected

Output

13.8 Vdc (±5%) @ 1 A for auxiliary equipment

24 Vdc (±5%) @ 1.5 A for Beckwith controls or auxiliary equipment

BATT Out – Battery Charge for 24 V Lead Acid Batteries, 0.5 A charge rate max

Transient protected

■ **NOTE:** Maximum total output power on all outputs is 50 Watts.

M-2034 BECO Drive

The M-2034 BECO Drive is a multi-recloser Universal Capacitor/Battery Charger solution.

Battery Charger: The integrated Battery Charger charges two 12 Vdc batteries and has communication with the M-7679 control to allow the control to perform a battery test and monitor the battery status.

The Battery Charger is a Dual-Level Float/Boost Charger with Pre-Charge. When battery voltage is below 21 Vdc, the charge current is limited to 40 mA dc (Pre-Charge). Once the battery voltage is above 21 Vdc, the charger begins to charge at the higher rates (Boost/Float). This will prevent high current in a damaged battery. Boost mode charges the battery at a rate that minimizes charge time and maximizes battery capacity. Float mode maintains the battery charge after the Boost mode charge has finished, preventing overcharging of the battery. The battery charge voltage is temperature compensated to optimize battery charge and life.

Functions

- Capacitor Charger with options for 53 V, 90 V, 155 V, 250 V output
- Aux 12 Vdc ±2% at 5 A (60 W max) to power accessories
- Sealed Lead Acid Battery Charger with output 24 Vdc–32 Vdc at ~2 A
- Battery voltage and current monitoring through communication with M-7679 Control
- Programmable auxiliary digital I/Os (8 inputs/8 outputs) for various applications through communication with M-7679 Control
- Battery Load Test (with 25 ohm load) enabled through communication with M-7679 Control
- Battery Turn Off due to low voltage, controlled through communication with M-7679 Control
- Battery Wake-up pushbutton
- Automatic Switching between AC and Battery for Control Power, Cap Charger, and Auxiliary 12 Vdc supply
- SF6 Gas-Pressure Sensor Interface through communication with M-7679 Control
- 24 V Control Power output
- AC Status Monitoring through communication with M-7679 Control

Onboard Status LEDs

The 6 status LEDs on the side of the M-2034 are defined in Table 1:

Battery Charger Status	Stat 1 Yellow	Stat 2 Green
Bulk	ON	ON
Absorb	ON	OFF
Float	OFF	ON
Bad Battery	OFF	OFF
Capacitor Charger Status	**Stat 1 – Output 1 Green**	**Stat 2 – Output 2 Green**
Output Voltage OK	ON	ON
Output Voltage Not OK	OFF	OFF
12V Aux Output Status	**Green**	
Aux Output Present	ON	
Aux Output Not Present	OFF	
Main Power Input	**Green**	
Main Power Input Present	ON	
Main Power Input Not Present	OFF	

Table 1 M-2034 Status LED Table

Optional AC Transfer Switch (B-1848)

The AC Transfer Switch has two AC power inputs: SOURCE 1 (Primary) and SOURCE 2 (Secondary). Internal circuitry of the AC Transfer Switch monitors the voltage magnitude of SOURCE 1 and will automatically switch the OUTPUT between SOURCE 1 and SOURCE 2.

When SOURCE 1 is greater than 104 Vac the OUTPUT is connected to SOURCE 1. If SOURCE 1 drops below 96 Vac the OUTPUT is switched to SOURCE 2. When SOURCE 1 returns and remains above 104 Vac for a time delay of 7 seconds, the OUTPUT will automatically be switched back to SOURCE 1. This eliminates "chattering" of the OUTPUT relays.

Status LEDs indicate the source availability and which source is connected to the OUTPUT. The "GREEN, SOURCE 1 PRESENT" LED is illuminated when SOURCE 1 is available. The "YELLOW, SOURCE 2 PRESENT" LED is illuminated when SOURCE 2 is available and SOURCE 1 is present. A bi-color "YELLOW, SOURCE 2 OUT/GREEN, SOURCE 1 OUT" LED will be used to determine which source is connected to the OUTPUT. The bi-color LED will be illuminated GREEN when connected to SOURCE 1 and YELLOW for SOURCE 2.

An External Voltage Control Input is provided to manually switch from SOURCE 1 to SOURCE 2. The OUTPUT will remain connected to SOURCE 2 until the voltage is removed from the External Voltage Control Input.

The OUTPUT relays are "break before make" ensuring that only one source is active at any given time.

Features:

Enclosure Dimensions: 4.25" x 3.5" x 2.5"

Storage/Operating Temperature: -40° C to 85° C

Inputs:

Input Voltage: 0 to 150 Vac

Input Frequency: 50/60 Hz

Maximum Continuous Current: 15 Amp

Pick Up Voltage: 104 ± 6 Vac

Drop Out Voltage: 96 ± 6 Vac

Minimum Hysteresis: 4 Vac

External Control Voltage Input: 15 Vdc to 30 Vdc

Time On Delay: 7 Seconds ± 3 Sec.

Optional Equipment/Accessories

- 120 Vac duplex, 3-wire, 15 A polarized GFI convenience outlet (on 120 Vac and 240 Vac supply only)
- Intrusion detection door contact
- Universal radio shelf
- Fold out out shelf for laptop rest
- Communications ready package
  - Fused DC power, 12 Vdc nominal
  - Radio equipment mounting
  - Polyphaser
  - Antenna and Type N external connector
  - Antenna cable lead with connectors

- Recloser control test switches mounted on the interior swing panel include:
  - Sensing currents
  - Sensing voltages
  - Trip and Close outputs

- Pole Mount Bracket Extension (B-1687) allows for mounting of the cabinet on any existing hole pattern from 20" to 40"
- Pole Mount Standoff Kit (B-1904) allows the cabinet to be mounted 4" away from the pole for climbing space
- 50 Watt, 120 Vac Heater with automatic thermostat (available on 120 Vac and 240 Vac supply only)
- Control cable locking devices, vandal resistant
- Lightning Protection (For installations with external antennas) options include:
  - DSXL PolyPhaser Lightning Arrestor 700MHz - 2.7GHz N Female protected side, N Female Bulkhead antenna side.
  - AL-LSXM PolyPhaser Lightning Arrestor 2 GHz to 6 GHz N Female protected side, N Female Bulkhead antenna side.
  - SMA male to N male antenna cable to connect lightning protection to a radio for cabinet mount.
  - TNC male to N male antenna cable to connect lightning protection to a radio for cabinet mount.
  - N male to N male antenna cable to connect lightning protection to a radio for cabinet mount (48").

- Antennas:
  - Laird FG9023, 902 MHz to 928 MHz, 3 dBi gain, fiberglass Omnidirectional antenna, N Female connector.
  - FM2, antenna Pole Mount Bracket for Laird fiberglass antennas.
  - Laird TRAB9023NP, 902 MHz to 928 MHz, 3 dBi gain, Omnidirectional Phantom antenna, N Female bulkhead connector.
  - Laird TRAB806/17103P, Multi Band, 806 MHz to 2.5 GHz, 3 dBi gain, Omnidirectional Phantom antenna, N Female bulkhead connector.
  - SMA male to N male antenna cable to connect antennas with an integrated bulkhead to a radio for cabinet mount (48").
  - TNC male to N male antenna cable to connect antennas with an integrated bulkhead to a radio for cabinet mount (48").
  - N male to N male antenna cable to connect lightning protection to a radio for cabinet mount (48").

Optional Equipment/Accessories (Cont.)

- Radio Options Include:

  2 Way VHF (154 MHz) radio
  - Radius

  2 Way (130 MHz - 3.7 GHz) radio modems:
  - SilverSpring Networks SSN ebridge and sbridge
  - MDS INET 900 AP
  - MDS INET II
  - MDS SD9
  - MDS X710
  - MDS SD4
  - MDS 9810
  - MDS TransNET
  - MDS Mercury 3650 and 900
  - MDS entraNET 900 and 2400
  - CellNet Series III

  Digital Cellular Modems:
  - CalAmp – Vanguard VG5530
  - DIGI – Transport WR31
  - Sixnet BT series Mobility Pro/Industrial Pro Gateways
  - Multitech Multimodem series routers and modems
  - AirLink Raven II, X, XE, XT
  - Telemetrics DNP RTMII
  - Zywan 3G/GPRS/GSM Cellular Modem

  ■ **NOTE:** Please contact the factory for additional radio options.

- Radio, Factory Installation:
  - Radio mounted and installed to M-2979
  - Customer supplied radio mounted and installed to M-2979
- RS-232 Radio Comm Cable – 6' length.
- RS-232 Radio Comm Cable – 6' length (Male to Female null modem).
- Ethernet Radio Comm Cable – 6' length.
- DB9 to DB25 – RS-232 Cable Converter
- 1/2" HEYCO Liquid Tight Cordgrip to secure cable coming into cabinet.
- 25 foot N male to N male LMR-400 antenna extension cable
- Surge Arrester for VT inputs
- Test Switches
- VT Fuses
- Cable Tray

Tests and Standards

The M-2979 Recloser Control Cabinet complies with the following tests and standards:

Electrical Environment

Surge Withstand Capability

IEEE C37.60	±100 KV, 7 KA HV Surge Arrester Operation
IEEE C37.90.1	±2,500 V_{pk} Oscillatory 1 MHz ±4,000 V_{pk} Fast Transient Burst 5 kHz
IEEE C37.90.1-1989	±2,500 V_{pk} Oscillatory 1 MHz ±5,000 V_{pk} Fast Transient 1 MHz
IEC 61000-4-18	±2,500 V_{pk} Oscillatory 1 MHz
IEC 61000-4-4	±4,000 V_{pk} Fast Transient Burst 5 kHz/2.5 kHz
IEC 61000-4-5	±4,000 V_{pk} 1.2 µs / 50 µs Surge (control cable)
IEEE C62.41.2	±6,000 V_{pk} 1.2 µs / 50 µs Surge (power cable)

Atmospheric Environment

Temperature/Humidity

IEC 60068-2-1	Cold, -40° C (-40° F) (operating w/o batteries)
IEC 60068-2-2	Dry Heat, +85° C (+185° F) (operating w/o batteries)
IEC 60068-2-30	Damp Heat condensing cycle, +25° C, +55° C (+131° F) @ 95%$_{RH}$ operating)
IEC 60664-3	Conformal coat grade UV40-250 board protection rating -50° C (-58° F) to +125° C (+257° F) CAT IV

IP Protection Degree

IEC 60529	IP55 Dust/Jetting Water Protection
ASTM B117-11	+50° C Salt Spray 5%

Mechanical Environment

ASTM 4169-09 Truck Level III Shipping Vibration

Batteries

Control System supply with a 24 Vdc control voltage powered by 2 x 12 Vdc sealed lead acid batteries.

Standard Battery Options

- 2 x 12 Vdc, 9 Ahr Batteries (P/N B-1679)
- 2 x 12 Vdc, 12 Ahr Batteries (P/N B-1680)
- 2 x 12 Vdc, 20 Ahr Batteries (P/N B-1746)

Operating Temperature Range

Charge: -20° C to +50° C (-4° F to +122° F)

Discharge: -40° C to +60° C (-40° F to +140° F)

Additional battery models/capacities are available and can be quoted upon request.

Physical

Aluminum (5052-H32), .090" thickness

Size: 28.78" high x 17.75" wide x 14.11" deep (73.1 cm x 45.01 cm x 35.84 cm)

Approximate Weight with M-7679: 30.4 lbs (13.79 kg)

Approximate Shipping Weight with M-7679: 36.4 lbs (16.51 kg)

Stainless Steel (316), 14 gauge

Size: 28.78" high x 17.75" wide x 14.11" deep (73.1 cm x 45.01 cm x 35.84 cm)

Approximate Weight with M-7679: 45.4 lbs (20.59 kg)

Approximate Shipping Weight with M-7679: 51.4 lbs (23.32 kg)

■ **NOTE:** Add approximately 7.5 lbs (3.4 kg) when equipped with Battery Backup option.

Warranty

The M-2979 Recloser Control Cabinet is covered by a five year warranty from date of shipment. Third party mounted options will carry their respective manufacturer's warranty, passed along through Beckwith Electric.

Trademarks

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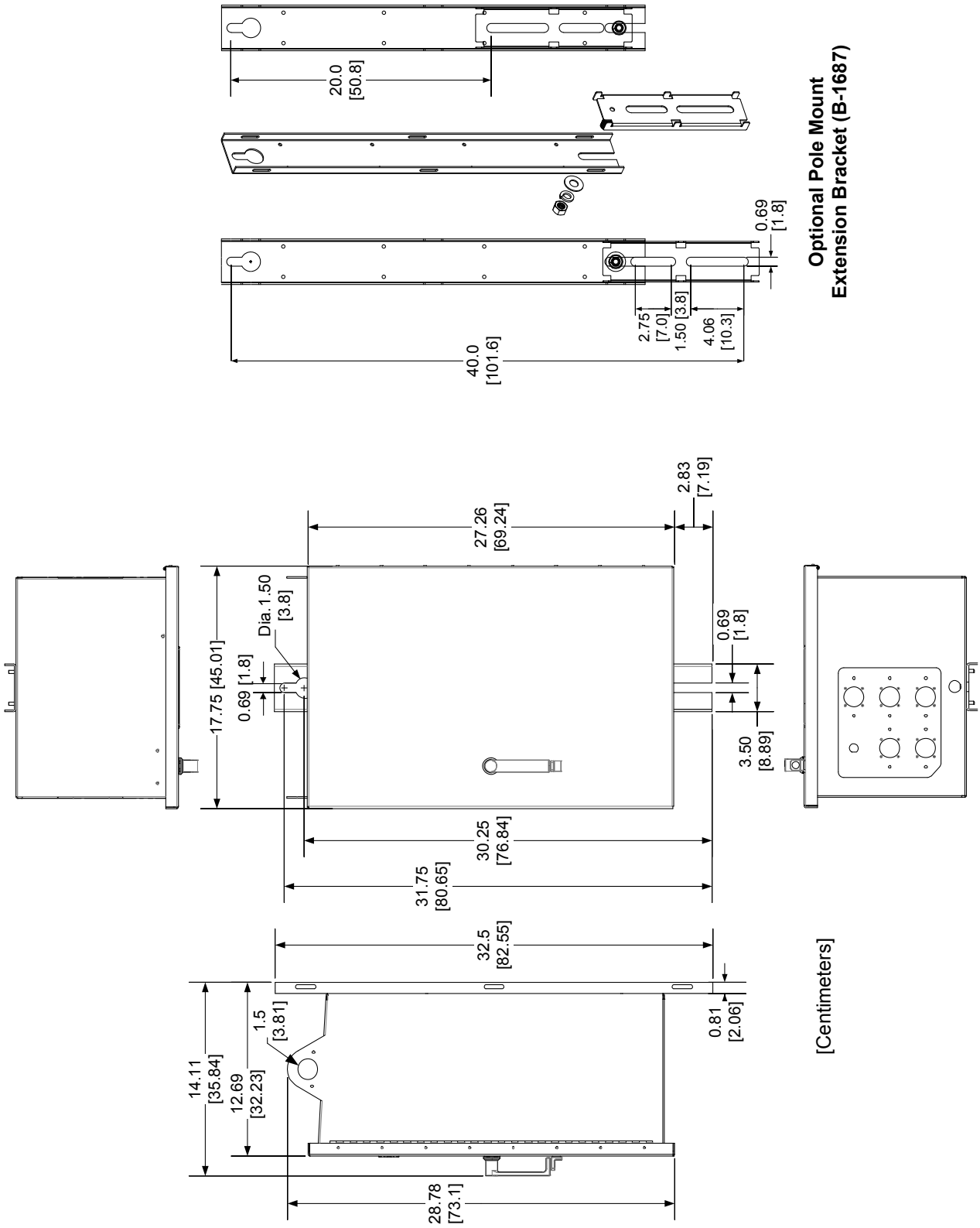


Figure 2 M-2979 Recloser Control Cabinet Dimensional Drawing

BECKWITH ELECTRIC CO., INC.
6190 - 118th Avenue North • Largo, Florida 33773-3724 U.S.A.
PHONE (727) 544-2326 • FAX (727) 546-0121
marketing@beckwithelectric.com
www.beckwithelectric.com
ISO 9001:2015

800-2979-SP-00MC1 07/19

WARNING

DANGEROUS VOLTAGES, capable of causing death or serious injury, are present on the external terminals and inside the equipment. Use extreme caution and follow all safety rules when handling, testing or adjusting the equipment. However, these internal voltage levels are no greater than the voltages applied to the external terminals.

DANGER! HIGH VOLTAGE

– This sign warns that the area is connected to a dangerous high voltage, and you must never touch it.

PERSONNEL SAFETY PRECAUTIONS

The following general rules and other specific warnings throughout the manual must be followed during application, test or repair of this equipment. Failure to do so will violate standards for safety in the design, manufacture, and intended use of the product. Qualified personnel should be the only ones who operate and maintain this equipment. Beckwith Electric Co., Inc. assumes no liability for the customer's failure to comply with these requirements.

– This sign means that you should refer to the corresponding section of the operation manual for important information before proceeding.

Always Ground the Equipment

To avoid possible shock hazard, the chassis must be connected to an electrical ground. When servicing equipment in a test area, the Protective Earth Terminal must be attached to a separate ground securely by use of a tool, since it is not grounded by external connectors.

Do NOT operate in an explosive environment

Do not operate this equipment in the presence of flammable or explosive gases or fumes. To do so would risk a possible fire or explosion.

Keep away from live circuits

Operating personnel must not remove the cover or expose the printed circuit board while power is applied. In no case may components be replaced with power applied. In some instances, dangerous voltages may exist even when power is disconnected. To avoid electrical shock, always disconnect power and discharge circuits before working on the unit.

Exercise care during installation, operation, & maintenance procedures

The equipment described in this manual contains voltages high enough to cause serious injury or death. Only qualified personnel should install, operate, test, and maintain this equipment. Be sure that all personnel safety procedures are carefully followed. Exercise due care when operating or servicing alone.

Do not modify equipment

Do not perform any unauthorized modifications on this instrument. Return of the unit to a Beckwith Electric repair facility is preferred. If authorized modifications are to be attempted, be sure to follow replacement procedures carefully to assure that safety features are maintained.

PRODUCT CAUTIONS

Before attempting any test, calibration, or maintenance procedure, personnel must be completely familiar with the particular circuitry of this unit, and have an adequate understanding of field effect devices. If a component is found to be defective, always follow replacement procedures carefully to that assure safety features are maintained. Always replace components with those of equal or better quality as shown in the Parts List of the Instruction Book.

Avoid static charge

This unit contains MOS circuitry, which can be damaged by improper test or rework procedures. Care should be taken to avoid static charge on work surfaces and service personnel.

Use caution when measuring resistances

Any attempt to measure resistances between points on the printed circuit board, unless otherwise noted in the Instruction Book, is likely to cause damage to the unit.

WARNING

DANGER!
HIGH VOLTAGE CAPACITORS PRESENT

– This sign warns that the area is connected to a dangerous high voltage, and you must never touch it.

– This sign means that you should refer to the corresponding section of the operation manual for important information before proceeding.

M-2034 BECO Drive
Discharge High Energy Capacitors

WARNING

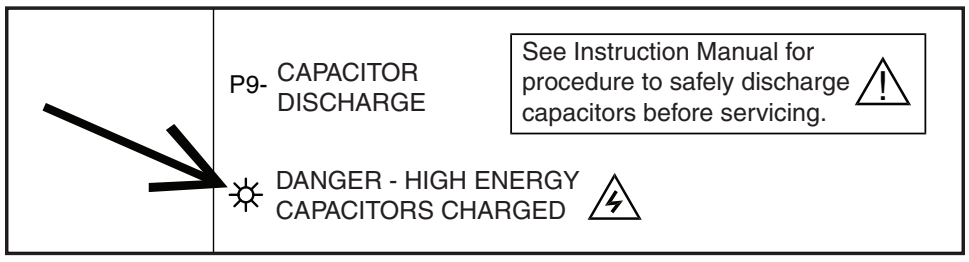
SHOCK HAZARD INSIDE

High energy capacitors present. Contact with terminals or circuitry may cause serious injury or death, even after power is removed from the device. See instruction manual for procedure to safely discharge capacitors before servicing. More than one disconnect switch may be required to de-energize the equipment before servicing.

When a cabinet is equipped with the **M-2034 BECO Drive**, dangerous voltages are present on the terminals. Cabinet capacitors must be **fully discharged**, after the unit is completely powered off (main power and battery disconnected). Capacitor discharge may take up to 7 hours.

Disconnect both AC and DC Battery Sources in order to SAFELY DISCHARGE the HIGH ENERGY CAPACITORS.

ONLY when the red LED indicator on the M-2034 BECO Drive is extinguished, is it safe to service the equipment. As an added precaution, it is highly recommended to manually check the capacitor voltage.



■ **NOTE: See G&W documentation for instructions to discharge high energy capacitors, in any recloser control cabinets with G&W components.**

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M-7679 R-PAC and M-2979 Cabinet Installation Guide

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1.0 General Information

The person or group responsible for the installation of the control will find all mechanical information required for physical installation, equipment ratings, and all external connections in this application guide. For reference, the Three-Line Connection Diagrams are repeated from the Instruction Book.

■**NOTE:** Prior to installation of the equipment, it is essential to review the contents of the M-7679 Instruction Book for information which may be of importance during installation procedures. The following is a quick review of the relevant chapters of the Instruction Book.

Instruction Book Chapter Reference

- **Chapter 2, Front Panel Operation –** describes the Front Panel and HMI display screen of the M-7679 R-PAC, including typical startup and message screens, the user interface, and the extensive Status and Metering values available in the HMI Monitor Menu.
- **Chapter 3, System Application & Function Setpoints –** information regarding the definitions of system quantities and equipment characteristics required by the control which include CT, VT configuration selection, and Input and Output assignments. This chapter also includes System Setpoints sections which describe the enabling of functions and setpoints, output contact assignments and digital input assignments.
- **Chapter 5, Testing –** Tests which may be desirable at the time of installation, any additional tests required during commissioning.

M-2979 Recloser Control Cabinet and M-2400 Series Adapters

Generally, the M-7679 is installed in a M-2979 Recloser Control Cabinet paired with the appropriate interface connector and internal wiring harnesses to support the application. This guide contains the technical information that supports the various applications.

The M-7679 is also available in recloser specific replacement Adapters which include:

- M-2406/M-7679 to retrofit the Cooper Form 6 (14-Pin or 19-Pin reclosers)
- M-2410/M-7679 to retrofit the SEL 351R-2
- M-2411/M-7679 to retrofit the SEL 351P-3/Panacea
- M-2418/M-7679 to retrofit the Cooper Form 5

The installation instructions and technical data for the Adapter interface and connection information is contained in the specific Adapter Application Guides.

2.0 M-7679 R-PAC Mechanical/Physical Dimensions

Figure 1 and Figure 2 illustrate the physical dimensions of the control that are required for mounting.

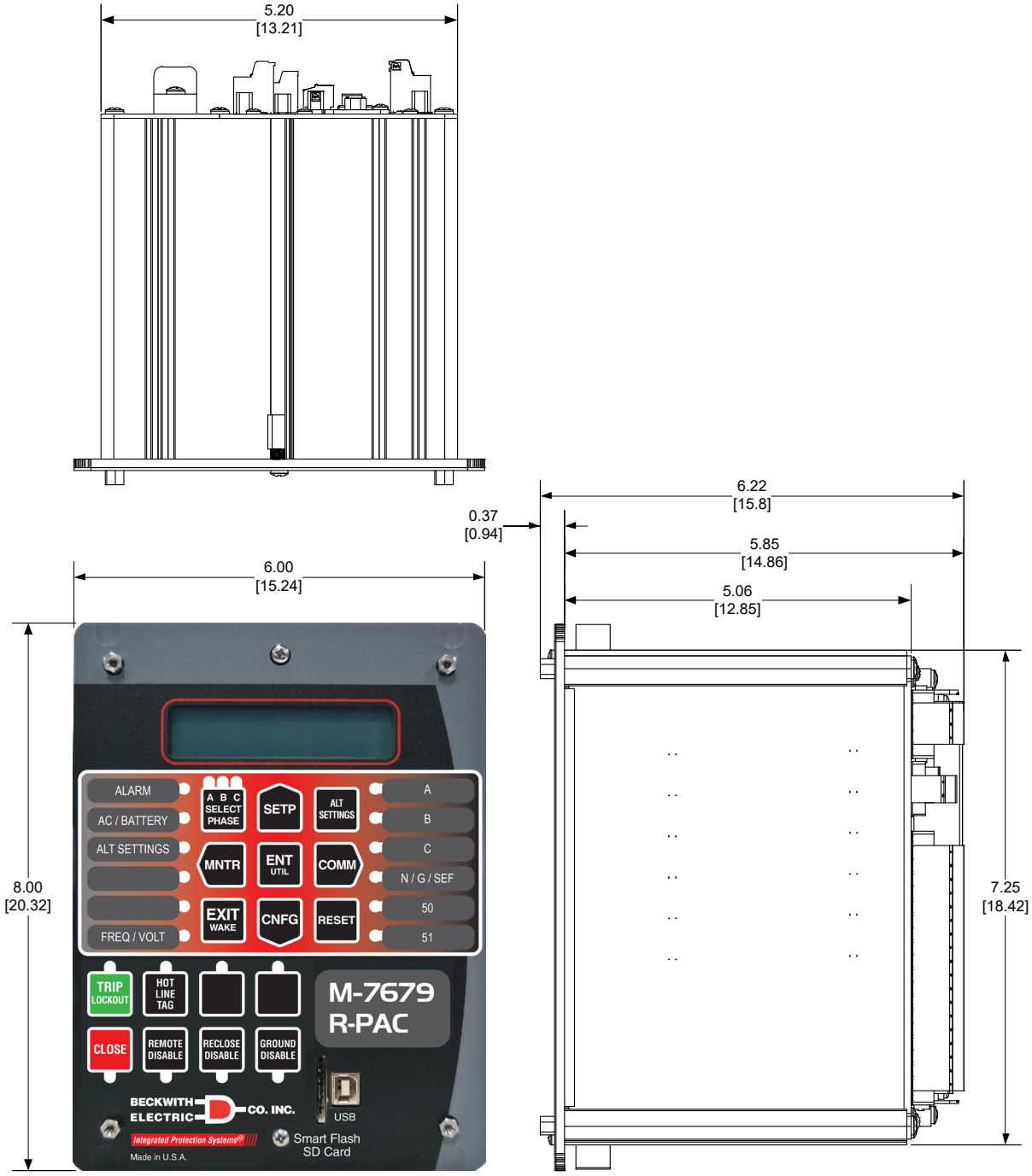


Figure 1 M-7679 Vertical Model Mounting Dimensions

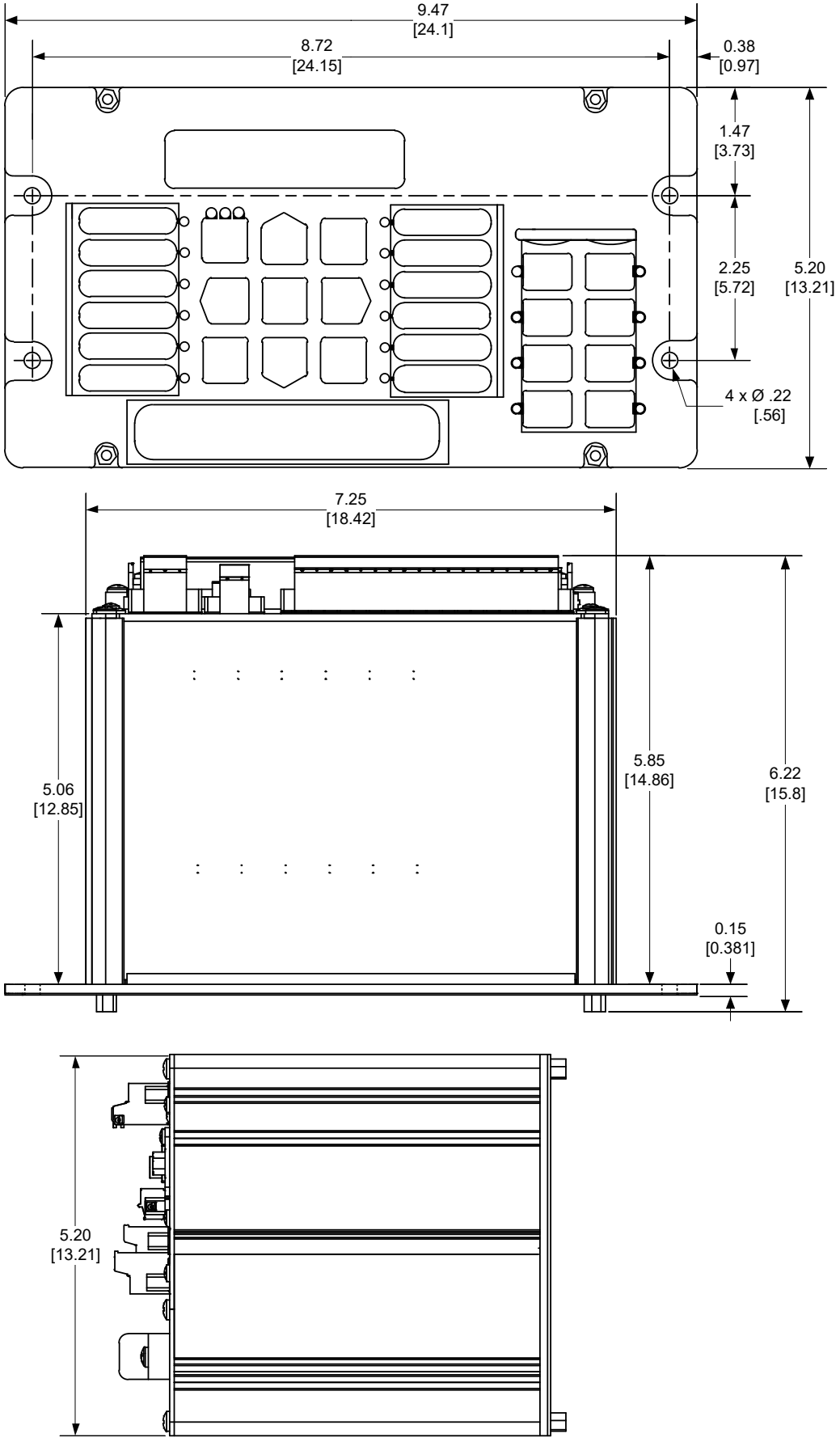


Figure 2 M-7679 Horizontal Model Mounting Dimensions

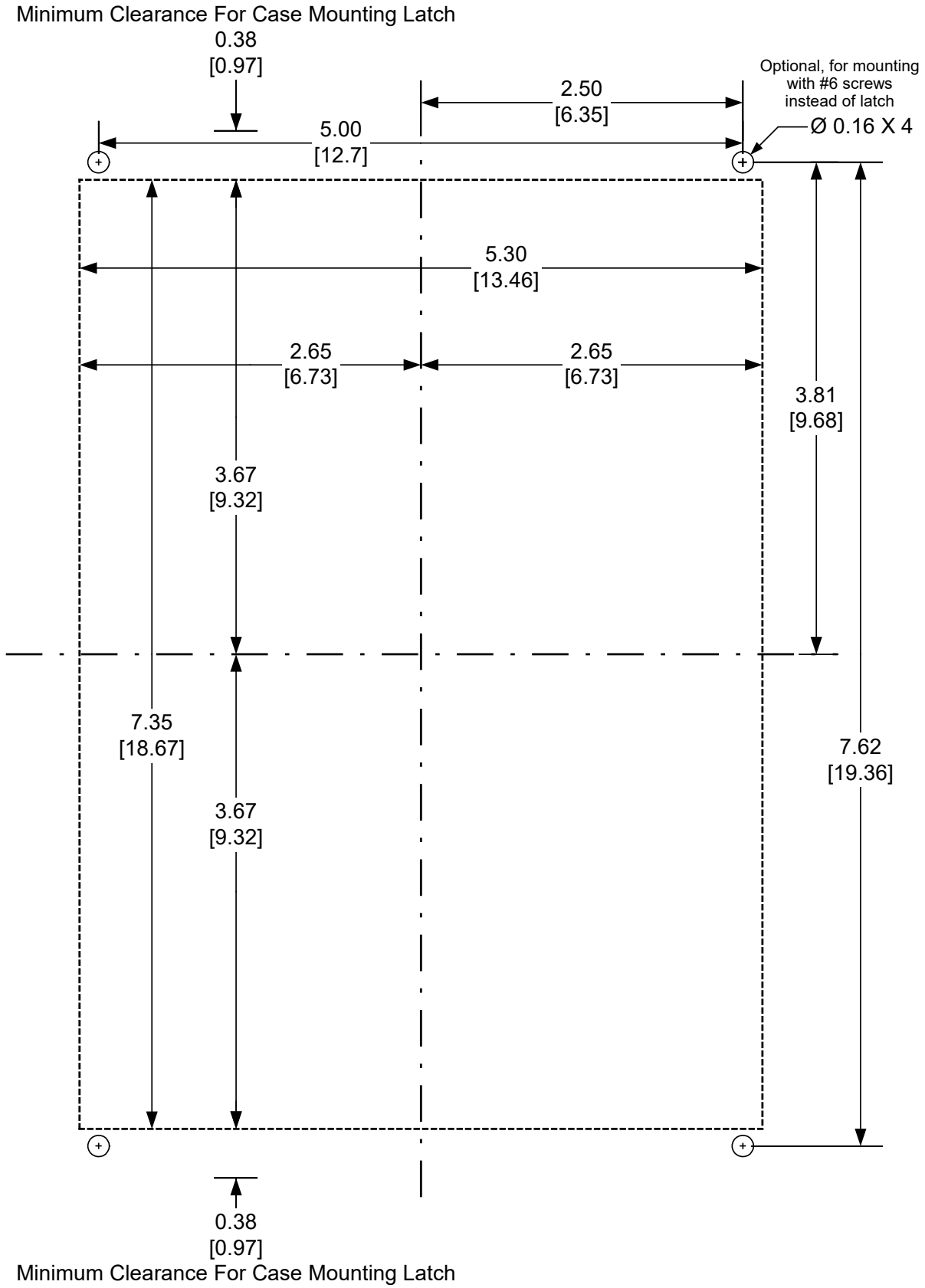


Figure 3 M-7679 Vertical Panel Cutout Dimensions

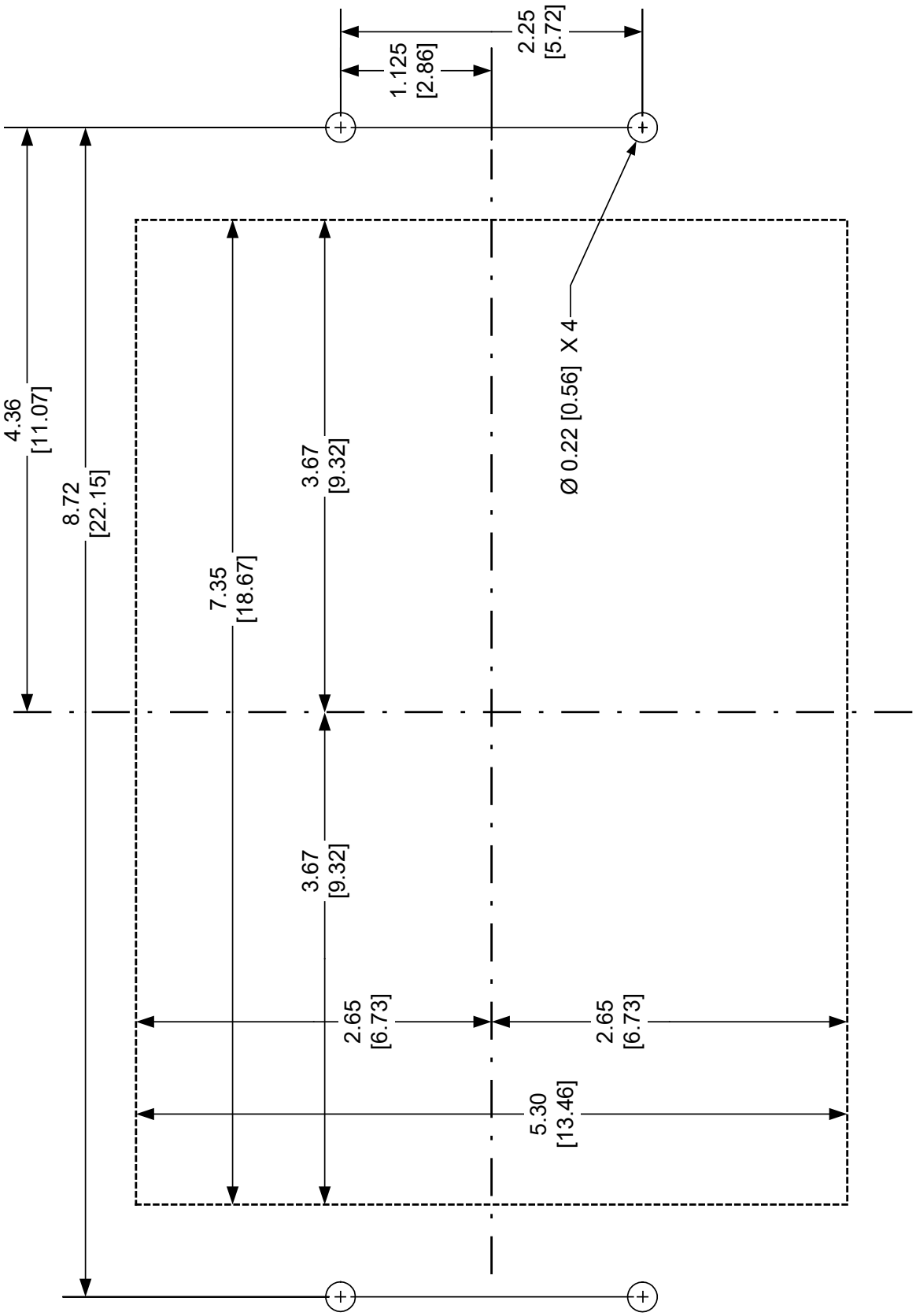


Figure 4 M-7679 Horizontal Panel Cutout Dimensions

3.0 External Connections

WARNING: The protective grounding terminal must be connected to an earthed ground anytime external connections have been made to the unit.

WARNING: Do not open live CT circuits. Live CT circuits should be shorted prior to disconnecting CT wiring to the M-7679. Death or severe electrical shock may result.

POWER SUPPLY

IED Power Supply

One of two power supply input ranges are available when the M-7679 is purchased. The low voltage range is 18 to 60 Vdc 12 VA. The high voltage range is 90 to 280 Vac or 90 to 315 Vdc 15 VA. The power source should supply a minimum of 15 watts. The power source should be fused. The low voltage range fuse should be 3 AG 1.0 A or equivalent. The high voltage fuse should be 3 AG 0.5 A or equivalent.

The power supply connects to TB-3; polarity is indicated on the rear panel of the M-7679.

Backup Power Supply Input

This input is used to provide backup power to the M-7679 in case of loss of the Main Power Supply. The input range of this supply is 11 to 14 Vdc. The power source used to supply this power should be isolated, filtered, and well regulated. The power source should supply a minimum of 15 watts.

The power supply connects to TB-2; polarity is indicated on the rear panel of the M-7679.

Grounding Requirements

The M-7679 is designed to be mounted in an adequately grounded panel, using ground bonding techniques (metal-to-metal mounting) and hardware that assures a low impedance ground.

Unit Isolation

Sensing inputs should be equipped with test switches and shorting devices where necessary to isolate the unit from external potential or current sources.

A switch/fuse for the M-7679's power shall be included in the installation, and shall be in close proximity to the relay and within easy reach of the operator, and shall be plainly marked as being the power disconnect device for the relay.

Insulation Coordination

Sensing Inputs: 60 V to 300 V, Installation Category IV, Transient Voltages not to exceed 5,000 V.

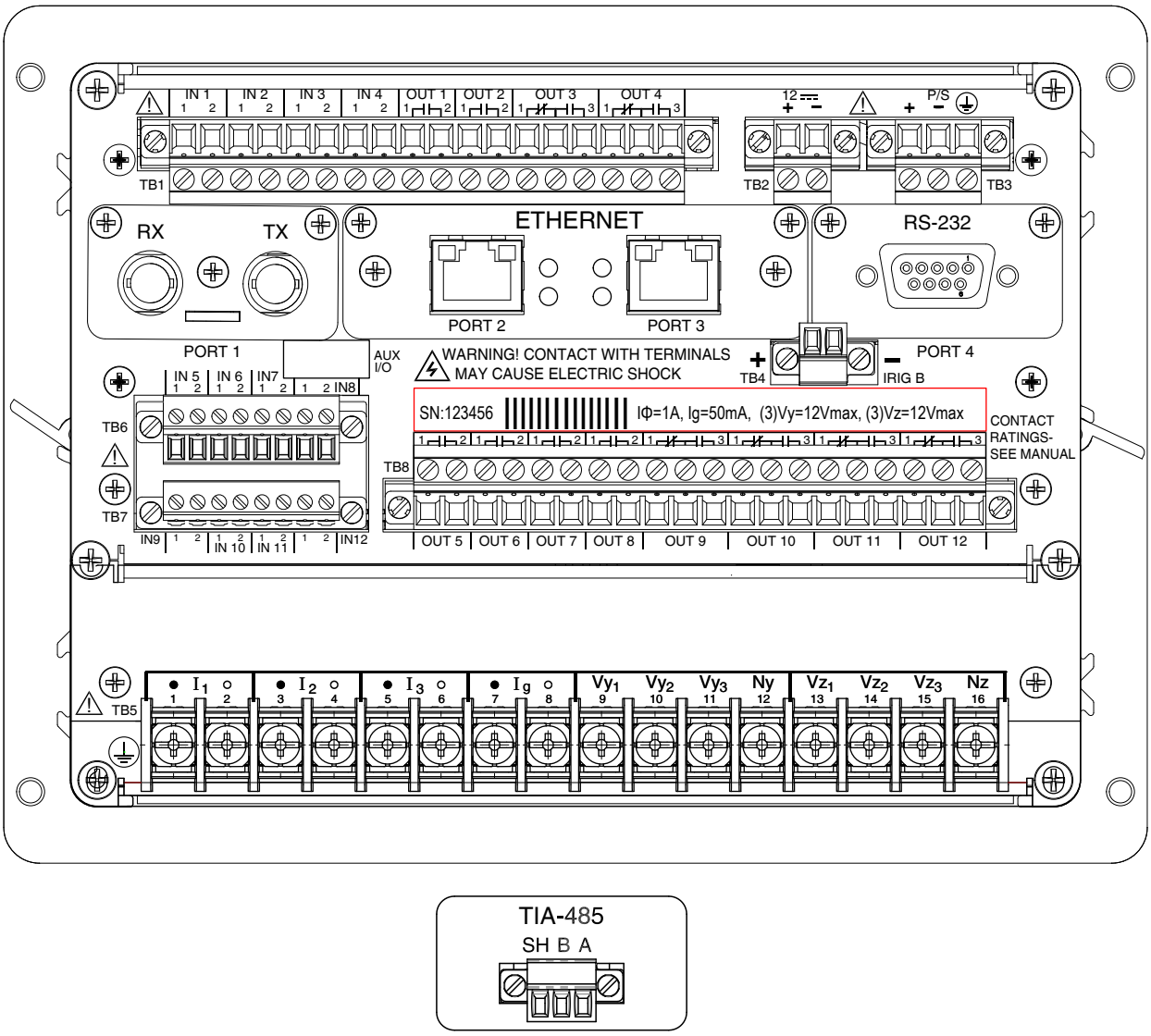
Torque Requirements

- TB-1, 2, 3, 8, 9 — 4.4–5.3 in-lbs
- TB-5* — 7–8 in-lbs
- TB-4, 6, 7 — 2–2.2 in-lbs

*TB-5 terminal block connections must be made with No. 22-12 AWG solid or stranded copper wire inserted in an AMP #324915 (or equivalent) connector and wire insulation used must be rated at 90° C minimum.

Relay Outputs

All outputs are shown in the de-energized state for standard reference. Relay standard reference is defined as protective elements in the non-trip, reconnection and sync logic in the non-asserted state, or power to the relay is removed. Output contacts are high speed operation contacts.



WARNING: The protective grounding terminal must be connected to an earthed ground any time external connections have been made to the unit.

Figure 5 Typical External Connections

M-7679 Typical Connection Diagram

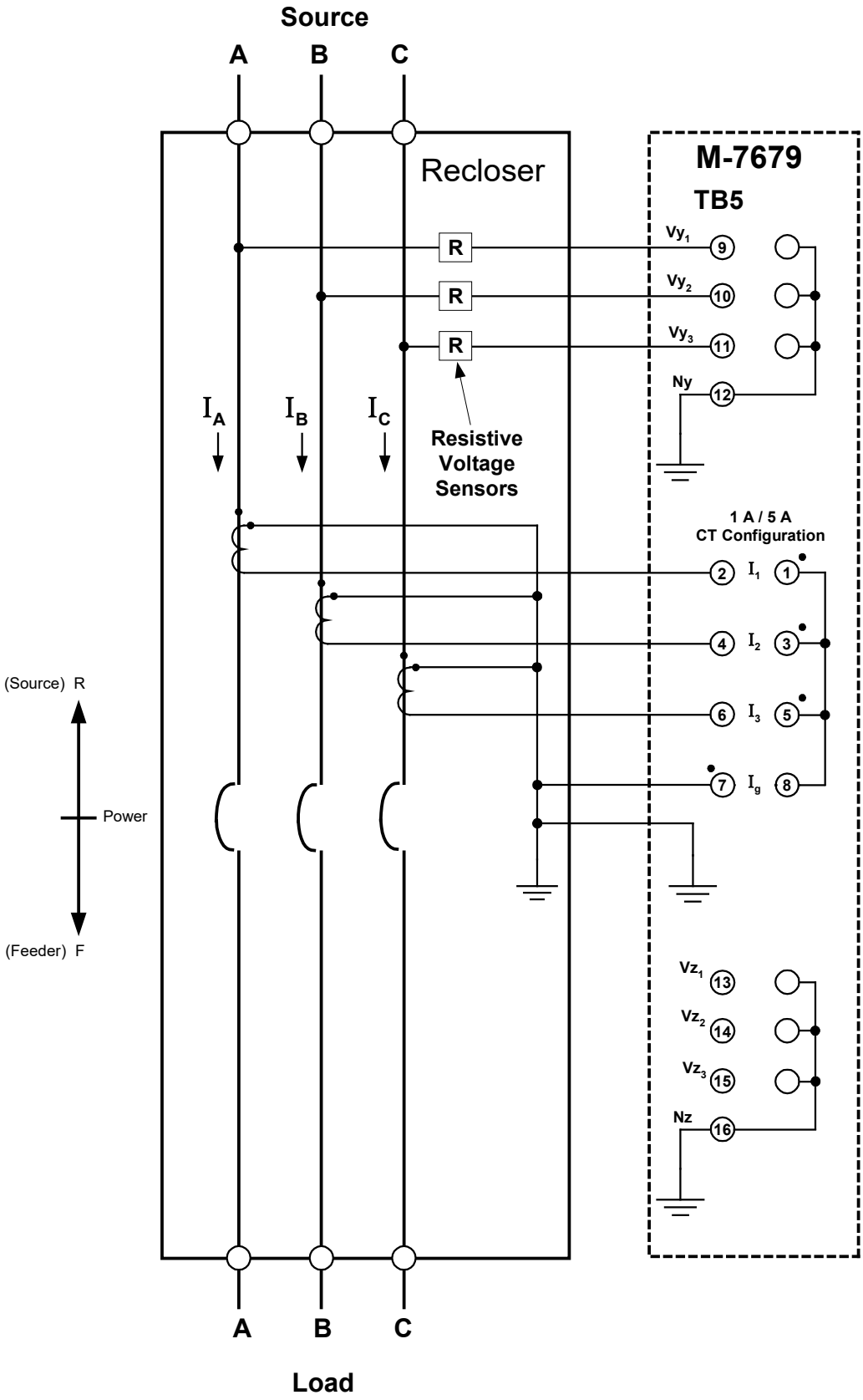


Figure 6 Typical Three-Line Connection Diagram

4.0 M-2032B Battery Charger/Power Supply

M-2032B BATTERY CHARGER/POWER SUPPLY OVERVIEW

Battery Charging Features

The M-2032B is designed to charge a 24 V sealed lead-acid battery. It includes an internal circuit to prevent overcharging of the batteries and extend their life.

- Tri-Level Bulk/Absorption/Float Charger with Pre-Charge
- When battery voltage is below 21 Vdc the charge current is limited to 40 mAdc (Pre-Charge), once the battery voltage is greater than 21 Vdc, the charger will begin charging at the higher rates (Bulk/Absorption/Float). This prevents high current in a damaged battery. The Bulk mode charges the battery at a rate that minimizes charge time and maximizes battery capacity. The Float mode maintains the battery charge after the Bulk mode charge has finished, preventing overcharging of the battery.
- The battery charge voltage is temperature compensated to optimize battery charge and life.

M-2032B/M-7679 Integration Features

This section describes the functionality of the M-2032B Battery Charger/Power Supply and it's interface with the M-7679 R-PAC. The M-2032B includes the following functions in support of the M-7679 R-PAC:

- Receives commands from the M-7679 to:
  - Turn-on/off battery test load
  - Turn-on/off 13.8 Vdc accessory supply
  - Turn battery supply off
- Communicates the following to the M-7679:
  - Charger state
  - Main power supply status
  - Battery Voltage
  - Battery Current
  - Recloser Gas Pressure (if recloser is equipped with sensor)
- Includes a Wakeup system that is initiated by the local panel pushbutton.

When the M-7679 main 120 Vac power supply source is energized, the M-2032B Battery Monitor/Charger controls charging current to the battery system.

The M-2032B includes a 24 volt battery charging circuit powered from an external main source. The battery charger includes circuitry to detect a loss of main power and automatically provides power from the 24 Vdc battery connections, and provides 13.8 Vdc Accessory power.

Turn-on/off Battery Load Test Command

The M-7679 issues the "Turn-on/off Battery Load Test" command to the M-2032B to test the battery capacity when the unit is operating from the main power supply.

Turn-on/off 13.8 Vdc Accessory Supply (Aux Power)

The accessory supply provides power for external devices such as radio, modems, etc. When the M-2032B is used in conjunction with the M-7679 the 13.8 Vdc output can be enabled/disabled utilizing the control's HMI, IPScom, or communication protocols.

Turn Battery Supply Off Command

When the battery voltage decreases to less than a level set by the user, the battery supply to the M-7679 will be turned off (Sleep Mode) to protect the battery. Discharging batteries below certain levels will shorten the life of or damage the battery.

Wakeup System Command

The Wakeup system command is initiated by the M-2032B local panel pushbutton. The wakeup system command allows the user to wake the M-7679 from the Sleep Mode that was initiated by the Battery Supply Off command. The wakeup system command restores power to the M-7679 for a user defined time period. If the main source power is not restored, then the Turn Battery Supply Off command will be reinstated placing the M-7679 in Sleep Mode.

Battery System

The Battery System consists of two series connected 12 Vdc, sealed lead-acid batteries that create a 24 Vdc battery system that powers the M-7679 and provides Trip and Close power to the control when the main power supply source is de-energized. If the main 120 Vac power supply source is de-energized, a fully charged battery system can sustain operation of the M-7679 for approximately 23 to 46 hours (depending on battery Ah rating) at temperature of 25° C.

BATTERY CHARGER MONITORING SYSTEM

The Battery Charger Monitoring System must be enabled in the Setpoints/Common Setpoints/PSBC/IED Power Supply/Battery Charger Monitor dialog screen (Figure 7). Also included in the Battery Charger section are the following settings:

Minimum battery voltage to turn OFF IED – If the battery voltage drops below this level setting, the control will power off, and enter Sleep Mode.

Enable/Disable and set time to perform load test – defines the start time for the Battery Load Test. This test is performed every 24 hours at the defined time.

Power Off Delay After AC Loss – defines the time that the control will stay powered on, after a main AC power loss occurs.

Power Off Delay After Wakeup – defines the time that the control will stay powered on, after wakeup, if no main AC power is detected. Upon wakeup, if the control is in a power off state due to the "Minimum battery voltage to turn OFF IED" condition, the control will check if the battery voltage is still below this setting. If this condition is detected, the control will reinstate Sleep Mode.

If the control is NOT in a power off state due to the "Minimum battery voltage to turn OFF IED" condition, the control will power off when this delay timer setting has expired.

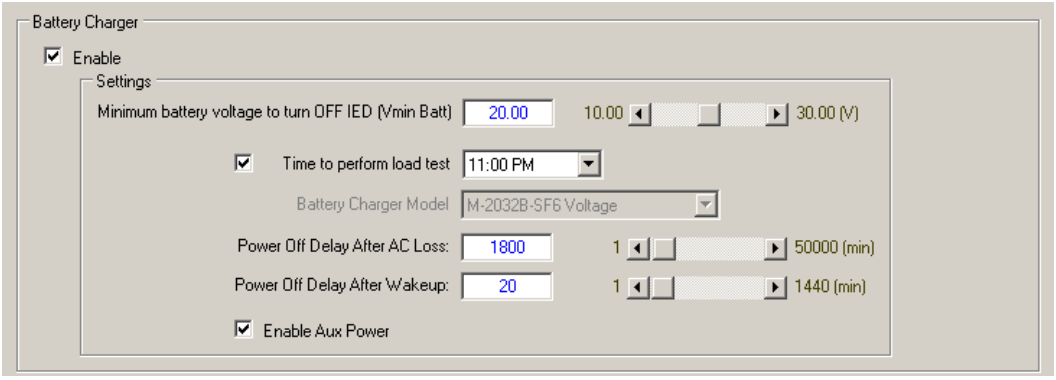


Figure 7 Power Supply/M-2032B Battery Charger Monitor Dialog Screen

Battery Charger Monitoring

The M-2032B communicates the Battery Power, Load Test, Charger, Battery Voltage and Charging Current status to the M-7679 that can be viewed from IPScom/Monitor/Battery Charger Monitoring (Figure 8).

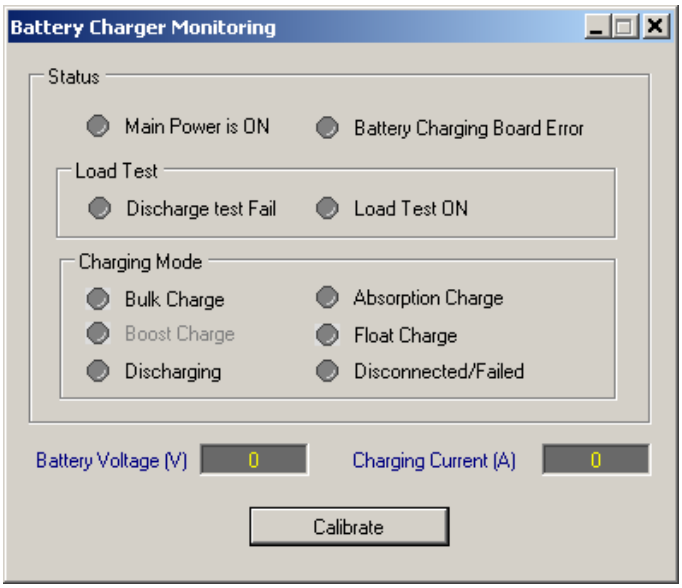


Figure 8 Battery Charger Monitoring Status Screen

Main Power Status

Main Power Detection – When the main 120 Vac power supply source is energized (green), the M-2032B Battery Charger controls the charging current to the battery system.

Battery Charging Board Error – The Battery Charging Board Error is detected (red) when a combination of the Main Power Supply Source status, the direction of the charging/discharging current and battery voltage level indicate a malfunction condition.

Load Test

Load Test ON – The M-7679 periodically tests the batteries by subjecting them to an internal 1 A load for 5 seconds. During the test, the "Load Test ON" status light is illuminated (red).

Discharge Test Fail – If the battery voltage falls below this threshold during the test, the "Discharge Test Fail" status light will be illuminated, and the BATTERY LED (if programmed) illuminates on the front panel. The "Discharge Test Fail" status light remains illuminated until the next successful battery load test.

Charging Mode

Bulk Charge – If the main power supply source is energized and a Bulk charging mode is required, then the M-2032B will charge the batteries in Bulk mode and the Bulk Charge status light will be illuminated (red).

Absorption or Float Charge – If the main power supply source is energized and Bulk charging mode is not required, then the M-2032B will charge the batteries in the Float mode and the Absorption or Float Charge status light will be illuminated (red). The Float mode current is approximately 10 mA. In the Absorption stage, the charger holds the voltage at a constant level and decreases the current until the battery is fully charged.

Discharging – When the main 120 Vac power supply source is de-energized and the M-7679 is operating from battery power (measured current has reversed direction) the Discharging status light will be illuminated (red). The changeover from main power to battery power is done by the M-2032B.

Also, when the M-7679 is operating from battery power, if the voltage decreases to less than a minimum user defined setting, the M-7679 will issue a "Turn-on/off Battery Load" command to turn off the main 24 Vdc supply to the M-7679. Upon executing the command, the M-7679 will be powered down and the Battery Charger will enter a low power sleep mode.

Disconnected/Failed – When the Battery Presence Detection test fails (performed every 15 minutes) or if the communication cable between the M-7679 and the M-2032B is unplugged or damaged, the Disconnect/Failed alarm will become active. The alarm will be cleared automatically when the Battery Presence Detection test runs successfully and/or communication between the M-7679 and the M-2032B is restored.

If the batteries fail, or when the batteries are removed temporarily during replacement, the 120 Vac source and battery charging system provide sufficient power to Trip and Close most reclosers.

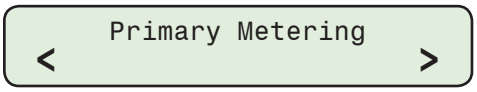
Battery Voltage and Charging Current

The M-7679 and M-2032B monitor the battery voltage and battery charge/discharge current.

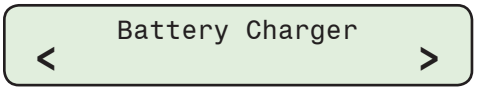
Accessing the Battery Charger Monitor Screens from the HMI

1. Press **MNTR**. The menu will advance to "MONITOR".

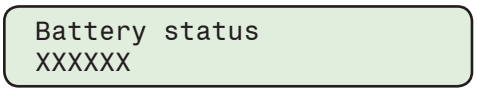
2. Press **ENT** or **CNFG** once. The unit will display the following:



3. Press **MNTR** or **COMM** as necessary until "Battery Charger" is displayed:

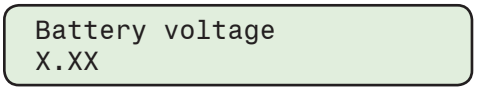


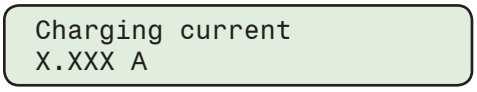
4. Press **CNFG** once, the unit will display the active Battery Status:



- Disconnected/Failed
- Bulk charge
- Absorption charge
- Float charge
- Discharge

5. Press **CNFG** as necessary to cycle through the additional Battery Status screens:





BATTERY LOAD TEST

The M-7679 automatically load tests the 24 Vdc batteries once every 24 hours at a user defined time of day (Figure 9). An internal 24-hour timer cumulatively times whenever the M-2032B is in the charge mode (e.g., 120 Vac is powering the M-7679 thus providing 24 Vdc for main power supply for the M-7679 and charging the battery). Even if the battery is fully charged, the M-2032B maintains a low-rate charging current, so it is still in the charge mode.

After the 24-hour timer times out, and the M-2032B is still in the charge mode, an internal 1 A load (25 Ω 50 W resistor) is automatically paralleled with the battery for 5 seconds. If battery voltage decreases to less than 22.0 Vdc during this load test, the BATTERY LED illuminates (if programmed) and remains illuminated until the next battery test is successful. The "Discharge Test" status light will also illuminate (red).

The Battery Load Test can be initiated from the M-7679 front panel HMI. The Battery Load Test can also be initiated utilizing a dedicated MODBUS point, or DNP object. All Battery System settings have corresponding communication points.

Initiating a Battery Load Test from the HMI

1. Press **ENT**. The menu will advance to "UTILITIES".

```
        UTILITIES
<COMM             MNTR>
```

2. Press **ENT** or **CNFG** once. The unit will display the following:

```
          About
<                    >
```

3. Press **MNTR** or **COMM** as necessary until "Battery Charger" is displayed.

```
     Battery Charger
<                    >
```

4. Press **CNFG** as necessary to navigate to the "Battery load test" menu item.

```
Battery load test
Press ENT to begin
```

5. Press **ENT**. The unit will display the following:

```
Battery load test
in progress...
```

6. The unit will perform the load test and, if successful, display the following:

```
Battery load test
Test successful
```

   If the Battery Load Test is not successful, the screen will display "Test Failed!".

7. If no AC power is detected, the load test is cancelled. The unit will display:

```
Battery load test
Disabled, no AC pwr.
```

BATTERY CHARGER CALIBRATION

The Battery Charger Calibration feature allows the user to calibrate the offset in charging current measurement. The Battery Charger must be disconnected from the battery before performing the calibration.

Battery Charger Calibration from IPScom

1. Disconnect the battery charger from the battery.
2. Select **Calibrate** from the Battery Charger Monitoring screen (Figure 8). IPScom will display the "Calibration Confirmation" screen (Figure 9). Ensure that the Battery Charger is disconnected.

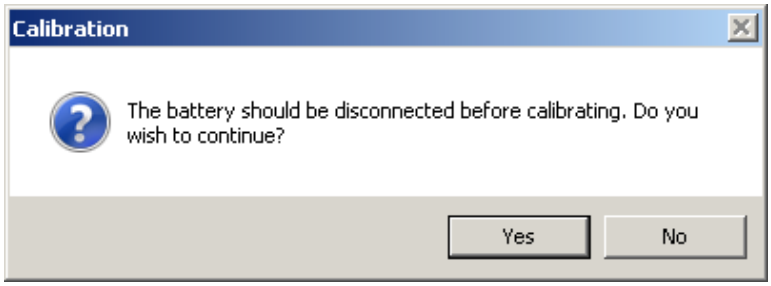
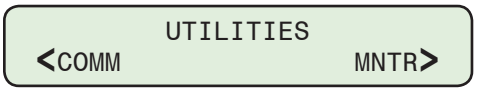


Figure 9 Disconnect Battery Charger Confirmation Screen

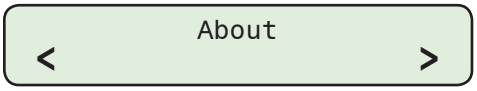
3. Select **Yes**. IPScom will perform the calibration and display the "Calibration Successful" confirmation screen.
4. Select **OK**. IPScom will return to the Battery Charger Monitoring screen.

Battery Charger Calibration from the HMI

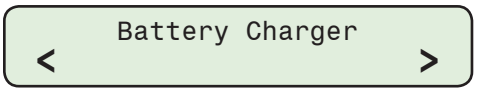
1. Disconnect the battery charger from the battery.
2. Press **ENT**. The menu will advance to "UTILITIES".



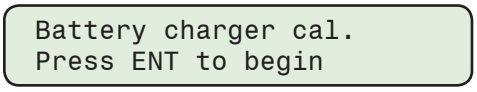
3. Press **ENT** or **CNFG** once. The unit will display the following:



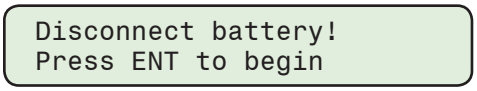
4. Press **MNTR** or **COMM** as necessary until "Battery Charger" is displayed.



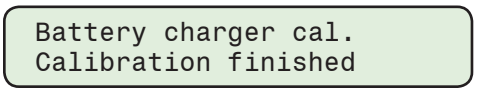
5. Press **CNFG** as necessary to navigate to the "Battery charger cal." menu item.



6. Press **ENT**. The unit will display the following:



7. Ensure that the Battery Charger is disconnected. Press **ENT**. The unit will perform the calibration and then display the following:

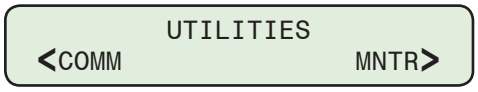


BATTERY MINIMUM VOLTAGE TO TURN OFF IED THRESHOLD

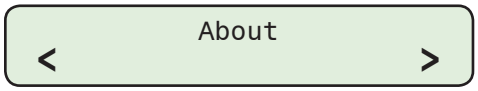
When the battery voltage decreases to less than the Minimum Voltage to Turn Off IED, the battery supply to the M-7679 will be turned off (Sleep Mode) to protect the battery. Discharging batteries below certain levels will shorten the life of or damage the battery.

Setting the Battery Minimum Voltage Threshold from the HMI

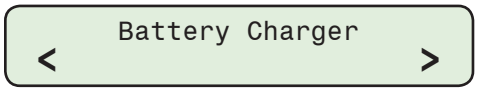
1. Press **ENT**. The menu will advance to "UTILITIES".



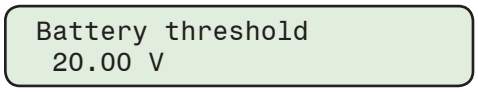
2. Press **ENT** or **CNFG** once. The unit will display the following:



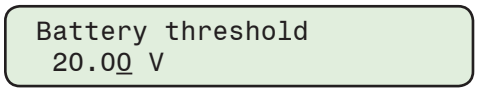
3. Press **MNTR** or **COMM** as necessary until "Battery Charger" is displayed.



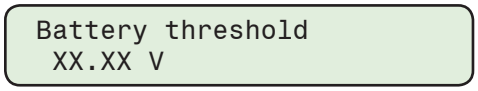
4. Press **CNFG** as necessary to navigate to the "Battery threshold" menu item.



5. Press **ENT**. The unit will display the following:



6. Utilizing the arrow pushbuttons enter the desired threshold, then press **ENT**. The unit will display the entered value.

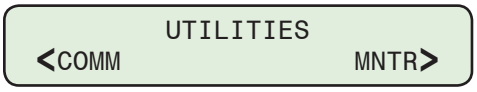


TURN-ON/OFF 13.8 VDC ACCESSORY SUPPLY POWER

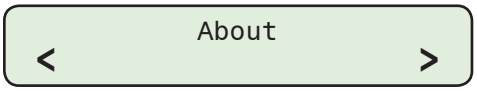
The accessory supply provides power for external devices such as radio, modems, etc. When the M-2032B is used in conjunction with the M-7679 the 13.8 Vdc output can be enabled/disabled utilizing the control's HMI, IPScom (Figure 7), or communication protocols.

Enabling/Disabling Accessory Supply Power from the HMI

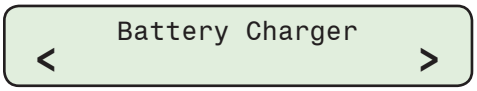
1. Press **ENT**. The menu will advance to "UTILITIES".



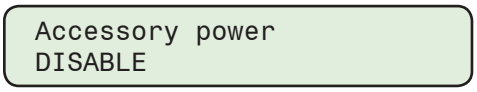
2. Press **ENT** or **CNFG** once. The unit will display the following:



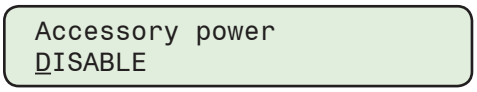
3. Press **MNTR** or **COMM** as necessary until "Battery Charger" is displayed.



4. Press **CNFG** as necessary to navigate to the "Accessory power" menu item.

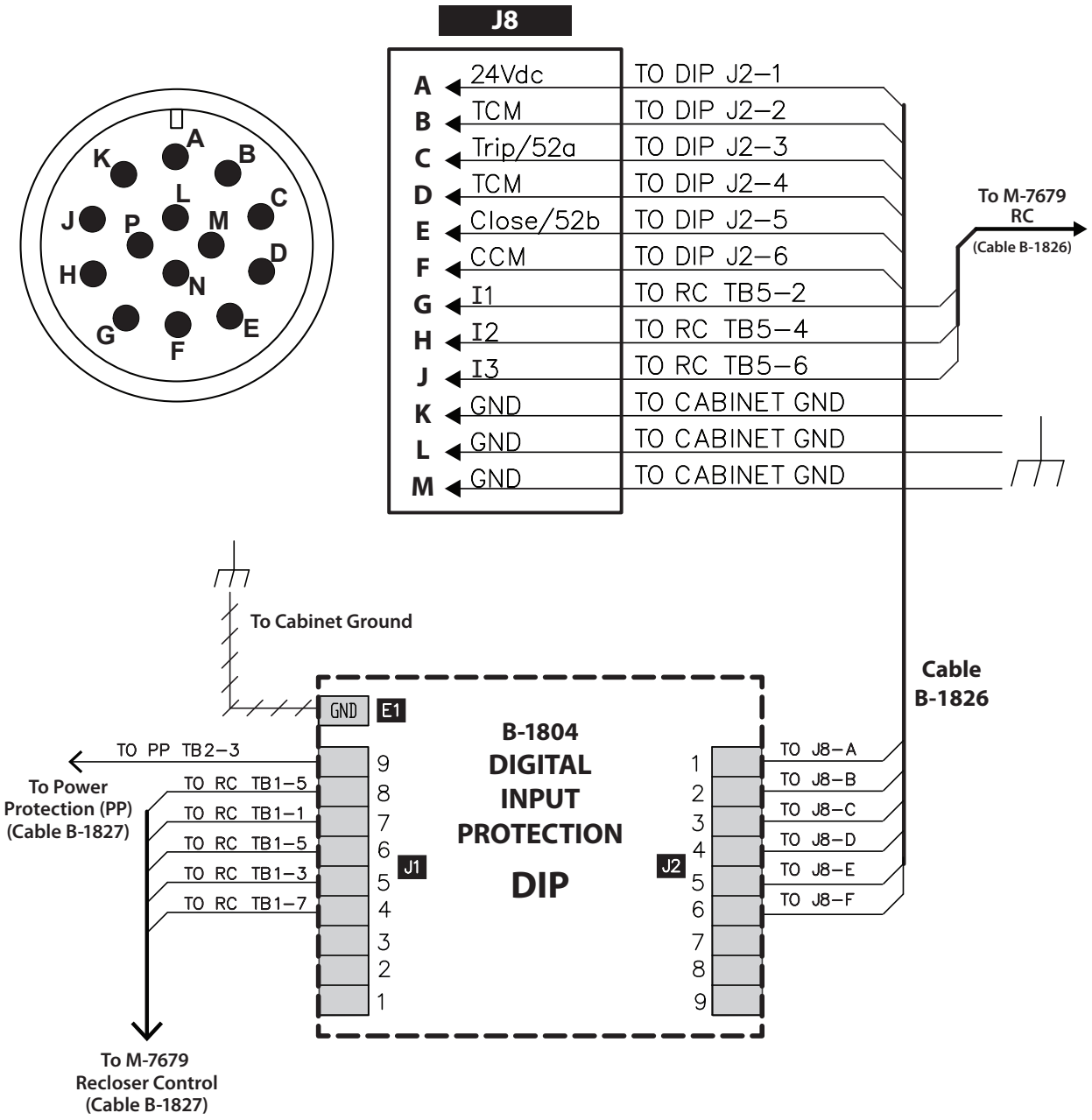


5. Press **ENT**. The unit will display the following:



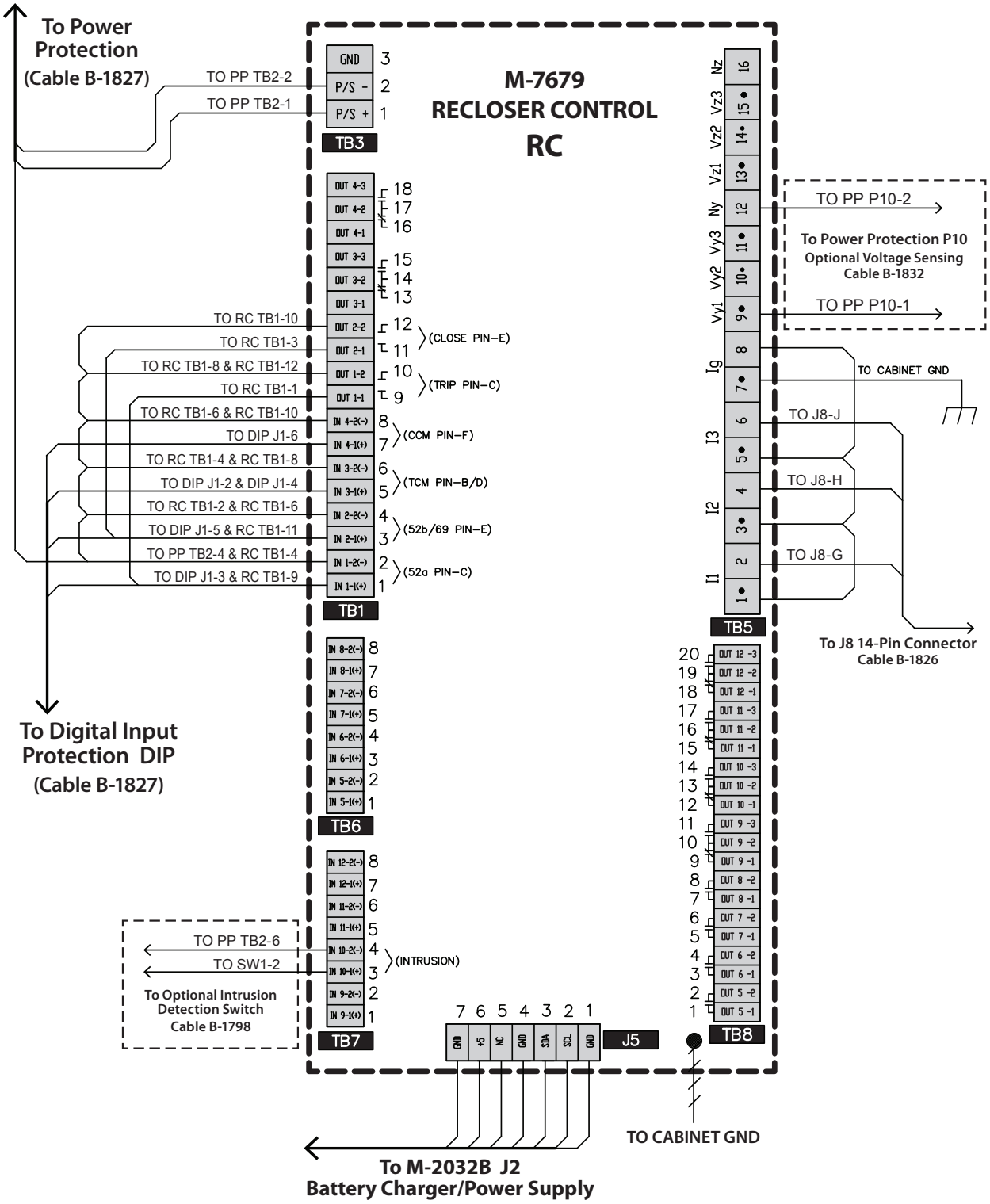
6. Utilizing the arrow pushbuttons select either Enable or Disable, then press **ENT**. The unit will display the selection.

5.0 14C2, 14G2 Traditional/G&W Viper S Recloser (14-Pin)



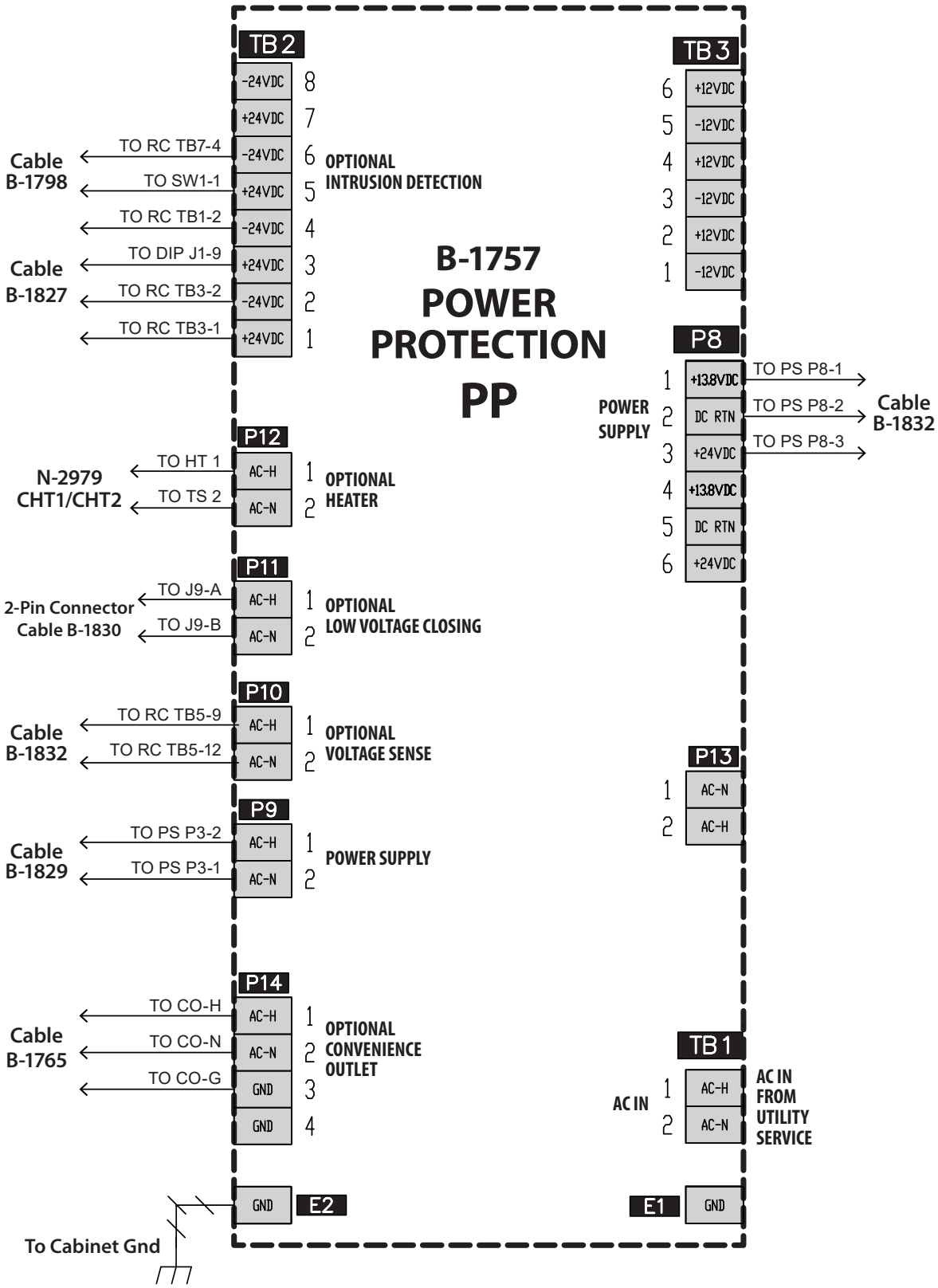
KEY:	
PP	Power Protection Figure 10(B)
RC	M-7679 Recloser Control Terminal Blocks Figure 10(A)

Figure 10 Cabinet Interface 14C2, 14G2 – 14 Pin Control Cable Receptacle Pinouts and Digital Input Protection Board



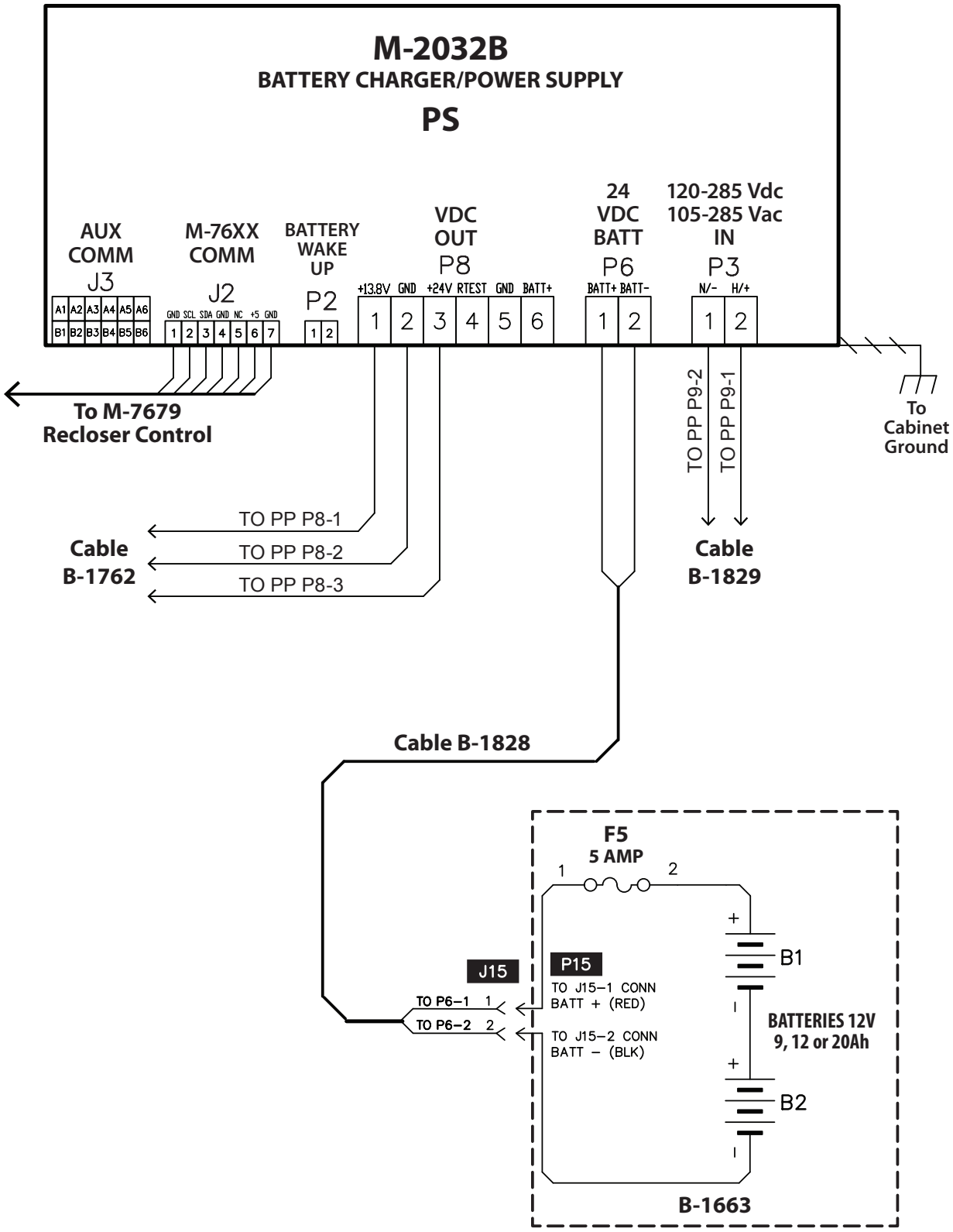
KEY:	
PP	Power Protection Figure 10(B)
DIP	Digital Input Protection Figure 10
J8	14-Pin Receptacle Figure 10

Figure 10(A) Cabinet Interface 14C2, 14G2 M-7679 Terminal Block (TB) Connections



KEY:	
RC	M-7679 Recloser Control Terminal Blocks Figure 10(A)
DIP	Digital Input Protection Figure 10
PS	M-2032B Battery Charger/Power Supply Figure 10(C)
Options	Optional Accessories Figure 10(D)

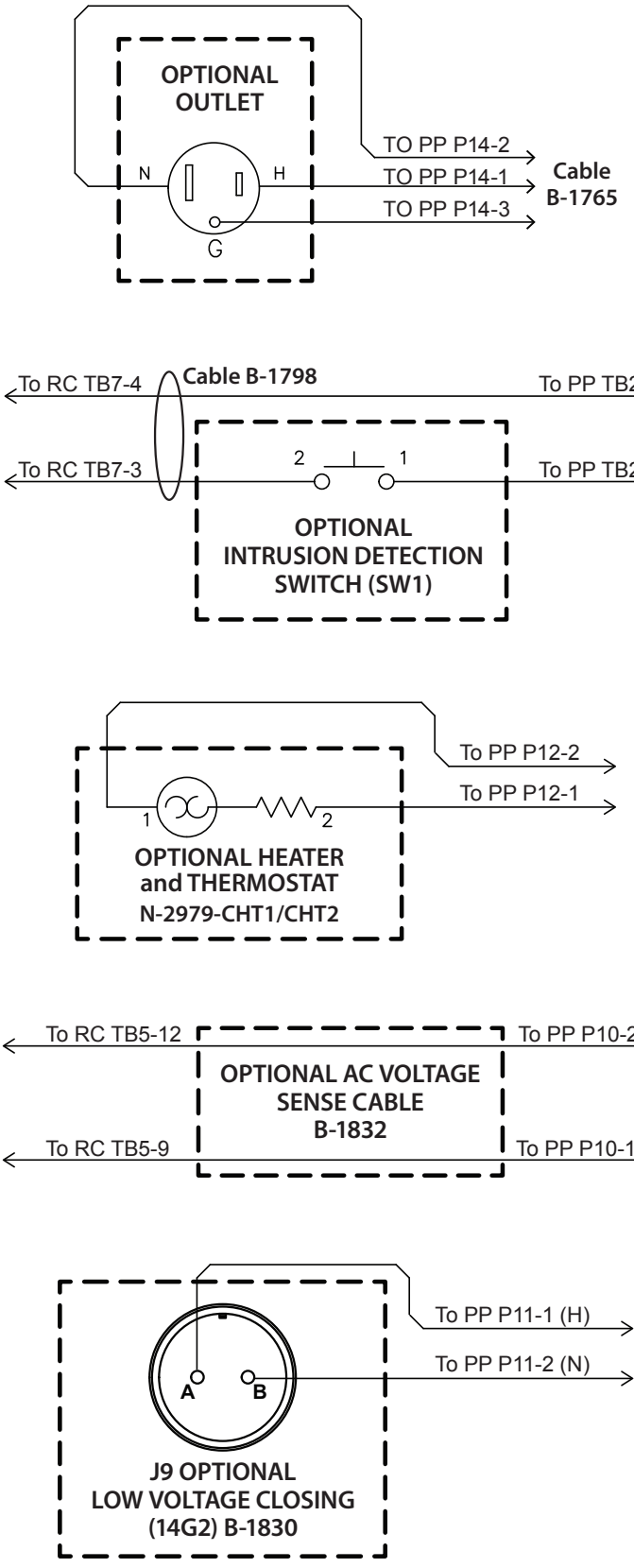
Figure 10(B) Cabinet Interface 14C2, 14G2 Power Protection (PP) Connections



KEY:

PP Power Protection Figure 10(B)

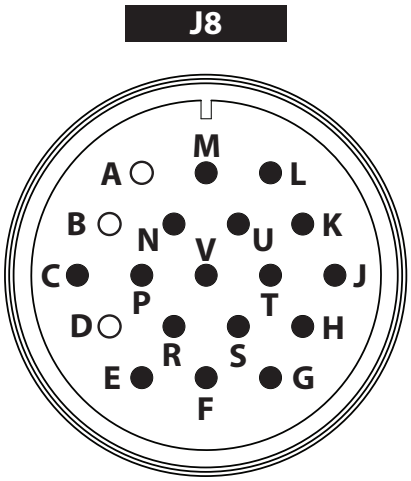
Figure 10(C) Cabinet Interface 14C2, 14G2 – M-2032B Battery Charger/ Power Supply Connections



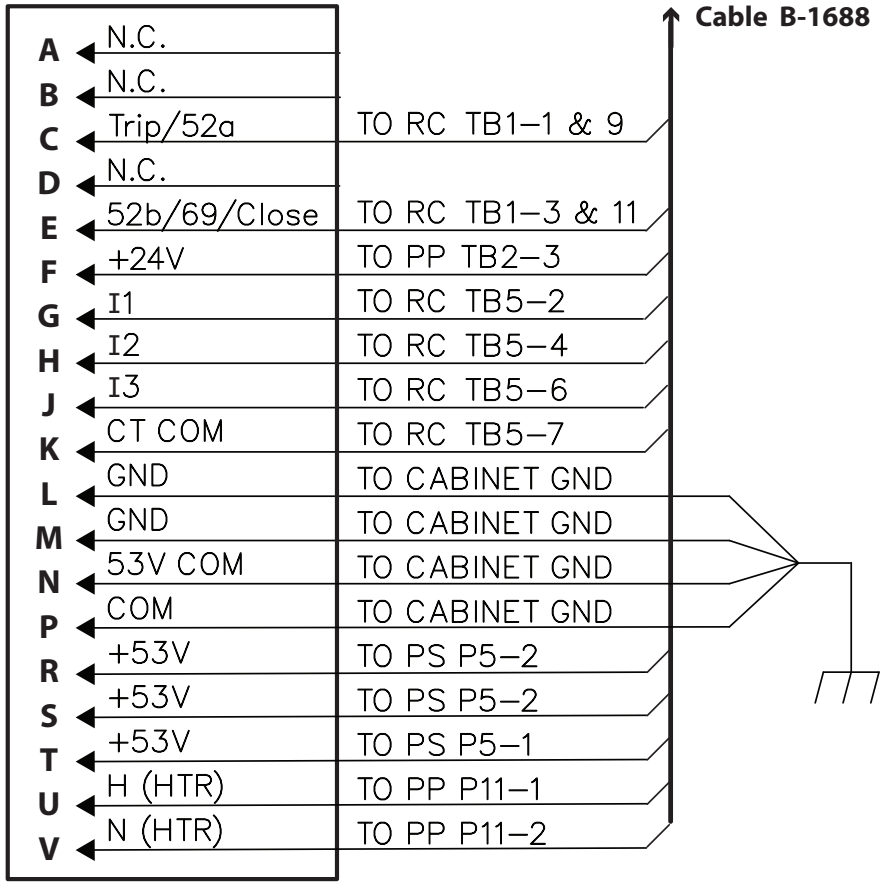
KEY:	
PP	Power Protection Figure 10(B)
RC	M-7679 Recloser Control Terminal Blocks Figure 10(A)

Figure 10(D) Cabinet Interface 14C2, 14G2 Optional Accessories Connections

5.1 19B Cooper/G&W Viper S (19-Pin)



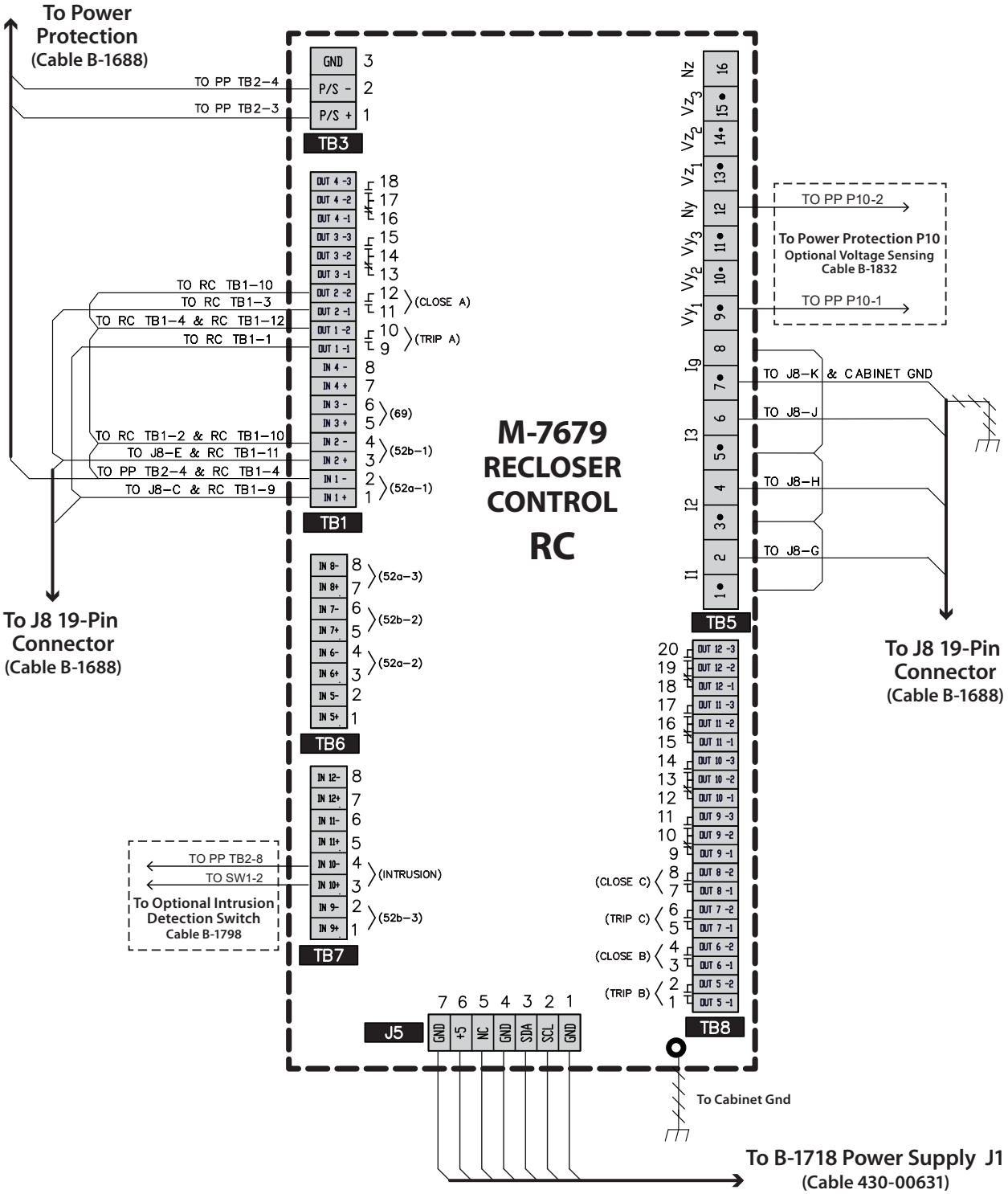
19-Pin Control Cable Receptacle



KEY:

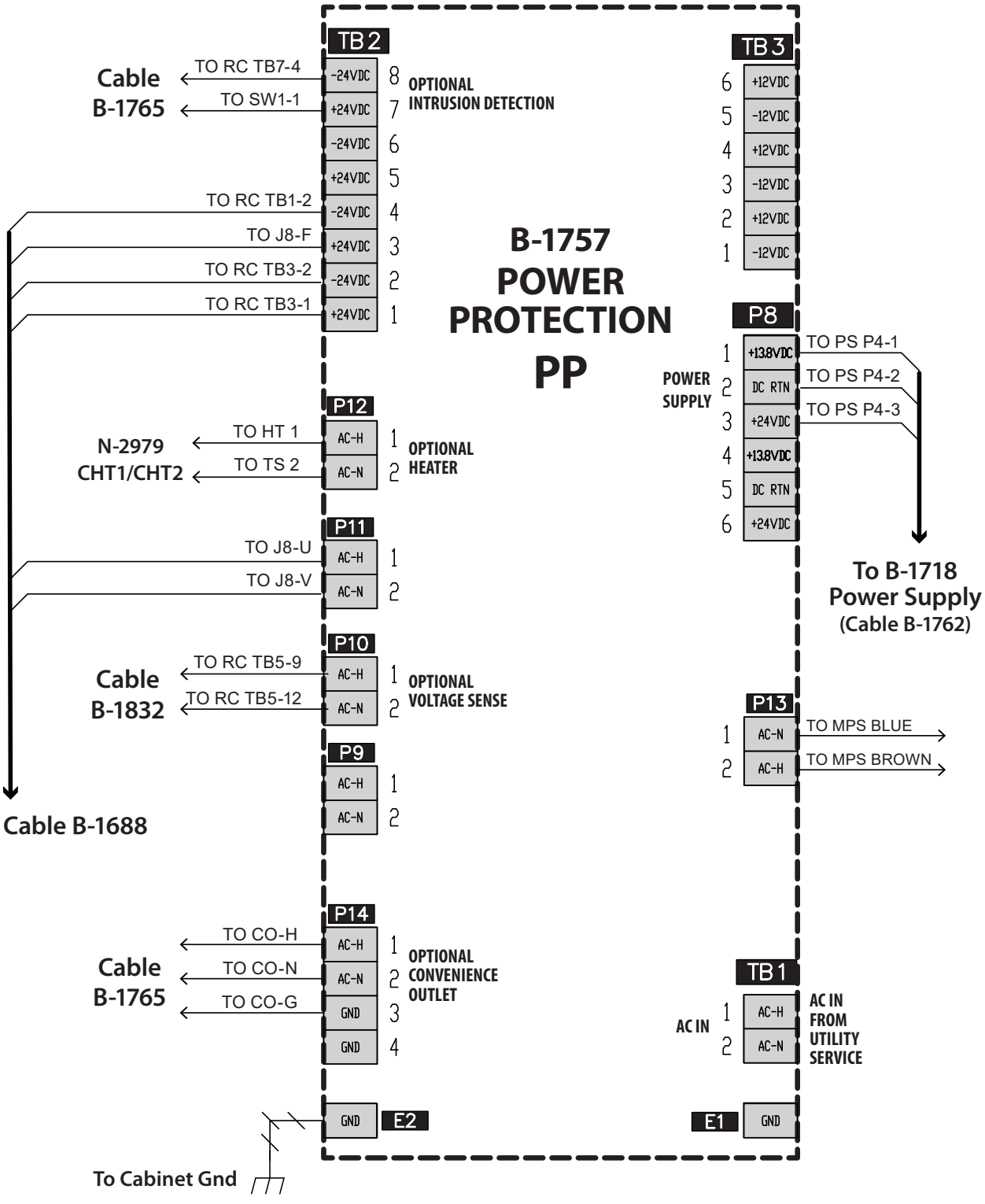
PP	Power Protection Figure 11(B)
PS	Power Supply Figure 11(C)
RC	M-7679 Recloser Control Terminal Blocks Figure 11(A)

Figure 11 Cabinet Interface 19B – 19 Pin Control Cable Receptacle Pinouts



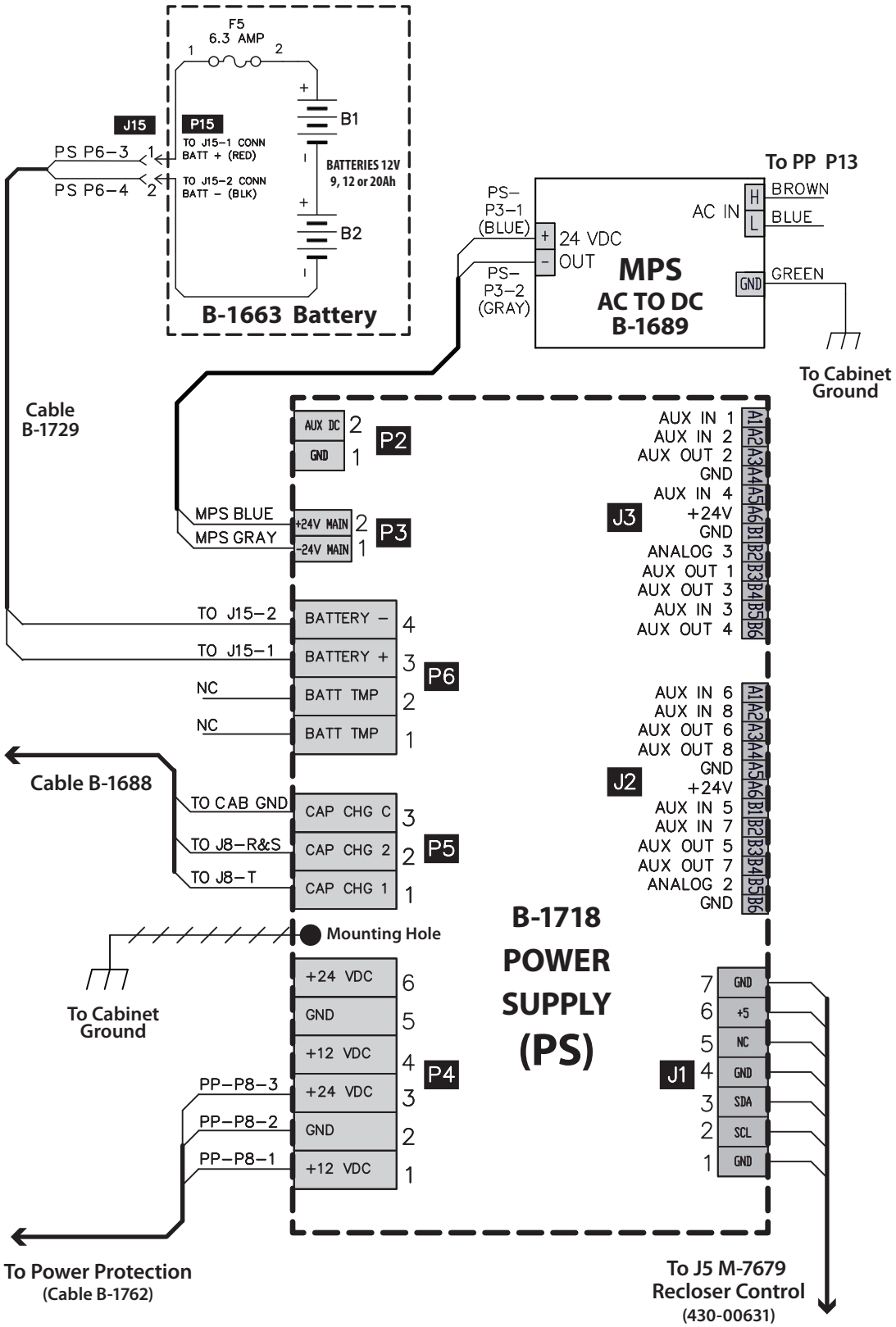
KEY:	
PP	Power Protection Figure 11(B)
J8	14-Pin Receptacle Figure 11
Options	Optional Accessories Figure 11(D)

Figure 11(A) Cabinet Interface 19B M-7679 Terminal Block (TB) Connections



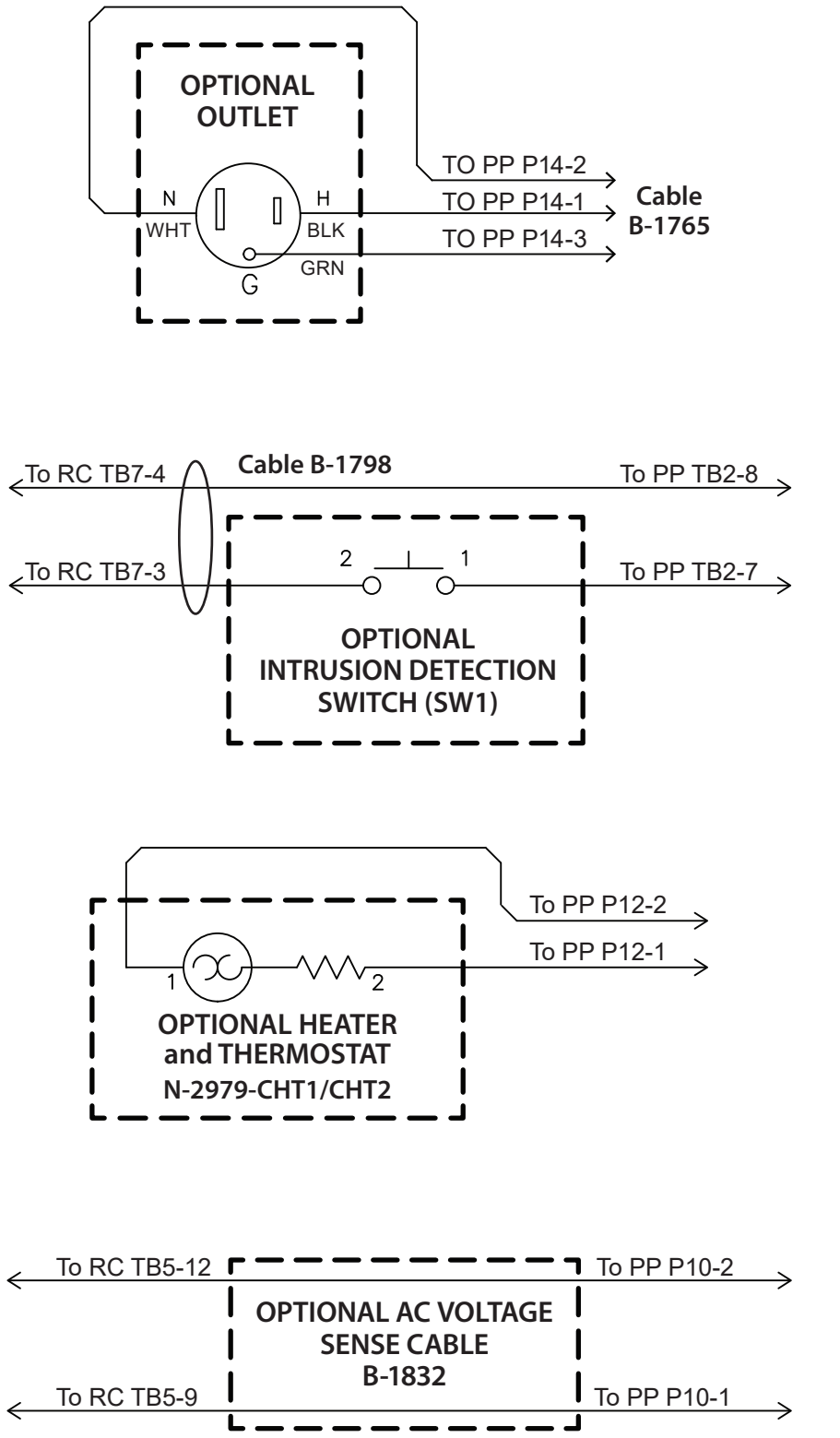
KEY:	
J8	14-Pin Receptacle Figure 11
PS	Power Supply Figure 11(C)
RC	M-7679 Recloser Control Terminal Blocks Figure 11(A)
Options	Optional Accessories Figure 11(D)

Figure 11(B) Cabinet Interface 19B Power Protection (PP) Connections



KEY:	
J8	14-Pin Receptacle Figure 11
PP	Power Protection Figure 11(B)
RC	M-7679 Recloser Control Terminal Blocks Figure 11(A)

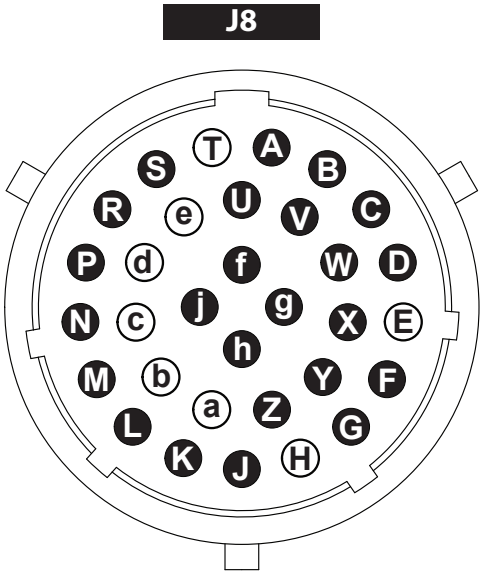
Figure 11(C) Cabinet Interface 19B Power Supply (PS) Connections



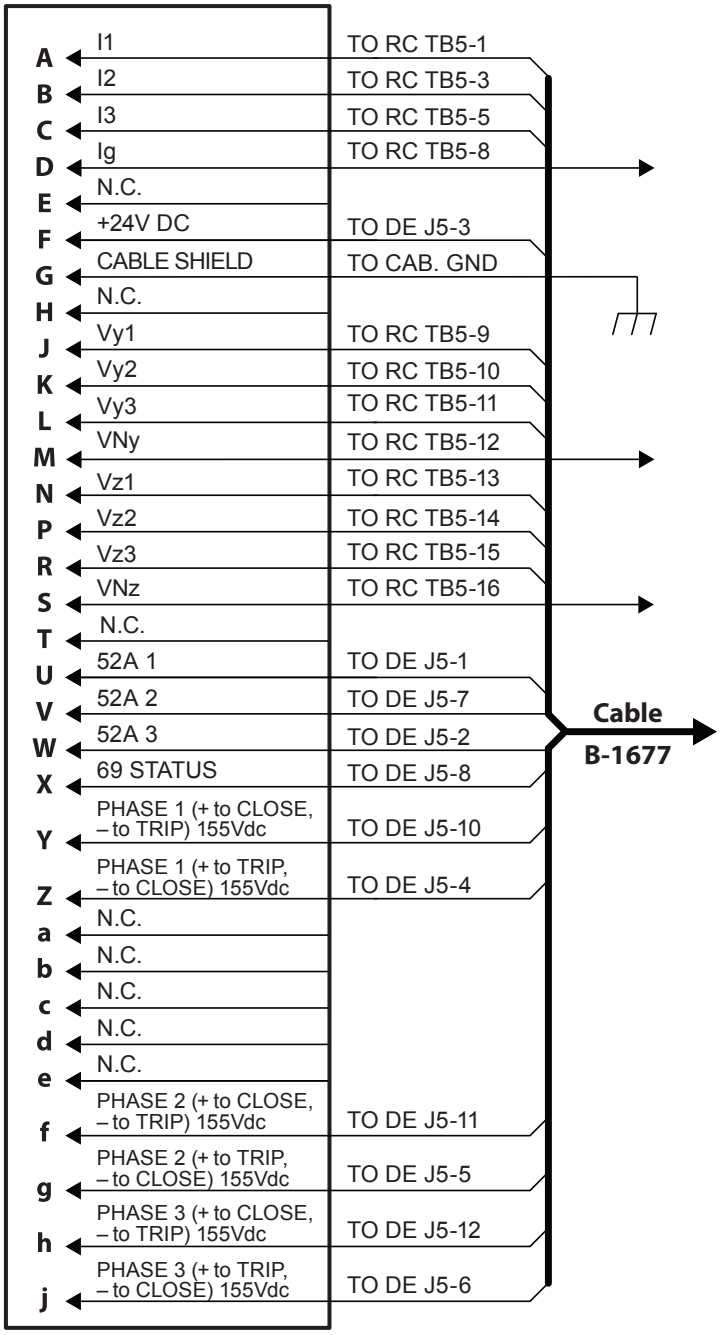
KEY:	
PP	Power Protection Figure 11(B)
RC	M-7679 Recloser Control Terminal Blocks Figure 11(A)

Figure 11(D) Cabinet Interface 19B Optional Accessories Connections

5.2 32V G&W VRC Viper ST/LT Recloser Cabinet (32-Pin)

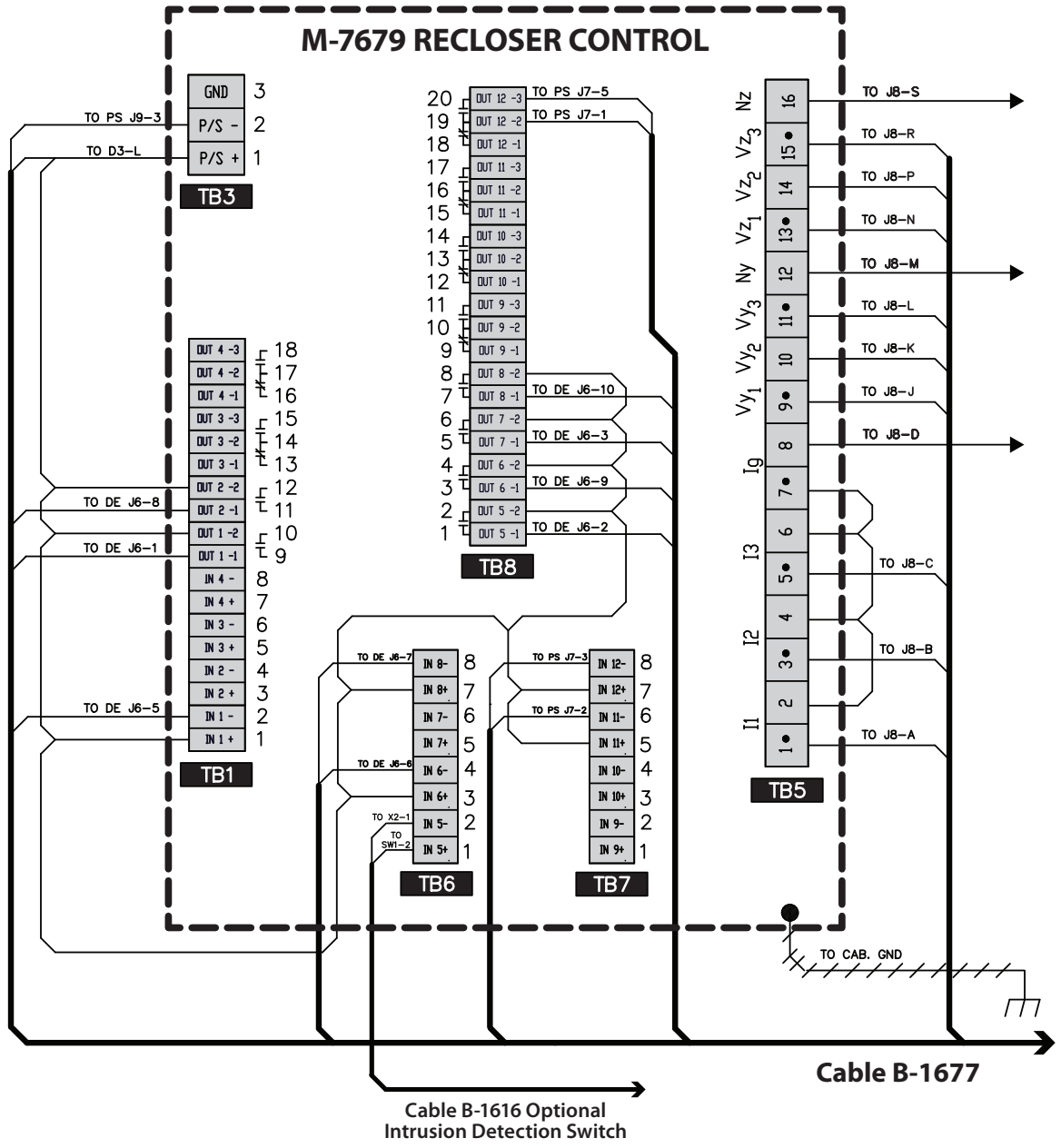


32-Pin Control Cable Receptacle



KEY:	
DE	Driving Electronics Figure 12(C)
RC	M-7679 Recloser Control Terminal Blocks Figure 12(A)

Figure 12 Cabinet Interface 32V – 32 Pin Control Cable Receptacle Pinouts



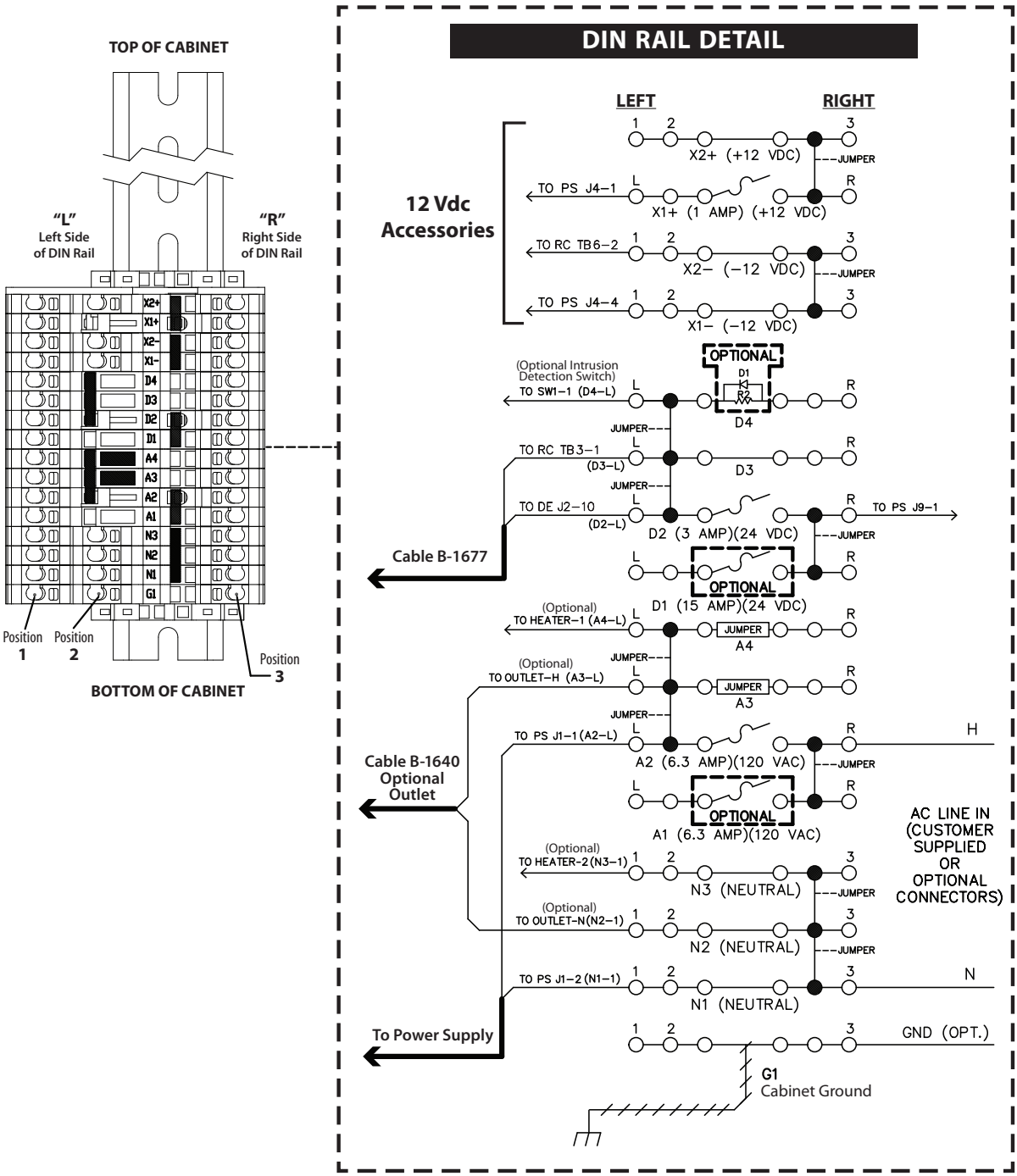
INPUT	FUNCTION
INPUT 1	52A-A
INPUT 3	69
INPUT 6	52A-B
INPUT 8	52A-C
INPUT 11	BATT ALARM
INPUT 12	AC STATUS

OUTPUT	FUNCTION
OUTPUT 1	TRIP A
OUTPUT 2	CLOSE A
OUTPUT 5	TRIP B
OUTPUT 6	CLOSE B
OUTPUT 7	TRIP C
OUTPUT 8	CLOSE C
OUTPUT 12	BATT TEST

KEY:

DE	Driving Electronics Figure 12(C)
PS	Power Supply Figure 12(D)
X2, D3	DIN Rail Figure 12(B)
J8	32-Pin Receptacle Figure 12

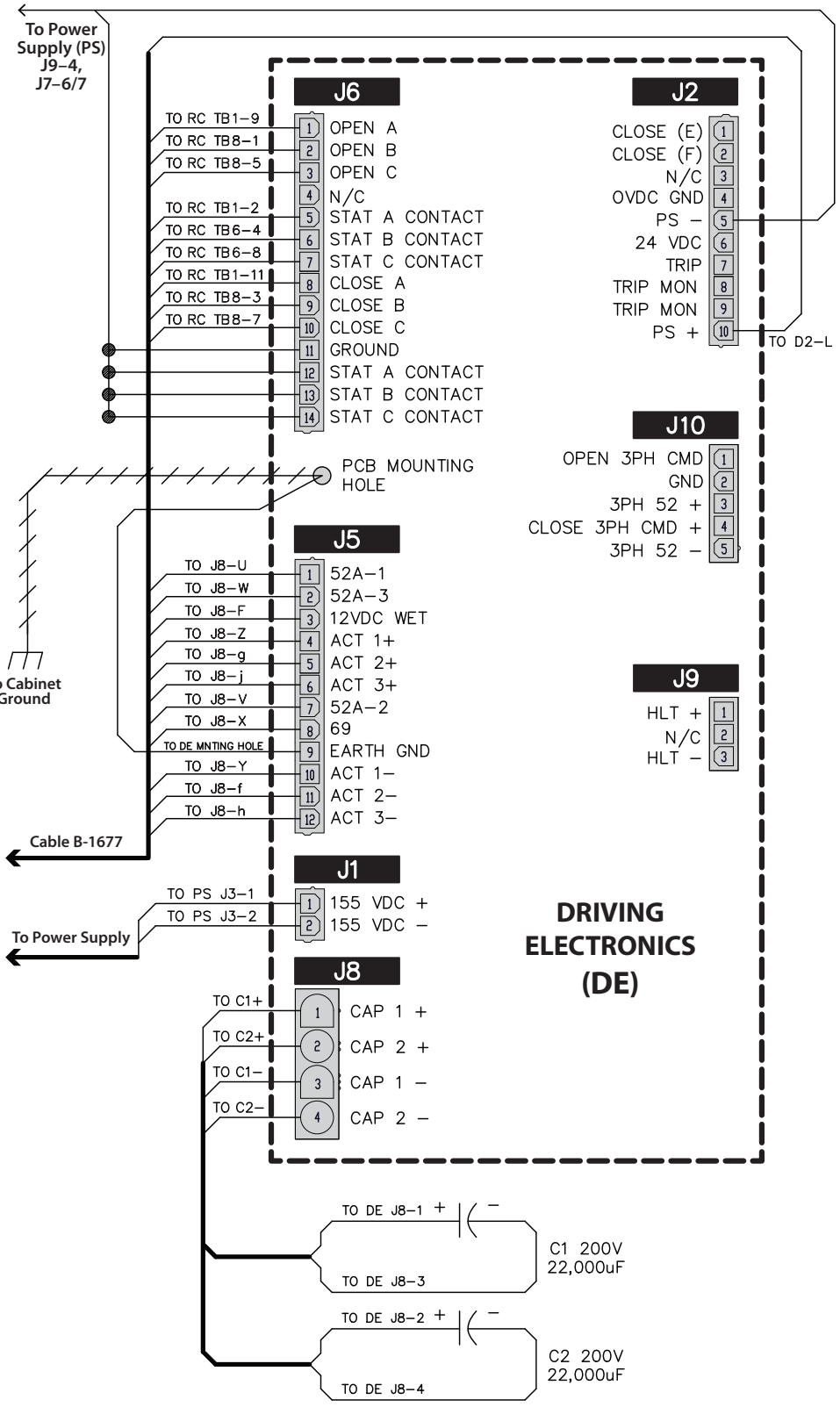
Figure 12(A) Cabinet Interface 32V M-7679 Terminal Block (TB) Connections



KEY:

DE	Driving Electronics Figure 12(C)
PS	Power Supply Figure 12(D)
RC	M-7679 Recloser Control Terminal Blocks Figure 12(A)

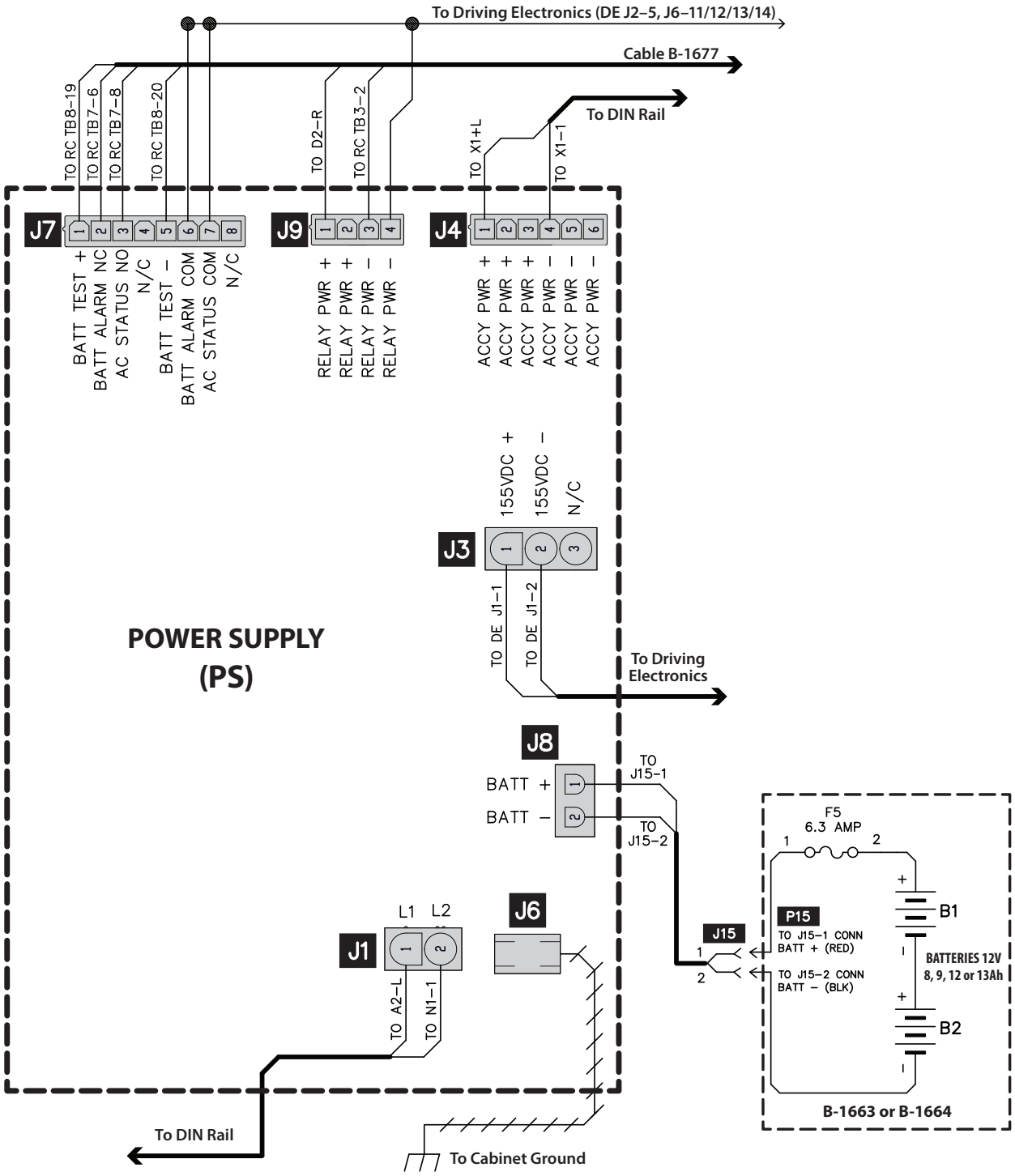
Figure 12(B) Cabinet Interface 32V DIN Rail Connections



KEY:

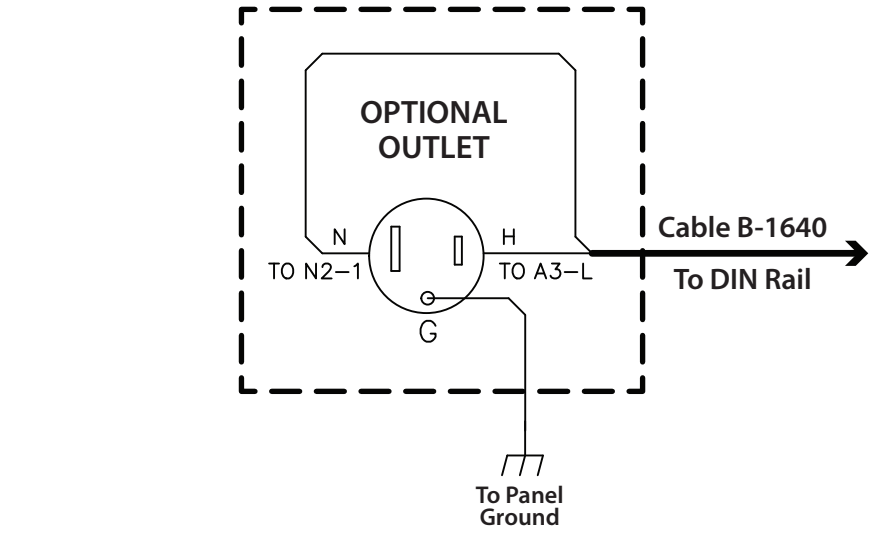
J8	32-Pin Receptacle Figure 12
RC	M-7679 Recloser Control Terminal Blocks Figure 12(A)
PS	Power Supply Figure 12(D)
D2	DIN Rail Figure 12(B)

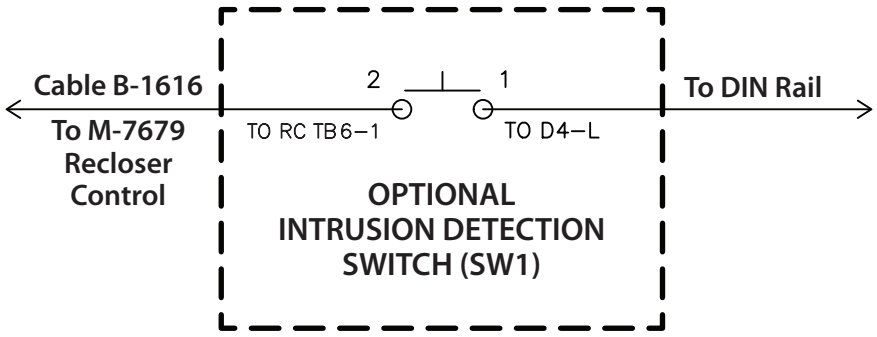
Figure 12(C) Cabinet Interface 32V Driving Electronics (DE) Connections

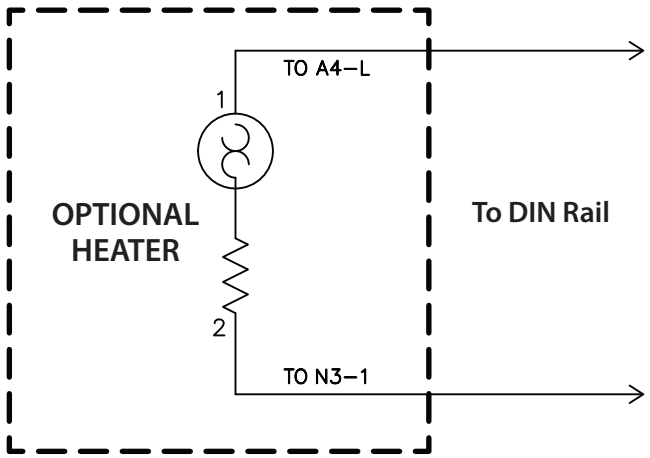


KEY:	
DE	Driving Electronics Figure 12(C)
RC	M-7679 Recloser Control Terminal Blocks Figure 12(A)
X1, D2, A2, N1	DIN Rail Figure 12(B)

Figure 12(D) Cabinet Interface 32V Power Supply (PS) Connections







KEY:	
N2/3, A3/4, D4	DIN Rail Figure 12(B)
TB6	M-7679 Recloser Control Terminal Blocks Figure 12(A)

Figure 12(E) Cabinet Interface 32V Optional Accessories Connections

5.3 32B Multi-Recloser Interface (32-Pin)

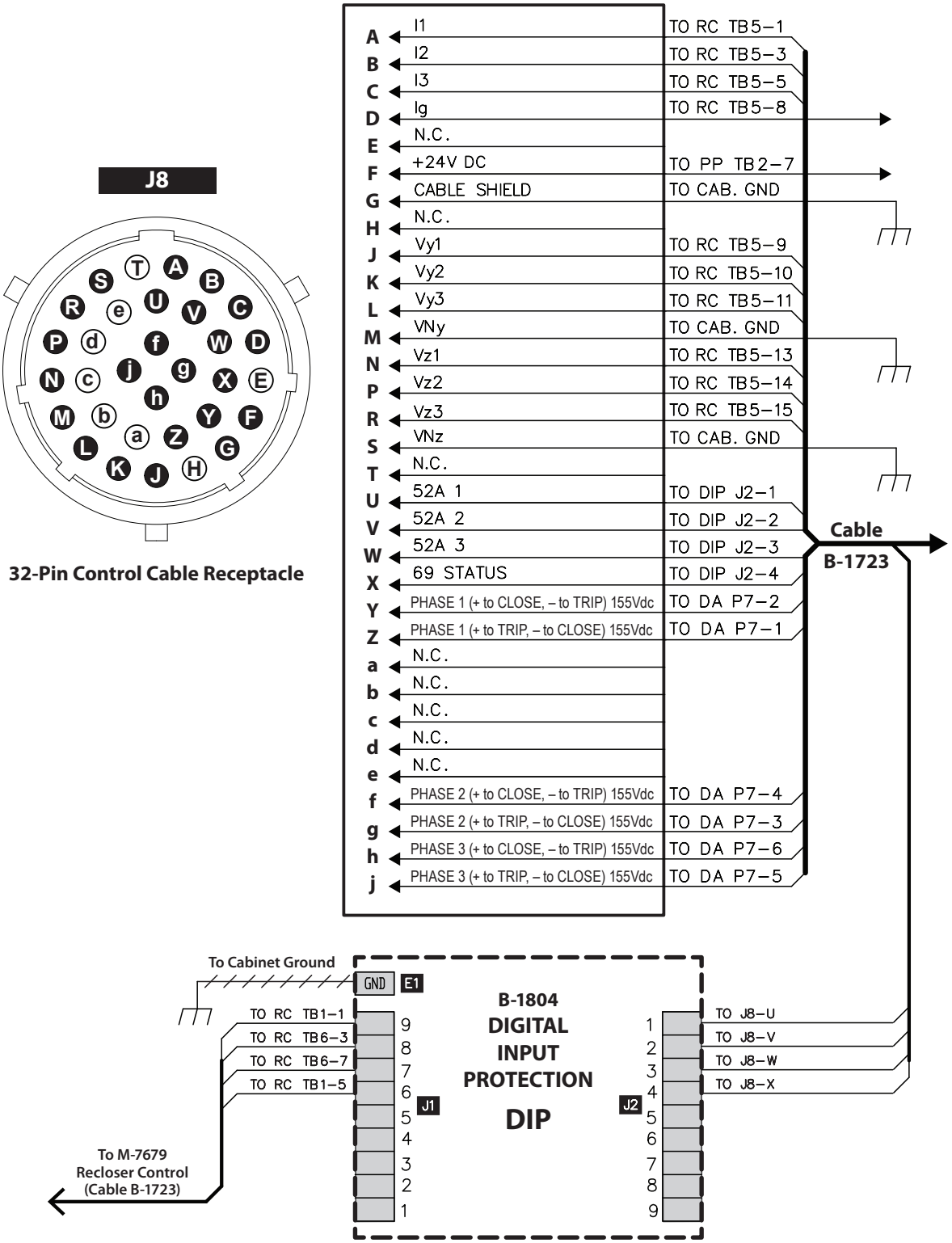
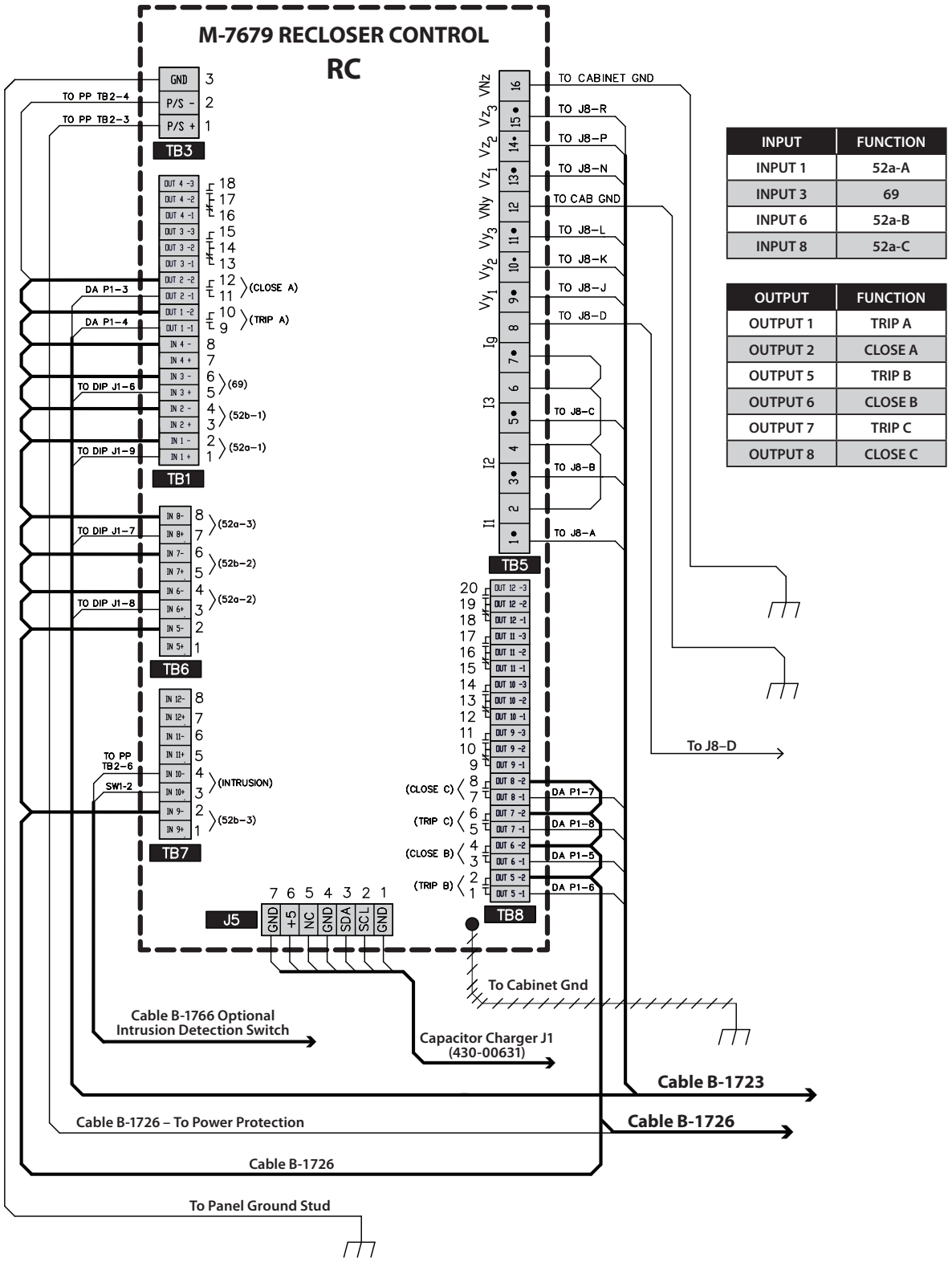


Figure 13 Cabinet Interface 32B – 32 Pin Control Cable Pinouts & DIP Board



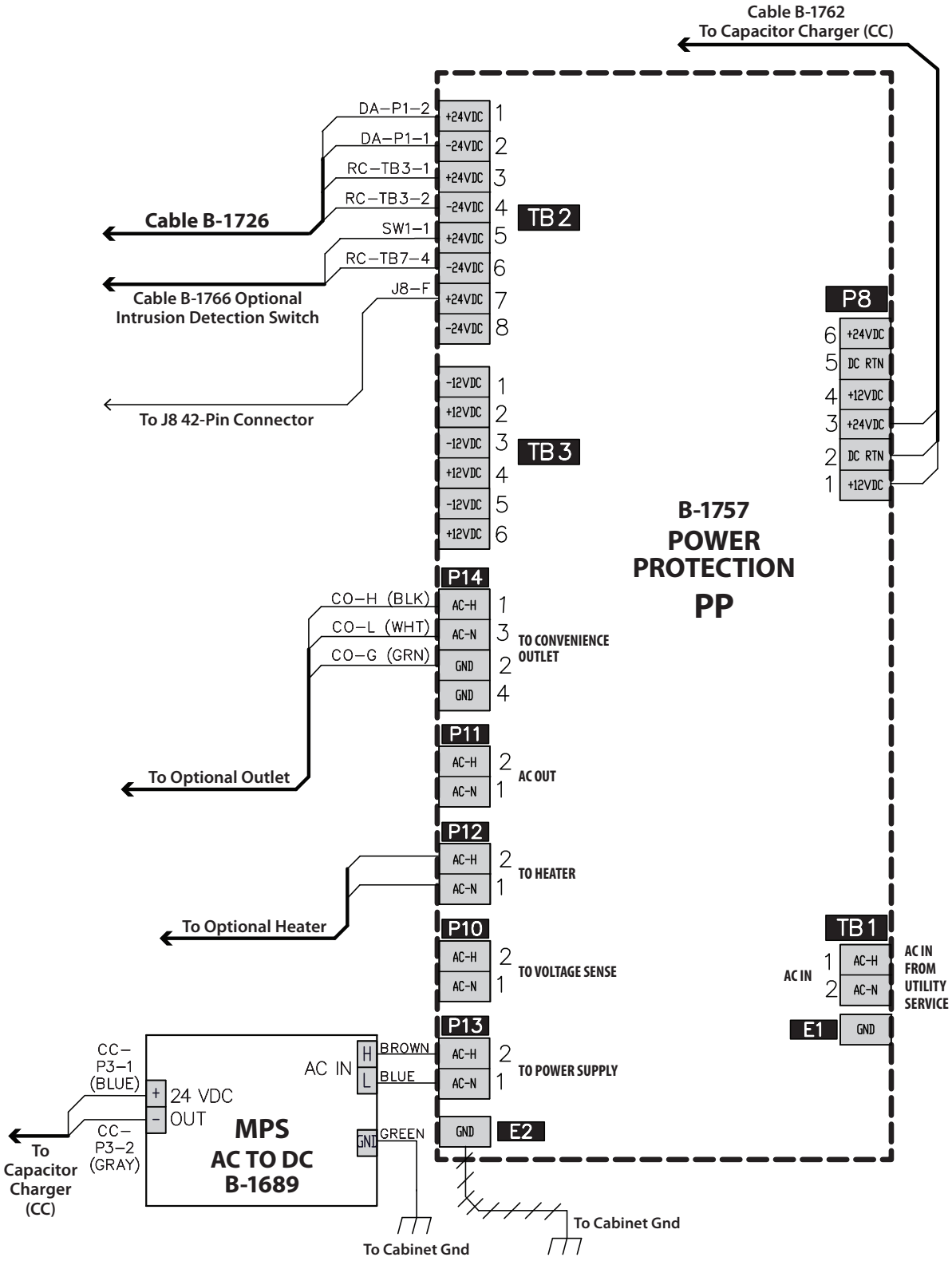
INPUT	FUNCTION
INPUT 1	52a-A
INPUT 3	69
INPUT 6	52a-B
INPUT 8	52a-C

OUTPUT	FUNCTION
OUTPUT 1	TRIP A
OUTPUT 2	CLOSE A
OUTPUT 5	TRIP B
OUTPUT 6	CLOSE B
OUTPUT 7	TRIP C
OUTPUT 8	CLOSE C

KEY:

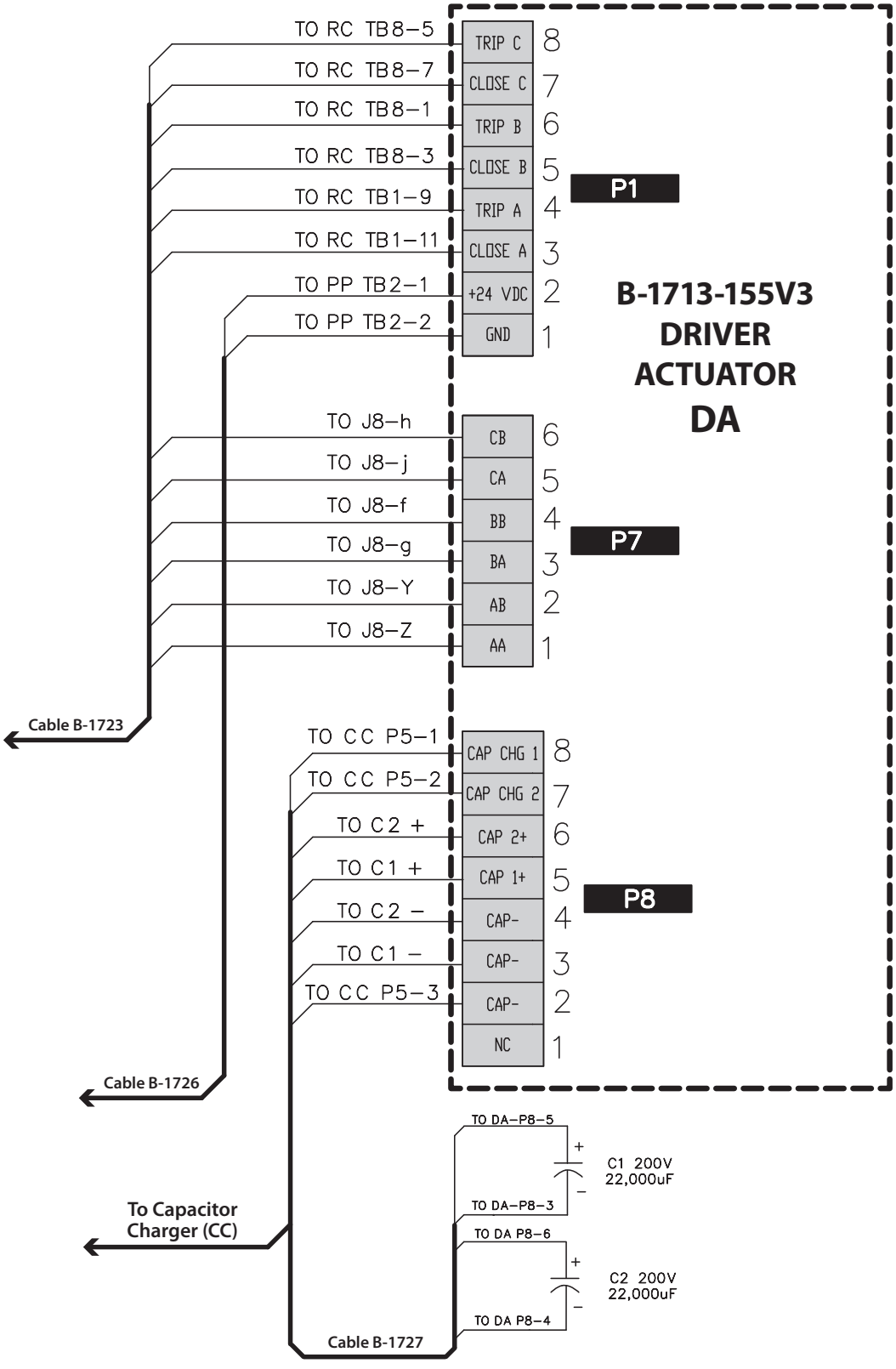
P1	Driver Actuator Figure 13(C)
CC	Capacitor Charger Figure 13(D)
PP	Power Protection Figure 13(B)
J8	32-Pin Receptacle Figure 13
DIP	Digital Input Protection Figure 13

Figure 13(A) Cabinet Interface 32B M-7679 Terminal Block (TB) Connections



KEY:	
J8	32-Pin Receptacle Figure 13
RC	M-7679 Recloser Control Terminal Blocks Figure 13(A)
DA	Driver Actuator Figure 13(C)
CC	Capacitor Charger Figure 13(D)

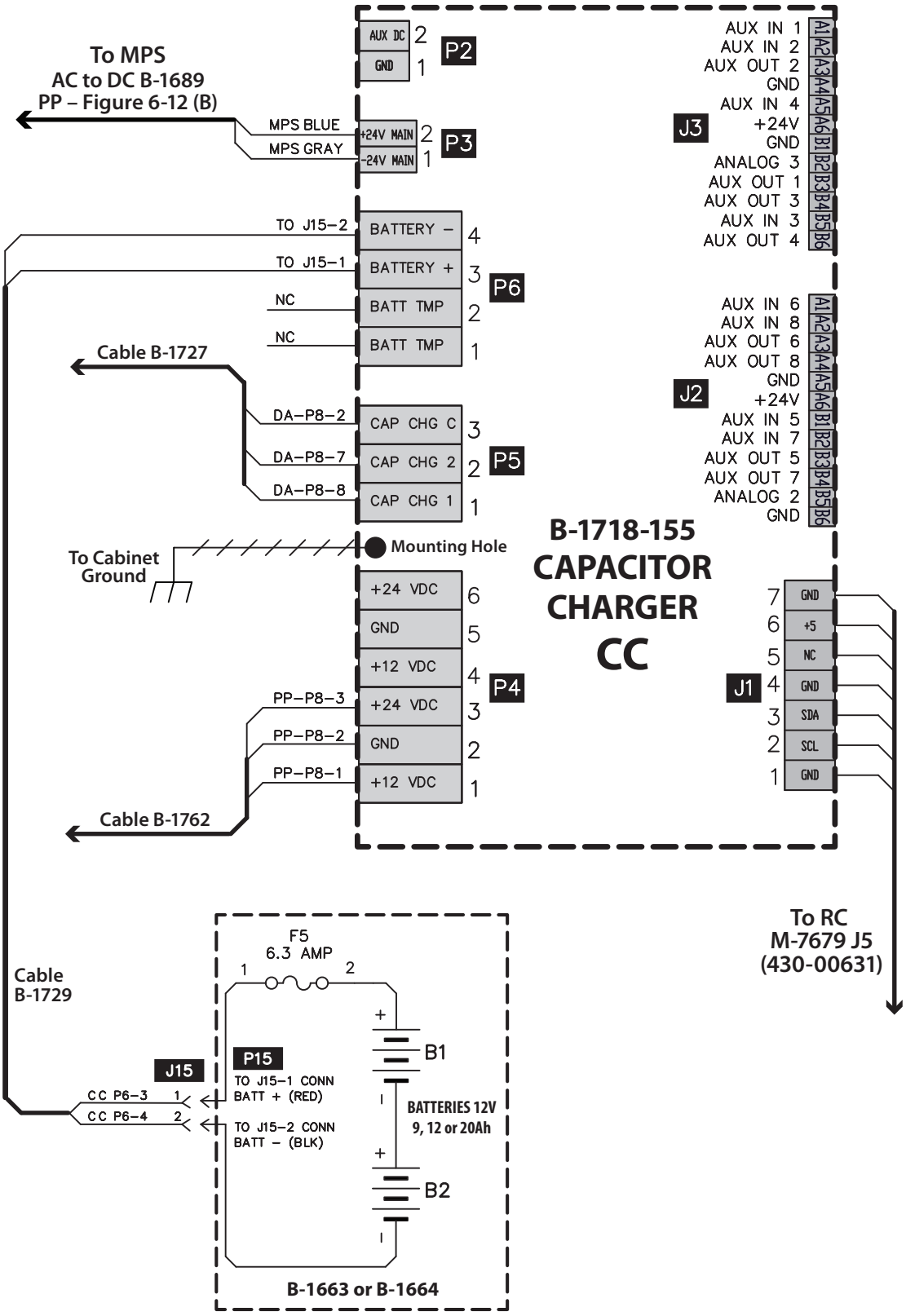
Figure 13(B) Cabinet Interface 32B Power Protection B-1756 Connections



KEY:

RC	M-7679 Recloser Control Terminal Blocks Figure 13(A)
PP	Power Protection Figure 13(B)
J8	32-Pin Receptacle Figure 13
CC	Capacitor Charger Figure 13(D)

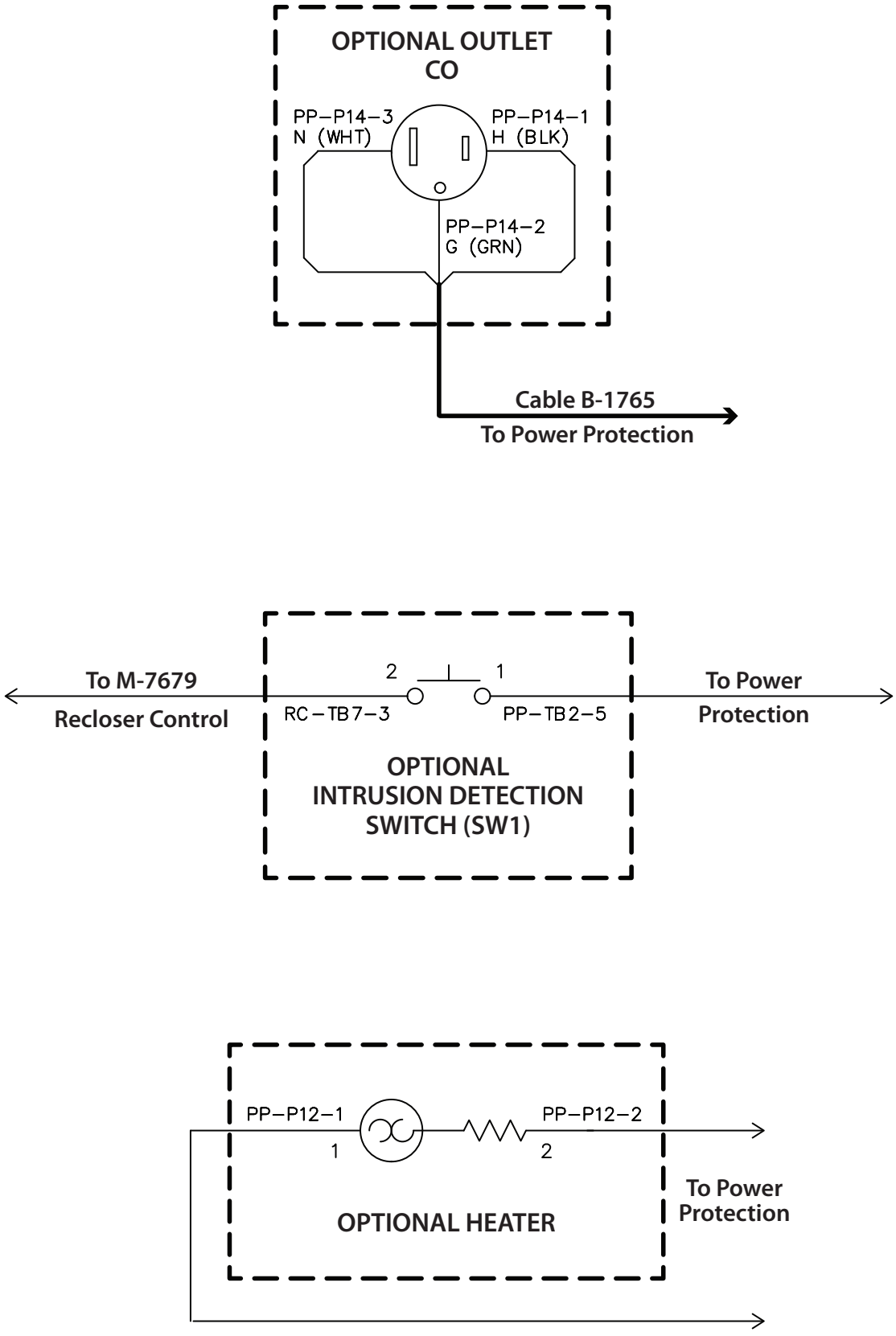
Figure 13(C) Cabinet Interface 32B Driver Actuator B-1713 Connections



KEY:

DA	Driver Actuator B-1713 Figure 13(C)
PP	Power Protection Figure 13(B)
RC	M-7679 Recloser Control Terminal Blocks Figure 13(A)

Figure 13(D) Cabinet Interface 32B Capacitor Charger B-1718 Connections

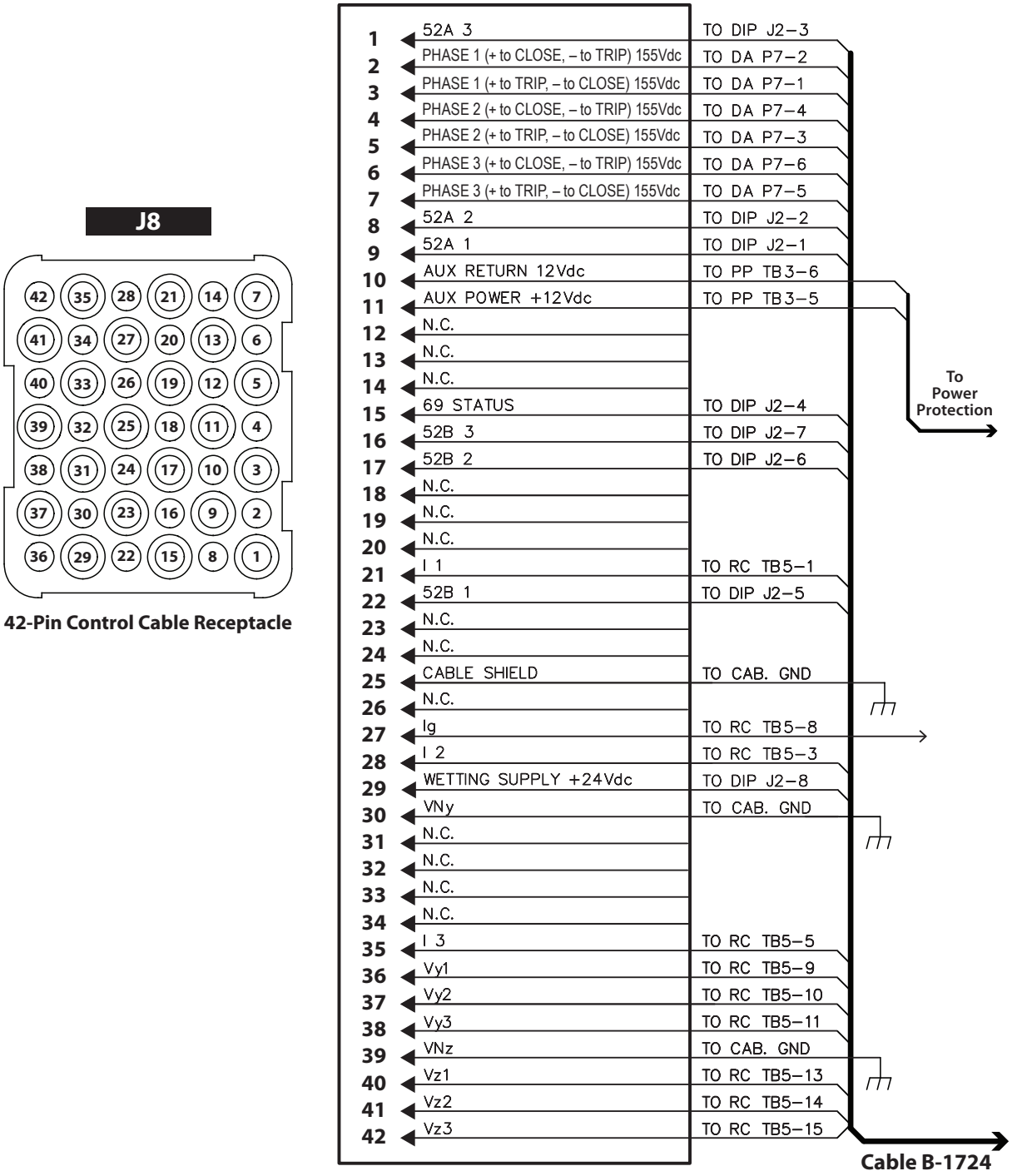


KEY:

PP	Power Protection Figure 13(B)
RC	M-7679 Recloser Control Terminal Blocks Figure 13(A)

Figure 13(E) Cabinet Interface 32B Optional Accessories Connections

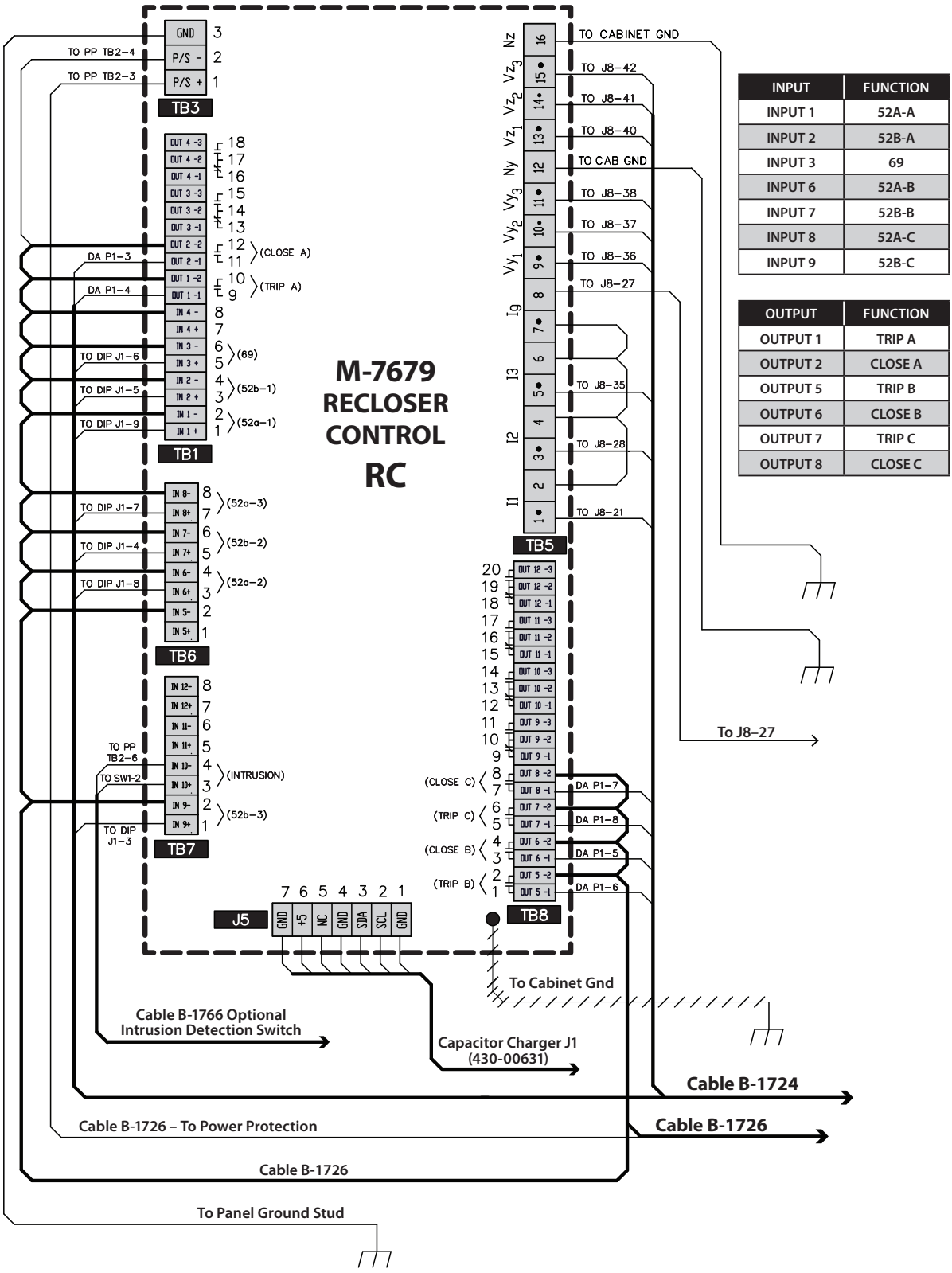
5.4 42B Multi-Recloser Interface (42-Pin)



KEY:

RC	M-7679 Recloser Control Terminal Blocks Figure 14
DA	B-1713 Driver Actuator Figure 14(C)
PP	B-1756 Power Protection Figure 14(B)
DIP	Digital Input Protection Figure 14(E)

Figure 14 Cabinet Interface 42B – 42 Pin Control Cable Receptacle Pinouts



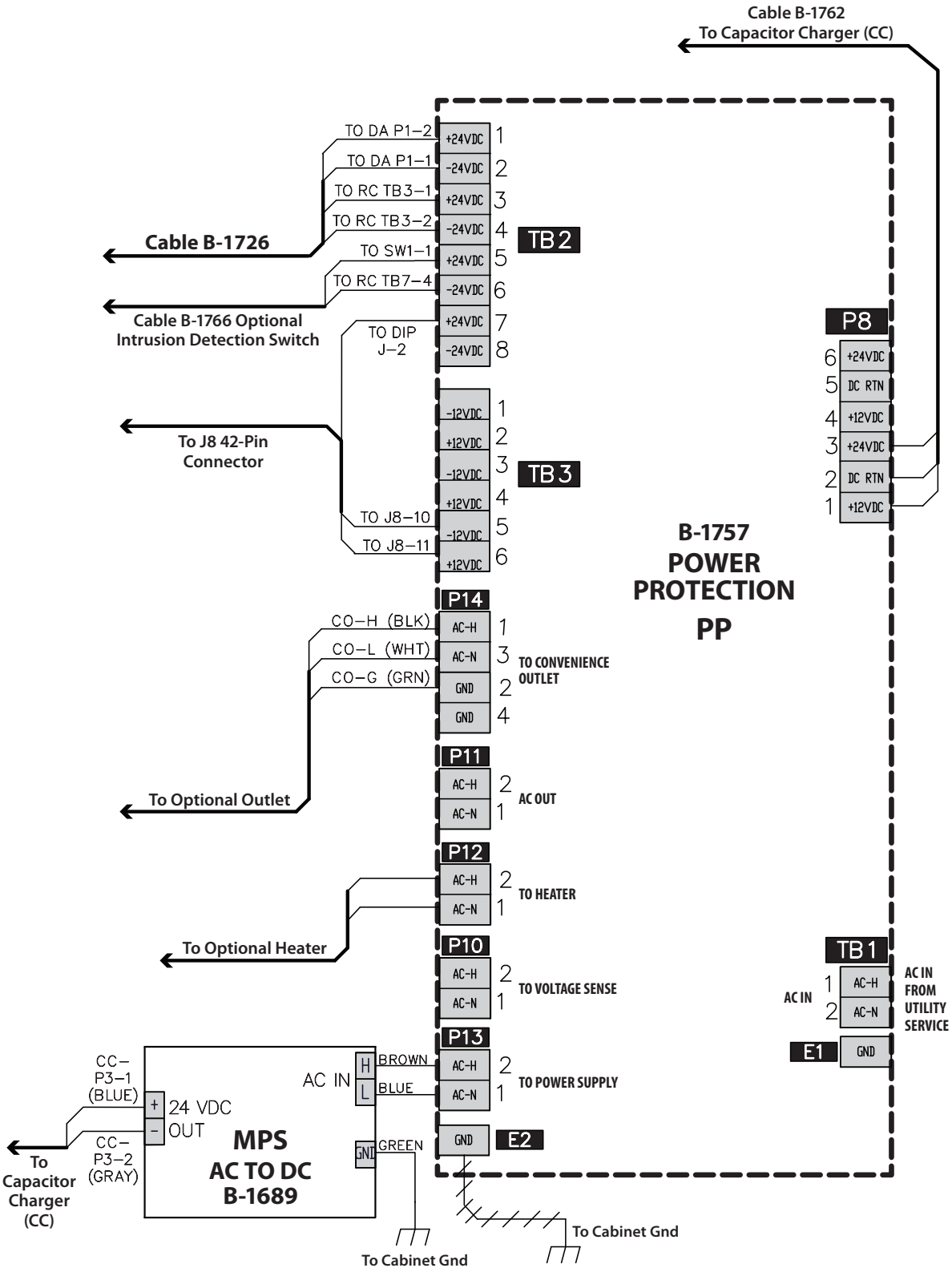
INPUT	FUNCTION
INPUT 1	52A-A
INPUT 2	52B-A
INPUT 3	69
INPUT 6	52A-B
INPUT 7	52B-B
INPUT 8	52A-C
INPUT 9	52B-C

OUTPUT	FUNCTION
OUTPUT 1	TRIP A
OUTPUT 2	CLOSE A
OUTPUT 5	TRIP B
OUTPUT 6	CLOSE B
OUTPUT 7	TRIP C
OUTPUT 8	CLOSE C

KEY:

J8	42-Pin Receptacle Figure 14
PP	B-1756 Power Protection Figure 14(B)
DA	B-1713 Driver Actuator Figure 14(C)
DIP	Digital Input Protection Figure 14(E)

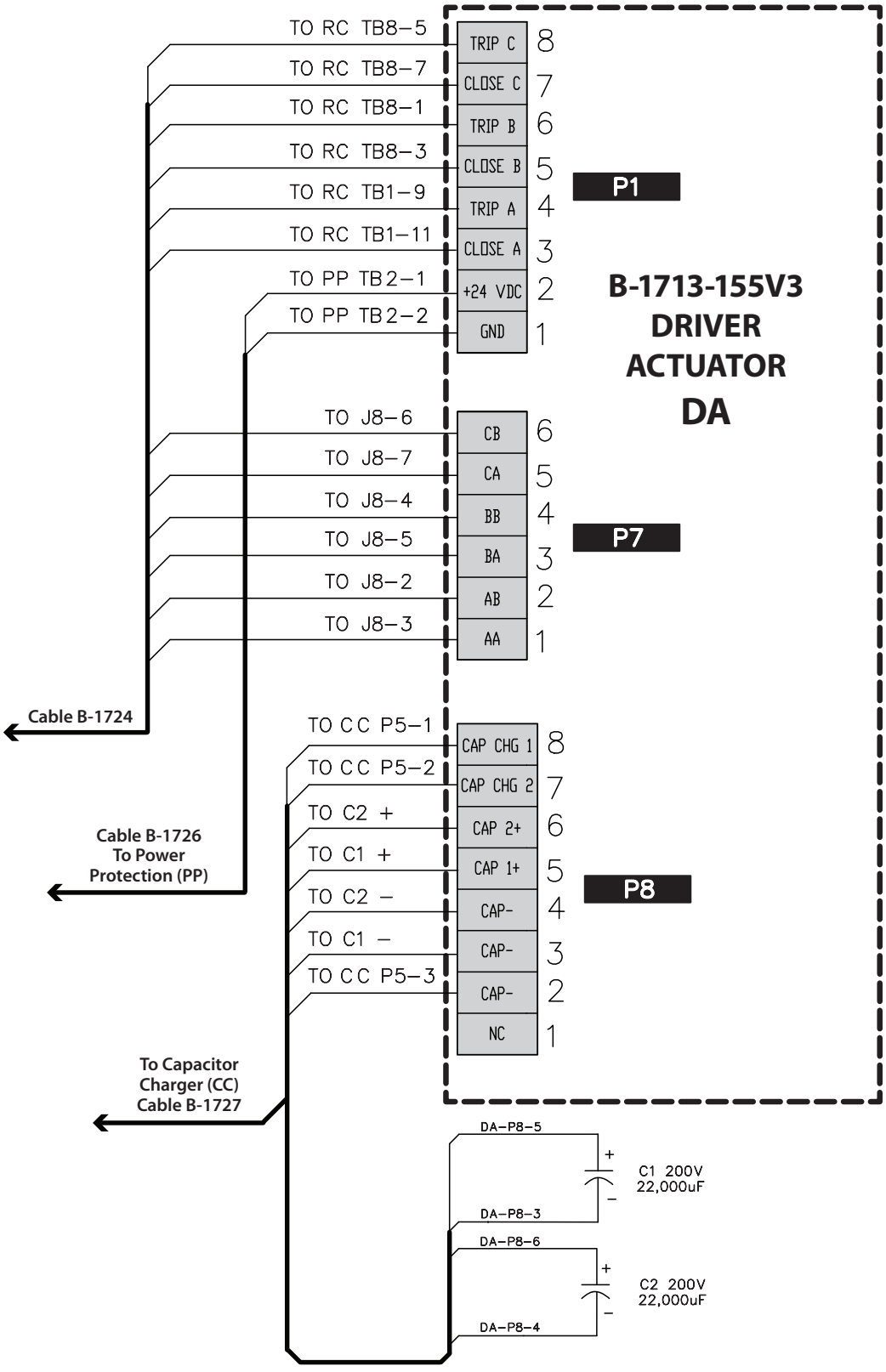
Figure 14(A) Cabinet Interface 42B M-7679 Recloser Control Connections



KEY:

J8	42-Pin Receptacle Figure 14
RC	M-7679 Recloser Control Terminal Blocks Figure 14(A)
DA	B-1713 Driver Actuator Figure 14(C)
CC	B-1718 Capacitor Charger Figure 14(D)

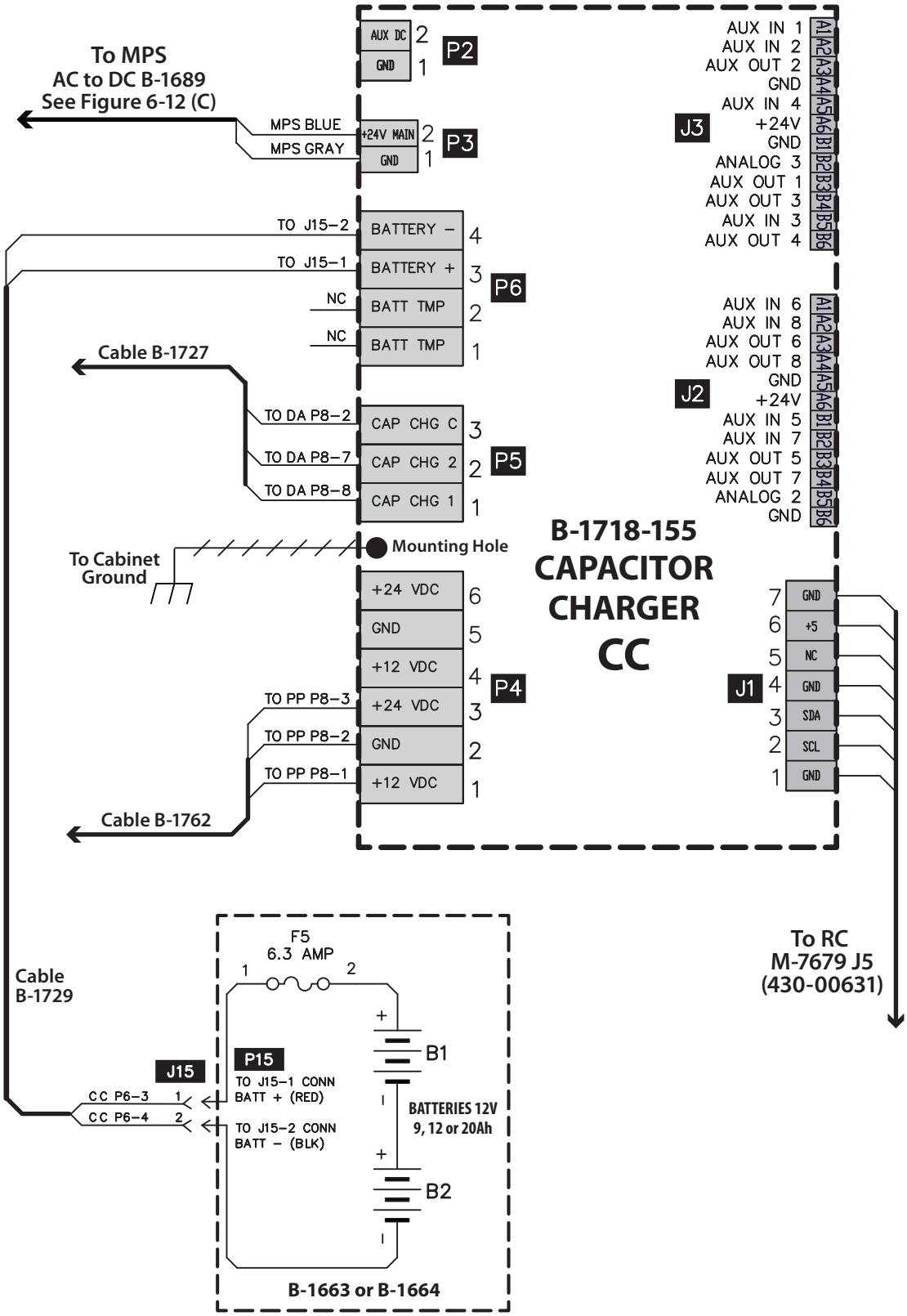
Figure 14(B) Cabinet Interface 42B Power Protection B-1756 Connections



KEY:

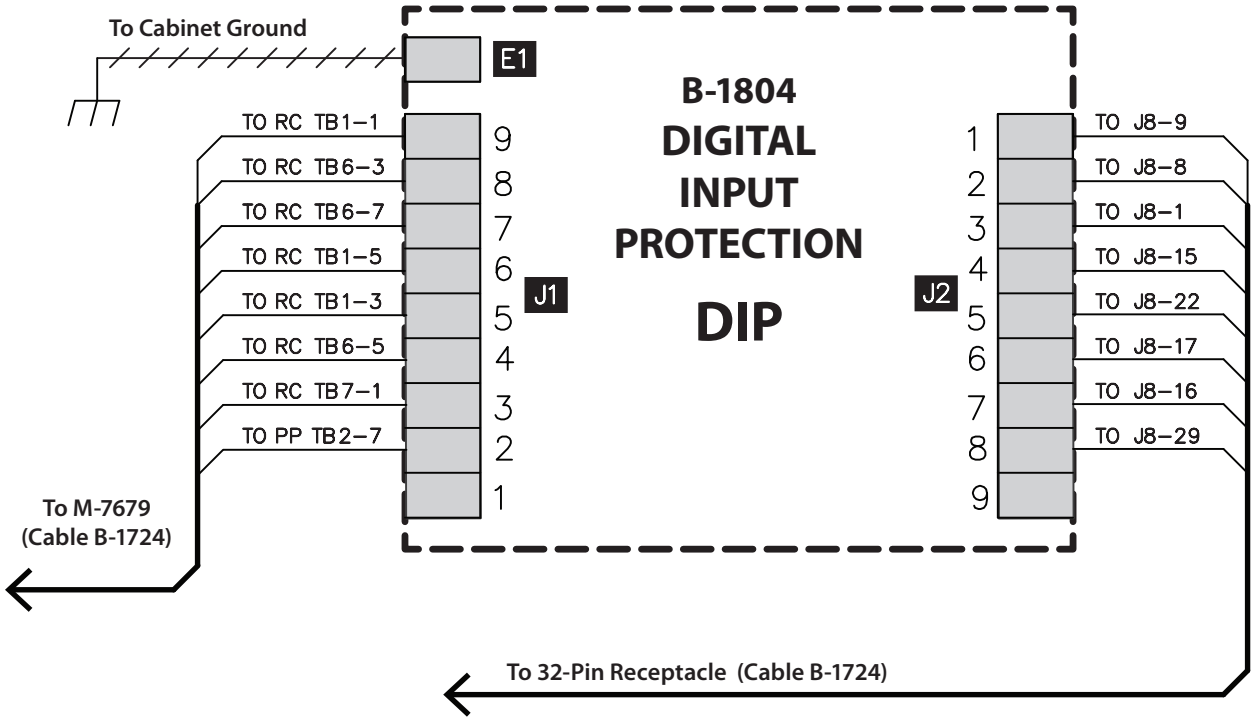
RC	M-7679 Recloser Control Terminal Blocks Figure 14(A)
PP	B-1756 Power Protection Figure 14(B)
J8	42-Pin Receptacle Figure 14
CC	B-1718 Capacitor Charger Figure 14(D)

Figure 14(C) Cabinet Interface 42B Driver Actuator B-1713 Connections



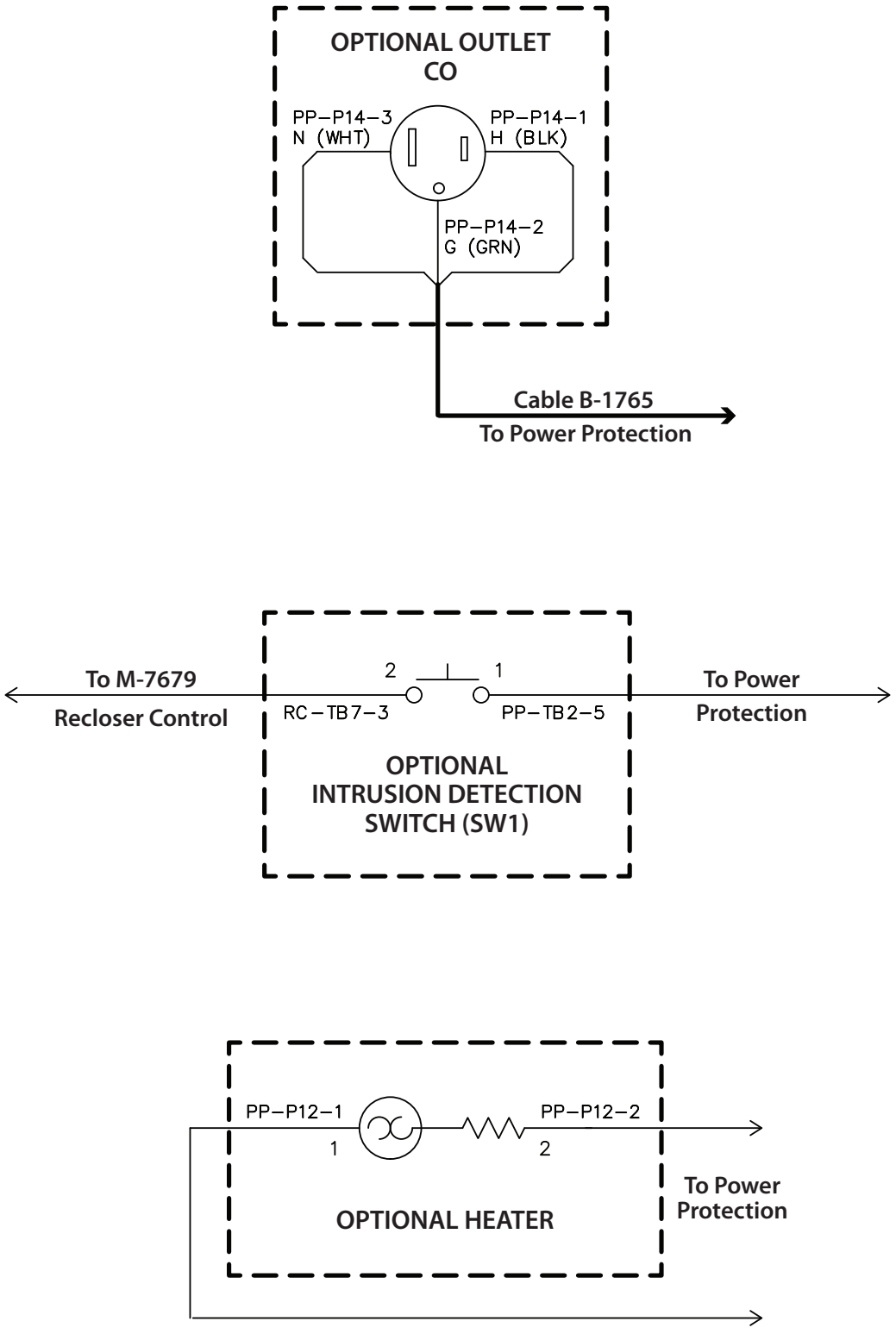
KEY:	
RC	M-7679 Recloser Control Terminal Blocks Figure 14(A)
PP	B-1756 Power Protection Figure 14(B)
DA	B-1713 Driver Actuator Figure 14(C)

Figure 14(D) Cabinet Interface 42B Capacitor Charger B-1718 Connections



KEY:	
RC	M-7679 Recloser Control Terminal Blocks Figure 14(A)
J8	42-Pin Receptacle Figure 14

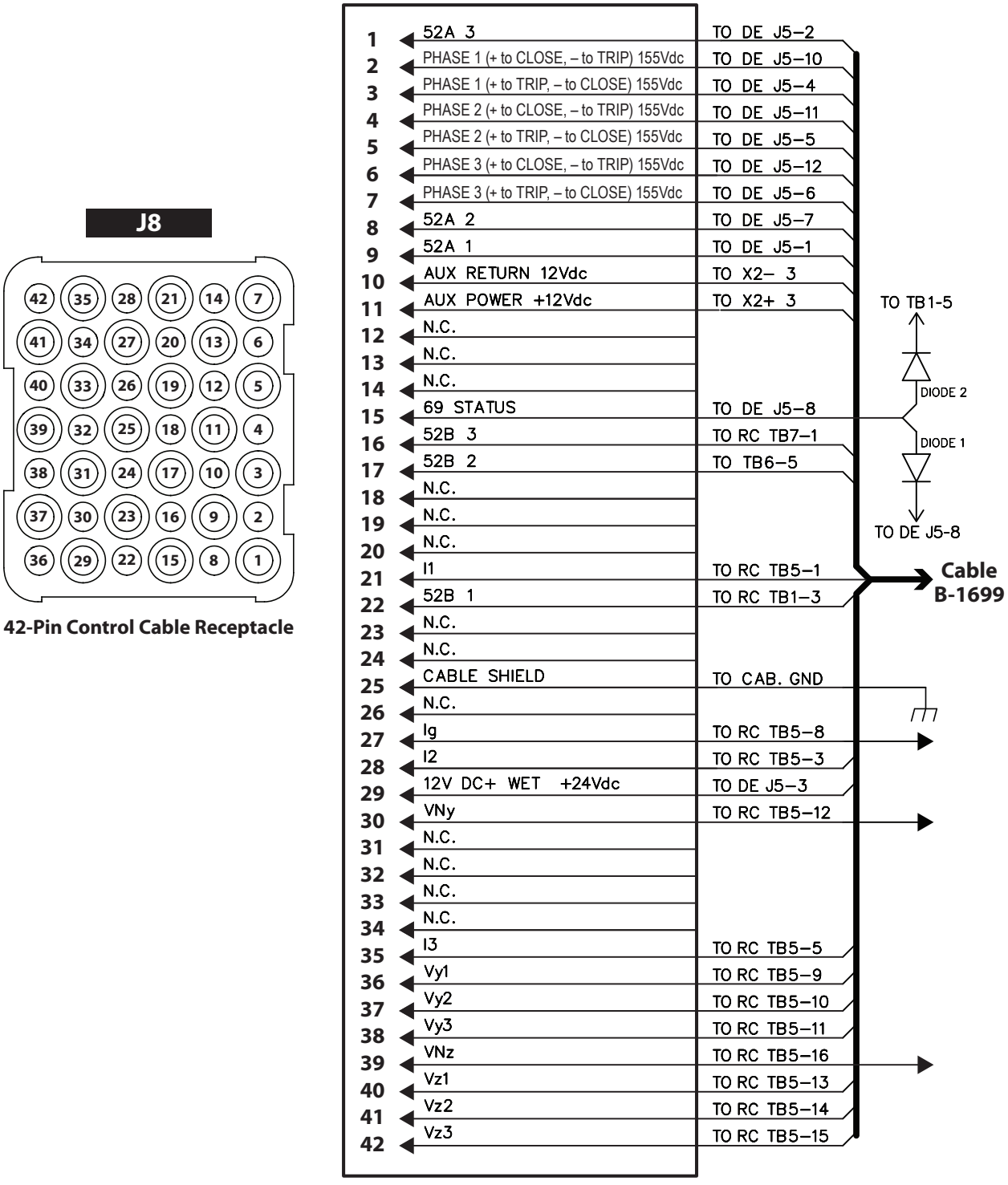
Figure 14(E) Cabinet Interface 42B Digital Input Protection B-1804 Connections



KEY:	
PP	B-1756 Power Protection Figure 14(B)
RC	M-7679 Recloser Control Terminal Blocks Figure 14(A)

Figure 14(F) Cabinet Interface 42B Optional Accessories Connections

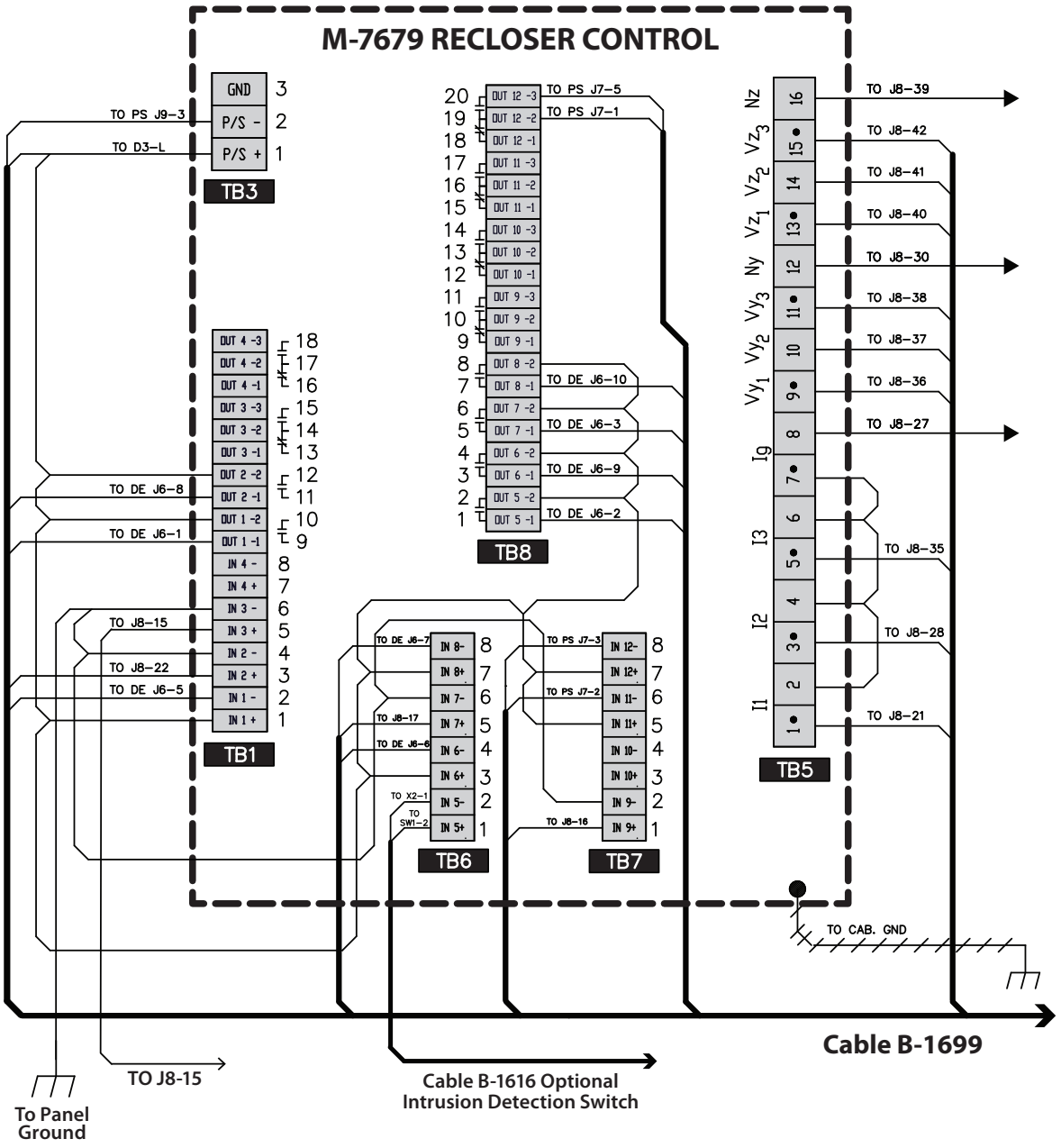
5.5 42V G&W VRC Viper ST/LT Recloser Cabinet (42-Pin)



KEY:

DE	Driving Electronics Figure 15(C)
RC	M-7679 Recloser Control Terminal Blocks Figure 15(A)
X2	DIN Rail Figure 15(B)

Figure 15 Cabinet Interface 42V – 42 Pin Control Cable Receptacle Pinouts



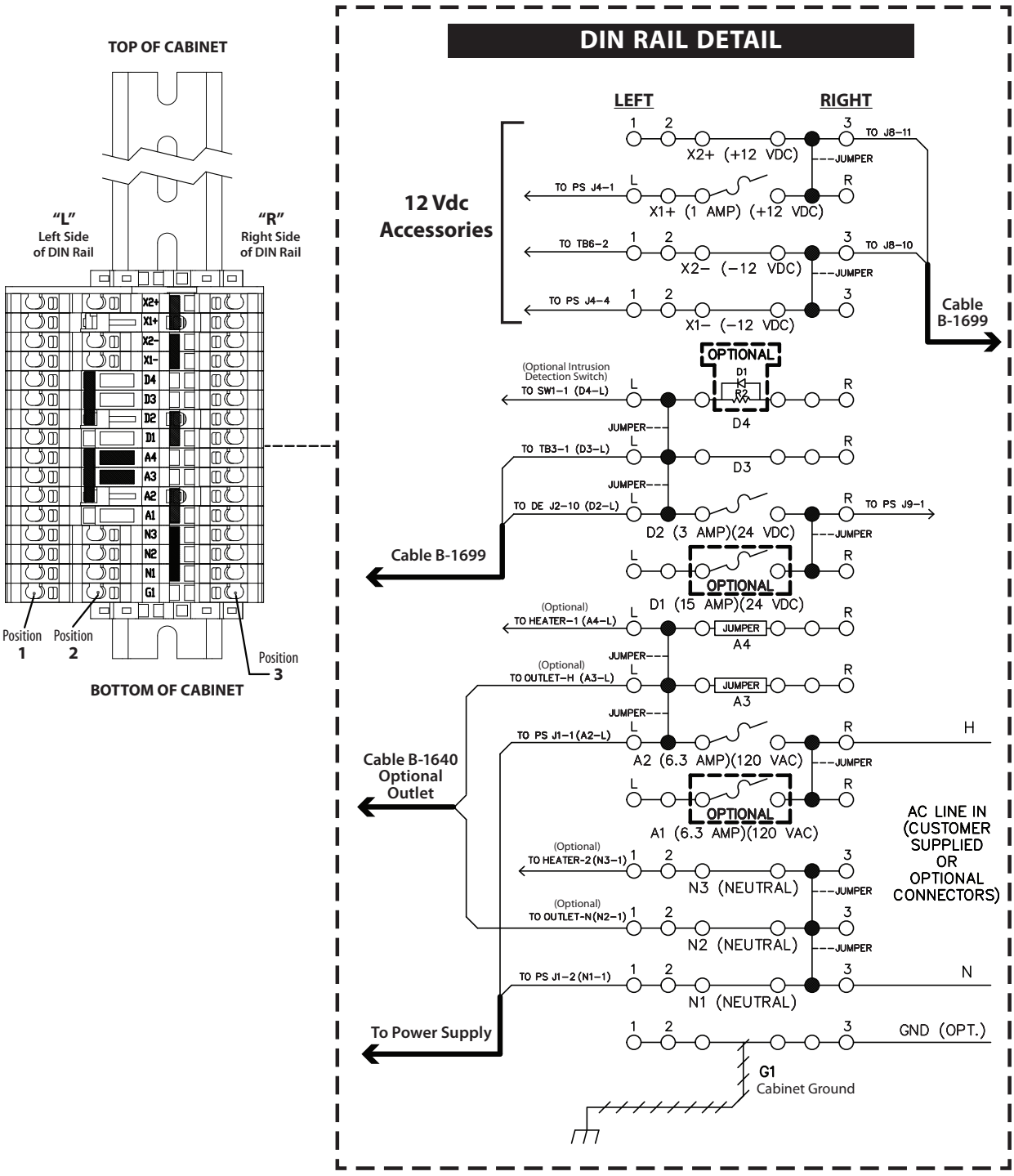
INPUT	FUNCTION
INPUT 1	52A-A
INPUT 2	52B-A
INPUT 3	69
INPUT 6	52A-B
INPUT 7	52B-B
INPUT 8	52A-C
INPUT 9	52B-C
INPUT 11	BATT ALARM
INPUT 12	AC STATUS

OUTPUT	FUNCTION
OUTPUT 1	TRIP A
OUTPUT 2	CLOSE A
OUTPUT 5	TRIP B
OUTPUT 6	CLOSE B
OUTPUT 7	TRIP C
OUTPUT 8	CLOSE C
OUTPUT 12	BATT TEST

KEY:

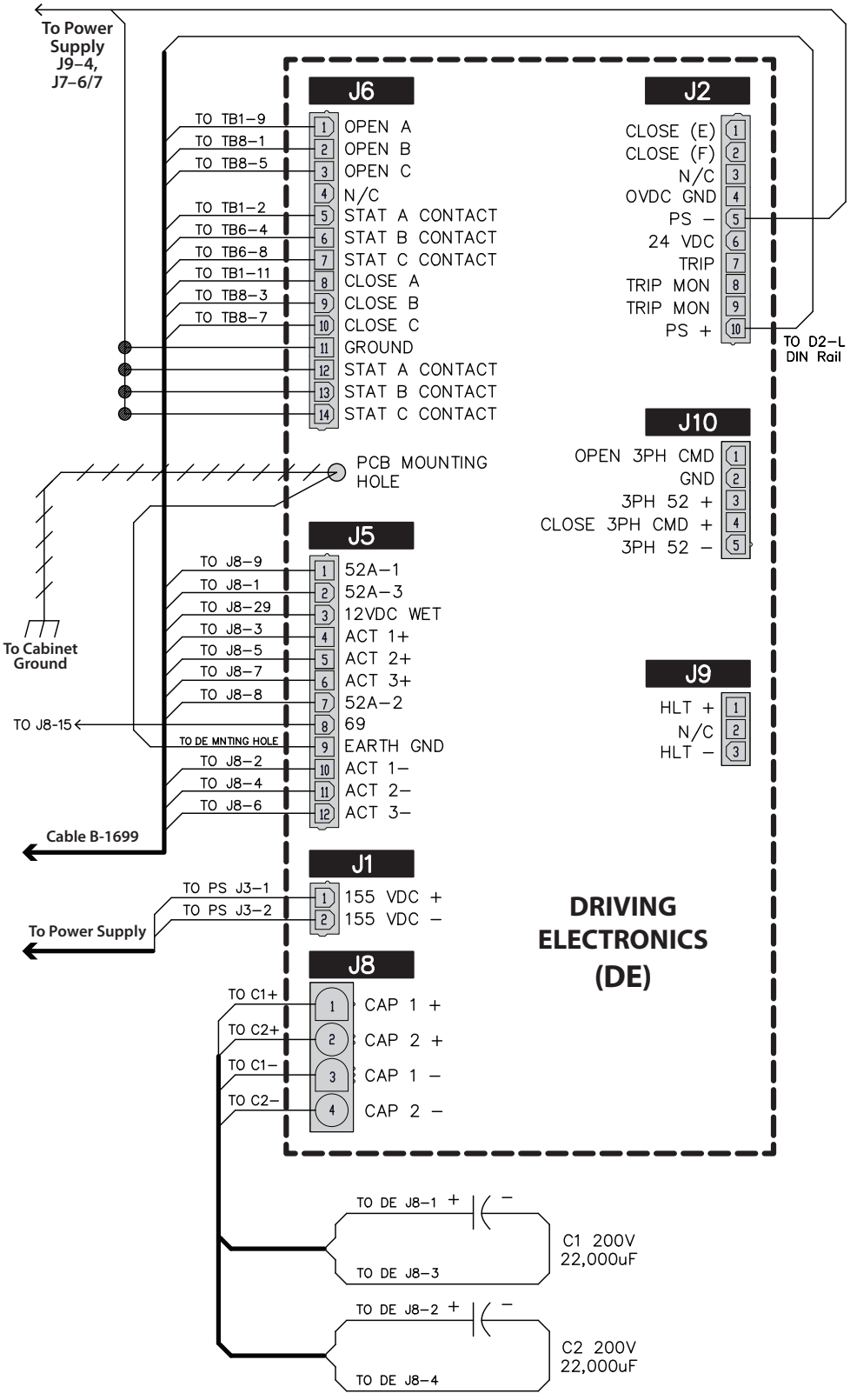
DE	Driving Electronics Figure 15(C)
PS	Power Supply Figure 15(D)
X2, D3	DIN Rail Figure 15(B)
J8	42-Pin Receptacle Figure 15

Figure 15(A) Cabinet Interface 42V M-7679 Terminal Block (TB) Connections



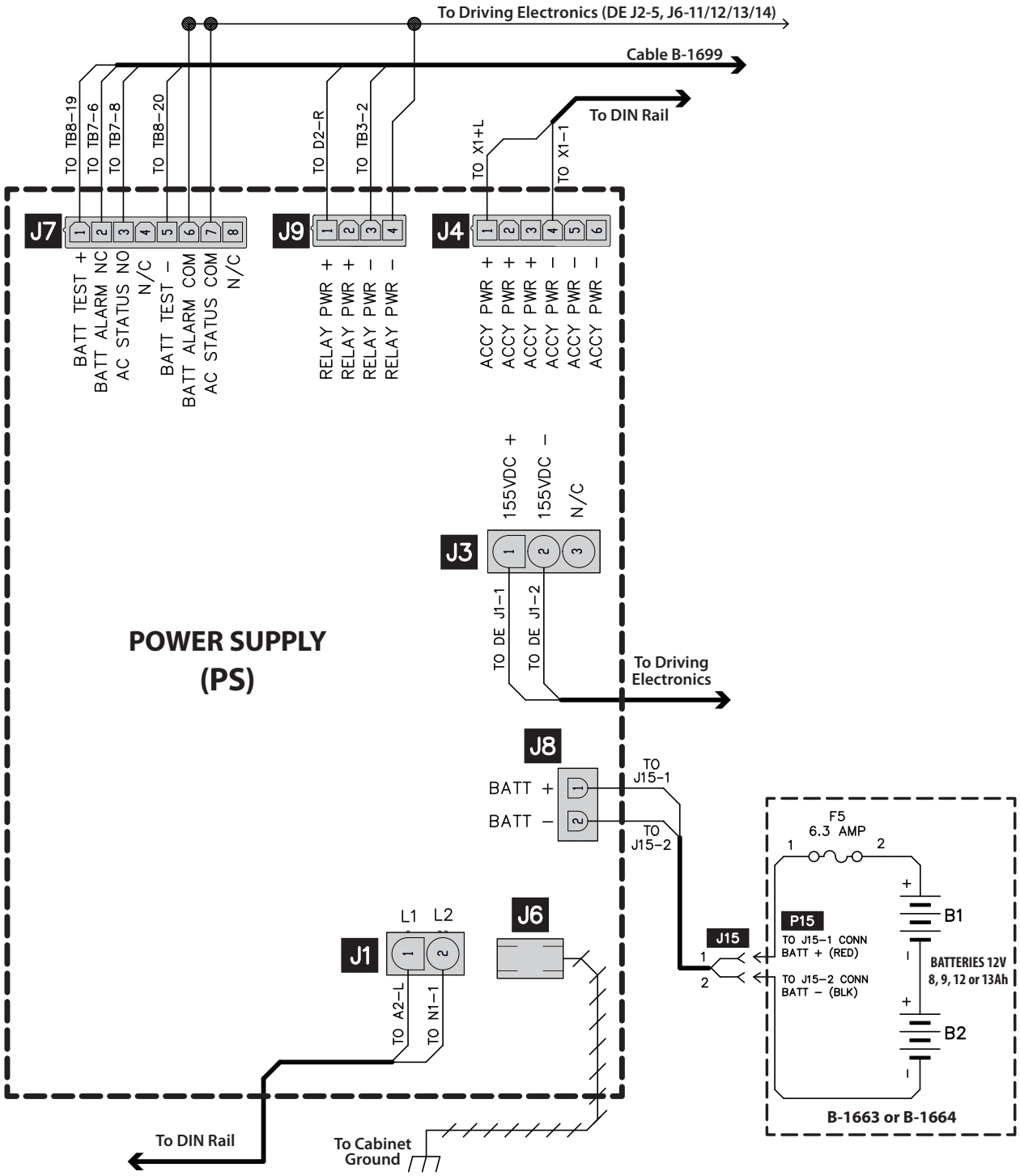
KEY:	
DE	Driving Electronics Figure 15(C)
PS	Power Supply Figure 15(D)
J8	42-Pin Receptacle Figure 15
TB3/6	M-7679 Recloser Control Terminal Blocks Figure 15(A)

Figure 15(B) Cabinet Interface 42V DIN Rail Connections



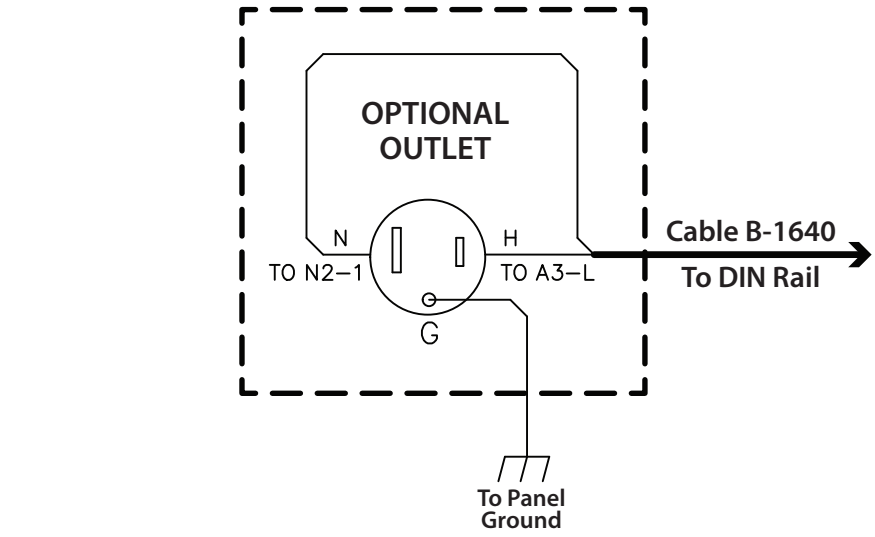
KEY:	
J8	42-Pin Receptacle Figure 15
TB1/6/8	M-7679 Recloser Control Terminal Blocks Figure 15(A)
PS	Power Supply Figure 15(D)
D2	DIN Rail Figure 15(B)

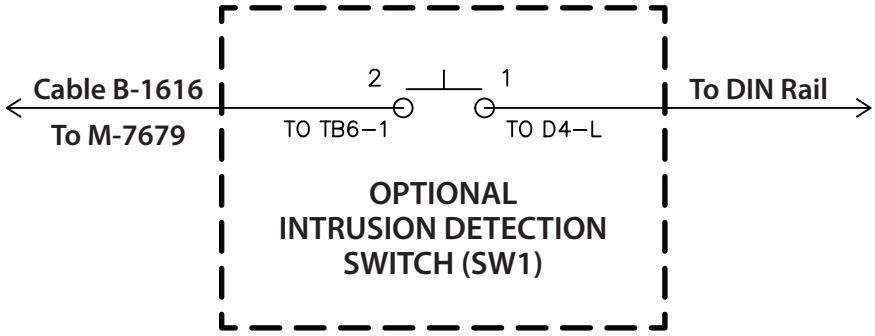
Figure 15(C) Cabinet Interface 42V Driving Electronics (DE) Connections

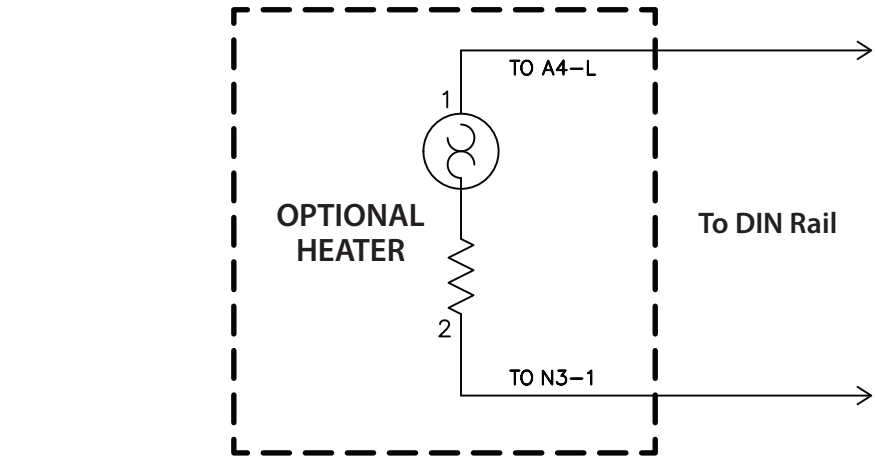


KEY:	
DE	Driving Electronics Figure 15(C)
TB3/7/8	M-7679 Recloser Control Terminal Blocks Figure 15(A)
X1, D2, A2, N1	DIN Rail Figure 15(B)

Figure 15(D) Cabinet Interface 42V Power Supply (PS) Connections



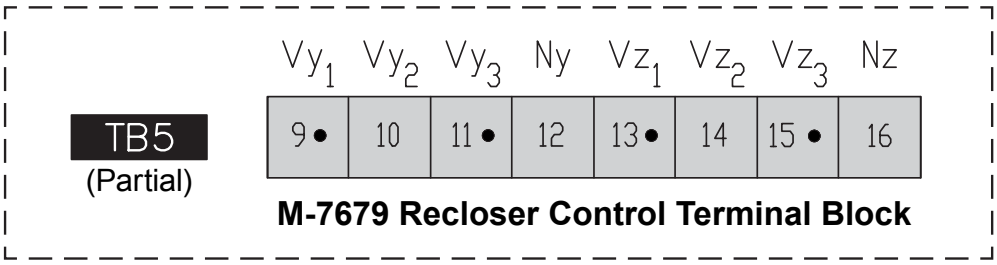


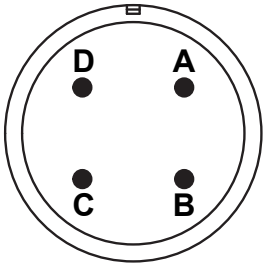


KEY:	
N2/3, A3/4, D4	DIN Rail Figure 15(B)
TB6	M-7679 Recloser Control Terminal Blocks Figure 15(A)

Figure 15(E) Cabinet Interface 42V Optional Accessories Connections

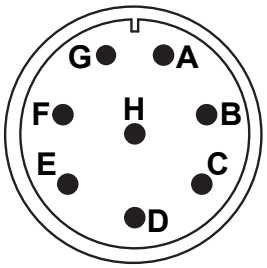
6.0 Optional Connectors





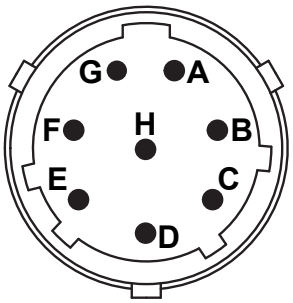
B-1675 J11

B-1675 4-Pin 120 Vac Voltage Sensing Cable	
PIN	**CONNECTION**
A	TB5-9 (Vy_1)
B	TB5-10 (Vy_2)
C	TB5-11 (Vy_3)
D	TB5-12 (Ny)



B-1676 J11

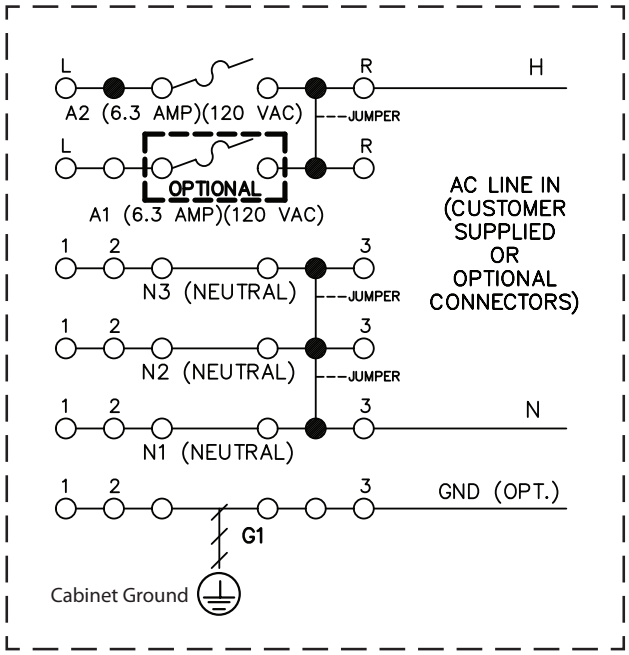
B-1676 8-Pin Multi-Turn, 120 Vac Voltage Sensing Cable			
PIN	**CONNECTION**	**PIN**	**CONNECTION**
A	TB5-9 (Vy_1)	E	TB5-13 (Vz_1)
B	TB5-10 (Vy_2)	F	TB5-14 (Vz_2)
C	TB5-11 (Vy_3)	G	TB5-15 (Vz_3)
D	TB5-12 (Ny)	H	TB5-16 (Nz)



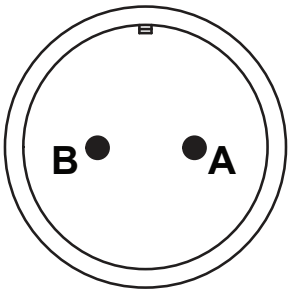
B-1678 J11

B-1678 8-Pin 1/4 Turn, LEA Voltage Sensing Cable			
PIN	**CONNECTION**	**PIN**	**CONNECTION**
A	TB5-9 (Vy_1)	E	TB5-13 (Vz_1)
B	TB5-10 (Vy_2)	F	TB5-14 (Vz_2)
C	TB5-11 (Vy_3)	G	TB5-15 (Vz_3)
D	TB5-12 (Ny)	H	TB5-16 (Nz)

Figure 16 M-7679 Optional Voltage Sensing Connectors

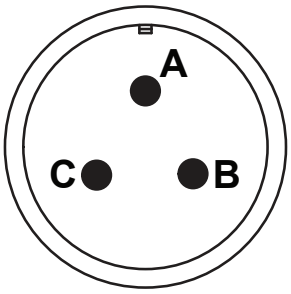


M-7679 Recloser Control Cabinet
DIN Rail (Partial)



B-1690
J10

B-1690 2-Pin Cannon AC Input Cable	
PIN	**DIN RAIL CONNECTION**
A	A2-R (AC Input, Line)
B	N1-3 (AC Input, Neutral)

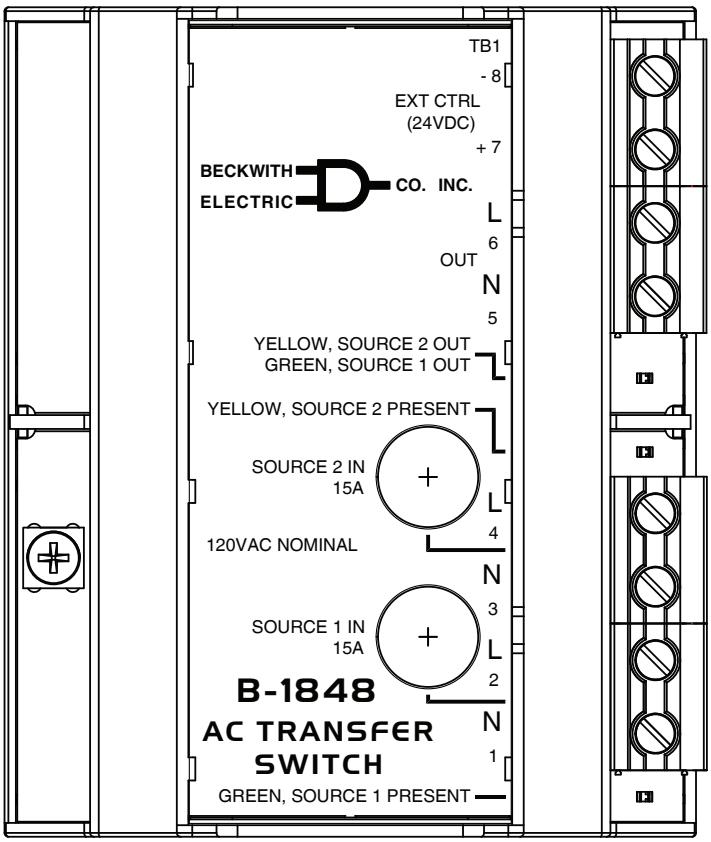


B-1691
J10

B-1691 3-Pin Cannon AC Input Cable	
PIN	**DIN RAIL CONNECTION**
A	A2-R (AC Input, Line)
B	N1-3 (AC Input, Neutral)
C	G1-3 (AC Input, Ground)

Figure 17 M-7679 Optional AC Power Input Connectors (B-1690, B-1691)

B-1848 AC Transfer Switch

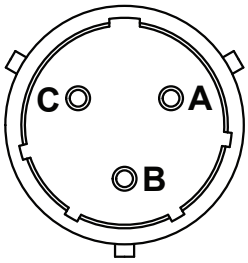


TB1 Terminals

Source 2 AC Input
TB1-4: AC-H
TB1-3: AC-N

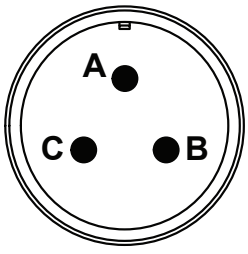
Output To B-1756 Power Protection
TB1-6: AC-H (TB1-1)
TB1-5: AC-N (TB1-2)

Source 1 AC Input
TB1-2: AC-H
TB1-1: AC-N



B-1776
J1

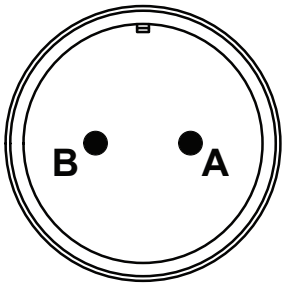
B-1776 3-Pin Cannon AC Input Cable, 3BQ	
PIN	**AC TRANSFER SWITCH CONNECTION**
A	SOURCE 1 or 2 (AC Input, Line)
B	SOURCE 1 or 2 (AC Input, Neutral)
PIN	**TO POWER PROTECTION – B-1756**
C	E1 (AC Input, Ground)



B-1777
J10

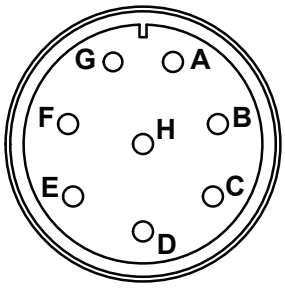
B-1777 3-Pin Cannon AC Input Cable, 3CT	
PIN	**AC TRANSFER SWITCH CONNECTION**
A	SOURCE 1 or 2 (AC Input, Line)
B	SOURCE 1 or 2 (AC Input, Neutral)
PIN	**TO POWER PROTECTION – B-1756**
C	E1 (AC Input, Ground)

Figure 18 Optional AC Transfer Switch (B-1848), AC Power Input Connectors (B-1776, B-1777)



B-1778
J10

B-1778 2-Pin Cannon AC Input Cable, 2BT	
PIN	**AC TRANSFER SWITCH CONNECTION**
A	SOURCE 1 or 2 (AC Input, Line)
B	SOURCE 1 or 2 (AC Input, Neutral)



B-1779

B-1779 8-Pin Cannon AC Input Cable, 8BT	
PIN	**AC TRANSFER SWITCH CONNECTION**
A	SOURCE 1 (AC Input, Line)
D	SOURCE 1 (AC Input, Neutral)
E	SOURCE 2 (AC Input, Line)
H	SOURCE 2 (AC Input, Neutral)

Figure 19 M-7679 Optional AC Power Input Connectors (B-1778, B-1779)

7.0 Universal Radio Shelf

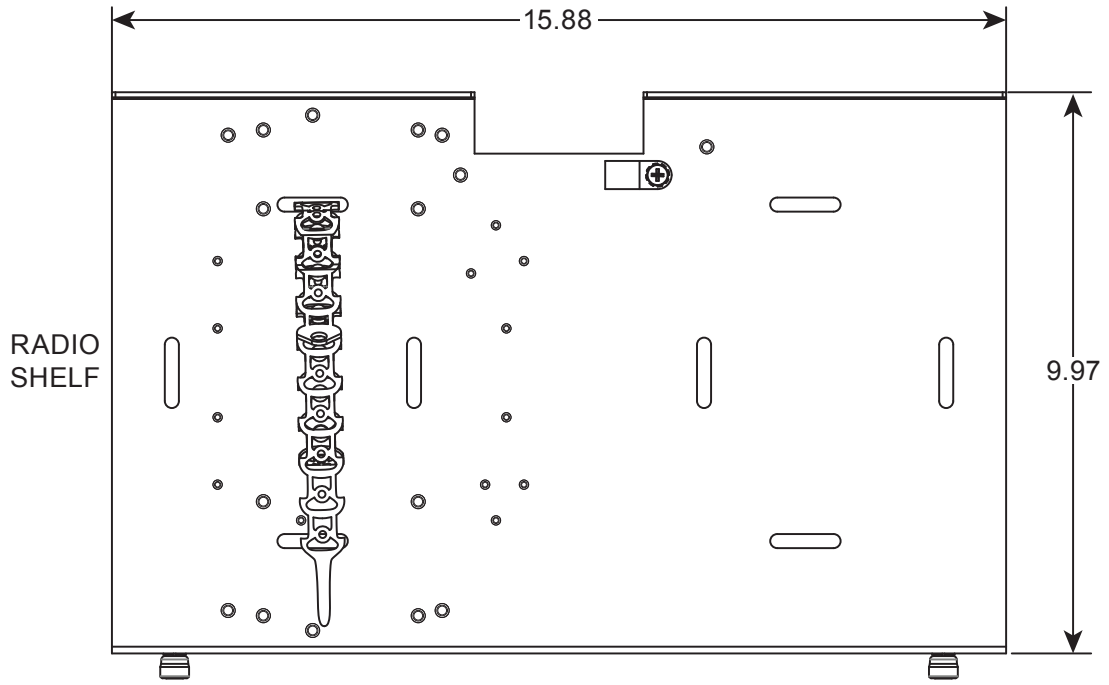


Figure 20 Universal Radio Shelf Dimensions

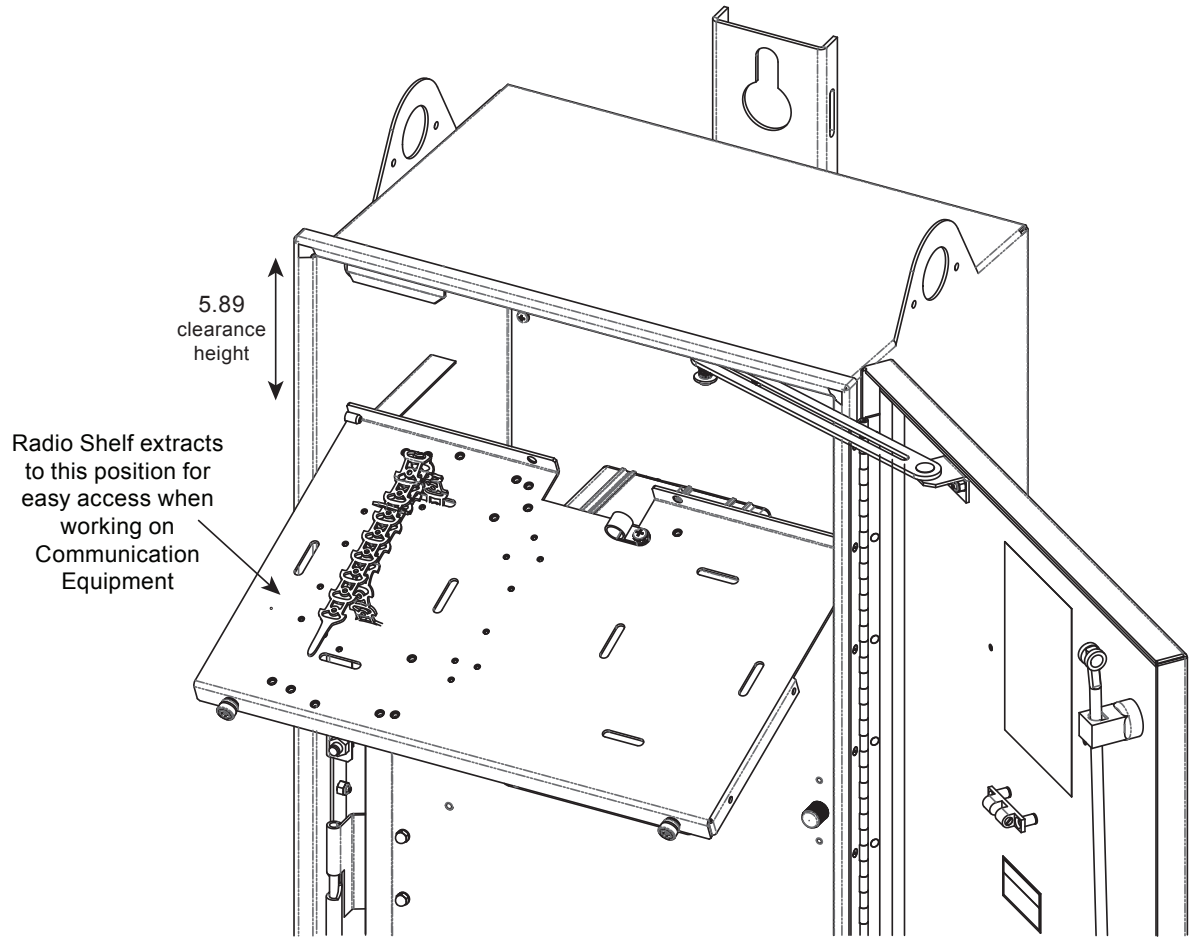


Figure 21 Radio Shelf Extended

RADIO MOUNTING DIAGRAMS QUICK REFERENCE	
RADIO	**FIGURE NUMBER**
Airlink Raven X or GS & GX Series	Figure 22
Airlink Raven XE, XT or RV50	Figure 23
Silver Springs	Figure 24
Sixnet 5XXX	Figure 25
Sixnet 6XXX	Figure 26
Utilinet/Gridstream	Figure 27
Zywan	Figure 28
MDS INET or entraNET	Figure 29
MDS SD	Figure 30
MDS TransNET	Figure 31
MDS X710	Figure 32

Table 1 Radio Mounting Diagrams Quick Reference Table

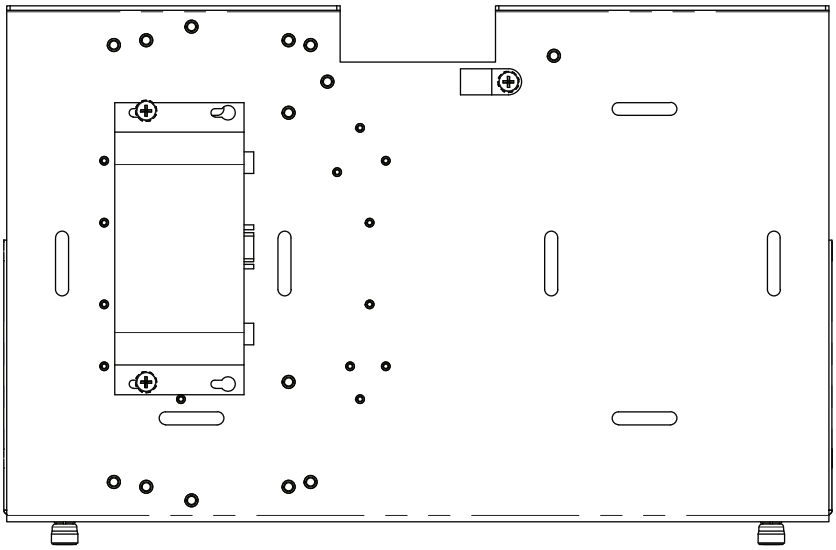


Figure 22 Airlink Raven X or GS & GX Series

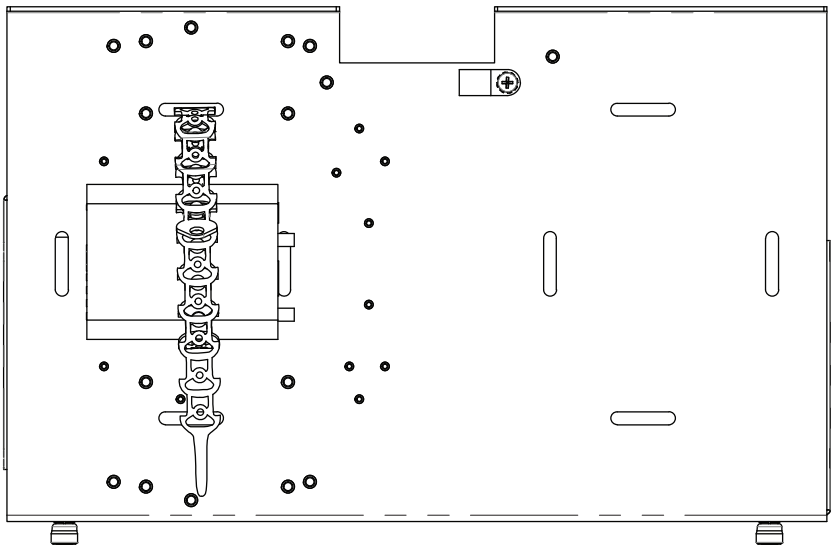


Figure 23 Airlink Raven XE, XT or RV50

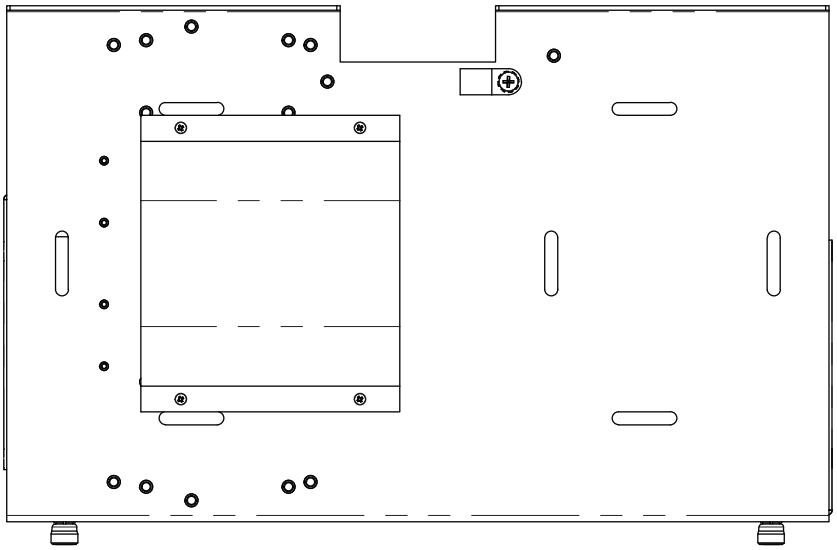


Figure 24 Silver Springs

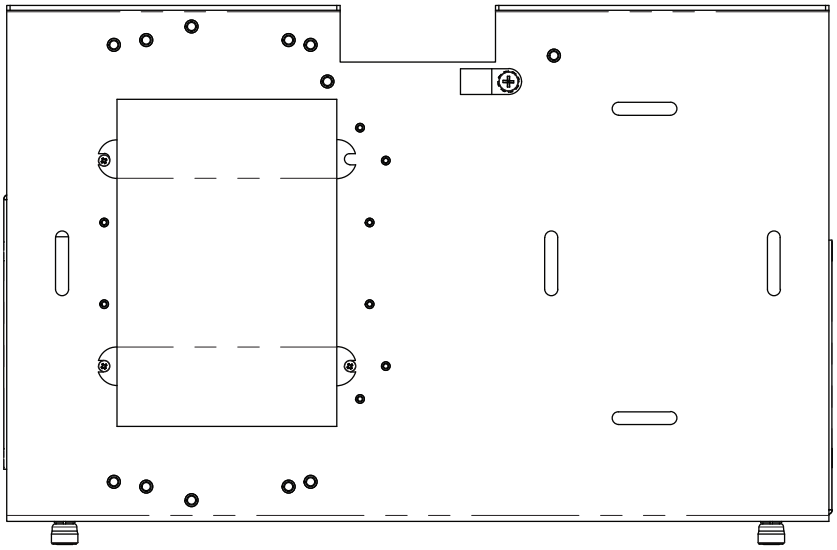


Figure 25 Sixnet 5XXX

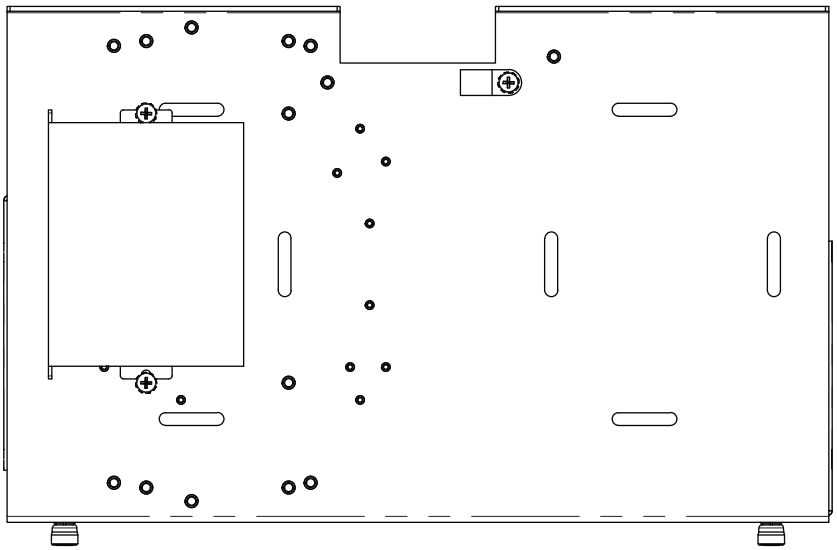


Figure 26 Sixnet 6XXX

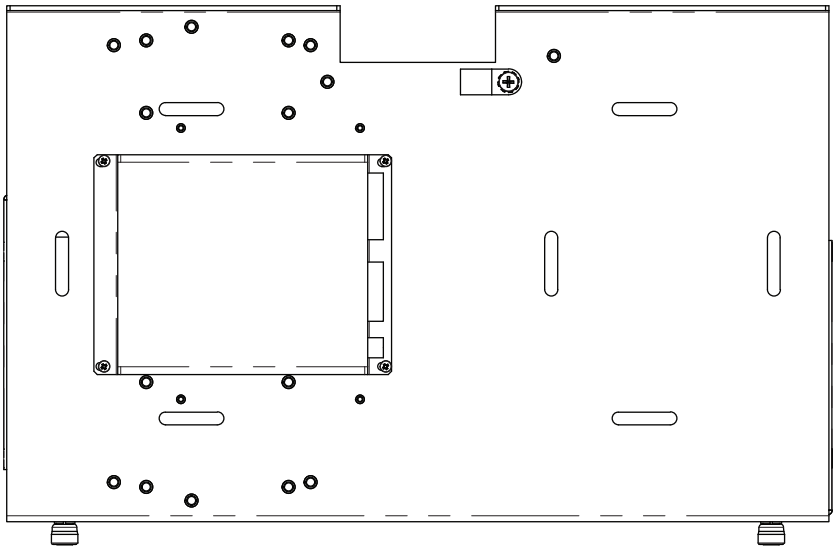


Figure 27 Utilinet/Gridstream

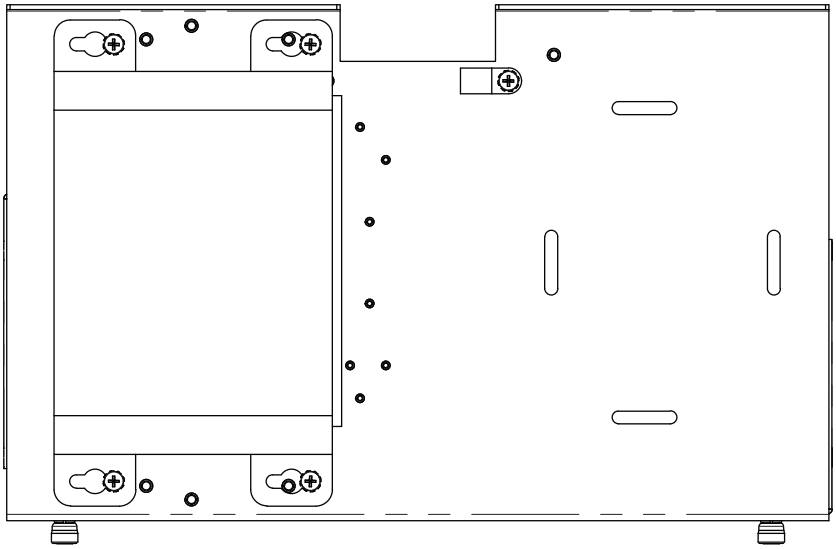


Figure 28 Zywan

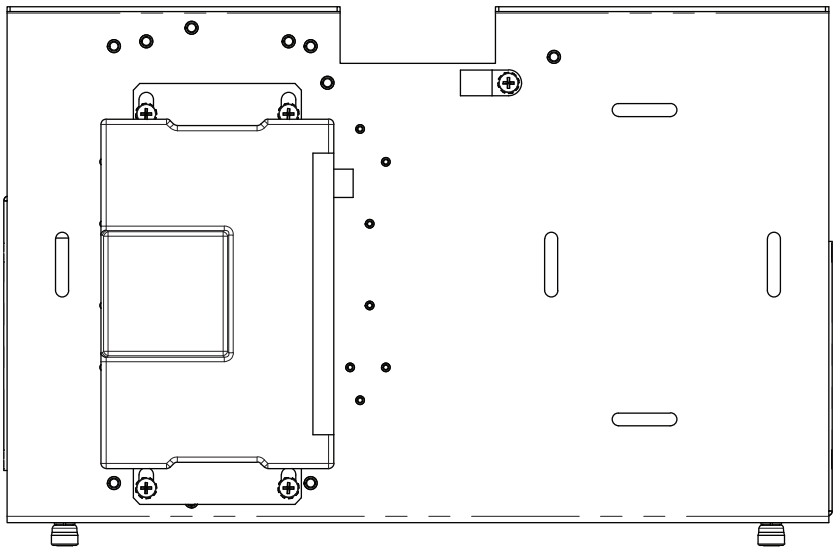


Figure 29 MDS INET or entraNET

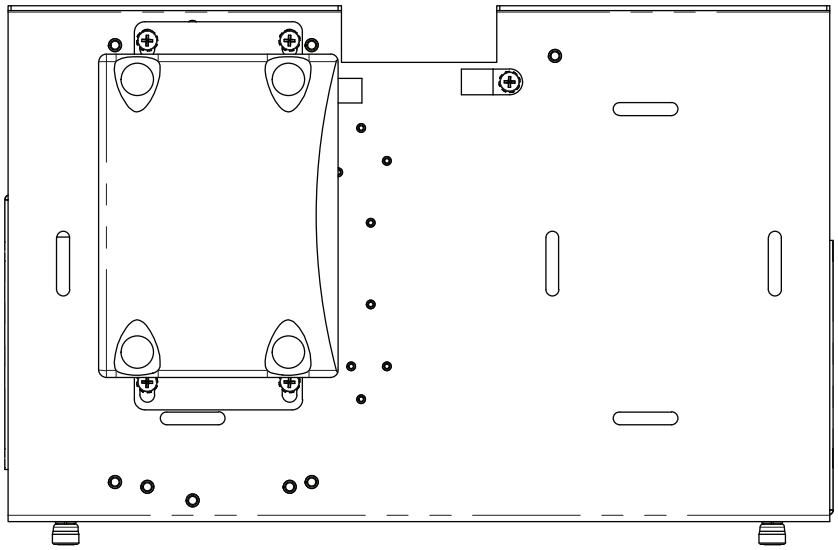


Figure 30 MDS SD

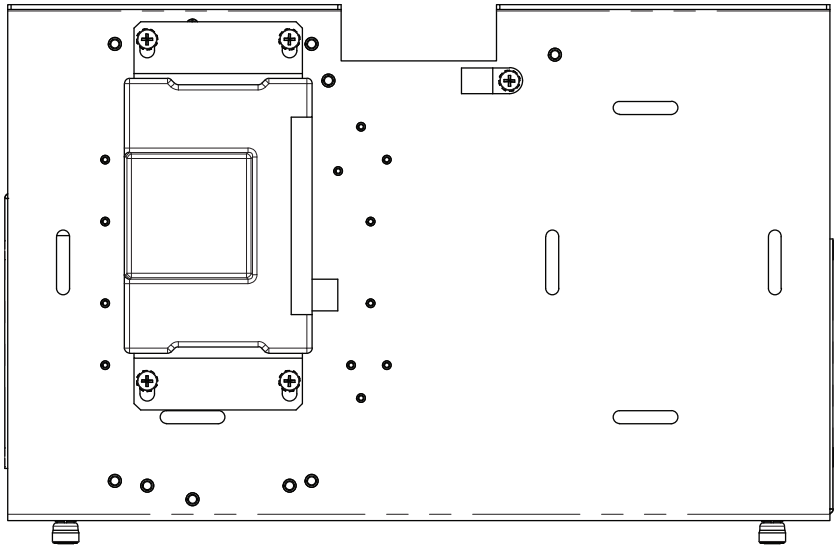


Figure 31 MDS TransNET

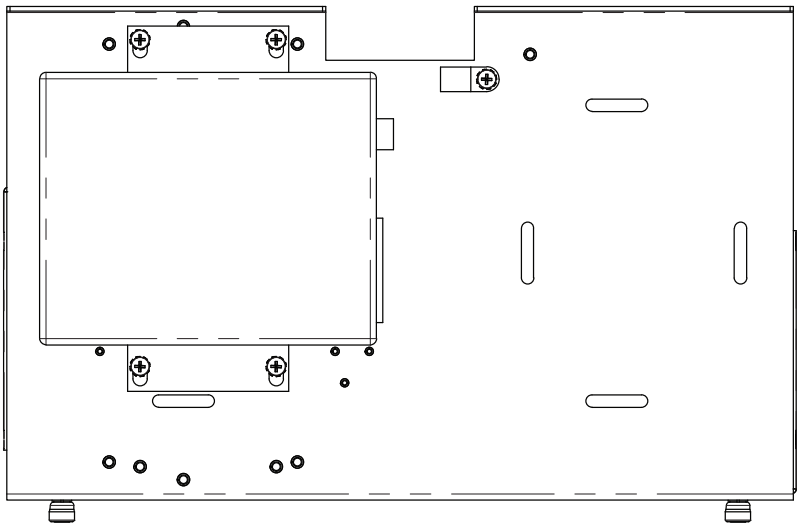


Figure 32 MDS X710

Legal Information

Patent

The units described in this manual are covered by U.S. Patents, with other patents pending.

Buyer shall hold harmless and indemnify the Seller, its directors, officers, agents, and employees from any and all costs and expense, damage or loss, resulting from any alleged infringementof United States Letters Patent or rights accruing thereform or trademarks, whether federal, state, or common law, arising from the Seller's compliance with Buyer's designs, specifications, or instructions.

Warranty

Seller hereby warrants that the goods which are the subject matter of this contract will be manufactured in a good workmanlike manner and all materials used herein will be new and reasonably suitable for the equipment. Seller warrants that if, during a period of ten years from date of shipment of the equipment, the equipment rendered shall be found by the Buyer to be faulty or shall fail to peform in accordance with Seller's specifications of the product, Seller shall at his expense correct the same, provided, however, that Buyers shall ship the equipment prepaid to Seller's facility. The Seller's responsibility hereunder shall be limited to replacement value of the equipment furnished under this contract.

Seller makes no warranties expressed or implied other than those set out above. Seller specifically excludes the implied warranties of merchantibility and fitness for a particular purpose. There are no warranties which extend beyond the description contained herein. In no event shall Seller be liable for consequential, exemplary, or punitive damages of whatever nature.

Any equipment returned for repair must be sent with transportation charges prepaid. The equipment must remain the property of the Buyer. The aforementioned warranties are void if the value of the unit is invoiced to the Seller at the time of return.

Indemnification

The Seller shall not be liable for any property damages whatsoever or for any loss or damage arising out of, connected with, or resulting from this contract, or from the performance or breach thereof, or from all services covered by or furnished under this contract.

In no event shall the Seller be liable for special, incidental, exemplary, or consequential damages, including but not limited to, loss of profits or revenue, loss of use of the equipment or any associated equipment, cost of capital, cost of purchased power, cost of substitute equipment, facilities or services, downtime costs, or claims or damages of customers or employees of the Buyer for such damages, regardless of whether said claim or damages is based on contract, warranty, tort including negligence, or otherwise.

Under no circumstances shall the Seller be liable for any personal injury whatsoever.

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BECKWITH ELECTRIC CO., INC.
6190 - 118th Avenue North • Largo, Florida 33773-3724 U.S.A.
PHONE (727) 544-2326 • FAX (727) 546-0121
marketing@beckwithelectric.com
www.beckwithelectric.com
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