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PANTHER

Terminal

Technical Manual

www.mt.com

E14957000A
(10/2008).R02

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	Met and exceeded my needs
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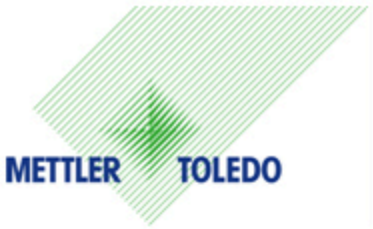
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Quality Manager - MTWT
P.O. Box 1705
Columbus, OH 43216
USA

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DECLARATION OF CONFORMITY

Konformitätserklärung
Déclaration de conformité
Declaración de Conformidad
Conformiteitsverklaring
Dichiarazione di conformità



We/Wir/Nous/Wij/Noi: **Mettler-Toledo, Inc.**
1150 Dearborn Drive
Worthington, Ohio 43085
USA

declare under our sole responsibility that the product,
erklären, in alleiniger Verantwortung, daß dieses Produkt,
déclarons sous notre seule responsabilité que le produit,
declaramos, bajo nuestra sola responsabilidad, que el producto,
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Model/Type: **Panther**

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).
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in combination with a weighing platform produced by Mettler-Toledo is in conformity with the following directives and standards.

Council directive on the harmonization of the laws of the Member states:	**standards:**	**Certificate number (If applicable)**
relating to non-automatic weighing instruments (90/384/EEC) amended by directive (93/68/EEC)	EN 45501:1992 Article 1.2.a	TC 2969
relating to electromagnetic compatibility (2004/108/EC)	EN 55022, B EN 50082-2	
relating to electrical equipment designed for use within certain voltage limits (2006/95/EC)	EN 60950	

Worthington, Ohio U SA, December, 2002 **Mettler-Toledo, Inc.**

Darrell Flocken, Manager - Weights & Measures
Office of Weights and Measures

Original issue: January, 1997
Revised: October, 2008 - Removed Hazardous Area approval information per marketing request

According to EN 45014

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INTRODUCTION

This publication is provided solely as a guide for individuals who have received Technical Training in servicing the METTLER TOLEDO product.

Information regarding METTLER TOLEDO Technical Training may be obtained by writing to:

METTLER TOLEDO
1900 Polaris Parkway
Columbus, Ohio 43240
Phone (US and Canada): (614) 438-4511
Phone (International): (614) 438-4888

FCC Notice

This device complies with Part 15 of the FCC Rules and the Radio Interference Requirements of the Canadian Department of Communications. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This manual correctly describes the operation and functionality of the PANTHER terminal containing software versions as follows. The software number is displayed during the power-up sequence.

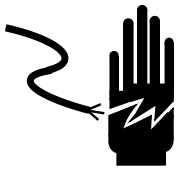
Model	Software #	Rev.
PANTHER Analog	G14891100A	L 7.1
PANTHER Analog	C15379000A	L 3.1
PANTHER DigiTOL	E14988700A	L 5.1

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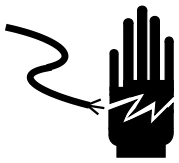
PRECAUTIONS

- READ this manual BEFORE operating or servicing this equipment
- FOLLOW these instructions carefully
- SAVE this manual for future reference
- ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance
- CALL METTLER TOLEDO for parts, information, and service



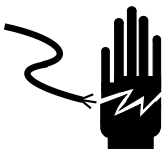
WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



WARNING

FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD CONNECT TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

CAUTION

BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS BEFORE ANY CONNECTIONS OR DISCONNECTIONS ARE MADE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT OR BODILY HARM.



CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

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WARNING

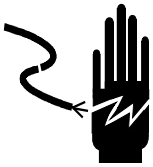
IN ORDER TO INSTALL THE DIVISION 2 APPROVED PANTHER PANEL MOUNT UTILIZING THE FACTORY MUTUAL APPROVAL, METTLER TOLEDO CONTROL DRAWING 155907R MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

WARNING

THE PANTHER TERMINAL IS NOT INTRINSICALLY SAFE! DO NOT USE WITHIN AREAS CLASSIFIED AS HAZARDOUS DIVISION 1 OR ZONE 0/1/2 BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES.

WARNING

THE PANTHER DIGITOL AND ANALOG HARSH VERSIONS ARE NOT APPROVED FOR USE IN HAZARDOUS AREAS. DO NOT INSTALL THESE VERSIONS IN HAZARDOUS AREAS.



WARNING!

WHEN THIS EQUIPMENT IS INCLUDED AS A COMPONENT PART OF A SYSTEM, THE RESULTING DESIGN MUST BE REVIEWED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OEPRATION OF ALL COMPONENTS IN THE SYSTEM AND THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



WARNING!

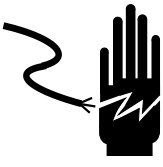
DEVICENET OPTION IS NOT TO BE USED IN A DIVISION 2 HAZARDOUS AREA.

INSTALL DEVICENET ONLY IN NON-HAZARDOUS LOCATION, REMOVE PANTHER HAZARDOUS AREA SPECIFICATION LABEL BEFORE INSTALLING THIS OPTION.



WARNING!

IF THIS DEVICE IS USED IN AN AUTOMATIC OR MANUAL FILLING CYCLE, ALL USERS MUST PROVIDE A HARD-WIRED EMERGENCY STOP CIRCUIT OUTSIDE THE DEVICE CIRCUITRY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.



WARNING

POWER OUTLETS MUST BE EASILY ACCESSIBLE AND LOCATED NO FURTHER THAN THE LENGTH OF THE POWER CORD SUPPLIED WITH THE PRODUCT. FAILURE TO DO SO COULD IN RESULT IN PERSONAL INJURY AND/OR PROPERTY.

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Notes:

For installations in Division 2 areas, refer to the PANTHER terminal Division 2 Installation Guide (*)15791600A.

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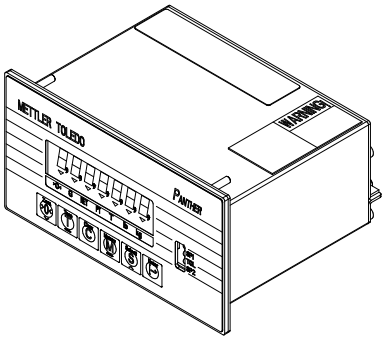
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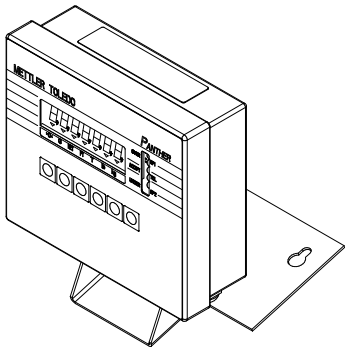
Introduction

This manual provides detailed information for installing, programming, and servicing the PANTHER Industrial Scale Terminal, a high performance basic capability weighing instrument. Information on operating the terminal (basic and advanced functions) can be found in the PANTHER Terminal User's Guide.

Review all instructions and safety precautions carefully. Installation and service procedures should be performed only by authorized personnel. If you encounter problems not covered in this manual, please contact your local authorized METTLER TOLEDO representative.

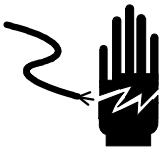


Panel-Mount Enclosure



Harsh Environment (Desk/Wall) Enclosure

Warnings/Precautions



WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.



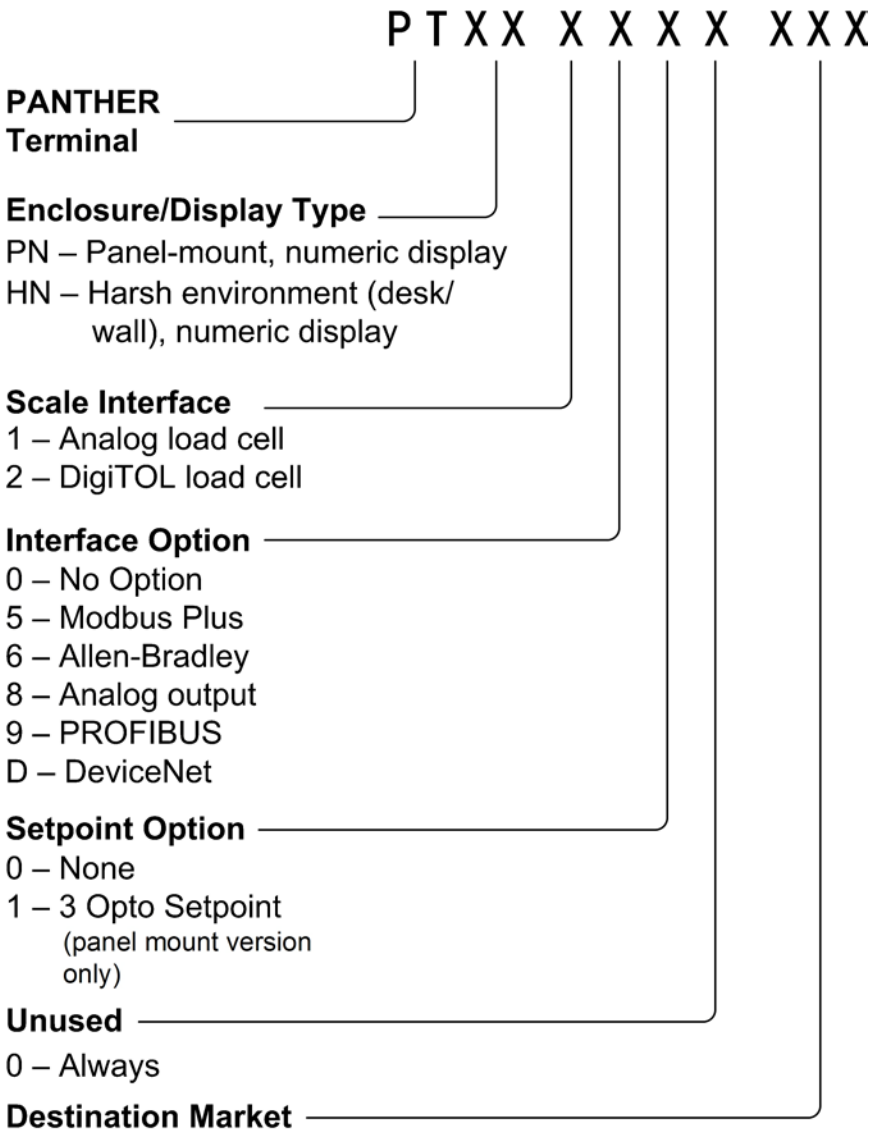
WARNING

IN ORDER TO INSTALL THE DIVISION 2 APPROVED PANTHER PANEL MOUNT UTILIZING THE FACTORY MUTUAL APPROVAL, METTLER TOLEDO CONTROL DRAWING 155907R MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

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Model Identification

Use the information below to confirm the correct model number for the PANTHER terminal with which you will be working. The model number is found on the data plate on the side of the PANTHER terminal.



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Compliance and Approvals

UL, cUL Listing; CSA Certification

The PANTHER terminal has been tested and complies with UL 1950. The PANTHER terminal is designed to meet CSA standard C22.2 No 143-1975, Office Machines. It carries the UL and cUL labels.

Weights and Measures Approvals

USA NTEP COC

The PANTHER terminal meets or exceeds requirements for Class III, 10000e NTEP division accuracy requirements in accordance with the National Institute of Standards and Technology (NIST) Handbook 44. A certificate of conformance 96-125A2 has been issued under the National Type Evaluation Program (NTEP) of the National Conference on Weights and Measures.

Canada Notice Of Approval

The PANTHER terminal was submitted for approval to the Canadian Weights and Measures Laboratories in Canada. After evaluation, the PANTHER terminal was found to meet and/or exceed requirements for Class III, 10000d rating and approval AM-5162 was issued by statutory authority of the Minister of Industry, Science and Technology of Canada.

European Approval

The PANTHER terminal was submitted for approval to The Nederlands Meetindtituut (NMi) in the Netherlands. After evaluation, the PANTHER terminal was found to meet and/or exceed the requirements for a Class III, 5000 division and a Class IIIL, 1000 division weighing instrument. EC type-approval certificate TC2969 Rev. 4 was issued by the NMi in accordance to Council Directive 90/384/EEC on Non-automatic Weighing Instruments.

Conducted and Radiated Emissions (RFI)

The PANTHER terminal meets or exceeds FCC docket 80-284 for conducted and radiated emissions requirements as a Class A digital device.

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Radio Frequency Interference Susceptibility

The PANTHER terminal meets USA, Canadian, and EC requirements for RFI susceptibility as listed in the following table with a maximum of one display increment of change when calibrated for recommended builds.

RFI Susceptibility			
	U.S.A.	Canadian	EC
Radio Interference Frequency	Field Strength	Transmitted Power at Specified Distance	Field Strength
27 MHz	3 volts/meter	4 watts at 2 meters	N/A
144 MHz	N/A	N/A	N/A
169 MHz	3 volts/meter	N/A	N/A
464 MHz	3 volts/meter	4 watts at 2 meters	N/A
27-1000 MHz	N/A	N/A	3 volts/meter

AC Power Line Voltage Variation

The PANTHER terminal meets NIST H-44, Canadian Gazette Part 1, and OIML-SP7/SP2 line voltage variation specifications as listed in the following table:

AC Power Line Voltages						
Specification	AC Line Voltage			Line Frequency in Hz		
Line Voltage Variation	Minimum	Nominal	Maximum	Minimum	Nominal	Maximum
NIST H-44	100	120	130	59.5	60	60.5
Canadian	108	120	132	58.8	60	61.2
OIML-SP7/SP2	102 187 204	120 220 240	132 242 264	58.8 49.0 49.0	60 50 50	61.2 51 51

Hazardous Area Use

The analog load cell version of the PANTHER panel-mount terminal has been approved by Factory Mutual for use in the U.S.A. in areas classified as Class I, II or III, Division 2, Groups A, B, C, D, F or G, Category 3, when installed in a National Testing Laboratory approved dust tight enclosure and connected per METTLER TOLEDO control drawing (*)155907R. Refer to the PANTHER panel-mount terminal Division 2 Installation Guide (*)15791600A for additional details.

The PANTHER terminal is not intrinsically safe but is capable of operation with load cells and bases in a Division 1 or Zone 0/1/2 hazardous area when used with approved barriers or when purging is utilized. Contact your authorized METTLER TOLEDO representative for information about hazardous area applications for the PANTHER terminal.

	WARNING

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	THE PANTHER TERMINAL IS NOT INTRINSICALLY SAFE! DO NOT USE WITHIN AREAS CLASSIFIED AS HAZARDOUS DIVISION 1 OR ZONE 0/1/2 BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES.

Specifications

Specifications	Harsh Environment	Panel Mount
W x D x H	178 x 66 x 159 mm (7 x 2.59 x 6.25 in)	171.5 x 132 x 91.9 mm (6.75 x 5.2 x 3.62 in)
Construction	Stainless steel; designed to provide NEMA 4X and IP65 protection	Stainless steel front panel; certified TYPE 12, 4 and 4X
Power	Universal AC power supply works with 100, 120, 220, 240 VAC power sources	
Operating Temperature	-1°C to 40°C (14° F to 104° F)	
Display/ Keypad	12.7 mm/0.55 in high, 7-digit, 7-segment vacuum fluorescent numeric display/6-function keypad	
Scale Performance	Internal resolution 1,000,000; External 10,000	
Scale Interface (analog)	Maximum of eight 350 ohm analog load cells	
Scale Interface (DigiTOL)	Compatible with METTLER TOLEDO xx97, UltraRes, and DigiTOL junction box products	
Scale Update Rate	>300 Hz internal; 20 Hz external	
Digital Filtering	METTLER TOLEDO's exclusive TraxDSP filtering	
Process Control	2 setpoints with preact; zero tolerance	
Checkweighing	4 targets with 5 zones each	
Discrete Outputs/Inputs	3 outputs/1 input/5 zone status LEDs	3 outputs/1 input/3 zone status LEDs
Serial Interface	Standard RS232 printer connections or bi-directional serial continuous output	
Shipping Weight	2.5 kg (5.5 lb)	2.04 kg (4.5 lb)
Options	Analog output (0-10 V or 4-20 mA analog output, 500Ω max. resistance) Three high level outputs for switching between 28-230 VAC (panel mount only) Direct PLC connectivity (Allen-Bradley RIO, PROFIBUS, or Modbus Plus)	

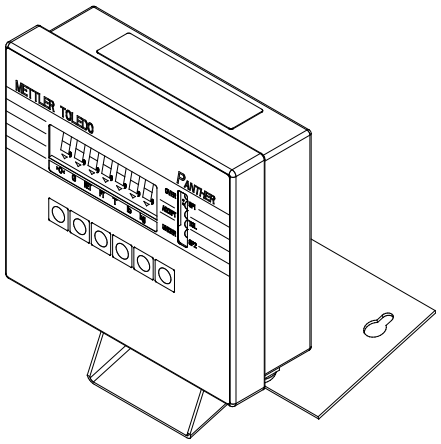
Physical Dimensions and Features

Harsh Environment Terminal (PTHN)

This PANTHER harsh environment enclosure is designed to TYPE 4X (IP65) standards. The enclosure is a fabricated stainless steel box with a removable cover. The unit is designed to sit on a flat surface or can be mounted to a wall or to METTLER TOLEDO columns. The bottom of the enclosure contains grip bushings to seal all cables entering the enclosure.

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The harsh enclosure version includes five multi-colored LEDs used to indicate over or under tolerance conditions for manual checkweighing applications. In setpoint applications, these LEDs indicate the status of the individual setpoints.



The PANTHER harsh environment terminal measures: 159 mm (6.25 in.) high × 178 mm (7.00 in.) wide at the front of the terminal and is 66 mm (2.59 in.) deep. The location of the keyholes for wall mounting screws is shown in Figure 1-1.

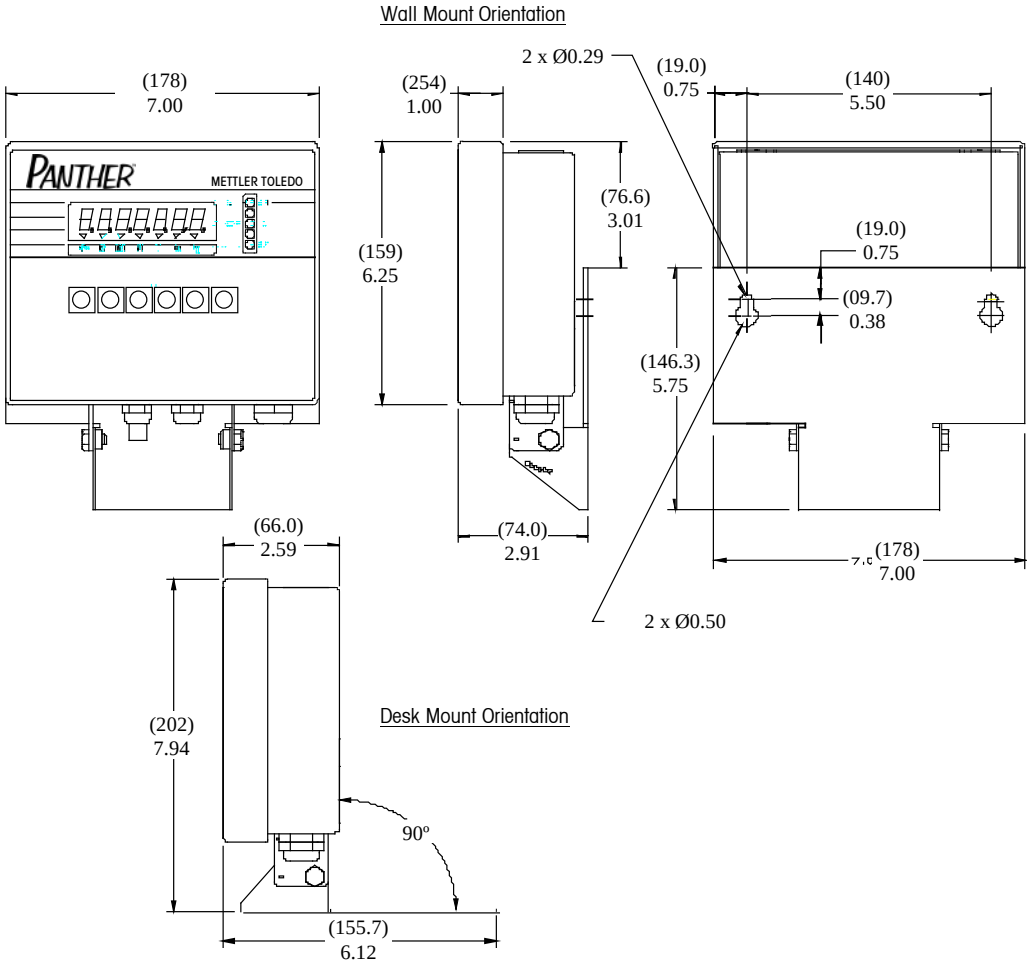
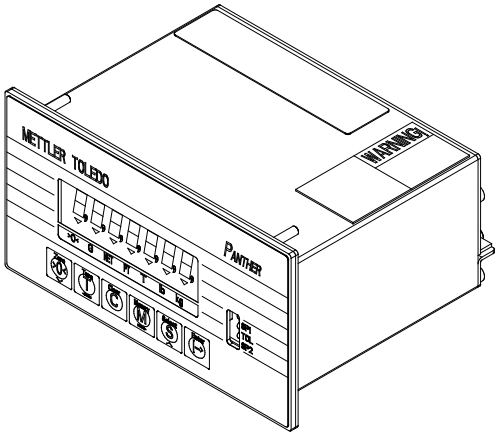


Figure 1-1

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Panel-Mount Terminal (PTPN)

This enclosure is designed to be mounted into a panel. Four threaded studs are used to mount the unit through a flat panel. The front panel and associated panel clamping mechanism are designed to provide an environmental seal and accommodate a panel thickness from 16 to 11 gauge. The panel mount version includes three LEDs.



The panel-mount PANTHER terminal model measures: 3.62 in. (91.9 mm) high × 6.75 in. (171.5 mm) wide at the front and 5.20 in. (132 mm) deep. Refer to the cutout diagram when installing the panel-mount PANTHER terminal. Note: The optional high-level optos add 1.25 in. (31.7 mm) to the depth.

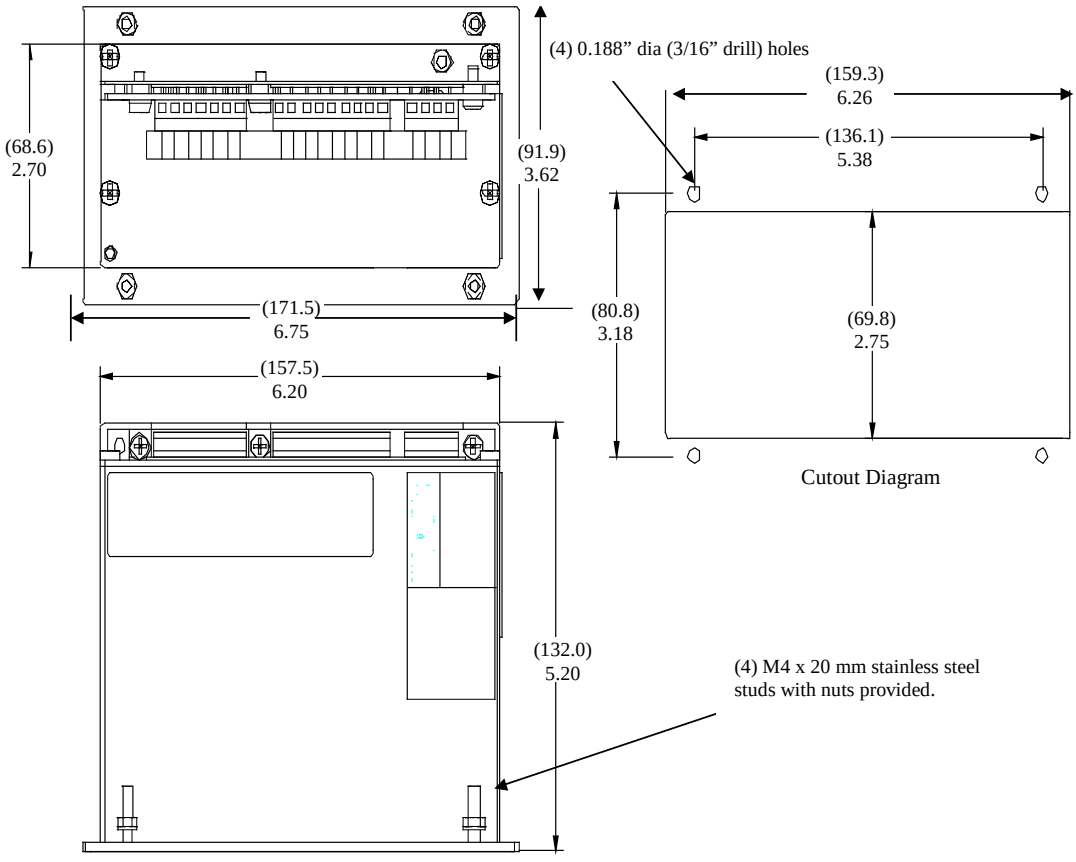
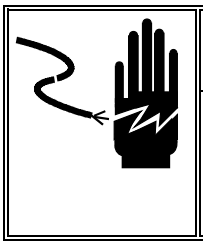


Figure 1-2

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⚠ WARNING

FOR U.S.A. DIVISION 2 HAZARDOUS AREA APPLICATIONS, METTLER TOLEDO CONTROL DRAWING 155907R MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

Display and Keyboard

The front panel of the PANTHER terminal panel-mount model is made of stainless steel and is certified to TYPE 12, 4 and 4X specifications.

The harsh environment front panel is fabricated stainless steel, and when locked onto the rear enclosure, is designed to TYPE 4X (IP65) specifications.

The display is a seven-character, seven-segment, 0.55 in. (12.7 mm) vacuum fluorescent numeric display.

The keyboard consists of a flat membrane switch covered with a domed polyester overlay.

The lens on both models is polyester and has hardcoating to resist damage to the lens.

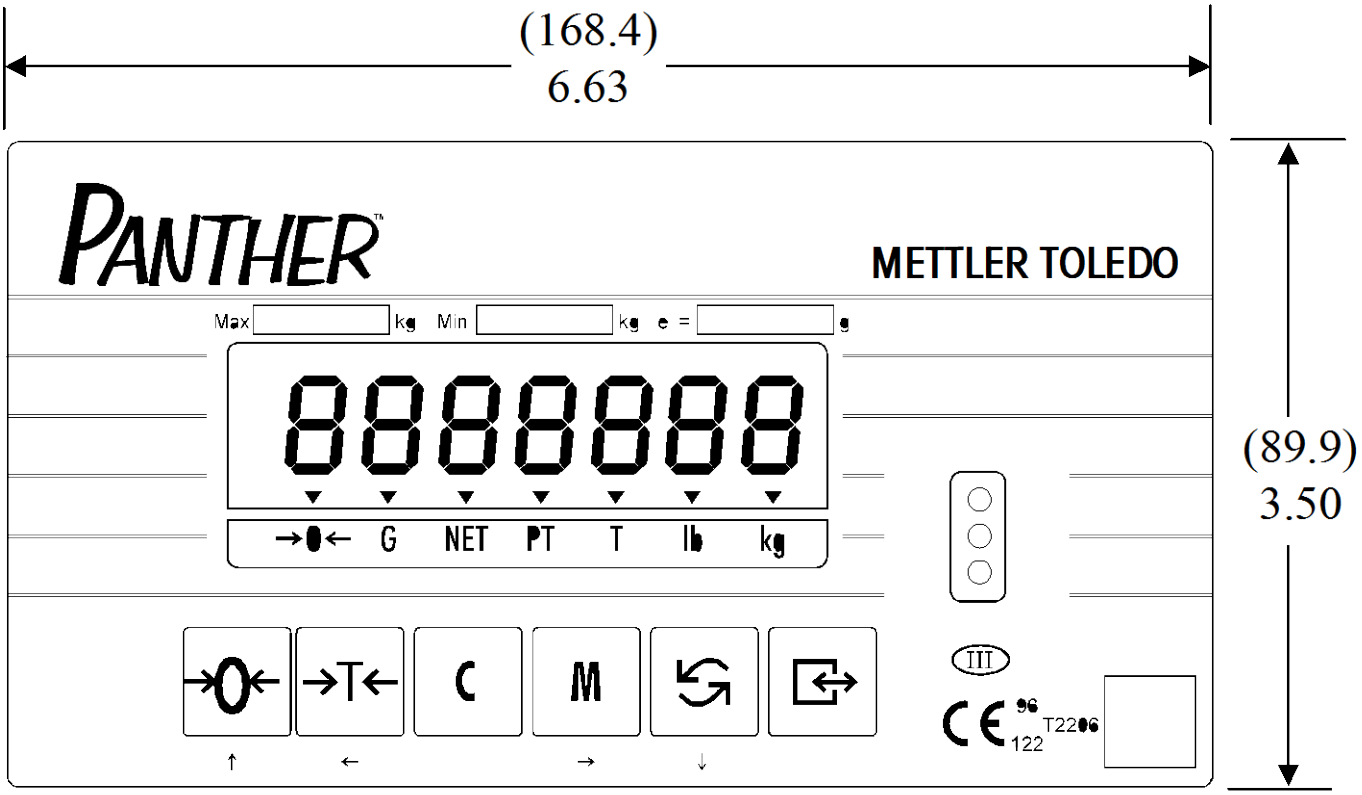


Figure 1-3

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2 Installation

Inspection and Contents Checklist

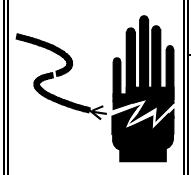
If you are responsible for installing the PANTHER terminal, please follow the procedures listed here.

- If the PANTHER terminal's shipping container appears damaged upon delivery, check inside for damage. File a freight claim with the carrier if necessary.
- If the container was undamaged, unpack the container if you have not already done so. Keep the original packing materials for future use.
- Make sure the PANTHER terminal package contains the following:
  - PANTHER Terminal (indicator)
  - Security Seal
  - Capacity Sheet Labels
  - Cursor Legends Labels
  - Address Labels
  - Installation Guide (paper copy)
  - Documentation CD-ROM

Location

The first step in installing the PANTHER terminal is to select the best location. Placing the PANTHER terminal in an appropriate location will enhance its longevity and operation. Keep in mind the following when choosing a location for the PANTHER terminal:

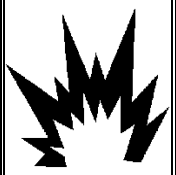
- The PANTHER terminal can be operated between a temperature range of 14°F to 104°F (–10°C to 40°C) at 10% to 95% humidity, noncondensing.
- The storage temperature range is from –40 to 140°F (–40 to 60°C) at 10% to 95% humidity, noncondensing.
- The PANTHER panel-mount terminal's enclosure meets TYPE 4X (IP65) requirements for a dust-tight and splash-proof enclosure. The harsh environment is designed to those specifications.
- **The PANTHER terminal is not intrinsically safe!** However, the PANTHER terminal is capable of operation with scales and barriers located in a hazardous area. Contact your authorized METTLER TOLEDO representative for assistance with hazardous area applications.



WARNING

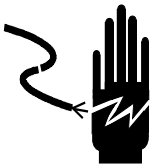
FOR U.S.A. DIVISION 2 HAZARDOUS AREA APPLICATIONS, METTLER TOLEDO CONTROL DRAWING 155907R MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

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WARNING!

THE PANTHER TERMINAL IS NOT INTRINSICALLY SAFE! DO NOT USE IN AREAS CLASSIFIED AS HAZARDOUS BY THE NATIONAL ELECTRIC CODE (NEC) BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES.



WARNING!

DEVICENET OPTION IS NOT TO BE USED IN A DIVISION 2 HAZARDOUS AREA.

INSTALL DEVICENET ONLY IN NON-HAZARDOUS LOCATION. REMOVE PANTHER HAZARDOUS AREA SPECIFICATION LABEL BEFORE INSTALLING THIS OPTION.



WARNING!

THE ANALOG HARSH VERSION OF THE PANTHER TERMINAL AND ALL DIGITOL VERSIONS OF THE PANTHER TERMINAL ARE NOT APPROVED FOR USE IN DIVISION 2 AREAS. DO NOT INSTALL THESE VERSIONS IN HAZARDOUS AREAS!

Accessing the Harsh Environment Terminal



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

To access the Controller PCB for internal wiring and setting switches:

1. Separate the front panel from the enclosure by inserting the tip of a flat-blade screwdriver into one of the two slots on the bottom of the front panel assembly.
2. Gently push in toward the enclosure. You should hear a quiet "pop" when the cover has been released.
3. Push in on the side of the slot closest to the bottom of the cover. Repeat for the other slot.
4. Lift the bottom of the front panel out until it completely clears the enclosure.
5. Squeeze the top of the front panel to the enclosure slightly and raise it to clear the two top clips. The cover will swing down, hinged by a wire cable at the bottom. Figure 2-1 shows the location of the slots (A).

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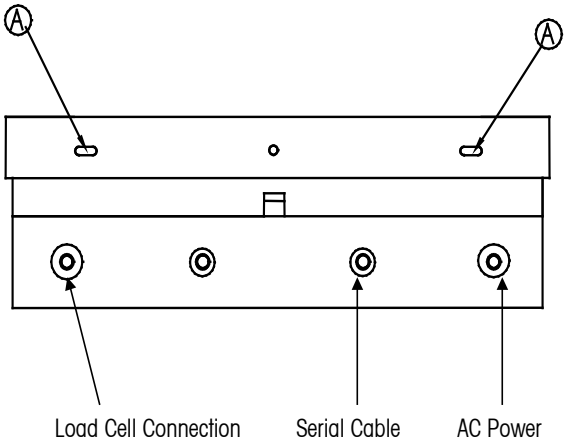


Figure 2-1

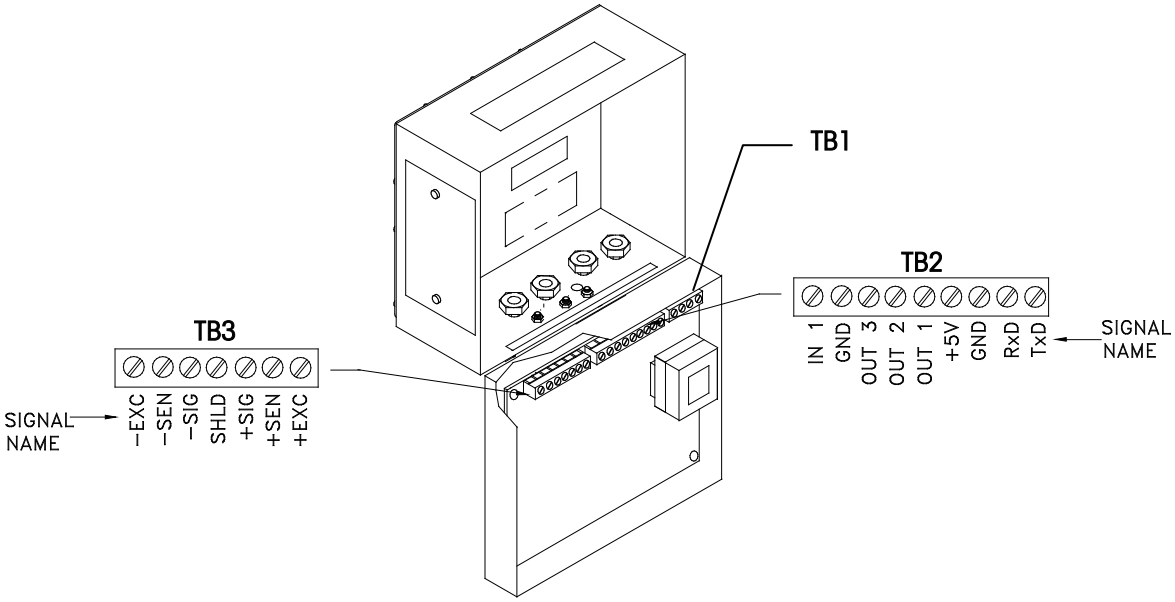


Figure 2-2

To connect the unit:

1. Pass the cables that enter the enclosure through an appropriately sized cable grip before connecting the wires.
2. Tighten the cable grip sufficiently to provide a water-tight seal around the cable only after re-securing the back cover. This will allow any internal cable slack to be received through the cable grip.

Accessing the Panel-mount Terminal

The PANTHER panel-mount model uses an exposed terminal access design. All connections are made at the back of the indicator on the controller PCB (See Figure 2-3). If access inside the unit is necessary, remove the two screws holding the cover plate at the rear of the unit and lift the cover plate over the terminal strips.

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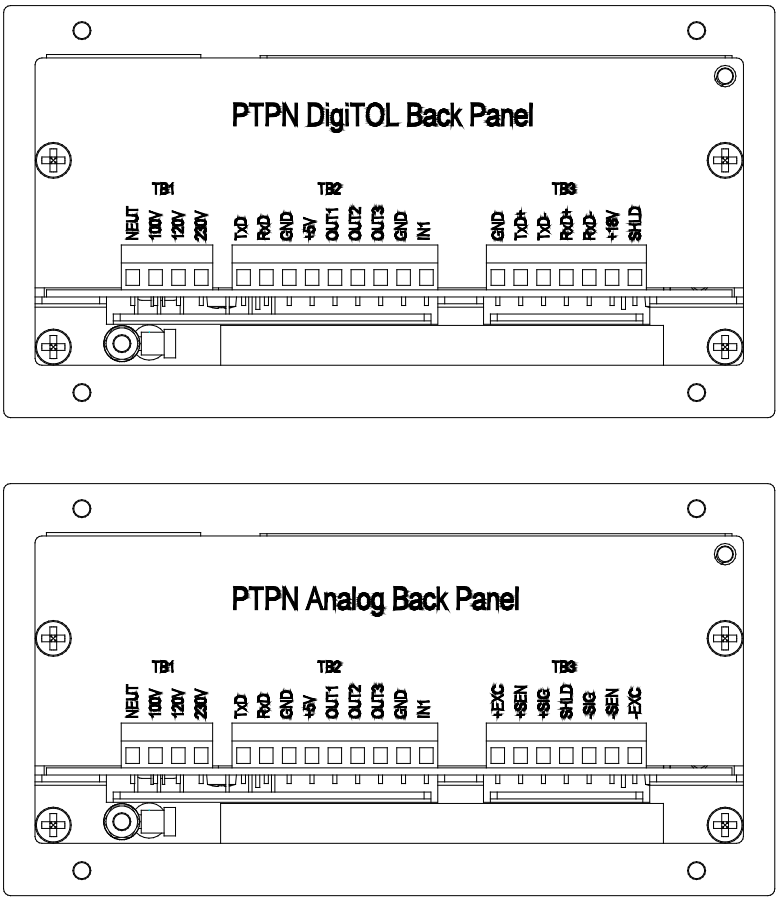


Figure 2-3

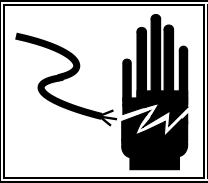
Power Requirements

The PANTHER terminal is provided with a universal (manually selectable) power supply which operates from 85 to 264 VAC. The supply operates with a line frequency of 49 to 63 Hz. Power consumption is 12 Watts maximum. Power is applied through a permanently attached line cord on the harsh environment model. (No power cord is shipped with the panel-mount model.)

Note: The integrity of the power ground for equipment is important for both safety and dependable operation of the PANTHER terminal and its associated scale base. A poor ground can result in an unsafe condition if an electrical short develops in the equipment. A good ground connection is needed to minimize extraneous electrical noise pulses. The PANTHER should not share power lines with noise-generating equipment. To confirm ground integrity, use a commercial branch circuit analyzer like an ICE model SureTest ST-1D. If adverse power conditions exist, a dedicated power circuit or power line conditioner may be required.

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Electrical Connections



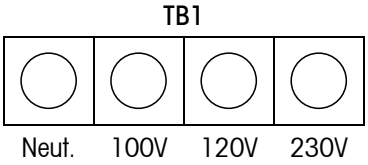
⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE REMOVING THE FUSE OR SERVICING.

NOTE: When the analog PANTHER panel-mount terminal is installed within an enclosure, which resides within an area classified as Division 2, special AC wiring requirements must be met. These requirements are shown on METTLER TOLEDO control drawing 155907R in the PANTHER Panel-Mount Terminal Installation Guide (*15791600A).

Confirm Power Connection

Harsh Environment Terminal. The harsh environment terminal is shipped with the power cord installed at the factory. Before applying power, confirm that the power cord is wired properly for the AC voltage where the terminal will be used. The power cord connects to the TB1 terminal strip on the controller PCB.



Standard Power Cord Colors	
Neutral	Blue
Hot	Brown
Ground (Chassis)	Green/Yellow

Panel-Mount Terminal. No power cord is shipped with the panel-mount model. Wiring to terminal strip TB1 on the rear of the PANTHER terminal is shown below. Ground is connected to the chassis ground.

TB1 Pin #	AC Power Input
1	Neutral
2	100 VAC
3	120 VAC
4	230 VAC

When the analog PANTHER panel-mount terminal is installed within an enclosure, which resides within an area classified as Division 2, special AC wiring requirements must be met. These requirements are shown on METTLER TOLEDO control drawing 155907R in the PANTHER Panel-Mount Terminal Installation Guide (*15791600A).

Analog Load Cell Connections

⚠ CAUTION

TO AVOID DAMAGE TO THE PCB OR LOAD CELL, REMOVE POWER FROM THE PANTHER TERMINAL AND WAIT AT LEAST 30 SECONDS BEFORE CONNECTING OR DISCONNECTING ANY HARNESS.

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Note: There is a jumper on the Controller PCB for selection of 2 mV/V or 3 mV/V load cells. This W1 jumper is described later in this chapter.

NOTE: Instructions for making the analog load cell connections are the same for the harsh environment and panel-mount models.

If an analog version of the PANTHER panel-mount terminal is used in a hazardous area classified as Division 2, or if only the load cells will be in a hazardous area classified as Division 2, METTLER TOLEDO control drawing 155907R must be followed. Please refer to the PANTHER Panel-Mount Terminal Installation Guide (*15791600A) for specifics about load cell non-incendive parameters and required calculations.

The maximum cable length for analog load cell connections to the PANTHER terminal depends on the total scale resistance (TSR) of the scale base. To calculate TSR:

$$TSR = \frac{\text{Load Cell Input Resistance (Ohms)}}{\text{Number of Load Cells}}$$

This chart gives recommended cable lengths based on TSR and cable gauge. The PANTHER terminal can power up to eight 350 Ohm analog load cells.

Recommended Maximum Cable Length			
TSR (Ohms)	24 Gauge (feet/meters)	20 Gauge (feet/meters)	16 Gauge (feet/meters)
350	800/244	2000/610	4000/1219
87 (4-350Ω cells)	200/61	600/183	1000/305
45 (8-350 Ω cells)	100/31	300/91	500/152

Once the length of the cable is determined, connect to TB3 of the PANTHER Terminal Controller PCB. The pinout for TB3 is labeled on the bottom of the controller. The following diagrams describe the PANTHER terminal analog load cell terminal strip TB3 wiring for standard 6-wire cable, Heavy Capacity (MASSTRON) 6-wire cable, and standard 4-wire cable.

PANTHER TB3 Standard 6-wire Cable

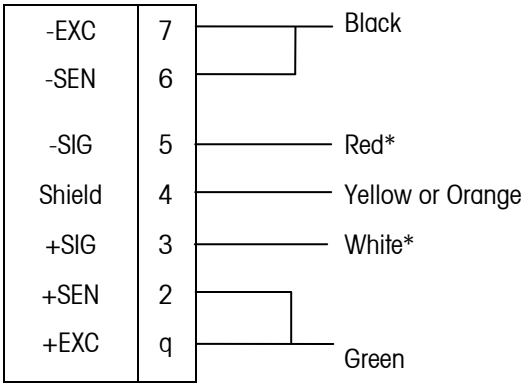
-EXC	7	Blue
-SEN	6	Red
-SIG	5	Black
Shield	4	Orange
+SIG	3	Green
+SEN	2	Yellow
+EXC	1	White

PANTHER TB3 Heavy Capacity (Masstron) 6-wire Cable

-EXC	7	Black
-SEN	6	Blue
-SIG	5	Red
Shield	4	Yellow
+SIG	3	White
+SEN	2	Brown
+EXC	1	Green

PANTHER TB3 4-wire Cable

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* If an increase in load results in a decrease in weight display, reverse the signal wires (+SIG and –SIG).

Minimum Increment Size for Analog Scale Input

The minimum increment size selection for an analog scale input is determined by calculating the microvolts per increment for the desired build. To calculate the microvolts per increment, solve the following equation for µV per increment.

$$\mu V \text{ per Increment} = \frac{\text{Increment Size} \times \text{Cell Output} \times 5000}{\text{Load Cell Capacity} \times \text{Ratio}}$$

The increment size, scale capacity, and load cell capacity must all be measured in the same weight units, lb or kg. If the weight units for any of these variables are listed in kg units, multiply by 2.2046 to convert to lb units for the purposes of this calculation.

Load cell output is rated in mV/V (millivolts per volt of excitation), marked on load cell data tag. Mettler Toledo load cells are typically 2 mV/V. Other load cells can range from 1 mV/V to 4.5 mV/V.

The load cell capacity is the rated capacity marked on load cell data tag. The ratio is the total number of load cells in the system or the total lever ratio (if scale is a mechanical lever system conversion).

Sample Calculation

1. Refer to the following example of µV per increment calculation for a Model 2158 floor scale installation.

Scale Capacity	5000 lb
Increment Size	1.0 lb
Load Cell Capacity	2500 lb
Number of Cells	4
Cell Output	2 mV/V
Excitation Voltage	5 VDC

2. Use the following formula to calculate the µV per increment:

$$\mu V \text{ per Increment} = \frac{\text{Increment Size} \times \text{Cell Output} \times \text{Excitation (mV)}}{\text{Load Cell Capacity} \times \text{Ratio}}$$

Substituting the 2158 parameters in the formula:

$$\mu V \text{ per Increment} = \frac{1.0 \text{ lb} \times 2 \text{ mV / V} \times 5000}{2500 \text{ lb} \times 4 \text{ Load Cells}} = 1.0 \mu V/\text{inc.}$$

The PANTHER terminal is approved as legal-for-trade at a minimum of 1 µV per increment. Acceptable weighing performance for non-legal-for-trade applications can be

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obtained when a minimum of 0.6 µV per increment is provided. At full scale, the maximum load cell output may not exceed 10 mV when the W1 jumper is in the 2 mV/V position or 15 mV when the W1 jumper is in the 3 mV/V position.

UltraRes and DigiTOL® Load Cell Connections

The fifth character of the product ID on the serial tag indicates if the unit is analog or DigiTOL® (1=Analog, 3=DigiTOL). Always verify the type of load cell interface before any connections are made and disconnect power to the PANTHER terminal before connecting or disconnecting any UltraRes or DigiTOL® bases. The maximum cable length for all DigiTOL® bases is 50 feet (15.24 meters).

⚠ CAUTION

TO AVOID DAMAGE TO THE PCB OR LOAD CELL, REMOVE POWER FROM THE PANTHER AND WAIT AT LEAST 30 SECONDS BEFORE CONNECTING OR DISCONNECTING ANY HARNESS.

Connect UltraRes or DigiTOL® bases to the PANTHER terminal as follows:

Panther		Color Code		UltraRes or DigiTOL® B/P Base	
Ground	1	BLUE		7	Ground
TxD+	2	RED		1	RxD A
TxD-	3	NC* WHITE		4	Batt In
RxD+	4	BLACK		8	TxD A
RxD-	5	YELLOW		6	TxD B
+18 VDC	6	GREEN		5	+20 VDC
Shield	7	ORANGE			

* No connection

DigiTOL J-Box Connections

The maximum cable length for the DigiTOL J-Box is 300 feet (91.4 meters). The following diagram illustrates load cell terminal strip wiring to the J-Box.

Panther		Color Code		DigiTOL® J-Box	
Ground	1	BLUE		TB2-12	Ground
TxD+	2	RED		TB1-2	RxD A
TxD-	3	NC* WHITE		TB1-3	RxD B
RxD+	4	BLACK		TB1-5	TxD A
RxD-	5	YELLOW		TB1-4	TxD B
+18 VDC	6	GREEN		TB2-1	+20 VDC
Shield	7	ORANGE			

* No connection

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Main PCB Serial Port Connection

The COM1 serial port is bi-directional. It can receive simple commands or serial target data, as well as transmit data to a printer or other serial device.

The following diagram and table describe the PANTHER terminal block TB2 COM1 pin-to-pin cable connections using an RS-232 cable. The maximum recommended cable length for RS-232 communications is 50 feet.

PANTHER TB2 COM1

1	TXD	RS-232 Transmit
2	RXD	RS-232 Receive
3	GND	Signal Ground

Pin Connection for METTLER TOLEDO Devices Using COM1 RS-232					
PANTHER TB2 COM1	8806 8861 8808 8845 8857 8865 8807	8617-TB2 9323-TB2 9325-TBS	8867	8863	8846
TXD	3*	2	2	3	2
RXD	--	--	--	--	--
GND	7*	3	7	5	5

*Each of these devices uses this connection.

Discrete I/O Connection

Discrete I/O TB2 terminal block assignments. All parallel port outputs are TTL Level, 5 VDC maximum. Discrete input levels are $V_{IN\ LOW}$ = 0.0 - 0.8 VDC, $V_{IN\ HIGH}$ = 3.5 - 5.0 VDC.

TB2

4	+5 VDC, current limited to 15 mA
5	OUT1
6	OUT2
7	OUT3
8	GND
9	IN1

Refer to Appendix 3 for additional information on discrete I/O functions.

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Setpoint Output Option

The Setpoint Output Option converts logic level outputs available at the Controller PCB terminal strip into high level AC, DC or contact outputs.

Panel-Mount Terminal (09170247000)

The panel-mount high level output option is usable only in the panel-mount PANTHER terminal. It consists of a PCB mounted on the rear of the panel-mount enclosure, which replaces the usual rear cover plate. Connections are made between the Controller PCB and the Setpoint Output Option PCB using discrete wires between the Controller PCB terminal strip and a dual 5-pin connector on the Setpoint Output PCB. Each AC output module is individually fused (located on the module), and is rated at 1A, 28-280 VAC, 50/60 Hz. Alternate output modules (e.g. for DC switching) may be substituted. Field wiring for the outputs is provided by terminal strips on the option PCB.

Overall dimensions: 53 mm wide x 152 mm deep (2.12" x 6.2")

Power consumption: 15 mA @ 5 VDC

External Field Wiring terminal strip assignments:

TB1-1	Output 1 (fused)
TB1-2	Output 1
TB2-1	Output 2 (fused)
TB2-2	Output 2
TB3-1	Output 3 (fused)
TB3-2	Output 3

Logic Level Wiring J1

1, 2	GND
3, 4	OUT3
5, 6	OUT2
7, 8	OUT1
9, 10	+5 VDC

Harsh Environment Terminal (09610086000)

The harsh environment Setpoint Output option is available for the harsh or panel-mount terminals. It consists of a PCB mounted in a NEMA 4X enclosure with an attached interface harness. Connections are made between the interface harness and the controller PCB terminal strip. Each output module is individually fused (located on the module) and is rated at 1A, 28-280 VAC, 50/60 Hz. Alternate output models (e.g. for DC switching) may be substituted. Field wiring for the outputs is provided by terminal strips on the option PCB.

Overall dimensions: 165 mm W x 254 mm L x 150 mm deep (6.5in x 10 in x 6 in)

External Field Wiring Terminal Strip Assignments

Setpoint PCB	Function
J2-1	Output 1 (fused)
J2-2	Output 1
J2-3	Output 2 (fused)
J2-4	Output 2
J2-5	Output 3 (fused)
J2-6	Output 3
J2-7	Input 1 (fused)
J2-8	Input 1
J2-9	Not Used
J2-10	Not Used

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Logic Level Wiring (Interface Harness)

Option Harness	PANTHER TB2
Black	4
Brown	5
Red	6
Orange	7
Yellow	9
Blue	Not Used
Green	8

*This unit does not come with Optos and does not have to be configured as shown.

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Allen-Bradley RIO™ Option (09170251000)

Wiring

The Allen-Bradley RIO network interface terminal strip is wired as follows:

Electrical: centered, transformer isolated line drivers
Connector: Three position removable terminal strip wired from left to right (rear connector view) as:

Blue
Shield
Clear

Refer to Chapter 5, PANTHER Terminal Allen-Bradley Option, for more information.

PROFIBUS™ Option (09170252000)

Wiring

The PROFIBUS connection is available at two locations on the PROFIBUS PCB. The first is a female 9 pin D subminiature connector, which is the PROFIBUS standard connection. The field connector assembly is not supplied by Mettler Toledo. This connection is the preferred connection in the panel-mount PANTHER terminal (PTPN). For the harsh environment terminal (PTHN), the pluggable terminal strip must be used. A pigtail harness is available to wire from the terminal strip to a female 9-pin D connector.

Female DE-9	1	GND (isolated)
	2	N.C.
	3	TX/RX+
	4	RTS
	5	GND (isolated
	6	+5V (isolated)
	7	N.C.
	8	TX/RX-
	9	N.C.

Terminal Strip	1	RTS
	2	TXD/RXD+
	3	TXD/RXD-
	4	+5V (isolated)
	5	GND (isolated

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PROFIBUS Pigtail Harness Wiring

The PROFIBUS Pigtail Adapter 0900-0311 is wired to the terminal strip as follows:

Color	Terminal Number	Signal
Yellow	1	RTS
Blue	2	COM A
Green	3	COM B
Red	4	+5VDC
Black	5	GND
Green	Chassis GND	

0900-0311 Adapter to Terminal Strip Wiring

Refer to Chapter 6, PANTHER Terminal Profibus Option, for more information.

Modbus™ Plus Option (09170253000)

Switch Settings

Each node on the Modbus Plus network must have a unique address. The PANTHER Terminal Modbus Plus node address is set with the "dip switches" on the Modbus Plus interface card. The node address value of the card is equal to the value of the switches plus 1 and it can be equal to a value of 1 to 64.

Switch pos. 1 2 3 4 5 6
value 1 2 4 8 16 32

With the switch in the OFF position, the value is as shown above. With the switch in the ON position, the value is zero for that switch.

Example:

			Switch Value
SW1	=	OFF	1
SW2	=	ON	0
SW3	=	ON	0
SW4	=	OFF	8
SW5	=	OFF	16
SW6	=	ON	0
			(PLUS 1)
NODE ADDRESS =			26

NOTE: With all of the switches ON, the node address equals 1.

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Wiring

The Modbus Plus network uses pins 1, 2, and 3 of the DE-9 connector, supplied by Modicon. Wiring instructions come with the connector. The 0900-0320 Modbus Plus Pigtail Adapter is wired to the PANTHER Terminal as follows:

Color	Terminal Strip #	DE-9	Function
Clear	1	1	Shield
Green	2	2	MPB B
Black	3	3	MPB A

0900-0320 Adapter to Terminal Strip Wiring

Refer to Chapter 7, PANTHER Terminal Modbus Plus Option, for more information.

Analog Output Option

The Analog Output terminal strip is shown here. Refer to Chapter 8, PANTHER Terminal Analog Output Option, for more information.

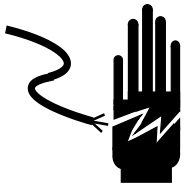
J2

1	4-20 mA
2	GND
3	N.C.
4	0-10 V
5	ALARM
6	+5V

R_L

Note: Customer's equipment load resistance (R_L) must be ≤ 500 Ω for proper operation.

Wiring



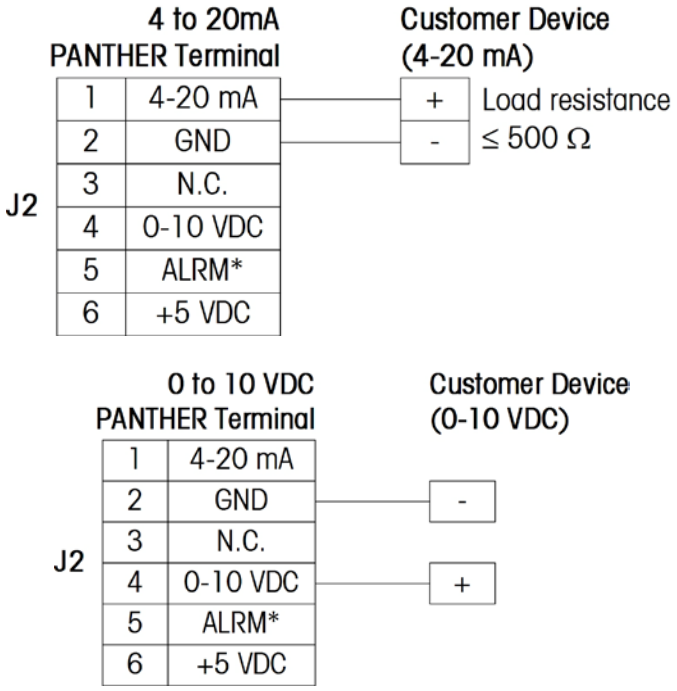
WARNING

DO NOT APPLY POWER TO THE PANTHER TERMINAL UNTIL INSTALLATION OF COMPONENTS AND EXTERNAL WIRING HAVE BEEN COMPLETED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

The maximum recommended cable length for the 0-10VDC output is 50 feet (15.2 meters). The recommended cable for use with the analog output is shielded 2-conductor stranded 20 gauge cable (Belden #8762 or equivalent) which is available from METTLER TOLEDO using part number 510220190.

Note: The output from the analog module is fixed at absolute displayed weight.

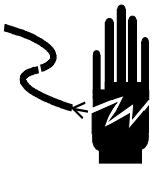
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The ALRM Output (Alarm) is an open collector output. If the PANTHER terminal weight display goes to an over capacity or under zero display, or Setup is entered, the connection closes and the ALRM Output will be capable of sinking up to 30 mA DC to ground. The voltage source can be the +5V supplied with the Analog Output PCB or a maximum of +30 VDC external source.

DeviceNet Option (64058785)

Wiring



⚠ WARNING!

DEVICENET OPTION IS NOT TO BE USED IN A DIVISION HAZARDOUS AREA.

INSTALL DEVICENET ONLY IN NON-HAZARDOUS LOCATION. REMOVE PANTHER HAZARDOUS AREA SPECIFICATION LABEL BEFORE INSTALLING THIS OPTION.

A 5-pin Phoenix-type connector is supplied with the kit. DeviceNet wiring includes the following:

V-
CAN-L
SHIELD
CAN-H
V+

Refer to Chapter 9, PANTHER Terminal DeviceNet Option, for more information.

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Controller PCB Switches/Jumpers

S1 Switch Settings

1 Setup/Calibration Enable = On
Normal Operation = Off
2 Not Used (Should be Off)
3 Display Comma Tail = On
4 Test Mode (Must be Off)

J1 Keyboard Connections

Pins 1-3	Memory
Pins 1-4	Select
Pins 1-5	Print
Pins 2-3	Zero
Pins 2-4	Tare
Pins 2-5	Clear

Jumper W1 (Analog Version)

Installed = 2 mV/V Load Cells
Not Installed = 3 mV/V Load Cells

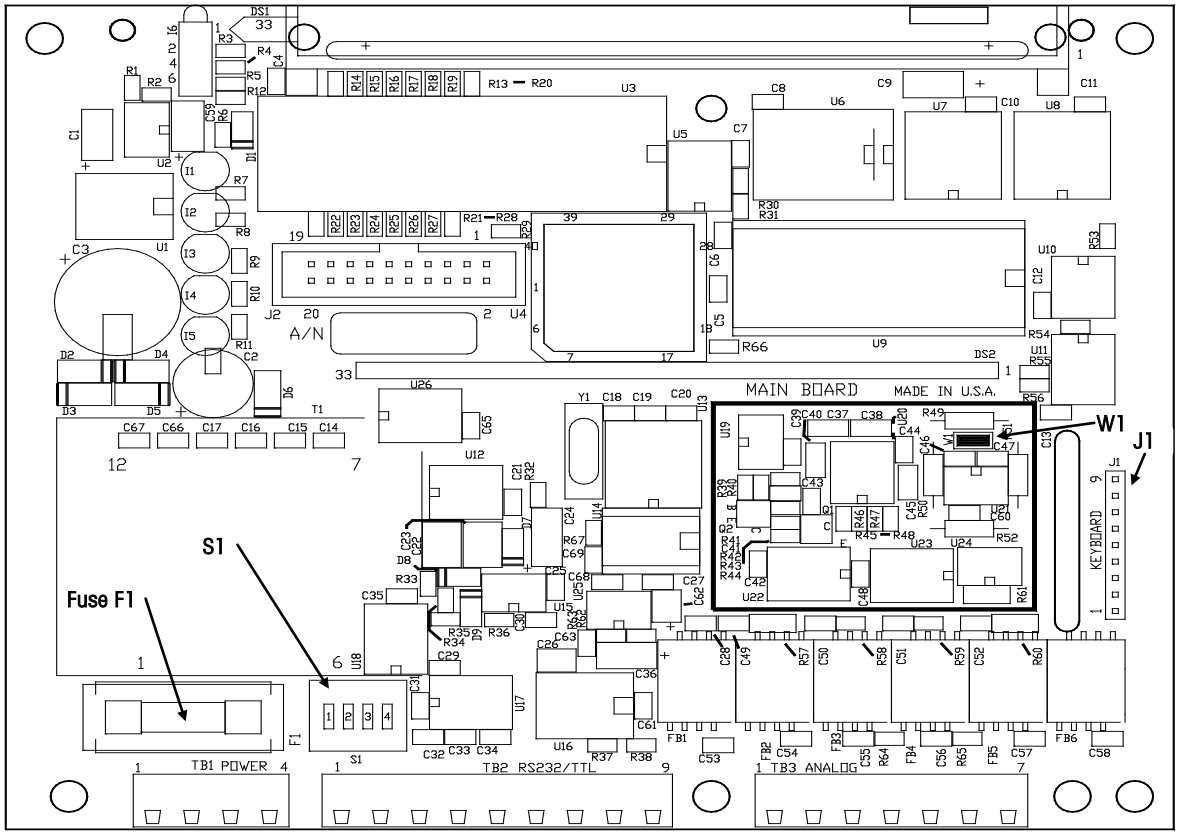


Figure 2-4: Main PCB Analog Versions (P/N *14865400A or *14865200A) (P/N #15201300A or #15201500A)

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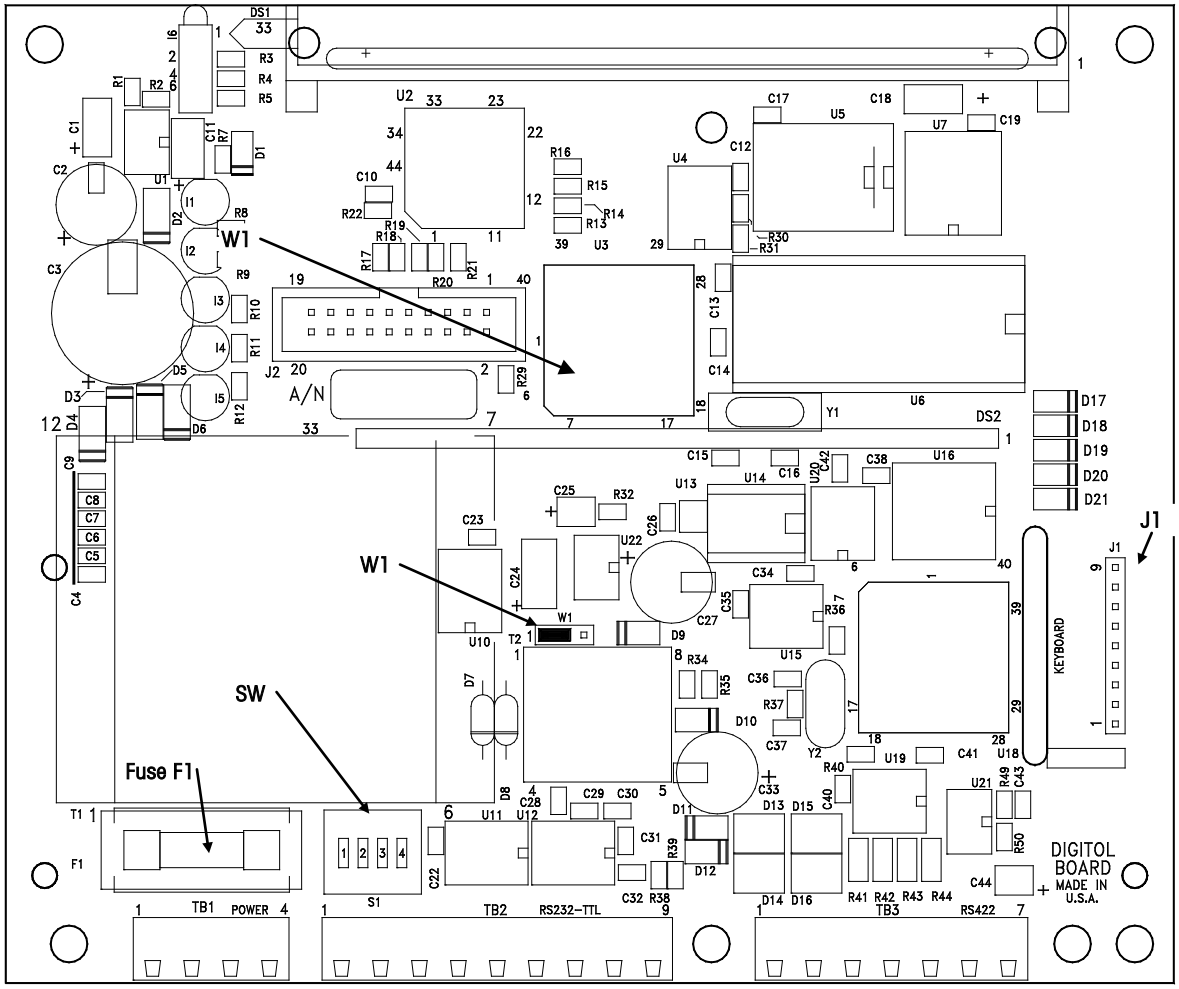


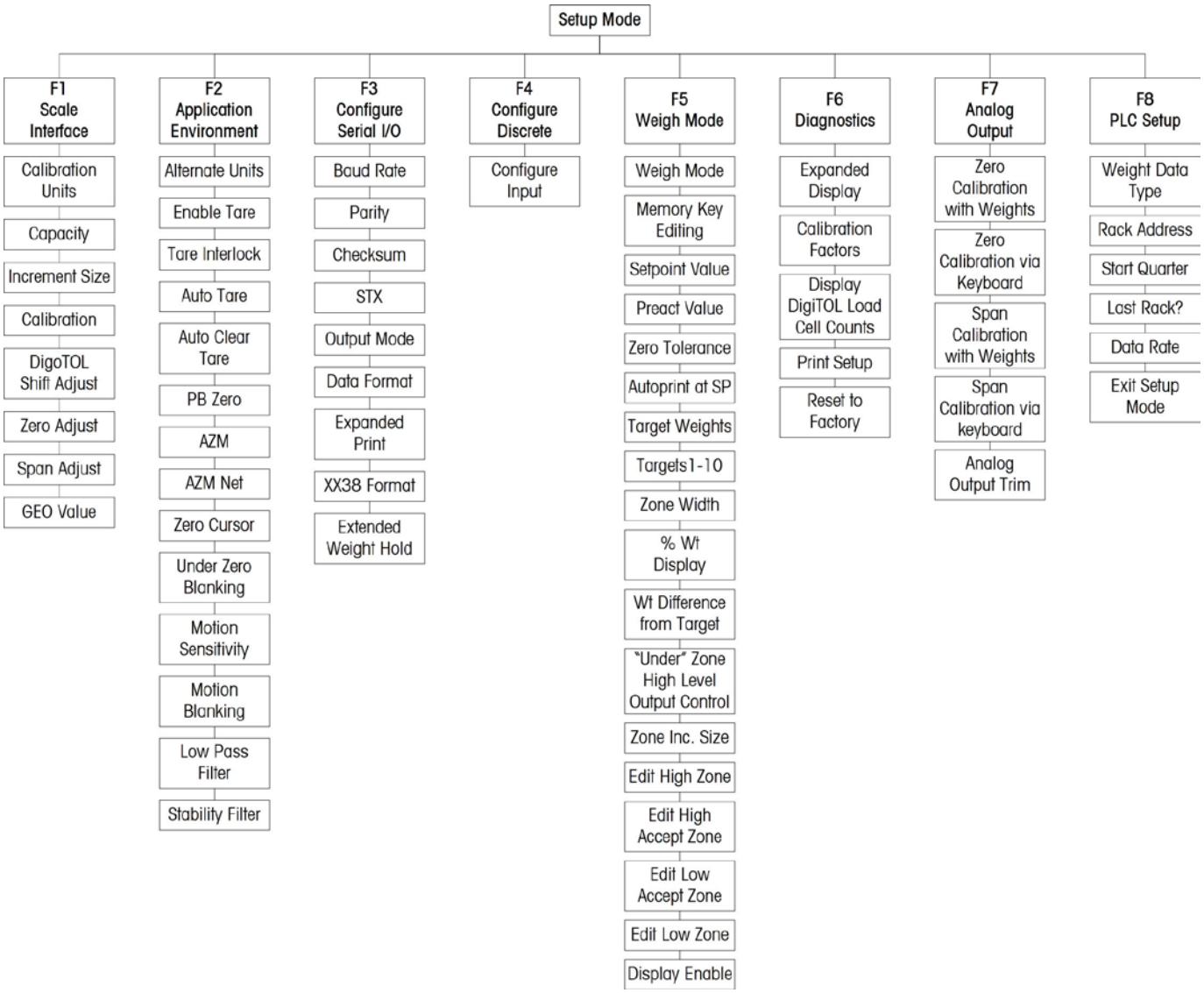
Figure 2-5: Main PCB DigiTOL Versions (P/N *1503180A or 14977900A)

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3

Programming and Configuration

The PANTHER terminal's functions and the accessibility of those functions to an operator are determined by how you configure the individual parameters of the terminal's eight program blocks (F1-F8). This chapter describes each program block and sub-block, and walks you through the various options for configuring them. The factory defaults loaded into the PANTHER terminal appear on page 3-3.



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General Information

Program Block Access

Note: the setup switch can remain closed if terminal security is not required.

To access and configure the program blocks, you must enter Setup Mode. Open the PANTHER terminal as described in Chapter 2 and close SW1-1. Close the terminal. Press **PRINT** and **ZERO** simultaneously. The **[F1]** prompt will be displayed, signaling you that you are now in Setup Mode.

General Programming Procedure

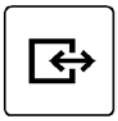
After accessing Setup Mode, each program block and sub-block can be configured. If the PANTHER terminal is being configured for the first time, it is recommended that the programmer configure each program block to assure the terminal is setup correctly as the application and/or environment dictates. You configure the program blocks and sub-blocks by using the keypad. When you are in setup mode, each key has a specific function. See Keystroke Functions in Setup Mode in the following section.

Once the **[F1]** prompt is displayed:

- The **SELECT** key will skip to the next block.



- The PRINT key will enter the block.



Once **PRINT** is pressed, the PANTHER terminal advances to the first parameter in the block. The display shows the sub-block number and the current value setting.

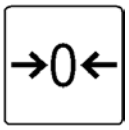
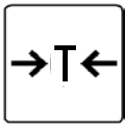
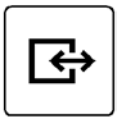
Press **PRINT** to accept the value and advance to the next sub-block. Or, press the **SELECT** key to toggle through the choices until the desired selection is displayed.

After the desired selection is displayed, press **PRINT** to accept the value. Continue until all required changes have been made.

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Keystroke Functions in Setup Mode

The following keys are used to configure the program blocks.

	ZERO	Backup to the previous step.
	TARE	Moves the blinking edit cursor left one digit.
	CLEAR	Resets a numeric data entry value to zero and/or allows programmer to skip to the end of setup.
	MEMORY	Moves the blinking edit cursor right one digit.
	SELECT	Increments the numeric data entry digit and/or allows the programmer to view the next in a selection list.
	PRINT [ENTER]	Accepts/terminates a data entry.

Default Settings

The following is a list of the factory default setup parameters loaded in the PANTHER terminal. You can return to these settings by following the procedures outlined in Reset to Factory Defaults (F6.5) on page 3-25.

	State	Description
F1.1	2	Scale Type (DigiTOL version only)
F1.1.1	4	Number of Load Cells
F1.2	1	Calibration Units = lb
F1.3	100	Scale Capacity
F1.4	0.01	Scale Increment Size
F1.5	0	DigiTOL Shift Adjust
F1.6	0	Zero Adjust
F1.7	0	Span Adjust
F1.8	16	Geo Code
F2.1	0	Alternate Units = none (unit switching disabled)
F2.3.1	1	Pushbutton Tare Enabled
F2.3.2	0	Tare Interlock Disabled
F2.3.3	0	Auto Tare Disabled
F2.3.4	0	Auto Clear Tare Disabled

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	State	Description
F2.4.1	1	Push Button Zero Enabled, 2% Range
F2.4.2	1	Auto zero Maintenance Enabled within 0.5 Window.
F2.4.3	1	Auto Zero Maint in Net Mode
F2.4.4	1	Zero Cursor Enabled
F2.4.5	0	No Under Zero Blanking
F2.5	1	Motion Sensitivity ± 0.5 Increments.
F2.5.1	0	Blanking Disabled
F2.6	2.0	Filter Corner Frequency
F2.6.1	0	Noise Filter Disabled
F3.1.1	9600	Baud
F3.1.4	2	Even Parity
F3.1.5	0	Checksum Disabled
F3.1.6	0	STX Disabled
F3.2	1	Demand Output
F3.2.1	0	Print Format = Single Line Printing
F3.2.2	0	No Expanded Print
F3.2.3	1	XX38 Data Format Disabled
F3.3	0	Extended Weight Hold Timer = 0.0 seconds
F4.1	1	Discrete input = Print Command
F5.1	0	Indicator Weighing Mode
F5.2	1	Setpoints/Targets Editing **MEMORY** Key
SP1	0	Setpoint 1/Target 1
SP2	0	Setpoint 2/Target 2
SP3	0	Target 3 (over/under only)
SP4	0	Target 4 (over/under only)
P1	0	No Preact for Setpoint 1.
P2	0	No Preact for Setpoint 2.
F5.4	0	No Zero Tolerance
F5.5	0	No Print at Setpoint 1Ccoincidence
F5.6	0	No Print at Setpoint 2 Coincidence
F5.7	0	Stored Target Weight Enabled (only appears if F5.1 = 2)
F5.7.1	1	Zone Weight Entered in Increments
F5.7.2	0	Display is in Weight Units
F5.7.3	1	Enable Weight Difference from Target
F5.7.4	1	Output on until weight is within 10d of zero.
F5.8.1	5	High Zone Width
F5.8.2	5	High Accept Zone Width
F5.8.3	5	Low Accept Zone Width
F5.8.4	5	Low Zone Width
F5.9	1	Enable Weight Display and Status Lights
F6.1	0	No expanded display mode
F6.2	0	Edit Cal. Factors
F6.3	0	No DigiTOL Counts Displayed
F6.4	0	Print Setup
F6.5	0	Reset to Factory

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	State	Description
*F7.2		Analog Output Zero Calibration with Test Weights, No Default
*F7.2.1		Analog Output Zero Calibration via Keyboard, No Default
*F7.3		Analog Output Span Calibration w/Test Weights, No Default
*F7.3.1		Analog Output Span Calibration with Keyboard, No Default
*F7.4		Analog Output Trim Adjustment, no default
8.1	0	See chapters 5, 6, 7 and 9 for details on PLC setup parameters. If PROFIBUS, AB, Modbus or DeviceNET PCB Option is installed. DeviceNet is available if the main PCB contains D153790 or later program.
F8.2	1	
F8.3	1	
F8.4	1	
F8.5	2	
F8.6	0	

* If analog output PCB option is installed.

Exiting Program Blocks and Setup Mode

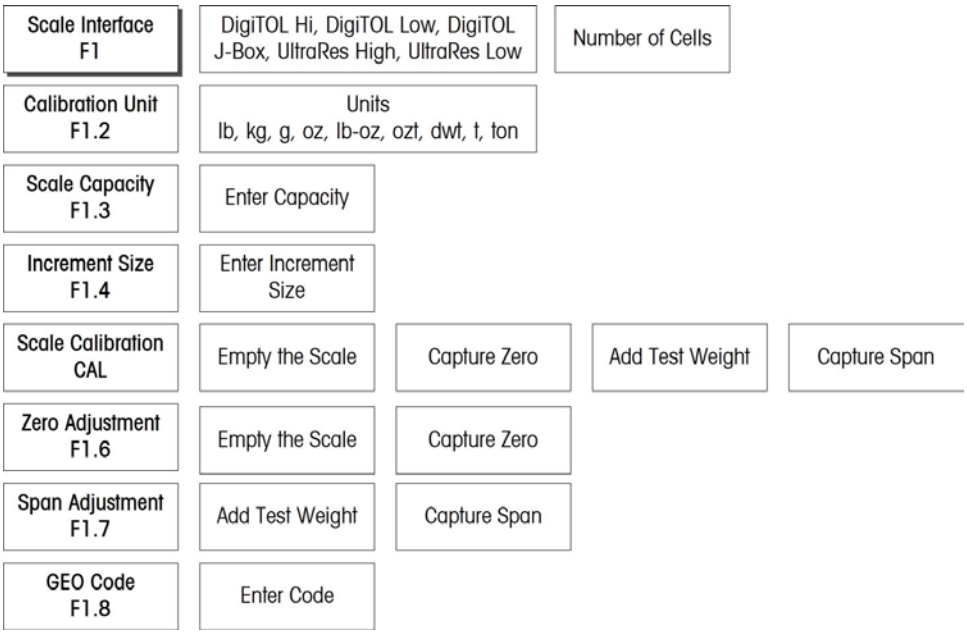
Once you have finished configuring the PANTHER terminal to meet the needs of your application, you can exit setup mode by doing the following:

- Press **CLEAR.**
- The **[CALOFF]** display appears.
- Press **PRINT**. The PANTHER terminal returns to the normal operating mode. The S1-1 switch can be turned off to secure the terminal.

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F1 Scale Interface Program Block

The Scale Interface program block allows the user to set and calibrate the features that affect weighing performance. The following diagram describes this block:



Press **PRINT (ENTER)** to access the Scale Interface program block and configure the sub-blocks. Or, press **SELECT** to skip to the next program block.

F1.1 Scale Type

NOTE: This parameter is skipped if using an analog PCB.

[F1.1 X] SCALE TYPE: Enter the value for X that corresponds to the type of DigiTOL scale base or DigiTOL J-Box.

X=1	Reserved (Analog only)	X=4	DigiTOL J-Box
X=2	DigiTOL Hi Res	X=5	UltraRes Hi
X=3	DigiTOL Lo Res	X=6	UltraRes Lo

[F1.1.1] Number of load cells (DigiTOL only). Select the number of load cells connected to the DigiTOL scale base or DigiTOL J-Box.

X=1	1 load cell	X=3	3 load cells
X=2	2 load cells	X=4	4 load cells

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F1.2 Calibration Units Sub-block

Example:
The PANTHER terminal is calibrated using kg test weights and is switchable to metric tons. Kg is the primary unit and "ton" (metric tons) is the alternate unit. The "ton" overlay would be placed over the blank on the PANTHER terminal display lens.

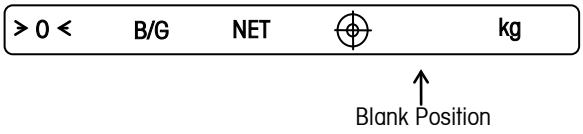
NOTE: If neither the primary or alternate unit is lb or kg, then the left cursor (blank position) is used to indicate the primary unit and the right cursor (kg position) is used to indicate the alternate unit. Alternate unit decals are provided with the PANTHER terminal.

[F1.2 X] CALIBRATION UNITS: Enter the value for X that corresponds to the type of test weights that will be used for calibration.

X=1	lb	X=5	lb-oz
X=2	kg	X=6	ozt
X-3	g	X=7	dwt
X=4	oz	X=8	t
		X=9	ton

The PANTHER terminal provides a wide array of primary and alternate weight units. **Primary Units** is selected in Step F1.2 as the Calibrated Unit. **Alternate Units** is selected in Step F2.1. If the primary weight unit selection is something other than kg or if alternate units will be used, an adhesive overlay (shipped with the terminal) needs to be installed over the blank position or "kg" legend on the display lens. This will correctly identify the displayed weight when shown converted to this unit (ton for metric tons for example). The label should be applied as follows:

- If one of the selected units is lb, the other legend overlay should be placed over "kg" and the lb overlay should be placed in the blank position.
- If one of the selected units is kg, the other legend overlay should be placed over the blank position.



NOTE: To access the legend label:

- Remove the AC power.
- Open the enclosure.
- Remove the controller PCB.
- Remove the legend label from the bottom of the display window.
- After modifying the label, reassemble in reverse order.

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F1.3 Scale Capacity Sub-block

[F1.3] SCALE CAPACITY

[XXXXXX] Current scale capacity, available for Numeric Entry editing.

Only legal scale capacities from the capacity table below are permitted.

Increment Size	LOAD CELL SCALE CAPACITIES							
	1000d	2000d	3000d	4000d	5000d	6000d	8000d	10000d
0.001	1	2	3	4	5	6	8	10
0.002	2	4	6	8	10	12	16	20
0.005	5	10	15	20	25	30	40	50
0.01	10	20	30	40	50	60	80	100
0.02	20	40	60	80	100	120	160	200
0.05	50	100	150	200	250	300	400	500
0.1	100	200	300	400	500	600	800	1000
0.2	200	400	600	800	1000	1200	1600	2000
0.5	500	1000	1500	2000	2500	3000	4000	5000
1	1000	2000	3000	4000	5000	6000	8000	10000
2	2000	4000	6000	8000	10000	12000	16000	20000
5	5000	10000	15000	20000	25000	30000	40000	50000
10	10000	20000	30000	40000	50000	60000	80000	100000
20	20000	40000	60000	80000	100000	120000	160000	200000
50	50000	100000	150000	200000	250000	300000	400000	500000

For lb-oz mode, the capacity must be entered in whole ounces.

Capacity (lb oz)	Increment (oz)	Calibration Capacity (oz)	# div
7 lb 8.00 oz	0.02	120	6000
9 lb 6.00 oz	0.05	150	3000
18 lb 12.00 oz	0.05	300	6000
25 lb 0.0 oz	0.1	400	4000
37 lb 8.0 oz	0.1	600	6000
50 lb 0.0 oz	0.2	800	4000
75 lb 0.0 oz	0.2	1200	6000
93 lb 12.0 oz	0.5	1500	3000
187 lb 8 oz	1	3000	3000
375 lb 0 oz	2	6000	3000
750 lb 0 oz	4	12000	3000

F1.4 Increment Size Sub-block

[F1.4] INCREMENT SIZE

[XXXX] Current Increment size is displayed for Selection List editing. Press the **SELECT** key to toggle through valid selections.

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Calibration Sub-block (No "F" Designation)

[CAL X] SCALE CALIBRATION PROCEDURE

X = 0 Skip calibration procedure
X = 1 Continue calibration

[E SCL] Empty scale platform and press **ENTER** to continue.

[15 CAL] Delay while initial is set (display counts down). If motion sensitivity is not disabled and motion is detected, the display returns to **[E SCL].**

[Add Ld] Place test weight on the scale platform, and press **ENTER.**

[`0'0000] Enter test weight value. No decimal point is permitted. Maximum test weight is 105% of full scale capacity.

[15 CAL] Delay while span is set (display counts down). If the motion is detected at this step then the display returns to the **[Add Ld]** prompt.

[CAL d] "Calibration done" is displayed momentarily.

Note: When in lb-oz mode, enter the test weight value in ounces.

F1.5 Shift Adjust (DigiTOL only)

[F1.5 x] SHIFT ADJUST

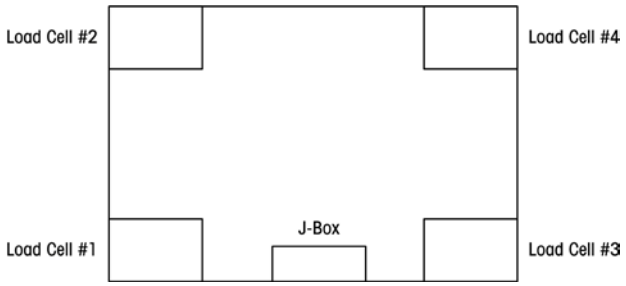
X = 0 Skip shift adjust
X = 1 Continue with shift adjust
X = 2 Set shift constants = 1.0. Skip remainder of procedure.

If "1" is selected, the following sequence will occur:

[E SCL] Empty the scale platform and press **ENTER** to continue.

[15] Delay while initial is set (display counts down). The weight will be averaged if motion occurs during this process.

[CELL X] Place the test weight on the platform over cell "X". Press **ENTER**. Load cell #1 is to the left of the J-Box (viewed from the top of the deck). Cells 2,3, and 4 are located as shown in the following illustration:



[15] Delay while weight reading is recorded (display counts down). The weight will be averaged if motion occurs during this process.

The [CELL X] step followed by the [15] count down step is repeated until all load cells selected in F1.5 (number of load cells connected) have been shift compensated.

If "2" is selected, any previously stored shift adjust values are removed. This causes the load cell outputs to be used without any trim built into the values. This feature is used

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when the terminal is connected to a tank or hopper scale using the DigiTOL power module and the shift test is not practical.

F1.6 Zero Calibration Adjust Sub-block

[F1.6 X] ZERO CALIBRATION ADJUST

X = 0 Skip zero adjustment
X = 1 Store current initial on scale as zero.

[15 CAL] If zero calibration adjust is selected, the display counts down from 15 to 0 while scale reading are being taken. Scale motion causes the countdown to restart from 15. Pressing **CLEAR** during the countdown aborts zero adjust so the motion sensitivity selection can be modified. When the countdown reaches "0," the scale reading is adjusted to the new zero reading.

F1.7 Span Calibration Adjust Sub-block

[F1.7 X] SPAN CALIBRATION ADJUST

X = 0 Skip span calibration adjust
X = 1 Perform span calibration adjustment.

[0] Numeric data entry of current scale test load. If the **PRINT** key is pressed with the display showing " 0" then span adjust is aborted.

[15 CAL] After valid non-zero data entry, the display counts down from 15 to 0 while scale readings are taken. Scale motion causes the countdown to restart from 15. Pressing **CLEAR** during countdown aborts span adjust so the motion sensitivity selection can be modified. When countdown reaches "0," an attempt is made to calculate the span calibration. If weight is negative, over-capacity or in expand mode, **[E 35]** is displayed to show span adjustment cannot be performed. If the weight is more than twice the original displayed weight, **[E 35]** is displayed. Press any key to clear **[E 35]** and proceed to the end of setup.

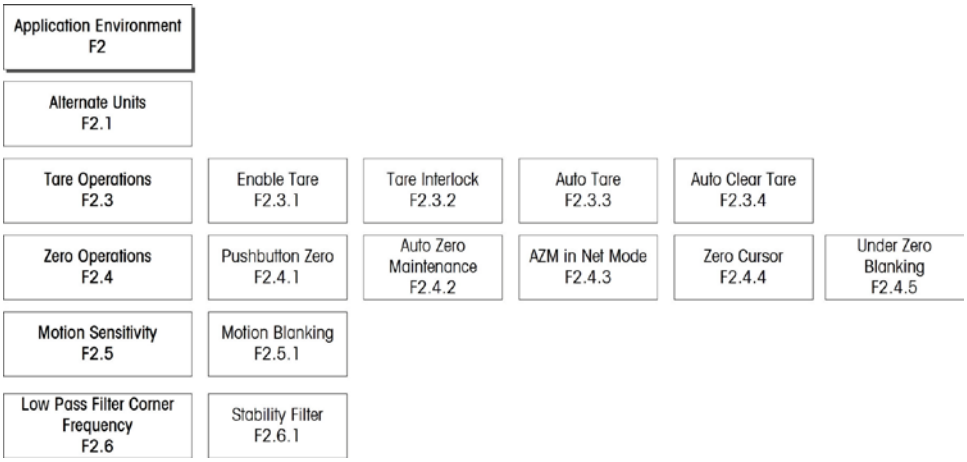
F1.8 Geo Code Sub-block

[F1.8 X X] GEO CODE

Values from 00 to 31 are accepted. The Geo Code is used to compensate for differences in the acceleration of gravity due to latitude and elevation if the scale was calibrated in one location then moved to another. Gravitational acceleration decreases with increasing height above sea level by approximately 0.2 parts per thousand every 1000 meters. The Geo Code has 32 settings with an increment size of 0.2 parts per thousand. The default Geo Code is 16 (U.S.) See the Geo Code Table in the appendix.

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F2 Application Environment Block



[F2] APPLICATION ENVIRONMENT

Press **SELECT** to skip to [F3]. Press **PRINT** to continue.

F2.1 Alternate Units Sub-block

Example:
The PANTHER terminal is calibrated using kg test weights and is switchable to metric tons. Kg is the primary unit and "ton" (metric tons) is the alternate unit. The "ton" overlay would be placed over the blank position on the PANTHER terminal display lens.

[F2.1 X] ALTERNATE UNITS: Enter a value for X that corresponds to the unit of measure desired as a secondary unit.

X = 0	None	X = 5	lb-oz
X = 1	lb	X = 6	ozt
X = 2	kg	X = 7	dwt
X = 3	g	X = 8	t
X = 4	oz	X = 9	ton (metric)

Refer to setup step F1.2 for additional information on the optional weight legends.

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F2.3 Tare Operations Sub-block

For lb-oz mode, no Keyboard Tare is permitted. Remote Tare from the discrete input or serial port is possible if enabled.

[F2.3] TARE OPERATIONS

Press **SELECT** to skip to [F2.4], press **PRINT** to continue.

[F2.3.1 X] ENABLE TARE FROM FRONT PANEL: Enter a value for X that will enable or disable Tare.

X = 0 Tare disabled

X = 1 Only Pushbutton Tare enabled

[F2.3.2 X] TARE INTERLOCK: The tare interlock feature, if enabled, places certain limitations on how tare values can be cleared and entered in legal-for-trade applications. Specifically, tare interlock meets legal-for-trade requirements by making the following restrictions:

Tare weights can be cleared only at gross zero (with scale empty).

Tare can be entered only when the scale is in gross mode.

Previous tare values must be cleared before a new tare value can be entered (chain tare disabled).

X = 0 Tare Interlock disabled

X = 1 Tare interlock enabled

[F2.3.3 X] AUTO TARE

X = 0 Auto Tare disabled

X = 1 Auto Tare enabled after no motion following > 5d in GROSS mode

[F2.3.4 X] AUTO CLEAR TARE

X = 0 Auto Clear Tare disabled

X = 1 Auto Clear Tare enabled, tare automatically clears at gross zero

F2.4 Zero Operations Sub-block

If AZM=0, the tare and zero value will be stored during a power loss. The terminal will display a correct net value when power is restored.

[F2.4] ZERO OPERATIONS

Press **SELECT** to skip to [F2.5], press **PRINT** to continue.

[F2.4.1 X] PUSHBUTTON ZERO ENABLE

X = 0 Pushbutton zero disabled

X = 1 Enable pushbutton zero and AZM within ±2% FS range

X = 2 Enable pushbutton zero and AZM within ±20% FS range

[F2.4.2 X] AUTOZERO MAINTENANCE: Auto Zero Maintenance (AZM) automatically compensates for small changes in zero resulting from material build-up or temperature changes. This sub-block lets you select the weight range (±) around gross zero within which the terminal will capture zero. If residual weight on the scale exceeds the weight range, the PANTHER terminal will not capture zero.

X = 0 No AZM or zero capture at power-up

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X = 1 AZM within 0.5 d window and power-up zero capture ±2%.

X = 2 AZM within 1d window and power-up zero capture ±2%.

X = 3 AZM within 3d window and power-up zero capture ±2%.

[F2.4.3 X] AZM IN NET MODE

X = 0 Disable AZM in net mode

X = 1 Enable AZM in net mode

[F2.4.4 X] ZERO CURSOR

X = 0 No Zero cursor

X = 1 Zero cursor enabled

[F2.4.5 X] UNDER ZERO BLANKING

X = 0 No Under Zero blanking

X = 1 Blank Display and internal signal "Under Capacity" if gross weight is greater than 5d under zero.

F2.5 Motion Sensitivity Selection Sub-block

[F2.5 X] MOTION SENSITIVITY SELECTION: The motion detection feature determines when a no-motion condition exists on the scale platform. The sensitivity level determines what is considered stable. Printing, pushbutton zero, and tare entry will wait for scale stability before carrying out the command. Stability detection occurs over a predefined period of time and allows a predetermined "acceptable" amount of motion (in scale increments).

X = 0 Motion detector disabled

X = 1 1.0 d motion sensitivity

X = 2 3.0 d motion sensitivity

[F2.5.1 X] MOTION BLANKING

X = 0 Blanking disabled

X = 1 Blank the weight display during motion

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F2.6 Low Pass Filter Corner Frequency

Note: Stability filter should not be enabled in batching or filling operations.

This is a break-out filter for no-motion. When this parameter is enabled and the scale is at no-motion, this filter stiffens the low pass filter so that it is harder to go back to a motion condition. Once motion is detected, the filtering goes back to the parameter set in [F2.6 x].

[F2.6 X.X] LOW PASS FILTER CORNER FREQUENCY

X.X is the numeric data entry for the low pass filter corner frequency (0.5-9.9 Hz).

[F2.6.1 X] STABILITY FILTER ENABLE/DISABLE

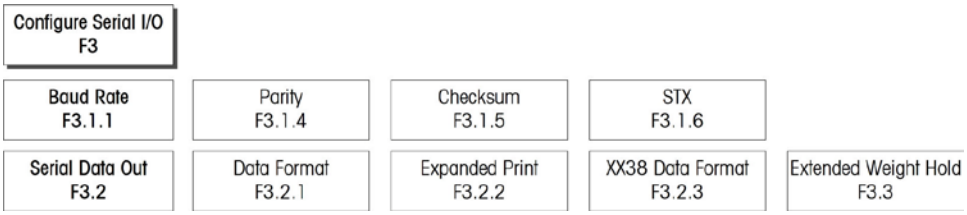
X = 0 Disable stability filter

X = 1 Enable stability filter

The stability filter can be used to improve the readability of a static weight display by removing small variations in weight around a steady state value. If the stability filter is enabled and a "no-motion" condition is detected, a very heavy filer is utilized. This keeps the display stable during slight changes in weight.

If motion is detected while in this condition, the very heavy filter is removed and the "normal" filter is used. This permits quick changes between stable weight readings. The stability filter is normally used for static weighing applications. If the stability filter is enabled in dynamic applications, such as batching or filling, unrepeatable cutoff weights may result if the heavy filter switches in as the cutoff point is reached.

F3 Configure Serial I/O Block



[F3] CONFIGURE SERIAL I/O

Press **SELECT** to skip to [F4].

Press **PRINT** to continue.

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F3.1 Select Serial Port Parameters Sub-block

[F3.1.1] DATA RATE

[XXXX] XXXX = Select 300, 1200, 2400, 4800, or 9600 baud

[F3.1.4 X] PARITY

X = 0 No parity

X = 1 Odd parity

X = 2 Even parity

[F3.1.5 X] CHECKSUM

X = 0 No checksum sent

X = 1 Checksum enabled

[F3.1.6 X] STX

X = 0 No STX sent

X = 1 STX enabled

F3.2 Serial Data Out

Refer to the appendix for details on output strings.

[F3.2 X] SERIAL DATA OUT

X = 0 Continuous mode. If continuous mode, the display skips to [F3.3 X].

X = 1 Demand mode. Continue to next step.

X = 2 SICS Protocol. If 2 is selected, the display skips to F4.

[F3.2.1 X] DATA FORMAT (Demand Mode output only)

X = 0 Single line

X= 1 Single line gross net tare.

X = 2 Multiple line gross net tare

X = 3 Single line with over/under status (over/under mode only)

[F3.2.2 X] EXPANDED PRINT (Demand Mode output only)

X = 0 Normal print

X = 1 Expanded print

[F3.2.3 X] XX38 Data Format

x=0 No "G" in single line demand string

x=1 "G" in single line demand string

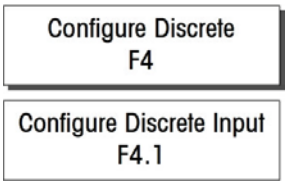
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F3.3 Extended Weight Hold Sub-block

[F3.3 X.X] EXTENDED WEIGHT HOLD DISPLAY

Use the numeric keypad to enter a value for the time (in seconds from 0.0 to 9.9) that the weight will be held (frozen) on the display when a print is initiated.

F4 Configure Discrete Block



[F4] CONFIGURE DISCRETE

Press **SELECT** to skip this block.

Press **PRINT** to continue.

F4.1 Configure Discrete Input Sub-block

[F4.1 X] CONFIGURE DISCRETE INPUT

Assign a function to the discrete input:

X = 0 No function

X = 1 Print

X = 2 Tare

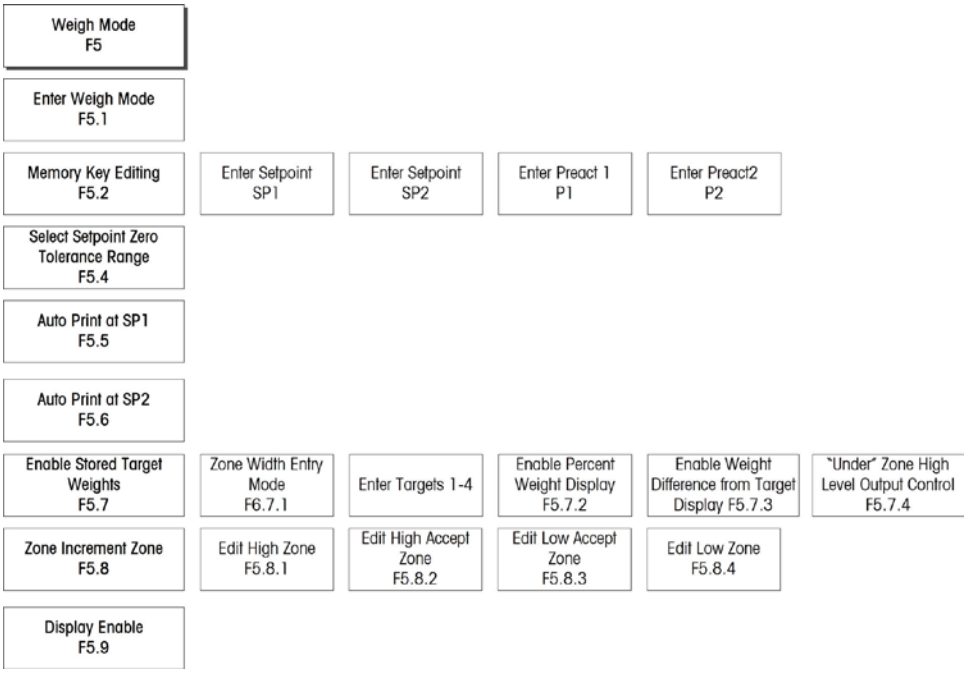
X = 3 Zero

X = 4 Select (switches units)

X = 5 Target

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F5 Weigh Mode Block



[F5] WEIGH MODE

Press **PRINT** to continue.

Press **SELECT** to skip to [F6].

F5.1 Enter Weigh Mode Sub-block

[F5.1 X] ENTER WEIGH MODE

X = 0 Indicator (Setpoints and Targets disabled). Skip to [F6]
X = 1 Setpoint
X = 2 Over/Under

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F5.2 Memory Key Editing Sub-block

[F5.2 X] MEMORY KEY EDITING

X = 0 No Setpoint or Over/Under editing using **MEMORY** key

Setpoint or Over/Under editing only in Setup Mode.

Proceed to Setpoint or Over/Under Editing.

If F5.1 was set to 2, this goes to F5.7.

X = 1 Setpoints/Targets may be edited only using the **MEMORY** key.

Preact /Zones editing only in Setup Mode.

Proceed to Preact or Zone Editing.

If F5.1 was set to 2, this goes to F5.7.

X = 2 Setpoints/Targets and Preacts/Zones may be edited only using

the **MEMORY** key. Tolerance editing only in Setup mode.

Proceed to Tolerance Editing. (Setpoint Mode Only)

If F5.1 was set to 2, this goes to F5.7.

X = 3 All Setpoint or Over/Under editing is done only using the **MEMORY** key.

If F5.1 was set to 2, this goes to F5.7.

Note: The next two sections (SP1, SP2) relate to the entry of setpoint values from the front panel.

The following section permits editing of Setpoint related functions. If the Weigh Mode is "Indicator" or "Over/Under" skip this section. If Memory Key Editing (F5.2) > 0, skip Setpoint Entry.

[SP1] ENTER SETPOINT 1

Press **CLEAR** to go to preact editing

Press **PRINT** to proceed.

[012345] Display now shows the previous setpoint 1 value, which may now be edited. If the new setpoint value is less than the existing preact value, then **[E 20]** will be displayed for approximately 2 seconds to flag the error before the display returns to the **[SP1]** display.

[SP2] ENTER SETPOINT 2

Press **CLEAR** to proceed to preact editing

Press **PRINT** to proceed.

Press **ZERO** to backup to [SP1]

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[012345] Display shows the previous setpoint 2 value. If the new setpoint value is less than the existing preact value, then **[E 20]** will be displayed for approximately 2 seconds to flag the error before the display returns to **[SP2]**.

If the Weigh Mode is "Indicator" or "Over/Under" skip this section. If Memory Key Editing (F5.2) > 1, skip Preact Entry. Values entered for preact adjust the corresponding cutoff action as follows:

Setpoint actuation = Setpoint entry - preact entry

Note: If the editing of Preact values from the front panel is allowed, skip the next two steps related to Preact Entry.

[P1] ENTER PREACT FOR SETPOINT 1

(Only appears if Setpoint Mode is selected in F5.1)

Press **CLEAR** to go to F5.4.

Press **PRINT** to proceed.

[012345] Display shows the previous preact value for editing.

Press **ZERO** back up to [SP2].

Press **PRINT** to accept entry and go to [P2]

Press **CLEAR** to zero display and start entry of a new value.

If the new preact value is greater than the existing setpoint value, then [E 20] will be displayed for approximately 2 seconds to flag the error before the display returns to the [P1] display.

[P2] ENTER PREACT FOR SETPOINT 2

Press **CLEAR** to go to F5.4.

Press **PRINT** to proceed.

[012345] Display shows the previous preact 2 value for editing.

Press **ZERO** back up to [P1].

Press **PRINT** to accept entry and proceed to [F5.4]

Note: If the editing of setpoint zero tolerance values from the front panel is allowed, skip the next section.

Press **CLEAR** to zero display and start entry of a new value.

If the new preact value is greater than the existing setpoint value, then **[E 20]** will be displayed for approximately 2 seconds to flag the error before the display returns to the **[P2**] display.

F5.4 Select Setpoint Zero Tolerance Range

[F5.4 X] SELECT SETPOINT ZERO TOLERANCE RANGE.

X = 0 no zero tolerance output.

X = 1 1 increment.

X = 5 5 increments.

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F5.5 Auto Print at SP1 Sub-block

[F5.5 X] AUTO PRINT AT SP1 (Setpoint Mode only)

X = 0 Auto print at SP1 disabled

X = 1 Auto print when setpoint reached after coming from zero.

F5.6 Auto Print at SP2 Sub-block

[F5.6 X] AUTO PRINT AT SP2 (Setpoint Mode only)

(Only appears if Setpoint Mode is selected in F5.1)

X = 0 Auto print at SP2 disabled

X = 1 Auto print when setpoint reached after coming from zero.

F5.7 Enable Stored Target Weights

[F5.7 X] ENABLE STORED TARGET WEIGHTS

X = 0 Disable stored target weight, skip to zone editing

X = 1 Enable stored target weight. (If entry of target values from the front panel is allowed, skip the next four steps related to target entry.)

(Only appears if Setpoint Mode is selected in F5.1)

[F5.7.1] ZONE WIDTH ENTRY MODE

X = 0 Zone width entered in increments 0-15d.

X = 1 Zone width entered as % of target, 0 to 4%

[SP1] ENTER TARGET 1 (Only if F5.2 = 0)

Press **CLEAR** to go to F5.7.2.

Press **PRINT** to proceed. Value is displayed. Edit. Press **PRINT** again.

Press **ZERO** to backup to [F5.7] NOTE: You cannot use the **ZERO** key to back up through the setpoints.

Press **SELECT** to move to other setpoints.

(Only appears if Over/Under Mode is selected in F5.1)

[012345] Display now shows the previous target 1 value for editing. When new value is entered, press **PRINT**. Repeat for SP2, SP3, and SP4.

[F5.7.1 X] ZONE WIDTH ENTRY MODE

X=0 Zone width is entered in increments (0-15)

X=1 Zone width is entered in percent of target (0-4%)

If units switching is enabled, display is always in weight units; skip this prompt.

[F5.7.2 X] ENABLE PERCENT WEIGHT DISPLAY

X = 0 Weight display is in weight units

X = 1 Weight display is in percent of target

Note: If F5.7.2 is set to 1, the display skips to F5.7.4.

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[F5.7.3 X] ENABLE WEIGHT DIFFERENCE FROM TARGET DISPLAY MODE

When enabled, if a valid target weight is available, weight is displayed as the difference from the target weight instead of the "normal" weight.

X = 0 Disable Weight Difference from Target

X = 1 Enable Weight Difference from Target

If the Weigh Mode is "Indicator" or "Setpoint" skip this section.

[F5.7.4 X] WEIGHT UNDER TARGET HIGH LEVEL OUTPUT CONTROL

X=0 Under target output always on when weight falls below Low zone.

X=1 Under target output on until weight falls below 10 increments of gross zero.

If entry of zone values from the front panel is allowed, skip to section 5.9.

F5.8 Zone Increment Size for Pushbutton Target

[F5.8] ZONE INCREMENT SIZE

[F5.8.1 XX] EDIT HIGH ZONE

XX = Current number of increments for High zone for selection list editing. (0 to 4.0% of target or 0 to 15 increments of weight)

[F5.8.2 XX] EDIT HIGH ACCEPT ZONE

XX = Current number of increments for High Accept zone for selection list editing.

[F5.8.3 XX] EDIT LOW ACCEPT ZONE

XX = Current number of increments for Low Accept zone for selection list editing.

[F5.8.4 XX] EDIT LOW ZONE

XX = Current number of increments for Low zone for selection list editing.

If the Weigh Mode is "Indicator" or "Setpoint" skip this section.

F5.9 Display Enable Sub-block

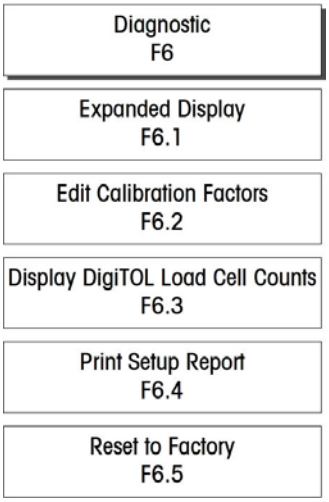
[F5.9 X] DISPLAY ENABLE

X = 0 Status lights only

X = 1 Weight displayed in minors

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F6 Diagnostics Block



[F6] DIAGNOSTICS

Press **SELECT** to skip to [F7].

Press **PRINT** to continue

F6.1 Expanded Display Sub-block

[F6.1 X] EXPANDED DISPLAY.

X = 0 Normal display mode

X = 1 Weight displayed in minors

F6.2 Edit Calibration Factors Sub-block

[F6.2 X] EDIT CALIBRATION FACTORS

X = 0 Skip this block

X = 1 Edit calibration factors

[123456] Zero factor, available for numeric data editing

[123456] Span factor, available for numeric data editing, page 1

[123456] Span factor, available for numeric data editing, page 2

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F6.3 Display Individual Load Cell Counts (DigiTOL Only)

[F6.3 X]

X = 0 Skip this operation.

X=1 Display cell readings in count.

F6.4 Print Setup

Display will show [PS - XX] during printing. The XX will increment from 01 to indicate printing is proceeding.

[F6.4 X] PRINT SETUP

X = 0 Skip this sub-block

X = 1 Print setup report

F6.5 Reset to Factory Defaults

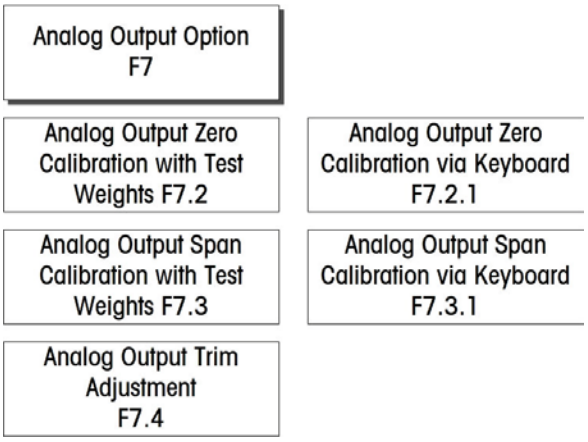
[F6.5 X] RESET SOFTSWITCH CONFIGURATION TO FACTORY SETTINGS

X = 0 Skip this sub-block

X = 1 Restore all settings to factory defaults

[LOAd 0] Are you sure prompt. Toggle to "1" for yes, "0" to abort, then press **PRINT**. If "yes", soft switches are now set to the factory default values.

F7 Analog Output Option Block



[F7] ANALOG OUTPUT OPTION (if option is installed)

Press **SELECT** to skip to [CALOFF].

Press **PRINT** to continue.

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F7.2 Analog Output Zero Calibration with Test Weights

[F7.2 X] ANALOG OUTPUT ZERO CALIBRATION WITH WEIGHTS

If X=0 then, Skip this step.

If X=1 then proceed to:

[0 Ld] Operate the **PRINT** key to acknowledge desired 'zero' weight is on scale.

[15 CAL] Delay while reading for application zero reading taken. Go to [F7.3 X].

[F7.2.1 X] ANALOG OUTPUT ZERO CALIBRATION VIA KEYBOARD

X = 0 Skip this step.

[ZZZZZZ] X = 1 Numeric Data entry of the previous application zero offset value. Go to [F7.3.1 X]

F7.3 Analog Output Span Calibration with Test Weights Sub-block

[F7.3 X] ANALOG OUTPUT SPAN CALIBRATION WITH WEIGHTS

X = 0 Skip this step.

[15 CAL] X = 1 Delay while zero reading for span determination is made.

[Add Ld] Press **PRINT** key to acknowledge addition of 'span' weight to the platform.

[15 CAL] Delay while reading for span determination is made. If a weight representing less than 1000d is used, an error message **[E 32]** is displayed and the previous span calibration is retained. This error display can be terminated by:

ZERO key -- prompt [F7.2 X]

CLEAR key -- prompt [CALOFF].

PRINT key-- prompt [F7.4 X]

If no errors occurred, then advance to [CALOFF]

[F7.3.1 X] ANALOG OUTPUT SPAN CALIBRATION VIA KEYBOARD

X = 0 Skip this step

[SSSSSS] X = 1 Numeric Data entry of previous application span factor value.

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F7.4 Analog Output Trim Adjustment

[F7.4] ANALOG OUTPUT TRIM ADJUSTMENT

X=0 Skip this section
X=1 Continue calibration using constant Zero and Full Scale values.
X=2 Continue calibration using active load cell weight.

Empty the scale when calibrating Zero. Load scale when adjusting Span.

[0 FAS] Decrease zero reading analog output with **SELECT** key or increase with **ZERO** key. One 'click' per key operation.

[0 SLO] If **MEMORY** is pressed, then alter zero reading analog output as above but at a slower rate. Successive operation of the **MEMORY** key causes a toggle back and forth between fast and slow mode operation. Finish entry with **ENTER** key. Abort using the **CLEAR** key.

[S FAS] Decrease span reading analog output with **SELECT** key or increase with the **ZERO** key; one 'click' per key operation.

[S SLO] If the **MEMORY** key is pressed, then alter span reading as above at a slower rate. Successive operation of the **MEMORY** key causes a toggle back and forth between fast and slow mode prompt and operation. Finish entry with **PRINT** key. Abort using the **CLEAR** key.

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F8 PLC Setup Block

Since configuration options are specific to each of the PLC Interface boards, refer to the appropriate chapter for setup information.

Exit Setup Mode Program Block

[CALOFF] EXIT SETUP MODE

The prompt reminds the user to move the Setup switch to "off".

Press **ZERO** to return to the previous block. Press **PRINT** to exit setup.

Additional Information

In order to secure the PANTHER terminal from accidental or unintentional changes in setup mode, turn switch SW1-1 off.

In legal-for-trade applications, after checking for correct operation and turning switch SW1-1 off, the enclosure must be "sealed." It may be sealed by using adhesive labels on two opposite sides of the enclosure and sticking the labels between the front and rear portions. If a wire and lead seal are required, loop the wire through the bottom center hole of the front door. Secure it with a seal. Once the terminal has been configured (programmed), it is ready for use. Instructions for using the PANTHER terminal are provided in the PANTHER Terminal User's Guide. Operators can perform any of the basic functions listed in that manual. The advanced functions must have been enabled during the programming sequence just completed in order for operators to have access to them.

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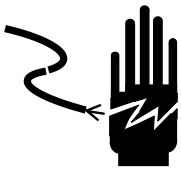


For your notes

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4 Service and Maintenance

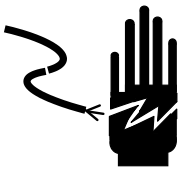
Cleaning and Maintenance



⚠ WARNING

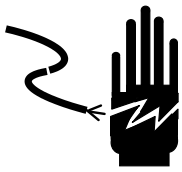
ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

Wipe the keyboard with a clean, soft cloth dampened with a mild glass cleaner. Do not use any type of industrial solvent such as toluene or isopropanol (IPA). These may damage the terminal's finish. Do not spray cleaner directly onto the terminal. Regular maintenance inspections by a qualified service technician are also recommended.



⚠ WARNING

IF THE KEYBOARD, DISPLAY LENS OR ENCLOSURE IS DAMAGED ON A PANTHER PANEL-MOUNT TERMINAL THAT IS BEING USED IN AN AREA CLASSIFIED AS DIVISION 2, THE DEFECTIVE COMPONENT MUST BE REPAIRED IMMEDIATELY. REMOVE AC POWER UNTIL QUALIFIED SERVICE PERSONNEL HAVE REPAIRED OR REPLACED THE DISPLAY LENS, KEYBOARD OR ENCLOSURE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



⚠ WARNING

IF THE PANTEHR TERMINAL IS LOCATED IN A HAZARDOUS AREA (INCLUDING DIVISION AREAS), MAKE SURE THE AREA IS MADE SAFE. FAILURE TO DO SO COULD RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE.

Troubleshooting

The PANTHER terminal is designed to be virtually error-free and reliable. If problems do occur, do not attempt to repair the scale or terminal before the source of the problem has been determined. Record as much information as possible about what has happened including any error messages and physical responses of the terminal and/or scale. If the PANTHER terminal is malfunctioning, perform the troubleshooting tests described in the next few pages to identify the problem.

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Error Codes and Actions

Error	Description	Corrective Measures
E1	PROGRAM MEMORY ERROR	Check power supply voltages. Replace Main Logic PCB.
E2	INTERNAL RAM ERROR	Check power supply voltages. Replace Main Logic PCB.
E3	EEPROM MEMORY ERROR	Press the **CLEAR** key. Check power supply voltages. Reprogram. Recalibrate. Replace Main Logic PCB.
E4	EXTERNAL RAM ERROR	Replace Main Logic PCB.
E7	A/D CIRCUIT MALFUNCTION OR NO ANALOG LOAD CELL CONNECTED	Program for correct load cell type. Check load cells and cables. Check power supply voltages. Replace Main Logic PCB
E8	DigiTOL LOAD CELL COMMUNICATION ERROR	Cycle power. Check load cells and cables. Check power supply voltages. Replace Main Logic PCB.
E9	DigiTOL LOAD CELL OUT OF RANGE	Recalibrate. Replace load cell.
E10	DigiTOL LOAD CELL RAM ERROR	Cycle power. Check power supply voltages. Replace load cell.
E13	DigiTOL LOAD CELL ROM ERROR	Cycle power. Check power supply voltages. Replace Main Logic PCB.
E16	INTERNAL MATH ERROR	Press **CLEAR** to acknowledge. Unit will reset.
E20	PREACT VALUE IS GREATER THAN SETPOINT VALUE	Clear preact value, then re-enter setpoint value
E32	INSUFFICIENT TEST WEIGHT USED FOR CALIBRATION	Recalibrate using more test weight
E34	TEST WEIGHT EXCEEDS 105% OF CAPACITY	Use less than 105% of capacity Press **CLEAR** and re-enter
E35	SPAN CALIBRATION ERROR	Recalibrate. If error persists, check programming or replace load cell.
E36	ANALOG LOAD CELL OUT OF RANGE	Recalibrate. Replace load cell
E50	WEIGHT CAN NOT BE DISPLAYED IN ALTERNATE UNITS	Some alternate units combinations are illegal. Choose another scale build or disable alternate units.
E60	STACK OVERFLOW.	Press **CLEAR**. Unit resets.
E E E	POSITIVE MORE THAN ZERO CAPTURE LIMIT OF 2% OF SCALE CAPACITY	Remove material from scale base. Disable AZM in setup. Cycle power.
-E E E	NEGATIVE MORE THAN ZERO CAPTURE LIMIT OF 2% OF SCALE CAPACITY	Disable AZM in setup. Calibrate scale. Cycle power.
------	NO ANALOG LOAD CELL DETECTED	Check load cell wiring. Replace load cell. Replace Main PCB.

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AC Power Test

Using a multi-meter, check the AC input power. Input power must be within -15% and +10% of the nominal AC line voltage.

Main Logic PCB Voltage Test

PANTHER Terminal (Analog)

Verify voltage of 5.00 VDC between + and - Excitation (±10%). If the PANTHER terminal has power and there is no excitation voltage, replace the PCB.

PANTHER Terminal (DigiTOL)

Verify +20 VDC between +20 VDC and ground.

Keyboard Test

The keyboard can be tested by removing it from the J1 connector on the Main PCB and making a continuity test between the pins shown below. The keyboard is a matrix type and should indicate less than 100 ohms resistance when a key is pressed.

Key Name	J1 Pins
Zero	2-3
Tare	2-4
Clear	2-5
Memory	1-3
Select	1-4
Print	1-5

Discrete Output Voltage

With no load applied and the PANTHER terminal at gross zero, the following voltages should be measured. Refer to the following table for correct voltage readings.

Test Points	Voltage Readings
GND & +5 VDC	5 VDC*
+5 VDC & OUT1	5 VDC*
+5 VDC & OUT2	5 VDC*
+5 VDC & OUT3	5 VDC*

*If voltages are not within the +4.5 to +5.2 VDC range, check:

- Discrete outputs (refer to information in the Appendix).
- Programming.
- Setpoint weight values.

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RS232 Serial Output Test

When measuring the higher baud rates in the Demand mode, the meter display will fluctuate for a shorter period of time.

Use the following test procedure to determine whether the RS-232 serial port is operational.

1. Remove power from the PANTHER terminal and the printer. Disconnect the data cable from the printer.
2. Set the voltmeter to read 20 volts DC.
3. Connect the red lead to pin 3 of the printer end of the data cable and connect the black lead to pin 7.
4. Apply power. The meter should read as follows:
   - In Demand mode, the meter should read between –5 and –15 with no fluctuation.
   - In Continuous mode, the meter should fluctuate between –5 and +5 continuously. The constant fluctuation on the meter display indicates the scale/indicator is transmitting information.

To test Demand baud rates, press the **PRINT** key. The display should fluctuate between +5 volts to -5 volts for the duration of the transmission, then become stable again. This indicates the terminal has transmitted data.

Analog Output Option

Test the voltages of each output to ground. Depending on the calibration of the scale and the displayed weight, each output should be outputting a linear voltage with respect to calibration. If the voltages are not present or the error code repeats, replace the analog output PCB.

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5 PANTHER Terminal Allen-Bradley Option

Allen-Bradley RIO Network Specifications

Refer to your Allen-Bradley documentation or Allen-Bradley directly for questions related to the A-B RIO network, such as cable length, number of nodes and PLC model compatibility. This manual does not attempt to provide all information pertaining to the Allen-Bradley RIO.

The Allen-Bradley RIO option consists of a PANTHER terminal I/O PCB and the software that resides in the PANTHER terminal, which implements the data exchange. The PANTHER terminal A-B RIO PCB has the following features:

- A-B RIO Node Adapter Chip Set (licensed from Allen-Bradley) and termination for the A-B network cable (blue hose) on a three-position removable terminal block.
- User programmable RIO communication parameters are configured in software set up through the PANTHER terminal. The parameters are as follows:

  57.6K, 115.2K, or 230.4K baud rate
  rack address
  starting quarter
  last rack designation
- Capability for bi-directional discrete mode communications of weight, display increments, status, and control data between the PLC and PANTHER terminal.

Allen-Bradley Overview

Information on data formats and data exchange to and from the Allen-Bradley RIO is not made available by Allen-Bradley.

The PANTHER terminal initiates a communication exchange with the PLC at every A-to-D weight update. This mode is also known as the Discrete I/O mode in Allen-Bradley terminology. This weight-synchronous communications is a high-speed, real-time message interface between the PANTHER terminal and PLC for process control.

Allen Bradley RIO Kit Installation

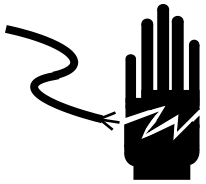
The PANTHER Allen Bradley Option Kit 0971-0251 provides connectivity to an Allen-Bradley PLC using the remote I/O (RIO) protocol. The Allen Bradley Kit may be installed in the PANTHER harsh environment or panel-mount enclosure type.

Part Number	Description	Quantity
(*)15098500A	Allen Bradley PCB Assembly	1
(*)14915300A	Option Harness	1
(*)14467400A	Snap-in Standoff	1
(*)14829500A	Mounting Bracket	1
(*)14828800A	Terminal Block Label	1
(*)14828700A	Controller Label, Analog	1
(*)15069600A	Controller Label, Digital	1
(*)14827600A	Rear Panel	1
(*)14217400A	Terminal Block, 3 position	1
R0511100A	Screw, M4	4
R0519600A	Nut, M4	2

(*) May have letter prefix.

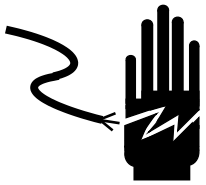
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Installing the Harsh Environment Enclosure



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



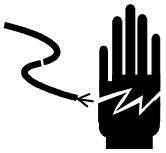
WARNING

DO NOT APPLY POWER TO THE PANTHER TERMINAL UNTIL THE EXTERNAL WIRING AND THE INSTALLATION OF ALL COMPONENTS HAS BEEN COMPLETED.



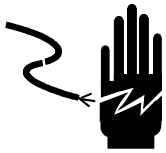
CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.



WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.



WARNING

FOR U.S.A. DIVISION 2 HAZARDOUS AREA APPLICATIONS, METTLER TOLEDO CONTROL DRAWING 155907R MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

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To install the 0971-0251 Allen-Bradley RIO PCB kit, refer to Figure 5-1 and the instructions that follow.

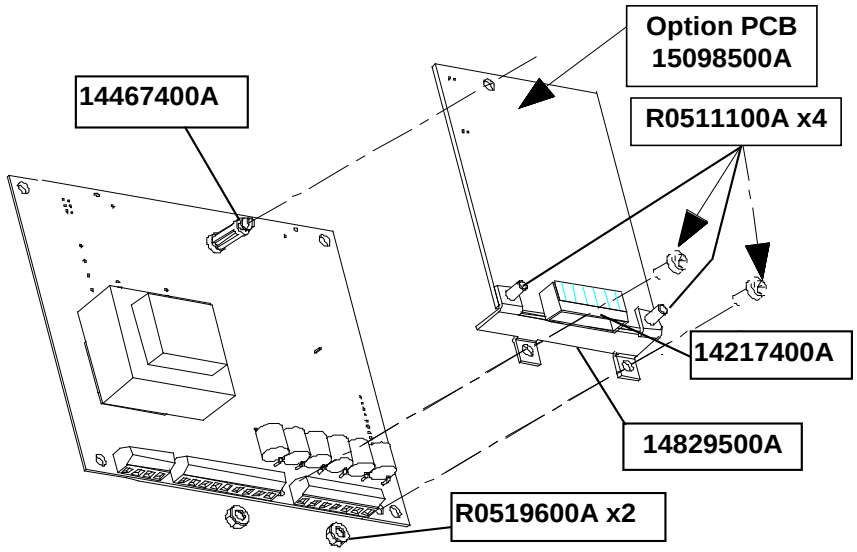


Figure 5-1 Allen-Bradley PCB Installation in Harsh Environment Enclosure

1. Disconnect AC power to the PANTHER terminal.
2. Locate the two slots found on the bottom of the enclosure lid. Press a large flat bladed screwdriver into the each slot until a gentle "pop" sound is heard, indicating that the latch has released.
3. Swing the bottom of the enclosure cover up until it clears the enclosure. Next lightly squeeze the top of the front cover to the enclosure then raise the cover to clear the upper two spring clips. The cover will swing down and be suspended by a grounding strap.
4. Remove the four screws which mount the Controller PCB to the cover.
5. Press the snap-in standoff (14467400A) into the Controller PCB (see Figure 5-1).
6. Plug the option harness (14915300A) to the Allen Bradley PCB at J1.
7. Connect the option harness to the Controller PCB at J2.
8. Attach the Allen Bradley Option PCB to the Controller PCB with 2 screws (R0511100A) and 2 nuts (R0519600A).
9. Mount the Controller PCB to the enclosure front cover using the four screws removed in step 3.
10. Insert terminal block (14217400A) into Allen Bradley PCB connector and wire interconnecting cable (not supplied with this kit).
11. Close the enclosure, apply power, and program as required. Refer to the chapter on programming information.

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Installing the Panel-Mount Enclosure

WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

1. Disconnect the PANTHER terminal from AC power.
2. Unscrew the two screws (R0511100A) retaining the rear enclosure cover plate, then remove and discard the original cover plate. Save the mounting screws for later.
3. Slide the Controller PCB partially out of the enclosure until the keyboard tail is exposed. Unplug the keyboard tail and remove the Controller PCB from the enclosure.

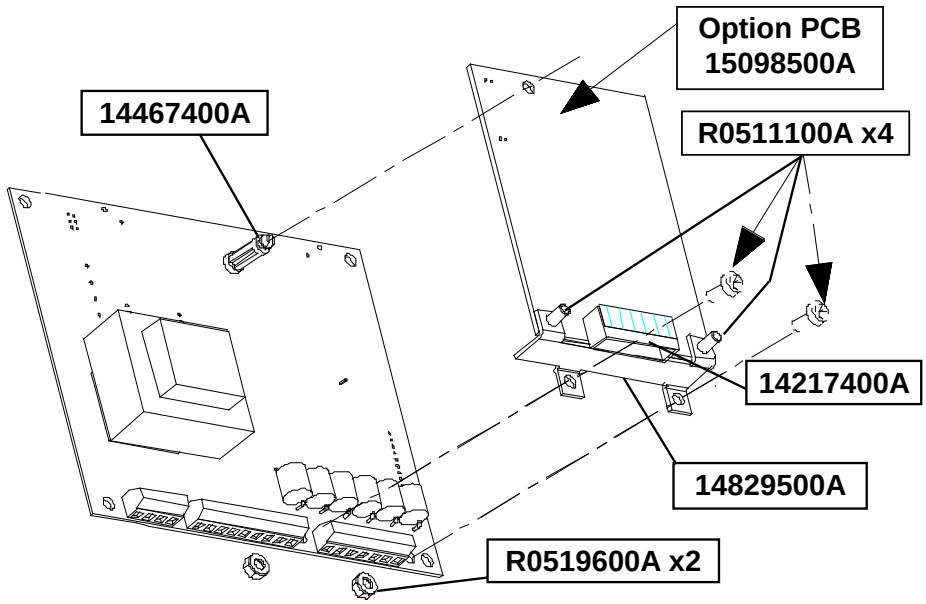


Figure 5-2 Allen-Bradley PCB Installation in Panel Mount Enclosure

4. Press the snap-in standoff (14467400A) into the Controller PCB.
5. Connect the option harness (14915300A) to the Controller PCB at J2.
6. Attach the Allen Bradley Option PCB to the Controller PCB with 2 screws (R0511100A) and 2 nuts (R0519600A).

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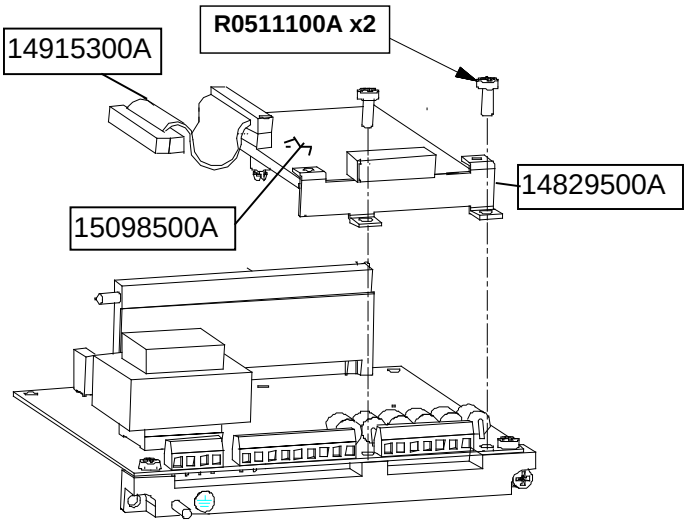


Figure 5-3 Allen-Bradley PCB Installation in Panel Mount Enclosure

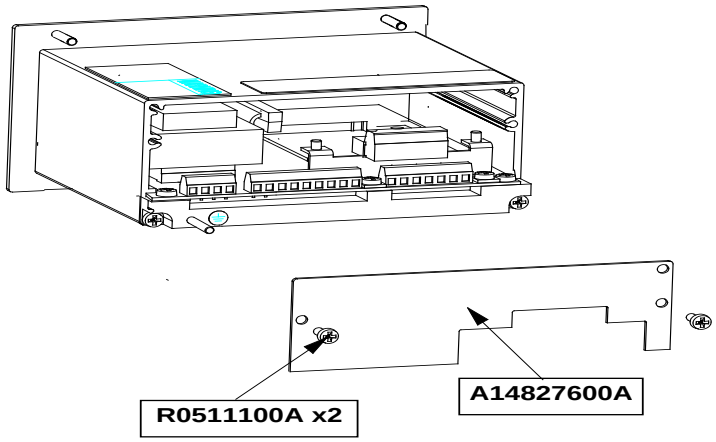


Figure 5-4 Allen-Bradley PCB Installation in Panel Mount Enclosure

8. Plug the option harness (14915300A) to the Allen Bradley Option PCB.
9. Plug the keyboard tail into the mating connector on the bottom of the Controller PCB.
10. Slide the Controller PCB assembly into the enclosure. Make sure the keyboard tail does not fold in front of the display.
11. Attach the new rear panel (14827600A) to the enclosure using the two screws (R0511100A) removed in step 2.
12. Affix the controller label (14828700A Analog or 15069600A DigiTOL) to the Allen Bradley Option rear panel to identify the Controller PCB terminals.
13. Insert terminal block (14217400A) into the Allen Bradley PCB connector. Affix the terminal block.
14. Wire interconnecting cable (not supplied with this kit) to the terminal block. Apply power and program as required.

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AB RIO Interface PCB Wiring and Specifications

Processor: Allen-Bradley ASIC

Memory: None

I/O: Allen-Bradley RIO network interface
Electrical: centered, transformer isolated line drivers
Connector: Three position removable terminal strip wired from left to right (rear connector view) as:
Blue
Shield
Clear
Bus Interface: Same as Connector PCB

Power Requirements: +5 VDC

PCB Outline: 6.8″ x 5.3″. 0.50″ max height.

Status Lights

The Allen-Bradley option board has a status LED with three modes:

ON	indicates normal operation
Flashing	indicates the PLC is in Program Mode
OFF	indicates a communication problem with the PLC

Allen-Bradley Setup In PANTHER Terminal

To configure the PANTHER terminal for an Allen-Bradley PCB, first select F8 in setup, then select the following options.

F8.1 Weight Data Type
0 = Displayed weight
1 = Internal divisions (capacity/increment)

F8.2 Rack Address
Enter 0-64 for the Rack Address.

F8.3 Start Quarter
Enter the starting ¼ rack address 1-4.

F8.4 Last Rack?
0 = No
1 = Yes

F8.5 Data Rate
1 = 57.6Kb
2 = 115.2 Kb
3 = 230.4Kb

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Communications

The Allen-Bradley Remote I/O (RIO) network is an Allen-Bradley proprietary network that permits certain A-B PLCs to communicate to additional racks of input and output devices or to other peripheral devices that implement the RIO interface. The network has evolved with generations of A-B PLCs to implement higher speeds and more connections. The PANTHER terminal utilizes component parts that are provided by A-B thereby assuring complete compatibility with the RIO network. PANTHER terminals are recognized as an Allen-Bradley device by the PLC.

Each PANTHER terminal connected to the RIO network represents a physical node. The connection is facilitated by a three-position removable terminal block on the PANTHER terminal RIO Option back panel. The terminal block is labeled 1, SHLD, and 2. These terminals correspond to the like terminals on the A-B PLC RIO connector. The wiring between the PLC and the PANTHER terminal RIO connector uses the standard RIO cable supplied by Allen-Bradley. This cable is often referred to as the "blue hose." The cable installation procedures and specifications are the same as recommended by Allen-Bradley for the RIO network.

Node Address

Although each PANTHER RIO option represents one physical node, the addressing of the node is defined as a logical rack address. This address is determined by the system designer, then programmed into the PANTHER terminal. Programming is done through the Allen-Bradley program block in setup. Each scale occupies a quarter rack in the RIO address space and the quarter may be defined as the first, second, third, or fourth quarter of a rack. It is also necessary to designate the location of the PLC which is the highest quarter used in a logical rack. The PANTHER terminal's programming capabilities allow selection of the starting quarter and designation of the last rack.

Controlling PANTHER Terminal Discrete I/O Using a PLC Interface

PANTHER terminals on RIO:

- Use Allen-Bradley licensed technology.
- Looks like an A-B RIO device.
- Use standard Blue Hose connections.

The PANTHER terminal provides the ability to directly control its discrete outputs and read its discrete inputs via the (digital) PLC interface options. The PANTHER terminal's discrete I/O updates are synchronized with the PANTHER A/D rate, not with the PLC I/O scan rate. This may cause a noticeable delay in reading inputs or updating outputs as observed from the PLC to real world signals."

Data Definition

The PANTHER RIO I/O network supports Discrete Data Transfer that allows for bi-directional communication of discrete bit encoded information or 16 bit binary word (signed integer) numerical values. Each PANTHER represents a quarter rack of data to the RIO Option and each quarter rack provides two input (read) and two output (write) words. A quarter logical rack has 32 input bits (two 16 bit words) and 32 output bits (two 16 bit words). The data in these input and output words is formatted as follows:

DISCRETE READ - PANTHER Terminal Output to PLC Input		
Bit Numbers	**Word 0[1]**	**Word 1**
0	Integer Weight bit 00	Setpoint 1[5]
1	Integer Weight bit 01	Setpoint 2[6]

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DISCRETE READ - PANTHER Terminal Output to PLC Input		
2	Integer Weight bit 02	Zero Tolerance[7]
3	Integer Weight bit 03	Unused
4	Integer Weight bit 04	Unused
5	Integer Weight bit 05	Unused
6	Integer Weight bit 06	Unused
7	Integer Weight bit 07	Unused
8	Integer Weight bit 08	Unused
9	Integer Weight bit 09	PAR 1.1[1]
10	Integer Weight bit 10	Unused
11	Integer Weight bit 11	Unused
12	Integer Weight bit 12	Motion[2]
13	Integer Weight bit 13	Net Mode[2]
14	Integer Weight bit 14	Update in Progress[3]
15	Integer Weight bit 15	Data OK[4]

1. PAR 1.1 is the current state of the PANTHER terminal discrete input.
2. Positive true (1=True).
3. If 1, the PANTHER terminal was updating the PLC interface shared memory while data was read. The PLC should ignore this data and rescan.
4. Set to 1 if scale is operating properly, not over or under range, in power up, expanded mode, or in setup mode. (Integer weight will be set to zero).
5. Setpoint 1 output bit status if in Setpoint mode or Under bit status if in Over-Under mode.
6. Setpoint 2 output bit status if in Setpoint mode or "Low OK - OK - High OK" bit status if in Over-Under mode.
7. Zero Tolerance output bit status if in Setpoint mode or Over bit status if in Over-Under mode.

DISCRETE WRITE - PLC Output to PANTHER Terminal Input		
Bit Numbers	**Word 0**	**Word 1**
0	Integer tare/Setpoint Bit 00	Select 1[1]
1	Integer tare/Setpoint Bit 01	Select 2[1]
2	Integer tare/Setpoint Bit 02	Select 3[1]
3	Integer tare/Setpoint Bit 03	Load Preset Tare[2,7]
4	Integer tare/Setpoint Bit 04	Clear Tare Command[3,8]
5	Integer tare/Setpoint Bit 05	Pushbutton Tare Command[3,7]
6	Integer tare/Setpoint Bit 06	Print Command[3]
7	Integer tare/Setpoint Bit 07	Zero Command[3]
8	Integer tare/Setpoint Bit 08	Enable Setpoint Command[4]
9	Integer tare/Setpoint Bit 09	Unused
10	Integer tare/Setpoint Bit 10	Unused
11	Integer tare/Setpoint Bit 11	Unused
12	Integer tare/Setpoint Bit 12	PAR 2.1[5]
13	Integer tare/Setpoint Bit 13	PAR 2.2[5]

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DISCRETE WRITE - PLC Output to PANTHER Terminal Input		
14	Integer tare/Setpoint Bit 14	PAR 2.3[5]
15	Integer tare/Setpoint Bit 15	Load Setpoint 1 Value[6]

1. A binary value in bits 0-2 select the data in Discrete Read weight data source: 0 = Gross weight, 1 = Net weight, 2 = Displayed weight, 3 = Tare or active Target if in Over/Under mode, 4 = Setpoint 1, 5-7 = Gross.
2. A transition from 0 to 1 causes the value in Word 0 to be written into the preset tare register.
3. A transition from 0 to 1 activates the command.
4. Setpoint or Over-Under high level outputs are disabled if this bit is set = 0, enabled if set = 1. Setting this bit to 1 after a downloaded Setpoint 1 or Target 1 value will store the downloaded value in non-volatile memory.
5. PAR2.1 - PAR2.3 are the PANTHER terminal parallel outputs. Writing a 1 to these bits causes the output to turn on. Output control is only accepted if the PANTHER terminal is in Indicator mode.
6. A transition from 0 to 1 causes the value in Word 0 to be written into PANTHER terminal memory, however, the non-volatile memory Setpoint 1 target register (if in Setpoint mode) or Target 1 target register (if in Over-Under mode) will not be updated unless the Enable Setpoint Command bit = 1. The Word 0 value for Setpoint 1 or Target 1 is in the primary unit (calibrated unit).
7. When tare interlocks are set, accumulative tares will not be permitted.
8. When tare interlocks are set, tare can only be cleared at gross zero.

Discrete Data Formats

Discrete Read (PANTHER Terminal Output to PLC Input)

A/B Addr	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
Word 0 In	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Word 1 In	Data OK	Update in Progress	NET	MOT			PAR 1.1							Zero TOL	SP2	SP1

Discrete Write (PLC Output to PANTHER Terminal Input)

A/B Addr	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
Word 0 Out	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Word 1 Out	Load SP1	PAR 2.3	PAR 2.2	PAR 2.1				Enab l SP	ZERO	PRNT	PB TARE	CLR Tare	Load Tare	SEL 3	SEL 2	SEL 1

Discrete Read Word 0 is a sixteen-bit signed integer that represents the weight value of the scale. The three SEL bits of Discrete Write Word 1 determine whether it is gross, net, tare, or displayed weight, or SP1. Discrete Write Word 0 is a sixteen-bit signed integer whose value can be loaded into tare or SP1 depending on the Load SP1 or Load Tare bits in Discrete Write Word 1.

SEL 1-3 represent a binary value to select the data for Discrete Read Word 0.
0= gross weight, 1 = net weight, 2 = displayed weight, 3 = tare weight, 4 = SP1 5-7 = gross weight.

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6 PANTHER Terminal PROFIBUS Option

PROFIBUS Overview

This section describes the option that permits the PANTHER terminal to communicate to a PROFIBUS L2-DP master according to DIN 19 245. The option consists of a module and software that resides in the PANTHER terminal, which implements the data exchange.

Note: As of this printing, the current gsd file required for use with PANTHER terminals is: Me1_0858.gsd. GSD files can be downloaded from the PROFIBUS web site.

The PANTHER terminal PROFIBUS PCB interfaces to PLCs such as Texas Instruments 505 series and Siemens S5-115 series. The Texas Instruments (TI) 505 PLCs interface to the PROFIBUS via an I/O processor called a Field Interface Module (FIM). The FIM bus master recognizes a fixed set of PROFIBUS slave devices, all of which are viewed by it as some sort of remote I/O rack. On power up, the FIM queries each PROFIBUS slave node to determine which of the recognized types a device might be and configures itself accordingly. The PANTHER PROFIBUS option appears to the FIM to be a small ET200U I/O rack.

The Siemens S5-115 series PLC also interfaces to the PROFIBUS using an I/O processor, an IM-308, which has no preconceived notions about PROFIBUS devices. This device must be locally programmed with the PANTHER Interface Device Data Base (DDB).

PROFIBUS Kit Installation

The PROFIBUS option is available as a field-installed kit by ordering P/N 0917-0252. This kit provides connectivity to a PROFIBUS PLC using the remote I/O (RIO) protocol. The PROFIBUS kit may be installed in either the PANTHER harsh environment or panel mount enclosure. Included in the kit are:

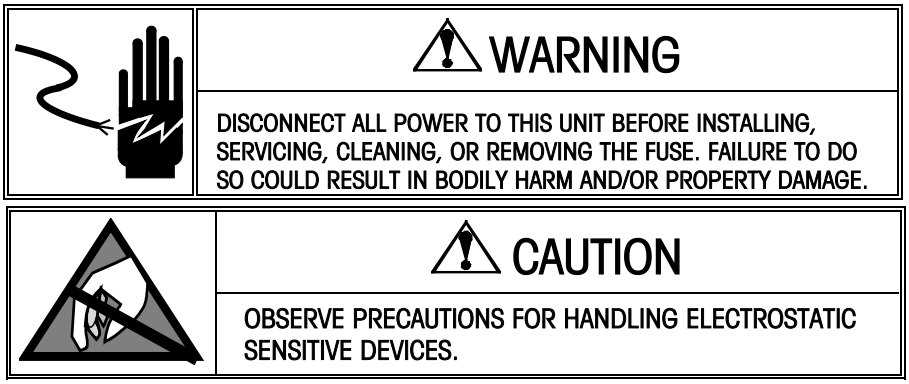
Part Number	Description	Quantity
(*)15166100A	PROFIBUS PCB Assembly**	1
(*)14915300A	Option Harness	1
(*)14467400A	Snap-in Standoff	1
(*)14829500A	Mounting Bracket	1
(*)14828700A	Controller Label, Analog	1
(*)15069600A	Controller Label, Digital	1
(*)15174000A	Rear Panel	1
R0511100A	Screw, M4	4
R0519600A	Nut, M4	2

* May have letter prefix.

** When replacing this item on a PANTHER terminal (panel-mount analog version) that is located in a USA Division 2 hazardous area, the following part number with a minimum of the following revision level of the part MUST BE USED – A15166100A. Later revisions are acceptable. Earlier revisions are not acceptable.

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Installation in the Harsh Environment Enclosure



To install PROFIBUS Option PCB Kit 0917-0252 in the harsh environment enclosure:

1. First disconnect AC power to the PANTHER terminal.
2. Locate the two slots found on the bottom of the enclosure lid. Press a large flat bladed screwdriver into the each slot until a gentle "pop" sound is heard, indicating that the latch has released.
3. Swing the bottom of the enclosure cover up until it clears the enclosure, then lightly squeeze the top of the front cover while raising the cover to clear the upper two spring clips. The cover will swing down and is suspended by a grounding strap.
4. Remove the four screws that mount the Controller PCB to the cover.

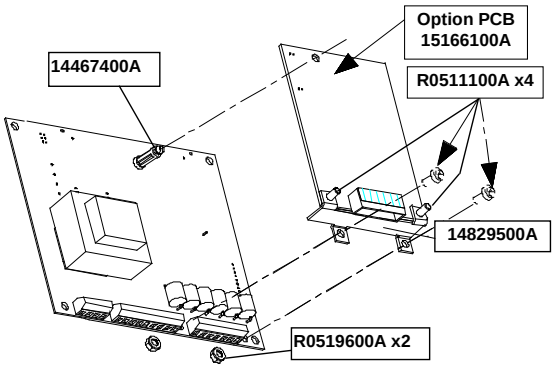
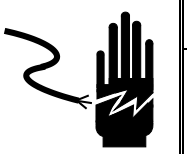


Figure 6-1 Mounting PROFIBUS Option PCB in Harsh Environment Enclosure

4. Press the snap-in standoff (14467400A) into the Controller PCB.
5. Snap the PROFIBUS Option PCB and mounting bracket assembly into place on the Controller PCB.
6. Attach the mounting bracket to the Controller PCB with 2 screws (R0511100A) and 2 nuts (R0519600A).
7. Plug the option harness (14915300A) into the PROFIBUS Option PCB at J1.
8. Plug the option harness into the Controller PCB at J2.
9. Mount the Controller PCB to the enclosure front cover using the four screws removed in step 4.
10. Route the interconnecting cable (not supplied with this kit) through the unused grip bushing in the enclosure and connect it to the PROFIBUS Option PCB.
11. Close the enclosure, apply power, and program as required. Refer to the setup section.

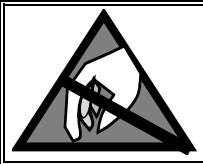
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Installation in Panel-Mount Enclosure



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

To install the PROFIBUS Option PCB Kit 0917-0252 in the PANTHER terminal panel-mount enclosure:

1. First disconnect AC power to the PANTHER terminal.
2. Unscrew the two screws (R0511100A) on the rear enclosure cover plate. Remove and discard the cover plate. Save the mounting screws for later.
3. Unscrew the two screws holding Controller PCB. Slide the Controller PCB part way out of the enclosure until the keyboard tail is exposed. Unplug the keyboard tail and remove the Controller PCB from the enclosure.

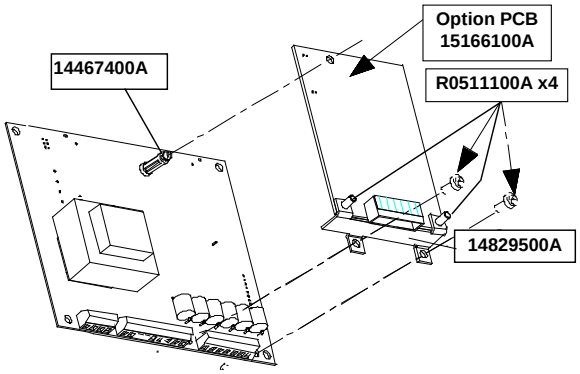


Figure 6-2 Mounting PROFIBUS Option PCB in Panel-Mount Enclosure

4. Press the snap-in standoff (14467400A) into the Controller PCB.
5. Snap the PROFIBUS Option PCB and mounting bracket into place on the Controller PCB.
6. Attach the mounting bracket to the Controller PCB with 2 screws (R0511100A).
7. Plug the option harness into the Controller PCB at J2. (Fold harness 90° to make connection to J2.)

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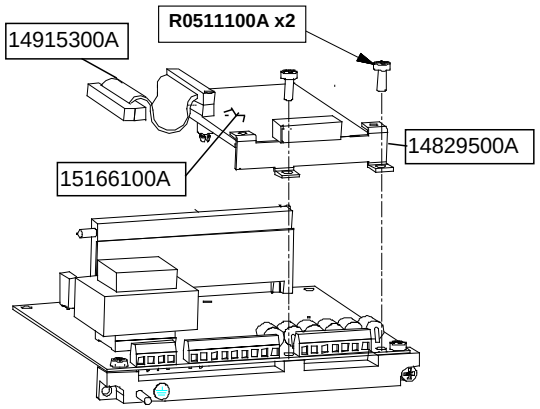


Figure 6-3 Installation in Panel Mount Enclosure

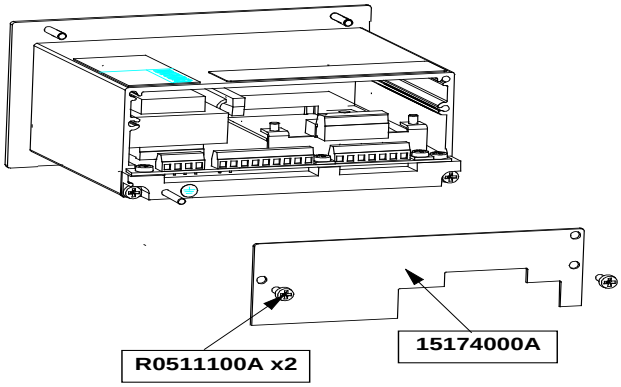


Figure 6-4 Installation in Panel Mount Enclosure

9. Plug the option harness into the PROFIBUS Option PCB.
10. Plug the keyboard tail into the mating connector on the Controller PCB.
11. Slide the Controller PCB assembly into the enclosure. Make sure the keyboard tail does not fold in front of the display. Attach Controller PCB to unit with the two screws removed in step 3.
12. Attach the new rear panel (15174000A) to the enclosure using the two screws (R0511100A) removed in step 2.
13. Affix the appropriate Controller Label (14828700A Analog or 15069600A Digital) to the PROFIBUS Option rear panel to identify the Controller PCB terminals. (Use the one that matches the label from the original rear panel.)
14. Attach interconnecting cable (not supplied with this kit) to the PROFIBUS Option PCB. Apply power and program as required.

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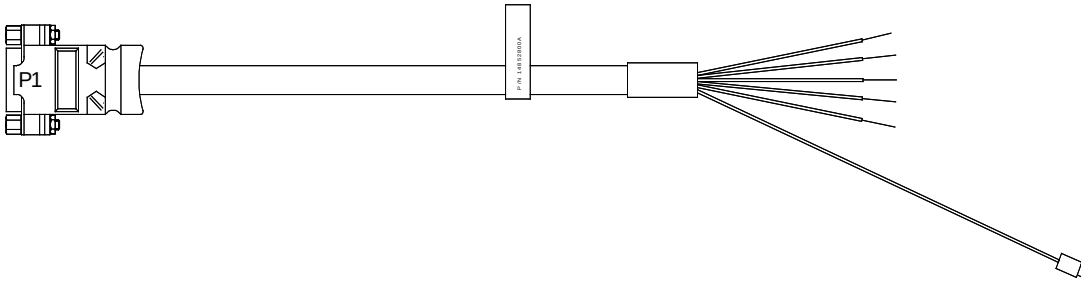
Wiring

The PROFIBUS connection is available at two locations on the PROFIBUS PCB. The first is a female 9 pin D subminiature connector, which is the PROFIBUS standard connection. The field connector assembly is not supplied by METTLER TOLEDO. This connection is the preferred connection in the panel-mount terminal. For the PANTHER harsh environment (terminal, the pluggable terminal strip must be used. In these cases, a pigtail harness is available to wire from the terminal strip to a female 9-pin D connector.

Female DE-9
1 GND (isolated)
2 N.C.
3 COM A
4 RTS
5 GND (isolated)
6 +5V (isolated)
7 N.C.
8 COM B
9 N.C.

Terminal strip
1 RTS
2 COM A
3 COM B
4 +5 V (isolated)
5 GND (isolated)

When using the PANTHER harsh environment terminal, a pigtail adapter harness is required in order to install the front cover on the PANTHER terminal. The adapter harness can be ordered using factory number 0900-0311. The adapter is shown here.



(*)14852800A Profibus Pigtail Adapter					
FROM		TO			SIGNAL
PT. 1	END 1	PT. 2	END 2	COLOR	
P1-4	10856700A	---	1 / 4″ Strip	Yellow	RTS
P1-3	10856700A	---	1 / 4″ Strip	Green	COM A
P1-8	10856700A	---	1 / 4″ Strip	Blue	COM B
P1-6	10856700A	---	1 / 4″ Strip	Red	+5V
P1-5	10856700A	---	1 / 4″ Strip	Black	GND
1G	12471400A	Drain	Solder	Green	DRAIN

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PROFIBUS Setup in PANTHER Terminal

To configure the PANTHER terminal for a PROFIBUS PCB, select F8 in setup, then select the following options.

F8.1 Weight Data Type

0 = Weight is in display units
1 = Weight is in increments

F8.2 Rack Address

Enter 0-126 for the Rack Address.

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Data Definition

The PANTHER PROFIBUS PLC Interface supports Discrete Data Transfer that allows for bi-directional communication of discrete bit encoded information or 16 bit binary word (signed integer) numerical values. Each PANTHER terminal represents a quarter rack of data to the PLC Option and each quarter rack provides two input (read) and two output (write) words. A quarter logical rack has 32 input bits (two 16 bit words) and 32 output bits (two 16 bit words). The data in these input and output words is formatted as follows:

DISCRETE READ - PANTHER TERMINAL Output to PLC Input		
Bit Numbers	**Word 0[1]**	**Word 1**
0	Integer Weight bit 00	Setpoint 1[5]
1	Integer Weight bit 01	Setpoint 2[6]
2	Integer Weight bit 02	Zero Tolerance[7]
3	Integer Weight bit 03	Unused
4	Integer Weight bit 04	Unused
5	Integer Weight bit 05	Unused
6	Integer Weight bit 06	Unused
7	Integer Weight bit 07	Unused
8	Integer Weight bit 08	Unused
9	Integer Weight bit 09	PAR 1.1[1]
10	Integer Weight bit 10	Unused
11	Integer Weight bit 11	Unused
12	Integer Weight bit 12	Motion[2]
13	Integer Weight bit 13	Net Mode[2]
14	Integer Weight bit 14	Update in Progress[3]
15	Integer Weight bit 15	Data OK[4]

1. PAR 1.1 is the current state of the PANTHER terminal parallel input.
2. Positive true (1=True)
3. If 1, the PANTHER terminal was updating the PLC interface shared memory while data was read. The PLC should ignore this data and rescan.
4. Set to 1 if scale is operating properly, not over or under range, in power up, expanded mode, or in setup mode (Integer weight will be set to zero.)
5. Setpoint 1 output bit status if in Setpoint mode or Under bit status in Over-Under mode.
6. Setpoint 2 output bit status if in Setpoint mode or "Low OK - OK - High OK" bit status if in Over-Under mode.
7. Zero Tolerance output bit status if in Setpoint mode or Over bit status if in Over-Under mode.

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DISCRETE WRITE - PLC Output to PANTHER TERMINAL Input		
Bit Numbers	Word 0	Word 1
0	Integer tare/Setpoint Bit 00	Select 1[1]
1	Integer tare/Setpoint Bit 01	Select 2[1]
2	Integer tare/Setpoint Bit 02	Select 3[1]
3	Integer tare/Setpoint Bit 03	Load Preset Tare[2,7]
4	Integer tare/Setpoint Bit 04	Clear Tare Command[3,8]
5	Integer tare/Setpoint Bit 05	Pushbutton Tare Command[3,7]
6	Integer tare/Setpoint Bit 06	Print Command[3]
7	Integer tare/Setpoint Bit 07	Zero Command[3]
8	Integer tare/Setpoint Bit 08	Enable Setpoint Command[4]
9	Integer tare/Setpoint Bit 09	Unused
10	Integer tare/Setpoint Bit 10	Unused
11	Integer tare/Setpoint Bit 11	Unused
12	Integer tare/Setpoint Bit 12	PAR 2.1[5]
13	Integer tare/Setpoint Bit 13	PAR 2.2[5]
14	Integer tare/Setpoint Bit 14	PAR 2.3[5]
15	Integer tare/Setpoint Bit 15	Load Setpoint 1 Value[6]

1. A binary value in bits 0-2 select the data in Discrete Read weight data source: 0 = Gross weight, 1 = Net weight, 2 = Displayed weight, 3 = Tare or active Target if in Over/Under mode, 4 = Setpoint 1, 5-7 = Gross.
2. A transition from 0 to 1 causes the value in Word 0 to be written into the preset tare register.
3. A transition from 0 to 1 activates the command.
4. Setpoint or Over-Under high level outputs are disabled if this bit is set = 0, enabled if set = 1. Setting this bit to 1 after a downloaded Setpoint 1 or Target 1 value will store the downloaded value in non-volatile memory.
5. PAR2.1 - PAR2.3 are the PANTHER terminal parallel outputs. Writing a 1 to these bits causes the output to turn on. Output control is only accepted if the PANTHER terminal is in Indicator mode.
6. A transition from 0 to 1 causes the value in Word 0 to be written into PANTHER terminal memory, however, the non-volatile memory Setpoint 1 target register (if in Setpoint mode) or Target 1 target register (if in Over-Under mode) will not be updated unless the Enable Setpoint Command bit = 1. The Word 0 value for Setpoint 1 or Target 1 is in the primary unit (calibrated unit).
7. When tare interlocks are set, accumulative tares will not be permitted.
8. When tare interlocks are set, tare can only be cleared at gross zero.

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7 PANTHER Terminal Modbus Plus Option

Modbus Plus Overview

The PANTHER Modbus Plus Interface is an option card that plugs into the PANTHER terminal. It has an 80C152 "Peer Processor" that implements the network protocol; a 1K Dual Port RAM that is the data path to the PANTHER controller card; an FM Encoder/ Decoder; and an RS485 driver that provides the interface to the Modbus Plus network.

The PANTHER terminal is a single Modbus Plus node. Point-to-point communication in the Modbus Plus network is the communication between two network nodes. The "Master Task" at the initiating node generates a "transaction query" for the "Slave Command Handler Task" at the destination node. The Slave Command Handler Task sends a "transaction response" to the transaction query. Peer Processors route the messages through the network.

The Modicon 984 PLC acts as the Master Task, and the PANTHER terminal has the Slave Command Handler Task. The PLC initiates all transactions, and the PANTHER terminal responds to the transaction queries. The general format for Modbus transaction query command is a one-byte command followed by a group of bytes. The maximum length is 252 bytes. The function bytes tell the slave device what action to perform.

The PANTHER supports the following Modbus functions:

- 03 Read Holding Registers. Requests the value of one or more 16-bit holding registers.
- 16 Preset Multiple Registers. Places values into a series of consecutive holding registers. The transaction query messages contain register values that specify what data that the PLC is requesting from the PANTHER. For example, if the PLC issues Function 03, the data field must contain information telling the PANTHER which register to start at and how many registers to read. All address references within the Modbus messages are relative to zero. For example, the first holding register in the Modicon 984 PLC is 40001, but has the value 0000 in the messages.

Modbus Plus Kit Installation

The PANTHER Modbus Plus Option Kit provides connectivity to a Modbus Plus PLC. The Modbus Plus Kit may be installed in either the PANTHER harsh environment or panel-mount enclosure.

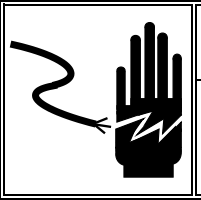
Included in the kit are the following parts:

Part Number	Description	Quantity
(*)15165700A	Modus Plus PCB Assembly	1
(*)14915300A	Option Harness	1
(*)14467400A	Snap-in Standoff	1
(*)14829500A	Mounting Bracket	1
(*)14828700A	Controller Label, Analog	1
(*)15069600A	Controller Label, Digital	1
(*)15174000A	Rear Panel	1
R0511100A	Screw, M4	4
R0519600A	Nut, M4	2

(*) May have letter prefix.

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Installation in Harsh Environment Enclosure



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

To install the Modbus Plus Option PCB Kit 0917-0253 in the PANTHER terminal harsh environment enclosure:

1. Disconnect AC power to the PANTHER terminal.
2. Locate the two slots on the bottom of the enclosure lid. Press a large flat-bladed screwdriver into the each slot until a gentle "pop" sound is heard, indicating the latch has released.
3. Swing the bottom of the enclosure cover up until it clears the enclosure. Lightly squeeze the top of the front cover to the enclosure. Raise the cover to clear the upper two spring clips. The cover will swing down and be suspended by a grounding strap.
4. Remove the four screws which mount the Controller PCB to the cover.

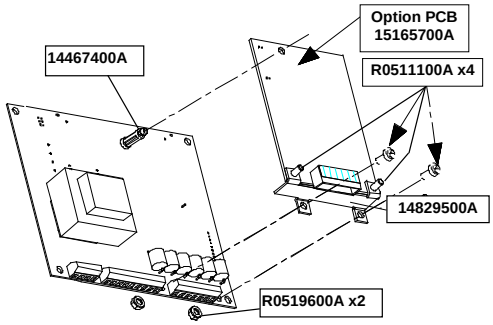


Figure 7-1 Mounting Modbus Plus Option PCB in Harsh Environment Enclosure

4. Press the snap-in standoff (14467400A) into the Controller PCB.
5. Snap the Modbus Plus Option PCB and mounting bracket into place on the controller PCB.
6. Attach the mounting bracket to the Controller PCB with 2 screws (R0511100A) and 2 nuts (R0519600A).
7. Plug the option harness (14915300A) into the Modbus Plus Option PCB at J1.
8. Plug the option harness into the Controller PCB at J2.
9. Mount the Controller PCB to the enclosure front cover using the four screws removed in step 4.
10. Route the interconnecting cable (not supplied with this kit) through the unused grip bushing in the enclosure and connect it to the Modus Plus Option PCB.
11. Close the enclosure, apply power, and program as required.
12. Enter setup and configure the Modbus Plus options.

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Installation in Panel Mount Enclosure

⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

To install the Modbus Plus Option PCB Kit 0917-0253 in the PANTHER terminal panel-mount enclosure:

1. First disconnect AC power to the PANTHER terminal.
2. Unscrew the two screws (R0511100A) retaining the rear enclosure cover plate, then remove and discard the original cover plate. Save the mounting screws for later.
3. Unscrew the two screws holding Controller PCB. Slide the Controller PCB part way out of the enclosure until the keyboard tail is exposed. Unplug the keyboard tail and remove the Controller PCB from the enclosure.

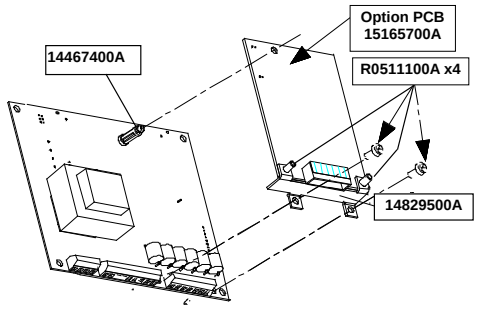


Figure 7-2 Mounting Modbus Plus Option PCB in Panel Mount Enclosure

4. Press the snap-in standoff (14467400A) into the Controller PCB.
5. Snap the Modbus Plus Option PCB and mounting bracket into place on the Controller PCB.
6. Attach the mounting bracket to the Controller PCB with 2 screws (R0511100A). See Figure 8-3.
7. Plug the option harness (14915300A) into the Controller PCB at J2.

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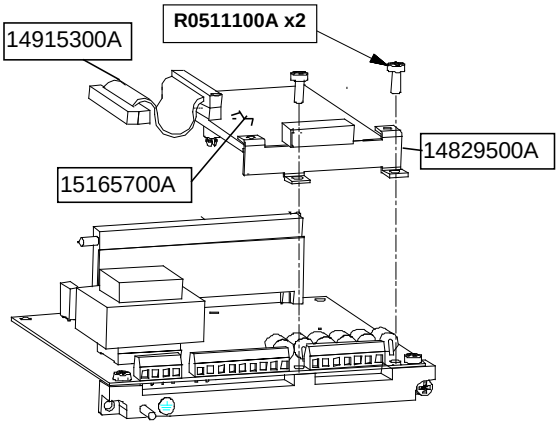


Figure 7-3 Installation in Panel Mount Enclosure

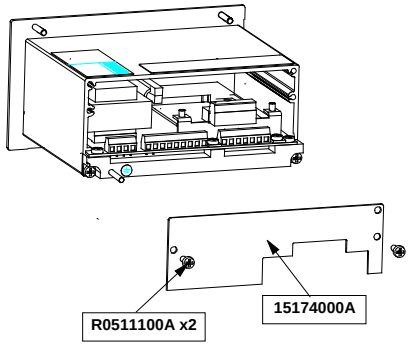


Figure 7-4 Installation in Panel Mount Enclosure

9. Plug the option harness into the Modbus Plus Option PCB at J1. (Fold Harness 90° to make connection to J2.)
10. Plug the keyboard tail into the mating connector on the Controller PCB.
11. Slide the Controller PCB assembly into the enclosure. Make sure the keyboard tail does not fold in front of the display. Attach Controller PCB to unit with the two screws removed in step 3.
12. Attach the new rear panel (15174000A) to the enclosure using the two screws (R0511100A) removed in step 2. See Figure 7-4.
13. Affix the appropriate Controller label (14828700A Analog or 15069600A Digital) to the Modbus Plus Option rear panel to identify the Controller PCB terminals. (Use the one that matches the label from the original rear panel.)
14. Attach interconnecting cable (not supplied with this kit) to the Modbus Plus Option PCB. Apply power and program as required.
15. Enter setup and configure the Modbus Plus options (Refer to Modbus Plus Setup in PANTHER terminal).

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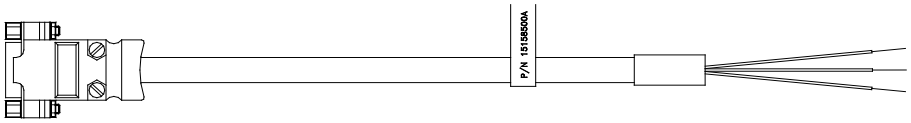
Wiring to PANTHER Terminal

The Modbus Plus network uses pins 1, 2, and 3 of the DE-9 connector, supplied by Modicon. Wiring instructions come with the connector.

The Modbus Plus pigtail is wired to the PANTHER terminal as follows:

Function	DE-9		Terminal Strip
Shield	1	Clear	1
MBP B	2	Green	2
MBP A	3	Black	3

There are two connections for the Modbus Plus Interface. The standard connection for the PANTHER panel-mount terminal is the DE-9 female connector. The PANTHER harsh environment terminal must use a pluggable terminal strip. When the terminal strip is used, the Modbus Pigtail Cable kit 0900-0320 is available. The 0900-0320 pigtail cable is shown below.



Switch Settings

Each node on the Modbus Plus network must have a unique address. The PANTHER terminal Modbus Plus node address is set with the "dip switches" on the ModBus Plus Interface card. The node address value of the card is equal to the value of the switches plus 1, and it can be equal to a value of 1 to 64.

Switch pos.	1	2	3	4	5	6
Value	1	2	4	8	16	32

With the switch in the OFF position, the value is as shown above. With the switch in the ON position, the value is zero for that switch.

Example:			Switch Value
SW1	=	OFF	1
SW2	=	ON	0
SW3	=	ON	0
SW4	=	OFF	8
SW5	=	OFF	16
SW6	=	ON	0
		(PLUS 1)	1
		Node Address =	26

Status Lights

There is a green diagnostic LED on the PANTHER Modbus Plus Options board, viewable through a small hole in the interface mounting bracket at the rear of the PANTHER terminal. The repetitive flashing patterns have the following meanings:

- **Flash every 160 milliseconds**. The PANTHER node is receiving and passing the token. Every node on the link should be flashing this same pattern.

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- **Flash every 1 second**. The PANTHER node is in an off-line state where it must monitor the link for 5 seconds. During this period, it hears all active nodes on the network and is building the active station table.
- **Two flashes, off for 2 seconds**. The PANTHER node is permanently in an idle, never-getting-token state. It is hearing the other nodes but never getting the token itself. This PANTHER node may have a bad transmitter.
- **Three flashes, off for 1.7 seconds**. This PANTHER node is not hearing any other nodes so it is periodically claiming and winning the token, then finding no other node to which to send it. It could be the only node on the link, or there are other nodes but this node had a bad receiver or network connection. The latter situation could be disruptive to the entire network.
- **Four flashes, off for 1.4 seconds**. This PANTHER node has heard a valid packet that was a duplicate-node-address sent from another node on the network. The node is now in an off-line state where it will passively monitor the link until it has not heard the duplicate node for 5 seconds.

Modicon 984-385E Setup Example

A Modbus Plus network cable connects the PANTHER Modbus Plus Interface to the Modbus Plus port on the 984-385E Programmable Controller Module. The Modicon Modbus Plus Network Planning and Installation Guide, (GM-MBPL-001) describes the network cabling, terminating connectors, and in-line connectors needed to build a network cable.

Set the node address for the 984-385E PLC using the DIP switches on the bottom of the Programmable Controller Module. The Modbus Plus Indicator on the 984-385E front panel indicates a good connection to the terminal when it constantly flashes green. A green diagnostic LED on the PANTHER Modbus Plus Options card flashes every 160 seconds when the terminal makes a good connection.

Modsoft Programming Software running on a PC controls the Modicon 984-385E PLC. A serial cable connects a serial port on the PC to the Modbus port on the PLC. The Modsoft Programmer User Manual, Part Number 890-USE-115-00 Version 1.0, describes in detail how to use Modsoft. Use version 2.32 or a later version of the Modsoft software. Perform the following steps from Modsoft to read and write to a PANTHER terminal on the Modbus Plus network from a Modicon 984-385 PLC.

- With Modsoft running on a PC, go to the Configuration Overview screen and select the 984-385E PLC. Switch to the Configuration Overview - Ports menu, and change the Modbus port to Bridge mode. This allows commands issued from Modsoft to be transferred to the Modbus Plus network.
- From the Modsoft main menu, go "on-line" to the 984-385E PLC from Modsoft. Once a connection is made, use the MSTR instruction to access the PANTHER. The Modicon Ladder Logic Block Library User Guide, (840 USE 101 00 Version 1.0) gives detailed information about MSTR instruction.

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MSTR Instruction Example to Read PANTHER Integer Registers

This example shows using the MSTR instruction to read the integer status and weight registers in the PANTHER terminal. In this example, the PANTHER terminal is at node 2 in the dipswitches on the PANTHER Modbus Plus interface card. This MSTR reads the holding registers for the scale in integer mode.

Control Block

Register		Content
40001	0002 Dec	Read command
40002	xxxx Hex	Error status
40003	0002 Dec	Number of registers to be read
40004	0001 Dec	Starting address of integer weight/status registers in the PANTHER terminal. (1 = 40001)
40005	0002 Hex	Routing path. PANTHER address = node 2
40006	0001 Dec	Data slave routing path.
40007	0000 Dec	Additional routing register
40008	0000 Dec	Additional routing register
40009	0000 Dec	Additional routing register
Data Area		
Register		
40100		The PLC stores registers read from the PANTHER starting here
Length		
0002		This integer value defines the length of the Data Area

MSTR Instruction Example to Write PANTHER Integer Registers

The following example shows using the MSTR instruction to write the integer command registers in the PANTHER. In this example, the PANTHER address is set to node 2. This MSTR writes the holding registers for the scale in integer mode.

Control Block

Register		Content
40011	0001 Dec	Write command
40012	xxxx Hex	Error status
40013	0002 Dec	Number of registers to be read
40014	0009 Dec	Starting address of integer command registers in the PANTHER terminal (9 = 40009)
40015	0002 Hex	Routing path. PANTHER address = node 2
40016	0001 Dec	Data slave routing path
40017	0000 Dec	Additional routing register
40018	0000 Dec	Additional routing register
40019	0000 Dec	Additional routing register
Data Area		
Register		
40150		MSTR writes data from registers starting at this address.
Length		
0002		This value defines the length of the Data Area.

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Modbus Plus Setup in the PANTHER Terminal

To configure the PANTHER terminal for a Modbus Plus PCB, first select *F8* in setup, then select the following options.

	Weight Data Type
F8.1	0 = Weight is in display increments, decimal point is implied.
	1 = Weight is in integer divisions, no decimal point implied.
F8.2	Enter 1-64 for rack address.
	Global Data
F8.6	0 = Global Data Disabled
	1 = Global Data Enabled

Discrete Read/Write Format

The PANTHER terminal can communicate weight to the PLC in a discrete integer weight format. The Modbus Plus uses Discrete Data Transfer that allows for bi-directional communication of discrete bit encoded information or 16-bit binary word (signed integer) numerical values.

On Modbus Plus, there are two words (32 bits) of input data for each scale and two words of output data for each scale.

The Modicon PLC uses these holding registers assignments to request integer weight and scale status from the PANTHER terminal.

40001 Scale 1 Integer Weight
40002 Scale 1 Status

The Modicon PLC uses these holding registers assignments to send "bit-oriented" commands and associated integer values to the PANTHER terminal.

40009 Scale 1 Integer Tare or Setpoint Value
40010 Scale 1 Bit-Oriented Commands

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Data Definition

The PANTHER Modbus Plus PLC Interface supports Discrete Data Transfer that allows for bi-directional communication of discrete bit encoded information or 16 bit binary word (signed integer) numerical values. Each PANTHER represents a quarter rack of data and each quarter rack provides two input (read) and two output (write) words. A quarter logical rack has 32 input bits (two 16 bit words) and 32 output bits (two 16 bit words).

The data is formatted as follows:

DISCRETE READ - PANTHER OUTPUT TO PLC INPUT			
PLC Bit Programming	**Bit Numbers**	**Word 0[1]**	**Word 1**
16	0	Integer Weight bit 00	Setpoint 1[5]
15	1	Integer Weight bit 01	Setpoint 2[6]
14	2	Integer Weight bit 02	Zero Tolerance[7]
13	3	Integer Weight bit 03	Unused
12	4	Integer Weight bit 04	Unused
11	5	Integer Weight bit 05	Unused
10	6	Integer Weight bit 06	Unused
9	7	Integer Weight bit 07	Unused
8	8	Integer Weight bit 08	Unused
7	9	Integer Weight bit 09	PAR 1.1[1]
6	10	Integer Weight bit 10	Unused
5	11	Integer Weight bit 11	Unused
4	12	Integer Weight bit 12	Motion[2]
3	13	Integer Weight bit 13	Net Mode[2]
2	14	Integer Weight bit 14	Update in Progress[3]
1	15	Integer Weight bit 15	Data OK[4]

1. PAR 1.1 is the current state of the PANTHER terminal parallel input.
2. Positive true (1=True)
3. If 1, the PANTHER terminal was updating the PLC interface shared memory while data was read. The PLC should ignore this data and rescan.
4. Set to 1 if scale is operating properly, not over or under range, in power up, expanded mode, or in setup mode (Integer weight will be set to zero.)
5. Setpoint 1output bit status in Setpoint mode; Under bit status if in Over-Under mode.
6. Setpoint 2 output bit status if in Setpoint mode or "Low OK - OK - High OK" bit status if in Over-Under mode.
7. Zero Tolerance output bit status in Setpoint mode; Over bit status in Over-Under mode.

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DISCRETE WRITE - PLC OUTPUT TO PANTHER INPUT			
PLC Bit Programming	Bit Numbers	Word 0	Word 1
16	0	Integer tare/Setpoint Bit 00	Select 1[1]
15	1	Integer tare/Setpoint Bit 01	Select 2[1]
14	2	Integer tare/Setpoint Bit 02	Select 3[1]
13	3	Integer tare/Setpoint Bit 03	Load Preset Tare[2,7]
12	4	Integer tare/Setpoint Bit 04	Clear Tare Command[3,8]
11	5	Integer tare/Setpoint Bit 05	Pushbutton Tare Command[3,7]
10	6	Integer tare/Setpoint Bit 06	Print Command[3]
9	7	Integer tare/Setpoint Bit 07	Zero Command[3]
8	8	Integer tare/Setpoint Bit 08	Enable Setpoint Command[4]
7	9	Integer tare/Setpoint Bit 09	Unused
6	10	Integer tare/Setpoint Bit 10	Unused
5	11	Integer tare/Setpoint Bit 11	Unused
4	12	Integer tare/Setpoint Bit 12	PAR 2.1[5]
3	13	Integer tare/Setpoint Bit 13	PAR 2.2[5]
2	14	Integer tare/Setpoint Bit 14	PAR 2.3[5]
1	15	Integer tare/Setpoint Bit 15	Load Setpoint 1 Value[6]

1. A binary value in bits 0-2 select the data in Discrete Read weight data source: 0 = Gross weight, 1 = Net weight, 2 = Displayed weight, 3 = Tare or active Target if in Over/Under mode, 4 = Setpoint 1, 5-7 = Gross.
2. A transition from 0 to 1 causes the value in Word 0 to be written into the preset tare register.
3. A transition from 0 to 1 activates the command.
4. Setpoint or Over-Under high level outputs are disabled if this bit is set = 0, enabled if set = 1. Setting this bit to 1 after a downloaded Setpoint 1 or Target 1 value will store the downloaded value in non-volatile memory.
5. PAR2.1 - PAR2.3 are the PANTHER terminal parallel outputs. Writing a 1 to these bits causes the output to turn on. Output control is only accepted if the PANTHER terminal is in Indicator mode.
6. A transition from 0 to 1 causes the value in Word 0 to be written into PANTHER terminal memory, however, the non-volatile memory Setpoint 1 target register (if in Setpoint mode) or Target 1 target register (if in Over-Under mode) will not be updated unless the Enable Setpoint Command bit = 1. The Word 0 value for Setpoint 1 or Target 1 are in the primary unit (calibrated unit).
7. When tare interlocks are set, accumulative tares will not be permitted.
8. When tare interlocks are set, tare can only be cleared at gross zero.

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8 PANTHER Terminal Analog Output Option

Analog Output Option Overview

The PANTHER Analog Output Option Kit provides output ranges of 0-10 VDC or 4 - 20 mA plus an optically isolated open collector status indication output. The Analog Output Kit may be installed in either the harsh environment or panel mount terminal. Included in the kit are the following parts:

Part Number	Description	Quantity
(*)14882700A	Analog Output PCB Assembly	1
(*)14915300A	Option Harness	1
(*)14467400A	Snap-in Standoff	1
(*)14829500A	Mounting Bracket	1
(*)14828800A	Terminal Block Label	1
(*)14828700A	Controller Label, Analog	1
(*)15069600A	Controller Label, DigiTOL	1
(*)14827600A	Rear Panel	1
(*)13162500A	Terminal Block, 6 position	1
R0511100A	Screw, M4	4
R0519600A	Nut, M4	2

(*) May have a revision level prefix

Installation in Harsh Environment Enclosure

1. Disconnect the AC power from the outlet before proceeding.



⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



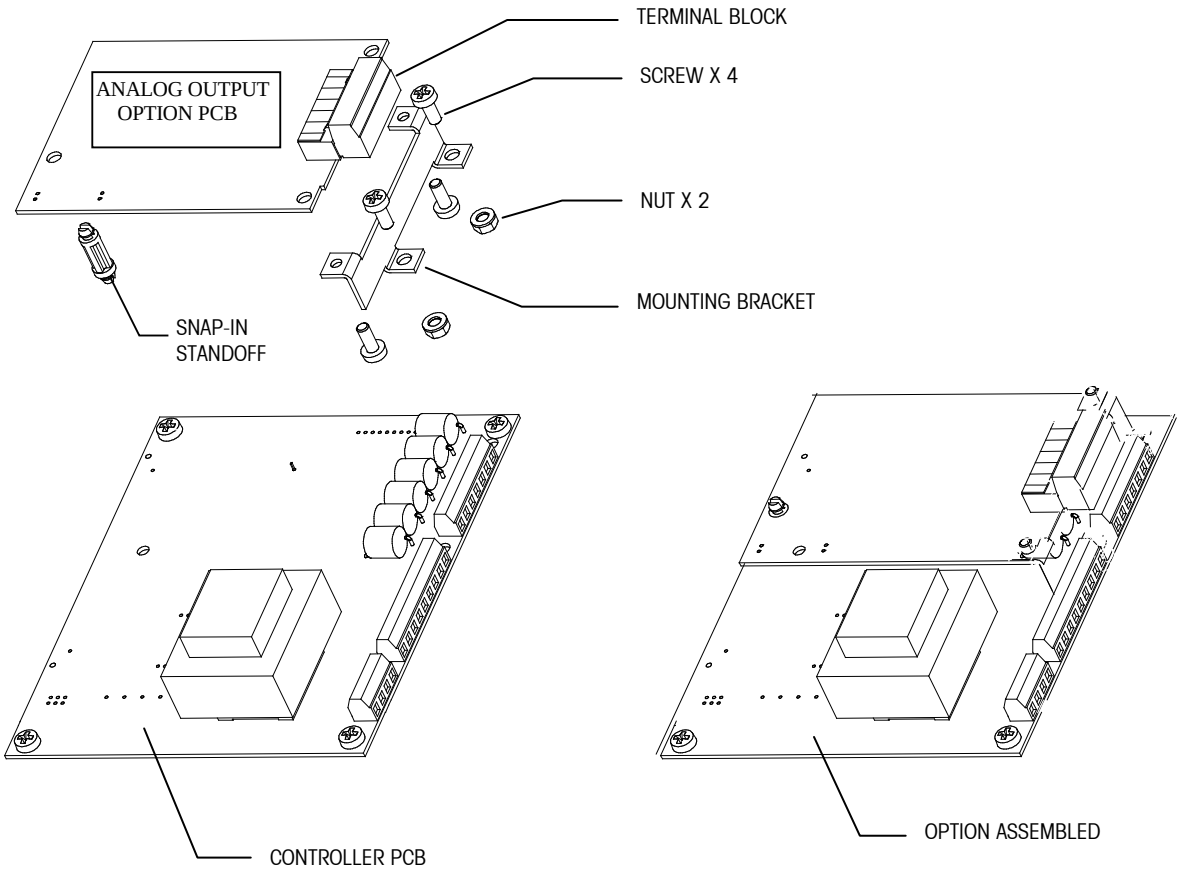
⚠ CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

2. Locate the two slots found on the bottom of the enclosure lid. Gently press a large, flat-bladed screwdriver into the each slot until a gentle "pop" sound is heard, indicating that the latch has released.

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3. Swing the bottom of the enclosure cover up until it clears the enclosure. Lightly squeeze the top of the front cover to the enclosure, then raise the cover to clear the upper two spring clips. The cover will swing down and be suspended by a grounding cable.
4. Remove the four screws which mount the Controller PCB to the cover.



4. The mounting bracket is attached to the Analog Output Option PCB with two screws.
5. Press the snap-in standoff into the Controller PCB.
6. Snap the Analog Output Option PCB and mounting bracket assembly into place on the Controller PCB.
7. Attach the mounting bracket to the Controller PCB with two screws and two nuts.
8. Plug the option harness into the analog output option PCB at J1.
9. Plug the option harness into the Controller PCB at J2.
10. Mount the Controller PCB to the enclosure front cover using the four screws removed in step 4.
11. Insert the terminal block into the Analog Output Option PCB connector and wire interconnecting cable (not supplied with this kit). Terminal designations are provided on the Analog Output Option PCB mating connector.

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Installation in Panel Mount Enclosure

1. Disconnect the AC power from the outlet before proceeding.



⚠ WARNING

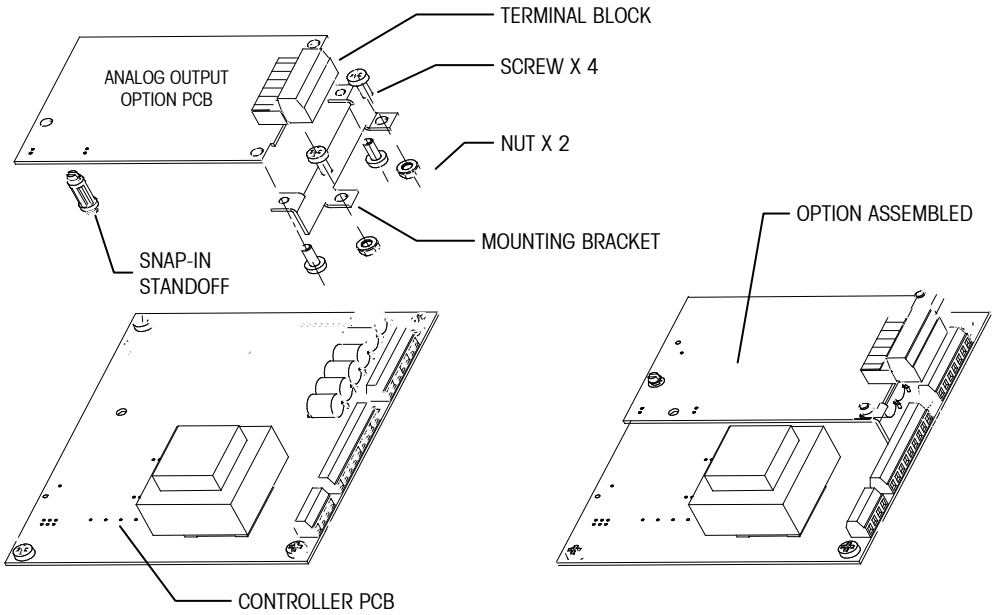
DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



⚠ CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

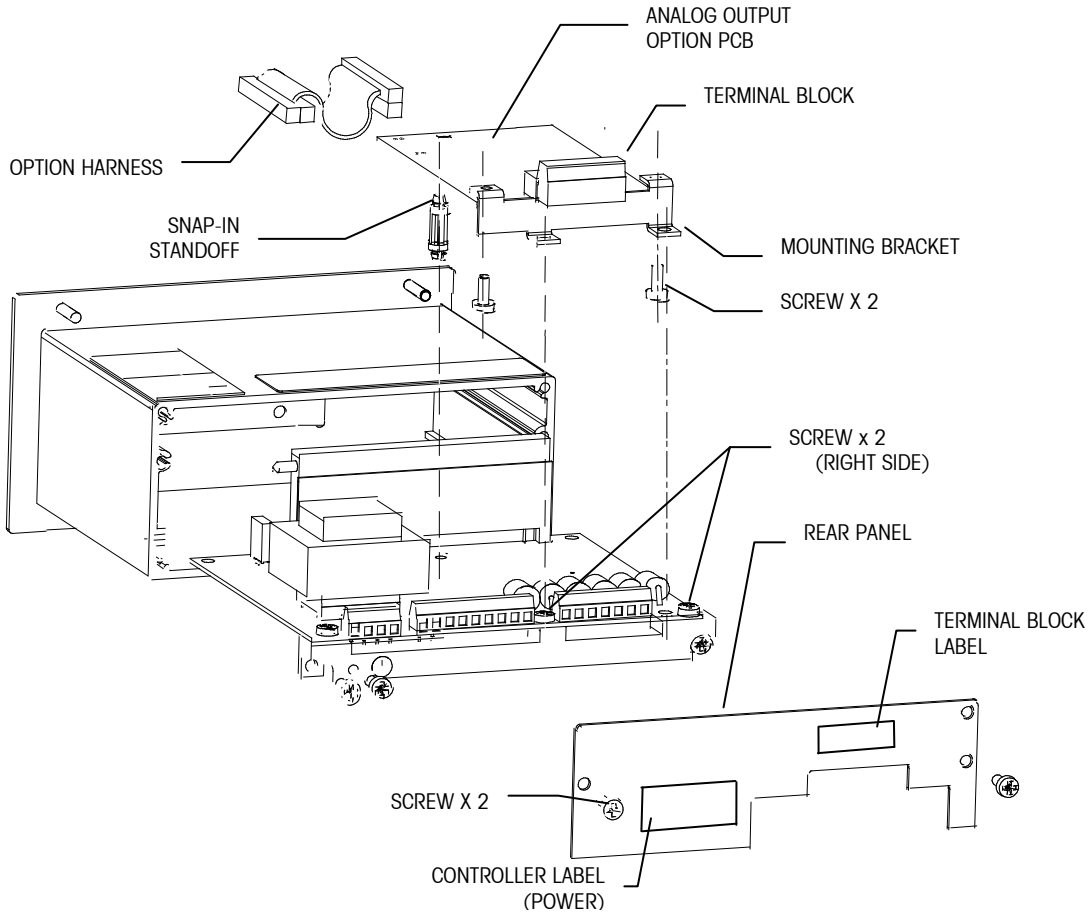
2. Remove the two screws retaining the rear panel, then remove and discard the original rear panel. Retain the screws for reassembly.
3. Remove the two screws retaining the Controller PCB mounting bracket. Retain for reassembly. Slide the Controller PCB part way out of the enclosure until the keyboard tail is exposed. Unplug the keyboard tail and remove the Controller PCB from the enclosure.



4. Remove the two screws on the right securing the Controller PCB to the Controller PCB mounting bracket. (Leave the one on the left alone.)
5. The mounting bracket is already attached to the Analog Output Option PCB with two screws.
6. Press the snap-in standoff into the Controller PCB.
7. Snap the Analog Output Option PCB and mounting bracket assembly into place on the Controller PCB.

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8. Attach the Analog Output Option PCB to the Controller PCB with the two screws from step 4.
9. Plug the option harness into the Controller PCB at J2.



10. Plug the option harness into the Analog Output Option PCB at J1.
11. Plug the keyboard tail into the mating connector on the bottom of the Controller PCB.
12. Slide the Controller PCB assembly into the enclosure. Make sure the keyboard tail does not fold in front of the display. Attach Controller PCB mounting bracket with two screws removed in step 4.
13. Attach the new rear panel to the enclosure using the two screws removed in step 2.
14. Affix the appropriate Controller label (analog or DigiTOL) power section (left side) to the new rear panel to identify the Controller PCB terminals. (Use the one that matches the label from the original rear panel.)
15. Insert the terminal block into the analog output PCB connector. Affix the terminal block label above the terminal block on the rear panel. Match the orientation of the label on the analog output option connector.
16. Wire interconnecting cable (not supplied with this kit) to the terminal block. Apply power and program as required.

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9 PANTHER Terminal DeviceNet Option

DeviceNet Network Overview

DeviceNet is an RS-485 based network utilizing CAN chip technology. This network was created for bit and byte-level devices, and can be configured to run up to 500Kbits per second depending on cabling and distances. Messages are limited to 8 bytes unfragmented. Any larger message must be broken up and sent in multiples. The network can include as many as 64 nodes including the master, commonly called the scanner.

DeviceNet Specifications and Features

DeviceNet Characteristics

Consult http://www.odva.org/ to obtain additional information on DeviceNet

- DeviceNet specific cable (twisted pair)
- Access to intelligence present in low-level devices – Master/Slave and Peer-to-Peer capabilities
- Trunkline-dropline configuration
- Support for up to 64 nodes
- Node removal without severing the network
- Simultaneous support for both network-powered (sensors) and self-powered (actuators) devices
- Use of sealed or open style connectors
- Protection from wiring errors
- Selectable baud rates of 125k baud, 250k baud, and 500k baud. Maximum trunk distance 500 meters and drop length of 156 meters at 125k baud
- Adjustable power configuration to meet individual application needs
- High current capability (up to 8 amps per supply)
- Operation with off-the-shelf power supplies
- Power taps that allow the connection of several power supplies from multiple vendors that comply with DeviceNet standards
- Built-in overload protection
- Power available along the bus: both signal and power lines contained in the trunkline
- Provisions for the typical request/response-oriented network communications
- Provisions for the efficient movement of I/O data
- Fragmentation (anything in excess of 8 bytes) for moving larger bodies of information
- Duplicate MAC ID detection

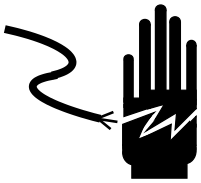
DeviceNet Kit Installation

The following items are included in the DeviceNet option kit:

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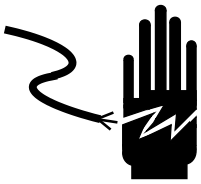
Part Number	Description	Quantity
71210016	PCB Assembly	1
14915300A	Harness	1
72194888	Plate, Rear, with Label	1
64058834	Installation Instructions	1
14829500A	Bracket, Option	1
71210017	Terminal Block, 5-position	1
14467400A	Spacer, Snap-In	1
R0511100A	Screw, M4 x 10	6
R0519600A	Nut, M4	2

Installation in the Harsh Environment Enclosure



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



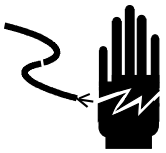
WARNING

DO NOT APPLY POWER TO THE PANTHER TERMINAL UNTIL THE EXTERNAL WIRING AND THE INSTALLATION OF ALL COMPONENTS HAS BEEN COMPLETED.



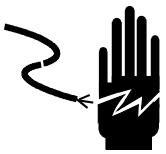
CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.



WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.



WARNING

DEVICENET OPTION IS NOT TO BE USED IN A DIVISION 2 HAZARDOUS AREA.

INSTALL DEVICENET ONLY IN NON-HAZARDOUS LOCATION. REMOVE PANTHER HAZARDOUS AREA SPECIFICATION LABEL BEFORE INSTALLING THIS OPTION.

To install DeviceNet Option PCB Kit 64058785 in the harsh environment enclosure:

1. First disconnect AC power to the PANTHER terminal.
2. Locate the two slots found on the bottom of the enclosure lid. Press a large flat bladed screwdriver into the each slot until a gentle "pop" sound is heard, indicating that the latch has released.

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3. Swing the bottom of the enclosure cover up until it clears the enclosure, then lightly squeeze the top of the front cover while raising the cover to clear the upper two spring clips. The cover will swing down and is suspended by a grounding strap.
4. Remove the four screws that mount the Controller PCB to the cover.

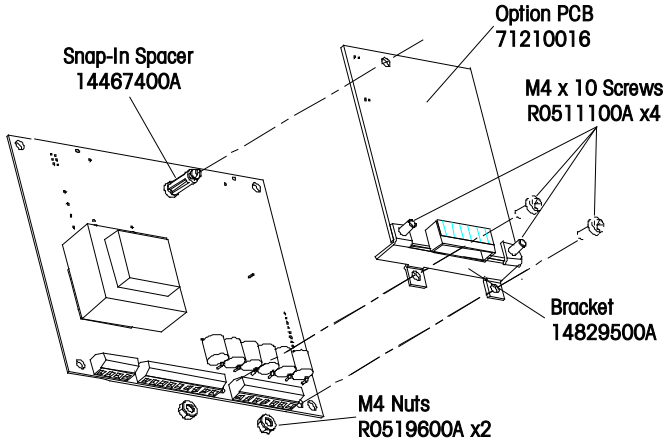
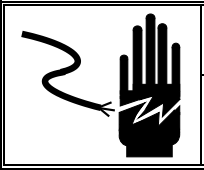


Figure 9-1: Mounting DeviceNet Option PCB in Harsh Environment Enclosure

5. Press the snap-in standoff (14467400A) into the Controller PCB.
6. Snap the DeviceNet Option PCB and mounting bracket assembly into place on the Controller PCB.
7. Attach the mounting bracket to the Controller PCB with 2 screws (R0511100A) and 2 nuts (R0519600A).
8. Plug the option harness (14915300A) into the DeviceNet Option PCB at J1.
9. Plug the option harness into the Controller PCB at J2.
10. Mount the Controller PCB to the enclosure front cover using the four screws removed in step 4.
11. Route the interconnecting cable (not supplied with this kit) through the unused grip bushing in the enclosure and connect it to the DeviceNet Option PCB.
12. Close the enclosure, apply power, and program as required. Refer to the setup section.

Installation in the Panel-Mount Enclosure



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

To install the DeviceNet Option PCB Kit 64058785 in the PANTHER terminal panel-mount enclosure:

1. First disconnect AC power to the PANTHER terminal.

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2. Unscrew the two screws (R0511100A) on the rear enclosure cover plate. Remove and discard the cover plate. Save the mounting screws for later.
3. Unscrew the two screws holding Controller PCB. Slide the Controller PCB part way out of the enclosure until the keyboard tail is exposed. Unplug the keyboard tail and remove the Controller PCB from the enclosure.



Figure 9-2: Rear of Panel-Mount Enclosure, Showing Keyboard Tail

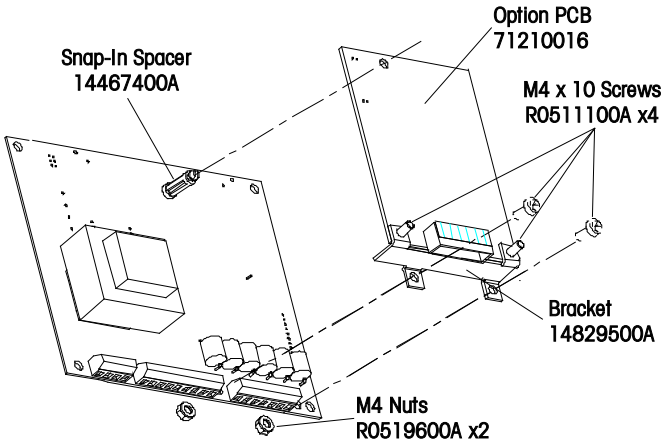


Figure 9-3: Mounting DeviceNet Option PCB in Panel-Mount Enclosure

4. Press the snap-in standoff (14467400A) into the Controller PCB.
5. Snap the DeviceNet Option PCB and mounting bracket into place on the Controller PCB.
6. Attach the mounting bracket to the Controller PCB with 2 screws (R0511100A).
7. Plug the option harness into the Controller PCB at J2. (Fold harness 90° as seen in Figure 9-4, to make connection to J2.)

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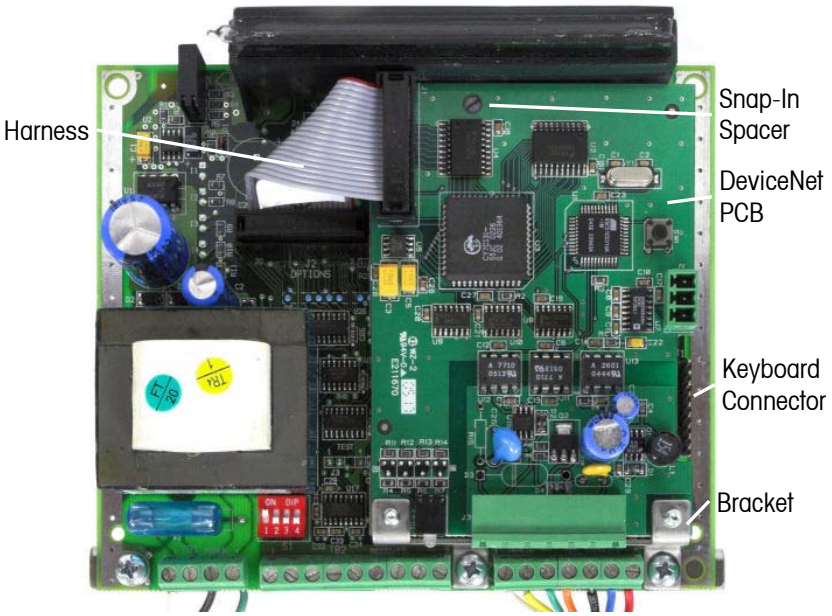


Figure 9-4: Top View of DeviceNet Option PCB Mounted and Connected to Controller PCB

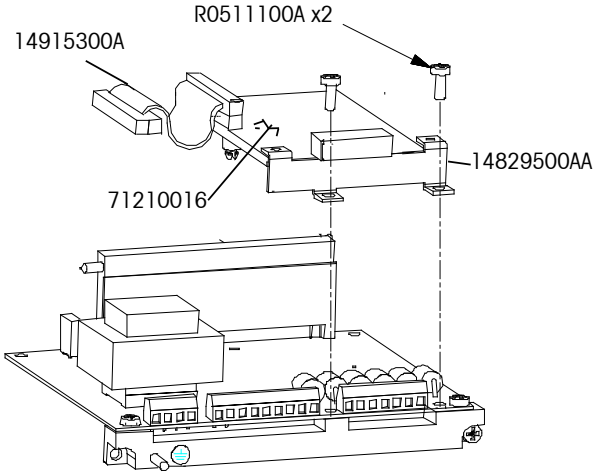


Figure 9-5: Installation in Panel Mount Enclosure

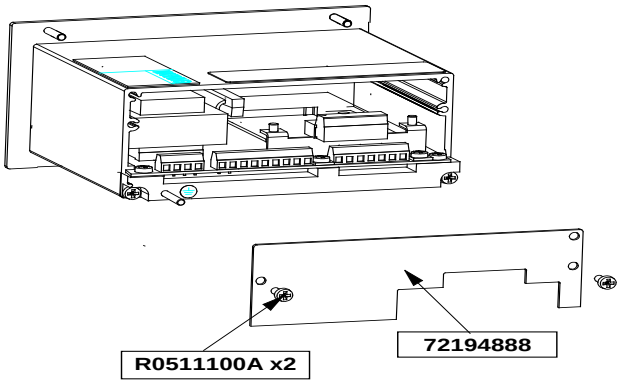


Figure 9-6: Installation in Panel Mount Enclosure

8. Plug the option harness into the DeviceNet Option PCB.
9. Plug the keyboard tail into the mating connector on the Controller PCB.

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10. Slide the Controller PCB assembly into the enclosure. Make sure the keyboard tail does not fold in front of the display. Attach Controller PCB to unit with the two screws removed in step 3.
11. Attach the new rear panel (15174000A) to the enclosure using the two screws (R0511100A) removed in step 2.
12. Affix the appropriate Controller Label to the DeviceNet Option rear panel to identify the Controller PCB terminals. (Use the one that matches the label from the original rear panel.)
13. Attach interconnecting cable (not supplied with this kit) to the DeviceNet Option PCB. Apply power and program as required.

DeviceNet Interface PCB Wiring and Specifications

Connections 5 pin Phoenix type connector, provided

The following pin-outs should be used:

V-
CAN-L
SHIELD
CAN-H
V+

Status Lights

The Panther DeviceNet board has 2 status LEDs, one indicating module status, the other network status.

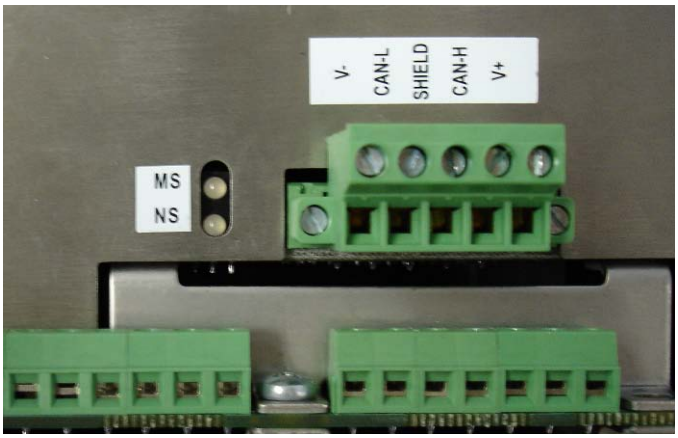


Figure 9-7: DeviceNet Status LEDs

Module Status LED (Labeled MS)

This LED displays the status of the Panther DeviceNet board.

Solid Green	Normal operation
Flashing Green	DeviceNet board fault
OFF	No power to the DeviceNet board

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Solid Red	Unrecoverable board fault
Flashing Red	Recoverable fault
Flashing Orange	Board performing self-test

Note: If the module status LED indicates anything other than solid green after powering up the unit and attaching the DeviceNet cable, the Panther must be powered down and restarted. If the LED continues to show any condition other than solid green, replace board.

Network status LED (Labeled NS)

This LED displays network status.

Solid Green	Node is communicating to scanner
Flashing Green	Device is connected to the network but not being scanned The most common reason for this is the device has not been added to the scan list. Consult DeviceNet configuration tool's help in order to commission the node and put it in the scan list.
OFF	No DeviceNet power
Solid Red	Critical Link error This error typically indicates a cable problem
Blinking Red	Connection Timeout

DeviceNet Setup in PANTHER Terminal

To configure the PANTHER terminal for a DeviceNet module use the following menu selections.

F8.1	**Weight format**	
	0	Displayed weight
	1	Internal divisions
F8.2	**Node address**	
	0-63	Ranges: 0-63
F8.5	**Baud rate**	
	0	Automatic
	1	125K
	2	250K
	3	500K

Note: After setup, the terminal should be powered down and re-started to allow changes to take effect.

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Communications

Node Address

The Panther can be assigned any valid DeviceNet node address. Typically 0 is reserved for scanner cards and address 63 is reserved for new devices "out of the box".

Controlling PANTHER Terminal Discrete I/O Using a PLC Interface

The Panther's onboard discrete I/O can be monitored and controlled via the DeviceNet master. Refer to the data definition tables for more information on how to monitor and control the I/O.

Data Definition

The Panther utilizes one input assembly instance and one output assembly instance. The input and output assembly instances are each sized at 4 bytes. Input and output is always defined relative to the master (scanner) card.

Assembly Data

The input assembly instance consists of 2 words or 4 bytes of data. Word 0 contains the weight data, Word 1 is the status data.

Input Assembly Data

Input Assembly (4 bytes) - PANTHER Terminal Output to PLC Input		
Bit Numbers	Word 0[1]	Word 1
0	Weight bit 00	Setpoint 1[5]
1	Weight bit 01	Setpoint 2[6]
2	Weight bit 02	Zero Tolerance[7]
3	Weight bit 03	Unused
4	Weight bit 04	Unused
5	Weight bit 05	Unused
6	Weight bit 06	Unused
7	Weight bit 07	Unused
8	Weight bit 08	Unused
9	Weight bit 09	Input 1[1]
10	Weight bit 10	Unused
11	Weight bit 11	Unused
12	Weight bit 12	Motion[2]

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Input Assembly (4 bytes) - PANTHER Terminal Output to PLC Input		
Bit Numbers	Word 0[1]	Word 1
13	Weight bit 13	Net Mode[2]
14	Weight bit 14	Update in Progress[3]
15	Weight bit 15	Data OK[4]

1. Input 1 is the current state of the PANTHER terminal discrete input.
2. Positive true (1=True)
3. If 1, the PANTHER terminal was updating the PLC interface shared memory while data was read. The PLC should ignore this data and rescan.
4. Set to 1 if scale is operating properly, not over or under range, in power up, expanded mode, or in setup mode (weight will be set to zero.)
5. Setpoint 1 output bit status if in Setpoint mode or Under bit status if in Over-Under mode.
6. Setpoint 2 output bit status if in Setpoint mode or "Low OK - OK - High OK" bit status if in Over-Under mode.
7. Zero Tolerance output bit status if in Setpoint mode or Over bit status if in Over-Under mode.

Output Assembly Data

The output assembly instance consists of 2 words or 4 bytes of data. Word 0 contains the data word, Word 1 is the command word.

Output Assembly (4 bytes) - PLC Output to PANTHER Terminal Input		
Bit Numbers	Word 0	Word 1
0	Tare/Setpoint Bit 00	Select 1[1]
1	Tare/Setpoint Bit 01	Select 2[1]
2	Tare/Setpoint Bit 02	Select 3[1]
3	Tare/Setpoint Bit 03	Load Preset Tare[2,7]
4	Tare/Setpoint Bit 04	Clear Tare Command[3,8]
5	Tare/Setpoint Bit 05	Pushbutton Tare Command[3,7]
6	Tare/Setpoint Bit 06	Print Command[3]
7	Tare/Setpoint Bit 07	Zero Command[3]
8	Tare/Setpoint Bit 08	Enable Setpoint Command[4]
9	Tare/Setpoint Bit 09	Unused
10	Tare/Setpoint Bit 10	Unused
11	Tare/Setpoint Bit 11	Unused
12	Tare/Setpoint Bit 12	Output 1[5]
13	Tare/Setpoint Bit 13	Output 2[5]
14	Tare/Setpoint Bit 14	Output 3[5]
15	Tare/Setpoint Bit 15	Load Setpoint 1 Value[6]

1. A binary value in bits 0-2 select the data in Discrete Read weight data source:
   0 = Gross weight, 1 = Net weight, 2 = Displayed weight, 3 = Tare or active Target if in Over/Under mode, 4 = Setpoint 1, 5-7 = Gross.

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2. A transition from 0 to 1 causes the value in Word 0 to be written into the preset tare register.
3. A transition from 0 to 1 activates the command.
4. Setpoint or Over-Under high level outputs are disabled if this bit is set = 0, enabled if set = 1. Setting this bit to 1 after a downloaded Setpoint 1 or Target 1 value will store the downloaded value in non-volatile memory.
5. Outputs 1-3 are the PANTHER terminal outputs. Writing a 1 to these bits causes the output to turn on. Output control is only accepted if the PANTHER terminal is in Indicator mode.
6. A transition from 0 to 1 causes the value in Word 0 to be written into PANTHER terminal memory, however, the non-volatile memory Setpoint 1 target register (if in Setpoint mode) or Target 1 target register (if in Over-Under mode) will not be updated unless the Enable Setpoint Command bit = 1. The Word 0 value for Setpoint 1 or Target 1 is in the primary unit (calibrated unit).
7. When tare interlocks are set, accumulative tares will not be permitted.
8. When tare interlocks are set, tare can only be cleared at gross zero.

DeviceNet Commissioning and Configuration

The user must register the EDS, connect the device and add the Panther to the DeviceNet master's scanlist. Note that every vendor's software is different. Depending upon master and software, the user may have to cycle power on the master in order to complete the commissioning of any device added to the network. Consult the master's documentation for more information. The following example is for Rockwell software and Logix5000 processor.

Configuration with RSNetWorx for DeviceNet

The EDS file located on the CD-ROM supplied with the Panther contains configuration information to allow RSNetWorx for DeviceNet to set up a single polled I/O connection between a METTLER TOLEDO Panther and DeviceNet master/scanner.

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Registering the EDS File

The EDS file must first be registered into RSNetWorx for DeviceNet. This is accomplished using the EDS Wizard.

To access the EDS Wizard:

1. Click **Tools** then **EDS Wizard…** to begin the registration process.

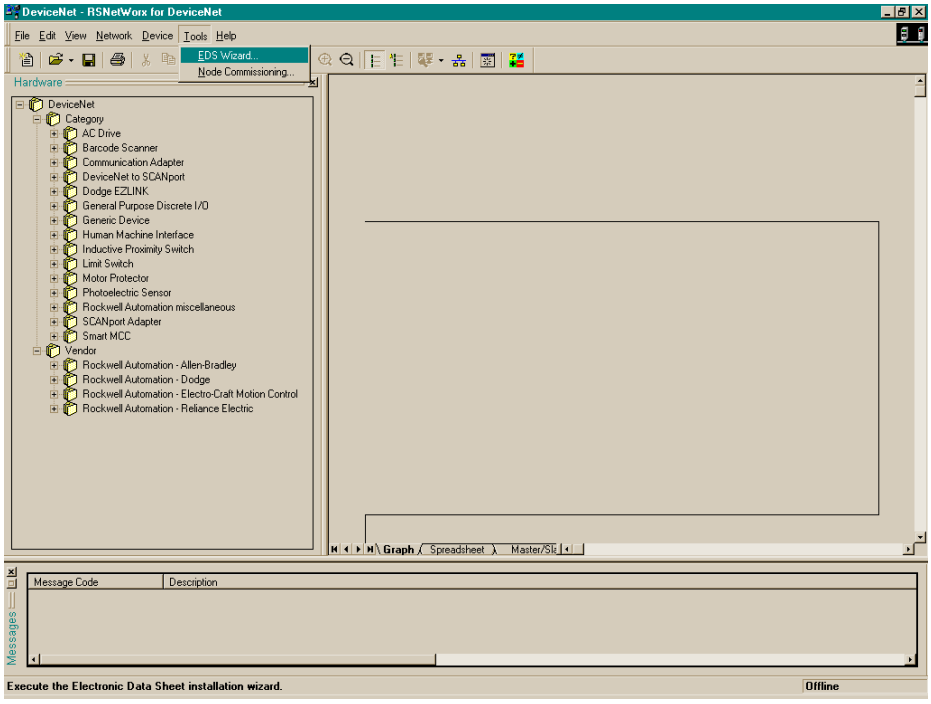


Figure 9-8: Accessing the EDS Wizard

2. The EDS Wizard Welcome screen appears.

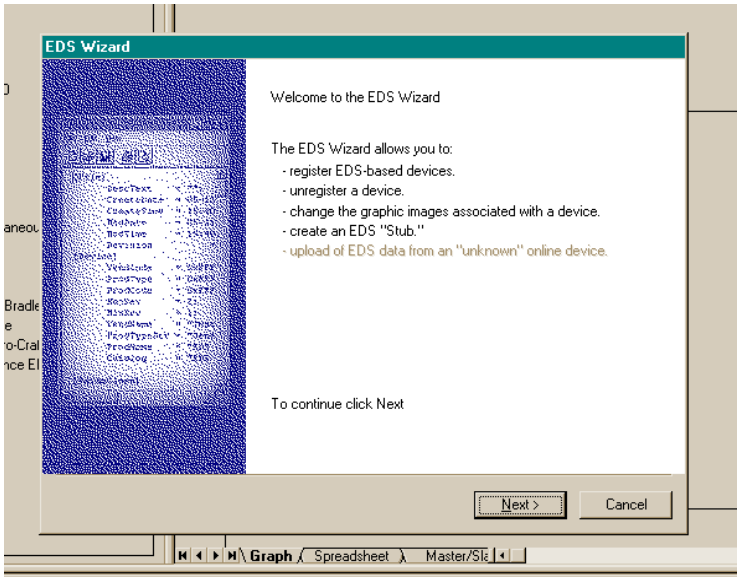


Figure 9-9: EDS Wizard Welcome

3. Click **Next** to begin the registration process.

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4. In the **Options** screen, make sure the **Register an EDS file(s)** radio button is selected.

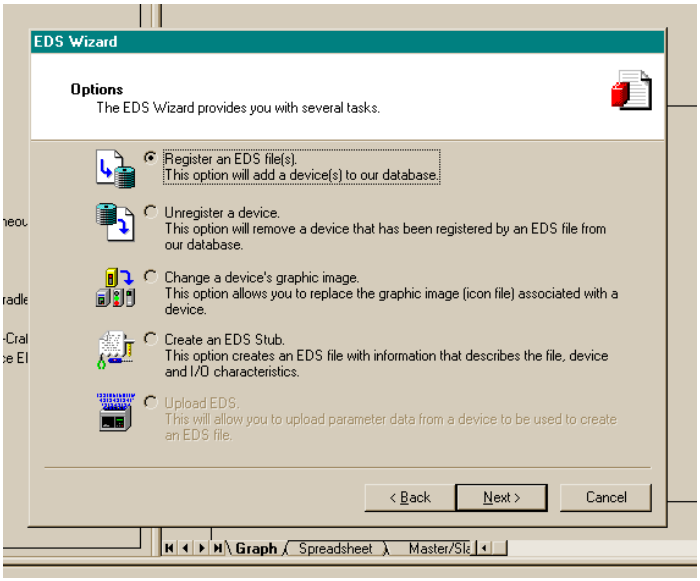


Figure 9-10: EDS Wizard Options Screen

5. Click **Next**, then **Browse** to select a file to register.
6. Browse to the appropriate location and select the file **MT_PT-DNET.eds**. (The EDS file is located on the CD-ROM.) Click the **Open** button.

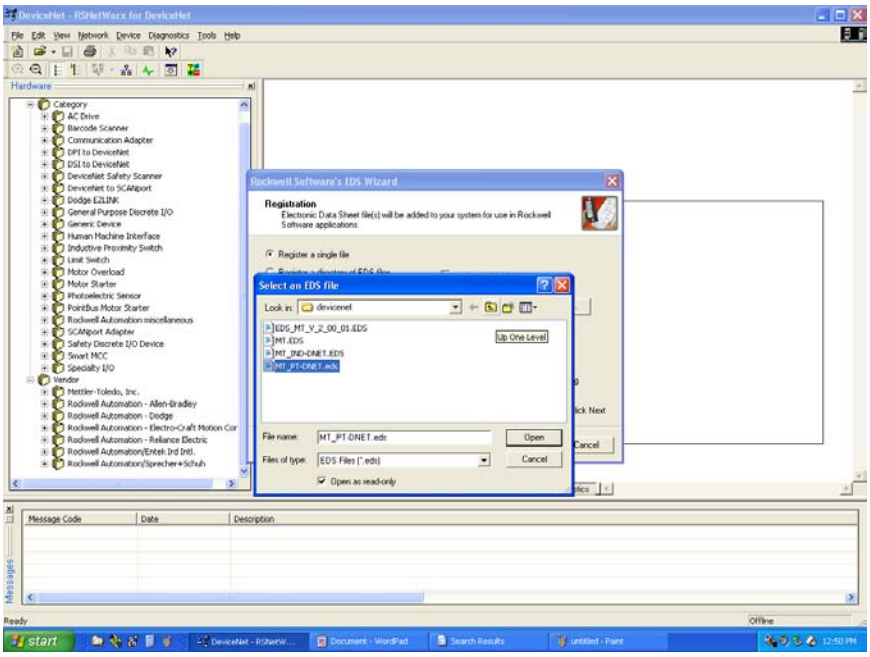


Figure 9-11: Selecting a File to Register Using the Browse Window

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7. Confirm that the correct file is showing in the **Named:** field, then click **Next**.

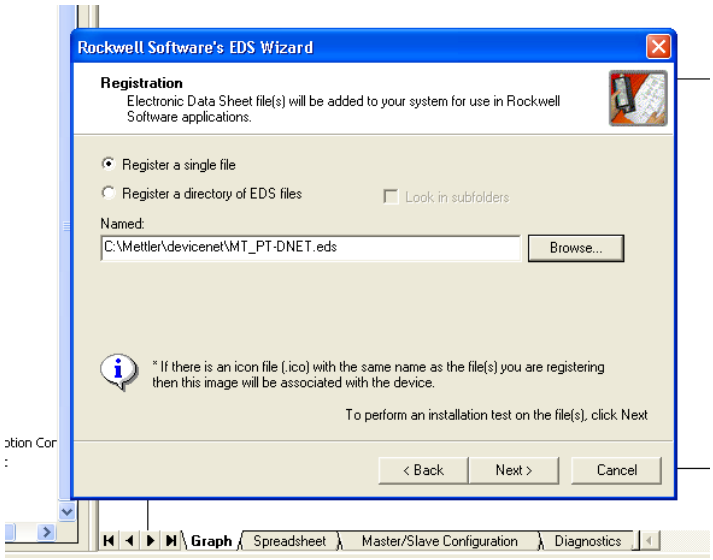


Figure 9-12: File Selected, Ready to Register

8. Make sure that there is a green check mark, indicating that the EDS file is valid, then click **Next** to continue.

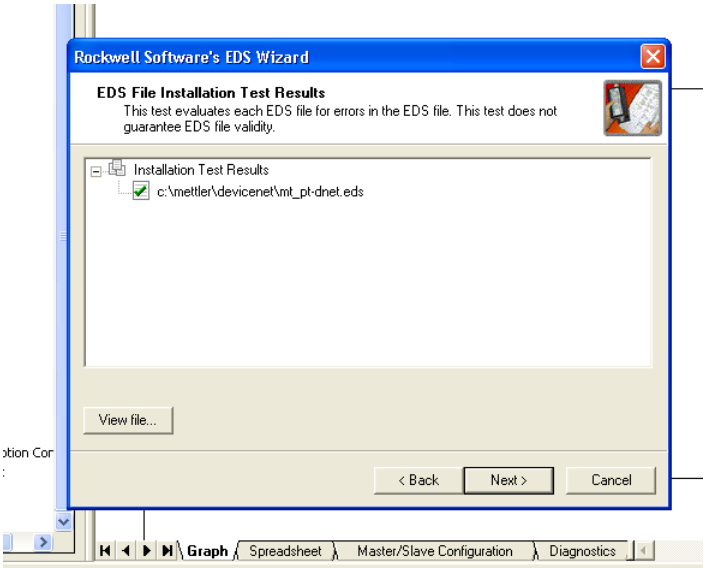


Figure 9-13: File Validity Confirmed

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9. Make sure the **MT_PT-DNET.ico** icon is selected. Note: RSNetWorx for DeviceNet will not be able to find the icon unless it is in the same directory as the EDS file.

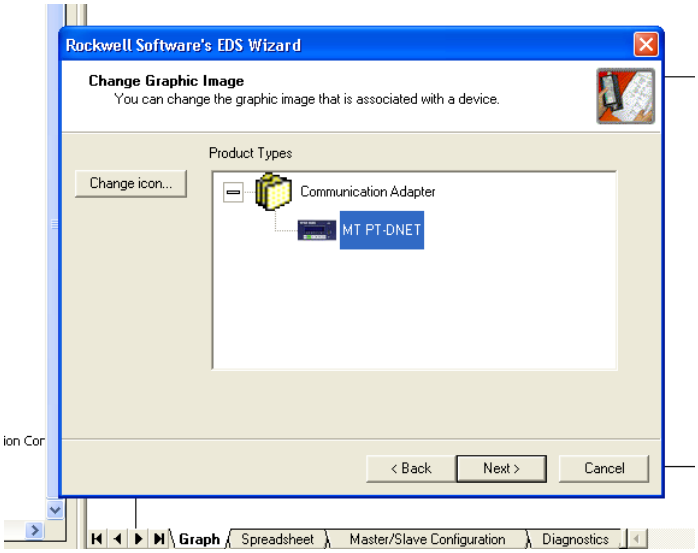


Figure 9-14: EDS Wizard Graphic Image (Icon) Selection

10. The **Final Task Summary** screen (Figure 9-15) will appear. Click **Next**.

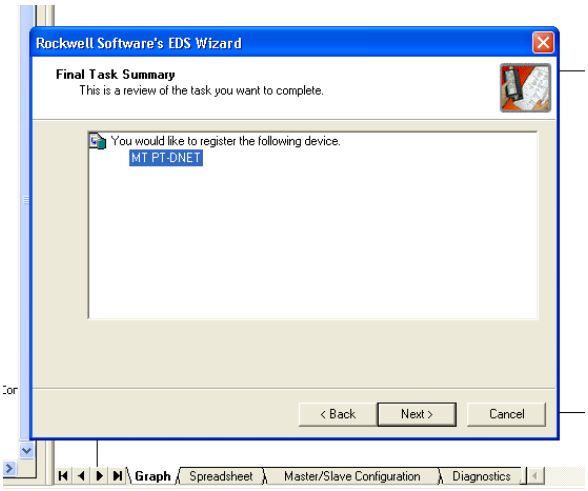


Figure 9-15: Final Task Summary Screen

11. A screen will appear with the message **You have successfully completed the EDS Wizard**. Click **Finish** to exit the EDS Wizard. EDS registration is complete.

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Setting up an I/O Connection

After the EDS file has been registered, RSNetWorx is used to set up a polled connection between the METTLER TOLEDO Panther and the DeviceNet master/scanner.

To set up the connection:

1. Select **Network** then **Online** to browse the DeviceNet network.

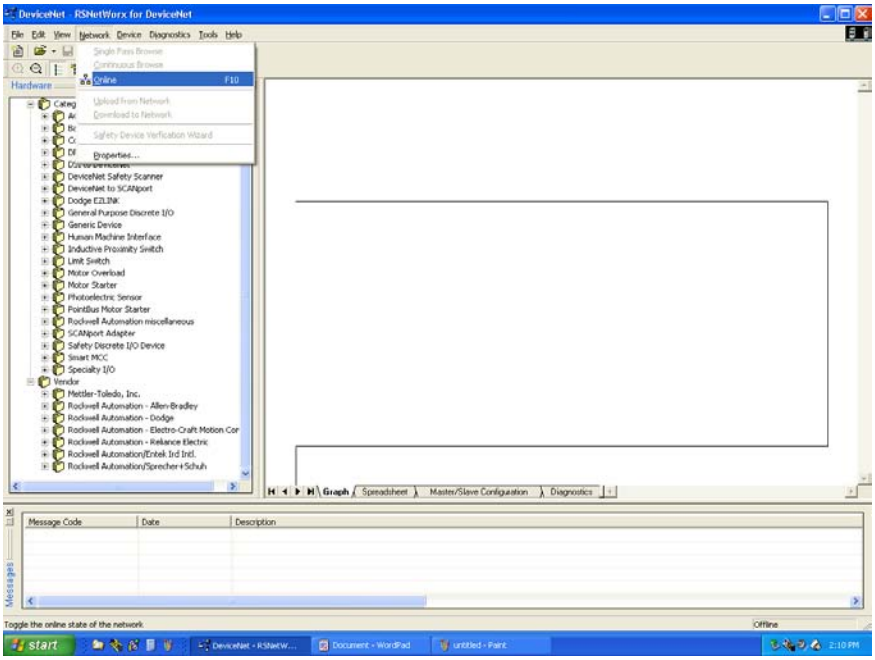


Figure 9-16: RSNetWorx Online Browse

2. Select the appropriate network path. In this case (Figure 9-17), 1756-DNB/A DeviceNet Scanner is selected.

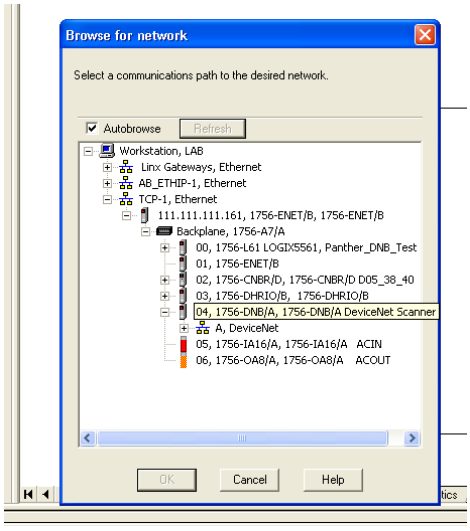


Figure 9-17: Browse for network

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3. Click **OK** to continue. A dialog box like the one shown in Figure 9-18 will appear. Note that you may be asked to upload or download, depending on the version of software used.

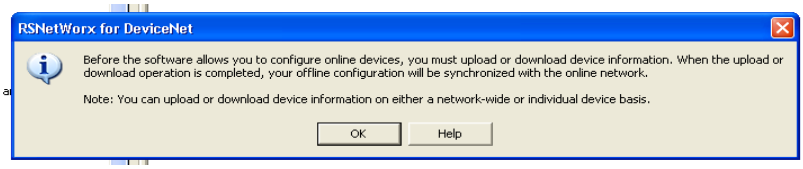


Figure 9-18: Confirmation Dialog Box

4. Click **OK** in the dialog box. A **Browsing network…** box will display with a progress meter indicating that the process is underway.

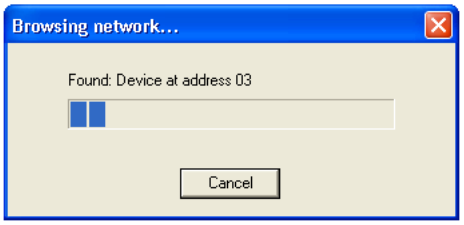


Figure 9-19: Browsing Network…

5. Once the scanner has browsed the entire network, add Panther to the 1756-DNB/A's Scanlist by right-clicking on the scanner icon in the Graph window (note the tab at the bottom of Figure 9-20), and choosing **Properties…**

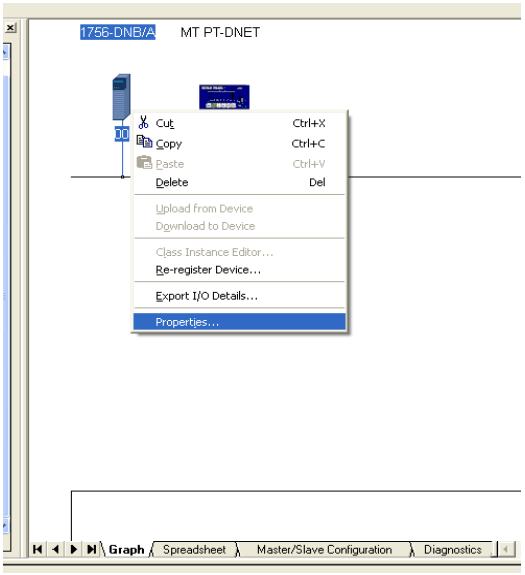


Figure 9-20: Accessing Scanner Properties

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6. The scanner's properties dialog box will appear, as in Figure 9-21.

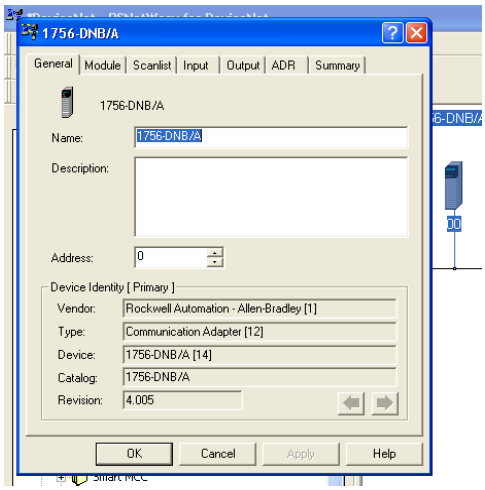


Figure 9-21: Scanner Properties Dialog: Initial View

7. Click the Scanlist tab in the properties dialog box. The view shown in Figure 9-22 will appear.

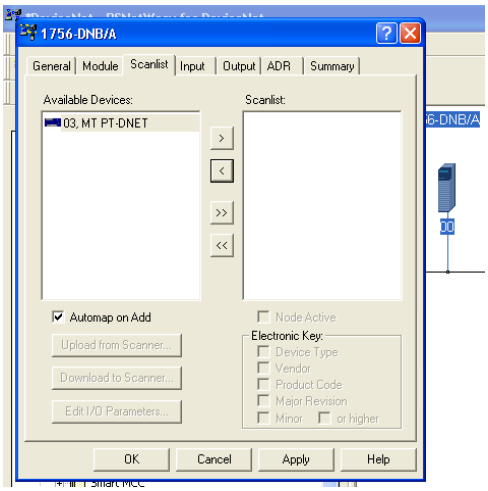


Figure 9-22: Scanner Properties Dialog: Scanlist Tab Showing

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8. Highlight the Panther (MT PT-DNET) and left-click to add it to the Scanlist. Once the Panther is added, it will appear in the right pane (Figure 9-23). Click **OK**.

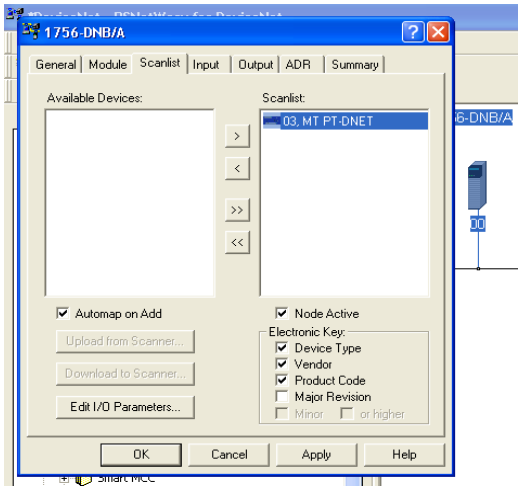


Figure 9-23: Panther Added to Scanlist

9. The next step is to download the configuration to the scanner card, in order to commission the network. In the prompt that appears (Figure 9-24), click **Yes** to continue. Note that some scanner cards may require cycling power off and on for changes to take effect.

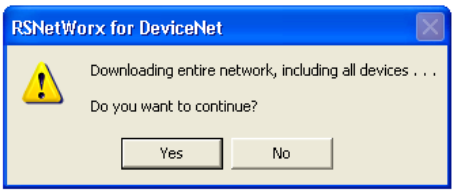


Figure 9-24: Network Download Confirmation Prompt

10. Once the Panther has been added to the Scanlist, access the Properties dialog and click on the Input and Output tabs to verify the Panther's I/O mapping (Figure 9-25) within the scanner card. Note that auto or manual mapping can be used. The input and output sizes are 4 bytes. Also note this is a polled device only. Consult the master's documentation for advance I/O mapping options. Be sure to start with an unused section of memory for offset.

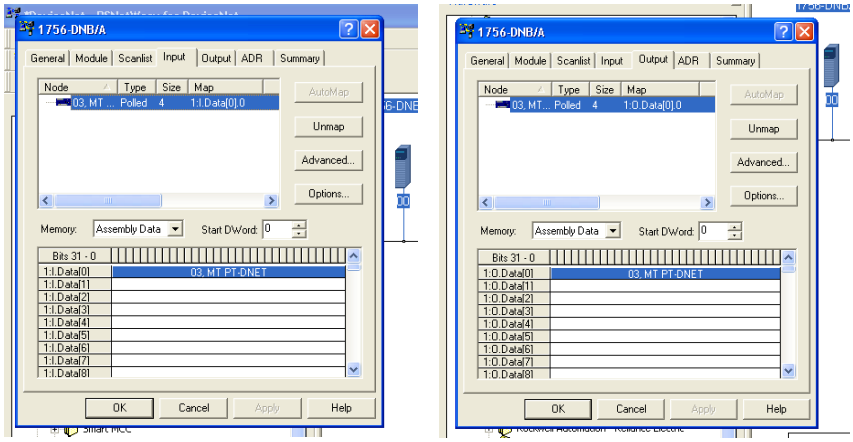


Figure 9-25: Panther Input Mapping

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11. Verify that I/O mapping is complete by choosing the summary tab. Note that the Mapped columns show Yes for the Panther.

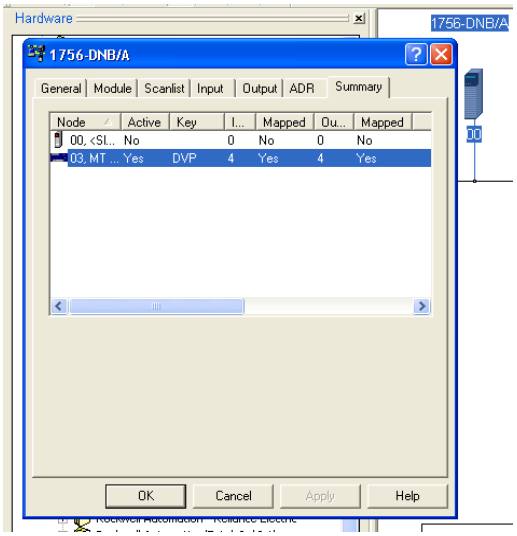


Figure 9-26: Summary Tab

PLC Programming

The Panther terminal is now ready to communicate to the master or DeviceNet scanner. You must configure the PLC or other master with DeviceNet scanner to send and receive data via polled messaging. For this example the RSLogix5000 software is used in conjunction with the Controllogix5000 processor with DeviceNet scanner card. Note that these examples may or may not be applicable depending upon whether you have an existing program or different version of software.

1. Create a new project.

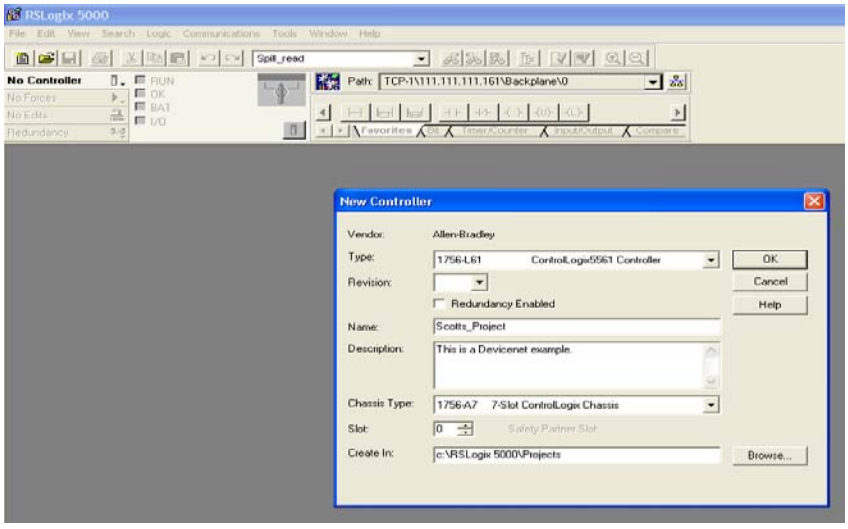


Figure 9-27: New Project Dialog

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2. Add DeviceNet scanner card to the existing chassis.

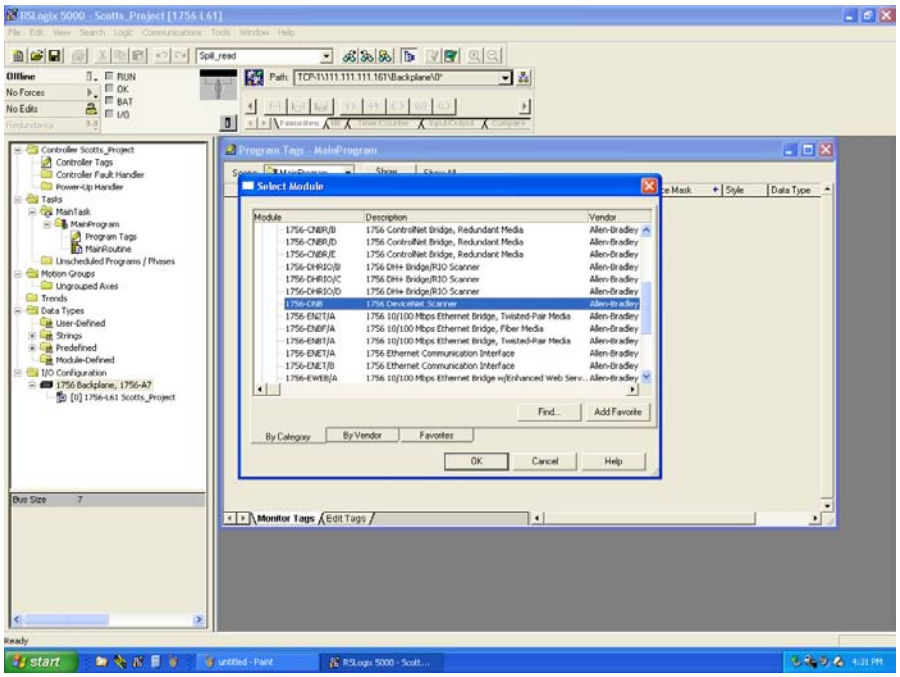


Figure 9-28: New Project Dialog

3. Configure scanner card. Refer to Rockwell software documentation for more information.

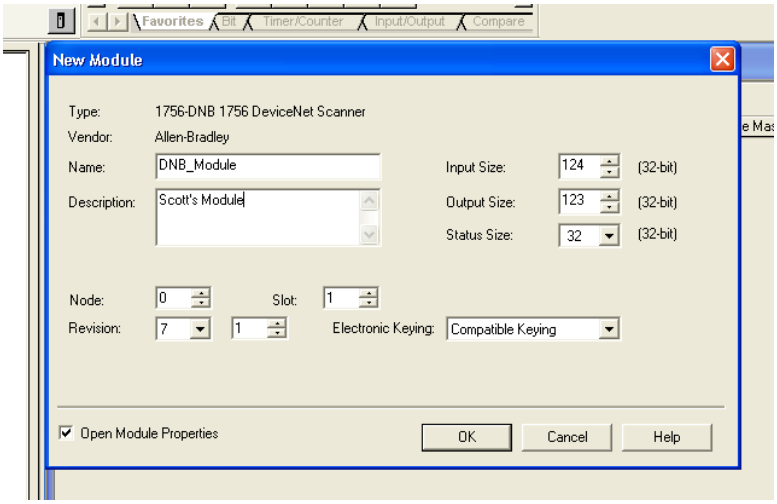


Figure 9-29: Configuring Scanner Card

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4. Create User-Defined tags. These are under Data Types (see the pane at left in **Figure 9-30**). We create these in order to get the data from the scanner's memory location into a useable/readable format. Create 2 tags. One is for the weight data (single 16 bit integer) that can be read in decimal format. The other is for the status information (16 bit value) and is read in binary.

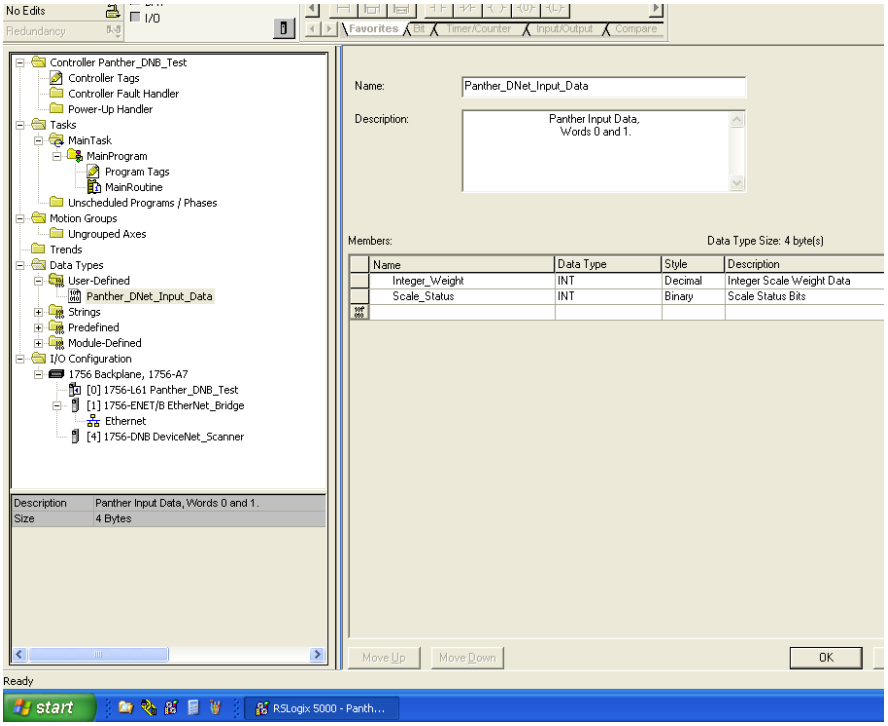


Figure 9-30: Creating User-Defined Tags

5. Create an unconditional rung of logic that activates the command register run bit. This bit is required to activate the DeviceNet scanner card. Then create another unconditional rung that activates the copy command. Copy the scanner's I/O mapped data into the user defined tags.

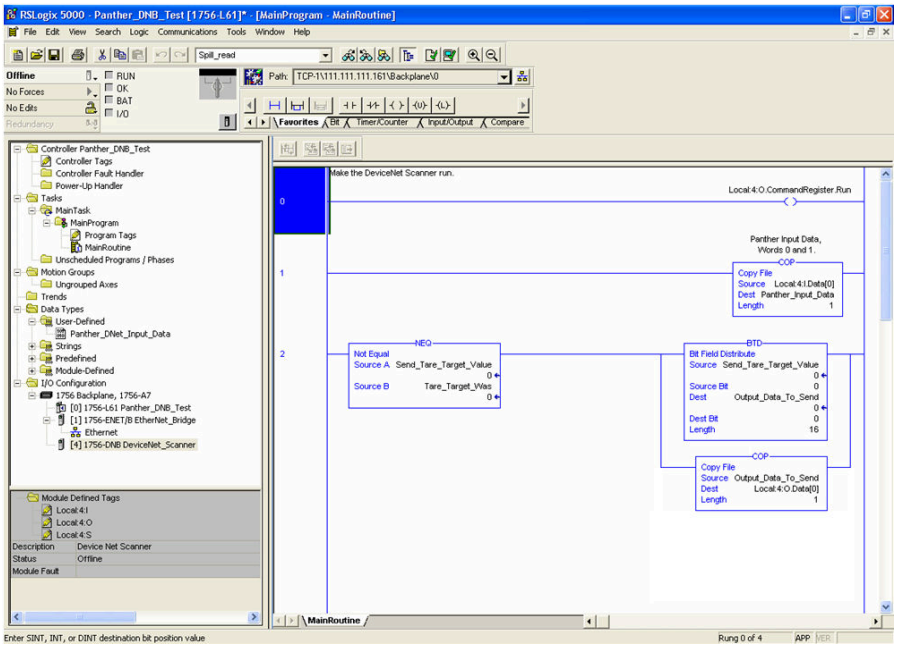


Figure 9-31: Creating Logic Run

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6. At this point you can download the program and run it and provided the wiring and configuration is correct, you will receive weight and status information back from the Panther.

Note: Examples, EDS, and the Panther icon are located on the Panther documentation CD provided with each unit.

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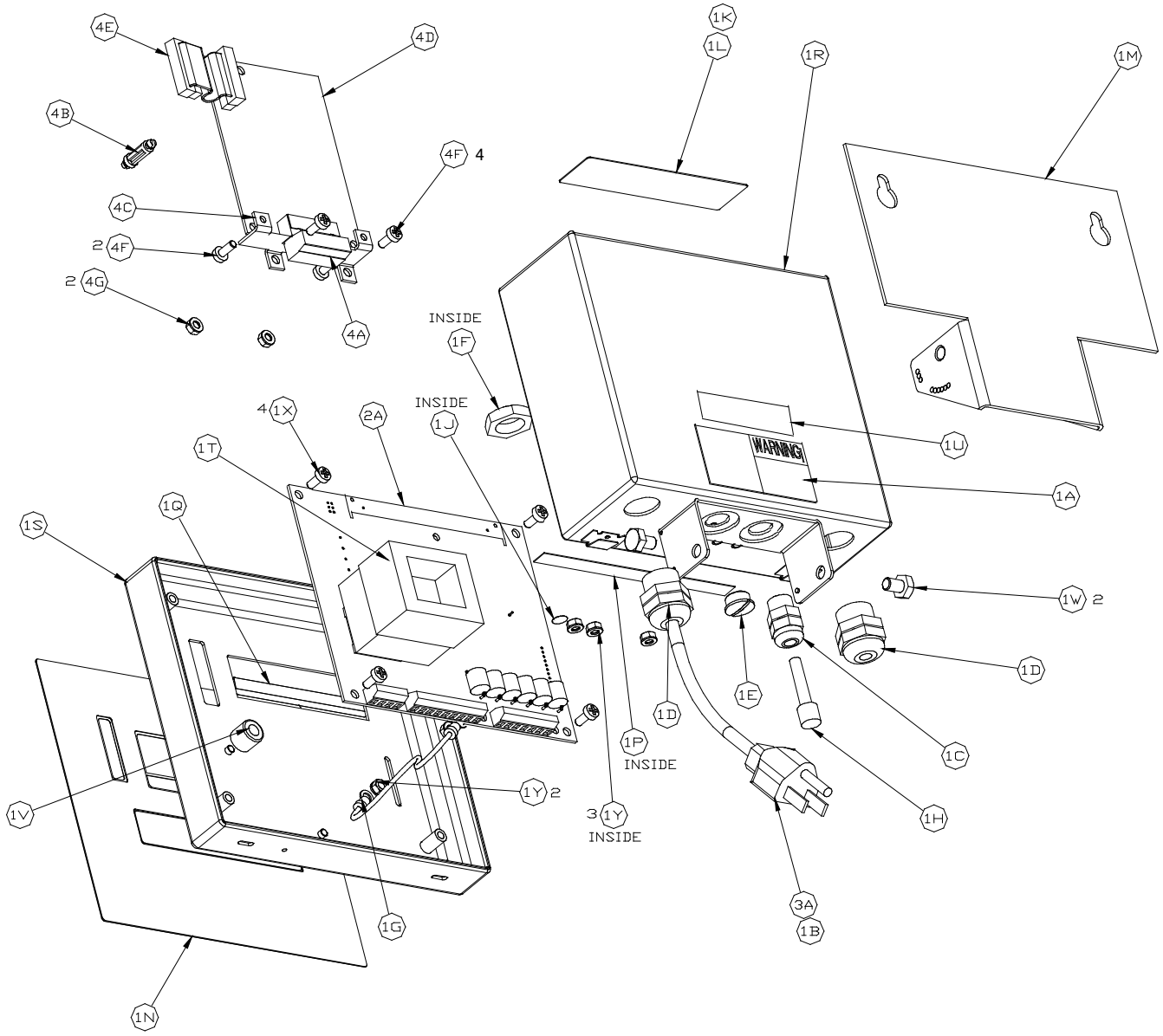


For your notes

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10 Parts and Accessories

Harsh Enclosure



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Consists of: (Common Parts)

Sym	Qty	Part Number	Description
1A	1	A12237300A	LABEL, WARNING-POWER
1B	1	12471400A	TERMINAL. #2 RING
1C	1	12901800A	BUSHING, CORD W/ NUT .11 - .25
1D	2	13002300A	BUSHING, CORD W/ NUT .11 - .25
1E	1	14399900A	HOLE PLUG, PG7
1F	1	14577900A	HEX NUT, PG7
1G	1	15048200A	GROUND HARNESS
1H	1	14467600A	HOLE PLUG, .24/.38 DIA.
1J	1	14531400A	LABEL, GROUND BSI
1K	1	14800000A	LABEL, DATA
1L	1	14801800A	SHIELD, LABEL
1M	1	14826100A	BRACKET, MOUNTING
1N	1	14826200A	KEYBOARD ASSEMBLY
1P	1	14828700A	LABEL, CONTROLLER I/O
1Q	1	14830600A	LEGEND PLATE, CURSOR
1R	1	14829300A	ENCLOSURE ASSEMBLY
1S	1	A14829400A	FRONT COVER ASSEMBLY
1T	1	14829600A	DAMPER PAD, TRANSFORMER
1U	1	D11397100A	LABEL, FCC
1V	1	14830500A	RUBBER FOOT
1W	2	R02072020	SCREW, 1/4-20 X .38 HEX HEAD STAINLESS STEEL
1X	4	R0511100A	SCREW, M4 X 10 PH PAN HEAD
1Y	5	R0519600A	HEX NUT, M4 W/ LOCKWASHER
NS	1	13492400A	FUSE, 250V, .125A

Add for Scale Option (PTHN-1XXX-XXX)

2A	1	D15201300A	PCB ASSEMBLY, MAIN ANALOG LOAD CELL
	1	(*)14977900A	PCB ASSEMBLY, MAIN DigiTOL LOAD CELL

Add for Power Cord

3A	1	14501500A	LINE CORD, NORTH AMERICA
	1	14503200A	LINE CORD, CONTINENTAL EUROPE
	1	A13894700A	LINE CORD, U.K./IRELAND
	1	14053000A	LINE CORD, AUSTRALIA
	1	14202800A	LINE CORD, CHILE (ITALY)

Add for Analog Output Interface Option (PTHN-X8XX-XXX)

4A	1	13162500A	CONNECTOR PLUG, 6 POS. ANALOG OUTPUT
4B	1	14467400A	SPACER, SNAP-IN 5/8"
4C	1	14829500A	MOUNTING BRACKET
4D	1	14882700A	PCB ASSEMBLY, ANALOG OUTPUT
4E	1	14915300A	HARNESS, OPTION
4F	4	R0511100A	SCREW, M4 X 10 PH PAN
4G	2	R0519600A	NUT, HEX M4 W/ LOCKWASHER

(*) May have revision letter prefix.

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Add for Modbus Plus Interface Option (PTHN-X5XX-XXX)

4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4C	1	14829500A	MOUNTING BRACKET
4D	1	15165700A	PCB ASSEMBLY, MODBUS PLUS OPTION
4E	1	14915300A	HARNESS, OPTION
4F	4	R0511100A	SCREW, M4 X 10 PH PAN
4G	2	R0519600A	NUT, HEX M4 W/ LOCKWASHER

Add for Allen Bradley Interface Option (PTHN-X6XX-XXX)

4A	1	14217400A	TERMINAL BLOCK, 3 POSITION
4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4C	1	14829500A	MOUNTING BRACKET
4D	1	15098500A	PCB ASSEMBLY, ALLEN BRADLEY RIO OPTION
4E	1	14915300A	HARNESS, OPTION
4F	4	R0511100A	SCREW, M4 X 10 PH PAN
4G	2	R0519600A	NUT, HEX M4 W/ LOCKWASHER

Add for PROFIBUS Interface Option (PTHN-X9XX-XXX)

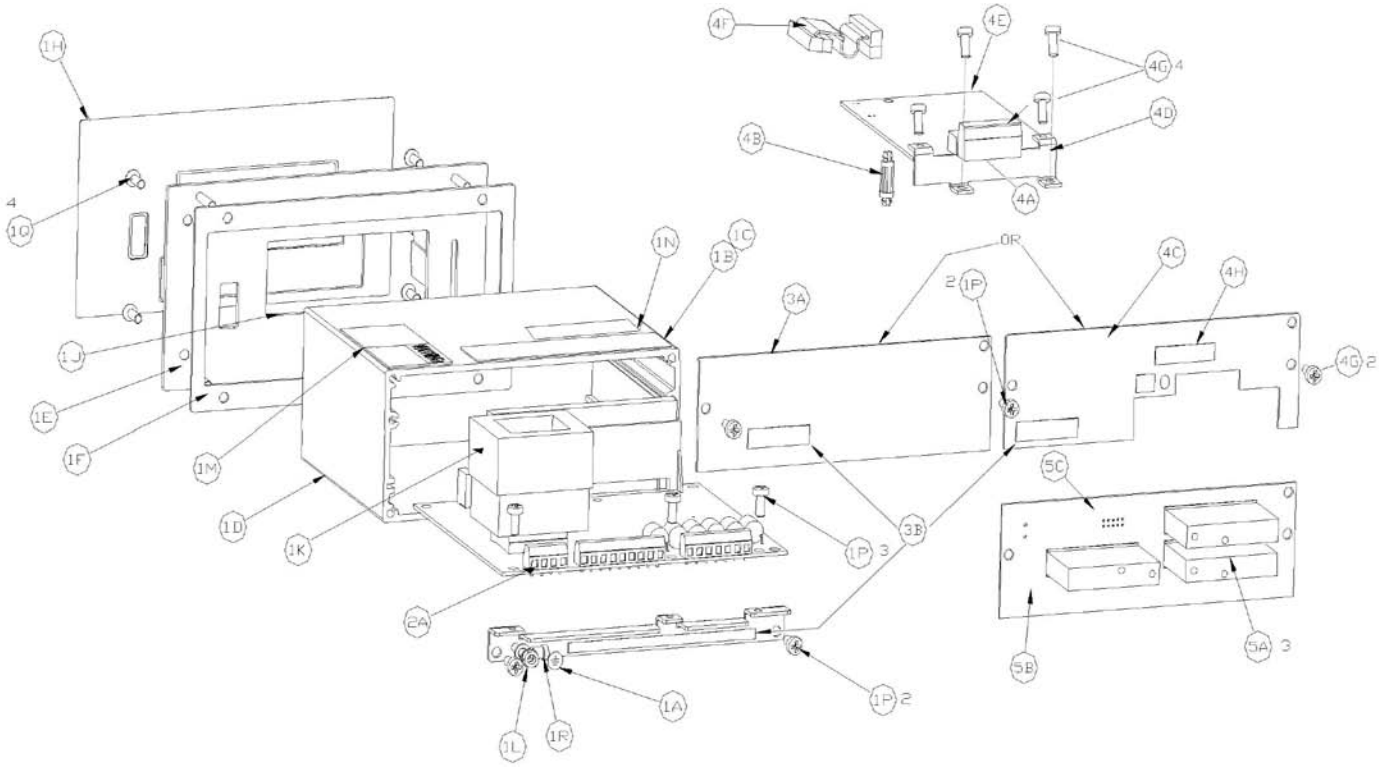
4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4C	1	14829500A	MOUNTING BRACKET
4D	1	15166100A	PCB ASSEMBLY, PROFIBUS OPTION
4E	1	14915300A	HARNESS, OPTION
4F	4	R0511100A	SCREW, M4 X 10 PH PAN
4G	2	R0519600A	NUT, HEX M4 W/ LOCKWASHER

Add for DeviceNet Interface Option (PTHN-XDXX-XXX)

4A	1	71210017	TERMINAL BLOCK, 5 POSITION
4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4C	1	14829500A	MOUNTING BRACKET
4E	1	14915300A	HARNESS, OPTION
4F	4	R0511100A	SCREW, M4 X 10 PH PAN
4G	2	R0519600A	NUT, HEX M4 W/ LOCKWASHER
4D	1	71210016	PCB ASSEMBLY, DEVICENET OPTION

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Panel Mount Enclosure



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Consists of: (Common Parts)

Sym	Qty	Part Number	Description
1A	1	14531400A	LABEL, GROUND BSI
1B	1	14800000A	LABEL, DATA
1C	1	14801800A	LABEL SHIELD
1D	1	14827100A	ENCLOSURE
1E	1	14827200A	FRONT PANEL ASSEMBLY
1F	1	14827300A	GASKET, FRONT PANEL
1G	1	14827400A	BRACKET, CONTROLLER BOARD
1H	1	14828300A**	KEYBOARD ASSEMBLY
1J	1	A14829100A	LEGEND PLATE, CURSOR
1K	1	14829600A	DAMPER PAD, TRANSFORMER
1L	1	R0159600A	NUT, HEX M4 W/ LOCKWASHER
1M	1	A12237300A	LABEL, WARNING POWER
1N	1	D11397100A	LABEL, FCC
1P	7	R0511100A	SCREW, M4 X 10 PH PAN
1Q	4	R0529400A	SCREW, M4 X 10 FL HD POZID.
1R	1	12471500A	TERMINAL, #8 RING
(*)	3	R0510000A	SCREW, M4 X 10 HD. DRILLED
(*)	4	R0519600A	NUT, HEX M4 X 10 W/ LOCKWASHER
NS	1	13492400A	FUSE, 250V, .125A

Add for Scale Option (PTPN-1XXX-XXX)

2A	1	(*)15201500A**	PCB ASSEMBLY, MAIN, ANALOG LOAD CELL
	1	(*)15031800A	PCB ASSEMBLY, MAIN, DigiTOL LOAD CELL

Add for Basic Unit

3A	1	14827500A	REAR PANEL, BASIC
3B	1	14828700A	LABEL, CONTROLLER I/O

Add for Analog Option (PTPN-X8XX-XXX)

3B	1	14828700A	LABEL, CONTROLLER I/O
4A	1	14162500A	CONNECTOR, TERM. BLOCK 6 POS.
4B	1	14467400A	SPACER, 5/8" SNAP IN
4C	1	14827600A	REAR PANEL, ANALOG OUTPUT
4D	1	14829500A	MOUNTING BRACKET
4E	1	14882700A	PCB ASSEMBLY, ANALOG BOARD
4F	2	14915300A	HARNESS, OPTION
4G	6	R0511100A	SCREW, M4 X 10 PH PAN HD
4H	1	14828800A	LABEL, ANALOG OUTPUT

Add For Setpoint Option (PTPN-XX1X-XXX)

5A	3	13636700A	AC RELAY, SOLID STATE
5B	1	14880500A	PCB ASSEMBLY, SETPOINT
5C	1	14915400A	HARNESS, SETPOINT

(*) May have revision letter prefix.

**When replacing these items on a PANTHER terminal that is located in a Division 2 hazardous area, the following part numbers with the minimum of the following revision levels of the part MUST BE USED – later revisions are acceptable but earlier ones are not:
Keyboard Assembly E14828300A; Main PCB D15201500A

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Add for Modbus Plus Interface Option (PTPN-X5XX-XXX)

4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4C	1	A15174000A	BACK PLATE
4D	1	14829500A	MOUNTING BRACKET
4E	1	15165700A	PCB ASSEMBLY, MODBUS PLUS OPTION
4F	1	14915300A	HARNESS, OPTION
4G	6	R0511100A	SCREW, M4 X 10 PH PAN

Add for Allen Bradley Interface Option (PTPN-X6XX-XXX)

4A	1	14217400A	TERMINAL BLOCK, 3 POSITION
4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4C	1	A14827600A	BACK PLATE
4D	1	14829500A	MOUNTING BRACKET
4E	1	15098500A	PCB ASSEMBLY, ALLEN BRADLEY RIO OPTION
4F	1	14915300A	HARNESS, OPTION
4G	6	R0511100A	SCREW, M4 X 10 PH PAN

Add for PROFIBUS Interface Option (PTPN-X9XX-XXX)

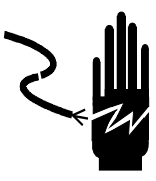
4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4C	1	A15174000A	BACK PLATE
4D	1	14829500A	MOUNTING BRACKET
4E	1	15166100A**	PCB ASSEMBLY, PROFIBUS OPTION
4F	1	14915300A	HARNESS, OPTION
4G	6	R0511100A	SCREW, M4 X 10 PH PAN

** When replacing this item on a PANTHER terminal that is located in a Division 2 hazardous area, the following part number with a minimum of the following revision level MUST BE USED – later revisions are acceptable but earlier ones are not:
PROFIBUS PCB Assembly A15166100A

Add for DeviceNet Interface Option (PTPN-XDXX-XXX)*

4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4D	1	14829500A	MOUNTING BRACKET
4E	1	71210016	PCB ASSEMBLY, DEVICENET OPTION
4F	1	14915300A	HARNESS
4G	6	R0511100A	SCREW, M4 X 10 PH PAN
4C	1	72194888	PLATE, REAR
4A	1	71210017	TERMINAL BLOCK, 5 POSITION

* Panther terminals with the DeviceNet Option installed are **not** rated for Division 2 Hazardous Area Operation.



⚠ WARNING!

**INSTALL DEVICENET ONLY IN NON-HAZARDOUS LOCATION.
REMOVE PANTHER HAZARDOUS AREA SPECIFICATION LABEL BEFORE INSTALLING THIS OPTION.**

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11 Appendices

Appendix 1: RS232 Serial I/O

The PANTHER terminal has a bi-directional RS-232 port that may be programmed for several functions. The input can provide simple commands from another device. The output can be configured for simple output to a printer, computer, or remote display.

The output is always 10 bit framing (1 start bit, 7 ASCII data bits, 1 parity bit, and 1 stop bit). The parity bit is selectable in setup as even, odd or always a '0'. The baud rate is also selectable from 300 to 9600. An ASCII Start of Text (STX) and a checksum character may be added to the data output if desired.

The checksum character is defined as the 2's complement of sum of the 7 least significant bits of all preceding characters including the <STX> and <CR> (dropping all bits that carry past the 7 least significant bits). The checksum character is transmitted with the same parity as all other characters. The checksum must be supported, but may be optionally selected "off" by the installer, in which case the character is not sent.

Serial Input

The PANTHER terminal has an input mode that allows simple commands to be received. These commands duplicate the front panel keyboard functions. Note that all characters are uppercase and no control characters need to be sent. All other ASCII characters are ignored, which permits the use of termination characters such as CR (Carriage Return) or LF (Line Feed).

The PANTHER terminal recognizes the following commands when the output mode is programmed as demand or continuous.

Command	Function	Description
C	Clear	Clear target or tare value
T	Tare	Take a pushbutton tare (always active)
P	Print	Transmit data
Z	Zero	Zero the scale (if within range and no-motion)
S	Send	Transmit data
U	Select	Switch units (if enabled in setup)
X	Target	Take a pushbutton target (over/under mode only)

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The terminal will transmit RS232C serial data when a print command is issued using the **PRINT** pushbutton, Auto Print, or a remote print command from a host. The data format, baud rate, checksum, parity, etc. are selectable in the setup mode. The serial data is output in an 10-bit ASCII frame which includes: 1 start bit, 7 data bits, 1 parity bit, and 1 stop bit. Parity is selectable as none, odd, or even using F3.1.4. Checksum and STX can be enabled or disabled using F3.1.5 and F3.1.6. All demand mode printing is inhibited during motion and when the weight is under gross zero. Printing is allowed on power-up whether or not zero is captured if AZM is enabled (parameter or sub-block F2.4.2). The available formats are:

SINGLE LINE DISPLAYED WEIGHT FORMAT

DATA	SO	STX	X	X	X	X	X	X	SP	LB	SP	NET	SI	CR	CHK	LF
NOTES	A	B	C	D	D	D	D	D	D	F	G	G	H	I	J	K

NOTES

A -**SO** = Shift-out character (optional). If F3.2.2 = 1, expanded print is enabled if receiving device is capable of using SO for enabling expanded (double-width) printing.

B -**STX** = Start of Text character (optional). If F3.1.5 = 1, STX and checksum characters will be sent in this position.

C -**X** = weight data digit, minus sign (-) for negative weight or tare, or space character will be sent in this position.

D -**X** = Weight data digit or decimal point character.

E -**SP** = Space character.

F - "LB" sent for pounds when F1.2 = 1, "kg" sent for kilograms when F1.2 = 2, "g" sent for grams when F1.2=3, "oz" sent for ounces when F1.2=4, "XXXXXX LB XXXXXXoz" sent for lb-oz when F1.2=5, "ozt" sent when F1.2=6, "dwt" sent when F1.2=7, "t" sent when F1.2=8, "ton" sent when F1.2=9, "%" sent when F1.2=2 and F5.7.2=1.

G -Space character and NET will be sent if displayed weight is a net weight. Space character and G will be sent if the displayed weight is gross.

H -**SI** = Shift-In character. If F3.2.2 = 1, SI will reset receiving device to normal print mode (if receiving device is capable of using SO/SI to toggle between expanded and normal print modes.)

I -**CR** = carriage return character.

J -**CHK** = checksum character (optional). Checksum will be sent with STX if F3.1.5 = 1.

K -**LF** = line feed character.

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SINGLE LINE GROSS/TARE/NET FORMAT

DATA	SO	STX	*	X	X	X	X	X	X	SP	LB	SP	G	SP	*	*	X	X	X	X	X	SP	LB	SP	T	SP	SO	*	X	X	X	X	X	X	SP	LB	SP	NET	SI	CR	CHK	LF
NOTES	A	B	C	C	C	C	C	C	C	D	E	D	F	D	G	G	G	G	G	G	G	D	E	D	H	D	J	J	J	J	JI	J	JI	J	D	E	D	K	L	M	N	O

NOTES

A –SO = Shift out

B -- **STX** = Start of Text character (optional). If F3.1.5 = 1, STX and checksum characters will be sent in data string

C -Gross weight data field (7 characters). (* = digit, minus sign (-), or space, X = digit or decimal point.)

D -**SP** = Space character

E - "LB" = pounds when F1.2 = 1, "kg" sent for kilograms when F1.2 = 2, "g" sent for grams when F1.2=3, "oz" sent for ounces when F1.2=4, "XXXXXX LB XXXXXXoz" sent for lb-oz when F1.2=5, "ozt" sent when F1.2=6, "dwt" sent when F1.2=7, "t" sent when F1.2=8, "ton" sent when F1.2=9, "%" sent when F1.2=2 and F5.7.2=1.

F -**G** = Character for gross weight.

G -Tare weight data field (7 characters). (* = digit, space, X = digit or decimal point)

H -**T** = characters for tare weight

I -**SO** = Shift-Out character (optional). If F3.2.2 = 1, expanded print is enabled (if receiving device is capable of using SO for enabling expanded (double-width) printing

J -Net weight data field (7 characters), (* = digit, minus sign (-), or space, X = digit or decimal point.)

K -**NET** = characters for net weight

L -**SI** = Shift-in character. If F3.2.2 = 1, SI will reset receiving device to normal print mode (if receiving device is capable of using SO/SI to toggle between expanded and normal print modes.)

M -**CR** = carriage return character

N -**CHK** = checksum character (optional). Checksum will be sent with STX if F3.1.5 =1

O -**LF** = line feed character

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MULTIPLE LINE GROSS/TARE/NET FORMAT

LINE 1
GROSS WEIGHT

Line One Data	SO	STX	X	X	X	X	X	X	X	SP	LB	SP	G	CR	CHK
NOTES	A	B	C	C	C	C	C	C	C	D	E	D	F	G	H

LINE 2
TARE WEIGHT

Line Two Data	SO	X	X	X	X	X	X	X	SP	LB	SP	T	CR	CHK	LF
NOTES	J	J	J	J	J	J	J	J	D	E	D	K	G	H	I

LINE 3
NET WEIGHT

Line Three Data	SO	X	X	X	X	X	X	X	SP	LB	SP	NET	SI	CR	CHK	LF
NOTES	K	L	L	L	L	L	L	L	C	D	C	M	N	F	G	H

NOTES

A -**STX** = Start of Text character (optional). If F3.1.5 = 1, STX and checksum characters will be sent in data string.

B -Gross weight data field (7 characters). (* = digit, minus sign (-), or space, X = digit or decimal point.)

C -**SP** = Space character

D - "LB" = pounds when F1.2 = 1, "kg" sent for kilograms when F1.2 = 2, "g" sent for grams when F1.2=3, "oz" sent for ounces when F1.2=4, "XXXXXX LB XXXXXXoz" sent for lb-oz when F1.2=5, "ozt" sent when F1.2=6, "dwt" sent when F1.2=7, "t" sent when F1.2=8, "ton" sent when F1.2=9, "%" sent when F1.2=2 and F5.7.2=1.

E - **G** = Character for gross weight

F -**CR** = carriage return character

G -**CHK** = checksum character (optional). Checksum will be sent with STX if F3.1.5 = 1

H -**LF** = line feed character

I -Tare weight data field (7 characters), (* = digit, space, X = digit or decimal point)

J -**T** = characters for tare weight

K -**SO** = Shift-out character (optional). If F3.2.2 = 1, expanded print is enabled (if receiving device is capable of using SO for enabling expanded (double-width) printing).

L -Net weight data field (7 characters), (* = digit, minus sign (-), or space, X = digit or decimal point)

M -**NET** = characters for net weight

N -**SI** = Shift-in character. If F3.2.2 = 1, SI will reset receiving device to normal print mode (if receiving device is capable of using SO/SI to toggle between expanded and normal print modes)

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Serial Data Output in Continuous Mode

A 300-9600 baud continuous output may be selected instead of the print on demand output. This data consists of 16 or 18 bytes transmitted in a 10-bit ASCII frame consisting of: 1 start bit, 7 data bits, 1 even parity bit, and 1 stop bit. The format is:

Character	Function
1	STX (Start of text - Optional)
2	Status Word A
3	Status Word B
4	Status Word C
5	Weight MSD
6	Weight
7	Weight
8	Weight
9	Weight
10	Weight LSD
11	Tare Weight MSD
12	Tare Weight
13	Tare Weight
14	Tare Weight
15	Tare Weight
16	Tare Weight LSD
17	CR (carriage return)
18	CKSM (Checksum - Optional

Non-significant weight data and tare data digits will be transmitted as spaces. A description of the status words A, B, and C is shown in Tables 4-6.

TABLE 4A - CONTINUOUS MODE STATUS WORD A - SETPOINTS ENABLED (F5.1=1)

STATUS WORD A - SETPOINT OPTION ENABLED (F5.1=1)				
Bit 0, 1, 2	Encoded Decimal Point			
	Display	Bit 2	Bit 1	Bit 0
	XXXXX0	0	0	1
	XXXXX	0	1	0
	XXXXX.X	0	1	1
	XXXX.XX	1	0	0
	XXX.XXX	1	0	1
Bit 3	Setpoint Output 1 (0 = less than setpoint value)			
Bit 4	Setpoint Output 2 (0 = less than setpoint value)			
Bit 5	Always = 1			
Bit 6	Always = 1			
Bit 7	Parity of Status Word A			

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TABLE 4B - CONTINUOUS MODE STATUS WORD A - SETPOINTS DISABLED (F5.1=1)

STATUS WORD A - SETPOINTS OPTION DISABLED (F5.1=1)			
Bit 0, 1, 2 Encode Decimal Point			
Display	Bit 2	Bit 1	Bit 0
XXXXX0		0	01
XXXXX	0	1	0
XXXX.X	0	1	1
XXX.XX	1	0	0
XX.XXX	1	0	1
Bit 3, 4 Increment Size	3	4	
X1	0	1	
X2	1	0	
X5	1	1	
Bit 5	Always = 1		
Bit 6	Always = 1		
Bit 7	Parity of Status Word A		

TABLE 5 - CONTINUOUS MODE STATUS WORD B

STATUS WORD B	
Bit 0	Gross = 0, Net = 1
Bit 1	Minus sign = 1
Bit 2	Overcapacity = 1
Bit 3	Motion = 1
Bit 4*	lb = 0, kg = 1
Bit 5	Always = 1
Bit 6	- If setpoints enabled (F5.1 = 1), bit 6 = within zero tolerance. - If setpoints disabled (F5.1 = 0), bit 6 = Power Up Flag.
Bit 7	Parity of Status Word B

Note: Bit 4 is set if units are other than lb or kg.

TABLE 6 - CONTINUOUS MODE STATUS WORD C

TABLE 6 - CONTINUOUS MODE STATUS WORD C	
Bit 0	Always = 0
Bit 1	Always = 0
Bit 2	Always = 0
Bit 3	Print = 1
Bit 4	Always = 1
Bit 5	Always = 1
Bit 6	Always = 1
Bit 7	Parity of Status Word C

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Appendix 2: Standard Interface Command Set (SICS) Protocol

All newer METTLER TOLEDO terminals support the standardized command set "METTLER TOLEDO Standard Interface Command Set" (MT-SICS), which is divided into 4 levels, depending on the functionality of the weighing instrument. The PANTHER terminal supports the MT-SICS level 0 command set.

What Do the Commands of MT-SICS Level 0 Offer?

You can use the commands of MT-SICS level 0 to perform the following operations via the interface:

- Request weighing results
- Tare the terminal
- Zero the terminal
- Identify MT-SICS implementation
- Identify the terminal
- Reset the terminal

Additional Documentation on Data Interface

Settings of the interface such as baud rate, parity, and connector pin assignments are described in previous sections of this manual.

Version number of the MT-SICS

Each level of the MT-SICS has its own version number which can be requested with the command I1. This section describes: MT-SICS level 0, version 2.1x. You can use the command I1 via the interface to request the MT-SICS level and MT-SICS version implemented on the PANTHER terminal.

Command Formats

Each command received by the PANTHER terminal via the data interface is acknowledged by a response of the PANTHER terminal to the transmitter. Commands and responses are data strings with a fixed format.

Commands sent to the balance comprise one or more characters of the ASCII character set. Here, the following must be noted:

- Enter commands only in uppercase.
- The possible parameters of the command must be separated from one another and from the command name by a space (ASCII 32 dec. in this description represented as _).
- Each command must be closed by CR LF (ASCII 13 dec., 10 dec.)

The characters CR and LF, which can be inputted using the **Enter** or **Return** key of most entry keypads, are not listed in this description, but it is essential they be included for communications with the PANTHER terminal.

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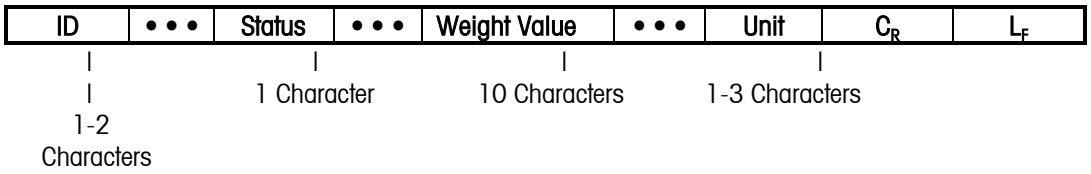
Response Formats

All responses sent by the PANTHER terminal to the transmitter to acknowledge the received command have one of the following formats:

- Response with weight value
- Response without weight value
- Error message

Format of the Response with Weight Value

A general description of the response with weight value is the following:



- ID--Response identification.
- _-- Space (ASCII 32 dec.)
- Status--Status of the terminal, see description of the commands and responses.
- Weight Value--Weighing result: shown as number with 10 digits, including sign directly in front of the first digit. The weight value appears right-aligned. Preceding zeroes are not shown with the exception of the zero to the left of the decimal point.
- Unit--Weight unit displayed after the terminal has been switched on.
- CR--Carriage Return (ASCII 13 dec.)
- LF--Line Feed (ASCII 10 dec.)

Comment--CR LF will not be shown in the description.

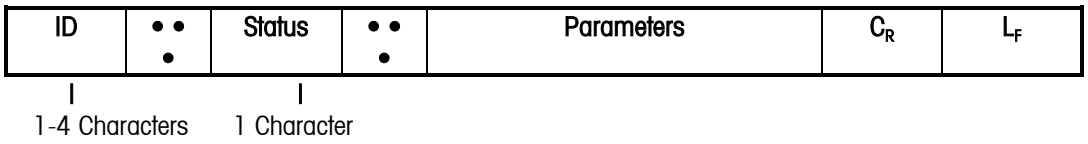
Example

Response with stable weight value of 0.256 g:

S_S_ _ _ _ _ _0.256_g

Format of the Response Without Weight Value

A general description of the response without weight value is the following:



- ID--Response identification.
- _--Space (ASCII 32 dec.)
- Status--Status of the terminal, see description of the commands and responses.
- Parameters--Command-dependent response code.
- Unit--Weight unit displayed after the terminal has been switched on.
- CR--Carriage Return (ASCII 13 dec.)
- LF--Line Feed (ASCII 10 dec.)

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Error messages

ID	C_R	L_F

ID--Error Identification

The PANTHER terminal supports the following two error ID:

- ES--Syntax error
  The terminal does not recognize the command.

CR--Carriage return (ASCII 13 dec.)
LF--Line Feed (ASCII 10 dec.)

Tips for the Programmer. Command and Response---You can improve the dependability of your application software by having your program evaluate the response of the terminal to a command. The response is the acknowledgment that the terminal has received the command.

Reset. To start from a determined state when establishing the communication between terminal and system, you should send a reset command to the terminal. When the terminal or system is switched on or off, faulty characters can be received or sent.

Quotation Marks ("). Quotation marks included in the command must always be entered.

Commands and Responses MT-SICS Level 0

The PANTHER terminal receives commands from the system computer and acknowledges the command with an appropriate response. The following sections contain a detailed description of all commands of the command set in alphabetical order with the associated responses. Commands and responses are closed with CR and LF. These termination characters are not shown in the following description, but they must always be entered with commands or sent with responses.

The commands of MT-SICS level 0 are supported by the PANTHER terminal and include:

- I1 Inquiry of MT-SICS level and MT-SICS version
- I2 Inquiry of terminal data
- I3 Inquiry of terminal SW version
- I4 Inquiry of serial number
- S Send stable weight value
- SI Send weight value immediately
- SIR Send weight value immediately and repeat
- T Tare
- Z Zero
- @ Reset

1. I1--INQUIRY OF MT-SICS LEVEL AND MT-SICS VERSIONS
Command: I1--Inquiry of MT-SICS level and MT-SICS versions
Response: I1_A_"x1"_"x2"_"x3"_"x4"_"x5"
  - x1 = 0--Terminal with MT-SICS level 0
  - x2--Version of the implemented MT-SICS0 commands
  - x3--Version of the implemented MT-SICS1 commands
  - x4--Version of the implemented MT-SICS2 commands
  - x5--Version of the implemented MT-SICS3 commands

Example
Command I1--Inquiry of MT-SICS level and versions used in the PANTHER terminal.
Response--I 1_A_"0"_"2.10"_""_""_""
  - 0 Level 0 implemented in PANTHER terminal

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- 2.10 Level 0, version 2.10 in PANTHER terminal
- "" Level 1 not supported in PANTHER terminal
- "" Level 2 not supported in PANTHER terminal
- "" Level 3 not supported in PANTHER terminal

Comments

- In the case of MT-SICS level, only fully implemented levels are listed. In other words, if it is not possible to implement all commands from a certain level, the level is not specified.
- In the case of the MT-SICS version, all levels are specified even those only partially implemented.

2. I2--INQUIRY OF TERMINAL DATA
Command: I2--Inquiry of terminal type.
Response: I2_A_"text" • Terminal data as "text".

Example
Command I2--Inquiry of PANTHER terminal type.
Response--I2_A_"Panther_ Analog_ _ _ _ _ _10000_lb"

- This response shows the PANTHER terminal is used with analog load cells and has been calibrated for 10000 lb capacity.

3. I3--INQUIRY OF TERMINAL SOFTWARE VERSION
Command: I3--Inquiry of terminal SW version
Response: I3_A_"text" • Terminal SW version as "text".

Example
Command I3--Inquiry of terminal SW version.
Response--I3_A_"0.00_0.00_154879R

- 0.00--PANTHER terminal has no operating system
- 0.00--Always this value for PANTHER terminal
- 154879R--PANTHER terminal software number

4. I4--INQUIRY OF SERIAL NUMBER
Command: I4--Inquiry of serial number.
Response: I4_A_"text"

- Serial number as "text"

Example
Command I4--Inquiry of serial number
Response--I4_A_"00000000

- 0000000000--Always this value for the PANTHER terminal.

Comments

- The response to I4 appears after the reset command (@) and at power-up.

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5. S--SEND STABLE WEIGHT VALUE

Command: S--Send the current stable weight

Responses:

- S_S_WeightValue_Unit--Current stable weight value.
- S_I--Command not executable (time-out since stability was not achieved.)
- S_+ --Terminal in overcapacity range.
- S_- --Terminal in under capacity range.

Example

Command S--Send a stable weight value.

Response: S_S_ _ _ _ _100.00_g

- The current stable weight is 100.00 g.

Comments

- The duration of the stability time-out is 2 seconds for the PANTHER terminal.
- The weight unit is the currently selected unit.

6. SI--SEND WEIGHT VALUE IMMEDIATELY

Command: SI--Send the current weight value regardless of scale stability.

Responses:

- S_S_WeightValue_Unit--Stable weight value.
- S_D_WeightValue_Unit--Dynamic weight value.
- S_+ --Terminal in overcapacity range.
- S_- --Terminal in under capacity range.

Example

Command SI--Send current weight value.

Response: S_D_ _ _ _ _129.02_LB

- The current dynamic weight is 129.02 LB.

Comments

- The response to the command SI is the last internal weight value (stable or dynamic) prior to receipt of the command SI.
- The weight unit is the currently selected unit.

7. SIR--SEND WEIGHT VALUE IMMEDIATELY AND REPEAT

Command: SIR--Send weight values repeatedly, regardless of terminal stability.

Responses:

- S_S_WeightValue_Unit--Stable weight value.
- S_D_WeightValue_Unit--Dynamic weight value.
- S_+ --Terminal in overcapacity range.
- S_- --Terminal in under capacity range.

Example

Command: SIR--Send current weight values at intervals.

Responses:

- S_D_ _ _ _ _129.02_LB
- S_D_ _ _ _ _129.06_LB
- S_D_ _ _ _ _129.08_LB
- S_D_ _ _ _ _114.14_LB
- ...__Terminal sends stable or dynamic weight values at intervals.

Comments

- SIR is overwritten by the commands S, SI, SIR, @ and thus canceled.
- The PANTHER terminal updates 20 times per second.
- The weight unit is the currently selected unit.

8. T--TARE

Command: T--Tare, i.e. store the next stable weight value as a new tare weight value.

Responses:

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- T_S_WeightValue_Unit--Taring performed, i.e. stability criterion and taring range complied with. The tare weight value returned corresponds to the weight change on the terminal since the last zero setting.
- T_I--Taring not performed (time-out since stability was not reached.)
- T_+ --Upper limit of taring range exceeded.
- T_- --Lower limit of taring range exceeded.

Example

Command: T--The PANTHER terminal is tared and has a value of 100.00 kg in the tare memory.

Response--T_S_ _ _ _ _100.00_kg

Comments

- The tare memory is overwritten by the new tare weight value.
- The duration of the stability time-out is 2 seconds for the PANTHER.
- The tare memory can be cleared using the command Z.
- The weight unit is the currently selected unit.

9. Z--ZERO

Command: Z--Zero the terminal.

Responses:

- Z_A--The following then holds:
  - Gross = net + tare = 0
  - Zero setting performed, i.e. stability criterion and zero setting range complied with.
- Z_I--Zero setting not performed (time-out since stability was not reached).
- Z_+ --Upper limit of zero setting range exceeded.
- Z_- --Lower limit of zero setting range exceeded.

Example

Command Z--Zero.

Response--Z_A--Zero setting performed.

Comments

- The tare memory is cleared during zero setting.
- The duration of the stability time-out is 2 seconds for the PANTHER terminal.

10. @--RESET

Command: @--Reset the terminal to the conditions found after switching on.

Response:

- I4_A_"text"--Serial number of the terminal, the terminal is ready for operation.

Example

Command @--Reset

Response--I4_A_"0000000000"—The PANTHER terminal resets and sends the null serial number.

Comments

- All commands awaiting responses are canceled.
- The tare memory is reset to zero.
- The "reset" command is always executed.

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Appendix 3: Discrete I/O Reference

The PANTHER terminal has a discrete I/O port with one input terminal and three output terminals.

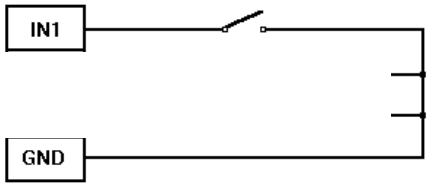
Inputs

Inputs can be programmed as various commands including tare, clear tare, zero scale, print, switch units or blank display.

The input is TTL compatible and capable of handling from 5 to 24 volt DC signals. To initiate the input, you must ground the input terminal. Input functions are edge triggered and must be held at logic ground level for at least 100 ms. The following table defines the available functions:

FUNCTION NAME	TYPE	DESCRIPTION OF ACTION
Tare	Edge	Tares the Scale to a Net Mode
Zero	Edge	Zeros the Scale
Print	Edge	Initiates a Print
Switch Units	Edge	Switches the Scale Weight Units
None	N/A	Input Not Assigned

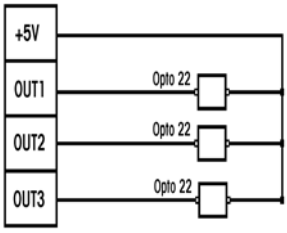
It is not necessary to supply voltage to the inputs when not triggering. Internally, a 5 volt power supply with a pull-up resistor keeps the inputs in the "OFF" condition. Because the signals are low level, the maximum recommended distance between the terminal and the device triggering the input (switch or relay contact) is 10 feet (3 meters) or less. The following shows a typical wiring scheme.



Outputs

The outputs are +5 VDC. A solid-state relay or OPTO 22 is typically connected to buffer the outputs to a 120 or 220 volt AC signal. An output terminal supplies a 5-volt DC supply for reference to the setpoint outputs. Because the supply is rated at 115 mA or DC current, make sure the total current draw from the devices used (relays or optos) do not exceed this limit. If the calculated current draw exceeds 115 mA, an external power supply is required. External power supplies are available from your authorized METTLER TOLEDO representative.

The following diagram shows a typical wiring scheme:



The discrete outputs may be used in conjunction with either the setpoint mode or over/under mode.

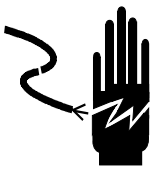
Setpoint Mode

The setpoint outputs are negative true and "ON" when the scale weight is below the setpoint coincidence value. The setpoints operate on the absolute value of the scale

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weight so they can be used for both weigh-in and weigh-out processes. No interlocks or relay logic are included with the standard PANTHER terminal. If start-stop logic is required, METTLER TOLEDO recommends that you purchase this hardware (and design) through your local authorized METTLER TOLEDO representative. The outputs are assigned the following functions:

Output	Function
Out 1	Setpoint 1
Out 2	Setpoint 2
Out 3	Zero Tolerance



⚠ WARNING!

WHEN THIS EQUIPMENT IS INCLUDED AS A COMPONENT PART OF A SYSTEM, THE RESULTING DESIGN MUST BE REVIEWED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OEPRATION OF ALL COMPONENTS IN THE SYSTEM AND THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



⚠ WARNING!

IF THIS DEVICE IS USED IN AN AUTOMATIC OR MANUAL FILLING CYCLE, ALL USERS MUST PROVIDE A HARD-WIRED EMERGENCY STOP CIRCUIT OUTSIDE THE DEVICE CIRCUITRY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

Over/Under Mode

The discrete outputs available in the over/under mode coincide with the "Over," "Accept," and "Under" LEDs on the front panel of the PANTHER terminal. The outputs are assigned the following functions:

Output	Function
Out 1	Under
Out 2	OK, OK light, OK heavy
Out 3	Over

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Appendix 4: GEO Codes

Use the following GEO Codes if you relocate the PANTHER terminal to a location other than the original location where it was calibrated.

Northern and southern latitude in degrees and minutes	Height above sea-level in meters										
	0 325	325 650	650 975	975 1300	1300 1625	1625 1950	1950 2275	2275 2600	2600 2925	2925 3250	3250 3575
	Height above sea-level in feet										
	0 1060	1060 2130	2130 3200	3200 4260	4260 5330	5330 6400	6400 7460	7460 8530	8530 9600	9600 10660	10660 11730
0° 0′ —5° 46′	5	4	4	3	3	2	2	1	1	0	0
5° 46′ — 9° 52′	5	5	4	4	3	3	2	2	1	1	0
9° 52′ — 12° 44′	6	5	5	4	4	3	3	2	2	1	1
12° 44′ — 15° 6′	6	6	5	5	4	4	3	3	2	2	1
15° 6′ — 17° 10′	7	6	6	5	5	4	4	3	3	2	2
17° 10′ — 19° 2′	7	7	6	6	5	5	4	4	3	3	2
19° 2′ — 20° 45′	8	7	7	6	6	5	5	4	4	3	3
20° 45′ — 22° 22′	8	8	7	7	6	6	5	5	4	4	3
22° 22′ — 23° 54′	9	8	8	7	7	6	6	5	5	4	4
23° 54′ — 25° 21′	9	9	8	8	7	7	6	6	5	5	4
25° 21′ — 26° 45′	10	9	9	8	8	7	7	6	6	5	5
26° 45′ — 28° 6′	10	10	9	9	8	8	7	7	6	6	5
28° 6′ — 29° 25′	11	10	10	9	9	8	8	7	7	6	6
29° 25′ — 30° 41′	11	11	10	10	9	9	8	8	7	7	6
30° 41′ — 31° 56′	12	11	11	10	10	9	9	8	8	7	7
31° 56′ — 33° 9′	12	12	11	11	10	10	9	9	8	8	7
33° 9′ — 34° 21′	13	12	12	11	11	10	10	9	9	8	8
34° 21′ — 35° 31′	13	13	12	12	11	11	10	10	9	9	8
35° 31′ — 36° 41′	14	13	13	12	12	11	11	10	10	9	9
36° 41′ — 37° 50′	14	14	13	13	12	12	11	11	10	10	9
37° 50′ — 38° 58′	15	14	14	13	13	12	12	11	11	10	10
38° 58′ — 40° 5′	15	15	14	14	13	13	12	12	11	11	10
40° 5′ — 41° 12′	16	15	15	14	14	13	13	12	12	11	11
41° 12′ — 42° 19′	16	16	15	15	14	14	13	13	12	12	11
42° 19′ — 43° 26′	17	16	16	15	15	14	14	13	13	12	12
43° 26′ — 44° 32′	17	17	16	16	15	15	14	14	13	13	12
44° 32′ — 45° 38′	18	17	17	16	16	15	15	14	14	13	13
45° 38′ — 46° 45′	18	18	17	17	16	16	15	15	14	14	13
46° 45′ — 47° 51′	19	18	18	17	17	16	16	15	15	14	14
47° 51′ — 48° 58′	19	19	18	18	17	17	16	16	15	15	14
48° 58′ — 50° 6′	20	19	19	18	18	17	17	16	16	15	15
50° 6′ — 51° 13′	20	20	19	19	18	18	17	17	16	16	15
51° 13′ — 52° 22′	21	20	20	19	19	18	18	17	17	16	16
52° 22′ — 53° 31′	21	21	20	20	19	19	18	18	17	17	16
53° 31′ — 54° 41′	22	21	21	20	20	19	19	18	18	17	17
54° 41′ — 55° 52′	22	22	21	21	20	20	19	19	18	18	17
55° 52′ — 57° 4′	23	22	22	21	21	20	20	19	19	18	18
57° 4′ — 58° 17′	23	23	22	22	21	21	20	20	19	19	18
58° 17′ — 59° 32′	24	23	23	22	22	21	21	20	20	19	19
59° 32′ — 60° 49′	24	24	23	23	22	22	21	21	20	20	19
60° 49′ — 62° 9′	25	24	24	23	23	22	22	21	21	20	20
62° 9′ — 63° 30′	25	25	24	24	23	23	22	22	21	21	20
63° 30′ — 64° 55′	26	25	25	24	24	23	23	22	22	21	21

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Northern and southern latitude in degrees and minutes	Height above sea-level in meters										
	0 325	325 650	650 975	975 1300	1300 1625	1625 1950	1950 2275	2275 2600	2600 2925	2925 3250	3250 3575
	Height above sea-level in feet										
	0 1060	1060 2130	2130 3200	3200 4260	4260 5330	5330 6400	6400 7460	7460 8530	8530 9600	9600 10660	10660 11730
64° 55′ — 66° 24′	26	26	25	25	24	24	23	23	22	22	21
66° 24′ — 67° 57′	27	26	26	25	25	24	24	23	23	22	22
67° 57′ — 69° 35′	27	27	26	26	25	25	24	24	23	23	22
69° 35′ — 71° 21′	28	27	27	26	26	25	25	24	24	23	23
71° 21′ — 73° 16′	28	28	27	27	26	26	25	25	24	24	23
73° 16′ — 75° 24′	29	28	28	27	27	26	26	25	25	24	24
75° 24′ — 77° 52′	29	29	28	28	27	27	26	26	25	25	24
77° 52′ — 80° 56′	30	29	29	28	28	27	27	26	26	25	25
80° 56′ — 85° 45′	30	30	29	29	28	28	27	27	26	26	25
85° 45′ — 90° 00′	31	30	30	29	29	28	28	27	27	26	26

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(10/2008).02

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