

TACTICAL POWER SUPPLY (TPS)

PP-2953D/U (NSN-6130-01-522-3494)

&

PP-6224C/U (NSN-6130-01-571-2142)



TPS User Guide

Prepared by:



**CUSTOM MANUFACTURING
& ENGINEERING™**

3690- 70th Avenue North
Pinellas Park, FL 33781
(727) 547-9799

www.custom-mfg-eng.com

© 2019 Custom Manufacturing & Engineering™ (CME™) All Rights Reserved.

This edition supersedes previous edition.

Note: Removal of the top cover may void the manufacturer's warranty. No serviceable parts inside.

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited

0011213-200, REVISION G



5

SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1

DO NOT TRY TO PULL OR TOUCH THE INDIVIDUAL

2

IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3

IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE, ROPE, OR SOME OTHER INSULATING MATERIAL

4

SEND FOR HELP AS SOON AS POSSIBLE

5

AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

SAFETY FIRST!

When interconnected, the TPS becomes part of the host platform electrical power distribution infrastructure. Dangerous voltages and currents are present within and controlled by the TPS. To prevent compromising the safety of personnel using the TPS equipment, it is imperative that it be used only as intended and in strict compliance with the safety warnings and cautions contained herein. To assist the user in this regard, this document adopts the following formats for classifying and highlighting specific information. They provide a summary of the basic safety considerations regarding use of the TPS. Carefully read all notices and warnings, and take appropriate action to ensure personnel safety before operating the unit.

WARNING

If a circuit breaker does not stay on when closed, do not attempt to close it repeatedly. That could create an overload situation hazardous to personnel and equipment. Instead, investigate cause of problem. Correct the situation before attempting to close the breaker again.

WARNING

DO NOT ATTEMPT TO CHARGE BATTERIES

This power supply is not designed to charge batteries. Damage to internal components or to the batteries can occur if battery charging is attempted. Charge batteries only with the appropriate battery charger.

The TPS is not designed to charge any type of battery directly or operate in parallel with any other power supply or voltage source including another TPS.

Mounting

The TPS should be mounted horizontally with heatsink fins vertically oriented on a flat surface for maximum heat dissipation. Mount the unit in an open area. Avoid confined spaces with poor air circulation. Do not mount near heat exhausts or other heat sources. Avoid direct sunlight, if possible. Avoid mounting the TPS upside down.

The TPS radiates significant heat at maximum load. Keep away from operators and heat sensitive items. Keep the top cover in place and secured. Do not place items on top of or between the cooling fins of the TPS. Maintain four-inch clearance on all sides, if possible.

SAFETY FIRST!

The following is a summary list of notices and warnings contained within this manual.



WARNING!

The TPS is to be operated with the top cover closed and fastened. Failure to do so will expose personnel to electrical and elevated temperature hazards. Removal of the top cover or any controls may void any warranty.



WARNING!

Only trained and certified electricians should perform termination of wiring. Failure to comply may result in injury or death by electrocution.



NOTICE!

Do not remove the top cover of the TPS chassis. There are no user serviceable components or adjustments inside. Removal of the top cover may void any warranty.



NOTICE!

This unit must not be paralleled or ganged with other units; any damage as a result of doing so will not be covered under warranty.



NOTICE!

Controls contained within the TPS chassis are not a part of standard operation and should not be adjusted.

Table of Contents

Para.	Title	Page No.
INTRODUCTION		
1.1.	Scope.....	1
1.2.	General Information	1
1.3.	Capabilities and Performance Characteristics.....	2
1.4.	Interchangeability.....	3
OPERATION		
2.1.	Shipping, Handling and Unpacking Equipment.....	4
2.2.	List of Items Furnished	4
2.3.	Ancillary Items / Spares	4
2.4.	Optional Items Not Supplied	5
2.5.	Front Panel Controls, Indicators and Connectors	5
2.6.	Rear Panel Connectors	9
2.7.	Installation	11
MAINTENANCE		
3.1.	General and Preventive Maintenance.....	13
TROUBLESHOOTING		
4.1.	Troubleshooting.....	14
4.2.	General Inspection, Non-powered.....	14
4.3.	Powered Operational Check.....	14
4.4.	Technical Support	15
REPAIR		
5.1.	Repair Process/Support Strategy.....	16
5.2.	Warranty.....	16
5.3	Customer Maintenance & Repair Request & Return Material Authorization (RMA)	16
APPENDIX A: LIST OF ACRONYMS & ABBREVIATIONS		18

List of Figures

Figure 1. TPS Showing Front Cover Open.....	1
Figure 2. TPS Rear Panel.....	2
Figure 3. Operator Control Panel.....	6
Figure 4. TPS Rear Panel Connectors.....	9

List of Tables

Table 1. Capabilities and Performance Characteristics	2
Table 2. List of Items Furnished.....	4
Table 3. Ordering Information	4
Table 4. Operator Panel AC IN Connector J1 Pin Configuration	7
Table 5. Operator Panel DC OUT Connector J2 Pin Configuration	8
Table 6. Rear Panel DC OUT Connectors J3 and J4 Pin Configurations	10
Table 7. Rear Panel BAT IN Connector J5 Pin Configuration	10

Beneficial comments (recommendations, additions, deletions) and/or any pertinent data that may be useful in improving this document should be addressed to:

Custom Manufacturing & Engineering™ (CME™)
ATTN: Operations Customer Service
3690 70th Avenue North
Pinellas Park, Florida 33781
(727) 547-9799 Main

CHAPTER 1 – INTRODUCTION

1.1. Scope

This manual provides user instructions for the PP-2953 D/U and PP-6224 C/U Tactical Power Supply (TPS). The manual contains operational data, maintenance, troubleshooting, and repair information.

1.2. General Information

The Custom Manufacturing & Engineering™ (CME™) TPS is a self-contained, completely sealed, benchtop- and vehicular-mounted portable power supply that produces 24 to 32 VDC at 0A to 25A (800W) from nominal 115/230 VAC at 50, 60, or 400 Hz single phase. The TPS can also operate from a 24 VDC storage battery in the battery standby mode. The TPS is illustrated in Figures 1 and 2.

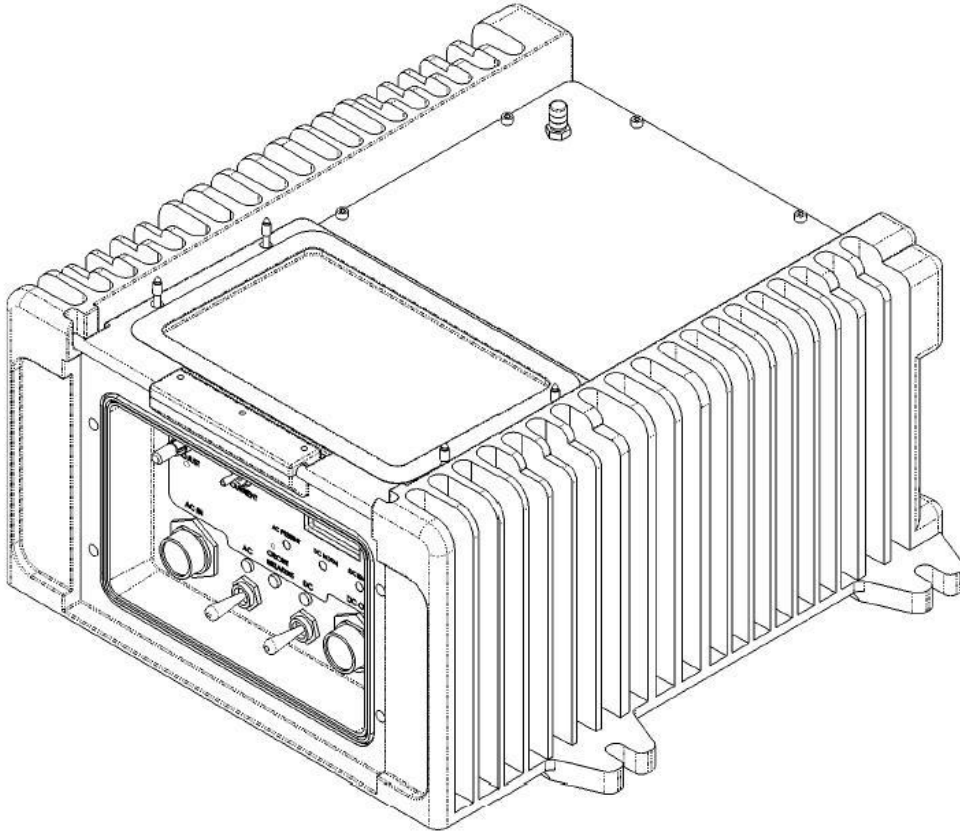


Figure 1. TPS Showing Front Cover Open

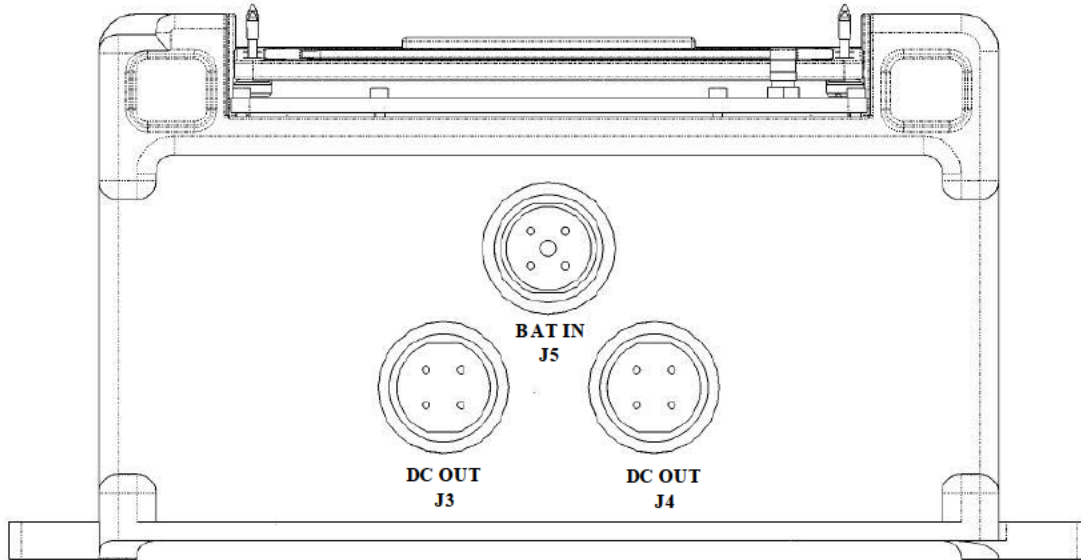


Figure 2. TPS Rear Panel

1.3. Capabilities and Performance Characteristics

Capabilities and performance characteristics for the TPS are listed in Table 1.

Table 1. Capabilities and Performance Characteristics

PARAMETER	CHARACTERISTIC
Power Input	115/230 VAC, 50, 60, or 400 Hz, $\pm 5\%$ Single Phase (Automatic input power detection)
Power Output	Adjustable 24–32 VDC at 0 to 25A (800W)
Output Current Limit Shutdown	Greater than 25A and less than 30A
Standby Mode	24 VDC Battery Standby Mode (pass-through from external battery)
Output Stability	2% peak-to-peak, 0.5% RMS max ripple from 20 Hz to 10 MHz at 28 VDC output
Operating Temperature Range	Ambient temperatures in the range of -40°F (-40°C) to 150° F (+66°C)
Efficiency	Greater than 70%
Height	7.00 Inches
Width	14.25 Inches
Depth	14.50 Inches
Volume	1446 Inches ³ (0.55W per inch ³)
Weight	37 Pounds (22W per pound)

The TPS includes an output display that measures and displays voltage or current. The display will operate in the battery standby mode without AC power applied to the TPS when a battery is connected to BAT IN, and it will provide battery voltage and current measurements. Voltage measurements are three digits in 0.1 VDC resolution from 21 to 32 VDC, and current measurements are in three digits in 0.1A resolution from 0 to 30A.


An overload shutdown feature is included such that when the output current exceeds between 25A and 30A, the unit will disconnect power from the load and will display **OC** regardless of the voltage/current selector switch. It will then reconnect at seven-second intervals to measure the current drawn by the load. If the current is below the limit, the unit will remain connected to the load. However, if the current exceeds the limit, the unit will repeatedly disconnect and connect until the current is below the limit.

The TPS also automatically switches to the battery standby mode of operation when the 115 VAC input is lost or drops below 77 VAC (plus 12, minus 0 VAC), or the 230 VAC input is lost or drops below 154 VAC (plus 24, minus 0 VAC). This mode introduces an unregulated DC output from the battery connected to BAT IN.

Remote sensing is available on output connector J2 on the front panel. When the load is placed at an extended distance from the TPS (≤ 25 ft) and the load is sensitive to input voltage level, a cable with sense leads connected to J2 will compensate for up to two volts of loss in the cable.

Reverse polarity protection. When the wrong polarity voltage is detected across the BAT IN connector (J5), the display will show **.8.8.8**. The TPS will prevent this voltage from propagating to the output of the TPS when in the battery standby mode. When in normal mode, the TPS continues providing regulated DC to the output even though the display is showing **.8.8.8**.

The TPS is not designed to charge batteries directly or operate in parallel with any other power supply type unit, including another TPS.

 **NOTICE!**
**This unit must not be paralleled or ganged with other units;
any damage as a result of doing so will not be covered
under warranty.**

1.4. Interchangeability

The PP-2953 D/U and PP-6224 C/UTPS models are interchangeable in form, fit and function with previously fielded versions of the PP-2953 and PP-6224 power supplies.

CHAPTER 2 – OPERATION

2.1. Shipping, Handling and Unpacking Equipment

When received, all furnished items (such as TPS with cables) are enclosed within a single shipping container. Small and/or fragile items and cables are packed in individual packaging with appropriate protective material within the shipping container.

Once unpacked, all parts should be inspected and inventoried. The front cover of the TPS should be opened and operator's control panel components inspected for loosening during shipment.

CME will package each deliverable in its own container to protect from damage, loss, deterioration, degradation, or substitution while in transit in accordance with the requirements of ASTM D3951. All shipping containers will be marked in accordance with MIL-STD-130.

If component damage is found, or components are missing, please refer to Chapter 5.

2.2. List of Items Furnished

A list of items furnished with the TPS is provided in Table 2.

Table 2. List of Items Furnished

TPS Unit	AC Input Cable CX-11979 ()/U	Cable Length	DC Output Cable CX-12342 ()/U	Cable Length
PP-2953 D/U	1 per system	3 ft	2 per system	3 ft
PP-6224 C/U	1 per system	3 ft	1 per system	3 ft

2.3. Ancillary Items / Spares

Ordering information for ancillary items / spares is provided in Table 3. Items can be purchased directly from CME using a Government IMPAC credit card. For assistance, please call (727) 547-9799.

Table 3. Ordering Information

Item	Part Number	CAGE Code	NSN
TPS with cables	PP-2953 D/U	08LA6	6130-01-522-3494
TPS with cables	PP-6224 C/U	08LA6	6130-01-571-2142
TPS without cables	0011213-001	08LA6	N/A
AC Input Cable	CX-11979 ()/U	08LA6	5995-01-280-0440
DC Output Cable	CX-12342 ()/U	08LA6	5995-00-466-0217

2.4. Optional Items Not Supplied

The following items may be required for operation (depending on use) but are not furnished with the equipment:

- Battery Standby Cable. This cable is used to provide 24 VDC from a storage battery in the standby mode. This cable mates with the BAT IN connector (J5) on the rear panel of the TPS.

- Remote Sensing DC Output Cable. This cable is used to provide remote sensing for long cable runs. This cable mates with the DC OUT connector (J2) on the front panel of the TPS.
- AC Input Cables for voltages other than 115 VAC.
- CME offers optional cable lengths up to 15 feet.
- CME offers a cable coupling to connect two (2), three-foot standard cables.
- For assistance, please call CME Operations at (727) 547-9799.

The Battery Standby Cable can be fabricated from the DC Output Cable by removing the male connector and adapting it to the DC source. Note that the male connector may be compatible with the source and might then be used as is. The female connector would then be connected to the BAT IN connector (J5).

The Remote Sensing DC Output Cable can be built to the mating connector (PT06A-14-16P) of the specified connector in Drawing SM-B-667921, Amphenol connector PT07C-14-16S. Cable wiring should follow Table 5. The gauge of the load carrying wire in the cable should be selected for no more than a two-volt loss at the load.

A qualified electrician can replace the male connector on the provided AC Input Cable for other AC services that meet the TPS AC Input specifications. The replacement connector is service and country dependent.

2.5. Front Panel Controls, Indicators and Connectors

This section describes the location, purpose, and function of the external controls and indicators associated with the TPS. Refer to Figure 3 for an illustration of the controls, indicators and connectors.

NOTICE!

Controls contained within the TPS chassis are not a part of standard operation and should not be adjusted.

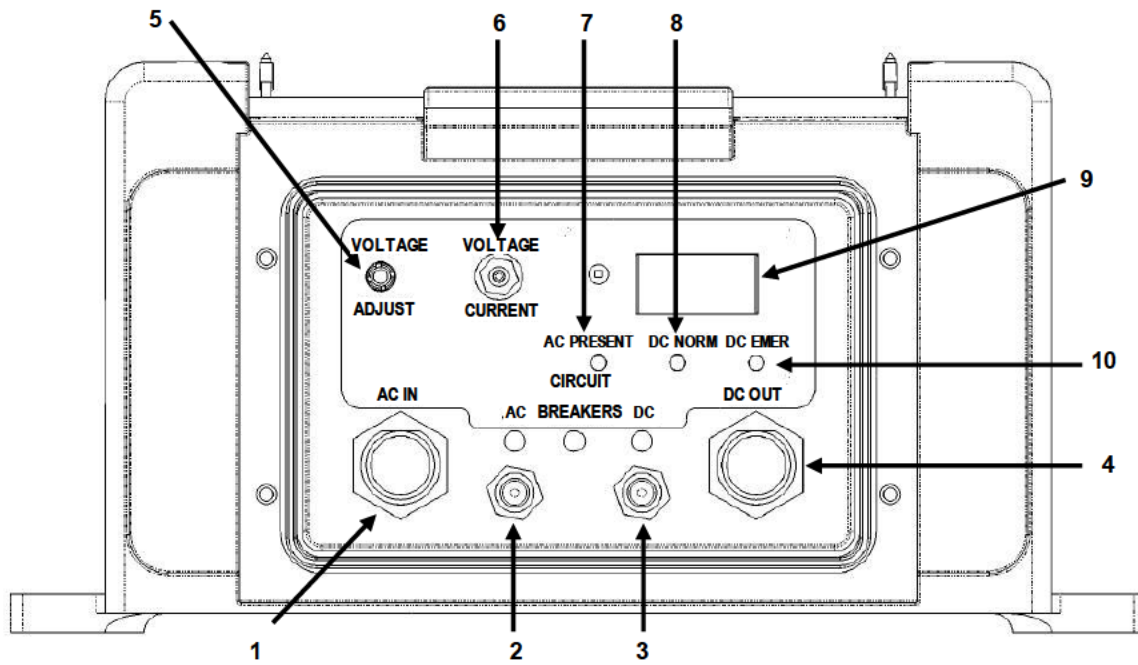


Figure 3. Operator Control Panel

Figure 3 Legend	
1	AC IN Connector (J1)
2	AC Power Switch/Circuit Breaker
3	DC Power Switch/Circuit Breaker
4	DC OUT Connector (J2)
5	Voltage Adjust
6	Voltage/Current Selector Switch
7	AC PRESENT Indicator Light
8	DC NORM Indicator Light
9	Output Display
10	DC EMER Indicator Light

2.5.1. AC IN Connector (J1) (1)

The TPS receives AC power using AC Input Cable CX-11979 ()/U. This cable connects between the power source and AC IN power connector J1 located on the Operator's Control Panel.

Pinouts for the AC IN power connector J1 are listed in Table 4.

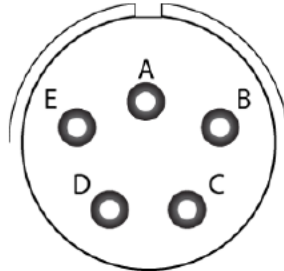


Table 4. Operator Panel AC IN Connector J1 Pin Configuration

Pin	AC Input
Position (socket) A	Line
Position (socket) B	Line
Position (socket) C	Neutral
Position (socket) D	Neutral
Position (socket) E	Ground

2.5.2. AC Power Switch/Circuit Breaker (2)

The AC power switch is located on the Operator's Control Panel as shown in Figure 3. The AC power switch provides power protection during operation and allows the operator to quickly disconnect power from the TPS. When sufficient AC power is applied to the TPS and this switch is ON (up), the AC PRESENT LED is illuminated green, indicating AC power is available.

2.5.3. DC Power Switch/Circuit Breaker (3)

The DC power switch is located on the Operator's Control Panel as shown in Figure 3. The DC power switch provides power protection during operation and allows the operator to quickly disconnect TPS DC power. When AC power is applied to the TPS and the AC power switch is ON (up), and the DC power switch is ON (up), the DC NORM LED is illuminated green, indicating regulated DC power is available.

The circuit breaker is also in use with the battery standby mode. The battery voltage at BAT IN is fed through the breaker to the DC OUT connectors and will limit the current drawn from the battery to a value between 25A and 30A.

2.5.4. DC OUT Connector (J2) (4)

The DC OUT Connector with remote sensing capability is located on the Operator's Control Panel as shown in Figure 3. Pinouts for this connector are listed in Table 5.

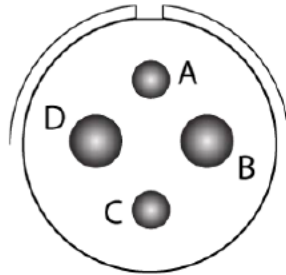


Table 5. Operator Panel DC OUT Connector J2 Pin Configuration

Pin	Output
Position (socket) A	(+) Sense
Position (socket) B	(-) Output
Position (socket) C	(-) Sense
Position (socket) D	(+) Output

2.5.5. Voltage Adjust (5)

When operating in the AC input mode, the VOLTAGE ADJUST potentiometer, shown in Figure 3, allows for setting the desired DC output voltage between 24 VDC and 32 VDC.

2.5.6. Voltage/Current Selector Switch (6)

The Voltage/Current Selector switch, shown in Figure 3, allows the operator to select either the output voltage or output current to be displayed on the output display. The center position of the switch turns off the output display. However, in over current (OC) or reverse polarity, the display functions independent of this switch.

2.5.7. AC PRESENT Indicator Light (7)

The AC PRESENT Indicator Light (LED), shown in Figure 3, indicates that the power supply is being provided AC input of sufficient voltage (77 to 89 VAC minimum for 115 VAC nominal, or 154 VAC to 178 VAC minimum for 230 VAC nominal).

2.5.8. DC NORM Indicator Light (8)

The DC NORM Indicator Light (LED), shown in Figure 3, indicates that the power supply is providing a regulated DC output within 24V to 32V.

2.5.9. Output Display (9)

The output display, shown in Figure 3, displays either DC output voltage or DC output current. The display consists of three digits with a decimal point to the right of the middle digit and is NVIS compliant. Besides displaying voltage or current, it will display over current as **OC** and reverse polarity input as **.8.8.8** regardless of display selection.

2.5.10. DC EMER Indicator Light (10)

The DC EMER Indicator Light (LED), shown in Figure 3, indicates that the power supply is operating in the battery standby mode.

The power supply automatically switches to the battery standby mode of operation when the 115 VAC input is lost or drops below 77 VAC (plus 12, minus 0 VAC), or the 230 VAC input is lost or drops below 154 VAC (plus 24 VAC, minus 0 VAC). This mode introduces an unregulated DC output from the battery connected to BAT IN. The DC EMER LED illuminates and the DC NORM LED extinguishes.

The Output Display will operate during the battery standby mode and display the battery voltage and current supplied by the battery. Care should be taken that the battery is not allowed to be completely discharged. If the battery is in a vehicle, it may not start if the voltage is allowed to drop below 23V.

When the 115 VAC input recovers to 103 VAC (plus 0 VAC, minus 12 VAC) or greater, or the 230 VAC input recovers to 206 VAC (plus 0 VAC, minus 24 VAC) or greater, the TPS automatically switches to AC operation with a regulated DC output. The DC NORM LED illuminates and the DC EMER LED extinguishes.

2.6. Rear Panel Connectors

The rear panel connectors of the TPS are illustrated in Figure 4.

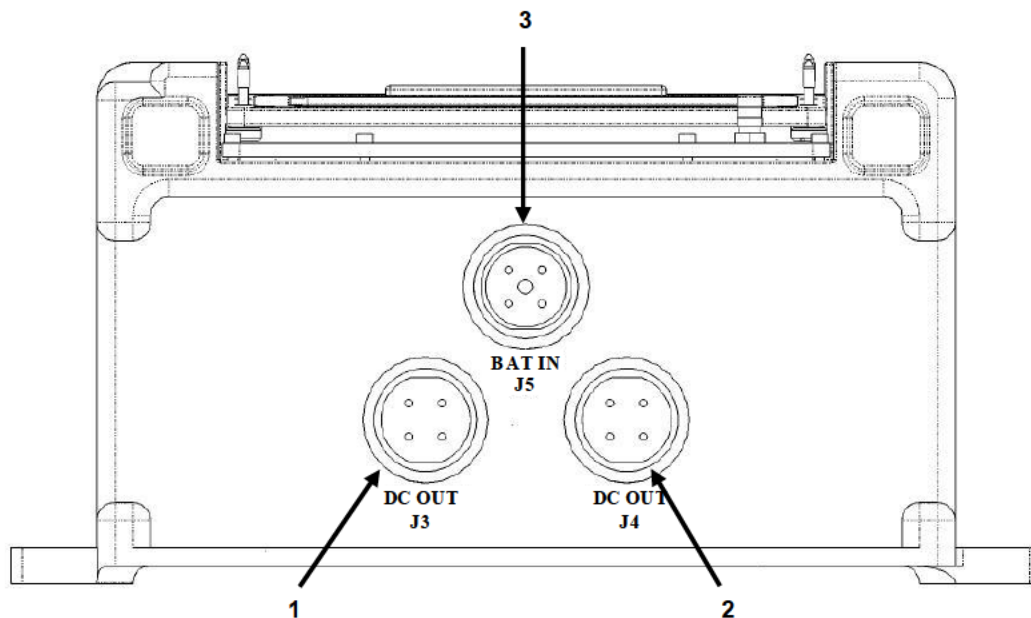


Figure 4. TPS Rear Panel Connectors

2.6.1. DC OUT Connectors J3 (1) and J4 (2)

Two DC Output Connectors are located on the rear panel as shown in Figure 4. Each connector has socket positions marked A, B, C, and D. Pinouts for this connector are listed in Table 6.

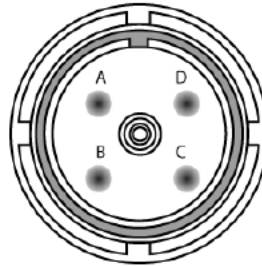


Table 6. Rear Panel DC OUT Connectors J3 and J4 Pin Configuration

Pin	Output
Position (socket) A	(-) Output
Position (socket) B	(+) Output
Position (socket) C	Not Used
Position (socket) D	Not Used

Both DC Output Connectors are capable of mating with the DC Cable, CX -12342 ()/U.

2.6.2. BAT IN Connector J5 (3)

The BAT IN Connector, shown in Figure 4, provides for DC input in the battery standby mode. This connector has socket positions marked A, B, C, and D. Pinouts for this connector are listed in Table 7.

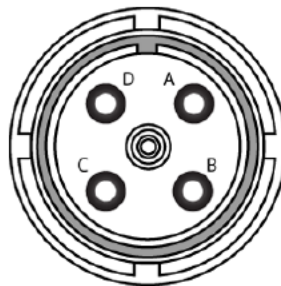


Table 7. Rear Panel BAT IN Connector J5 Pin Configuration

Pin	Input
Position (socket) A	(-) Input
Position (socket) B	(+) Input
Position (socket) C	Not Used
Position (socket) D	Not Used

2.7. Installation

2.7.1. Mounting

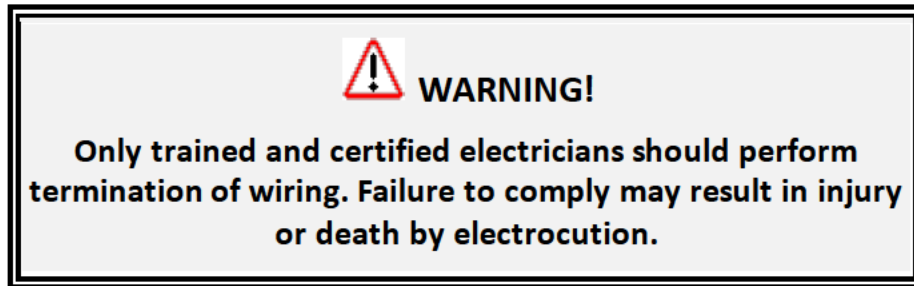
The TPS should be mounted upright horizontally on a flat surface for maximum heat dissipation. Mount the unit in an open area. Avoid confined spaces with poor air circulation. Do not mount near heat exhausts or other heat sources. Avoid direct sunlight. Avoid mounting the unit vertically, but if mounted vertically, orient the cooling fins to be vertical. **Do not mount the TPS upside down.**

The TPS radiates significant heat at maximum load. Keep away from operators and heat sensitive items. Keep the top cover in place and secured. Do not place items on top of or between the chassis cooling fins of the TPS. Maintain four-inch clearance on all sides, if possible.

For mobile installations, the TPS has four flanges on its base. The mounting slots are designed for a 3/8-inch bolt. These are not supplied as their length and thread type are installation dependent. The TPS should be secured for mobile operation unless it is stored for transit.

2.7.2. Electrical Connections

The following connections are required for proper operation:



1. Open the TPS Operator's Control Panel and ensure that both the AC and DC Circuit Breakers are OFF (down).
2. Connect the DC Output cable male connector, CX -12342()/U, to either J3 or J4 on the rear of the TPS.
3. Connect the DC Output cable female connector, CX -12342()/U, to the equipment to be powered.
4. Connect the AC Input Cable female connector, CX-11979()/U, to the TPS AC IN on the front panel
5. Connect the AC Input Cable male connector, CX-11979()/U, to a 115 VAC, 60 Hz, or 400 Hz, single-phase power source. Other sources, such as 230 VAC, 50Hz or 240 VAC, 60Hz, require a different cable not supplied with TPS.



2.7.3. Power On

1. On the TPS Operator's Panel, set the VOLTAGE/CURRENT switch to the VOLTAGE (up) position.
2. Set the AC power switch to the ON (up) position. The Output Display will cycle through a short self-test, counting up from 0 to 9 on all three digits, then stop, displaying **0.0**. The AC PRESENT and DC NORM indicators will illuminate.
3. Set the DC power switch to the ON (up) position. The Output Display will indicate the output voltage. The displayed voltage is for reference only and is not exact. The TPS is now producing power.

2.7.4. Voltage Adjustment

Should the output voltage require adjustment, perform the following:

1. Power on the TPS as described in Paragraph 2.7.3.
2. Using a size 0.5-inch standard wrench or socket wrench, loosen the lock nut on the VOLTAGE ADJUST control.
3. Using a flat blade screwdriver, adjust the VOLTAGE ADJUST shaft up or down until the Output Display indicates the desired voltage. The displayed voltage is for reference only and is not exact.
4. Using a size 0.5-inch wrench or socket wrench, tighten the VOLTAGE ADJUST lock nut until it is snug. Be careful to not over tighten the lock nut.

2.7.5. Power off

Set both the AC and DC Circuit Breakers to OFF (down). All front panel indicators will extinguish.

CHAPTER 3 – MAINTENANCE

NOTICE!

Do not remove the top cover of the TPS chassis. There are no user serviceable components or adjustments inside. Removal of the top cover may void any warranty.

3.1. General and Preventive Maintenance

The TPS is a sealed power supply with no moving parts, therefore requiring no lubrication and little maintenance. If inoperable, follow field instructions for return and repair. Do not remove the top cover or any of the controls of the TPS. There are no user-serviceable components or adjustments inside. CME does provide authorized factory service and repair as well as replacement cables.

3.1.1. Common Tools and Equipment

Tools required are:

1. English hex wrench set or socket wrench set
2. Flat blade screwdriver
3. Voltmeter

3.1.2. Special Tools, TMDE, and Support Equipment

Tools required are:

1. Wrench for the spanner nut on connectors M55181/2-01 and M55181/4-01

3.1.3. Routine Checks and Services

Perform the following checks and services as necessary:

1. With front lid closed, clean unit (hose off with low pressure water, if needed) to remove foreign material
2. Check for cut or frayed cables, replace or repair as needed
3. Check for bent or broken components, follow field instructions as needed
4. Check for finger-loose nuts, bolts, screws, switches and connectors (do not over tighten)
5. Check chassis cooling fins for open clearance foreign material, dirt or mud (clean)
6. Remove items blocking or covering chassis cooling fins

3.1.4. Calibration

The output display does not require calibration as it is provided as a convenience for the operator. The accuracy should be $\pm 0.6V$ and $\pm 0.6A$, but this is not guaranteed. For precision measurements, calibrated instrumentation should be used. The output voltage can be measured at any unused DC OUT connector during normal operation.

CHAPTER 4 – TROUBLESHOOTING

4.1. Troubleshooting

4.1.1. Personnel

A trained technician with the appropriate equipment should perform troubleshooting.

4.1.2. Equipment

1. Volt-ohm Meter
2. Amp Meter
3. DC Power Source capable of 24 VDC
4. DC Load, 2 ea 28V, 5A to 25A for a total of 30A
5. AC Power Source, 115VAC, 15A service

4.2. General Inspection, Non-powered

4.2.1. Check All Cable Assemblies

1. Check connectors for broken pins
2. Check connectors for foreign material on contacts
3. Check connectors for bent connector housings
4. Check connectors for loose or disconnected wires
5. Check the cable for exposed wires
6. Check the cable for overheat damage, charring
7. Check the cable for broken or pinched wires
8. Perform continuity and short test with an ohmmeter using Tables 4, 5, 6 and 7, as appropriate

4.2.2. Check the TPS

1. Check the connectors for damaged or broken pins
2. Check connectors for foreign material on contacts
3. Check connectors for bent connector housings
4. Check switches for damage, bent batons or poor detent position
5. Check top cover for evidence of removal; **removal of the top cover or any controls may void any warranty**

4.3. Powered Operational Check

4.3.1. Power Unit

Follow Sections 2.7.2 and 2.7.3 to power unit.

4.3.2. Normal Operational Check

Observe the following:

1. The Output Display counted from 0 to 9 on all digits and then displayed **0.0** as described in section 2.7.3
 2. The AC Present and DC NORM indicators are lit
 3. When the VOLTAGE/CURRENT selection switch is set to CURRENT, the current measures 0.5A to 0.7A (no load applied)
 4. When the VOLTAGE/CURRENT selection switch is set to VOLTAGE, the voltage measures between 24V and 32V
 5. Following section 2.7.4, adjust the voltage for 24V, 32V, and finally to 28V
- If any of the observations are not met, the unit may not be functioning properly.

4.3.3. Loaded Operational Check

1. To the preceding setup with the DC power switch set to OFF, connect the DC load to a DC OUT connector; a DC OUT cable may need to be modified to facilitate this
 2. Set the DC switch to ON and the VOLTAGE/CURRENT switch to CURRENT
 3. The Output Display should show a reading within 0.6A of the load value
- If the no current or over current is observed, the unit is defective. If the current measurement is not within 0.6A, continue to the next check.

4.3.4. Current Limit Shutdown

1. With the DC power switch set to OFF, add the second load to the preceding setup
 2. Set the DC switch to ON, the VOLTAGE/CURRENT switch still set to CURRENT
 3. The Output Display should show **OC** until the load is removed
- If the Output Display does not display **OC**, the unit is defective. If it does display **OC**, then the display may no longer be accurate enough to use for any purpose other than indicating current flow.

4.3.5. Battery Standby Mode

1. With the DC power switch set to OFF with one load from the preceding setup, connect a DC source to the BAT IN; a TPS may be used and DC OUT cable may be used to connect them
 2. Set the DC switch to ON with the VOLTAGE/CURRENT switch still set to CURRENT and observe the Output Display shows the current drawn by the load
 3. Set the AC switch to OFF and observe the AC PRESENT and DC NORM indicators are off and the DC EMER indicator is on and the Output Display shows the current drawn by the load
- If the observations mentioned in step 3 do not occur, the unit is defective.

4.4. Technical Support

For technical support of your TPS, please go to

Customer Maintenance & Repair Request web page at:
<https://www.custom-mfg-eng.com/customer-maintenance--repair.html>

Or call CME Operations at (727) 547-9799 or Ext. 1677.

CHAPTER 5 – REPAIR

CME does provide authorized factory service and repair as well as replacement cables. CME maintains a highly trained staff to diagnose and repair your power supply quickly and return it to you tested and ready to go back in service. To facilitate your repair please be aware of the following:

CME warranties new TPS power supplies for up to 12 months under standard warranty. You will need to supply customer service with the serial number of the product to obtain a return authorization. Please retain your proof of purchase.

5.1 In Warranty Returns.

An in-warranty return will be repaired free of charge as long as the Tamper Seals are intact, product arrives in good condition, product shows no sign of misuse and original assemblies contained in the product can be repaired. Repaired product(s) will be returned to the customer via ground service at CME's expense or faster at the customers' expense.

Warranty covers all items manufactured for the Tactical Power Supplies, PP-2953 D/U and PP-6224 C/U. The warranty covers all material and workmanship defects during the warranty period. This warranty does not cover any damage due to accident, misuse, abuse or negligence.

All items that are repaired or replaced, under the warranty provisions of the contract, will remain under warranty through the expiration date noted on the warranty label affixed to the power supply front cover.

5.2 Out of Warranty Returns.

If the product(s) is Out of Warranty, the standard cost to repair will be given to you when the return material authorization (RMA) is issued. A Purchase Order for the repair cost must be received *before* the product will be evaluated. This cost is valid as long as the tamper seal is intact, product arrives in good condition, product shows no sign of misuse and original assemblies contained in the product can be repaired. If that is not the case, you will be notified of any additional service related costs via email. If, at that time you decide you do not want the product serviced, it can be returned to you "as is" at your expense or it can be scrapped at our location, whichever you prefer. We require written permission to return or scrap unrepaired products. Repaired products are returned at the expense of the Customer and can be shipped per your instructions. All repairs are warranted for 6 months for failure of the repair ONLY.

Note: Replacement of the main PC Board is not covered by the Standard Repair charge. CME reserves the right to refuse to repair any product that has been tampered with or an attempt has been made to repair the product by unauthorized personnel.

Returned power supplies are typically evaluated, repaired and returned to the customer within 3 weeks. If additional repairs/materials are warranted, the repair may require additional time. CME is aware of the importance to all of our customer's schedules and will do their best to return all products as quickly as possible.

5.3 Customer Maintenance & Repair Request & Return Material Authorization (RMA)

To submit an RMA request for your TPS, please go to

Customer Maintenance & Repair Request web page at:

<https://www.custom-mfg-eng.com/customer-maintenance--repair.html>

Or call CME Operations at (727) 547-9799 or Ext. 1677.

Shipping Instructions

The product should be shipped back to the following address with the return material authorization (RMA) number on the package or included on the documentation inside the shipping container.

Custom Manufacturing & Engineering, Inc.
ATTN: Operations
3690 70th Avenue North
Pinellas Park, FL 33781

As long as the original packaging is in good condition, it can be used to repackage the product for return. Customer should use the bubble wrap and/or foam inserts that came with it to insure proper packaging.

Note: Loose Styrofoam (peanuts) is not an acceptable packing material. Shipping damage to the power supply can result in additional charges. If you don't have the original packaging or it is damaged, please follow these guidelines:

- Wrap the product securely in a heavy duty bubble pack or similar foam
- Use a strong double-wall container that is made for shipping equipment
- Seal the container securely
- Mark the container 'Fragile' to ensure proper handling
- Please refer to your Return Authorization number in all correspondence

APPENDIX A: LIST OF ACRONYMS & ABBREVIATIONS

Term	Definition
A	Amps
AC	Alternating Current
CME	Custom Manufacturing & Engineering™
CLS	Contractor Logistics Support
DC	Direct Current
Hz	Hertz (Frequency)
LED	Light Emitting Diode
NSN	National Stock Number
OC	Over Current
RMA	Return Material Authorization
RMS	Root Mean Square
TMDE	Test, Measurement and Diagnostic Equipment
TPS	Tactical Power Supply
V	Volts
VAC	Volts Alternating Current
VDC	Volts Direct Current
W	Watts