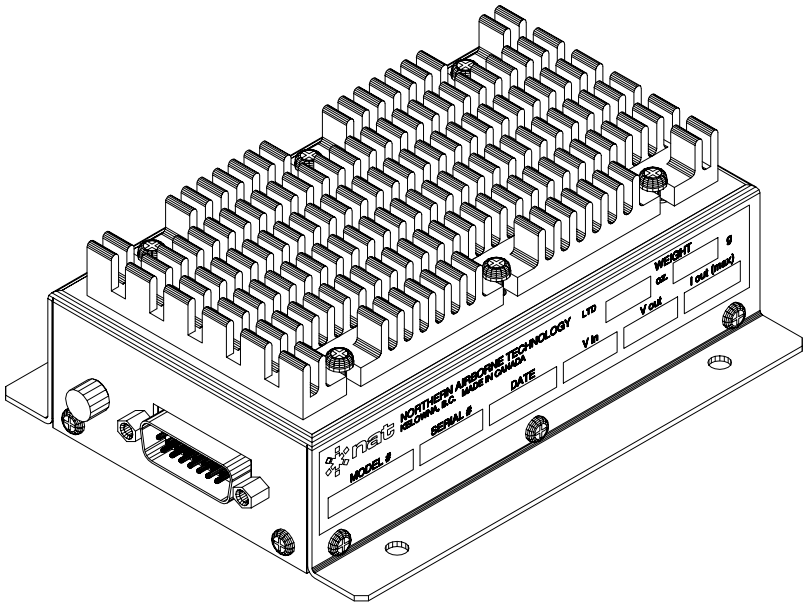
SM32A

VR28-013
DC/DC Power Converter
Serial Numbers 1221 and later



INSTALLATION AND OPERATION MANUAL

REV 4.00 Aug 21, 2006

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Periodically NAT will release manual amendments. In order to maintain the most accurate and up to date manual these amendments should be carried out immediately upon receipt and recorded on the following amendment record.

AMENDMENT RECORD

Amendment Number	Amendment Date	Section(s) Changed	Date Entered	Entered By
Note: Revision 4.00 is the first public release of this document				

Insert any Amendment Instruction sheets after this page.

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Section 1 Description

1.1 Introduction

This manual contains information on the VR28-013 DC/DC Power Converter (serial numbers 1221 and later). All derivative products will be covered by manual supplements, which can be obtained from NAT as required.

Information in this section consists of purpose of equipment, features and specifications.

1.2 Purpose of Equipment

The VR28-013 is an efficient voltage converter designed to power non-aircraft radios or equipment from a 28 Vdc aircraft power buss. It is a remote bulkhead mounted unit designed to convert a nominal +28 Vdc input to a nominal +13 Vdc output at up to 6 Amps.

1.3 Features

The VR28-013 uses the same switched-mode power supply (SMPS) circuitry utilized by NT-series radios to provide constant output power without excessive heat generation.

The unit has remote on/off switching.

An output power LED is provided to give a visual indication that the unit is operating.

Power In, Power Out, and Ground pins are grouped together and internally connected for installation versatility.

The unit has over-voltage and reverse-voltage protection to ensure operation in severe aircraft environments.

1.4 Specifications

1.4.1 Electrical Specifications

Power Supply: Switched-mode regulated power supply with input reverse-polarity, over-current, over-voltage, and output short-circuit protection.

Operating Voltages

Nominal	+28.0 Vdc
Minimum	+22.0 Vdc
Maximum	+30.3 Vdc
Emergency	+18.0 Vdc

Current Consumption		
	Standby	0.03 A nom. (Off)
	No Load	0.1 A nom. (@ I_{OUT}=0.0 A)
	Low Current Load	0.5 A nom. (@ I_{OUT}=0.6 A) 0.8 A nom. (@ I_{OUT}=1.2 A)
	High Current Load	2.0 A nom. (@ I_{OUT}=3.0 A) 4.0 A nom. (@ I_{OUT}=6.0 A)
Power Output		
	Intermittent Operation	+13.0 Vdc ±10%, 6.0 A max.
	Continuous operation	+13.0 Vdc ±10%, 20% duty cycle: 1 minute at I_{OUT}=6.0 A, 4 minutes at I_{OUT}=1.2 A
	Efficiency	80% typical
	Input Overcurrent Protection	Internal Fuse, 7 A capacity
Input Signals		
	Power On/Off:	Voltage: <1 Vdc (logic LO) for ON Current: 15 mA nom., sink
Output Signals		N/A

1.4.2 Physical Specifications

Height		1.85" (47.0 mm) max
Depth		5.32" (135.1 mm) max
Width		3.99" (101.3 mm) max
Weight		1.02 lbs (0.46 kg) max
Mounting		Remote bulkhead mount with four 10-32 screws
Material/Finish:		
	Chassis and cover	Brushed aluminum with chromate conversion finish
	Heatsink	Aluminum extrusion with clear anodized finish
Connectors:	J3	Male 15 pin D-submin connector with jackposts

1.4.3 Miscellaneous Specifications

External Input Overcurrent Protection: 5 A External Circuit Breaker recommended

External Output Overcurrent Protection: 7.5 A External Fuse recommended

1.4.4 Environmental Specifications

Temperature:	
Operating	-20° C. to +55° C
Survival	-55° C. to + 85° C
Vibration/Shock	DO-160C Cat B/M/N
Altitude	35,000 feet
Humidity	95% Non-condensing

End of section 1

Section 2 Installation

2.1 Introduction

Information in this section consists of: unpacking and inspection procedures, installation procedures, post-installation checks, and installation drawings.

2.2 Unpacking and Inspection

Unpack the equipment carefully and locate the warranty card. Inspect the unit visually for damage due to shipping and report all such claims immediately to the carrier involved. Note that each unit should have the following:

- VR28-013 DC/DC Power Converter
- Warranty Card
- Release certification

Verify that all items are present before proceeding and report any shortage immediately to your supplier.

2.2.1 Warranty

Complete the warranty card information and send it to NAT when the installation is complete. If you fail to complete the warranty card, the warranty will be activated on date of shipment from NAT.

Note: An appropriately rated facility, e.g. Certified Aircraft Repair Station, must install this equipment in accordance with applicable regulations. NAT Ltd's warranty is not valid unless the equipment is installed by an authorized NAT Dealer. Failure to follow any of the installation instructions, or installation by a non-certified individual or agency will void the warranty, and may result in a non-airworthy installation.

2.3 Installation Procedures

2.3.1 Warnings

Do not bundle any lines from this unit with transmitter coax lines. Do not bundle any logic or audio lines with this unit. Do not position this unit next to any device with audio interfaces, or significant audio interference will result.

2.3.2 Cautions

In all installations, use shielded cable exactly as shown, and ground as indicated. Significant problems may result from not following these guidelines.

2.3.3 Cabling and Wiring

All wiring should be at least 22 AWG, except power and ground lines, which should be at least 18 AWG. Ensure that all ground connections are clean and well secured.

All unshielded wire shall be selected in accordance with AC43.13-1B Change 1, Paragraphs 11-76 through 11-78. Wire types should be to MIL-W-22759 as specified in AC43.13-1B Change 1, Paragraphs 11-85, 11-86, and listed in Table 11-11. For shielded wire applications, use Tefzel MIL-C-27500 shielded wire with solder sleeves (for shield terminations) to make the most compact and easily terminated interconnect. Follow the wiring diagrams in Section 2.6 as required.

Allow 3 inches from the end of the wire to the shield termination to allow the hood to be easily installed. Note that the hood is a 'clamshell' hood, and is installed after the wiring is complete.

All wiring should be at least 22 AWG, except power and ground lines, which should be at least 20 AWG. Ensure that all ground connections are clean and well secured.

2.3.4 Post-Installation Checks

If any preset requires adjustment, be sure this is carried out before the aircraft leaves, and that the unit and its mating connector are secured before departure. Make all required log book entries, electrical load, weight and balance amendments and other paperwork as required by your local regulatory agency.

2.3.4.1 Voltage/resistance checks

Do not attach the VR28-013 until the following conditions are met.

Check the following:

a) Check harness pins **<1>**, **<2>** and **<9>** for +28 Vdc relative to ground.

b) Ensure +13 Vdc lines pins **<6>**, **<7>** and **<14>** are not shorted to ground.

c) Check P101, pins **<4> <11>** and **<12>** for continuity to ground (less than 0.5 Ω).

2.3.4.2 Power On checks

Power up the aircraft's system with the VR28-013 installed, and confirm that the unit is operating properly and the Power Output LED is on.

Double-check that the mounting and connector hardware is tightened securely.

Upon satisfactory completion of all performance checks, make the required log entries and complete the necessary Regulatory Agency paperwork before releasing the aircraft for service.

2.4 Continued Airworthiness

Maintenance of the VR28-013 is 'on condition' only. Periodic maintenance of this product is not required.

2.5 Accessories Required But Not Supplied

Installation kit p/n VR28-IKC (crimp) is required to complete the installation. The kit consists of the following:

VR28-IKC 15-pin D-min Female Crimp Kit (NAT Part No. **D15SL-IKC**)

Quantity	Description	NAT Part #
1	D-min 15 Socket Housing	20-21-015
15	MS Crimp Socket	20-26-901
1*	Jack Screw Set	20-27-002
1*	Lock Clip Set	20-27-004
1	15 Pin Connector Hood	20-29-015

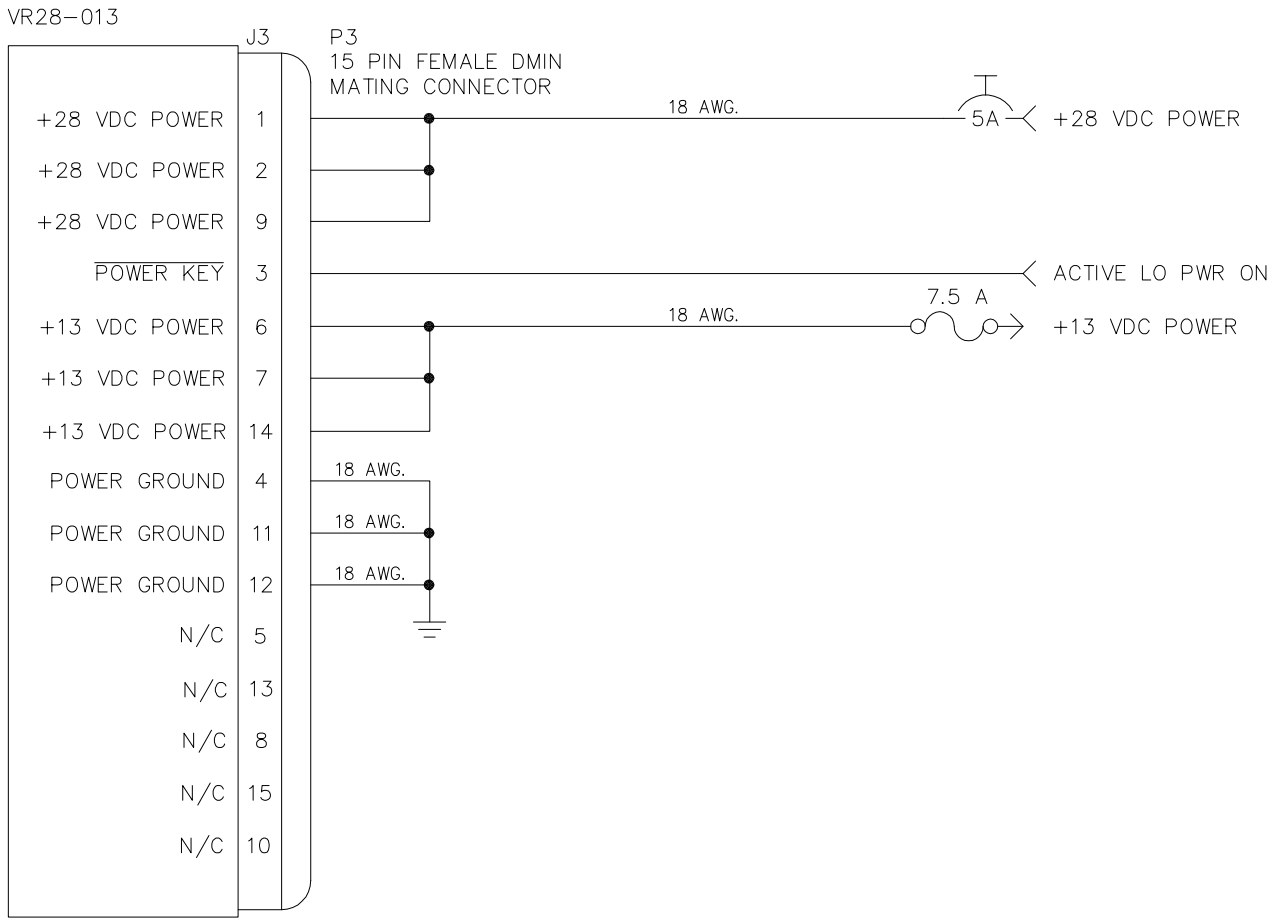
* Use as required.

2.6 Installation Drawings

DRAWING	REV.	DESCRIPTION	TYPE	SERIAL #
VR28\013\403-0	2.00	DC/DC Power Converter	Interconnect	1221 and up
VR28\013\405-0	2.00	DC/DC Power Converter	Connector Map	1221 and up
VR28\013\922-0	2.00	DC/DC Power Converter	Mech. Installation	1221 and up

Section 2 ends after these Drawings

REVISIONS			
REV	DESCRIPTION	DATE	BY
2.00	DOCCR01506 – REDESIGN	JAN 02/06	MWS



NOTES:

1. ALL WIRES SHOULD BE 22 AWG UNLESS OTHERWISE SPECIFIED. ALL UNSHIELDED WIRE SHALL BE SELECTED IN ACCORDANCE WITH AC43.13–1B CHANGE 1, PARAGRAPHS 11–76 THROUGH 11–78. WIRE TYPES SHOULD BE TO MIL–W–22759 AS SPECIFIED IN AC43.13–1B CHANGE 1, PARAGRAPHS 11–85, 11–86 AND LISTED IN TABLE 11–11. ALL SHIELDED WIRE/CABLE SHOULD BE IN ACCORDANCE WITH MIL–C–27500.

DEFINITIONS:

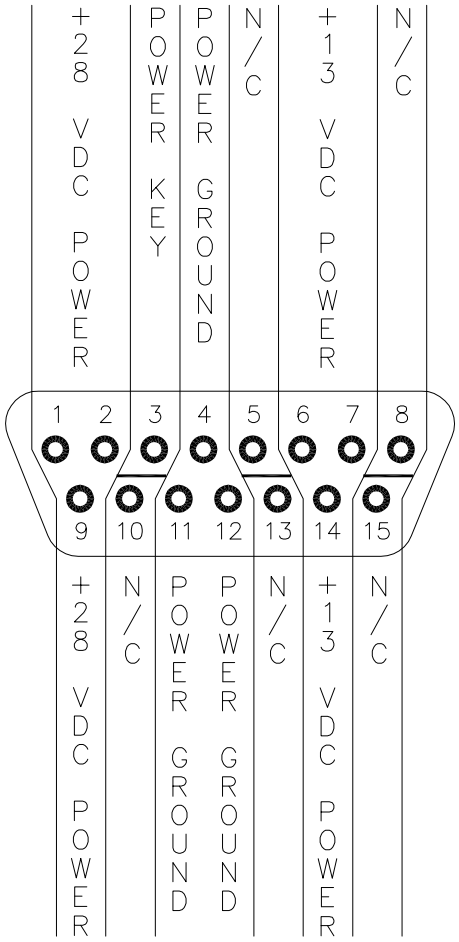
N/C: NO CONNECTION. THE PIN IS NOT CONNECTED TO ANYTHING INTERNALLY, AND THEREFORE SHALL HAVE NO CONNECTION EXTERNALLY.

DESIGNED	DS/KEH	NORTHERN AIRBORNE TECHNOLOGY LTD.				
DRAWN	MWS					
DATE	MAY 13/98	TITLE: DC/DC POWER CONVERTER				
CHECKED	NAT 201 / NAT 255					
APPROVED	NAT 114	SIZE: A	CAGE CODE: 3AB01	PART NO.: VR28–013	REV.: 2.00	SHEET: 1/1
FILE: 403–0.DWG		DWG. TYPE: INTERCONNECT		DWG. NO.: VR28\013\403–0		

REVISIONS			
REV	DESCRIPTION	DATE	BY
2.00	DOCCR01506 – REDESIGN	DEC 16/05	MWS

P3

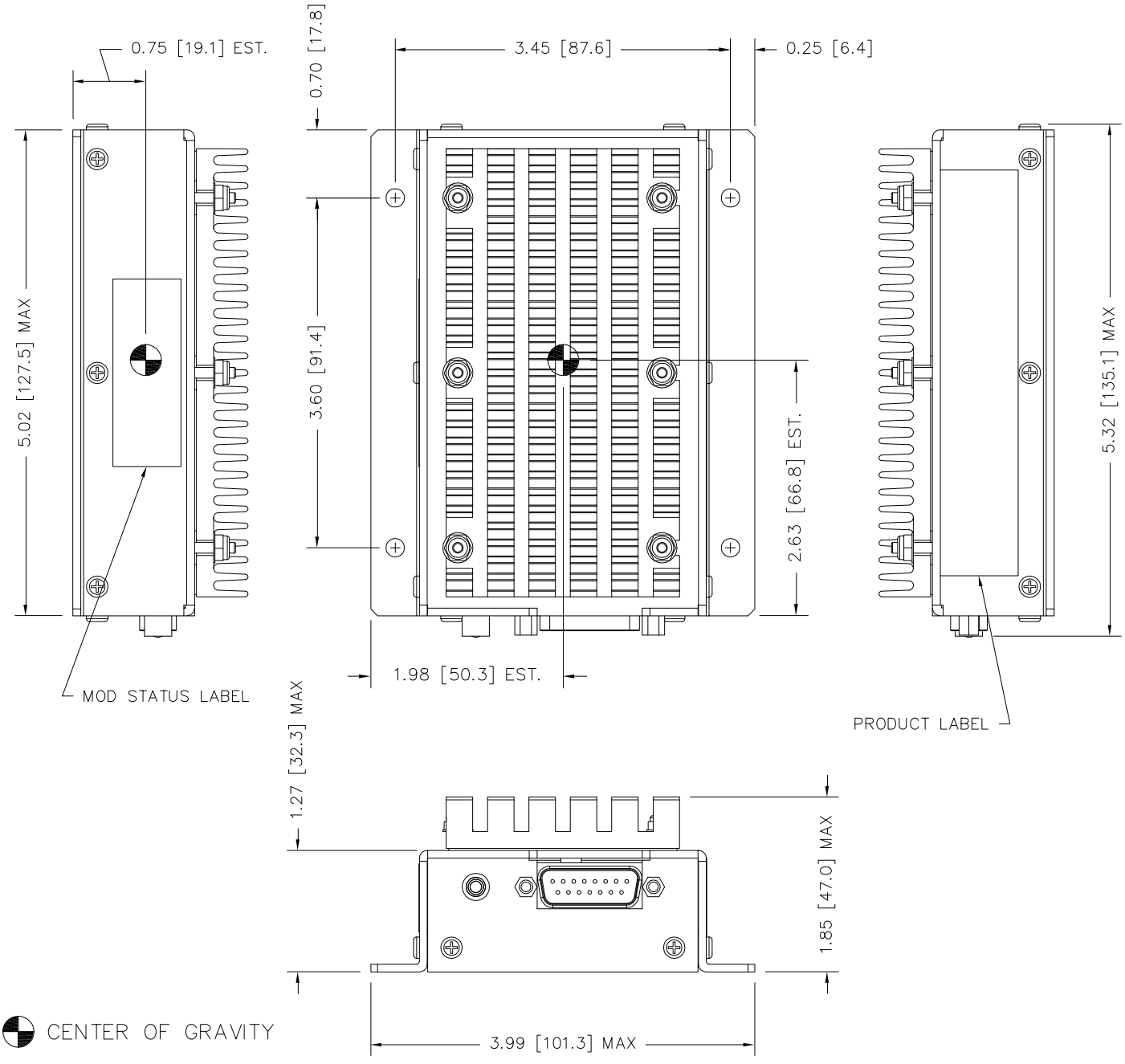
15 PIN FEMALE DMIN
MATING CONNECTOR



VIEW IS FROM REAR OF AIRFRAME CONNECTOR

DESIGNED	DS/KEH	NORTHERN AIRBORNE TECHNOLOGY LTD.				
DRAWN	MWS					
DATE	MAY 13/98	TITLE	DC/DC POWER CONVERTER			
CHECKED	NAT 255					
APPROVED	NAT 114	SIZE A	CAGE CODE 3AB01	PART NO. VR28–013	REV. 2.00	SHEET 1/1
FILE 405–0.DWG		DWG. TYPE CONNECTOR MAP		DWG. NO. VR28\013\405–0		

REVISIONS			
REV	DESCRIPTION	DATE	BY
1.10	ECR #1181 UPDATED LABEL.	MAY 19/98	MWS
1.20	ECR #1264 – HEATSINK REDESIGNED.	OCT 30/98	TGM
1.30	ECR #1730 – HEATSINK CHANGED BACK TO ORIGINAL, FORMAT CHANGES.	OCT 9/01	TAT
2.00	DOCCR01506 – REDESIGN	JAN 11/06	MWS



NOTES:
1. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5M–1994

TOLERANCES UNLESS STATED OTHERWISE 0.X=+/–0.030 0.XX=+/–0.010 0.XXX=+/–0.005 0.XXXX=+/–0.002 ANGLE=+/– 0.5 DEG.	DIMENSIONS IN INCHES THIRD ANGLE PROJECTION	DESIGNED	KEH	NORTHERN AIRBORNE TECHNOLOGY LTD.			
		DRAWN	MWS				
		DATE	MAY 13/98	TITLE	DC/DC POWER CONVERTER		
		CHECKED	NAT 201 / NAT 255				
MASS: 1.02 lbs. (0.46 kg) MAX		APPROVED	NAT 114	SIZE A	CAGE CODE 3AB01	PART NO. VR28–013	REV. 2.00 / SHEET 1/1
MATERIAL: –							
FINISH: –		FILE	922–0.DWG	DWG. TYPE	MECH. INSTALLATION	DWG. NO.	VR28/013/922–0

Section 3 Operation

3.1 Introduction

Information in this section consists of the functional and operational procedures for the VR28-013 DC/DC Power Converter.

3.2 General

When the Power Key line (J2 - pin 3) is grounded, the unit will turn on and the preset output voltage will be generated.

An external LED located near the connector illuminates green to indicate that the circuitry is working and that output power is being generated.

3.3 Operation Specifics

The VR28-013 has no user operational aspects.

End of section 3