GE Medical Systems

Technical Publications

Direction 2266541

Revision A

Phoenix PDU Module in 0.7T Power Cabinet

Operating Documentation

TABLE OF CONTENTS

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS — This manual contains important instructions for the GRFD Power Distribution Unit (PDU) that must be followed during installation, operation, and maintenance.

OPENING ENCLOSURE EXPOSES HAZARDOUS VOLTAGES. REFER SERVICE TO QUALIFIED PERSONNEL.

Note

As standards, specifications, and designs change from time to time, please ask for confirmation of the information given in this publication.

1 INTRODUCTION

1–1 General Description

The GRFD Power Distribution Unit (PDU) distributes power to various components of a General Electric MRI system while providing surge suppression and electrical isolation from the power line. Three phase input voltage is selectable among six levels: 200 Vac, 208 Vac, 380 Vac, 400 Vac, 415 Vac, and 480 Vac. Rated frequency is 50/60 Hz. Power rating is 20 kVA continuous, 35 kVA instantaneous. The PDU mounts in a standard 19–inch rack.

GRFD POWER DISTRIBUTION UNIT
ILLUSTRATION 1–1

1–2 Scope

This manual describes procedures for installation and basic operation of the GRFD Power Distribution Unit as well as procedures for failure diagnosis/isolation and installation of field replaceable components of the PDU.

2 SPECIFICATIONS

Specifications subject to revision without notice

Model Number
2228875

2–1 Electrical Specifications

Power Rating
20 kVA Continuous; 35 kVA Instantaneous

Input Voltage
200Δ, 208Δ, 380Δ, 400Δ, 415Δ, or 480Δ Vac, User Selectable

Frequency
50/60 Hz

Output Voltage
208Y/120 Vac

Overload Protection
Input main circuit breaker with adjustable trip settings; output distribution circuit breakers

Load Current
55 amperes total maximum continuous

Transformer Impedance

Less than 2%

Efficiency

97% Typical

2–2 Environmental Specifications

Heat Dissipation

2111 BTU/Hr

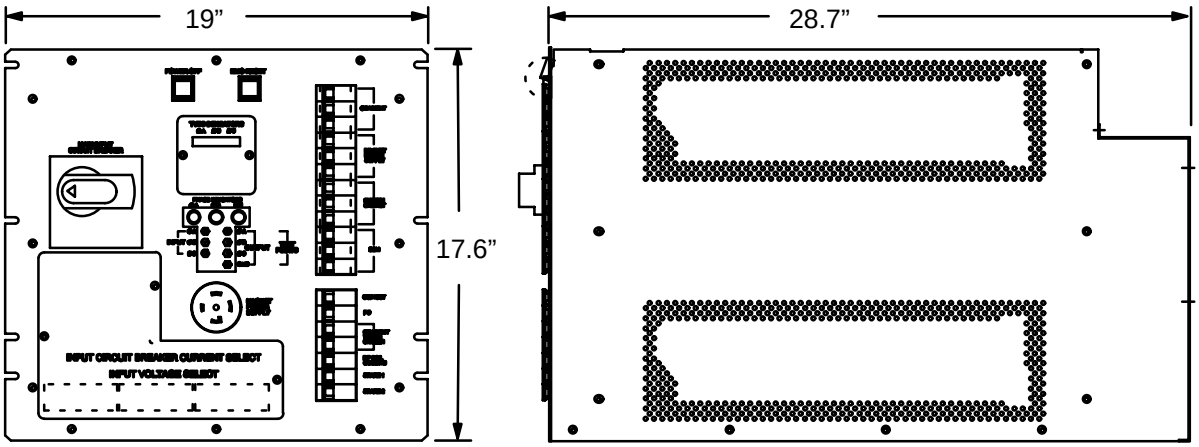
2–3 Mechanical Specifications

Weight

465 lb / 212 kg

Dimensions

See Illustration 2–1



GRFD PDU Overall Dimensions
ILLUSTRATION 2–1

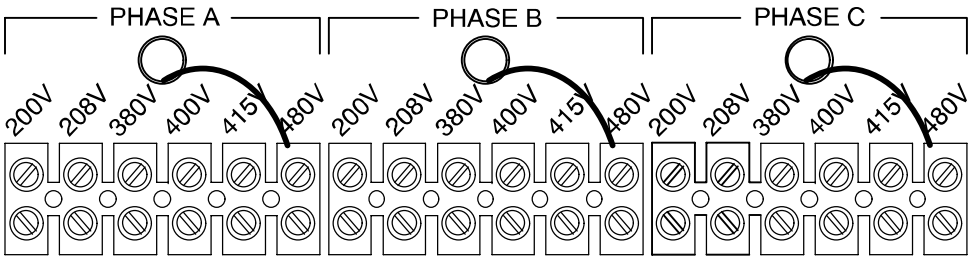
3 INSTALLATION AND OPERATION

3–1 Installation

3–1–1 Input Voltage Selection

Before connecting the input power cables, determine the nominal value of the input voltage. The PDU allows for nominal input voltages of 200, 208, 380, 400, 415, or 480 Vac (three phase). Input voltage selection is accomplished as follows:

1. On the Main Disconnect Panel (MDP), turn off the PDU circuit breaker, lock and tag.
2. Using a voltmeter or other voltage indicating device, check to be sure that no voltage is being applied to the input of the PDU.
3. Remove the plate from the front panel of the PDU marked INPUT CIRCUIT BREAKER CURRENT SELECT / INPUT VOLTAGE SELECT.
4. Illustration 3–1 shows the Input Voltage Select terminal block. For each of the three phases, be sure the wire is connected to the proper terminal for the actual input voltage at the site and that the terminal screw is tight to make a good connection.



INPUT VOLTAGE SELECT TERMINAL BLOCK
ILLUSTRATION 3–1

5. The overload and short circuit trip settings for the Input Circuit Breaker must now be set to the correct values corresponding to the input voltage.
   5a. Remove the small cover plate under the main circuit breaker which is held in place by three screws and lift open the transparent plastic cover on the lower portion of the circuit breaker to give access to the dip switches controlling the circuit breaker operation.
   5b. Illustration 3–2 shows the position of the dip switches for each input voltage selection. The switches immediately under the letter “L” are the only ones that should be changed. All others must be left in their “as shipped” up position.

3–1–2 Connection

Note the Cable Access Panel shown in Illustration 3–5 at the lower portion of the rear of the PDU. This panel provides strain relief cable clamps for the input and the various output cables. This panel may be removed from the PDU to provide easier access to the terminal blocks.

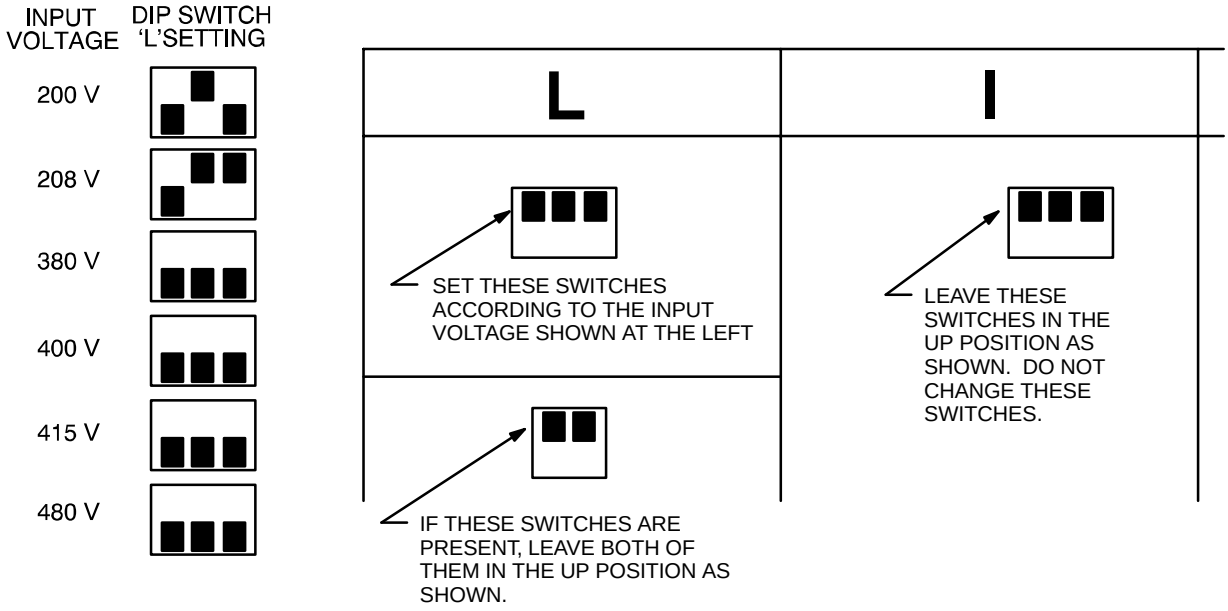
1. Route the cables through their respective cable clamps and connect cables to the appropriate terminals as shown.
2. Replace the Cable access Panel and tighten the cable clamps.

NOTE

For input cables, use wire sizes in accordance with National Electric Code Table 310–16. The following table gives maximum full–load input currents in amperes (which would occur at 10% undervoltage) for each of the several input voltages, as a guide to selecting proper wire sizes.

Maximum Input Current vs. Input Voltage
TABLE 3–1

Input Voltage	200 V	208 V	380 V	400 V	415 V	480 V
Maximum Input Current	67 A	64 A	35 A	33 A	32 A	28 A



CIRCUIT BREAKER DIP SWITCH SETTINGS
ILLUSTRATION 3–2

3–2 Operation

3–2–1 Main Input Circuit Breaker

The Main Input Circuit Breaker operating handle has three positions:

- OFF (as shown in Illustration 3–4),
- ON (vertical), and
- TRIPPED (slightly to the right of vertical). If the Main Input Circuit Breaker has been tripped, it is necessary to move the handle to the OFF position to reset it before turning it ON.

The Main Input Circuit breaker may be locked in the OFF position. By pressing on the small triangle on the operating handle, the lockout tab is made accessible to a padlock.

3–2–2 Power Off

This square pushbutton at the top of the front panel, when pressed, will immediately trip the Main Input Circuit Breaker, interrupting all power to the load.

3–2–3 EMO Reset

This square pushbutton immediately to the right of the Power Off pushbutton will enable the Emergency Stop circuit.

3–2–4 TVSS Indicators

To the right of the Main Input Circuit Breaker is a small cover plate labeled “TVSS INDICATORS.” A cutout in this plate makes visible the indicator on each of the three TVSS modules. Should a TVSS module fail because of a particularly large voltage surge, a flag on the module indicator will appear showing the word “DEFECT” and the Main Input Circuit Breaker will trip. Therefore, should the Main Circuit Breaker trip unexpectedly, check the TVSS Indicators for one or more failed modules showing the word “DEFECT” (see Illustration 3–3). Any module that fails must be replaced to restore the PDU to operation with surge protection functioning. See Section 4–1–1, Replacement of a TVSS Module, for instructions for replacing a TVSS Module.

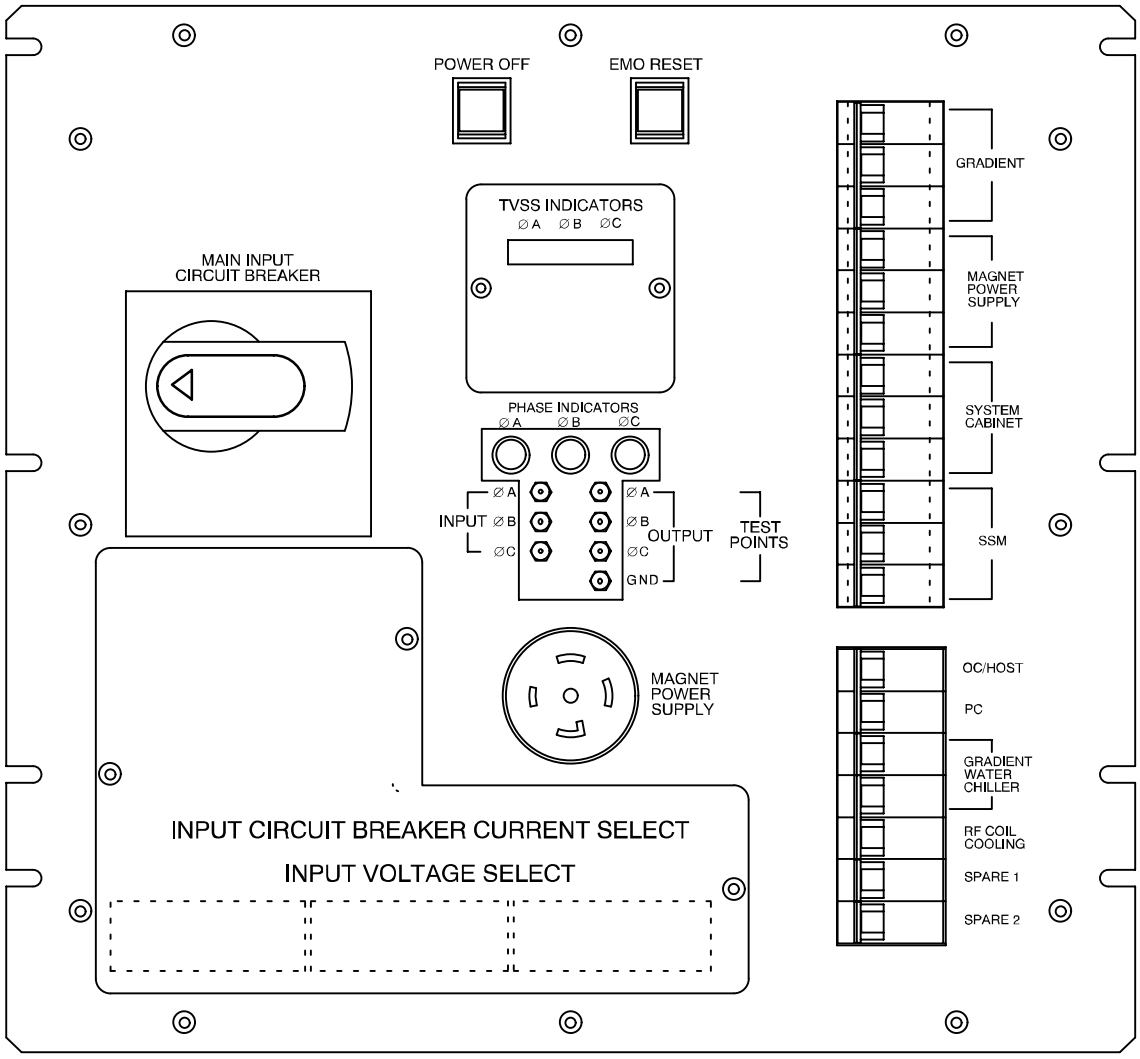
FAILED TVSS MODULE
ILLUSTRATION 3–3

3–2–5 Phase Indicators

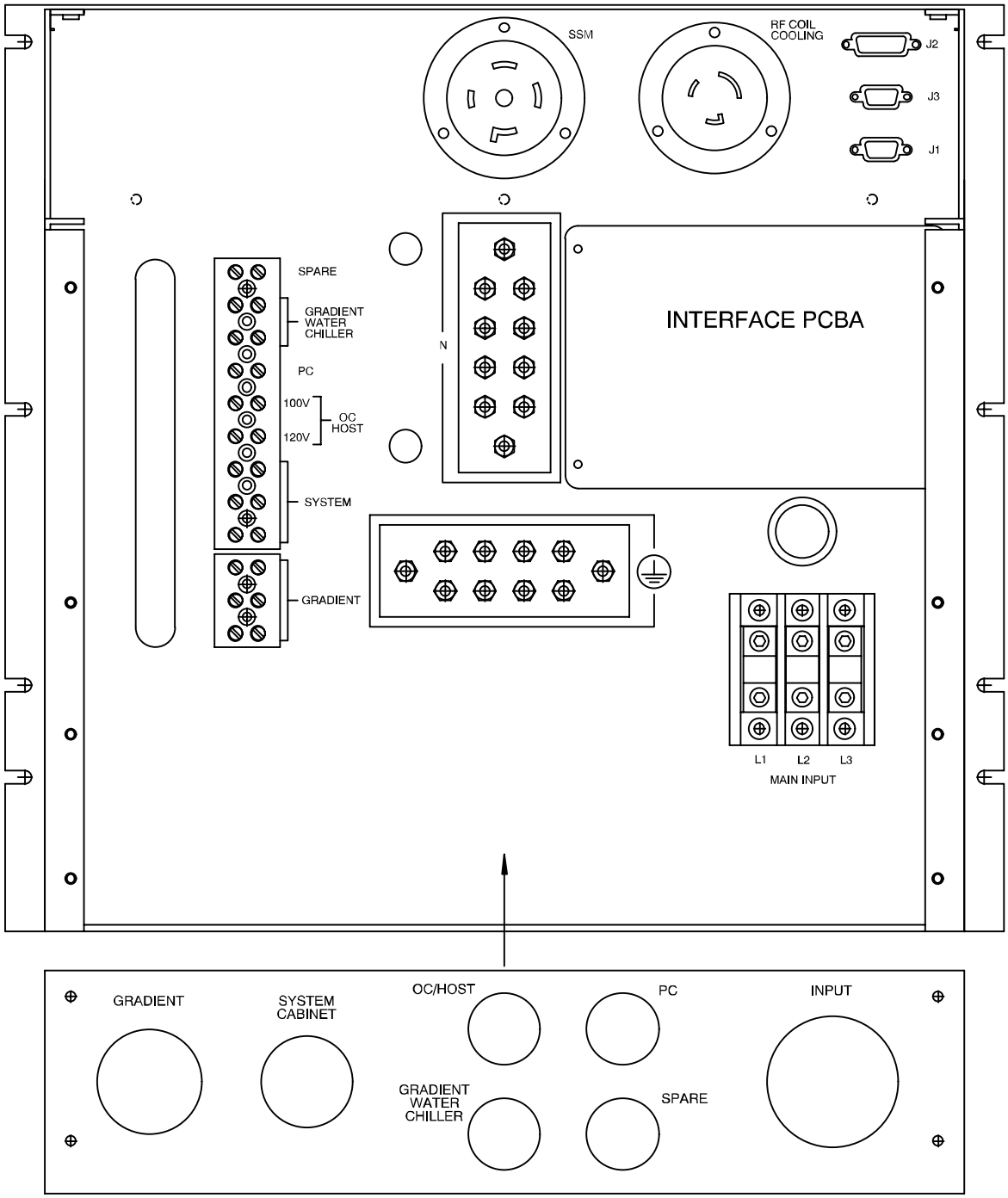
Just below the TVSS Indicator cover plate are three Phase Indicator lights. These indicate that the transformer is energized and ready to deliver power to the load.

3–2–6 Input / Output Voltage Test Points

Immediately below the Phase Incidators on the front panel are jacks into which can be plugged connectors for testing for input and output voltage. See Illustration 3–4. The voltage at these points is reduced by a factor of 100:1 from the actual voltage at the terminal blocks



FRONT PANEL COMPONENT LOCATIONS
ILLUSTRATION 3–4



REAR PANEL COMPONENT LOCATIONS

ILLUSTRATION 3–5

4 FIELD REPLACEABLE UNITS (FRU'S)

LISTING OF FRU's
TABLE 4–1

Item	Phoenix Power Systems Part No.	Description	FRU Type
1	005–00080–01	Control PCBA	1
2	003–00040–01	Power Off / EMO Reset Switch	2
3	05512–1000	Capacitor, 50 µF, 250 Vac	N
4	001–00286–04	Front Panel	2
5	001–00288–02	Rear Cover	2
6	003–00041–01	Input Circuit Breaker Assy	2
7		Screws for Panels	2
8	393–00005	TVSS Module	1
9	476–00007	Contactor	N
10	380–00002	Green Neon Indicator	2
11	182–01345	CB, 16A, 1 Pole	2
12	182–00029	CB, 20A, 1 Pole	2
13	182–00078	CB, 30A, 1 Pole	2
14	182–01012	CB, 20A, 2 Pole	2
15	182–00012	CB, 30A, 3 Pole	2
16	182–00027	CB, 60A, 3 Pole	2
17	675–00012	Switch, SPDT, 20A	2

4–1 FRU Installation

4–1–1 Replacement of the TVSS Module

The operation of the TVSS Indicators is explained in Section 3–2–4, TVSS Indicators. If one (or more) of the indicators shows that a TVSS Module has failed, follow the steps below to replace the failed module and restore TVSS protection:

1. On the Main Disconnect Panel (MDP), turn off the PDU circuit breaker, lock and tag.
2. Using a voltmeter or other voltage indicating device, check the voltage at the input terminal block TB1 to be sure that no voltage is being applied to the input of the PDU.
3. On the front panel of the PDU, remove the small cover plate over the TVSS Modules.

TVSS COVER PLATE
ILLUSTRATION 4–1

4. Then pull out the failed TVSS Module(s) (showing the word “DEFECT”) and plug in the replacement(s) as shown in Illustration 4–2.

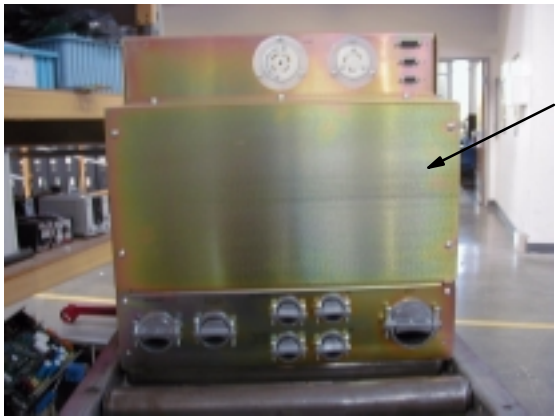
TVSS MODULE REPLACEMENT
ILLUSTRATION 4–2

5. Replace the TVSS Cover Plate and re–energize the PDU.
6. Verify that all TVSS Modules are good (no defect displayed).

4–1–2 Replacement of the Control PCBA

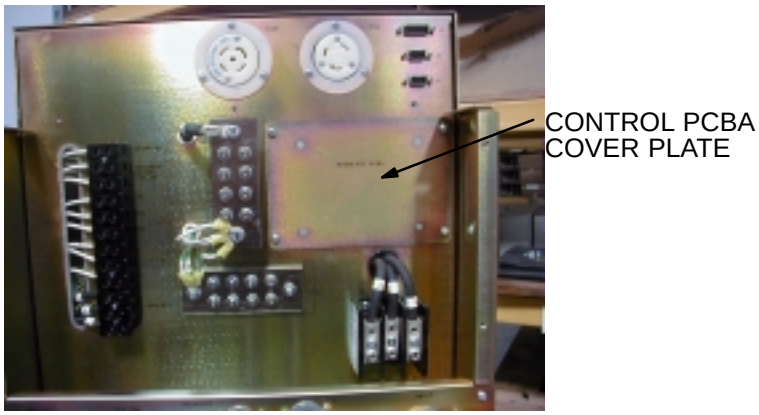
Follow the steps below to replace a failed Control PCBA:

1. On the Main Disconnect Panel (MDP), turn off the PDU circuit breaker, lock and tag.
2. Using a voltmeter or other voltage indicating device, check to be sure that no voltage is being applied to the input of the PDU.
3. Remove the Rear Cover Plate as shown in Illustration 4–3 by removing the seven screws that hold it in place.



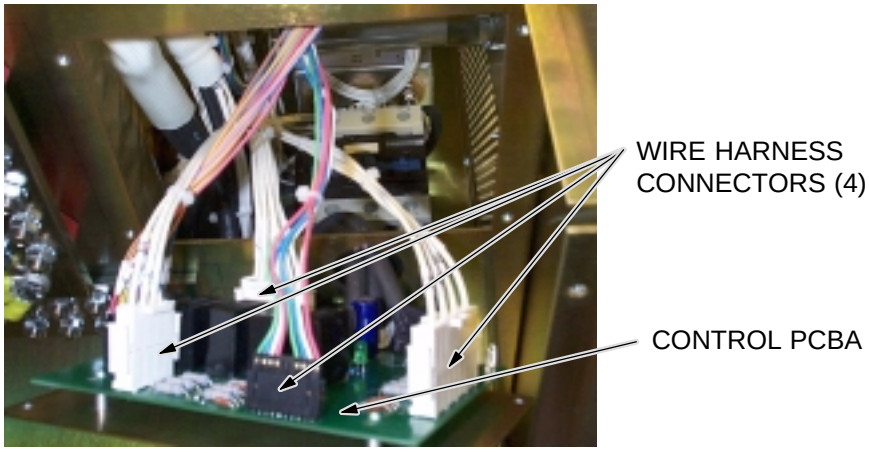
REAR COVER PLATE REMOVAL
ILLUSTRATION 4–3

4. Remove the four screws from the cover plate marked “INTERFACE PCBA.”



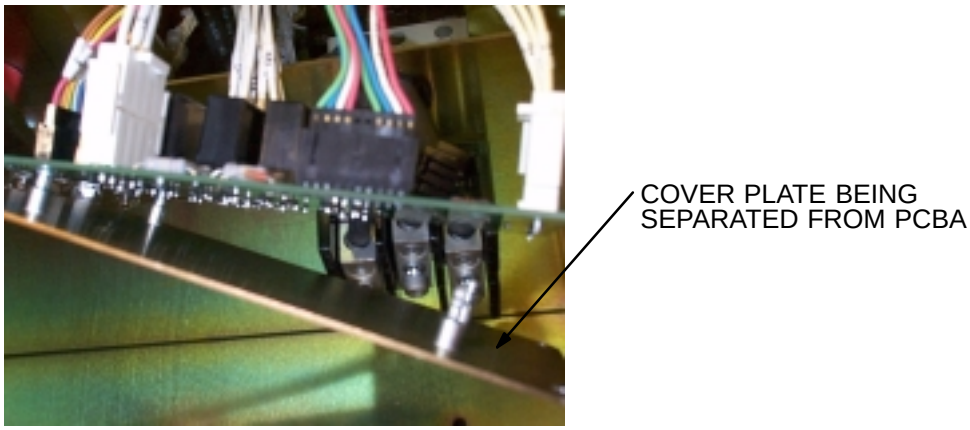
CONTROL PCBA COVER PLATE
ILLUSTRATION 4–4

5. Carefully back out the cover plate and the attached Control PCBA as show below. Then unplug the four connectors that connect wire harnesses to the PCBA.



PCBA HARNESS CONNECTORS
ILLUSTRATION 4–5

6. Remove the PCBA from the cover plate. A slight force will separate it as shown below.



SEPARATING COVER PLATE FROM CONTROL PCBA
ILLUSTRATION 4–6

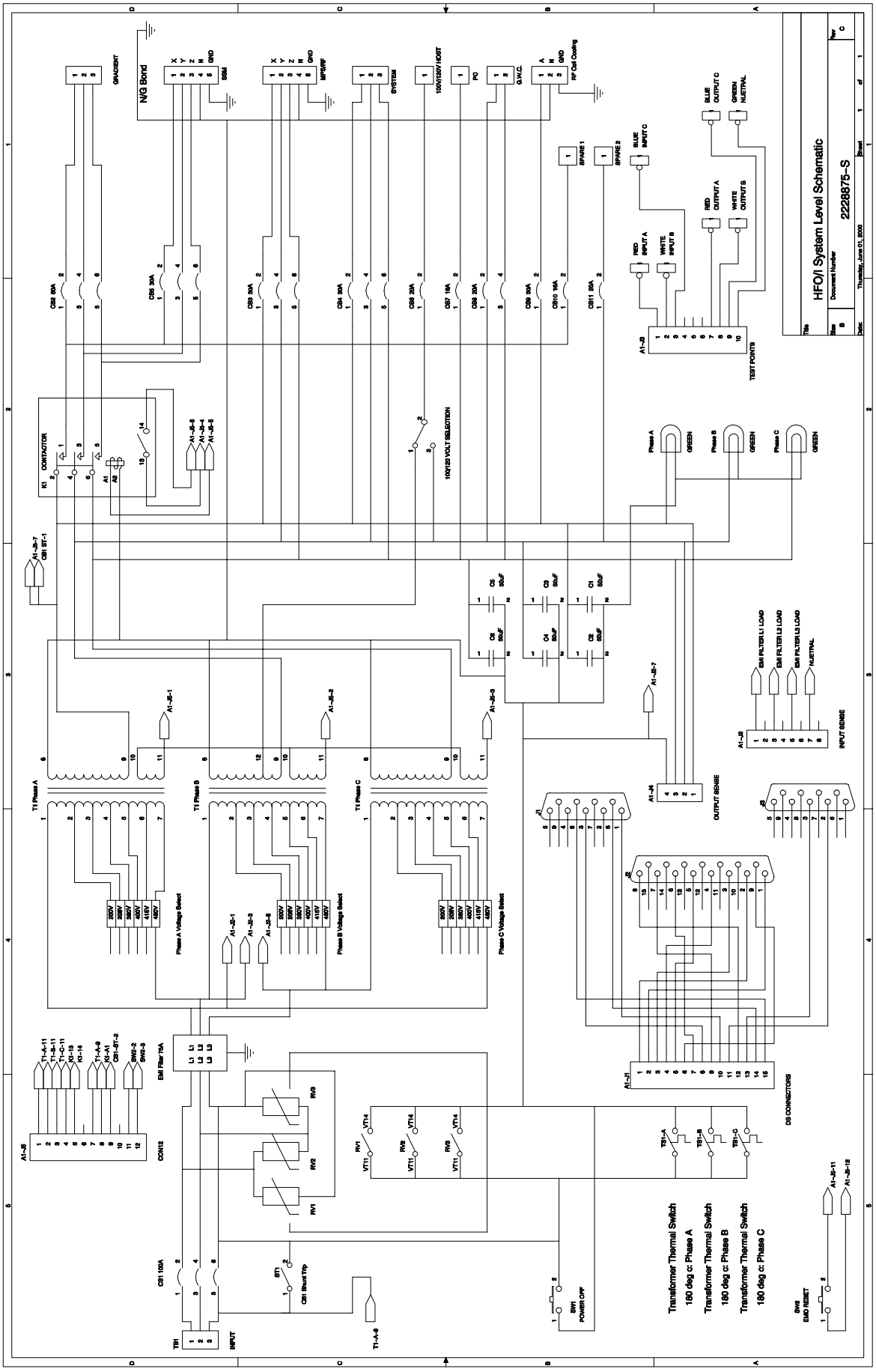
7. Snap the replacement PCBA on to the cover plate, reconnect the harness connectors, put the assembly back in place and attach it with the four screws previously removed.
8. Re–energize the PDU and resume normal operation.

4–1–3 Troubleshooting Guide

The following table lists fault conditions that may be encountered along with possible causes and solutions.

Troubleshooting Guide
Table 4–2

Fault Condition	*Possible Cause*	*Solution*
Main Input CB Trips	TVSS Module failure	Check TVSS modules for failure, "DEFECT" will appear in window when failure has occurred. Replace defective TVSS module.
	Overtemperature	Investigate cause of overtemperature, then allow unit to cool down and reset circuit breaker.
	Shorted Power Off Switch	Replace Power Off switch
	Open from J3-2 to J3-3	Check wiring to J3
Distribution Breakers Tripping	Deffective Circuit Breaker	Change Circuit Breaker
	Overload	Check Load
K1 Contactor not operating	Defective Contactor	Ensure that the contactor is receiving 120V to A1 and A2. If 120V is present, then replace contactor.
	Defective PCBA	If 120V is not present at A1 and A2 of K1, then verify that J2-7 to J2-8 is shorted. If not shorted, verify that the wiring is correct. If wiring is correct, then replace Control PCBA.
Indicators not lighting when power is applied	Input Circuit breaker off	Turn input breaker on
	Input phase missing	Verify that all phases are present at TB1
	Light burned out	Replace light
Input / Output Voltage sensing	Not getting proper output	If the voltage measured is not the 100:1 ratio, replace the Control PCBA


HFO/I System Level Schematic
2228875-S
Thursday, June 01, 2000
N/G Bond
GRADIENT
SSM
MPS/RF
SYSTEM
100V/200V HOST
PO
G.M.C.
RF Coil Cooling
SPARE 1
SPARE 2
BLUE
INPUT C
RED
INPUT A
WHITE
INPUT B
BLUE
OUTPUT C
RED
OUTPUT A
WHITE
OUTPUT B
GREEN
NUETRAL
TEST POINTS
CONTACTOR
100V/200 VOLT SELECTION
Phase A
Phase B
Phase C
GREEN
EMI FILTER L1 LOAD
EMI FILTER L2 LOAD
EMI FILTER L3 LOAD
NUETRAL
INPUT SENSE
OUTPUT SENSE
T1 Phase A
T1 Phase B
T1 Phase C
Phase A Voltage Select
Phase B Voltage Select
Phase C Voltage Select
200V
208V
380V
400V
416V
480V
EMI Filter 75A
CON12
INPUT
CB1 100A
CB1 Shunt Trip
DB CONNECTORS
Transformer Thermal Switch
180 deg cc Phase A
Transformer Thermal Switch
180 deg cc Phase B
Transformer Thermal Switch
180 deg cc Phase C
SW1
POWER OFF
SW2
EMO RESET

REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
A	June 7, 2000	A. King	Initial version GRFD PDU Model 2228875 User's Manual

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