Service and Operations Manual

for the

UP200-V2

Digital Electrostatic Power Supply

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Version 1.00 Rev A – PRELIMINARY

Table of Contents

Section 1
Description

The UP200-V2 power supply is an upgrade and a key element in a modern electrostatic finishing system. The basic operation is to provide a controlled low voltage (0 to –21VDC) output to the electrostatic cascade that is capable of providing up to 100,000 volts. The UP200-V2 incorporates state of the art safety features and fail-safes to provide for a safe operating environment. These include:

- Over voltage detection
- Over current detection
- Fast current slew rate detection and limiting
- Turn-on proximity detection
- Open and short line detection and protection
- Current limiting via voltage fold-back

plus several other innovations.

The UP200-V2 is capable of being operated by a Robot or PLC in a fully automated system.

The UP200-V2 is similar in operation to the UP-200 except it does not have the three-button front panel interface for adjusting the supply's most critical operating parameters and safety thresholds. A front panel data port with a PC –GUI allows access to all options, diagnostics, and reporting features. A special feature of the UP200-V2 is its direct input of operating parameters using standard units; i.e. the Current Fault threshold is input in microamps. This feature permits precise and repeatable operation of the supply and eliminates the need for personnel to enter the paint booth for setting and checking parameters and calibration.

Section 2
Controls and Operation

2.1 Front Panel Description

The UP200-V2 allows viewing and setting important operational and safety parameters from the front panel. The front panel features clear display of output voltage and current values.

2.1.1 KV Status Window

At the top of the front panel is a 3-digit window that normally displays the voltage (kV) at the tip of the atomizer. This is based on the output voltage of the power supply. A display of "FLt" in this window indicates that a system fault has occurred and the supply has been temporarily shut down, other fault codes include dI, I, P and L.

2.1.2 uA Window

The lower 3-digit window on the front panel displays the micro Amps (uA) being delivered by the cascade or is used to show the value of a fault.

2.1.3 HV Enabled Warning LED

This LED indicates that the UP200-V2 is delivering high voltage. High Voltage can be enabled either by the front HV Enable Switch or by the Remote Controller. This is to inform personnel to be careful when in the paint booth.

2.1.4 Fault LED

This LED indicates the UP200-V2 is in a fault situation and that the fault relay has been set.

Types of Faults

1. didt Fault
2. Current Fault
3. Line Fault
4. Voltage Fault
5. Proximity Fault

2.1.5 Foldback LED

This LED is for indicating certain action being taken by the UP200-V2.

It will flash anytime the unit goes into foldback. A foldback (output voltage reduction) is an action that happens if the current limit is reached or a didt foldback is reached. It is normal to see this flash once in a while, but many foldback operations is an indication that either the paint sprayer is to close to the work, or voltage is to high.

2.1.6 Mode Switch

The front panel has one option switch. Its purpose is to allow the user to go into local mode and test the voltage with a test wand without attaching a GUI system. EFC recommends setting the Local voltage to 50KV or 60KV for accurate readings.

There are two modes available:

Normal – which allows the UP200-V2 to operate exactly as indicated by the GUI settings.

Local – which will force the UP200-V2 into Local Mode and set the output voltage as Local setting set by the GUI. This option does not enable the supply.

2.1.7 HV Enable Switch

The HV Enable switch allows high voltage output to be engaged from the front panel. This is normally used for testing as with the Mode Switch.

2.1.8 Power On/Off Switch

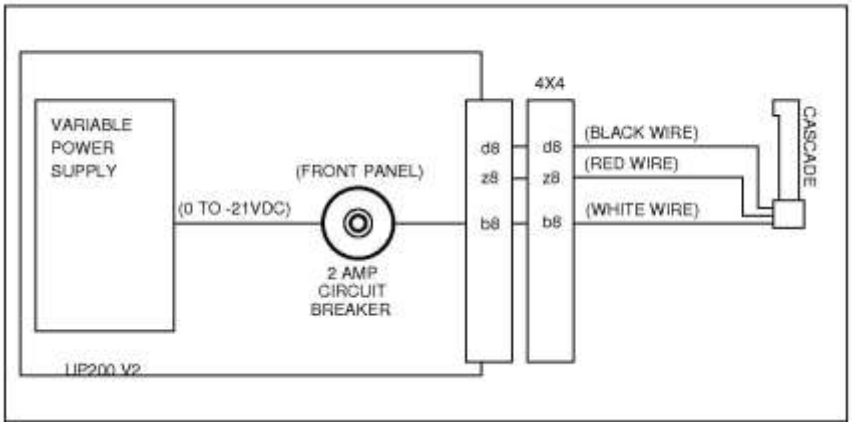
The main power switch on the front panel controls the incoming AC power. When in the off position, all power to the supply is turned off.

2.1.9 Local Data Port

This is the front panel interface to a PC running the ATP-4000 GUI program. The interface is RS232, 9600bps, 8 Bits, No Parity, 1 Stop Bit, Xon/Xoff flow control. Emulation is AJSON.

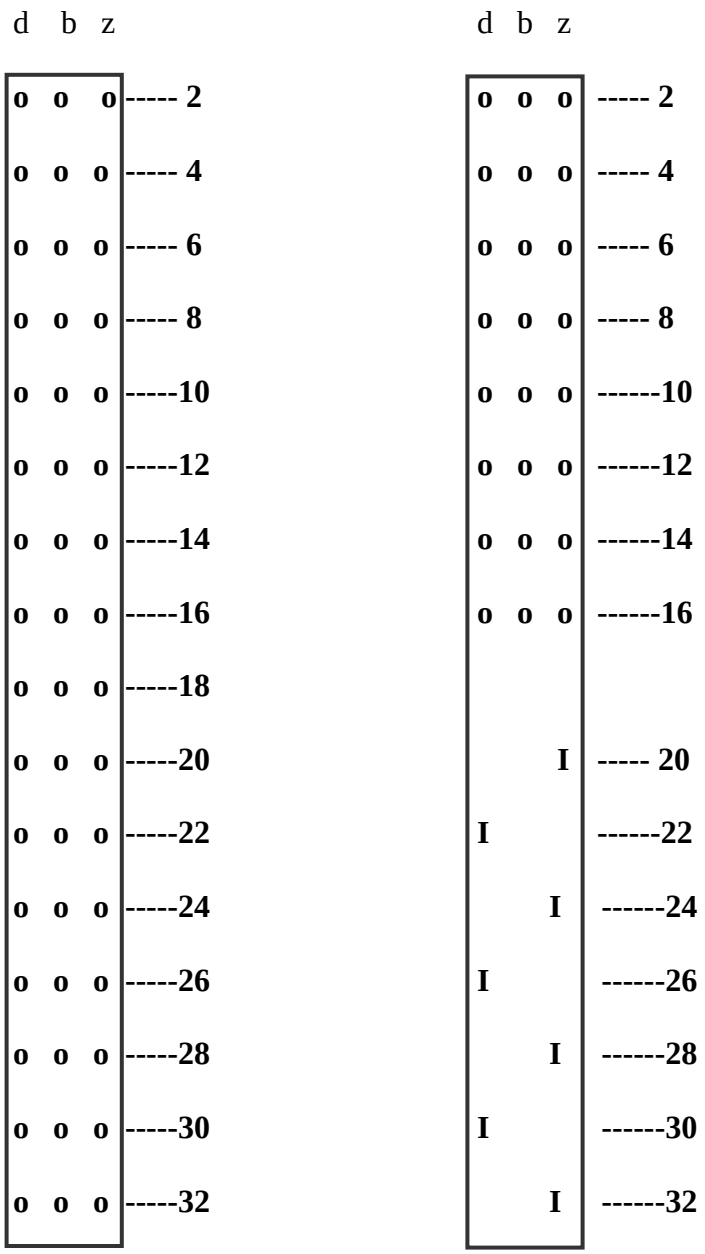
2.1.10 HV Circuit Breaker

This is the last line of protection for the power output of the UP-200 V2. The HV circuit breaker is tripped if the output is shorted and the processor cannot protect the circuit in time. When tripped the breaker's button will stick out indicating a fault. Check the wiring for a short and Press the button back in to reset the breaker.

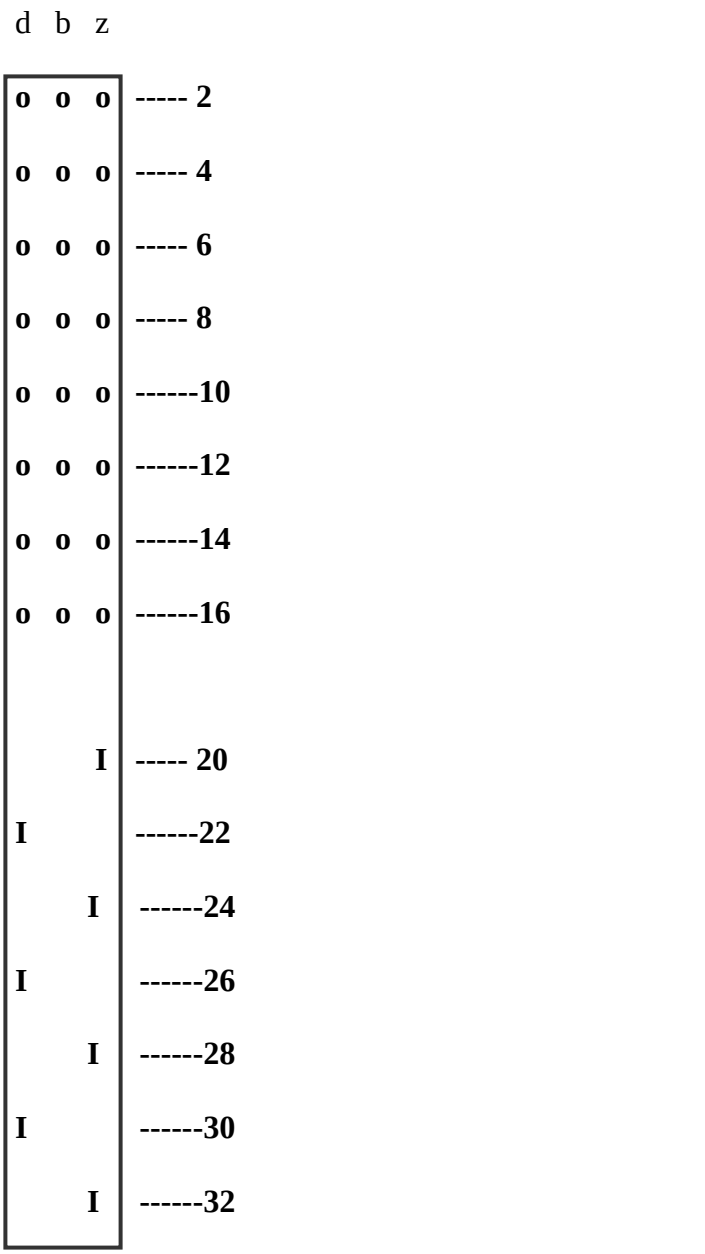


Section 2.2
Back Plane Connectors (A/B)

The rear panel consists of two connectors. These are referred to as A (Top) and B (Bottom). These connectors provide the interface to the backplane of the supply. Refer to Appendix A for details on these connectors.



Connector A (Top)
Rear View
Mate: EFC 60-1A69

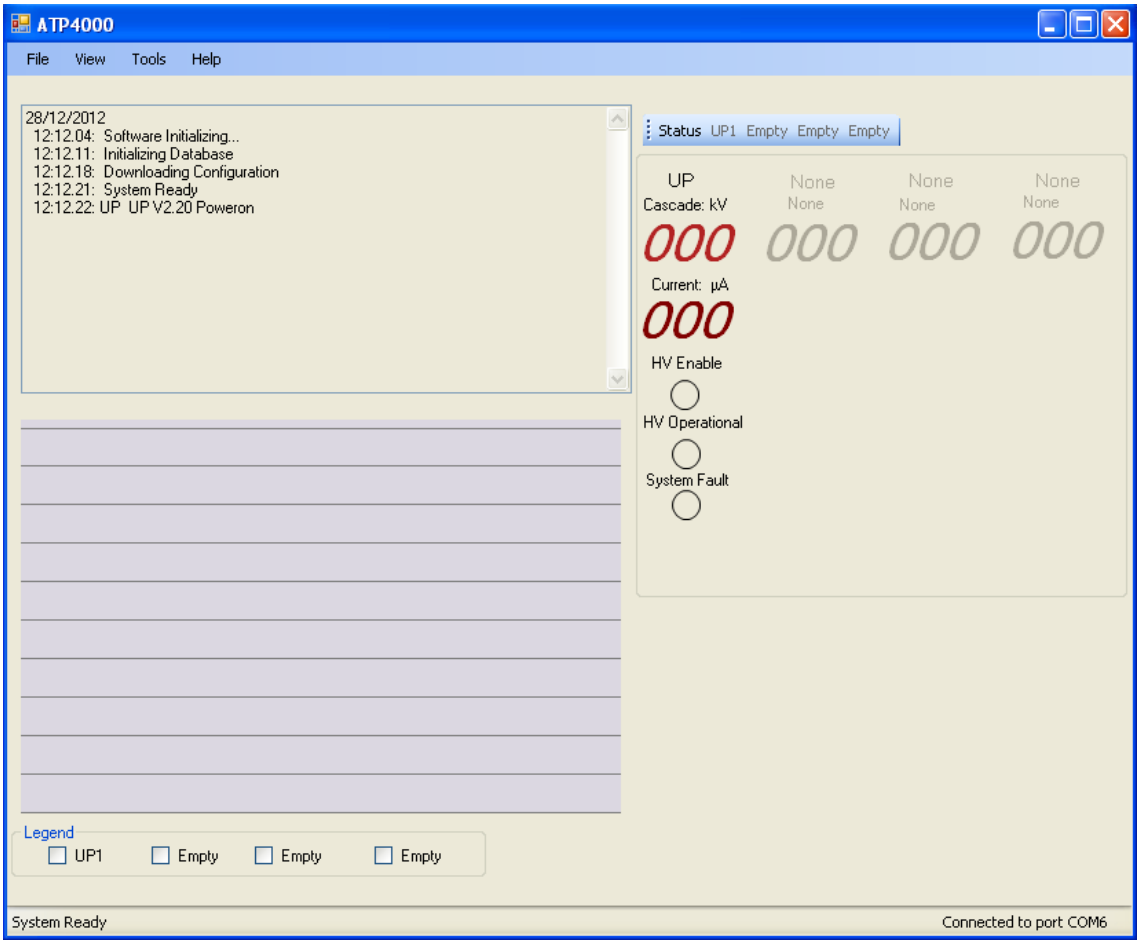


Connector B (Bottom)
Rear View
Mate: EFC 60-1A70

Section 3
ATP4000 GUI

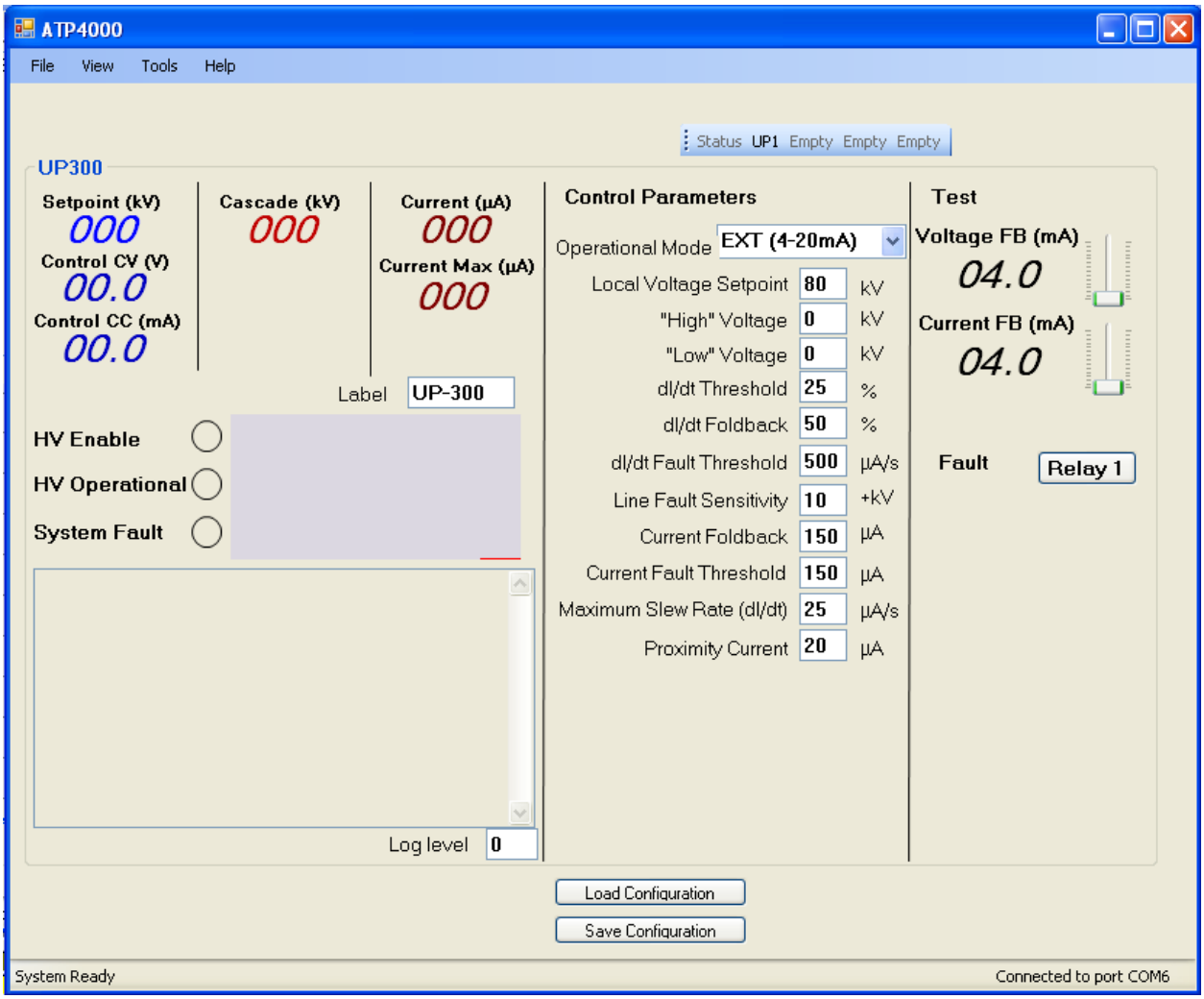
The UP200-V2 communicates to a PC using the ATP4000 GUI. This must be installed and will automatically look through all Com ports to find the UP200-V2. This is a Visual Basic.Net software package only available from EFC. The ATP4000 GUI is designed for setup and operation of the UP200V2, UP250, UP300, TSC300, and AFC300. Below is a subset of the ATP4000 documentation for the UP200-V2.

Top control page of the ATP4000 GUI that has discovered a UP connected. The UP200-V2 will always show up as Unit 1 as indicated in the device bar at the top right.



Look for the "Connected to …" message in the lower right corner.

By selecting “UP1” in the Device Bar the screen should change to the following:



Note: because the UP200-V2 works exactly like the UP-300 the ATP will report UP300 in the top left corner.

The screen is broken into 3 section:

3.1 Input / Output for showing current action.

a. Shows all inputs 0-10V, 4-20ma remote inputs, Cascade Current, Enable signal, and calculated Set point value based on the setup.
b. Shows all outputs Cascade Voltage, Fault
c. A graph will indicate a running record of what the cascade is doing.
d. Log window showing current action.
e. Label – allows you to tag the device with your personal name.

3.2 PARAMETERS for setting various operating parameters. When a new parameter is entered it will be indicated in red, when the enter key is pressed the data is sent to the unit and confirmed when the data turns black. The following parameters are available:

A. Operational Mode
   Selects among four modes of voltage control operation:
   A) Local – voltage set to fixed value when enabled
   B) Hi/Lo – voltage set to High or Low value based in input signal
   C) External Current – 0-20mA input for 0-100kV output
   D) External Voltage – 0-10V input for 0-100kV output
   E) External 4-20mA – 4-20mA input for 0-100kV output

B. Local Voltage Setting
   Specifies output voltage (kV) when operating in Local mode. In local mode, the UP-200 provides 0kV when disabled and this voltage when enabled. The enable signal is described in Appendix A, Connector A, pins Z2 and B2.

C. External "High" Voltage
   Specifies the "high" voltage when working in the Hi/Lo operational mode. The UP200-V2 will deliver this voltage when the Hi/Lo contacts are shorted (closed). Refer to Appendix A, Connector B, pins B12 and D12.

D. External "Low" Voltage
   Specifies the "low" voltage when operating in Hi/Lo mode. The UP200-V2 will deliver this voltage when the Hi/Lo contacts are open. Refer to Appendix A, Connector B, pins B12 and D12.

E. dI/dt Threshold
   Maximum current increase rate. Limits how fast the supply will allow the current to increase. Specified as a percentage of the dI/dt fault threshold. Chiefly used when ramping up voltage after the supply is enabled. When the current rises to this percentage of the dI/dt fault level, the voltage increase will halt until the rate of current increase subsides.

F. dI/dt Foldback
   Similar to dI/dt Limit, but when the rate of current increase rises to this percentage of the dI/dt fault level, the voltage will be decreased in an attempt to avoid a fault condition. This is a EFC Patented feature.

G. di/dt Fault Threshold.
   If the power supply senses an increase in current faster than this rate it will fault.

H. Line Fault Sensitivity
   This parameter adjusts the level at which the UP200-V2 will start evaluating the feedback to determine if a line fault has happened. In cases of extremely long LV cables, this may need to be increased to eliminate improper line faults.

I. Current Foldback
Threshold (μA) where voltage fold-back begins. This feature is used to avoid current faults by temporarily reducing voltage output when the delivered current exceeds this threshold.

J. Current Fault Threshold
Threshold current (μA) where the UP200-V2 will shut down. If current delivery exceeds this threshold, the system will signal a fault back to the controller and shut down the supply.

K. Maximum Slew Rate (dI/dt)
The maximum current slew rate (μA/s) fault level. A rapid increase in current is a precursor to arcing. Careful adjustment of this parameter affords protection against sparks.

L. Proximity Current
Each time high voltage is enabled, the supply performs a short proximity check. It adjusts itself to produce 25kV and then looks for current. If it sees more than this number of microamps, the atomizer is presumed to be close to some object and the supply is shutdown.

3.3 TEST

This allow the user to test different outputs for proper operation.

A. Voltage FB (mA) will show the current output of the volt meter feedback output. By moving the slider the output of this interface can be changed.

B. Current FB (mA) will show the current output of the current meter feedback output. By moving the slider the output of this interface can be changed.

C. Fault (Relay1) by clicking this button you can force the fault relay to close.

(Warning this section can cause the power supply to override normal operation parameters.) When the Enable line is toggled the power supply will return to normal operation.

Section 4
Theory of Operation
Patent Pending

The operation of the UP-200 can be broken down into 4 sections (Refer to figure 1), Input, Output, Process and Power. The CPU gathers Input from the various sources, and processes the information to determine the proper Output.

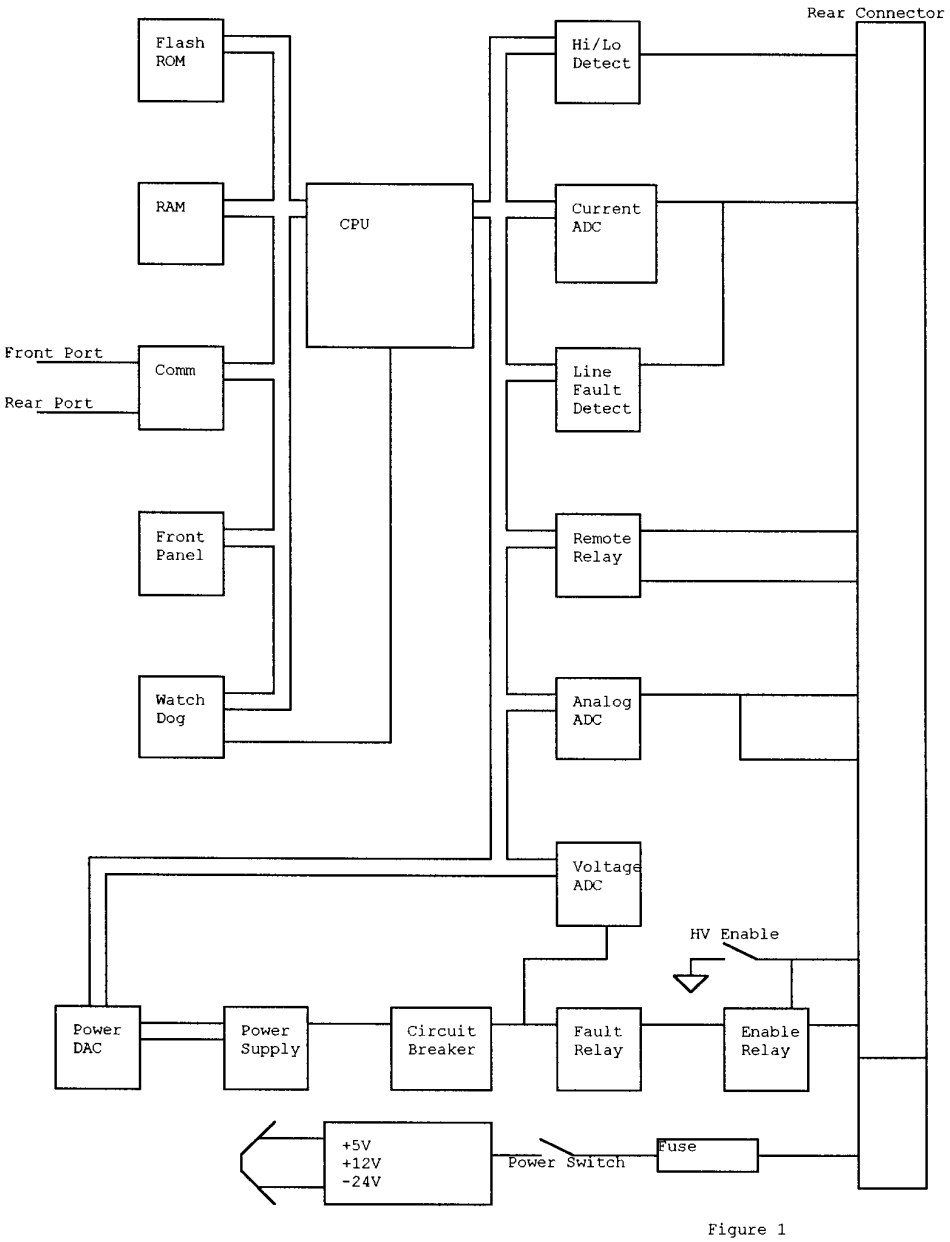


Figure 1

Due to the design and "soft" nature of the UP200-V2, many intelligent features have been added to enhance the safety of the painting operation and to aid in the troubleshooting of system problems.

4.1 Fail Safe Features

Many Fail Safe Features have been added to the product as follows:

- 5V Fail - If the +5V is lost the Fault Relay will open and disengage the power from the output leads.

- 12V Fail – If the +12V is lost the Enable Relay will open and disengage the power from the output leads.

- CPU Watchdog – If the CPU stops or gets stuck in a loop, a watchdog circuit will reset it. The reset will also clear the fault relay and thus turn off the power to the output leads. The Watchdog also resets the Fault relay to the off position at power up. The processor must reinitialize the Fault circuit in order for output power to be re-established.

- Power Fail – If the Secondary Supply should fail the microprocessor will detect this, shut down the supply and open the Fault Relay.

- Main Power Fuse – If an internal short or power surge happens the main fuse will blow and shut down the supply.

- Secondary Power Circuit Breaker – If a short happens on the secondary power supply and the microprocessor fails to catch it, the front panel circuit breaker provides the last line of defense.

- Thermal Shut Down of Secondary Supply – The secondary supply has a thermal shutdown mechanism built it. If these parts should exceed a preset limit, the secondary supply will shutdown.

4.2 Software Control

The software monitors many items in sequence to determine proper operation and fault situations. The processor, running at approximately 1 Million Instructions Per Second (MIPS), appears to be doing all these functions simultaneously. The system is designed for real-time (sub-millisecond) management of the safety systems and accurate control of output power.

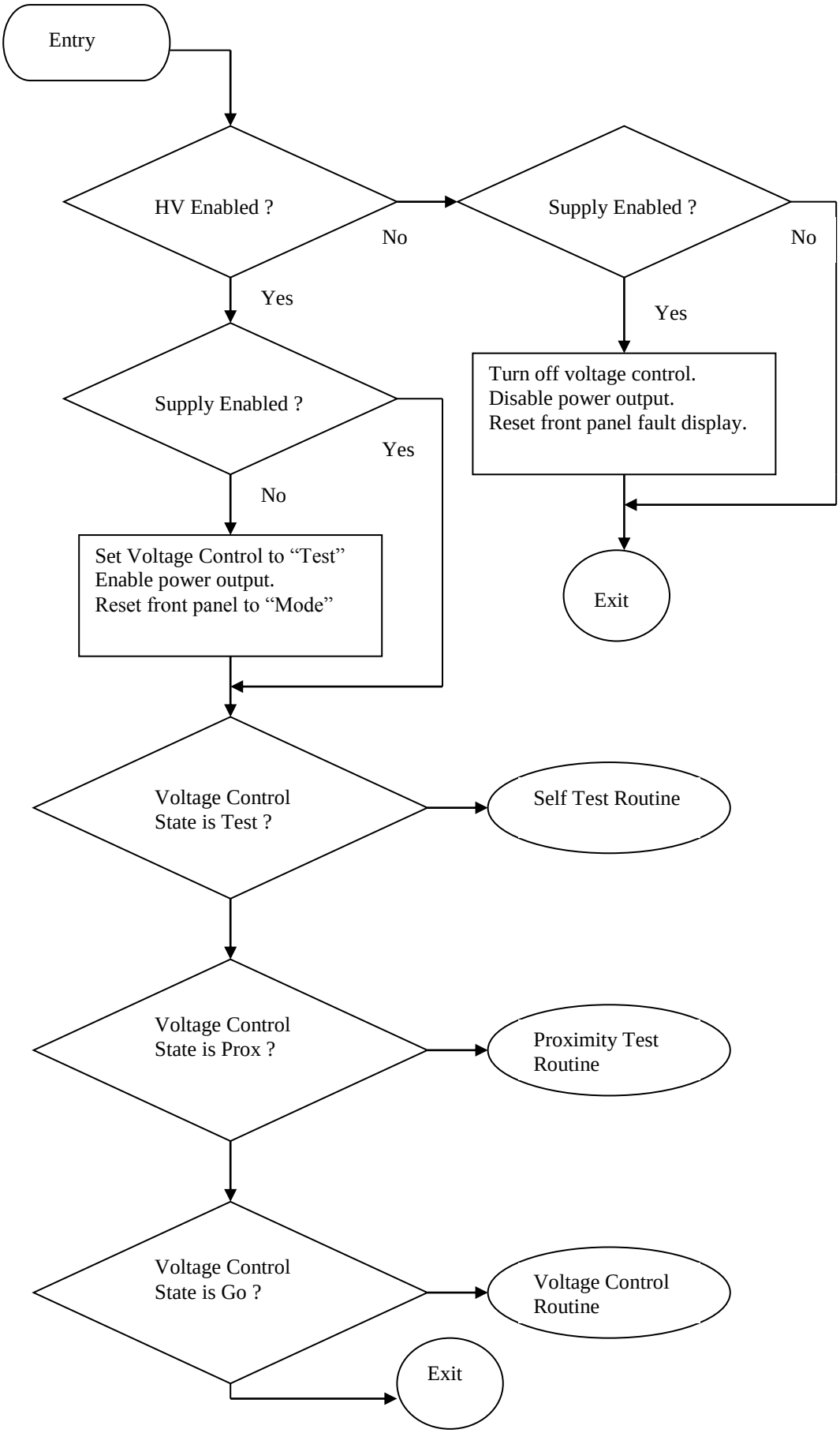
- Monitor the output voltage to allow for a closed loop control, display and report functions.
- Monitor the Cascade Current to allow for current limit, current fault, dI/dt fault, and dI/dt foldback, as well as display and report these functions.
- Monitor the External Control Inputs, (0-20ma External Current Control or 0-10V External Voltage Control, Hi/Lo External Control, and the Enable line) to determine the proper output for the power supply.

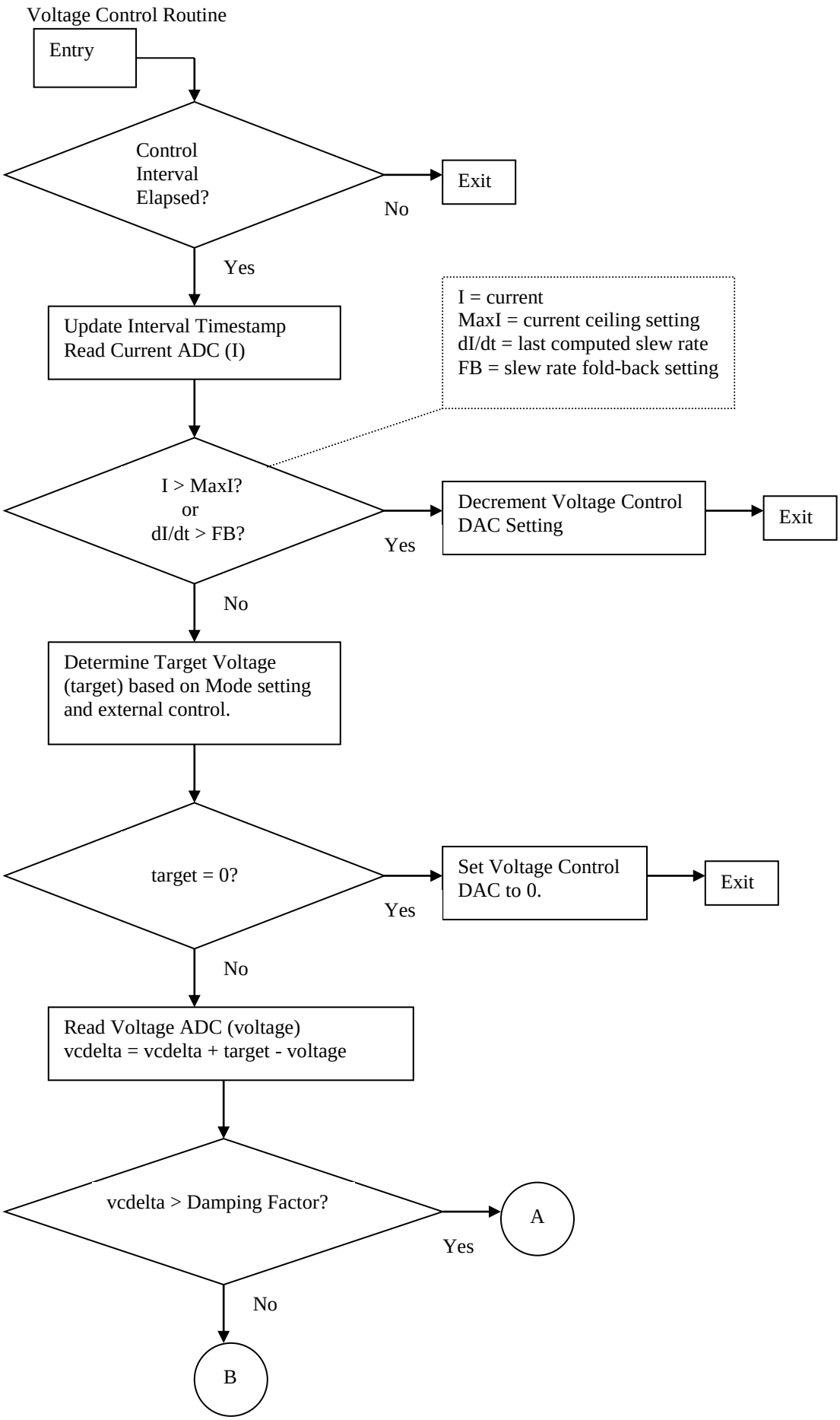
- Monitor the User interfaces (Front Panel, Local Data Port, Main Data Port) to determine proper setup and report operations.

The Following Flow Diagrams show some of the procedures that are used in controlling the Voltage and Faults of the UP-200:

Notice in the voltage control state machine that when the UP-200 is instructed to apply power it does so in a manner as to prevent false faults (i.e. the voltage ramps up at a rate not to exceed 50% of dI/dt and current fault) and yet, provide protection from sparks in the event of a catastrophic incident. dI/dt is not turned off and if a rapidly approaching object, such as a falling grounded pipe, were to come in proximity of the cascade the UP-200 would fault out even at power up.

Voltage Control State Machine




Voltage Control Routine
Entry
Control Interval Elapsed?
No
Exit
Yes
Update Interval Timestamp
Read Current ADC (I)
I = current
MaxI = current ceiling setting
dI/dt = last computed slew rate
FB = slew rate fold-back setting
I > MaxI? or dI/dt > FB?
Yes
Decrement Voltage Control DAC Setting
Exit
No
Determine Target Voltage (target) based on Mode setting and external control.
target = 0?
Yes
Set Voltage Control DAC to 0.
Exit
No
Read Voltage ADC (voltage)
vcdelta = vcdelta + target - voltage
vcdelta > Damping Factor?
Yes
A
No
B

4.3 Communications

The UP200-V2 has two modes of communications, Analog and Digital. In order to keep compatible with the existing controllers, Analog is the interface that is used. Digital is used to provide setup and reporting functions via ATP-4000 GUI. These interfaces are described in the Appendix in more detail.

4.4 Front Panel Fault Indicators

di/dt Fault
kV Window = dI
uA Window = NNN (Value when the unit failed)
Fault LED = On

Current Fault
kV Window = I
uA Window = NNN (Value when the unit failed)
Fault LED = On

Proximity Fault
kV Window = P
uA Window = NNN (Value when the unit failed)
Fault LED = On

Line Fault
kV Window = L
uA Window = NNN (Value when the unit failed)
Fault LED = On

Section 5
Installation

The UP200-V2 is designed to fit into an EFC 6U – 19" rack. The rack will provide up to six sets of connectors (DIN 41612) for the PS-100, UP100, UP200 or UP200-V2 to plug into. When placing units in the rack, be careful that the connectors mate before pushing the power supply in. When the unit is completely seated, lock the unit in place with the four quarter-turn latches. The UP-200 has been designed to be electrically compatible with any existing configuration of equipment for the UP-100, PS-100 or GN3002 Electrostatic Power Supplies. Depending on connector spacing, a 7hp filler panel may be needed. This power supply is specifically designed for the EFC 4X4 Rack, which can contain:

- Four UP-200s
- TSC-400 Quad Turbine Speed Controller
- AFC-400 Quad Flow Rate Controller

This combination is a complete Electrostatic / Turbine Solution for four robots. After installation, refer to the Operations Section (2.0) for detail about setup. For more detail, refer to the Rack Installation Manual.

Section 6
Troubleshooting

The UP-200 is designed to provide as much information as possible in the case of non-operation or Fault conditions. However, due to the limited display space on the front panel some of the errors are encoded.

6.1 Setup Problems

These problems usually indicate a problem in the setup:

Problem	Action / Check
Front Panel Meters are blank.	Is the "Power" switch on, or is the power switch broken. Is AC power being supplied to the unit? Is it Low? Is the Main Power Fuse blown? Is the power pin bent in the B connector? Is the UP-200 pushed fully into the rack?
LED windows are on, Unit goes into fault as soon as Enabled	Depending on which parameter, that is causing the fault, check to make sure that it is set properly, some parameters such as "Proximity Level" is set up by the terminal interface. Are these set correctly? Is the UP-200 pushed fully into the rack? Is there a pin bent on the rear connectors? Is the Circuit breaker button popped up? Is there a broken wire to the cascade?

6.2 Fail Safe Problems

These problems usually indicate a problem with the power supply:

Problem	Action / Check
Front Panel Meters flash on and off.	Check for Low AC input voltage. Also, if unit is cold, condensation may have formed on the circuit board, let unit dry and try again.
Front Panel is blank, and Enable relay clicks when Enable switch is turned on/off	This usually means the +5V PS has failed, return the unit for repair.
Front Panel is ok, but no output, The Enable relay does not click when the Enable switch is turned on/off.	Check the Interlock input on Connector B, if this is not used these input must be shorted. This could also be an indication that the +12V power supply has failed.

Front Panel is ok, Enable relay can be heard when the Enable switch is turned on/off, but no output.	Check the Circuit Breaker on the front panel, if unit is warm the secondary power supply may be in thermal shutdown (let cool). If this continues, check the cascade and wire to make sure excessive current is not being drawn. If none of these fix the problem return unit for repair.

6.3 System Fault Problems

These indicators usually indicate a problem in the system. When the system finds a system fault the top LED window will flash "FLt", the Status Window will display the failing parameter, (Current draw, dI/dt level, Voltage) and the other LEDs on the front panel will indicate what the problem is.

Fault Mode	Action / Check
Current Limit Flashing	This will flash each time the current has tried to exceed the user set limit and the UP-200 has folded back the voltage. This is not a problem, but an indicator to the user that this parameter has been reached. No corrective action needed.
Current Fault Flashing	This can indicate three different faults: Over-Current Fault, Under-Current Fault or Power Up Proximity Fault. When any current fault occurs, the UP-200 will discontinue power output. The value in the Status window is the value of the current when it faulted. If the displayed current is 000 microamps, then the fault occurred because too little current was detected. Possible cause is an incorrectly installed cascade. If the value in the Status Window is low, (around 10uA) then a proximity Fault is the cause, check to make sure that the atomizer is not near a grounded object when the UP-200 is enabled. If the current displayed in the Status window is high (150uA; depending on the user set level) then the unit faulted because the user set Current Fault Limit has been exceeded. Check the path of the atomizer during operation to make sure it is not coming too close to a grounded object.
dI/dt Flashing	This will flash when the dI/dt has exceeded the user set value. The UP-200 will discontinue power output. This could be caused from the atomizer approaching a grounded surface too quickly. The value in the Status window is the value of the dI/dt when it failed.
Voltage Flashing	This usually indicates that the maximum voltage (105kV) has been exceeded. A voltage fault can also be caused at

	startup when the system measures current before applying voltage or while running when applying high voltage but measuring no current. These are fail-safe faults that indicate an internal failure of the UP-200.
Line Fault Flashing	This indicates that something is wrong with the cascade circuit, usually a wire or bad cascade.
Line Fault and Voltage Fault	This indicates that a short has happened in the cascade circuit, usually a wire or bad cascade.
Flashing Line Fault and dI/dt Fault Flashing	This indicates a open in the cascade circuit, usually a wire or bad cascade.

Section 7
Specifications

7.1 Electrical Specifications

POWER REQUIREMENTS:	100 -240 VAC, 50/60 Hz., SINGLE PHASE, Automatic Universal input
MAIN POWER FUSE:	250VAC, 2A - NOT USER SERVICIABLE
POWER CONSUMPTION:	57VA MAX AC
POWER OUTPUT:	50 WATTS DC
VOLTAGE OUTPUT:	0 TO -21VDC (USER ADJUSTABLE)
ANALOG CONTROL INPUT:	
VOLTAGE:	**0 TO 10VDC, Z=20K ohms** 0VDC INPUT = 0KV OUTPUT 10VDC INPUT = 100KV OUTPUT
CURRENT:	**0 TO 20mA, Z= 50 ohms** 0mA INPUT = 0KV OUTPUT 20mA INPUT = 100KV OUTPUT **4 TO 20mA, Z-50 ohms** 4mA Input = 0KV OUTPUT 20mA Input = 100KV OUTPUT
HI/LO CONTROL INPUT:	**CLOSED CONTACT** OPEN = LOW SETTING CLOSED = HI SETTING
INTERLOCK CONTACTS:	1A 12VDC RESISTIVE LOAD
MAIN POWER FUSE:	20mm 250V, 2 AMP FAST ACTING
RELAY CONTACTS:	
ENABLE RELAY	1A, 24VDC / .3A, 115VAC, ISOLATED
FAULT RELAY	1A, 24VDC / .3A, 115VAC, ISOLATED
LOCAL/REMOTE RELAY	0.5A, 100VDC, ISOLATED
METER FEEDBACK	
VOLTAGE	4-20MA = 0 TO 100KV
CURRENT	4-20MA = 0 TO 200UA

7.2 Mechanical Specifications

Height	10.3", (266.70mm), 6U
Width	2.79", (70.86mm), 14HP
Depth	7.7", (172.50mm)
Weight	4.5lb, 2.04Kg
Connectors Rear:	A - EPT-109-40064-2 B - EPT-117-40064-2
Front:	DB9-S - AMP 745781-4

7.3 Environmental Specifications

The UP200-V2 should not be placed in an environment that exceeds these specifications:

Temperature
Range: 0 to 40degrees C (32 to 104 degrees F)

Relative humidity: 5 to 90% non condensing

7.4 Internal Power Supply Specifications and Approvals

- 24V Supply

Specifications:	Mean Well RPS-60-24 Input: 100 - 240VAC, 50/60Hz Output: 24VDC, 2.5A
Approvals:	UL - QQHM2.E227340, QQGQ2.E183223 CE - TA50085654 01 CB - DE 2-009520-A1

+ 15V Supply

Specifications:	Mean Well RS-25-15 Input: 100 - 240VAC, 50/60Hz Output: 15VDC, 1.7A
Approvals:	UL - QQGQ2.E183223 CB - JPTUV-058687-M1 CE - TUV - R50046664

Section 8

Appendix

Appendix - A

Rear Panel – Connectors A & B
The rear panel has two connectors (top A, and bottom B). These mate with connectors in the card cage. The pin out for each is as follows:

Connector A

Pin Number	Signal	Notes
Z2	REMOTE HV ENABLE - SIGNAL	| Short these two signals
B2	REMOTE HV ENABLE - COMMON	| together to enable supply
Z4	GROUND	
D2	ENABLE RELAY - COMMON	| Enable Relay Feedback
D4	ENABLE RELAY - NO	|
D6	ENABLE RELAY – NC	|
Z8	ATOMIZER – COMMON (RED)	
B8	ATOMIZER – POWER 0 – -21V (WHITE)	
D8	ATOMIZER – FEEDBACK (BLACK)	
Z12	ATOMIZER – 4W ENABLE	
Z32	ATOMIZER – SHIELD	
D10	FAULT RELAY 1 – NO	| Fault Relay Feedback 1
D12	FAULT RELAY 1 – NC	|
Z16	FAULT RELAY 1 – COMMON	|
D16	FAULT RELAY 2 – NO	| Fault Relay Feedback 2
D18	FAULT RELAY 2 – NC	|
D14	FAULT RELAY 2 – COMMON	|

Connector B

Pin Number	Signal	
Z2	ENABLE INTERLOCK 1 +	| Conveyer Interlock 1
D2	ENABLE INTERLOCK 1 –	| (Must be shorted to Enable)
Z4	ENABLE INTERLOCK 2+	| Conveyer Interlock 2
D4	ENABLE INTERLOCK 2-	| (Must be shorted to Enable)
Z6	CURRENT METER OUTPUT COMMON	| 4-20ma Current Usage
D6	CURRENT METER OUTPUT SIGNAL	| Feedback
Z8	VOLTAGE METER OUTPUT COMMON	| 4-20ma Voltage Usage
D8	VOLTAGE METER OUTPUT SIGNAL	| Feedback
Z10	ANALOG VOLTAGE CONTROL IN (0-10VDC)	* Use only one!
D10	ANALOG VOLTAGE CONTROL COMMON	
Z12	ANALOG CURRENT CONTROL IN (0-20mA)	* Use only one!
B12	ANALOG CURRENT CONTROL COMMON	
D12	HI./LO CONTROL IN	* Use only one!
B12	HI/LO CONTROL COMMON	
D14	LOCAL/REMOTE SWITCH +	| Mode Local/Remote
D16	LOCAL/REMOTE SWITCH –	| Feedback
20	AC 1 POWER MAIN	| AC Power Input
24	AC 2 POWER MAIN	|
32	AC GROUND	|

Appendix - B

Communications Cable

Local Data Port (Front Panel)

To PC		UP200-V2
DB9-S		DB9-P
1		1
2	----------	2
3	----------	3
4		4
5	----------	5
6		6
7		7
8		8
9		9

A USB to RS232 conversion cable can also be used.

Appendix C

Comm Parameters

Emulation:	AJSON (ATP-4000 GUI)
Speed:	9600
Stop Bits:	1
Data Bits:	8
Parity:	None
Flow Control	Xon, Xoff

Appendix D

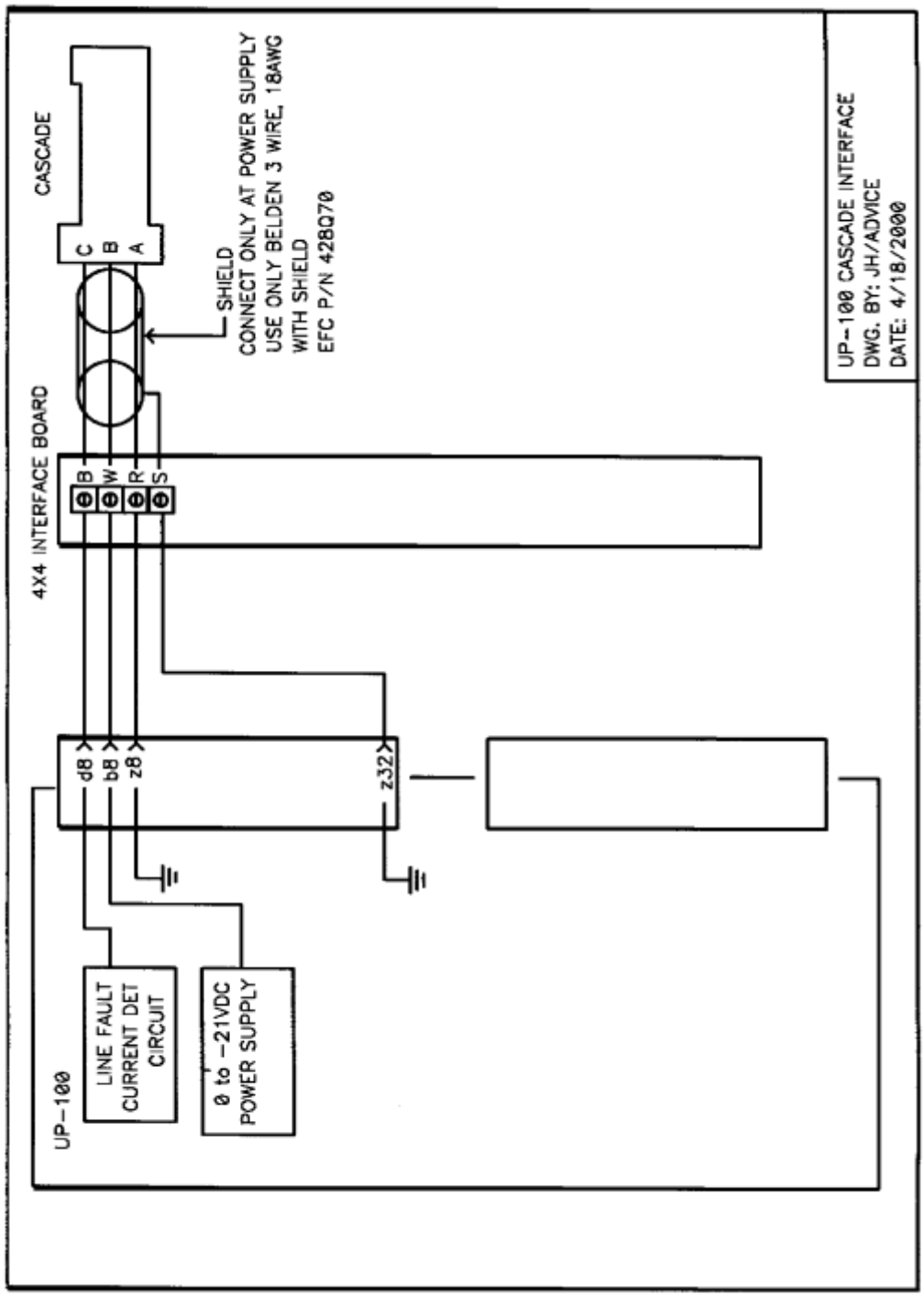
4-20ma Voltage and Current feedback information

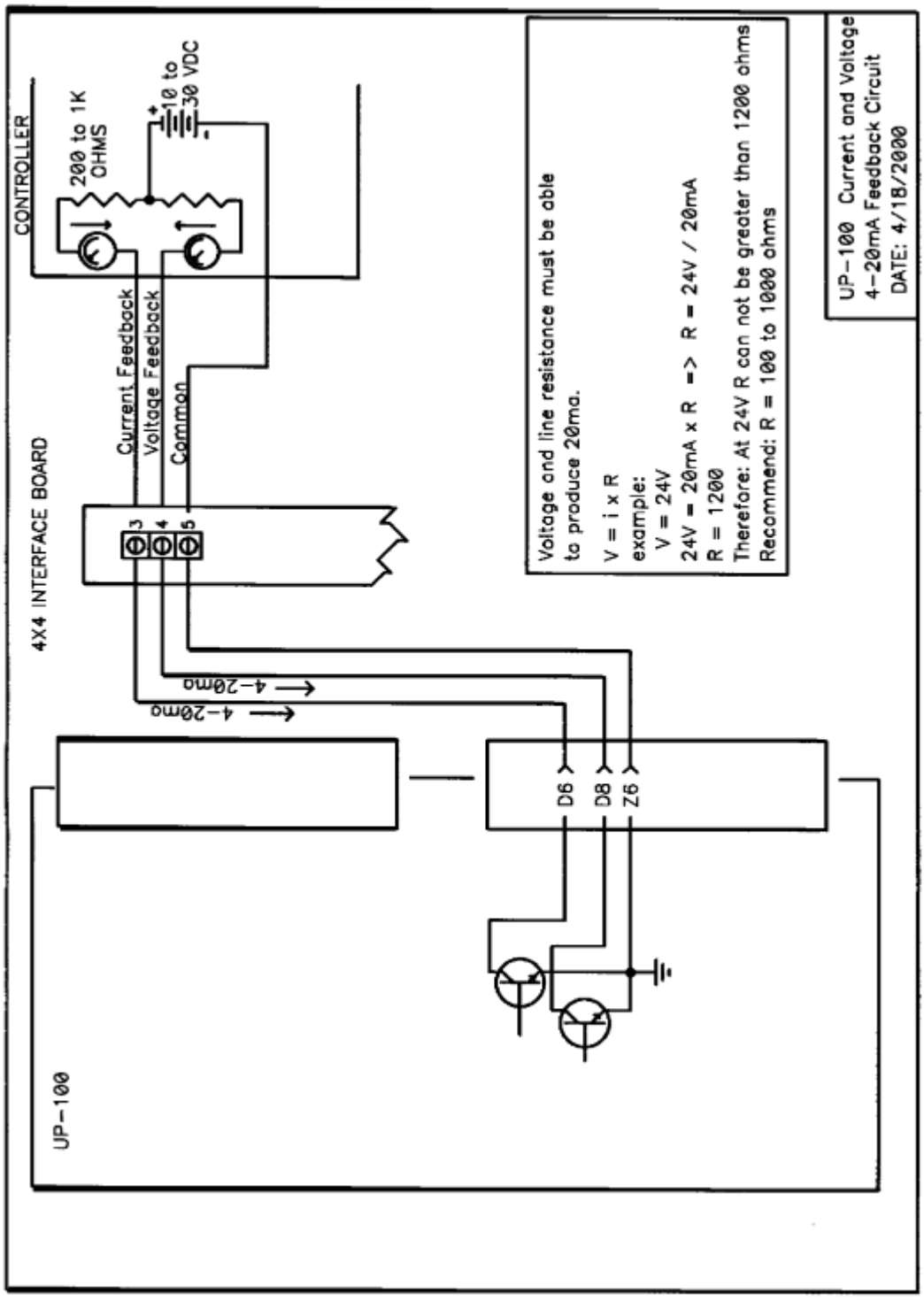
Voltage: 4-20ma output corresponds to 0 to 100KV respectively +/- 3%

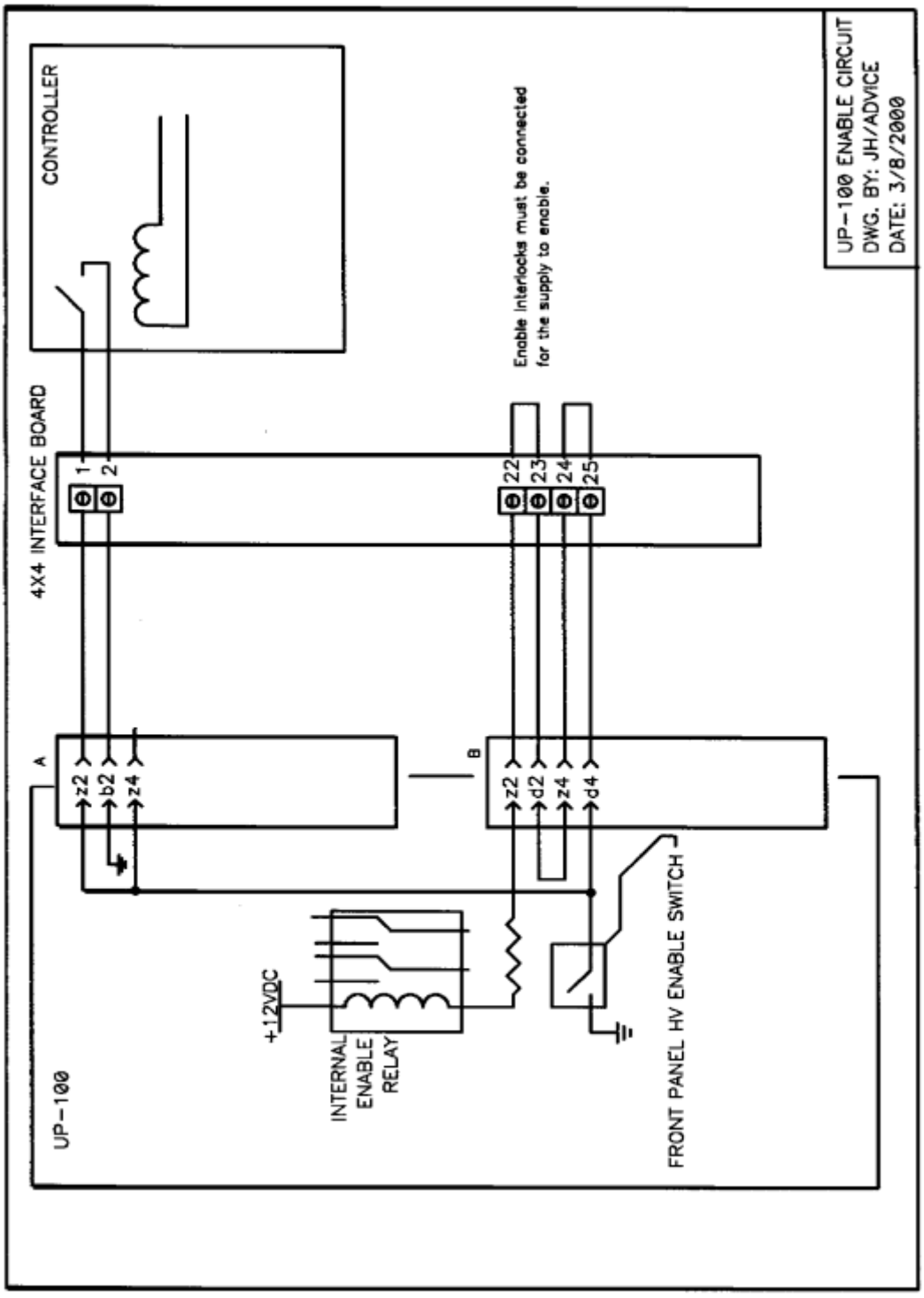
Current: 4-20ma output corresponds to 0 to 200uA respectively +/- 3%

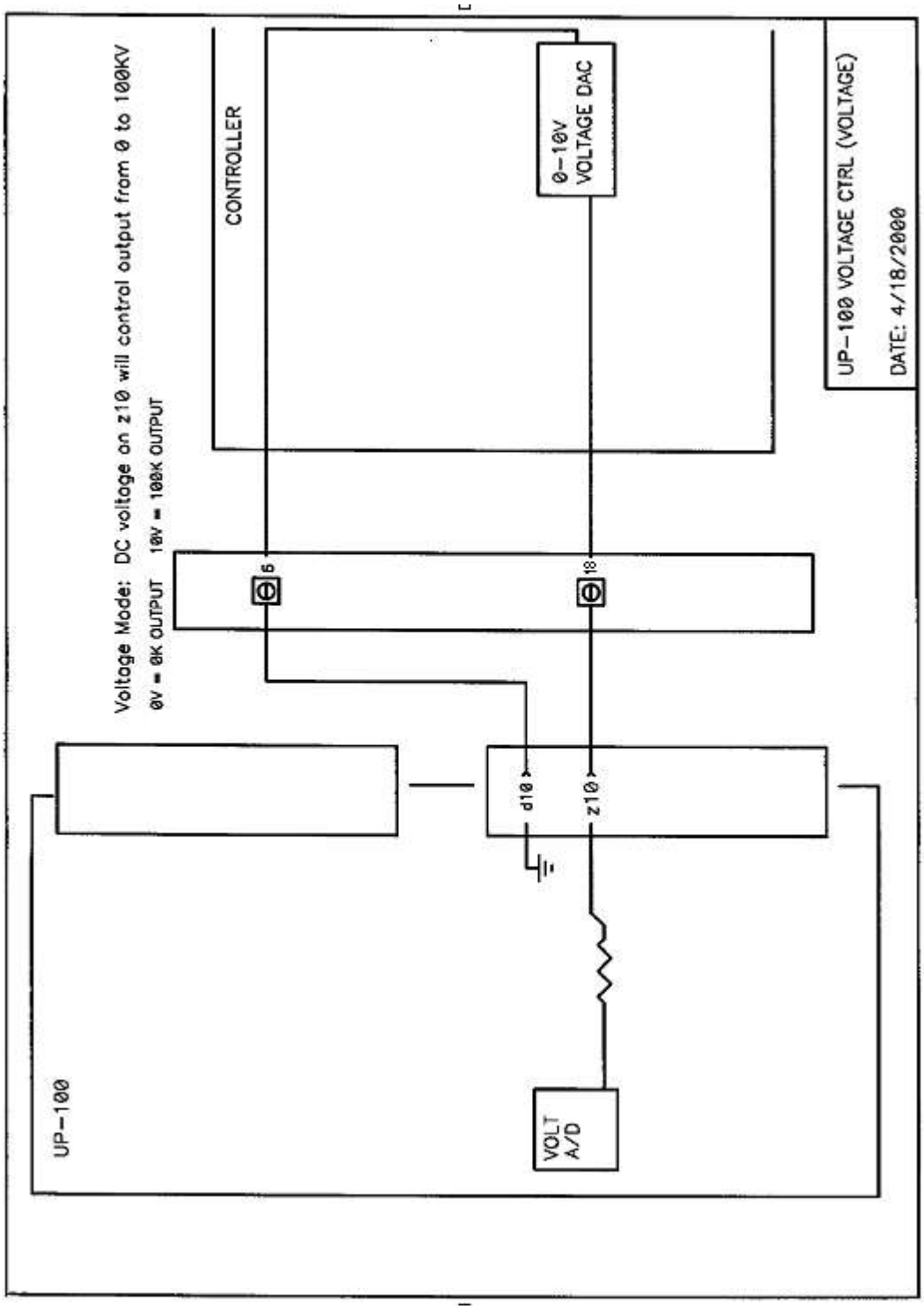
As the power supply has an automatic fine adjustment routine internally, it is not recommended that the supply be fine adjusted based on these outputs. These outputs are for reference only.

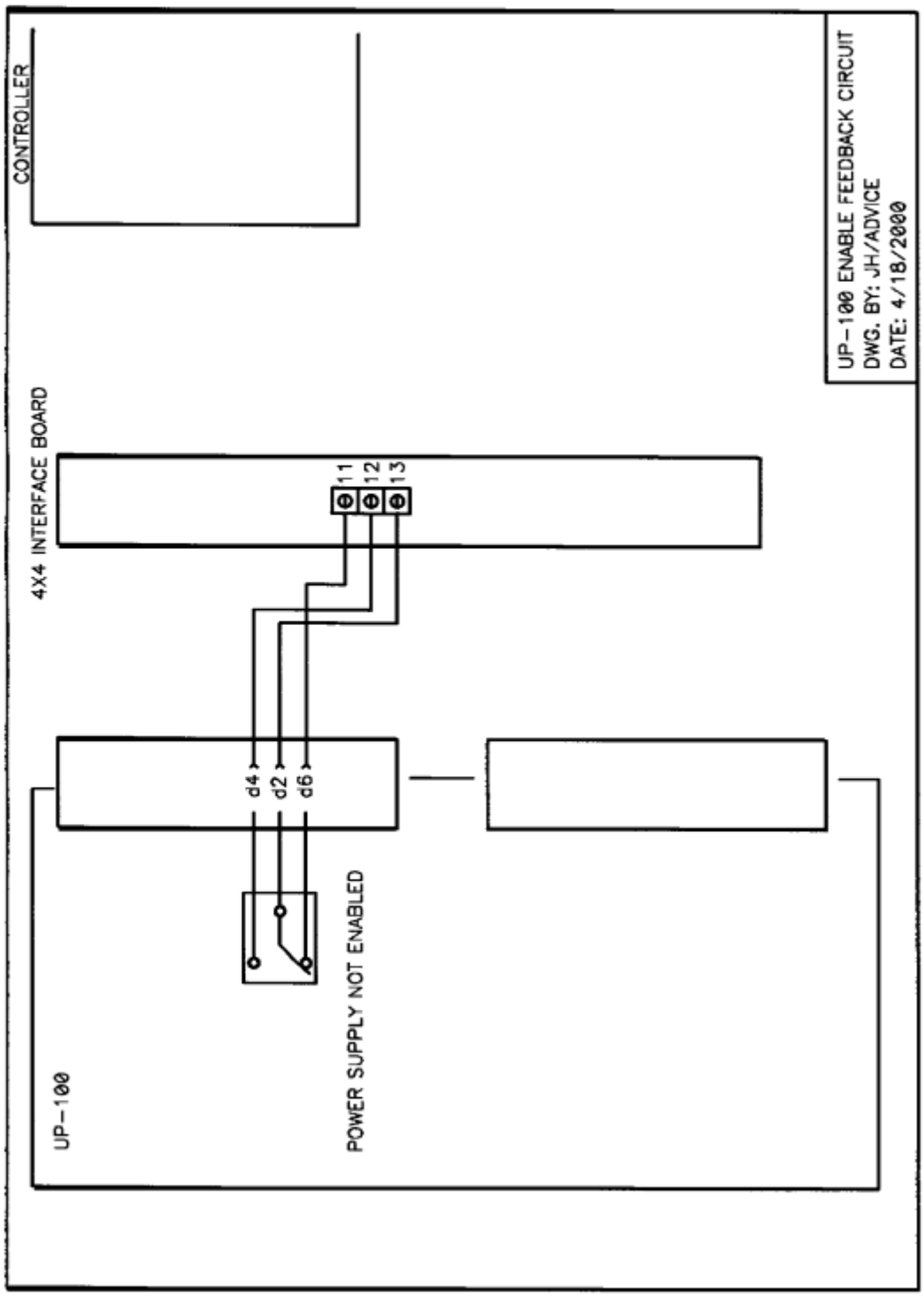
Appendix E Connection Diagrams

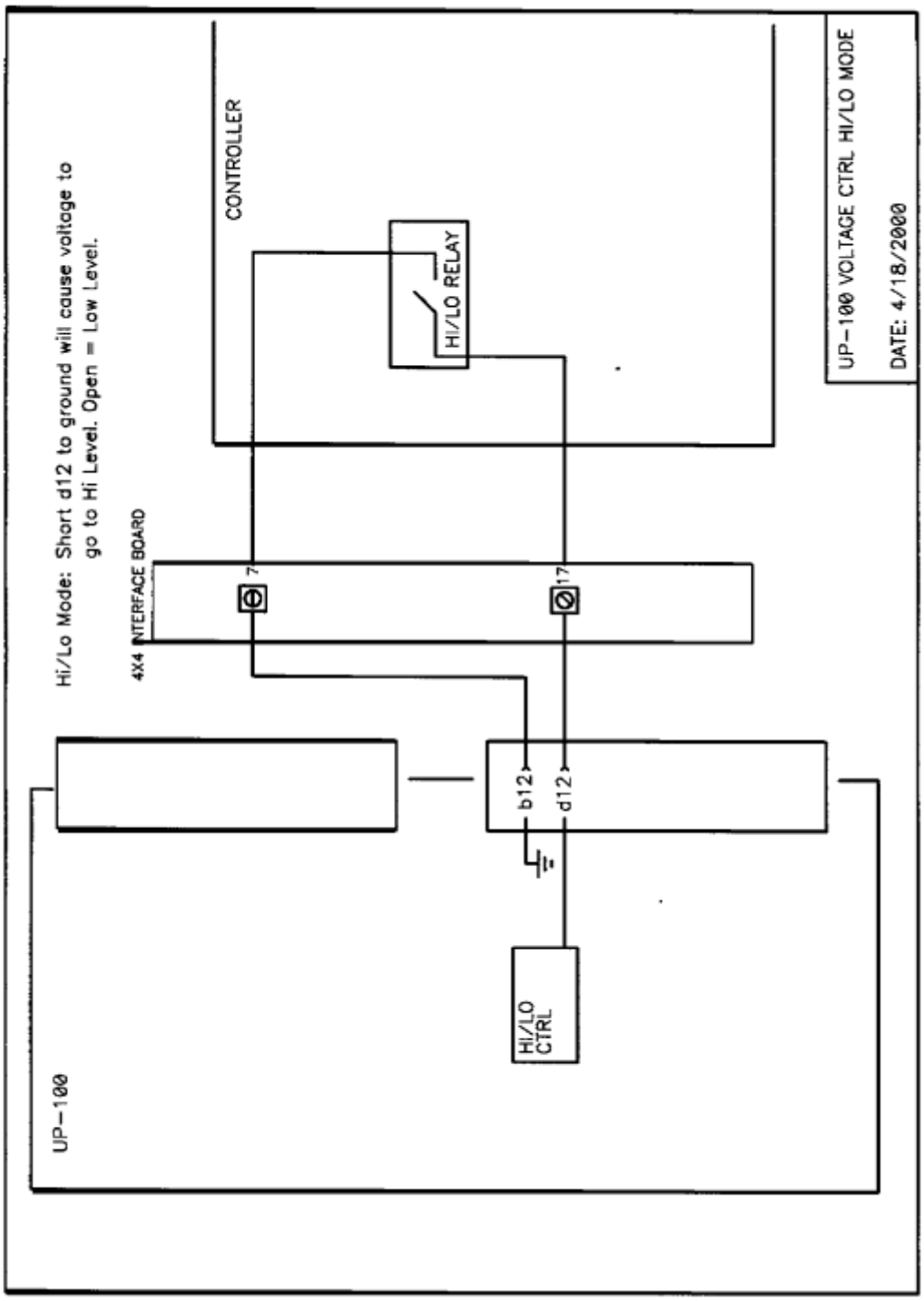


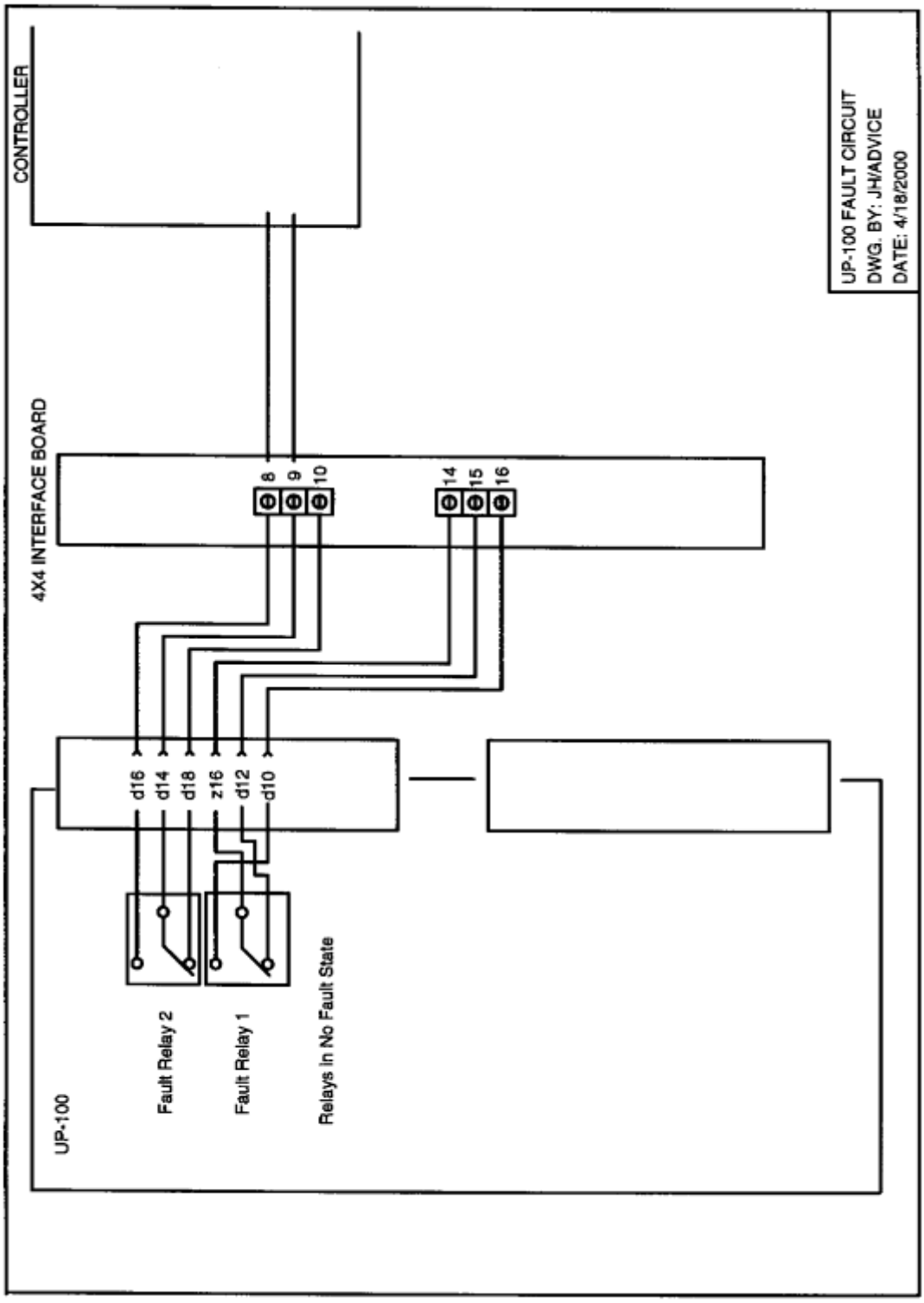

CONTROLLER
200 to 1K OHMS
10 to 30 VDC
+
-
Current Feedback
Voltage Feedback
Common
J3
4
5
4X4 INTERFACE BOARD
4-20ma
4-20ma
D6
D8
Z6
UP-100
Voltage and line resistance must be able to produce 20ma.
V = i x R
example:
V = 24V
24V = 20mA x R => R = 24V / 20mA
R = 1200
Therefore: At 24V R can not be greater than 1200 ohms
Recommend: R = 100 to 1000 ohms
UP-100 Current and Voltage 4-20mA Feedback Circuit
DATE: 4/18/2000

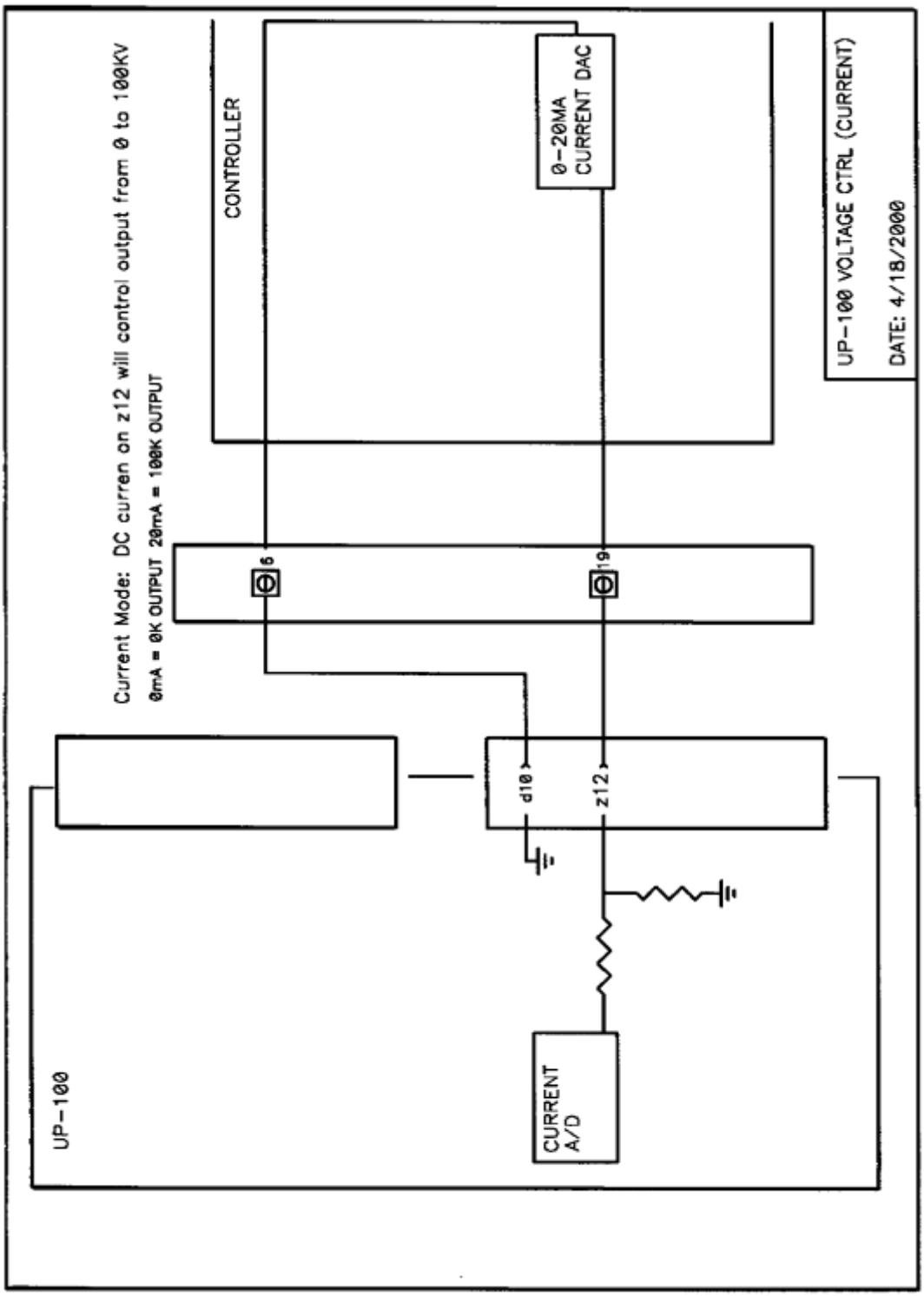

UP-100 ENABLE CIRCUIT
DWG. BY: JH/ADVICE
DATE: 3/8/2000
Enable interlocks must be connected for the supply to enable.
CONTROLLER
4X4 INTERFACE BOARD
1
2
22
23
24
25
A
z2
b2
z4
B
z2
d2
z4
d4
+12VDC
INTERNAL ENABLE RELAY
FRONT PANEL HV ENABLE SWITCH
UP-100


UP-100 VOLTAGE CTRL (VOLTAGE)
DATE: 4/18/2000
CONTROLLER
0-10V
VOLTAGE DAC
Voltage Mode: DC voltage on z10 will control output from 0 to 100KV
0V = 0K OUTPUT 10V = 100K OUTPUT
6
18
d10
z10
VOLT
A/D
UP-100


CONTROLLER
4X4 INTERFACE BOARD
11
12
13
d4
d2
d6
UP-100
POWER SUPPLY NOT ENABLED
UP-100 ENABLE FEEDBACK CIRCUIT
DWG. BY: JH/ADVICE
DATE: 4/18/2000


UP-100 VOLTAGE CTRL HI/LO MODE
DATE: 4/18/2000
Hi/Lo Mode: Short d12 to ground will cause voltage to go to Hi Level. Open = Low Level.
CONTROLLER
HI/LO RELAY
4X4 INTERFACE BOARD
7
17
b12
d12
HI/LO CTRL
UP-100


CONTROLLER
4X4 INTERFACE BOARD
8
9
10
14
15
16
d16
d14
d18
z16
d12
d10
UP-100
Fault Relay 2
Fault Relay 1
Relays in No Fault State
UP-100 FAULT CIRCUIT
DWG. BY: JH/ADVICE
DATE: 4/18/2000


UP-100 VOLTAGE CTRL (CURRENT)
DATE: 4/18/2000
CONTROLLER
0-20MA CURRENT DAC
Current Mode: DC curren on z12 will control output from 0 to 100KV
0mA = 0K OUTPUT 20mA = 100K OUTPUT
6
19
d10
z12
UP-100
CURRENT A/D

Change Log

REV	Description	Date	Author
A	Original Release		JH
B	Updates	3/20/2015	JH