

Product Manual

167-790-048

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***Lucent Technologies
LINEAGE[®] 2000
Flexible Power System
Monitor and Control Unit***

Notice:

Every effort was made to ensure that the information in this document was complete and accurate at the time of printing. However, information is subject to change.

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1 Introduction

General Information

This product manual (167-790-048) describes the 115B and 115C Monitor and Control Units used in the Lucent Technologies Lineage® 2000 Flexible Power System (FPS). The FPS consists of the Lucent Technologies Lineage® 2000 Small Converter Plant (SCP) and the Lineage® 2000 Small Rectifier-Converter Plant (SRCP). The topics covered in this manual include general description, basic features, options, installation and configuration, acceptance testing and operation for the Monitor and Control Unit.

The pluggable 115B or 115C Monitor and Control Unit performs the centralized monitoring and reporting functions for the components of the FPS system such as the 693AA converters and 592A switch-mode rectifiers, FPS distribution systems, as well as future products used in the FPS. The 115B is used with the Small Converter Plant and the 115C is used with the Small Rectifier-Converter Plant. A terminal board is provided with the shelf to allow the customer to access the office alarms connections and for remote On/Standby control of the rectifiers and converters. The Monitor and Control incorporates features needed for both the converter-only SCP and the rectifier-converter SRCP plants. A complete feature set is provided for converters in SCPs and rectifiers in SRCPs. A limited feature set for monitoring alarms is provided for converters in an SRCP. Table 1-A is a summary of these features:

Table 1-A: Feature Summary

Small Converter Plant (SCP) (115B)	
Converter Features	
Converter Voltage Monitoring	
Converter Current Monitoring	
Converter Voltage Adjust	
Converter Voltage Measurable by ECS CP3	
Converter Current Measurable by ECS CP3	
Converter Voltage to Front Panel Test Jacks	
Full Converter Alarm Monitoring	
LED Test for LCD & LEDs	
Converter On/Standby Control	
PMN & PMJ Alarms sent to ECS CP1	
Small Rectifier-Converter Plant (SRCP) (115C)	
Converter Features	Rectifier Features
N/A	Rectifier Voltage Monitoring
N/A	Rectifier Current Monitoring
N/A	Rectifier Voltage Adjust
N/A	Rectifier Voltage Measurable by CP3
N/A	Rectifier Current Measurable by CP3
N/A	Rectifier Voltage to Front Panel Test Jacks
Converter On/Standby Control	Rectifier On/Standby Control
Full Converter Alarm Monitoring	Full Rectifier Alarm Monitoring
LED Test for LCD & LEDs	Yes
PMN & PMJ Alarms sent to ECS CP1	Yes

The 115C Monitor and Control Unit is shown in Figure 1-1.

Figure 1-2 is a block diagram of the 115 Monitor and Control Unit. It shows the various alarm gathering and reporting functions, voltage and current monitoring, interface for a future remote access option, and the front panel LCD display and LEDs.

Technical Support

Technical support for Lucent Technologies Technologies equipment is available to customers around the world.

USA, Canada, Puerto Rico, and the US Virgin Islands

On a post-sale basis, **during the Product Warranty period**, our Technical Support telephone number 1-800-CAL RTAC (1-800-225-7822) provides coverage during normal business hours. Product Specialists are available to answer your technical questions and assist in troubleshooting problems. For out-of-hours EMERGENCIES, the 800 number will put you in touch with a Regional Technical Assistance Center Engineer via our 24 hour a day, 7 day per week Help Desk.

When Technical Support is required in **the Post-Warranty Period**, the service may be billable unless you hold an extended warranty or contractual agreement.

Central and South America

If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs.

Europe, Middle East, and Africa

If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs.

Asia Pacific Region

If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs.

Product Repair and Return

Repair and return service for Lucent Technologies Technologies equipment is available to customers around the world.

USA, Canada, Puerto Rico, and the US Virgin Islands

For information on returning of products for repair, customers may call 1-800-255-1402 for assistance.

Central and South America

If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.

Europe, Middle East, and Africa

If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.

Asia Pacific Region

If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.

Customer Service

For customer service, any other product or service information, or for additional copies of this manual or other Lucent Technologies Technologies documents, call 1-800-THE-1PWR (1-800-843-1797). Specify the select code number for manuals, or drawing number for drawings. Contact your regional customer service organization or sales representative for information regarding spare parts.

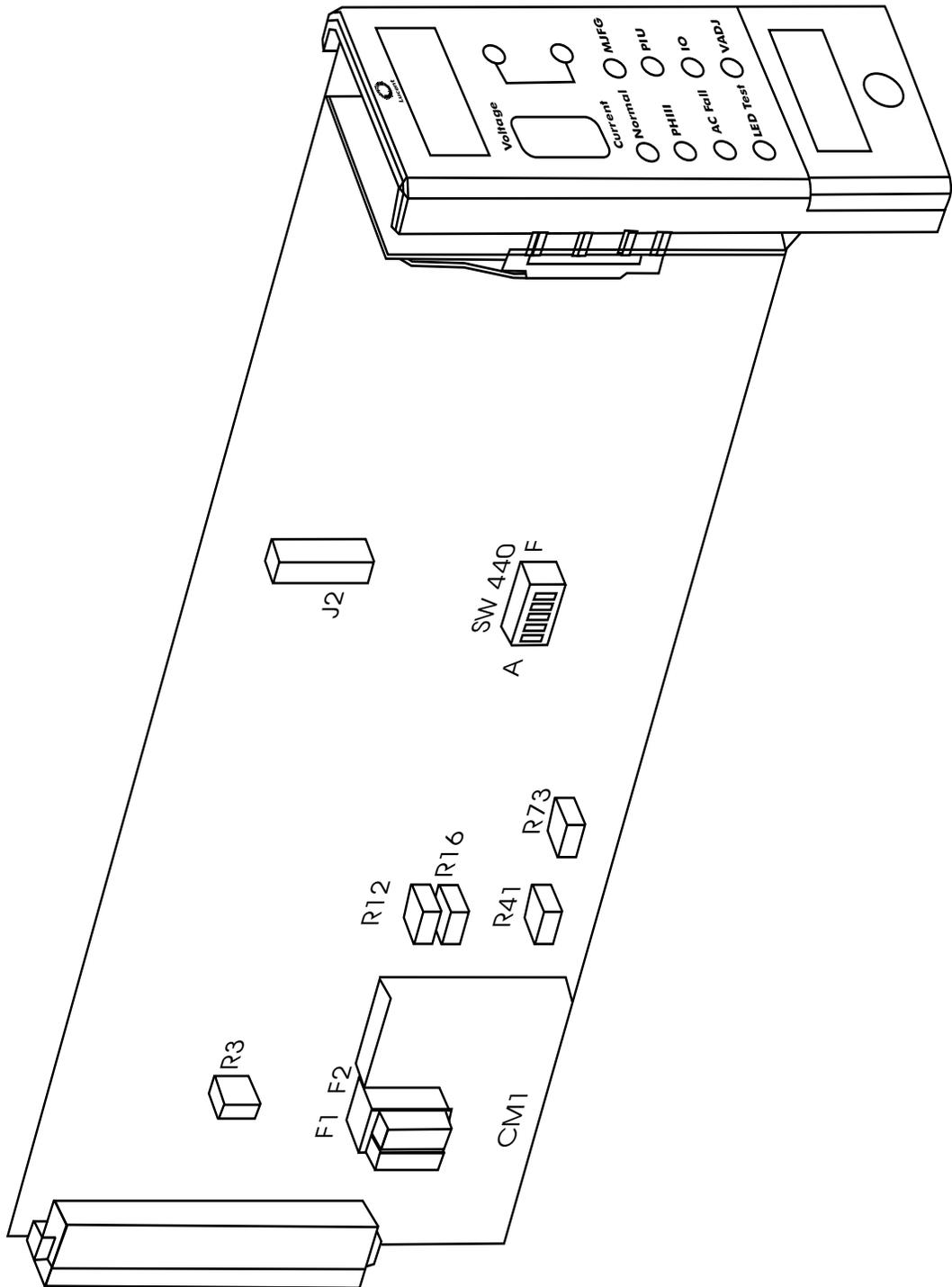


Figure 1-1: Monitor and Control Unit For Flexible Power System

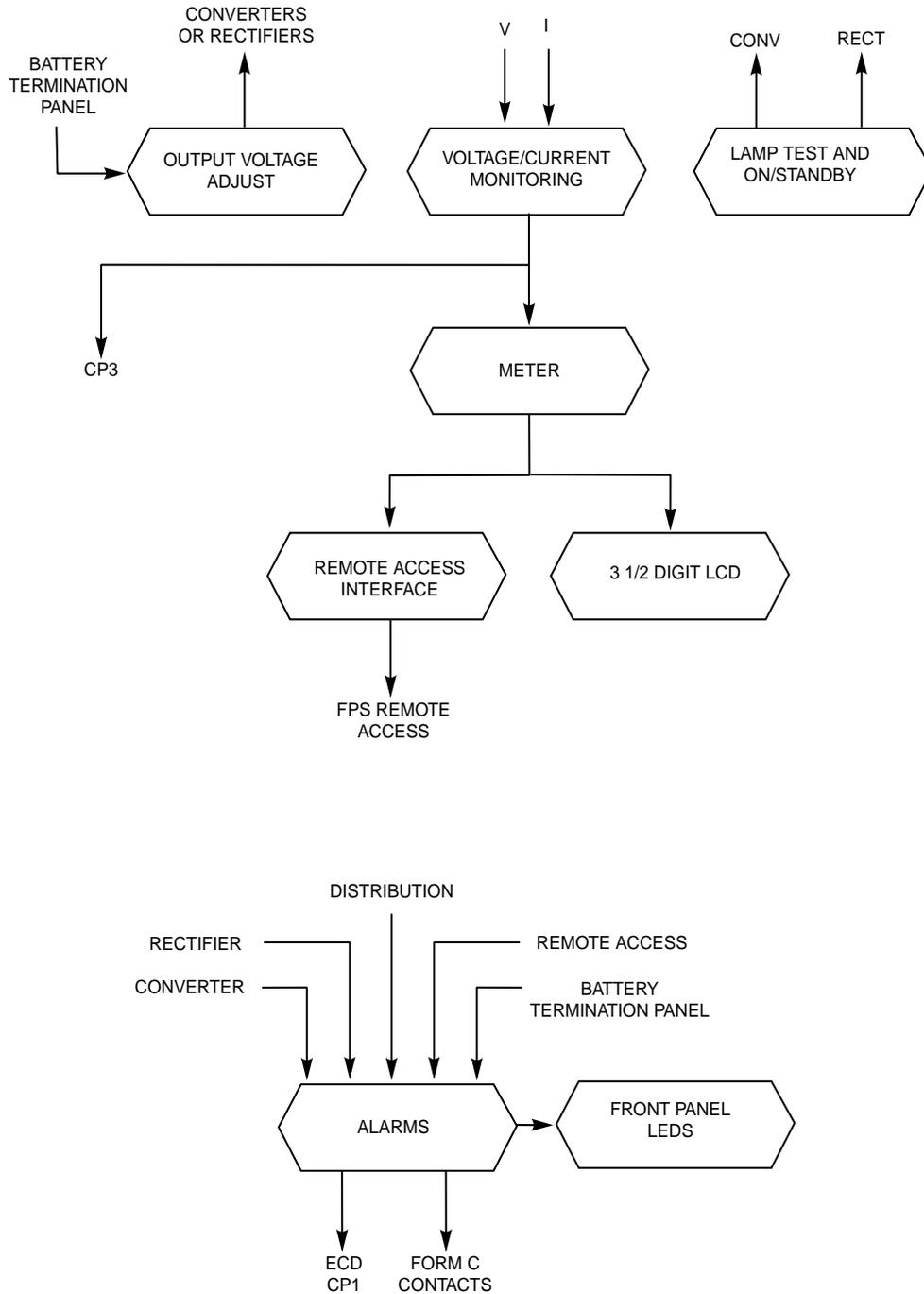


Figure 1-2: Monitor and Control Unit For Flexible Power System (Block Diagram)

2 *Product Description*

Monitor and Control Unit Specifications

Table 2-A: 115B and 115C Monitor and Control Unit Specifications

	115B	115C
Operating Voltage:	19 VDC to 30 VDC	38 VDC to 72 VDC
Input Power:	3.5 watts max	4.0 watts max
Operational Temperature:	0°C to +50°C	
Display Meter:	3-1/2 digit backlit LCD	
	Range:	0.0 to 150.0V (voltmeter)
	Range:	0 to 150A (ammeter)
	Voltage Accuracy:	+/-1% of reading
	Current Accuracy:	+/-1% of reading +/-1A
	Resolution:	+/-0.1 volt
	Resolution:	+/-0.1 ampere
Plant Voltage Setting:	Adjustable by potentiometer on Monitor and Control Unit front panel	
	693AA Converter	48V to 52V
	592A Rectifier	48V to 56V

Table 2-A: 115B and 115C Monitor and Control Unit Specifications

ECS Controller Datalogger Outputs:	Range:	0 to 6V (for monitoring plant voltage)
	Range:	0 to 6V (for monitoring plant current)
	Voltage Accuracy:	+/-1.5% of reading
	Current Accuracy:	+/-2% of reading +/-1A
Alarm Contact Ratings:	60VDC, 0.5A, Form C	
BD Settings:	Adjustable from 46V to 55V in steps of 1.0V +/- 0.5V (115C only); the default BD setting is 51V	
Altitude:	-200 to 13,000 feet	
Humidity:	20% to 80% non-condensing	
Electrostatic Discharge:	IEC 801-2 Level 3	
Radiated & Conducted Emissions:	FCC Level A	
Electromagnetic Immunity:	10V/m over the range of 60 Hz to 30 kHz	
LED Test:	Lights all segments of LCD, all LEDs on Monitor and Control and Power Units	

Feature Description

Operating Voltage The 115 Monitor and Control Unit is operated from a DC voltage as specified above in the Controller Specifications. Either the (+) or (-) input may be tied to ground or left floating.

Office Alarm Contacts A set of Form C contacts is brought out to the BFD1 terminal board, located on the side of the shelf, for each of the following plant alarms:

Code	Alarm	Condition for Alarm
115B	Power Major (PMJ)	Two or more converters alarm or go on/standby. (Also creates a PMN alarm.)
	Power Minor (PMN)	One converter alarms or goes on/standby.
	Major Fuse Alarm (MJF)	Activated by distribution fuse or breaker alarm. (Also creates a PMJ alarm.)
115C	Power Major (PMJ)	Battery thermal alarm, temperature compensation activated at 55°C (optional). Two or more rectifier and/or two or more converter alarms. (Also creates a PMN alarm.)
	Power Minor (PMN)	Battery thermal alarm, temperature compensation activated at 42°C (optional). One rectifier and/or one converter alarm.
	Major Fuse Alarm (MJF)	Activated by distribution fuse or breaker alarm. (Also creates a PMJ alarm.)
	Battery-on-Discharge (BD)	Activated when Plant Voltage drops below programmed BD threshold. (Also creates a PMJ alarm.)
	AC Failure (ACF)	Activated by rectifier when input AC power falls below the normal operating range. (Also creates a PMN alarm.)

See Table 2-C for connections to BFD1 terminal board.

These are Form-C, or transfer type, contacts to allow an installer to connect the Monitor and Control Unit to the office alarms system. Each set of contacts consists of a combination of normally open and normally closed contacts with one side of each in common. The normally open contact is referred to as NO, the normally closed contact is referred to as NC, and the common or return contact is referred to as C. Each Form C set is isolated. The alarm state is the “normal” state, i.e., when an alarm condition exists, a closure exists between the NC and C poles and an open exists between the NO and C poles. If the Monitor and Control Unit is powered down, all alarm relays are de-energized and all alarms are available to the office alarm system.

***Adjustable
Battery on
Discharge Alarm***

The Battery on Discharge (BD) alarm is provided for a SRCP plant equipped with backup batteries. In the event that AC power is lost, the batteries provide power for a period of time to allow maintenance personnel to correct the problem. While the batteries are providing the plant's power, the plant voltage will be decreasing until a point at which the connected load will not operate will be reached. The 115C, which is used in the SRCP, contains a DIP-switch settable BD alarm to monitor the plant voltage. Whenever the plant voltage drops below this preset threshold, the Monitor and Control Unit issues a Battery on Discharge alarm, a PMJ alarm, and lights both the red BD and PMJ LEDs on its front panel.

It should be noted that a BD alarm does not necessarily indicate that rectifier output current has been lost or reduced. A BD alarm can be caused by adjusting the plant voltage via the potentiometer on the Monitor and Control Unit front panel to a level below the BD setpoint. It can also be caused by a current overload on normally functioning rectifiers. The voltage threshold for the BD alarm is selected by the user by setting SW440 on the main circuit board of the Monitor and Control. The setpoint is typically at least 3 volts below the plant float voltage for nominal 48V plants. This threshold avoids nuisance alarms due to component tolerances, variations in load, and other transient conditions. See Table 2-B for the switch positions for BD.

Table 2-B: BD Voltage

O = Switch Open, C = Switch Closed							
Voltage	SW 440A (.5V)	SW 440B (1V)	SW 440C (2V)	SW 440D (4V)	SW 440E (8V)	SW 440F (24/48)	Notes
23.0 +.25V	C	C	C	C	C	C	115A Not Available
23.5 +.25V	O	C	C	C	C	C	
24.0 +.25V	C	O	C	C	C	C	
24.5 +.25V	O	O	C	C	C	C	
25.0 +.25V	C	C	O	C	C	C	
25.5 +.25V	O	C	O	C	C	C	
26.0 +.25V	C	O	O	C	C	C	
26.5 +.25V	O	O	O	C	C	C	
27.0 +.25V	C	C	C	O	C	C	
27.5 +.25V	O	C	C	O	C	C	
28.0 +.25V	C	O	C	O	C	C	
46.0 +/- .5V	C	C	C	C	C	O	115C Factory Pre-set 51V
47.0 +/- .5V	C	O	C	C	C	O	
48.0 +/- .5V	C	C	O	C	C	O	
49.0 +/- .5V	C	O	O	C	C	O	
50.0 +/- .5V	C	C	C	O	C	O	
51.0 +/- .5V	C	O	C	O	C	O	
52.0 +/- .5V	C	C	O	O	C	O	
53.0 +/- .5V	C	O	O	O	C	O	
54.0 +/- .5V	C	C	C	C	O	O	
55.0 +/- .5V	C	O	C	C	O	O	

**Rectifier/
Converter
Failure Alarm**

Whenever a single rectifier failure (RFA) and/or a single converter failure (CFA) alarm is received by the Monitor and Control Unit, a Power Minor (PMN) alarm is issued to the office alarm system via a Form-C relay contact, and a yellow LED is lit on the front of the Monitor and Control Unit. If two or more rectifier failures and/or two or more converter failures are received by the Monitor and Control Unit, both the PMN and the Power Major (PMJ) alarm will be issued, and both the yellow PMN and the red PMJ LED are lit. Since a loss of a single rectifier and/or converter may not necessarily affect the plant voltage and constitute an emergency, it is treated as a minor alarm. It should be noted, however, that a CFA is sent by each converter in the standby mode. Therefore, a PMJ will be issued whenever two or more converters are turned off, even if they are not needed.

AC Fail The AC Fail Alarm, which is only provided on the 115C, is intended to indicate that ac input power to at least one rectifier has disappeared or dropped below a minimum voltage. This alarm is provided as an isolated transfer contact for the office alarm systems. An ACF alarm also issues a PMN alarm so that both the yellow PMN and ACF LEDs will be lit.

Major Fuse Alarm The Monitor and Control Unit monitors the distribution for blown fuses and/or tripped breakers. Since a blown fuse or tripped breaker in the distribution indicates that some part of the customer's equipment has lost power, a Power Major (PMJ) alarm will be issued in addition to the Major Fuse alarm (MJF). The MJF is sent to the office alarms via a single Form-C transfer contact and both the red PMJ and MJF LEDs will be lit on the front of the Monitor and Control Unit.

Front Panel Status Indicators Light-emitting diodes are located on the front panel of the 115 to indicate the alarm status of the plant. The LEDs are as follows:

Name	Color	MJ/MN	Function
115B			
Normal	Green	N/A	Indicates system normal operation
PMJ	Red	Major	Major alarm, can be service affecting
PMN	Yellow	Minor	Minor alarm, not service affecting
MJF	Red	Major	Blown fuse or tripped breaker in distribution
115C			
Normal	Green	N/A	Indicates system normal operation
PMJ	Red	Major	Major alarm, can be service affecting
PMN	Yellow	Minor	Minor alarm, not service affecting
MJF	Red	Major	Blown fuse or tripped breaker in distribution
BD	Red	Major	Battery on Discharge, plant voltage is low
ACF	Yellow	Minor	AC power is missing or low to rectifier(s)

**Front Panel
Meter**

A 3-1/2 digit, backlit liquid-crystal display is located on the front of the Monitor and Control Unit. A switch near the display selects either the plant voltage or the plant current to be shown. When the meter select switch is set in the AMPS position, the display indicates the following current in amperes:

115B	115C
Total Conv Output Current	Rectifier Output + Battery Current

The 115C monitors both the total current sourced from the rectifiers as well as the current that flows through the batteries. The battery current is measured with an external shunt placed in the battery string. The 115C sums the total rectifier current with the battery current (current flowing out of the battery during discharge is positive, current flowing into the batteries during charge and float is negative) to derive the true plant current. In the case of an AC failure in which all the rectifiers are not powered and the batteries are providing the source current, the LCD will display the total battery current, which is now the same as the total load current. When AC is restored, the battery recharge current is subtracted from the total rectifier output current to derive the plant load current. When the meter select switch is set in the VOLTAGE position, the display indicates the following voltage:

115B	115C
Converter Output Voltage	Rectifier Output Voltage

LED Test Button

Depressing the LED Test button will cause all of the LCD segments to display 188.8 and all LEDs in the FPS to light while the switch is pressed.

Voltage Adjust

A potentiometer is provided on the Monitor and Control Unit to allow the customer to adjust the plant output voltage. The 115B adjust the converters' output voltage while the 115C adjusts the rectifiers' output voltage. In the event that the Monitor and Control unit were to lose power, the voltage adjust signal from the Monitor and Control Unit would be disconnected from the voltage adjust bus, setting rectifiers/converters to their nominal voltage.

**Front Panel Test
Jacks**

Test points are provided on the front panel so that the plant voltage may be checked with the user's meter. The test points are current-limited against accidental short circuits by test probes. In the 115B, the converter output voltage is brought out to the test points. In the 115C, the rectifier output voltage is brought out to the test points.

On/Standby

Terminal block connections are provided in the alarm wiring area as inputs to the 115 Monitor and Control Unit to allow the customer to put the rectifiers and/or converters in the On/Standby mode. The converter shelf provides a connection for putting all converters on standby. The rectifier converter shelf provides connections for putting all converters and/or rectifiers on standby. See Table 2-C for pin assignments.

CP1 Connections

The Monitor and Control Unit provides two sets of relay contacts for use with a Lineage[®] 2000 ECS Controller (CP1) for alarm reporting. Either a PMN or a PMJ alarm in the FPS will provide a contact closure, through a series 4.64 kohm resistor to the CP1 Batt, RPMN, and RPMJ inputs, respectively. See Table 2-C for pin assignments.

CP3 Connections

The Monitor and Control Unit provides a dc voltage signal that is proportional to the plant voltage and a dc voltage signal that is proportional to the plant current that may be read by the CP3 datalogger board in a Lineage[®] 2000 ECS controller. Each signal is 0 to 6 VDC and must be scaled by the ECS controller by multiplying the voltage read by 25 to derive the actual plant voltage or current. These signals can be accessed at connector J202 on the right side of the shelf.

Terminal Board

The BFD1 terminal board, located on the left side of the shelf, is provided for the customer to access the office alarm relay contacts and the controls to put the rectifiers and/or converters On/Standby. Table 2-C shows those connections:

Table 2-C: Alarm and Control Signals

TB3	TB4
1 BATT	1 BD - NO
2 AUX - PMJ	2 BD-C
3 AUX - PMN	3 BD-NC
4	4 PMJ - NO
5 CONV O/S	5 PMJ - C
6 O/S RTN	6 PMJ - NC
7 RECT O/S	7 PMN - NO
8 O/S RTN	8 PMN - C
9	9 PMN - NC
10 ACF - NO	10 MJF - NO
11 ACF - C	11 MJF - C
12 ACF - NC	12 MJF - NC

3 ***Installation and Setup***

This section covers the installation and setup procedures for the 115B and 115C Monitor and Control Units. Follow all the applicable steps in the following sections in the order they are presented. The following tools are required:

- Jeweler's screwdriver (for alarm wiring and voltage adjustment)
- Wire strippers
- Cutters
- 5 mm hex Allen tool (provided with the Flexible Power System)

The Monitor and Control Unit is a pluggable control unit shipped in a separate package with the FPS system. Open the package carefully and remove the unit from its wrapping, using ESD protection to prevent damage to the circuit board.

The Monitor and Control Unit is keyed so that it will not fully seat into a shelf of an improper voltage. Compare the code stamped on the board near the backplane connector to the code on the label found on the small faceplate cover. The code should be the same and should be compatible with plants as follows:

- 115B Small Converter Plants (24V input)
- 115C Small Rectifier-Converter Plants (ac input)

Hardware Setup

Caution

Circuit packs can be damaged by static electricity. Operators should always wear a grounded wrist strap plugged into the shelf when touching or handling circuit packs.

Battery on Discharge Threshold

When installing a 115C Monitor and Control Unit into the Small Rectifier-Controller Plant, switch SW440 must be set to the desired threshold at which the plant voltage will create a BD alarm. See Table 2-C for the switch settings for a specific voltage. The recommended threshold is 3V below the nominal plant voltage for a 48V system. See Figure 1-1 for the location of switch SW440 on the 115C.

Unit Installation

1. Remove the unit from its wrapping. Set aside the small faceplate cover at the bottom of Monitor and Control Unit.
2. Insert the board into the slot in the lower left position of the FPS shelf, making sure that the board is seated correctly inside the upper and lower card guides. Move the latch on the front edge to its fully upright position.
3. Observe the keying pins on the left side of the faceplate to ensure they align with slots in the side of the shelf. Do not attempt to force the unit in if the pins do not align properly.
4. Press firmly on the right front edge of the faceplate to fully seat the unit. When installed, the faceplate should seat flush against the shelf edge.
5. Set the lower cover in place and tighten the captive screw using the allen tool provided with the shelf.

To unplug the Monitor and Control Unit:

If the Monitor and Control Unit should need to be removed, simply loosen the hex screw at the bottom of the faceplate, remove the small cover and set aside, and press down on the latch to unseat the unit. The small cover should remain with the Monitor and Control Unit if it is returned for any reason.

Office Alarms - Field Wiring

Office alarm wiring, remote On/Standby wiring, and wiring to the ECS Controller Board (CP1) are provided on terminal blocks on the left side of the shelf.

1. Refer to Table 2-C or the label near the terminals for terminal assignments.
2. The terminal blocks accept the stripped (.25 inch) ends of 22-24 AWG stranded wire. Wires should be strain relieved on the tie bar just behind the terminal block area.

4 ***Acceptance Testing***

The Monitor and Control Unit is tested as a unit and as part of a Flexible Power System in the factory. This section of the manual is provided for those users who wish to repeat some of those test procedures as part of the installation and turn-up process. Most of these tests should not be performed while the plant is powering active loads. The test procedures in this section are listed below:

- LED Test
- Meter Accuracy Test
- Battery on Discharge Test
- Fuse Alarm Test
- On/Standby Test
- Voltage Adjust Test

Test Equipment required:

- Digital Multimeter (DMM) with a DC accuracy of at least .05%
- Short length of wire or clip lead
- Jeweler's screwdriver

LED Test

Momentarily depress the LED Test button on the faceplate of the 115 Monitor and Control Unit. Monitor the display and verify that all segments of the LCD are lit and it displays 188.8. Verify that the following LEDs are lit on the faceplate:

115B		115C	
Normal	Green	Normal	Green
PMJ	Red	PMJ	Red
PMN	Yellow	PMN	Yellow
MJF	Red	MJF	Red
		BD	Red
		ACF	Yellow

Verify that all of the LEDs in each rectifier and/or converter in the FPS are also lit while the LED Test button is pressed.

Meter Accuracy

Step A: Using the appropriate DC range on the DMM, plug the DMM test leads into the test jacks on the Monitor and Control Unit faceplate.

Step B: Place the Voltage/Current switch on the front panel in the voltage position.

Step C: Verify that the reading on the LCD display is within 1% of the DMM reading.

If you have a way of independently measuring the plant current with 0.1% accuracy, then you may perform the following test.

Step D: Place the Voltage/Current switch on the front panel in the current position.

Step E: Verify that the reading on the LCD display should be +/- 1% +/- 1A of the independently measured value.

Battery on Discharge (115C only)

Step A: Verify that BD and PMJ LEDs are not lit.

Step B: Temporarily set SW440 for a BD setting of 50V.

Step C: While monitoring the voltage at the test jacks with the DMM, use the front panel voltage adjust potentiometer to reduce the plant voltage until the BD LED is lit.

Step D: Verify that BD occurred at 50.0V +/- 0.5V as measured on the DMM.

Step E: Verify that the BD LED is lit and Normal LED is extinguished.

Step F: Using the ohms scale on the DMM, measure an open between TB4-2 and TB4-1 and a short between TB4-2 and TB4-3.

Step G: Using the ohms scale on the DMM, measure an open between TB4-5 and TB4-4 and a short between TB4-5 and TB4-6.

Step H: Verify that the PMJ LED is lit.

Step I: Set SW440 for the value desired by the customer and adjust the plant voltage to the plant nominal voltage.

Step J: Verify that the Normal LED is lit and that the PMJ and BD LEDs are extinguished.

Step K: Using the ohms scale on the DMM, measure an open between TB4-2 and TB4-3 and a short between TB4-2 and TB4-1.

Step L: Using the ohms scale on the DMM, measure an open between TB4-5 and TB4-6 and a short between TB4-5 and TB4-4.

Fuse Alarm Test

Step A: Verify that MJF LED is not lit.

Step B: If equipped with fuses, place a blown fuse in one of the indicating fuse positions in the distribution. If equipped with circuit breakers, place a clip lead from the upper distribution block (TB5) to the circuit breaker alarm bus.

Step C: Verify that the MJF and PMJ LEDs are lit and Normal is extinguished.

Step D: Using the ohms scale on the DMM, measure an open between TB4-11 and TB4-10 and a short between TB4-11 and TB4-12.

Step E: Remove the clip lead or replace the blown fuse with a good fuse.

Step F: Verify that the Normal LED is lit and that the PMJ and BD LEDs are extinguished.

On/Standby Test

For 115B: **Step A:** Place a short between TB3-6 and TB3-5.

Step B: Verify that all the converters in the FPS are On/Standby.

Step C: If only one converter is in the plant, verify that PMN LED is lit.

Step D: If there are two or more converters in the plant, verify that both PMN and PMJ are lit.

Step E: Remove the short.

For 115C: **Converter test:**

Step A: Place a short between TB3-6 and TB3-5.

Step B: Verify that all the converters in the FPS are On/Standby.

Step C: If only one converter is in the plant, verify that PMN LED is lit.

Step D: If there are two or more converters in the plant, verify that both PMN and PMJ are lit.

Step E: Remove the short.

Rectifier test:

Step F: Place a short between TB3-8 and TB3-7.

Step G: Verify that all the rectifiers in the FPS are On/Standby.

Step H: Remove the short.

Voltage Adjust

For 115B: **Step A:** Adjust the potentiometer all the way clockwise.

Step B: Verify that the plant voltage is 48V +/- .5V

Step C: Adjust the potentiometer all the way counter-clockwise.

Step D: Verify that the plant voltage is 52V +/- .5V

Step E: Readjust the potentiometer for nominal plant voltage.

For 115C: **Step A:** Adjust the potentiometer all the way clockwise.

Step B: Verify that the plant voltage is 48V +/- .5V

Step C: Adjust the potentiometer all the way counter-clockwise.

Step D: Verify that the plant voltage is 56V +/- .5V

Step E: Readjust the potentiometer for nominal plant voltage.

5 *Operation*

The front panel switches and indicators provide the only operator interaction in a 115 Monitor and Control Unit that is operating normally. In the event of a malfunction, refer to the Troubleshooting section of the shelf product manual. The front panel controls and displays are shown, as numbered and described below, in Figure 5-1.

- (1) Output Display: 3-1/2 Digit LCD display shows the plant DC voltage or load DC current.
- (2) Voltage/Current Switch: Two position switch selects either plant DC voltage or load current for display.
- (3) Normal indicator: Green LED is lit whenever there are no alarms present to indicate normal operation.
- (4) PMN indicator: Yellow LED, when lit, indicates a single rectifier alarm (RFA), a single converter alarm (CFA), an AC failure indication from a rectifier, or battery temperature alarm (BFN1 circuit pack).
- (5)* AC Fail indicator: Yellow LED, when lit, indicates a loss of AC or low voltage AC to a rectifier.
- (6) LED Test: Push-button switch to test all segments of LCD display and all LEDs in the plant.
- (7, 8) (+) (-) Test Jacks: Test jacks available for monitoring the plant voltage with an external DMM.

- (9) MJF indicator: Red LED, when lit, indicates an overcurrent protector in the distribution has operated. Such protectors include circuit breakers and fuses. This is a MAJOR alarm condition.
- (10) PMJ indicator: Red LED, when lit, indicates multiple CFA alarms, multiple RFA alarms, BD alarm, MJF alarm, or battery temperature alarm (BNF2 circuit pack).
- (11)* BD Indicator: Red LED, when lit, indicates that the rectifier plant voltage is below a pre-set threshold.
- (12) Vadj: Potentiometer to adjust the plant voltage. It adjusts the converter voltage in the 115B and the rectifier voltage in the 115C.

* Items 5 and 11 are for the 115C only.

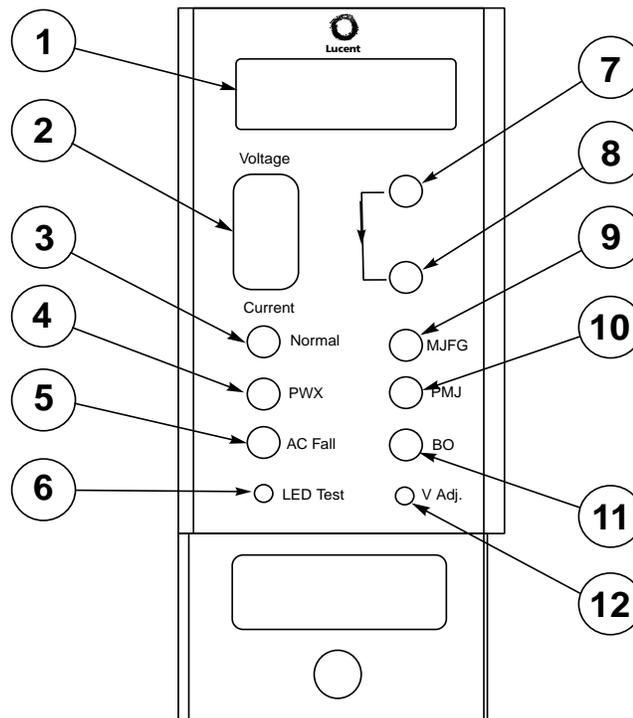


Figure 5-1: Front Panel Controls and Displays

6 ***Product Warranty***

A. Seller warrants to Customer only, that:

1. As of the date title to Products passes, Seller will have the right to sell, transfer, and assign such Products and the title conveyed by Seller shall be good;
2. Upon shipment, Seller's Manufactured Products will be free from defects in material and workmanship, and will conform to Seller's specifications or any other agreed-upon specification referenced in the order for such Product;
3. With respect to Vendor items, Seller, to the extent permitted, does hereby assign to Customer the warranties given to Seller by its Vendor of such Vendor Items, such assignment to be effective upon Customer's acceptance of such Vendor Items. With respect to Vendor items recommended by Seller in its specifications for which the Vendor's warranty cannot be assigned to Customer, or if assigned, less than Sixty (60) days remain of the Vendor's warranty or warranty period when the Vendor's items are shipped to Customer or when Seller submits its notice of completion of installation if installed by Seller, Seller warrants that such Vendor's items will be free from defects in material and workmanship on the date of shipment to Customer. In such an event, the applicable Warranty Period will be sixty (60) days.

- B. The Warranty Period listed below is applicable to Seller's Manufactured Products furnished pursuant to this Agreement, unless otherwise stated:

Warranty Period

Product Type	New Product	Repaired Product or Part*
Central Office Power Equipment**	24 Months	6 Months
* The Warranty Period for a repaired Product or part thereof is as listed or, in the case of Products under Warranty, is the period listed or the unexpired term of the new Product Warranty Period, whichever is longer.		
** The Warranty Period for Products ordered for Use in Systems or equipment Manufactured by and furnished by Seller is that of the initial Systems or equipment.		

- C. If, under normal and proper use during the applicable Warranty Period, a defect or nonconformity is identified in a Product and Customer notifies Seller in writing of such defect or nonconformity promptly after Customer discovers such defect or nonconformity, and follows Seller's instructions regarding return of defective or nonconforming Products, Seller shall, at its option attempt first to repair or replace such Product without charge at its facility or, if not feasible, provide a refund or credit based on the original purchase price and installation charges if installed by Seller. Where Seller has elected to repair a Seller's Manufactured Product (other than Cable and Wire Products) which has been installed by Seller and Seller ascertains that the Product is not readily returnable for repair, Seller will repair the Product at Customer's site.

With respect to Cable and Wire Products manufactured by Seller which Seller elects to repair but which are not readily returnable for repair, whether or not installed by Seller, Seller at its option, may repair the cable and Wire Products at Customer's site.

- D. If Seller has elected to repair or replace a defective Product, Customer shall have the option of removing and reinstalling or having Seller remove and reinstall the defective or nonconforming Product. The cost of the removal and the reinstallation shall be borne by Customer. With respect to Cable and Wire Products, Customer has the further

responsibility, at its expense, to make the Cable and Wire Products accessible for repair or replacement and to restore the site. Products returned for repair or replacement will be accepted by Seller only in accordance with its instructions and procedures for such returns. The transportation expense associated with returning such Product to Seller shall be borne by Customer. Seller shall pay the cost of transportation of the repair or replacing Product to the destination designated by Customer within the Territory.

- E. The defective or nonconforming Products or parts which are replaced shall become Seller's property.
- F. If Seller determines that a Product for which warranty service is claimed is not defective or nonconforming, Customer shall pay Seller all costs of handling, inspecting, testing, and transportation and, if applicable, traveling and related expenses.
- G. Seller makes no warranty with respect to defective conditions or nonconformities resulting from actions of anyone other than Seller or its subcontractors, caused by any of the following: modifications, misuse, neglect, accident, or abuse; improper wiring, repairing, splicing, alteration, installation, storage, or maintenance; use in a manner not in accordance with Seller's or Vendor's specifications or operating instructions, or failure of Customer to apply previously applicable Seller modifications and corrections. In addition, Seller makes no warranty with respect to Products which have had their serial numbers or month and year of manufacture removed, altered, or with respect to expendable items, including, without limitation, fuses, light bulbs, motor brushes, and the like.
- H. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. CUSTOMER'S SOLE AND EXCLUSIVE REMEDY SHALL BE SELLER'S OBLIGATION TO REPAIR, REPLACE, CREDIT, OR REFUND AS SET FORTH ABOVE IN THIS WARRANTY.

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