POWER SYSTEMS "LINEAGE"® 2000 CONTROLLER FOR 24 VOLT OR 48 VOLT POWER PLANT J85501A

CHANGES

A. Changed and Added Functions

A.1 The S option is being reinstated to provide for a ground return path between DATA SWITCH and connecting circuits.

B. Changes in Apparatus

B.1 Removed	Replaced By
CP10 Circuit Pack, MC-80031A1, U Option - CM2 (App Fig 2)	CP10 Circuit Pack, MC-80031A1B, U Option - CM2 (App Fig 2)

D. Description of Changes

D.1 In FS8, the port connections (option S) to DATA SWITCH were renumbered. Option S was reinstated to "AVAIL" and option Q was rated "DA".

D.2 Circuit Note 103 was updated for drawing issue 10A.

D.3 Circuit Note 110 was revised to remove reference to 8000A shunt.

D.4 Circuit Note 124 was added.

D.5 A lead was added to TB304 terminal 5 in CAD 2.

D.6 The port numbers going to DATA SWITCH in CAD 4 (sheet G7) were corrected.

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CHANGES

D. Description of Changes

D.1 Designations LDM and LDMR were removed from P1 and P4 connectors in FS1.

D.2 Reference to F option was added to FS1.

D.3 In FS2, added the following titles to the key pad:

S17 - FLOAT/EQUALIZE	S25 - FEEDER DRAINS
S18 - BATTERY RESERVE	S26 - FLOAT/EQUALIZE HISTORY
S20 - HELP	S34 - FEEDER DRAINS STATS

D.4 Designations LDM and LDMR were removed from terminals 3 and 4 of TB1 in FS3.

D.5 Removed reference to J85503 and SD-82605-01 from Note 122.

D.6 Removed designations LDM and LDMR from TB1 in CAD1.

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CHANGES

A. Changed and Added Functions

A.1 Option ZB has been added in FS1 to provide an improved Auxiliary Board (ED-83006-31) equipped with FLOAT/EQUALIZE capability.

A.2 Option ZH has been added in FS6 to provide an improved Remote Interface Board (MC-80013B1C) equipped for providing Super User capability, 300/1200 baud rate operation, BYE command, remote editing and page command.

A.3 Option ZE has been added in FS7 to provide an improved Universal Shunt Monitor Board (MC-80013D1B) equipped to allow remote programming provided it is used in conjunction with the new Remote Interface Board (MC-80013B1C). The new MC-80013D1B is also equipped with a battery backed RAM.

A.4 FS10 (option ZC) has been added to provide a Battery Reserve Predictor (MC-80013E1) capability. This new feature requires the use of the new Plant Signals Board (ED-83009-31) for optimum accuracy.

A.5 FS9 (option P) has been added to provide a new feature, Rectifier Sequence Controller (ED-83228-30).

B. Changes in Apparatus

B.1 Added

CR1, CR2 Diode: WP-90062,L2,
ZI Option - [CM1] App Fig 1

CP12 Circuit Pack, ED-83228, P Option, FS9 - [CM2] App Fig 2

CP13 Circuit Pack, MC-80013E1, ZC Option, FS10 - [CM2] App Fig 2

W8 Cable Assembly, H-285-224,L200, P Option - App Fig 2

W9 Cable Assembly, H-285-224,L203, ZC Option - App Fig 2

Thermistor Assembly, 845957406, ZC Option - App Fig 2

B.2

Superseded	Superseded By
CP2 Circuit Pack, ED-83006-30, ZA Option - [CM1] App Fig 1	CP2 Circuit Pack, ED-83006-31, ZB Option - [CM1] App Fig 1
CP3 Circuit Pack, MC-80013A1, A Option and MC-80013A1B, B Option - [CM1] App Fig 1	CP3 Circuit Pack, MC-80013A1C, D Option - [CM1] App Fig 1
CP8 Circuit Pack, MC-80013B1, ZF Option and MC-80013B1B, ZG Option - [CM2] App Fig 2, FS6	CP8 Circuit Pack, MC-80013B1C, ZH Option - [CM2] App Fig 2, FS6
CP9 Circuit Pack, R Option; MC-80013D1, ZD Option - [CM2] App Fig 2, FS7	CP9 Circuit Pack, R Option; MC-80013D1B, ZE Option - [CM2] App Fig 2, FS7

D. Description of Changes

D.1 On sheet B1, FS1, the new version of the CP2 Auxiliary circuit was shown and designated option ZB.

D.2 The connections to CP4 and CP11 boards that interface with the new CP2 were added and designated option ZB.

D.3 On sheet B3, the K option is added to provide SI(F), SIR(F), and SI(G), SIR(G) isolated alarm contacts.

D.4 On sheet B6, FS6, the new version of the CP8 Remote Interface board was shown and designated option ZH.

D.5 On sheet B7, FS7, the new version of the CP9 Universal Shunt Monitor board was shown and designated option ZE.

D.6 FS9 and FS10 were added to show the addition of two new features. The Battery Reserve Predictor board (MC-80013E1) was added and designated option ZC. The Rectifier Sequence Controller was added and designated option P.

D.7 On sheet C1, updated App Fig 1 and 2.

D.8 Added sheet C2 to include all of App Fig 3.

D.9 On sheet D1, Circuit Notes 102 and 103 have been changed to add options D, P, ZC and ZB. Circuit Note 108 has been modified to improve H-Cable ordering information. Note 104 has been modified to show addition of CP8, CP9, CP10, CP12 and CP13. Information Note 303A was updated.

D.10 On sheet D2, added Circuit Notes 120, 121, 122, and 123. Modified Notes 114, 115 and 305.

D.11 Added sheet D3 and the continuation of Note 123.

D.12 On Sheets G1 and G2, added ZB option connections.

D.13 on Sheet G3, added SI alarm connections to TB1 and backplane connections for the Rectifier Sequence Controller.

D.14 On Sheet G7, added CAD 5.

D.15 On Sheet B5, added CR1 and CR2 diodes designated ZI option.

D.16 Option Index Table was updated.

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CHANGES

D. Description of Changes

D.1 The numbering sequence on the J1 and J2 connectors was corrected on sheet B2.

D.2 Option Q was added to correct wiring errors in FS8.

D.3 The wiring option for the M2 PLANT LOAD CURRENT ammeter was corrected on sheet B5.

D.4 Circuit Note 103 updated for issue 7M.

D.5 Circuit Note 119 was added.

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CHANGES

B. Changes in Apparatus

B.1 Added

W4 Cable Assembly, H-285-224,L-195
E/W J10A-Connector, KS-21302,L26
E/W KS-21302,L51 Contacts - App Fig 2

W5 Cable Assembly, 845805001
E/W J10B Connector, KS-21302,L26
E/W KS-21302,L51 Contacts
E/W J10C Connector, 90319-0002 (MOLEX) - App Fig 2

W6-Cable Assembly, H-285-2241,L-196
E/W J10D Connector, KS-21302,L10
E/W KS-21302,L51 Contacts - App Fig 2

W7-Cable Assembly, H-285-224,L-197
E/W TB303 Terminal Block, SS84P08511 (BUCHANAN) - App Fig 2

CP10 Circuit Pack, MC-80031A1, U Option - App Fig 2, CM2

D. Description of Changes

D.1 Added reference to option R to reference designations W2, W3, and FA- in App Fig 2.

D.2 Added Data Switch connections (option U) to Remote Interface in FS6.

D.3 Added option U components to App Fig 2.

D.4 Added Data Switch (MC-80031A) as FS8 (option U).

D.5 Sheet Note 3 added to sheet B6.

D.6 Sheet Note 1 added to sheet B7.

D.7 Updated Circuit Notes 102, 116 and Information Note 303 and added Circuit Note 118 to reflect addition of option U.

D.8 Sheet G7 added to reflect options T and U.

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CHANGES

D. Description of Changes

D.1 Terminal numbers of the J9A and J9B connectors were corrected to agree with the manufactured product.

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CHANGES

B. Changes in Apparatus

B.1 Added

W2 Cable Assembly, 845653286 - App Fig 2
E/W J9A- Connector, KS-21302,L10 E/W KS-21302,L51 contacts
J9D- Connector, 2-520183-2 (AMP)
P9D- Connector, 2-520102-2 (AMP)

W3 Cable Assembly, 845653294 - App Fig 2
E/W J9B- Connector, KS-21302,L10, E/W KS-21302,L51 Contacts
J9D- Connector, 2-520183-2 Receptacle (AMP)
P9D- Connector, 2-520102-2 Tab (AMP)

CP9 Circuit Pack, MC-83001D1, R Option - App Fig 2, CM2

FA- Fuse Assembly - App Fig 2
E/W P9C- Connector, 03-09-1011 Housing (MOLEX)
E/W 02-09-2101 Pin (MOLEX)
FB-Fuse, HLR Fuse Holder (BUSSMAN) E/W
GLR-1/2 Fuse (BUSSMAN)
E- Terminal, 2-34067-1 Butt Splice (AMP)

FS7 (Universal Shunt Monitor Circuit), R Option

B.2 Superseded	Superseded By
CP3 Circuit Pack, MC-80013A1, A Option - App Fig 1	CP3 Circuit Pack, MC-80013A1B, B Option - App Fig 1
H Option (Mfr Disc)	J Option
A Option (Mfr Disc)	B Option

D. Description of Changes

D.1 Changed Circuit Notes 102, 103, 108, and 116.

D.2 Added Circuit Note 117.

D.3 Added Equipment Note 202.

D.4 Changed Information Notes 303A and 303B.

D.5 Changed Option Index table.

D.6 Changed Sheet Note 1 on Sheets B3 and G3.

D.7 Added Sheet Note 3 on Sheet B3.

D.8 Added reference to Options H and J to CAD1 (Sheet G1).

D.9 Added CAD 4, Option V.

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D. DESCRIPTION OF CHANGES

D.1 Frame ground (FG) was moved from TB1 terminal 22 to TB1 terminal 18 to provide for an isolated closure on alarm contacts SI(C) and SIR (C) and also to provide convenient access to FG.

D.2 Circuit Note 106 was removed to accommodate this change.

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TABLE OF CONTENTS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This microprocessor controlled circuit monitors the charge-discharge circuit and sends visible and audible alarms whenever a rectifier fails, a fuse operates, or a circuit breaker trips or whenever battery voltage exceeds predetermined limits. In addition, the control circuit has a vacuum fluorescent display that displays diagnostic information on the condition of the plant and rectifiers, provides average load drain information and peak current drain information and also maintains the plant at maximum efficiency by automatically turning the rectifiers on and off, provides information when the plant drain approaches the rectifier capacity, and has an automatic backup should the microprocessor fail. The controller can also be equipped (on an optional basis) to have a remote interface.

SECTION II - DETAILED DESCRIPTION

1. REG AND CONTROL FUSE CIRCUIT

1.01 The fuse panel consists of a total of 21 fuses. There are 16 fuses available for use as regulation fuses. These fuses [designated both regulation battery (RB) RB1 through RB16 and F1 through F16] connect the rectifier regulator (REG) leads to the REG bus. Each connection provides REG battery voltage through the rectifier signals board (CP 4) to the respective rectifier. Operation of an RB fuse will connect battery to the minor regulation (MIN REG) resistor and on to the controller as a regulation battery fuse (RBF) alarm. This signal is applied to the auxiliary circuit (AUX CKT) board (CP 2) and is fed to the front panel and simultaneously processed by the microprocessor. It will light the SYSTEM ALARM light-emitting diode (LED). Operation of the key associated with the LED will give an indication on the display that a REG fuse has operated. Inspection of the fuse panel will reveal the operated fuse. The F17 control fuse (CTF) feeds the negative battery (NEG BAT) connection and provides battery voltage for the AUX CKT alarms [high voltage (HV), battery discharge (BD), low voltage 1 (LV1), and low voltage 2 (LV2)]. If the CTF operates, it causes a major alarm. The F18 MINOR SENSE fuse provides battery voltage for monitoring the front panel display. Operation of this fuse will have the same minor alarm signal as provided by an operated RB fuse. The F19 minor power feed (MINOR PWR FEED) fuse provides power for the CP 6 24-volt converter (option Z) or the CP 7 48-volt converter (option W). Operation of this fuse will send a minor alarm by means of a fuse alarm, minor (FAM). The F20 battery (BAT) fuse supplies battery to all connected rectifiers. Operation of this fuse will send a major alarm by means of a fuse alarm, major (FAJ) connection. The F21 ABS fuse provides

power for the ESS* switching equipment alarms. It provides battery to the ABSO through ABSJ connections. Operation of this fuse will send a major alarm through the FAJ connection.

* Trademark of AT&T Western Electric

2. BACKPLANE

2.01 The backplane is the central connecting point for the BELLMASTER Telecommunications Power Plant Management System circuit packs. It provides interconnections between the BEG and control fuse circuit and the appropriate circuit packs, provides termination for all control and alarm signals from the rectifiers, provides a means for changing to the various options that are available, and can be programmed to identify the various combinations of shunts that are available for use with this plant.

2.02 The TB1 terminal strip, which accepts and transmits the required alarms, connects to P1A and P1B on the backplane by means of 963N-24 connectors. It provides for alarm connections to or from the auxiliary circuit board, the plant signals board, and the rectifier signals board.

3. DISPLAY CIRCUIT MODULE/KEYPAD

3.01 The vacuum fluorescent display (VFD) is a 80-character display used in displaying alarm messages. The circuitry contained on this board will decode alarm information and present it as a readable message on the display. The red light-emitting diodes (CR2 through CR6) on the left side of the display will light for major alarms, and the amber light-emitting diodes (CR8 through CR12) on the right side will light for minor alarms. The CR1 light-emitting diode is a microprocessor fail (μP FAIL) indicator.

3.02 The microprocessor is constantly scanning the system. A key closure on the front panel will interrupt the scanning and supply the microprocessor with row and column information on the key. The microprocessor will then display the necessary information on the VFD. The acceptance of any key information is indicated by an audible tone supplied by a beeper located on the display board.

4. AUXILIARY CIRCUIT BOARD

4.01 The auxiliary circuit board monitors battery voltage and sends alarms when the battery voltage exceeds or falls below accepted limits. It also monitors and sends alarms for various control and alarm fuse operations.

5. CPU CIRCUIT PACK

5.01 The central processing unit (CPU) board contains the microprocessor and additional interface circuits, the timing, and the programs required for the BELLMASTER Telecommunications Power Plant Management System controller. This board connects to the other circuit boards through the backplane and also interfaces with the front panel through another connector.

6. PLANT SIGNALS BOARD

6.01 The plant signals board monitors the battery voltage, the shunt current, the auxiliary circuit, and the engine TRs. This information is then digitized or isolated or both and then sent to the CPU board for final processing.

7. RECTIFIER SIGNALS BOARD

7.01 The rectifier signals board accepts and transmits information to eight different rectifiers. It is an interface between the BEG fuses and the rectifiers and provides battery (BAT) to the rectifiers alarm circuits, transmits and receives alarm information, and identifies the type of rectifiers being used with the plant.

8. 24V CONVERTER/48V CONVERTER

8.01 The converters are dc to dc converters that change battery voltage into three voltages required for the operation of the various integrated circuits (ICs) located throughout the controller. The three required voltages are ±15 volts and +5 volts.

9. REMOTE INTERFACE OPTION CIRCUIT PACK

9.01 The remote interface option circuit pack provides for accessing the BELLMASTER Telecommunications Power Plant Management System from remote areas over a data line. This feature enables interrogation of the plant alarms and other status indications.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 The 48-volt plant has the following voltage limits with respect to high-voltage shutdown and low-voltage alarm.

HV = 53.00 ±0.50 Volts

HD = 51.25 ±0.50 Volts

1.02 The 24-volt plant has the following voltage limits with respect to high-voltage shutdown and low-voltage alarm.

HV = 26.75 ±0.25 Volts

HD = 25.50 ±0.25 Volts

1.03 The dc to dc converters have the following output tolerances:

+5.00 Volts, Regulated, ±0.02 Percent

±15 Volts, ±15 Percent

1.04 Temperature Limits

0 through 50 Degrees Celsius

2. FUNCTIONAL DESIGNATIONS

2.01 Alarms

Designation	Meaning
AUX CKT	Auxiliary Circuit
BD	Battery Discharge
FAJ	Fuse Alarm, Major
FAN	Fuse Alarm, Minor
HV	High-Voltage
LV1	Low Voltage 1
LV2	Low Voltage 2
RBF	Regulation Battery Fuse

2.02 Battery

Designation	Meaning
BAT	Battery

2.03 Circuit Packs

Designation	Meaning
AUX	Auxiliary
AUX CKT	Auxiliary Circuit
CPU	Central Processing Unit
PLT SIG	Plant Signals
RECT BOARD	Rectifier Board
RECT SIG	Rectifier Signals
REM ACC	Remote Access
24V CONV	24-Volt Converter
48V CONV	48-Volt Converter

2.04 Diodes, Light-Emitting (LEDs)

Designation	Meaning
BAT DISCH	Battery Discharge
µF	Microprocessor Fail
RECT FAIL	Rectifier Fail

2.05 Display

Designation	Meaning
VFD	Vacuum Fluorescent Display

2.06 Fuses

Designation	Meaning
BAT	Battery
CTF	Control Fuse
MINOR PWR FEED	Minor Power Feed
RB	Regulation Battery
REG FUSE	Regulator Fuse

2.07 Leads

Designation	Meaning
+24S	24-Volt Regulated Battery Supply
+48S	48-Volt Regulated Battery Supply
A	ESS Switching Equipment Minor Alarm Connection
BATGRD	Battery Ground
BATSH	Battery Side of Shunt
BATSHG	Ground Side of Shunt
BD	Battery Discharge
BDFP	Battery on Discharge to Front Panel
BDPX	Battery on Discharge From Processor to AUX CKT
BDXP	Battery on Discharge From AUX CKT to Processor
COL	Conventional Rectifier Signals Board RS Connection
CTF	Control Fuse
CTFXP	Control Fuse Alarm From Processor to AUX CKT
D	ESS Switching Equipment Major Alarm Connection
FAJ	Fuse Alarm, Major
FAJFP	Fuse Alarm, Major, to Front Panel
FAJXP	Fuse Alarm, Major, From Processor to AUX CKT
FAN	Fuse Alarm, Minor

FANFP	Fuse Alarm, Minor to Front Panel
FANXP	Fuse Alarm, Minor, From Processor to AUX CKT
FRGRD	Frame Ground
HVFP	High Voltage to Front Panel
HVPX	High-Voltage Shutdown From Processor to AUX CKT
HVS	High-Voltage Shutdown Signal to Rectifier Signals Board
HVXP	High Voltage From AUX CKT to Processor
INP	Conventional Rectifier Signals Board Connection to RS CKT
LV2XP	Very Low Voltage From Processor to AUX CKT
MNALM	Minor Alarm
NEG BAT	Negative Battery
OCOL	COL Return
PMJ	Power, Major
PMJR	Power, Major, Return
PMJV	Power, Major, Visible
PMJVR	Power, Major, Visible, Return
PMN	Power, Minor
PMVR	Power, Minor, Return
PMNV	Power, Minor, Visible
PMNVR	Power, Minor, Visible, Return
PWR	Power
RBF	REG BAT Fuse
RBXP	REG BAT From AUX CKT to Processor
REG	Regulator
RES	Restart
RESR	Restart Return
RETFP	Front Panel Return
RETPX	Microprocessor Return
RFAN	Rectifier Alarm, Minor
RS	Rectifier Signals
RSB	Rectifier Signals Board
RS CKT	Rectifier Signals Circuit
SI(A)	Status Indicator (Battery on Discharge)
SI(B)	Status Indicator (High Voltage)
SI(C)	Status Indicator (MNF/RFA)
SI(D)	Status Indicator (Very Low Voltage)
SI(E)	Status Indicator (Major Fuse Alarm)
SIR( )	Status Indicator Return
TRR	Remote Shutdown
µP FAIL	Microprocessor Fail
UPFX	Processor Fail From Plant Signals Board to AUX CKT

2.08 Regulator

Designation	Meaning
REG	Regulator

2.09 Resistor

Designation	Meaning
MIN REG	Minor Regulator

2.10 Switches

Designation	Meaning
BATTERY DISCHRG	Battery Discharge
LIMITED RECHRG	Limited Recharge
PLANT DRAIN STATS	Plant Drain Status
PLANT EFF STATUS	Plant Status
RECT DRAIN	Rectifier Drain
RECT FAILURE	Rectifier Failure

3. FUNCTIONS

3.01 None.

4. CONNECTING CIRCUITS

SD-82395-01	24 Volt 35 Amp Rectifier
SD-82396-01	48 Volt 35 Amp Rectifier
SD-82397-01	24 Volt 100 Amp Rectifier
SD-82398-01	48 Volt 100 Amp Rectifier
SD-82399-01	24 Volt 200 Amp Rectifier
SD-82400-01	48 Volt 200 Amp Rectifier

SD-82603-01 BELLMASTER Charge and Discharge Circuit

5. MANUFACTURING TESTING REQUIREMENTS

5.01 The manufacturing testing requirements are in the X-79930 specification.

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