POWER SYSTEMS "LINEAGE"® 2000 CHARGE AND DISCHARGE CIRCUIT 24 OR 48 VOLTS 6400 AMPERES MAXIMUM J85500

CHANGES

A Changed and Added Functions

A.1 An optional figure (APP FIG 10) is added to provide a red LED at the top of the initial and supplementary distribution bays for quickly locating the bays with blown fuses or operated circuit breakers.

B. Changes in Apparatus

B.1 ADDED

App Fig 10 (FS11) ZF Option

D. Description of Changes

D.1 FS 11 and ZF option were added to the circuit to provide a red alarm LED for -48V plants. When the alarm LED is not required or for the 24V plants, the ZE option should be used.

D.2 Option Index table updated.

D.3 Sheet Note 5 and 1 were added on sheets B1 and B7, respectively.

D.4 Circuit Note 102 updated. Circuit Note 103 updated for drawing Issue 7M.

D.5 Equipment Notes 131 and 132 were added.

F. Changes in Description of Operation

F.1 Add paragraph 10 to Section II of the CD as follows:

10. FS 11- BAY ALARM LAMP

10.01 The operation of a fuse or circuit breaker on a panel places the battery voltage on the FAS_, lead of the panel. The voltage is applied either through the FAJ resistor of the fuse panel or the FAJ resistor of the bay, depending on whether a fuse or circuit breaker is operated. In applying FS 11, all FAS_ leads originating from fuse or circuit breaker panels that are co-located on a bay are connected together (FAS1, FAS2 and FAS3 nodes respectively for the initial, first and second supplementary bays) and applied to the junction of the CR3 diode and R5 resistor of the CM2_ circuit module of the bay (X and W option plants). When an over current device of the bay operates, the corresponding FAS_ lead causes current to flow through two circuits. The flow through CR3 activates the Fuse alarm circuit located in the controller. The flow through R5, turns Q1 transitor ON. With Q1 on, about 20 mA flows through the DS2_ LED, turning it ON.

10.02 Normally, the junction of the R5 resistor and CR3 diode is at DISCH GRD pontential (0 volts). When a bay activate its FAS_ lead and causes the FAJ lead of the controller to become negative (about -28 volt), the CR3 diodes of inactive bays become reverse biased and prevent turning ON their Q1 transistors.

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CHANGES

B. Changes in Apparatus

B.1 Superseded	Superseded By
DATA SET, 103J-LP Universal Data Systems, ZA Option - App Fig 3	DATA SET, 212A-LP Universal Data Systems, ZB Option - App Fig 3

D. Description of Changes

D.1 FS10 Battery Reserve Predictor Thermistor Assembly, option ZB, was added.

D.2 Reference to option ZB was added to the FS1 heading.

D.3 The EQ lead, option ZB, was added from the rectifier to the MCS controller in FS1. Also, in FS1, the 1H and GRD leads, option ZB, were added to the MCS controller.

D.4 In FS2, information for the "CO GRD" connection, options ZC/ZD, was added.

D.5 CAD3 was added.

D.6 In FS7, terminal numbers were added to the leads, and BATSH and BATSHG leads were added. The destination information of the BATSH and BATSHG leads was changed.

D.7 Circuit Notes 102 and 107 were updated by the addition of the reference to option ZB.

D.8 Circuit Note 103 was updated for drawing issue 6B.

D.9 Circuit Note 130 and Information Note 306 were added.

D.10 Option Index table was updated.

D.11 Circuit Note 105 was changed.

D.12 Information Note 303 was updated by addition of J85502, J85503, and J85603 rectifiers.

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CHANGES

D. Description of Changes

D.1 In FS2, the input leads "RB" and "DISCH BAT" identified as options R,P were added to the negative 48V Battery.

D.2 In FS2, reference to options R and P were added to leads "-LV", "N", "P", and "+LV" for the negative 48V Battery. Reference to option P was added to output leads "DC1" and "DC2". Reference to option D was added to lead "DISCH BAT" for the Initial Bay in FS2.

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POWER SYSTEMS "LINEAGE"® 2000 CHARGE AND DISCHARGE CIRCUIT 24 OR 48 VOLTS 6400 AMPERES MAXIMUM J85500

TABLE OF CONTENTS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit provides a 24-cell (W option) or 12-cell (Z option), positive (Y option) or negative (X option) dc power plant with a maximum 6400-ampere charge and 5200-ampere discharge capability with accompanying dc circuit breakers and/or fuses, controls, rectifiers, and battery equipment. The plant can utilize either Microprocessor Controlled System (MCS) or Conventional Controlled System (CCS) control units (E or F option, respectively). The plant provides alarms and optionally, statistical information about the condition of the plant and the loads fed and/or monitored by it. The MCS control unit can improve the energy efficiency of the power plant by turning off rectifiers not required by the plant.

2. GENERAL DESCRIPTION OF OPERATION

2.01 This power plant converts an ac input into a dc output with backup power provided by batteries. The power plant utilizes ferroresonant rectifiers to convert alternating current into direct current. These rectifiers are controlled by either a microprocessor control unit (MCS) or a conventional control unit (CCS). The plant has an optional low voltage disconnect feature for specific plant configurations. The plant has many distribution options available dependent on load conditions as well as the control unit utilized. Option S allows load filters to be charged through the distribution circuit breakers. The plant enables specified inverters to be ordered with it and fed from the power plant.

2.02 The rectifiers are set to float the batteries and recharge them as required. There are several backup systems in the plant that will monitor the battery and send alarms for high or low battery voltages. If the battery voltage exceeds the upper limit of 53.00 ±0.5 volts (W option), 26.75 ± 0.25 volts (Z option), the plant will send a high-voltage shutdown to all rectifiers and send out a major alarm. Rectifiers with output current >10 percent of their rating will shutdown. After shutdown the HV Alarm disappears and a minor alarm is sent. If any distribution fuse or circuit breaker operates, a major alarm is sent and the appropriate LED on the plant controller will light. Major alarms are also sent when the battery voltage drops to 51.25 ±0.5 volts (W option), 25.50 ±0.25 volts (Z option). These alarms include the 51(A), D, BD, PMJ, and PMJV. At 48.25 ±0.5 volts (W option), 24.00 ±0.25 volts (Z option), an additional alarm [51(D)] is sent.

2.03 The MCS control unit has many options available to enhance the power plant capabilities. The unit is microprocessor driven. It enables the plant rectifiers to float the plant batteries at a regulated voltage, provide load current and recharge the plant batteries as required. It has contacts available to indicate alarm conditions. It also provides for improved power plant efficiency via an "energy efficiency algorithm" which turns off rectifiers not required by the power plant and selects the highest efficiency rectifiers to provide plant current. The control unit keeps a history of alarms and load statistics. This control unit can utilize a modem (M option) to relay alarms and data. The control unit can be combined with selected shunts to monitor current (G and V options for the feeder drain monitoring option and A, B, and C options for the universal shunt monitoring feature).

2.04 The CCS control unit is a conventional control unit that enables the plant rectifiers to float the plant batteries at a regulated voltage, provide load current and recharge the plant batteries as required. It has contacts available to indicate alarm conditions.

SECTION II - DETAILED DESCRIPTION

1. RECTIFIERS AND MCS "LINEAGE® 2000 CONTROLLER

1.01 FS 1 shows a general type of rectifier with the connections required for it to be controlled by a MCS LINEAGE 2000 controller. The plant has ability to accept all codes of the J coded ferroresonant rectifiers. The plant can work with any number or combination of rectifiers (within the restrictions placed on it by the control unit) up to a maximum of 16 rectifiers. Below are listed connections between the MCS control unit, the rectifiers of FS1 and the rest of the power plant:

LEADS BETWEEN THE RECTIFIERS AND THE POWER PLANT

Designation	Meaning
B	Main rectifier charging lead to battery.
G	Main rectifier ground lead to battery.
BAT	Provides battery to the rectifier. This battery supply is needed for operation of rectifier alarms.
APG	The applied plant ground is a separate ground used for IC circuit ground. This ground is the return signal for the VI power supply.
VI	A supply voltage fed from the rectifiers to the plant.
GRD	Provides ground for relays and LEDs and for monitoring the battery voltage to the control unit.
HV	Whenever the battery exceeds its high voltage limits, the voltage monitor in the control unit shuts down rectifiers via this lead.
RB/RG	The rectifier senses the battery voltage over these leads. The RB and RG leads are converted to R+ and R- in the rectifier.
RFA/RFAR (if present)	When a rectifier fails, it transmits a ground to the control unit via the RFA lead.
RS/RSR	When a rectifier fails because of high voltage caused by transients, the controller makes one attempt to start a rectifier over the RS lead.
TR	Remote shutdown sent from engine control.
PH	Phase monitor alarm.
CB/CBR (if present)	Circuit breaker trip alarm.
MAN	Indicates manual shutdown of a rectifier.

LEADS FROM THE CHARGE AND DISCHARGE BUSES TO THE CONTROL UNIT

BATSHG and BATSH:	Used to measure the voltage drop of a predetermined resistance (the R1 shunt) to determine the current being delivered to the loads for the power plant.
DISCH BAT and DISCH GRD:	Used to measure the voltage between the DISCHARGE BUS and the DISCHARGE GROUND BUS.

RB and RG: REGULATION BATTERY and REGULATION GROUND, respectively, and are used to measure the voltage between the CHARGE BATTERY BUS and the CHARGE GROUND BUS.

LEADS FROM THE CIRCUIT BREAKERS AND FUSES TO THE CONTROL UNIT

FAJ: Used as an input to the control unit to signal it that a load circuit breaker has tripped or the low voltage disconnect option has removed the battery from the power plant.

LEADS FROM THE FILTER CHARGER CIRCUIT TO THE CONTROL UNIT

FAN: Used as an input to the control unit to signal it that the CHG fuse has operated.

LEADS FROM EXTERNAL CIRCUITRY TO THE CONTROL UNIT

TR 1 through 4: Used to control groups of rectifiers. They are the means to shutdown rectifiers from an external source.

LEADS FOR THE FEEDER DRAIN MONITOR OPTION

The G or V wiring options [SH () leads] are required when it is desired to have a shunt monitored by the FEEDER DRAIN MONITORING option of the MCS control unit. This feature can only be used with shunts that are -48 volts or -24 volts, with a resistance that gives a full load voltage drop of 25 or 50 mV and are associated with this power plant. The restrictions on the use of this option are detailed on this SD as well as CD/SD-82588-01.

LEADS FOR THE UNIVERSAL SHUNT MONITORING OPTION

The C option wiring [CH() leads] is required when it is desired to have a shunt monitored by the UNIVERSAL SHUNT MONITORING option of the MCS control unit. This will allow shunts with a resistance that gives a full load voltage drop of 25 or 50 mV to be monitored that are associated with this plant or other plants. The restrictions on the use of this option are detailed on this SD as well as CD/SD-82588-01.

1.02 Part of FS 1 shows the MCS control unit. The MCS control unit has many options available that enhance the power plant. These options are detailed in CD/SD-82588-01. The following is a list of the control unit options and the options that they relate to in the power plant:

CD/SD-82588-01 OPTION:	RELATED CD/SD-82683-01 OPTION:
E (MCS CONTROL UNIT)	E
W (48 VOLT PLANT)	W
Z (24 VOLT PLANT)	Z
X (NEGATIVE PLANT)	X
Y (POSITIVE PLANT	Y
M (MODEM)	M
V (OPTIONAL CARD CAGE)	REQUIRED FOR M, C, D
T (REMOTE INTERFACE)	REQUIRED FOR M
G (FEEDER DRAIN MONITOR)	G, V WIRING + SHUNTS AS REQUIRED (ALSO REQUIRED IF FS 7, NOTE 122 APPLY)
R (UNIVERSAL SHUNT MONITOR)	C WIRING AND A, B SHUNTS AS REQUIRED

2. BATTERY BUSES AND PLANT SHUNT

2.01 FS 2 shows the various battery arrangements. The CHARGE BATTERY BUS, CHARGE GROUND BUS, DISCHARGE GROUND BUS and the plant shunt R1 are all an integral part of the initial battery stand. The plant shunt, CHARGE GROUND BUS and DISCHARGE GROUND BUS arrangement are such that the size of the plant can be changed. The shunts range in size from 400 to 6000 amperes.

3. DISCHARGE CIRCUIT AND FILTER CHARGER CIRCUIT

3.01 FS 3 shows the discharge circuit which consists of circuit breakers and/or fuses. The load is connected to circuit breakers and/or fuses. If either should operate, a major alarm is transmitted via the FAJ lead to the controller (SD-82588-01). The circuit breakers will transmit an alarm only in the tripped position, this allows for turning off selected loads without having to disconnect the alarm leads. Some KS-22812 circuit breakers are equipped with internal shunts which allow for separate load monitoring.

3.02 FS 3 also shows the FILTER CHARGER (S option). This circuit will permit the precharging of capacitor loads prior to operating their respective circuit breakers. The R1.1-R1.4 resistors are used to limit the charging current and the DS1 LED provides a visual indication when the capacitor is charged. Operation of the CHG fuse will result in a minor alarm transmitted over the FAN lead. This lead is protected by the current limiting resistor R2.

3.03 FS 3 also shows a circuit that contains distribution circuit breakers that can operate on an over-current or low-voltage condition. CM1 is a 118A circuit module. This circuit module causes the circuit breakers to operate via a shunt coil on the circuit breaker. For

more details on the operation of the 118A circuit module see CD/SD-82568-01. The 118A modules and circuit breakers that can possibly be used in this circuit are documented in APP FIG 4.

4. REMOTE ACCESS

4.01 FS 4 show the MODEM (M option). This option provides for the connection of a MODEM which will allow for the remote access to the plant. The option can be used to obtain plant operating data from any remote location equipped to gain access to the plant.

5. RECTIFIERS AND CSS "LINEAGE" 2000 CONTROLLER

5.01 FS 5 shows a general type of rectifier with the connections required for it to be controlled by a CCS LINEAGE 2000 controller. The plant has the ability to accept all codes of the J-coded as well as certain RS-coded ferroresonant rectifiers. The plant can work with any number or combination of rectifiers (within the restrictions placed on it by the control unit) up to a maximum of 16 rectifiers. Below are listed connections between the CCS control unit, the rectifiers of FS 5 and the rest of the power plant:

LEADS BETWEEN THE RECTIFIERS AND THE POWER PLANT

B: Main rectifier charging lead to the plant batteries.

G: Main rectifier ground lead to the plant batteries.

RB/RG: The rectifier uses these leads to sense battery voltage.

HV/HVR: The control unit uses these leads to shut down rectifiers that could be causing a high voltage condition whenever the battery exceeds its high voltage limit.

BAT: Used to provide battery supply voltage for internal rectifier needs.

GRD: Used to provide ground voltage for internal rectifier needs.

RFA/RFAR: The RFAR lead is used to bring ground from the control unit to the rectifier. Upon rectifier failure, this ground is converted to an RFA ground by a relay closure in the rectifier. This ground is then transmitted back to the control unit.

RS/RSR: The control unit uses these leads to makes one attempt to restart failed rectifiers. If rectifiers failed due to a transient high voltage condition, they will be restarted via these leads.

CB/CBR: The rectifier provides a clean closure between these two leads for the control units' use when the rectifiers output circuit breaker is tripped.

LOA/LOAR: The rectifier provides a clean closure between these two leads for the control units' use when the rectifier experiences a loss of alternating current.

PMN/PMNR: The rectifier provides a clean closure between these two leads for the control units' use when a rectifier fails or there is a loss of alternating current.

PMNV/PMNVR: The rectifier provides a clean closure between these two leads for the control units' use when a rectifier fails or there is a loss of alternating current.

LEADS FROM THE CHARGE AND DISCHARGE BUSES TO THE CONTROL UNIT

BATSHG/BATSH: Used to measure the voltage drop of a predetermined resistance (the R1 shunt) to determine the current being delivered to the loads of the power plant.

DISCH/DISCH GRD: Used to measure the voltage between the DISCHARGE BUS and the DISCHARGE GROUND BUS.

RB/RG: RB and RG stand for REGULATION BATTERY and REGULATION GROUND, respectively, and are used to measure the voltage between the CHARGE BATTERY BUS and the CHARGE GROUND BUS.

LEADS FROM THE CIRCUIT BREAKERS AND FUSES TO THE CONTROL UNIT

FAJ: Used as an input to the control unit to signal it that a load circuit breaker has tripped or the low voltage disconnect option has removed the battery from the power plant.

LEADS FROM THE FILTER CHARGER CIRCUIT TO THE CONTROL UNIT

FAN: Used as an input to the control unit to signal it that the CHG fuse has operated.

LEADS FROM EXTERNAL CIRCUITRY TO THE CONTROL UNIT

TR 1 through 4: Used to control groups of rectifiers. They are the means to shutdown rectifiers from an external source.

5.02 Part of FS 5 shows the CCS control unit. The CCS control unit options are detailed in CD/SD-82588-01. The following is a list of the control unit options and the options that they relate to in the power plant:

CD/SD-82588-01 OPTION:	RELATED CD/SD-82603-01 OPTION:
F (CCS CONTROL UNIT)	F
W (48 VOLT PLANT)	W
Z (24 VOLT PLANT)	Z
X (NEGATIVE PLANT)	X
Y (POSITIVE PLANT)	Y

6. PART OF DISCHARGE CIRCUIT

6.01 FS 6 shows more distribution circuitry that is available with this power plant. Fuses that have shunts mounted in series with them can be used to take advantage of the MCS advanced monitoring capabilities. A switch-fuse assembly is also available that allows a load to be fed from a redundant fuse upon the failure of one fuse with a minimum loss of time via a manual switch. The alarm features are similar to that described in paragraph 3.01 of this section.

7. OUTBOARD MCS CONTROL UNIT RETROFIT INTERFACE

7.01 The MCS control unit can be utilized with selected existing power plants to provide monitoring and/or control of those plants in very specialized conditions. The utilization of this power plant in order to provide this service is explained in application specific documentation.

8. LOW VOLTAGE DISCONNECT

8.01 FS 6 also shows the LOW VOLTAGE DISCONNECT CIRCUIT used with the P or R option. These options are only available with the W option. Option R is for use with a maximum load rating of 1200 amperes and option P is for use with a maximum load rating of 800 amperes. This circuit is used to disconnect battery when the battery voltage is too low. When the voltage between the CHARGE BATTERY BUS and CHARGE GROUND BUS falls below a preselected voltage, the battery will be disconnected from the CHARGE BATTERY BUS.

8.02 When the voltage falls below the predetermined level, a Darlington pair of transistors in ED-83104-30 turn off, changing the voltage at terminal 3 of ED-83104-30 from ground to approximately the battery voltage. This de-energizes the K1 contactor. When the K1 contactor is de-energized, it de-energizes the K2 contactor. When the K2 contactor is de-energized, the batteries are disconnected from the CHARGE BATTERY BUS. If the voltage between the CHARGE BATTERY BUS and CHARGE GROUND BUS rises above the disconnect level, the batteries will be connected back to the CHARGE BATTERY BUS via K2. The FAJ lead is energized when the batteries are disconnected from the plant. This causes a major alarm.

8.03 This preselected Low Voltage Disconnect value can be chosen from a set of possible voltages via ED-83104-30 groups. See SD-83104-01 Sheet J1 for further information on the ED-83104-30.

9. INVERTER

9.01 The 1-, 3-, 5-, and 10-KVA inverters that operate from -48 volts DC or 120 volts AC input and produce 120 volts AC output are available as option Q. These inverters can be fed from specified circuit breakers of FS 3. For more information see Note 124 of the SD.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 See CD/SD-82588-01 for the control unit working limits. When the R or P options are utilized see CD/SD-83104-01 for the working limits of the low voltage disconnect circuit. See the appropriate CD/SD for the working limits of the rectifiers utilized with the power plant.

2. FUNCTIONAL DESIGNATIONS

2.01 Listed are the lead designations not previously defined in the CD:

Designation	Meaning
FA	Power source for the FAJ leads
CF	Power source for FILTER CHARGING CIRCUIT
CBA	Power from FILTER CHARGING CIRCUIT TO CBs
+LV	Voltage sense lead for Low Voltage Disconnect
-LV	Voltage sense lead for Low Voltage Disconnect
N	Power source to drive K2 contactor
P	Power source to drive K2 contactor
DC1	Bus bar between battery and K2 contactor
DC2	Bus bar between K2 contactor and Charge Battery Bus

2.02 Circuit Pack

Designation	Meaning
CP1	Low Voltage Disconnect Circuit Pack

See CD-82588-01 for additional designations.

3. FUNCTIONS

3.01 J85501A Control circuit functions are contained in CD/SD-82588-01.

3.02 J85502A, B, C rectifier functions are contained in CD/SD-82604-01.

3.03 J85503A, B rectifier functions are contained in CD/SD-82605-01.

3.04 J85503C rectifier functions are contained in CD/SD-83102-01.

3.05 CM1 circuit module functions are contained in CD/SD-82568-01.

3.06 ED-83104-30 functions are contained in CD/SD-83104-01.

3.07 J87434A rectifier functions are contained in CD/SD-82395-01.

3.08 J87435A rectifier functions are contained in CD/SD-82396-01.

3.09 J87436A rectifier functions are contained in CD/SD-82397-01.

3.10 J87437A rectifier functions are contained in CD/SD-82398-01.

3.11 J87438A rectifier functions are contained in CD/SD-82399-01.

3.12 J87439A rectifier functions are contained in CD/SD-82400-01.

3.13 J85603C rectifier functions are contained in CD/SD-82656-01.

4. CONNECTING CIRCUITS

4.01 SD-82395-01 - Rectifier Circuit for J87434A

4.02 SD-82396-01 - Rectifier Circuit for J87435A

4.03 SD-82897-01 - Rectifier Circuit for J87436A

4.04 SD-82398-01 - Rectifier Circuit for J87437A

4.05 SD-82399-01 - Rectifier Circuit for J87438A

4.06 SD-82400-01 - Rectifier Circuit for J87439A

4.07 SD-82568-01 - Circuit Breaker Panel Assembly

4.08 SD-82588-01 - LINEAGE Controller

4.09 SD-82604-01 - Rectifier Circuit for J85502A, B, C

4.10 SD-82605-01 - Rectifier Circuit for J85503A, B

4.11 SD-83102-01 - Rectifier Circuit for J85503C

4.12 SD-83104-01 - LINEAGE 2000 Charge and Discharge Circuit

4.13 SD-82658-01 - Rectifier Circuit for J85603C

5. MANUFACTURING TESTING REQUIREMENT

5.01 Refer to the rectifier CD/SD for their Manufacturing Test Requirements. Refer to the control unit CD/SD for its Manufacturing Test Requirements. The LOW VOLTAGE DISCONNECT circuit (options R and P) Manufacturing Test Requirement is X-79596.

SECTION IV - REASONS FOR REISSUE

B. Changes in Apparatus

B.1 Added

Rectifiers, J85502C, J85503A, J85503B, J85503C, J85603C } App Fig 1

TB2 Terminal Block, 408639340, N Option App Fig B

D. Description of Changes

D.1 In App Fig 1, SHUNTS were designated R4.

D.2 In App Fig 4, SHUNTS were designated R5.-.

D.3 In App Fig 6, SHUNTS were designated R6.-.

D.4 Option Index updated with addition of option N.

D.5 Supporting Information table updated.

D.6 In App Fig 5, reference to L8 was added to controller J85581A.

D.7 In App Fig 5, reference to L1 and L2 was added to rectifiers J87436, J87437, J87438, and J87439.

D.8 In sheet note 2, on sheet B3B, reference to KS-22247, L4 was added.

D.9 Sheet note 1 was added to sheet B6.

D.10 In FSs 3 and 6, added "or Universal Shunt Monitor" to FEEDER DRAIN MONITOR SD-82588-01.

D.11 In FS2, reference to Note 284 was added to -48V Battery section.

D.12 In FS3, reference to Note 385 was added.

D.13 In FS2, "CHG GRD BUS BAR" and "DISCHG GRD BUS BAR" were changed from "CHG GRD FEED" and "DISCHG GRD FEED" respectively.

D.14 In FS1, reference to options was added to controller section.

D.15 In FSs 2, 3, and 6; reference to Note 127 was added.

D.16 In FS5, reference to options F, W, X, Y, Z was added.

D.17 In FS8, reference to Note 283 was added.

D.18 Circuit Note 182 was updated by addition of options A, B, C, and N.

D.19 Circuit Note 183 was updated for issue 4B.

D.20 Added reference to "J85584A, B" in Circuit Note 111.

D.21 In Circuit Note 113, "6 Lead" in 5th line was changed from "B Lead." Last sentence was added to Note 113.

D.22 Circuit Note 117 was deleted and Note 119 was revised.

D.23 Circuit Notes 125, 126, and 127 were added.

D.24 Equipment Notes 283 and 284 were added.

D.25 Information Note 385 was added.

D.26 CAD1 was designated as option E.

AT&T TECHNOLOGIES

DEPT 54NJ348318-PDT-WJG