

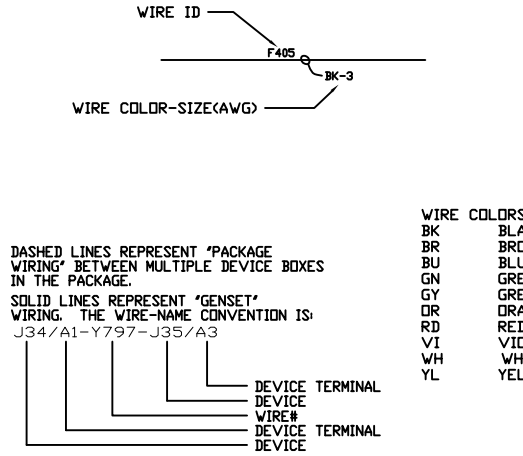
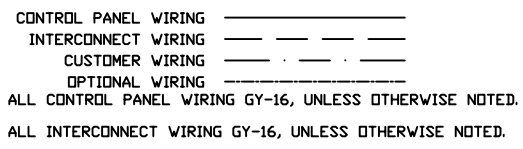
- 25 SYNC CHECK RELAY
- 27/59 OVER/UNDER VOLTAGE
- 32 REVERSE POWER RELAY
- 40 LOSS OF EXCITATION RELAY
- 47 UNDERVOLTAGE PHASE SEQUENCE RELAY
- 50 INSTANTANEOUS OVERCURRENT RELAY
- 51 TIME OVERCURRENT RELAY
- 52 CIRCUIT BREAKER
- 59 OVERVOLTAGE RELAY
- 62 TIME DELAY RELAY
- 65 OVERDR
- 810/U OVER/UNDER FREQUENCY RELAY
- 86 LOCKOUT RELAY
- 87 DIFFERENTIAL RELAY
- A AMPERE
- A4/E4 ADEM ENGINE CONTROLLER
- AC ALTERNATING CURRENT
- ADEM ADVANCED DIGITAL ENGINE MANAGEMENT
- AI ANALOG INPUT
- ALT ALTERNATOR
- AMR AUTO MODE RELAY (EMCP IN AUTO)
- ANNUN ANNUNCIATOR
- AO ANALOG OUTPUT
- ASR AUTO START RELAY
- AR ARBITRATION RELAY
- ATS AUTOMATIC TRANSFER SWITCH
- AUX AUXILIARY
- AUTO AUTOMATIC
- BATT BATTERY
- BBSR BEST BATTERY SOURCE RELAY
- BC BATTERY CHARGER
- B- BATTERY NEGATIVE
- B+ BATTERY POSITIVE
- CA COMMON ALARM RELAY
- CB CIRCUIT BREAKER
- CBC CIRCUIT BREAKER CLOSE
- CBOR CIRCUIT BREAKER OPEN RELAY
- CBS CIRCUIT BREAKER SWITCH
- CBT CIRCUIT BREAKER TRIP
- CDL CAT DATA LINK
- CDVR CATERPILLAR DIGITAL VOLTAGE REGULATOR
- CDTR COOLDOWN TIMER RELAY
- CLFSD CRITICAL LOW FUEL SHUTDOWN
- CONN CONNECTOR
- CT CURRENT TRANSFORMER
- CTR CRANK TERMINATION RELAY
- CTSB CT SHORTING BLOCK
- D DIODE
- DBR DEAD BUS RELAY
- DDI DEDICATED DIGITAL INPUT
- DI DIGITAL INPUT
- DDI DEDICATED ISOLATED DIGITAL INPUT
- DI0 DIGITAL INPUT/OUTPUT MODULE
- DI0 DIGITAL OUTPUT
- ECM ENGINE CONTROL MODULE
- EMCP ELECTRONIC MODULAR CONTROL PANEL
- EPR EMCP POWER RELAY
- ERR ENGINE RUN RELAY
- ESPB EMERGENCY STOP BUTTON
- E-STOP EMERGENCY STOP
- EXC EXCITER
- EXT EXTERNAL
- F FUSE
- FCS FUEL TRANSFER CONTROL SWITCH
- FLG FUEL LEVEL GAUGE
- FLT FAULT
- FMS FUEL TRANSFER MODE SWITCH
- FS FUEL SENSOR
- FAR FUEL ALARM RELAY
- FMR FREQUENCY MODE RELAY
- FMRX FREQUENCY MODE RELAY SLAVE
- FTR FUEL TANK RUPTURE
- G3R GROUP 3 RELAY
- GCB GEN CIRCUIT BREAKER
- GCBR GENERATOR CIRCUIT BREAKER RELAY
- GCM GAUGE CONTROL MODULE
- GCT GROUND SENSE CURRENT TRANSFORMER
- GEN (G) GENERATOR
- GMR GENERATOR MULTIFUNCTION RELAY
- GND GROUND
- GPC GENERATOR PARALLELING CONTROL
- GSH GENERATOR SPACE HEATER
- GSHR GENERATOR SPACE HEATER RELAY

- GRR GLOBAL RUN REQUEST
- HC HEATER CONTACTOR
- HWDBA HARD WIRED DEAD BUS ARBITRATION
- HWLSLD HARD WIRED LOAD SENSE LOAD DEMAND
- HVL HIGH VOLTAGE LIGHT
- IDI ISOLATED DIGITAL INPUT
- IRS IDLE/RATED SWITCH
- JWH JACKET WATER HEATER
- KW KILOWATT
- LBR LINKBOARD RELAY
- LBS LINKBOARD SWITCH
- LDS LOAD DOOR SOLENOID
- LDSRB LOAD DOOR SOLENOID RESISTOR BOARD
- LFLSA LDW FUEL LEVEL SWITCH ALARM
- LMR LEGACY MODE RELAY
- LR LOAD RELAY (FUEL)
- LRX LOAD RELAY SLAVE (FUEL)
- LVL LDW VOLTAGE LIGHT
- MAN MANUAL
- MCH SPRING CHARGING MOTOR (GCB)
- MCM 1000 CIRCULAR MILS
- MMR MANUAL MODE RELAY (EMCP IN RUN)
- MN UNDERVOLTAGE TRIP (GCB)
- MPU MAGNETIC PICK-UP
- NAC NORMAL AFTER CLOSE
- NAT NORMAL AFTER TRIP
- N.C. NORMALLY CLOSED
- NIA NOT IN AUTO
- NEU (N) NEUTRAL
- N.O. NORMALLY OPEN
- OFS OVERFLOW SWITCH (FUEL TANK)
- OIP OPERATOR INTERFACE PANEL
- OMR OFF MODE RELAY (EMCP IN OFF)
- DVL OVERLOAD
- PAR PARALLELED WITH UTILITY RELAY
- PCS PARALLELING CONTROLS SWITCH (ON/OFF)
- PICR PARALLELING INTERCONNECT RELAY
- PICRX PARALLELING INTERCONNECT RELAY SLAVE
- PIR PARALLELING INHIBIT RELAY
- PF POWER FACTOR
- PLL PUMP LOAD LIGHT
- PS PINION SOLENOID
- PSHD PRIMARY UNIT SHIELD
- PMG PERMANENT MAGNET GENERATOR
- POT POTENTIOMETER
- PPS PRIMING PUMP SWITCH
- PSS PERSONNEL SAFETY SWITCH
- PT POTENTIAL TRANSFORMER
- PTL PULL TO LOCK
- PUL PRIMARY UNIT LIGHT
- PULL PUMP UNLOAD LIGHT
- PUR PRIMARY UNIT RELAY
- PWM PULSE WIDTH MODULATION
- PWO PULSE WIDTH OUTPUT
- PWUR PARALLELED W/ UTILITY RELAY
- RBS RUPTURE BASIN SWITCH
- R RELAY
- RDBA RELAY DEAD BUS ARBITRATION
- RES RESISTOR
- REF REFERENCE
- RSES REMOTE START ENABLE SWITCH
- RSS REMOTE START SWITCH
- RSR REMOTE START RELAY
- RTN RETURN
- SC SHUNT COIL
- SCN SCREEN (SHIELD)
- SDE BELL ALARM CONTACT
- SHD SHIELD/SHIELDED
- SHDN SHUTDOWN
- SM STARTER MOTOR
- SPSR SHORE POWER SOURCE RELAY
- SPWR SHORE POWER
- SMMS STARTER MOTOR MAGNETIC SWITCH
- SP SPEED POTENTIOMETER
- SR SLAVE RELAY
- SSR SOURCE SELECTOR RELAY
- TERM TERMINATION
- T.O.M. TETHERED OPERATING MODULE
- TR TRIP UNIT (GCB)
- UCBR UTILITY CIRCUIT BREAKER RELAY
- UMR UTILITY MULTIFUNCTION RELAY
- UR UNLOAD RELAY (FUEL)
- URX UNLOAD RELAY SLAVE (FUEL)
- UTTR UTILITY TRANSFER TRIP RELAY
- VAR VOLT-AMPERES REACTIVE
- VFSS VOLTAGE/FREQUENCY SELECT SWITCH
- XF CLOSE COIL (GCB)
- a NORMALLY OPEN CONTACT
- b NORMALLY CLOSED CONTACT
- c a AND b WITH COMMON
- mA MILLIAMPERE
- mV MILLIVOLT
- A PHASE
- B PHASE
- C PHASE

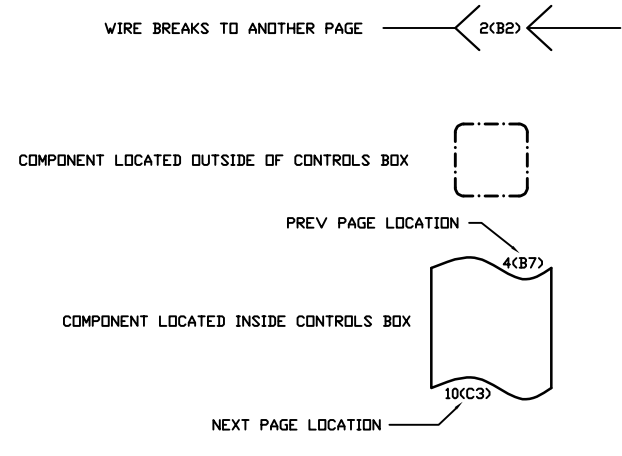
INPUT/OUTPUT CONTENTS

| I/O# | FUNCTION |
|--------|---|
| R01 | EMCP RELAYS (DIGITAL OUTPUTS) |
| R02 | FUEL LEVEL HIGH ALARM |
| R03 | OFF MODE |
| R04 | REDUCED POWER MODE OFF (NOTE D) |
| R05 | ENGINE START INITIATED |
| R06 | COMMON SHUTDOWN |
| R07 | VOLTAGE SELECTION IS LOW |
| R08 | STOP MODE |
| R09 | COMMON ALARM |
| R10 | AUTO MODE |
| R11 | ENGINE RUNNING |
| R12 | VOLTS/ HZ WITHIN LIMITS |
| R13 | TRANSFER FUEL IN |
| R14 | TRANSFER FUEL OUT |
| R15 | FREQUENCY SELECTION IS LOW |
| R16 | DISABLE AUX AC |
| R17 | FUEL LEVEL LOW ALARM |
| | LIVE BUS INDICATION |
| DDI-01 | EMCP INPUTS |
| DDI-02 | EMERGENCY STOP INPUT |
| DDI-03 | REMOTE INITIATE COMMAND |
| DDI-04 | GENERATOR CIRCUIT BREAKER AUX a |
| | GENERATOR CIRCUIT BREAKER AUX b |
| DI-01 | IDLE MODE COMMAND |
| DI-02 | EMERGENCY STOP SWITCH (EXTERNAL) |
| DI-03 | UTILITY BBREAKER AUX a (BASELOAD MODE) |
| DI-04 | TANK LEAK |
| DI-05 | AUTO LOAD FUEL |
| DI-06 | AUTO UNLOAD FUEL |
| DI-07 | DISABLE AUTO PARALLELING CMD |
| DI-08 | SMS IN CHECK |
| IDI-01 | VOLTAGE SELECTION IS LOW |
| IDI-02 | FREQUENCY SELECTION IS LOW |
| IDI-03 | CUSTOM (LOCK-OUT RELAY TRIPPED) |
| IDI-04 | KVAR POWER SHARE INHIBIT |
| DDI-01 | GROUP START INPUT |
| DDI-02 | BELL ALARM |
| DDI-03 | GENERATOR CIRCUIT BREAKER TRIP COMMAND |
| DDI-04 | GENERATOR CIRCUIT BREAKER CLOSE COMMAND |
| A11 | EMCP ANALOG INPUTS |
| A12 | AVAILABLE |
| A13 | AVAILABLE |
| A14 | FUEL LEVEL |
| | AVAILABLE |
| A01 | EMCP ANALOG OUTPUTS |
| A02 | FUEL LEVEL DISPLAY |
| A03 | AVAILABLE |
| | AVAILABLE |
| PW01 | EMCP PWM OUTPUTS |
| PW02 | AVAILABLE |
| | AVAILABLE |

| 400V 50Hz | 480V 60Hz | | |
|-----------------|------------|-----------|--------|
| 208V 60Hz | 240V 60Hz | | |
| POSITION 1 | POSITION 2 | | |
| GROUP SELECTION | | | |
| SELECTION | VFSS | LINKBOARD | GROUP# |
| 480V 60 Hz | 2 | HV | 1 |
| 240V 60Hz | 2 | LV | 2 |
| 400V 50Hz | 1 | HV | 3 |
| 208V 60Hz | 1 | LV | 4 |



- CONTROL PANEL WIRING _____
- INTERCONNECT WIRING _____
- CUSTOMER WIRING _____
- OPTIONAL WIRING _____
- ALL CONTROL PANEL WIRING GY-16, UNLESS OTHERWISE NOTED.
- ALL INTERCONNECT WIRING GY-16, UNLESS OTHERWISE NOTED.
- NOTE A: CLOSURE PLUG MUST BE INSTALLED WHEN UMR OPTION IS NOT INSTALLED.
- NOTE B: INSTALL SCREWS IN EACH HOLE ON SHORTING BLOCK WHILE CTS ARE NOT IN USE. WHEN CTS ARE IN USE, REMOVE SCREWS ON WIRES LABELED F448, F450, & F452. DO NOT REMOVE SCREWS FOR F453 WIRES..
- NOTE C: WHEN OPERATING EMCP 4.4 IN LEGACY MODE, ONLY ONE UNIT (PRIMARY UNIT) SHOULD JUMPER 93 TO 94 IN INTERCONNECT BOX. WHEN OPERATING EMCP 4.4 IN STAND ALONE MODE JUMPER 93 TO 94. WHEN OPERATING EMCP 4.4 IN PARALLELING MODE (EMCP 4.4 ONLY BASED CONTROLS) JUMPER 93 TO 94 ON ALL UNITS. ALLOWS BREAKER CLOSURE TO A DEAD BUS.
- NOTE D: SPARE CIRCUITS BETWEEN INTERCONNECT BOX AND AC/DC BOX.
- NOTE E: UTILITY CKT BKR STATUS. CONNECT TO AUX "a" NORMALLY OPEN CONTACT OF UTILITY CIRCUIT BREAKER.
- NOTE F: UTILITY TRANSFER TRIP. OPENS CKT BKR AND ACTIVATES 86 LOCKOUT UNTIL MANUALLY RESET.
- NOTE G: SHIELD WIRES SHOULD BE CONNECTED TO TERMINAL BLOCKS ON PRIMARY UNIT ONLY. ON MIDDLE UNITS, CONNECT SHIELDS TOGETHER. ON END UNIT, DO NOT CONNECT SHIELD WIRES.
- NOTE H: WHEN CONNECTING THE EMCP 4.4 TO LEGACY UNITS (WITH LOAD SHARE MODULES) FOR ISLAND MODE LOAD SHARING, VAR SHARING IS NOT AVAILABLE. CONNECT LS+ AND LS- AMONG ALL UNITS AND USE VOLTAGE DROOP TO REGULATE VARS. DO NOT CONNECT VS+ AND VS- ON ANY UNITS.
- NOTE I: PARAMETER SET TO DISABLED AS DEFAULT, OPERATOR TO SET AS LISTED WHEN DESIRED AND NOT USING GROUP START
- NOTE J: END USER TO INSTALL JUMPER ON FIRST UNIT ONLY WHEN CONNECTED FOR PARALLELING



| | | | |
|--|------------------------|--|---------------|
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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | | PROJECT REFERENCE | |
| FILE | | APS1000A | |
| TOLERANCES: | THIRD ANGLE PROJECTION | SCALE/SHEET SIZE | DRAWN BY |
| XX ± 0.100 | ANGLE | 1=40/D | D. RICHARDSON |
| XXX ± 0.050 | | SHEET | DATE |
| ANGULAR ± 1' | | 1 OF 23 | 8/15/14 |
| TITLE | | DRAWING NUMBER | |
| SCHEMATIC | | 81E500-02 | |
| APS1000A EMCP 4.4 | | | |

GENERATOR

N T1 T2 T3

DRDOP CT

P27 II J27

P54 II J54

CDVR

P12-J12

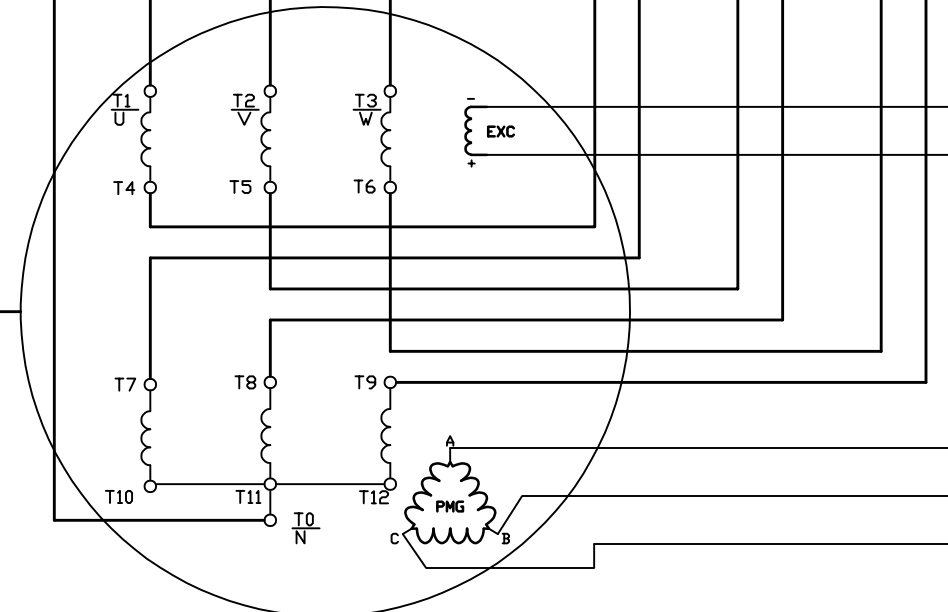
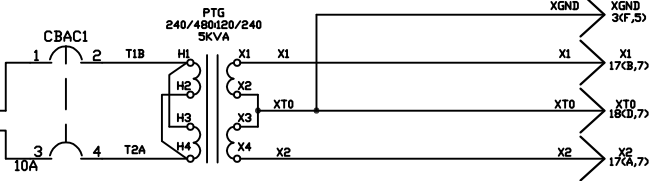
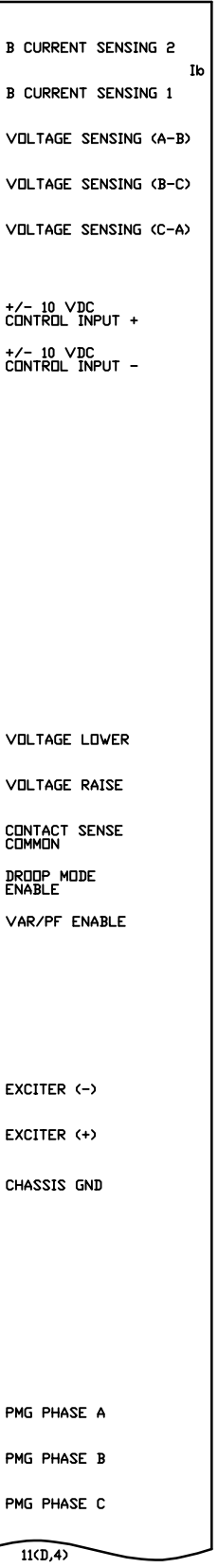
DUAL-VOLT LINK BOARD

P25 II J25

P9-J9

P6-J6

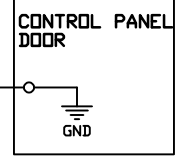
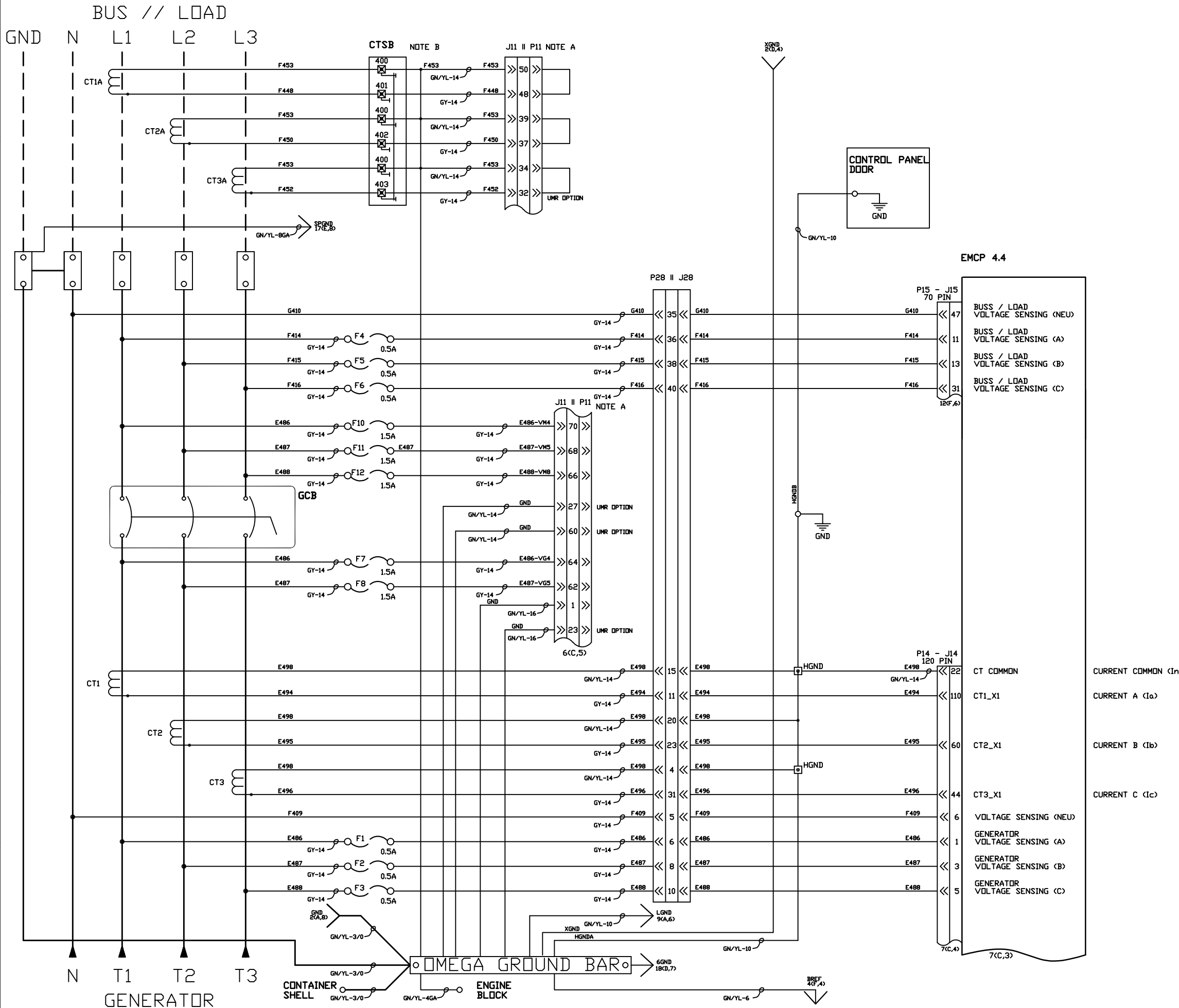
P26 II J26



GENERATOR
PHASE ROTATION L1-L2-L3
U-V-W

AC GENERATOR AND REGULATOR SENSING
FOR NOTES SEE SHEET ONE

| | | | |
|--|--|--|--|
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| TITLE SCHEMATIC APS1000A EMCP 4.4 | | | |

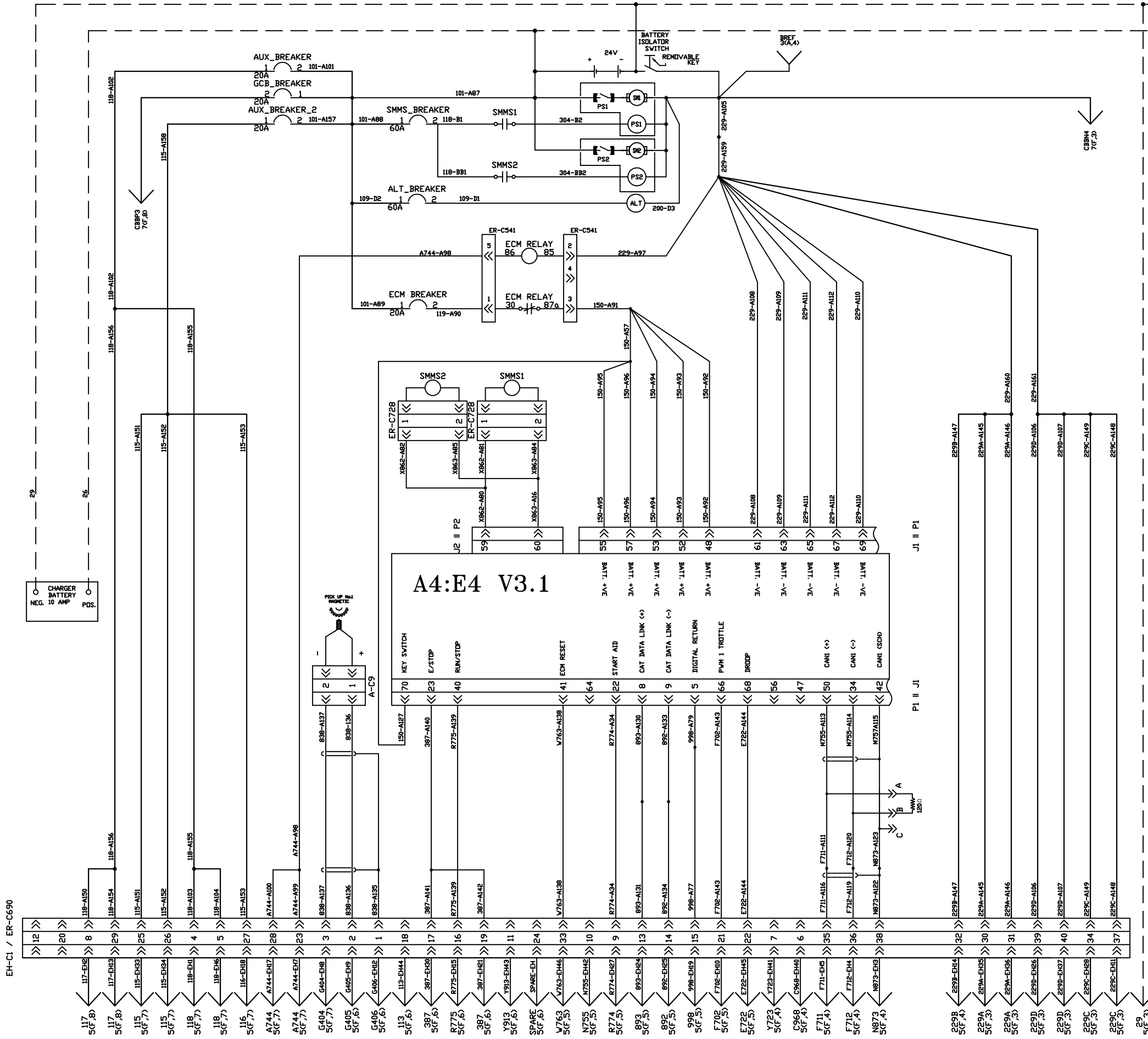


EMCP 4.4

| Terminal | Wiring | Terminal | Wiring | Description |
|----------|--------|----------|--------|-----------------------------------|
| 47 | G410 | 47 | G410 | BUSS / LOAD VOLTAGE SENSING (NEU) |
| 11 | F414 | 11 | F414 | BUSS / LOAD VOLTAGE SENSING (A) |
| 13 | F415 | 13 | F415 | BUSS / LOAD VOLTAGE SENSING (B) |
| 31 | F416 | 31 | F416 | BUSS / LOAD VOLTAGE SENSING (C) |
| 22 | E498 | 22 | E498 | CT COMMON |
| 110 | E494 | 110 | E494 | CT1_X1 |
| 60 | E495 | 60 | E495 | CT2_X1 |
| 44 | E496 | 44 | E496 | CT3_X1 |
| 6 | F409 | 6 | F409 | VOLTAGE SENSING (NEU) |
| 1 | E486 | 1 | E486 | GENERATOR VOLTAGE SENSING (A) |
| 3 | E487 | 3 | E487 | GENERATOR VOLTAGE SENSING (B) |
| 5 | E488 | 5 | E488 | GENERATOR VOLTAGE SENSING (C) |

AC EMCP SENSING
FOR NOTES SEE SHEET ONE

| | | | |
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| TITLE SCHEMATIC APS1000A EMCP 4.4 | | SHEET 3 OF 23 | |



EH-C1 / ER-C690

SOLAR ARRAY PANEL ROOM MOUNTED

DC DISTRIBUTION 1
FOR NOTES SEE SHEET ONE

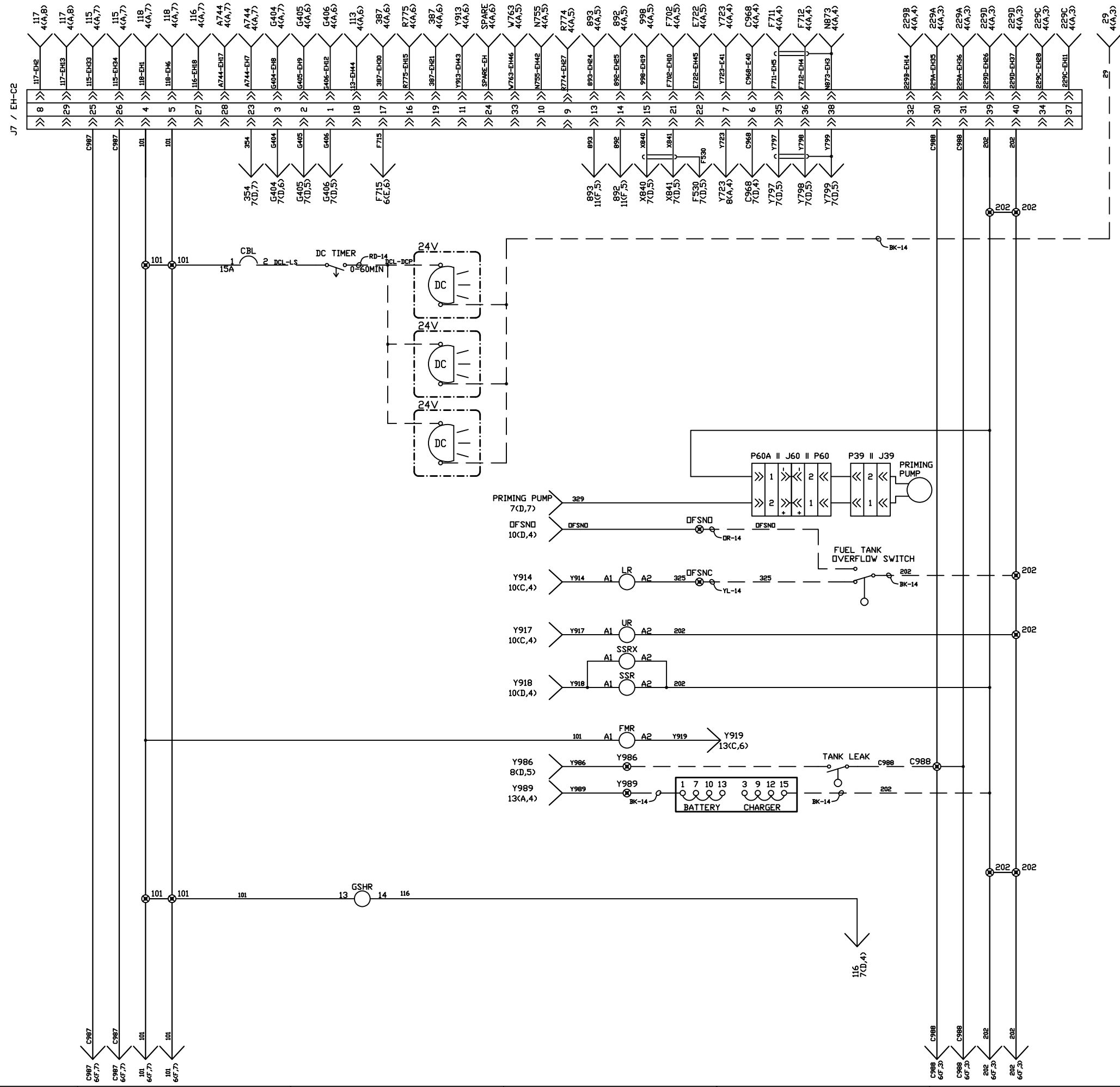
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|---|--|---|--|---|--|---|--|
| <p>117-5(F,8)</p> <p>117-5(F,8)</p> <p>115-5(F,7)</p> <p>115-5(F,7)</p> <p>118-5(F,7)</p> <p>118-5(F,7)</p> <p>116-5(F,7)</p> <p>113-5(F,6)</p> <p>387-5(F,6)</p> <p>775-5(F,6)</p> <p>387-5(F,6)</p> <p>993-5(F,5)</p> <p>892-5(F,5)</p> <p>998-5(F,5)</p> <p>7702-5(F,5)</p> <p>7722-5(F,5)</p> <p>7723-5(F,4)</p> <p>9968-5(F,4)</p> <p>771-5(F,4)</p> <p>7712-5(F,4)</p> <p>9873-5(F,4)</p> <p>229B-5(F,4)</p> <p>229A-5(F,3)</p> <p>229A-5(F,3)</p> <p>229D-5(F,3)</p> <p>229D-5(F,3)</p> <p>229C-5(F,3)</p> <p>229C-5(F,3)</p> <p>29-5(F,3)</p> | | <p>118-A150</p> <p>118-A154</p> <p>115-A151</p> <p>115-A152</p> <p>118-A103</p> <p>118-A104</p> <p>115-A153</p> <p>744-A100</p> <p>744-A99</p> <p>898-A137</p> <p>898-A136</p> <p>898-A135</p> <p>387-A141</p> <p>775-A139</p> <p>387-A142</p> <p>7763-A138</p> <p>775-A130</p> <p>774-A134</p> <p>893-A131</p> <p>892-A134</p> <p>998-A17</p> <p>7702-A143</p> <p>7722-A144</p> <p>771-A116</p> <p>7712-A119</p> <p>9873-A122</p> <p>229B-A147</p> <p>229A-A145</p> <p>229A-A146</p> <p>229D-A106</p> <p>229D-A107</p> <p>229C-A149</p> <p>229C-A148</p> | | <p>118-A102</p> <p>115-A158</p> <p>118-A102</p> <p>118-A155</p> <p>115-A151</p> <p>115-A152</p> <p>118-A103</p> <p>118-A104</p> <p>115-A153</p> <p>744-A100</p> <p>744-A99</p> <p>898-A137</p> <p>898-A136</p> <p>898-A135</p> <p>387-A141</p> <p>775-A139</p> <p>387-A142</p> <p>7763-A138</p> <p>775-A130</p> <p>774-A134</p> <p>893-A131</p> <p>892-A134</p> <p>998-A17</p> <p>7702-A143</p> <p>7722-A144</p> <p>771-A116</p> <p>7712-A119</p> <p>9873-A122</p> <p>229B-A147</p> <p>229A-A145</p> <p>229A-A146</p> <p>229D-A106</p> <p>229D-A107</p> <p>229C-A149</p> <p>229C-A148</p> | | <p>118-A102</p> <p>115-A158</p> <p>118-A102</p> <p>118-A155</p> <p>115-A151</p> <p>115-A152</p> <p>118-A103</p> <p>118-A104</p> <p>115-A153</p> <p>744-A100</p> <p>744-A99</p> <p>898-A137</p> <p>898-A136</p> <p>898-A135</p> <p>387-A141</p> <p>775-A139</p> <p>387-A142</p> <p>7763-A138</p> <p>775-A130</p> <p>774-A134</p> <p>893-A131</p> <p>892-A134</p> <p>998-A17</p> <p>7702-A143</p> <p>7722-A144</p> <p>771-A116</p> <p>7712-A119</p> <p>9873-A122</p> <p>229B-A147</p> <p>229A-A145</p> <p>229A-A146</p> <p>229D-A106</p> <p>229D-A107</p> <p>229C-A149</p> <p>229C-A148</p> | |
| <p>117-EH6</p> <p>117-EH3</p> <p>115-EH3</p> <p>115-EH4</p> <p>118-EH1</p> <p>118-EH6</p> <p>116-EH8</p> <p>113-EH4</p> <p>387-EH30</p> <p>775-EH5</p> <p>387-EH1</p> <p>993-EH3</p> <p>892-EH5</p> <p>998-EH3</p> <p>7702-EH10</p> <p>7722-EH5</p> <p>7723-EH4</p> <p>9968-EH4</p> <p>771-EH5</p> <p>7712-EH4</p> <p>9873-EH3</p> <p>229B-EH4</p> <p>229A-EH5</p> <p>229A-EH6</p> <p>229D-EH6</p> <p>229D-EH7</p> <p>229C-EH6</p> <p>229C-EH1</p> | | <p>118-A150</p> <p>118-A154</p> <p>115-A151</p> <p>115-A152</p> <p>118-A103</p> <p>118-A104</p> <p>115-A153</p> <p>744-A100</p> <p>744-A99</p> <p>898-A137</p> <p>898-A136</p> <p>898-A135</p> <p>387-A141</p> <p>775-A139</p> <p>387-A142</p> <p>7763-A138</p> <p>775-A130</p> <p>774-A134</p> <p>893-A131</p> <p>892-A134</p> <p>998-A17</p> <p>7702-A143</p> <p>7722-A144</p> <p>771-A116</p> <p>7712-A119</p> <p>9873-A122</p> <p>229B-A147</p> <p>229A-A145</p> <p>229A-A146</p> <p>229D-A106</p> <p>229D-A107</p> <p>229C-A149</p> <p>229C-A148</p> | | <p>118-A102</p> <p>115-A158</p> <p>118-A102</p> <p>118-A155</p> <p>115-A151</p> <p>115-A152</p> <p>118-A103</p> <p>118-A104</p> <p>115-A153</p> <p>744-A100</p> <p>744-A99</p> <p>898-A137</p> <p>898-A136</p> <p>898-A135</p> <p>387-A141</p> <p>775-A139</p> <p>387-A142</p> <p>7763-A138</p> <p>775-A130</p> <p>774-A134</p> <p>893-A131</p> <p>892-A134</p> <p>998-A17</p> <p>7702-A143</p> <p>7722-A144</p> <p>771-A116</p> <p>7712-A119</p> <p>9873-A122</p> <p>229B-A147</p> <p>229A-A145</p> <p>229A-A146</p> <p>229D-A106</p> <p>229D-A107</p> <p>229C-A149</p> <p>229C-A148</p> | | <p>118-A102</p> <p>115-A158</p> <p>118-A102</p> <p>118-A155</p> <p>115-A151</p> <p>115-A152</p> <p>118-A103</p> <p>118-A104</p> <p>115-A153</p> <p>744-A100</p> <p>744-A99</p> <p>898-A137</p> <p>898-A136</p> <p>898-A135</p> <p>387-A141</p> <p>775-A139</p> <p>387-A142</p> <p>7763-A138</p> <p>775-A130</p> <p>774-A134</p> <p>893-A131</p> <p>892-A134</p> <p>998-A17</p> <p>7702-A143</p> <p>7722-A144</p> <p>771-A116</p> <p>7712-A119</p> <p>9873-A122</p> <p>229B-A147</p> <p>229A-A145</p> <p>229A-A146</p> <p>229D-A106</p> <p>229D-A107</p> <p>229C-A149</p> <p>229C-A148</p> | |
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ALTORFER POWER SYSTEMS
 6315 W. FAUBER RD. PHONE (309) 697-1234
 BARTONVILLE, IL 61607 FAX (309) 292-7546

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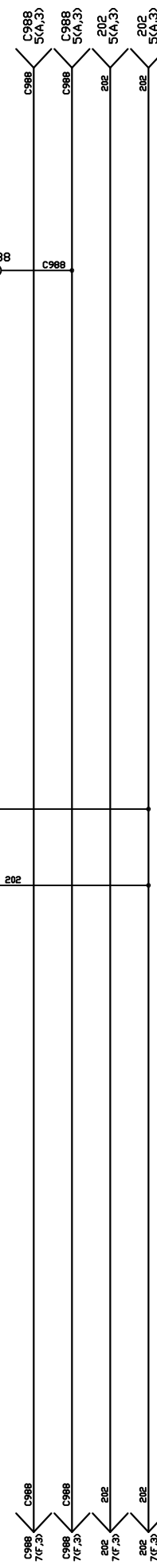
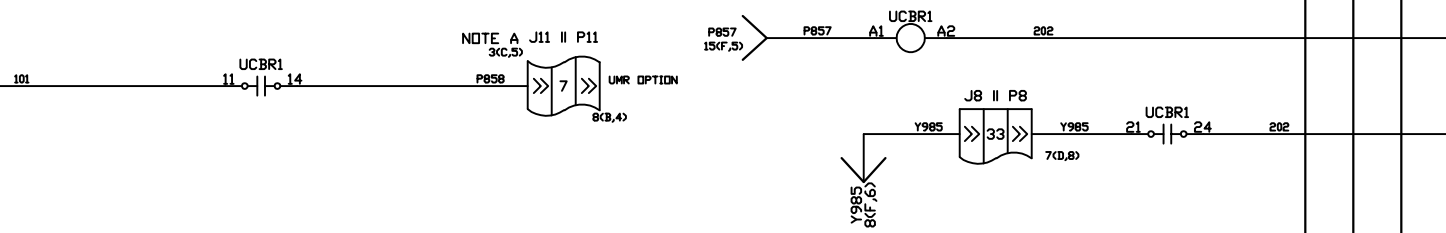
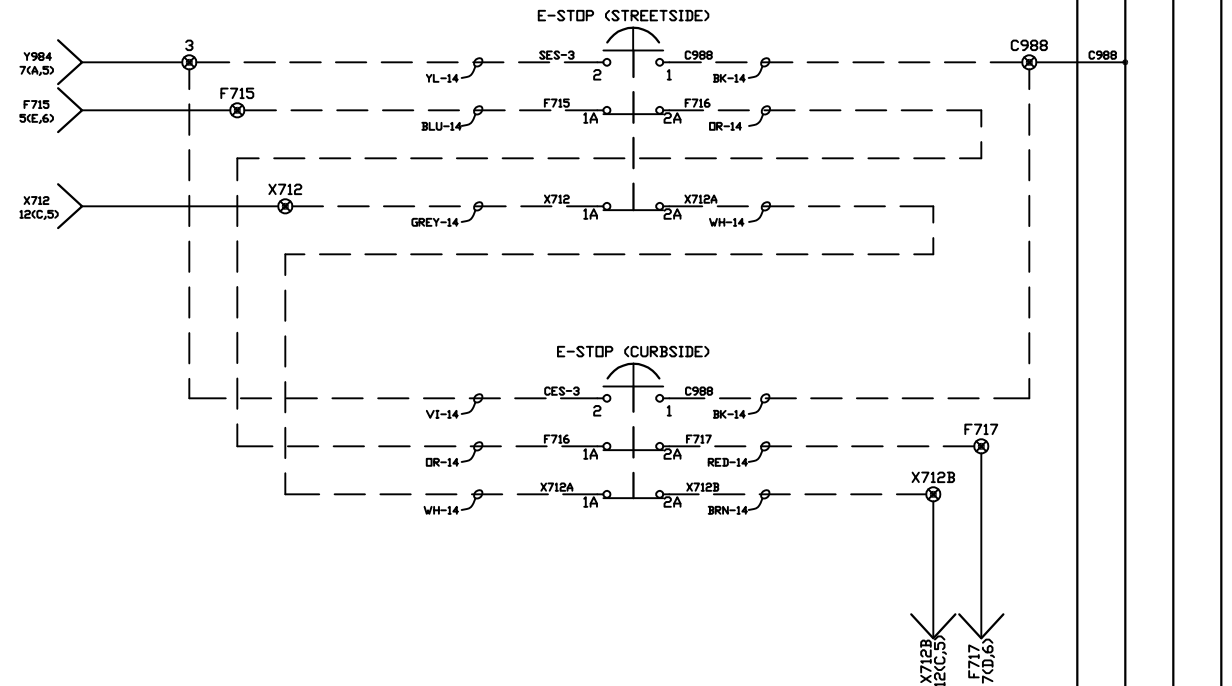
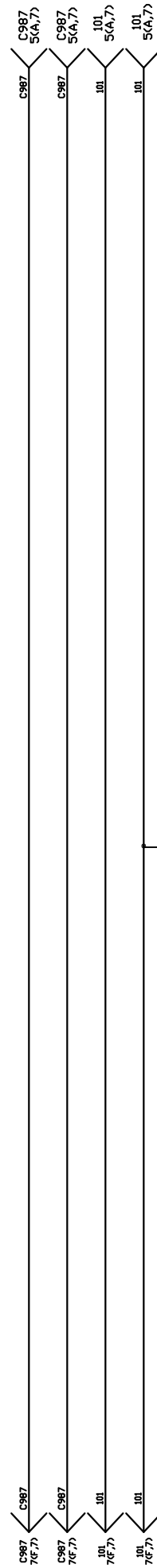
| | | |
|------------------|-------------------|-------------------|
| FILE | DF/81E | PROJECT REFERENCE |
| SCALE/SHEET SIZE | DRAWN BY | QUOTE NUMBER |
| 1=40/D | D. RICHARDSON | - |
| DATE | WORK ORDER NUMBER | - |
| 8/15/14 | - | - |
| SHEET | 4 OF 23 | DRAWING NUMBER |
| 81E500-02 | - | - |

TITLE: SCHEMATIC
 ALTORFER POWER SYSTEMS EMCP 4.4



DC DISTRIBUTION 2
FOR NOTES SEE SHEET ONE

| | | | |
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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | | FILE DF/81E | PROJECT REFERENCE APS1000A |
| TOLERANCES: .XX ± 0.100 .XXX ± 0.050 .XXX ± 0.005 | THIRD ANGLE PROJECTION | SCALE/SHEET SIZE 1=40/D | DRAWN BY D. RICHARDSON |
| ANGULAR ± 1° | | SHEET 5 OF 23 | DATE 8/15/14 |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | | QUOTE NUMBER - WORK ORDER NUMBER - DRAWING NUMBER 81E500-02 | |



DC DISTRIBUTION 3
FOR NOTES SEE SHEET ONE

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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | | PROJECT REFERENCE APS1000A | |
| TOLERANCES: XX ± 0.100 ANGLE XXX ± 0.060 PROJECTION XXXX ± 0.005 ANGULAR ± 1° | | SCALE/SHEET SIZE 1=40/D SHEET 6 OF 23 | |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | | DRAWN BY D. RICHARDSON DATE 8/15/14 WORK ORDER NUMBER - DRAWING NUMBER 81E500-02 | |
| 6 | 5 | 4 | 3 |
| 2 | C.B. CONTROL WIRING UPDATE | 8/22/2015 | INT. REV. |
| 1 | CORRECT ETHERNET | | |

UTILITY BREAKER AUX a
(BASELOAD MODE)

REMOTE START

TANK LEAK ALARM

AUTO
LOAD FUEL

AUTO
UNLOAD FUEL

KW SHARE INHIBIT

SMS IN CHECK

FUEL LEVEL HIGH ALARM

OFF MODE

REDUCED POWER MODE (NOTE D)

ENGINE START INITIATED

COMMON SHUTDOWN

VOLTAGE SELECTION IS LOW

STOP MODE

COMMON ALARM

AUTO MODE

ENGINE RUNNING

VOLTS/HZ WITHIN LIMITS

AUTO LOAD FUEL

AUTO UNLOAD FUEL

FREQUENCY SELECTION IS LOW

DISABLE AUX AC

FUEL LEVEL LOW ALARM

VOLTAGE SELECTION IS LOW

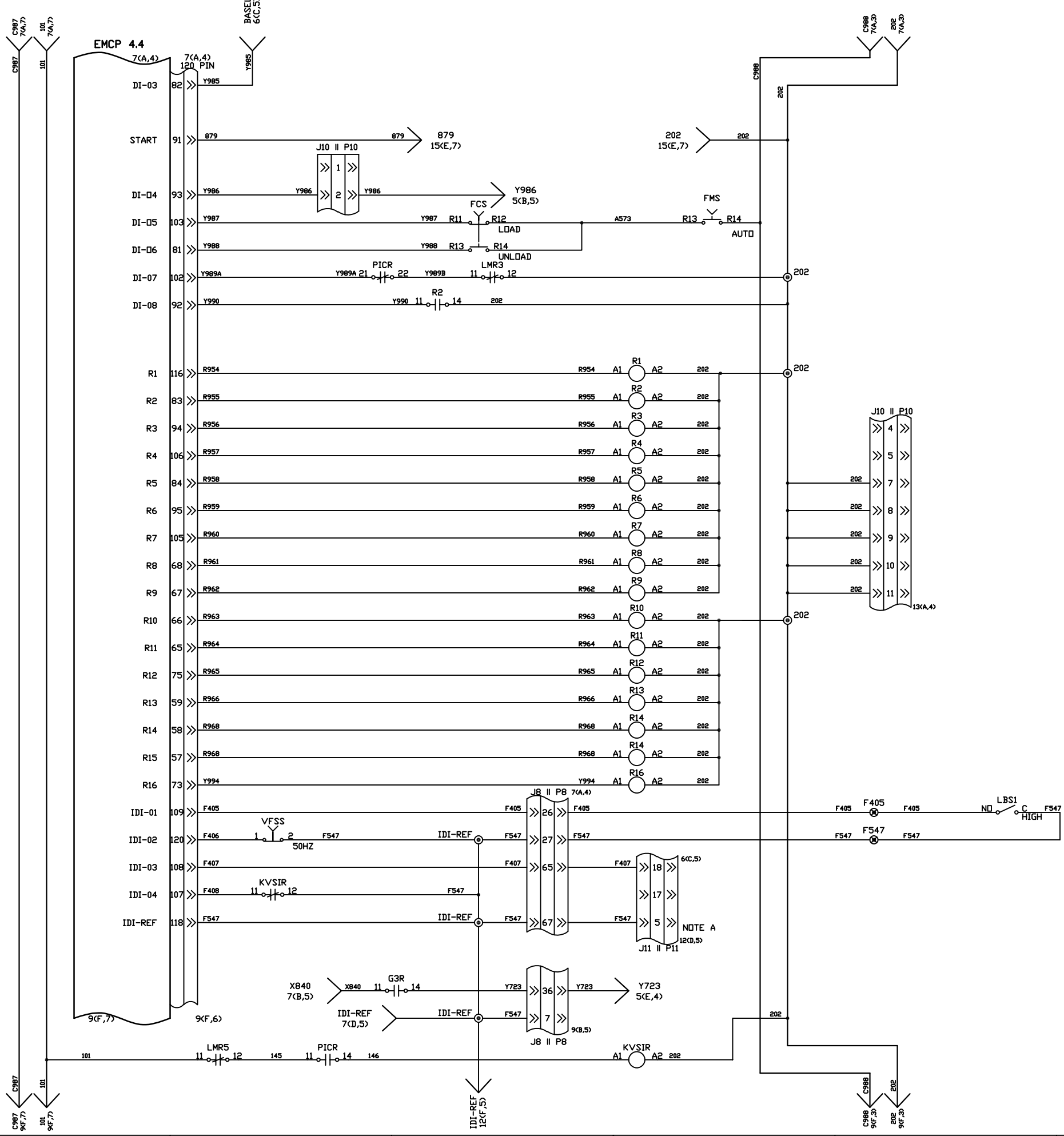
FREQUENCY SELECTION IS LOW

CUSTOM
(LOCK OUT
RELAY TRIPPED)

KVAR SHARE INHIBIT

ISOLATED DIGITAL
INPUT REFERENCE

EMCP 4.4



DC DISTRIBUTION 5
FOR NOTES SEE SHEET ONE

| | | | |
|---|------------------------|--|--------------------------------|
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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | | FILE DF/81E | PROJECT REFERENCE APSP1000A |
| TOLERANCES: XX ± 0.100 XXX ± 0.060 XXXX ± 0.005 | THIRD ANGLE PROJECTION | SCALE/SHEET SIZE 1=40/D | DRAWN BY D. RICHARDSON |
| ANGULAR ± 1° | | SHEET 8 OF 23 | DATE 8/15/14 |
| TITLE SCHEMATIC APSP1000A EMCP 4.4 | | QUOTE NUMBER - WORK ORDER NUMBER - DRAWING NUMBER 81E500-02 | |

FUEL LEVEL GAUGE

FUEL LEVEL SIGNAL ANALOG OUTPUT 1 +

ANALOG OUTPUT 1 -

ANALOG OUTPUT 1 SCN

ANALOG DUPUT 2 +

ANALOG OUTPUT 2 -

ANALOG OUTPUT 2 SCN

ANALOG DUPUT 3 +

ANALOG OUTPUT 3 -

ANALOG OUTPUT 3 SCN

PWM DUPUT 1 +

PWM OUTPUT 1 -

PWM OUTPUT 1 SCN

PWM DUPUT 2 +

PWM OUTPUT 2 -

PWM OUTPUT 2 SCN

ANALOG INPUT 1 POWER

ANALOG INPUT 1 +

ANALOG INPUT 1 -

ANALOG INPUT 1 SCN

ANALOG INPUT 2 POWER

ANALOG INPUT 2 +

ANALOG INPUT 2 -

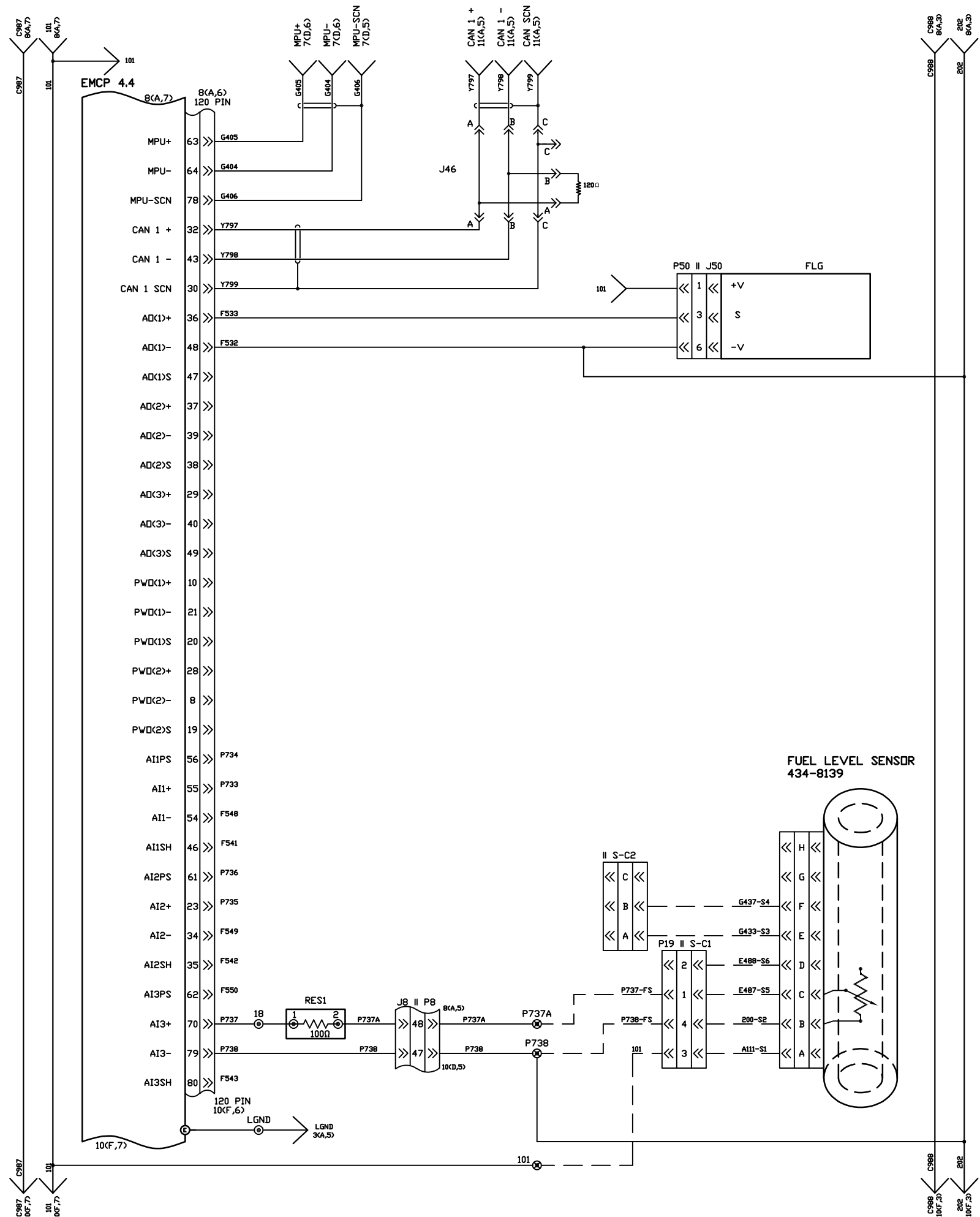
ANALOG INPUT 2 SCN

ANALOG INPUT 3 POWER

FUEL LEVEL SIGNAL ANALOG INPUT 3 +

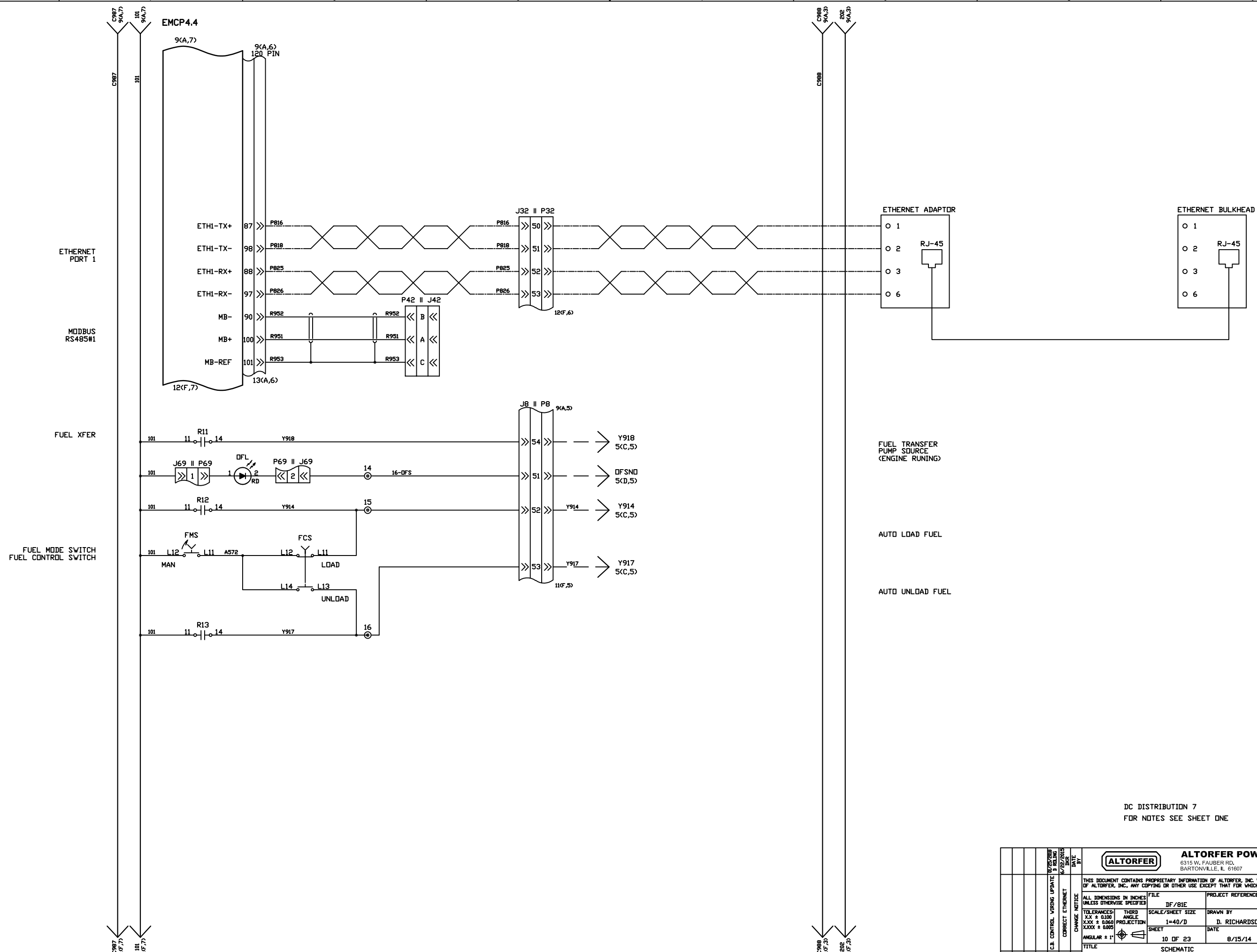
FUEL LEVEL - ANALOG INPUT 3 -

ANALOG INPUT 3 SCN



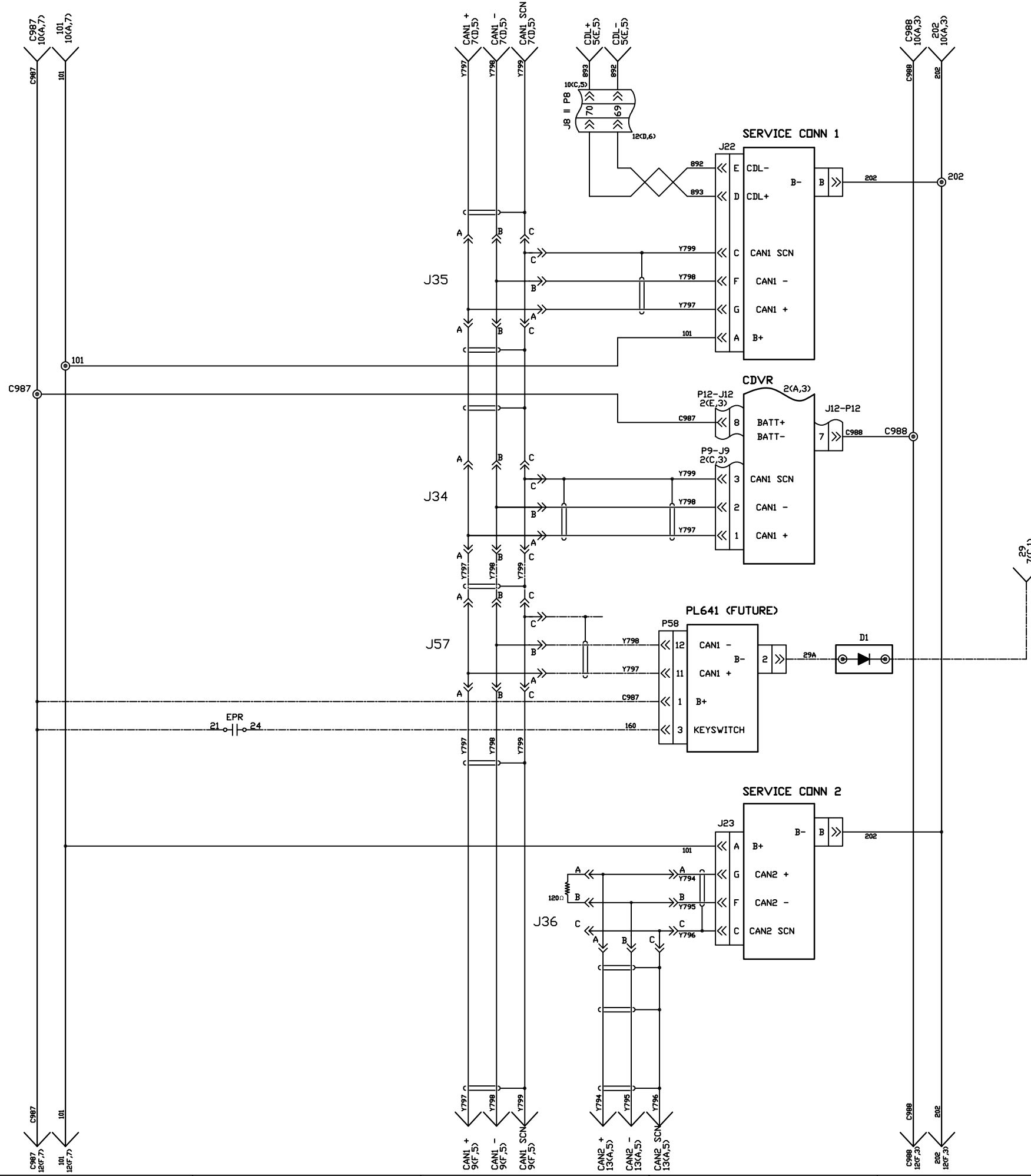
DC DISTRIBUTION 6
FOR NOTES SEE SHEET ONE

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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | | PROJECT REFERENCE APS1000A | |
| TOLERANCES: XX ± 0.100 XXX ± 0.050 XXXX ± 0.025 | | SCALE/SHEET SIZE 1=40/D DATE 8/15/14 | |
| ANGLE THIRD ANGLE PROJECTION | | DRAWN BY D. RICHARDSON | |
| SHEET 9 OF 23 | | WORK ORDER NUMBER - | |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | | DRAWING NUMBER 81E500-02 | |



DC DISTRIBUTION 7
FOR NOTES SEE SHEET ONE

| | | | |
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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | | FILE DF/81E | PROJECT REFERENCE APS1000A |
| TOLERANCES: XX ± 0.100 XXX ± 0.050 XXXX ± 0.025 | THIRD ANGLE PROJECTION | SCALE/SHEET SIZE 1=40/D | DRAWN BY D. RICHARDSON |
| CORRECT ETHERNET CHANGE NOTICE | SHEET 10 DF 23 | DATE 8/15/14 | WORK ORDER NUMBER - |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | | | DRAWING NUMBER 81E500-02 |



DC DISTRIBUTION 8
FOR NOTES SEE SHEET ONE

| | | | |
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| CHANGE NOTICE 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 | ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED TOLERANCES: .XX ± 0.008 .XXX ± 0.005 .XXX ± 0.005 ANGULAR ± 1° | FILE SCALE/SHEET SIZE 1=40/D SHEET 11 OF 23 TITLE SCHEMATIC APS1000A EMCP 4.4 | PROJECT REFERENCE APS1000A DRAWN BY D. RICHARDSON DATE 8/15/14 WORK ORDER NUMBER - DRAWING NUMBER 81E500-02 |

LEAGACY MODE RELAY

LEAD UNIT SELECT

PRIMARY UNIT RELAY

PARALLEL INTERCONNECT RELAY

DEAD BUSS RELAY

COOLDOWN TIMER RELAY

LOAD DOOR SOLENOID RESISTOR BOARD

LOAD DOOR SOLENOID

GROUP 3 RELAY

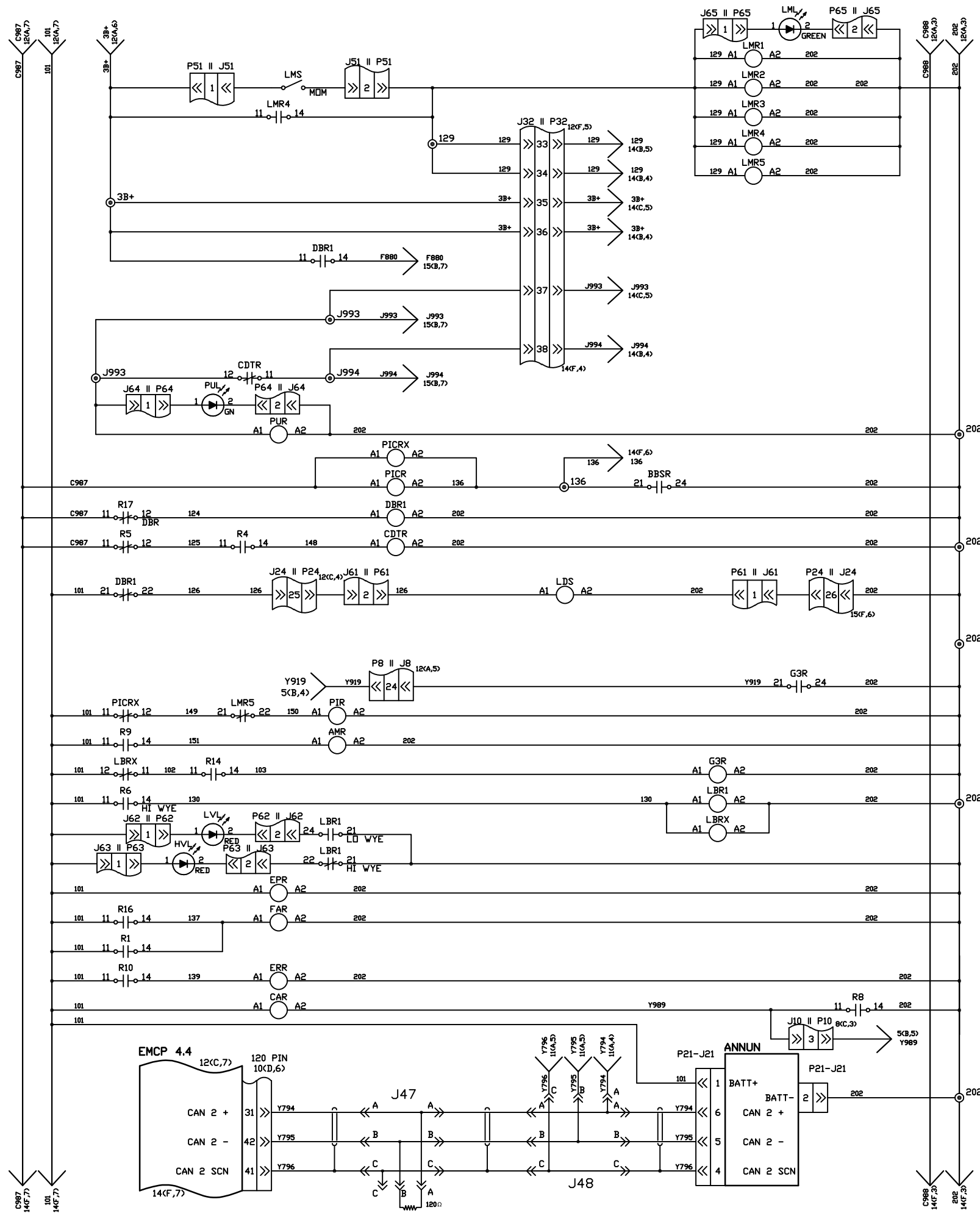
LINK BOARD RELAY

EMCP POWER RELAY

FUEL ALARM RELAY

ENGINE RUNNING RELAY

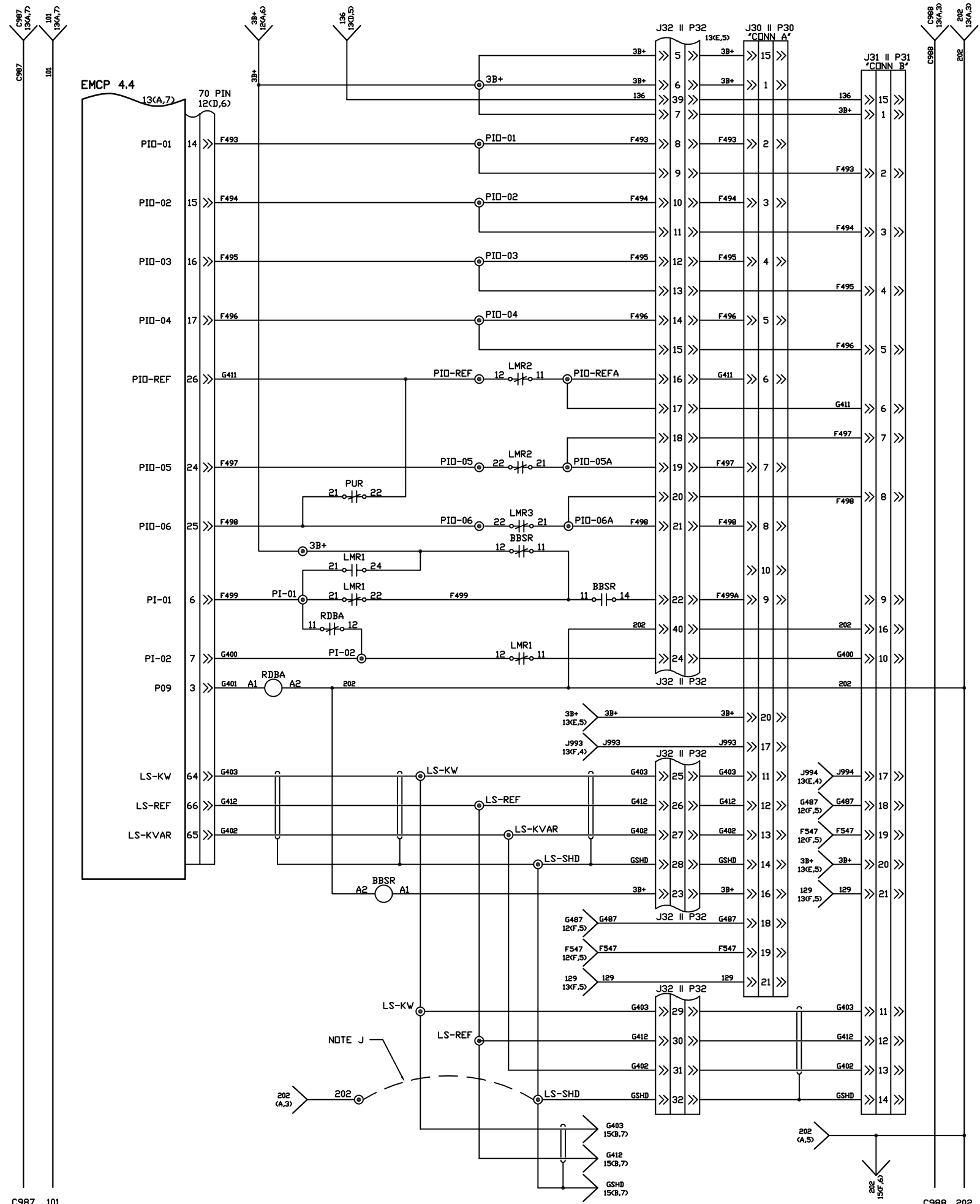
COMMON ALARM RELAY



DC DISTRIBUTION 10
FOR NOTES SEE SHEET ONE

| | | | |
|---|--|--|--|
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| <small>ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED</small> | | <small>FILE PROJECT REFERENCE</small> | |
| <small>TOLERANCES UNLESS OTHERWISE SPECIFIED</small> | | <small>DF/81E</small> | |
| <small>XX ± 0.009 ANGLE</small> | | <small>SCALE/SHEET SIZE</small> | |
| <small>XXX ± 0.005 PROJECTION</small> | | <small>1=40/D</small> | |
| <small>ANGULAR ± 1°</small> | | <small>DRAWN BY</small> | |
| <small>TITLE</small> | | <small>D. RICHARDSON</small> | |
| <small>13 OF 23</small> | | <small>DATE</small> | |
| <small>SCHEMATIC</small> | | <small>8/15/14</small> | |
| <small>AP51000A EMCP 4.4</small> | | <small>WORK ORDER NUMBER</small> | |
| <small>81E500-02</small> | | <small>DRAWING NUMBER</small> | |

- HWLSLD #1
DISABLE LSLD
- HWLSLD #2
OVERLOAD
- HWLSLD #3
EXCESS
- HWLSLD #4
RAMPING
- PARALLEL
REFERENCE
- HWDBA #1
REQUESTING
- HWDBA #2
CAPTURING
- HWDBA #3
ARBITRATION
- HWDBA #4
ARBITRATION
- HWDBA #5
RELAY
- LOAD SHARE
REAL KW
- LOAD SHARE
REFERENCE
- LOAD SHARE
REAL KVAR

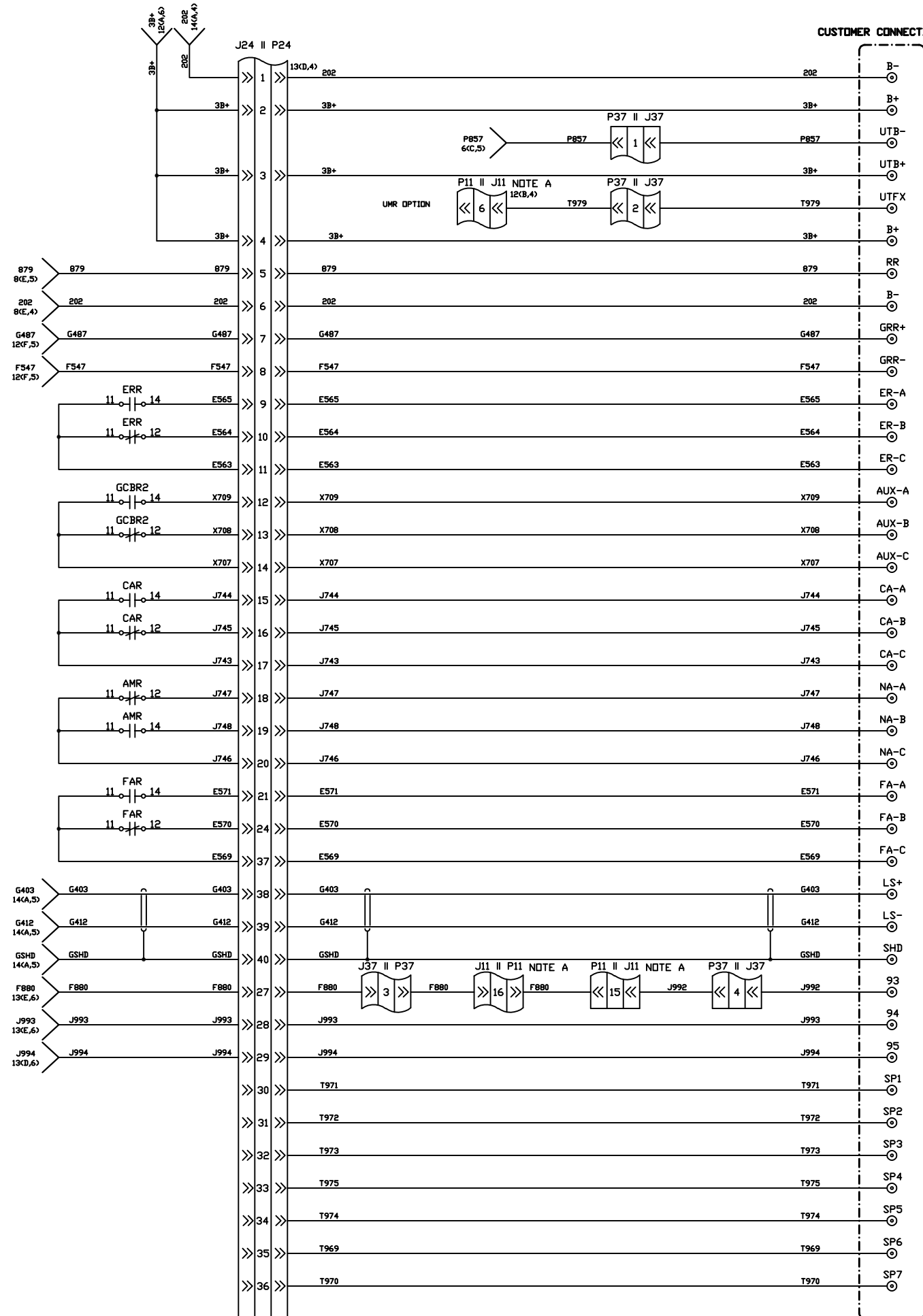


NOTE J

DC DISTRIBUTION 11
FOR NOTES SEE SHEET ONE

| | | | |
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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | FILE DF/81E | PROJECT REFERENCE APS1000A | |
| TOLERANCES: XX ± 0.100 ANGLE XXX ± 0.050 PROJECTION XXXX ± 0.005 | SCALE/SHEET SIZE 1=40/D | DRAWN BY D. RICHARDSON | QUOTE NUMBER - |
| ANGULAR ± 1° | SHEET 14 OF 23 | DATE 8/15/14 | WORK ORDER NUMBER - |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | DRAWING NUMBER 81E500-02 | | |

CUSTOMER CONNECTIONS



CUSTOMER CONNECTION BOX

- B- ○
- B+ ○
- UTB- ○
- UTB+ ○
- UTFX ○
- B+ ○
- RR ○
- B- ○
- GRR+ ○
- GRR- ○
- ER-A ○
- ER-B ○
- ER-C ○
- AUX-A ○
- AUX-B ○
- AUX-C ○
- CA-A ○
- CA-B ○
- CA-C ○
- NA-A ○
- NA-B ○
- NA-C ○
- FA-A ○
- FA-B ○
- FA-C ○
- LS+ ○
- LS- ○
- SHD ○
- 93 ○
- 94 ○
- 95 ○
- SP1 ○
- SP2 ○
- SP3 ○
- SP4 ○
- SP5 ○
- SP6 ○
- SP7 ○

UTILITY BREAKER STATUS NOTE E

UTILITY TRANSFER TRIP NOTE F

INDIVIDUAL START

GROUP START

ENGINE RUNNING RELAY

CIRCUIT BREAKER STATUS RELAY

COMMON ALARM RELAY

NOT IN AUTO RELAY

FUEL ALARM RELAY

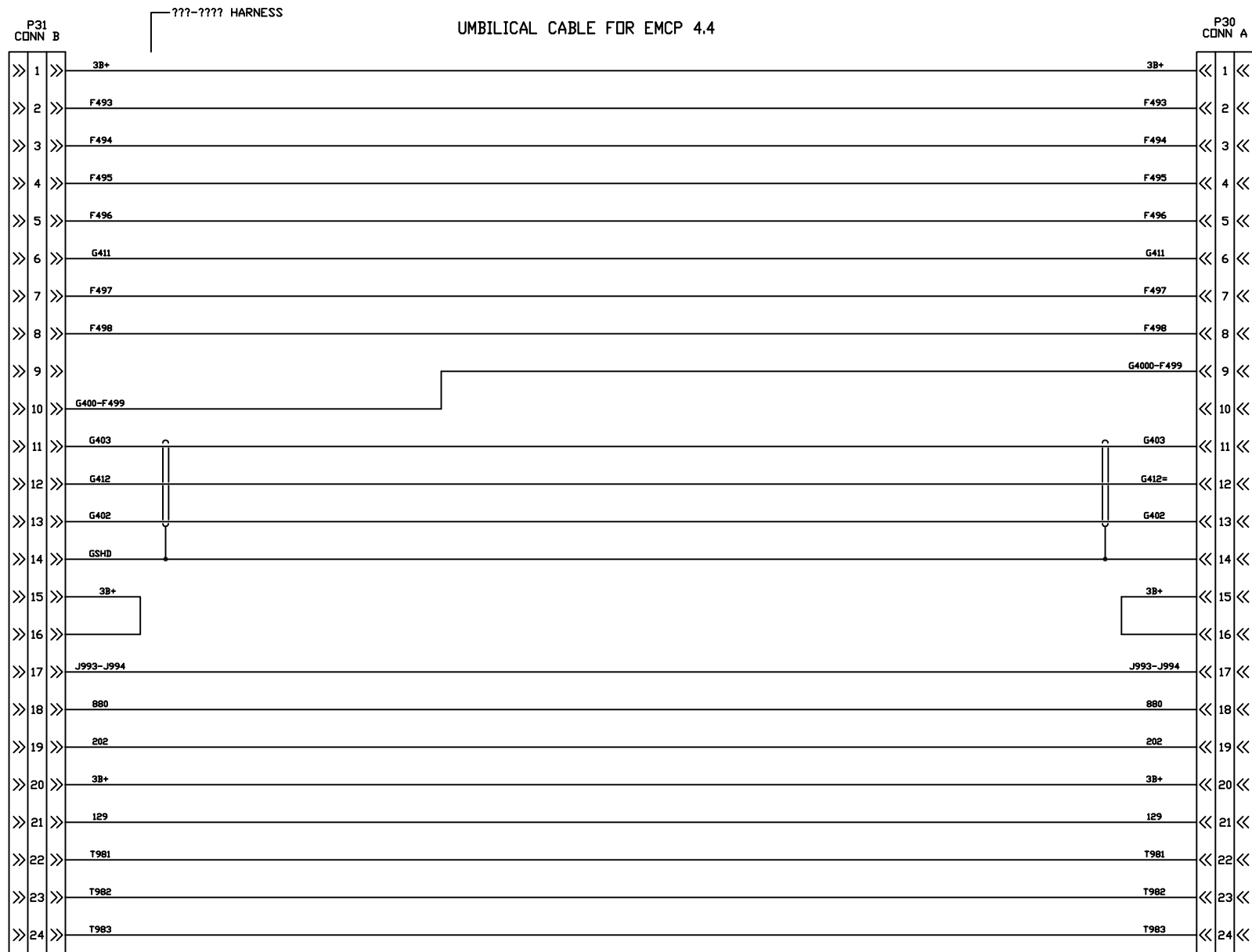
KW LOAD SHARING

IST UP LOGIC NOTE C

SPARE CIRCUITS NOTE D

DC DISTRIBUTION 12
FOR NOTES SEE SHEET ONE

| | | | |
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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | | PROJECT REFERENCE APS1000A | |
| TOLERANCES: XX ± 0.100 XXX ± 0.050 XXXX ± 0.025 ANGULAR ± 1° | THIRD ANGLE PROJECTION | SCALE/SHEET SIZE 1=40/D SHEET 15 OF 23 | DRAWN BY D. RICHARDSON DATE 8/15/14 |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | | QUOTE NUMBER - WORK ORDER NUMBER - DRAWING NUMBER 81E500-02 | |



BEST BATTERY POSITIVE

HWLSLD #1
DISABLE LSLD

HWLSLD #2
OVERLOAD

HWLSLD #3
EXCESS

HWLSLD #4
RAMPING

PARALLEL
REFERENCE

HWDBA #1
REQUESTING

HWDBA #2
CAPTURING

HWDBA #3
ARBITRATION IN

HWDBA #4
ARBITRATION OUT

LOADSHARE
KW

LOADSHARE
REFERENCE

LOADSHARE
KVAR

LOADSHARE
SHIELD

PARALLELING
INTERCONNECT
RELAY
CONTROL

FIRST UP LOGIC

GROUP START SIGNAL

GROUP START RETURN

BEST BATTERY POSITIVE

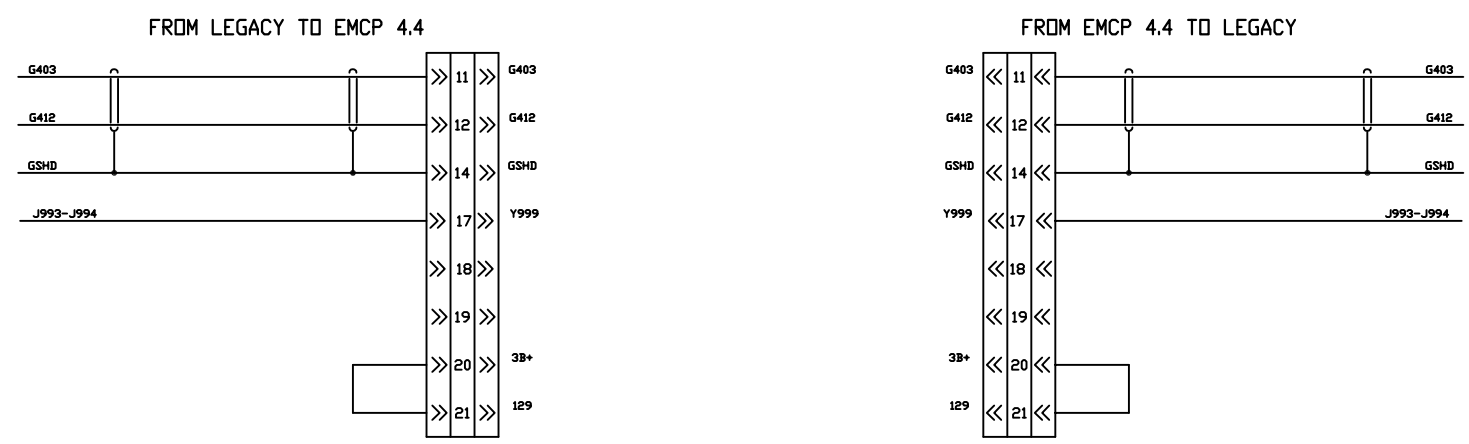
LEGACY MODE SIGNAL

SPARE

SPARE

SPARE

ADAPTOR CABLE ASSEMBLIES FOR LEGACY POWER MODULES



LOADSHARE
KW

LOADSHARE
REFERENCE

LOADSHARE
SHIELD

FIRST UP LOGIC

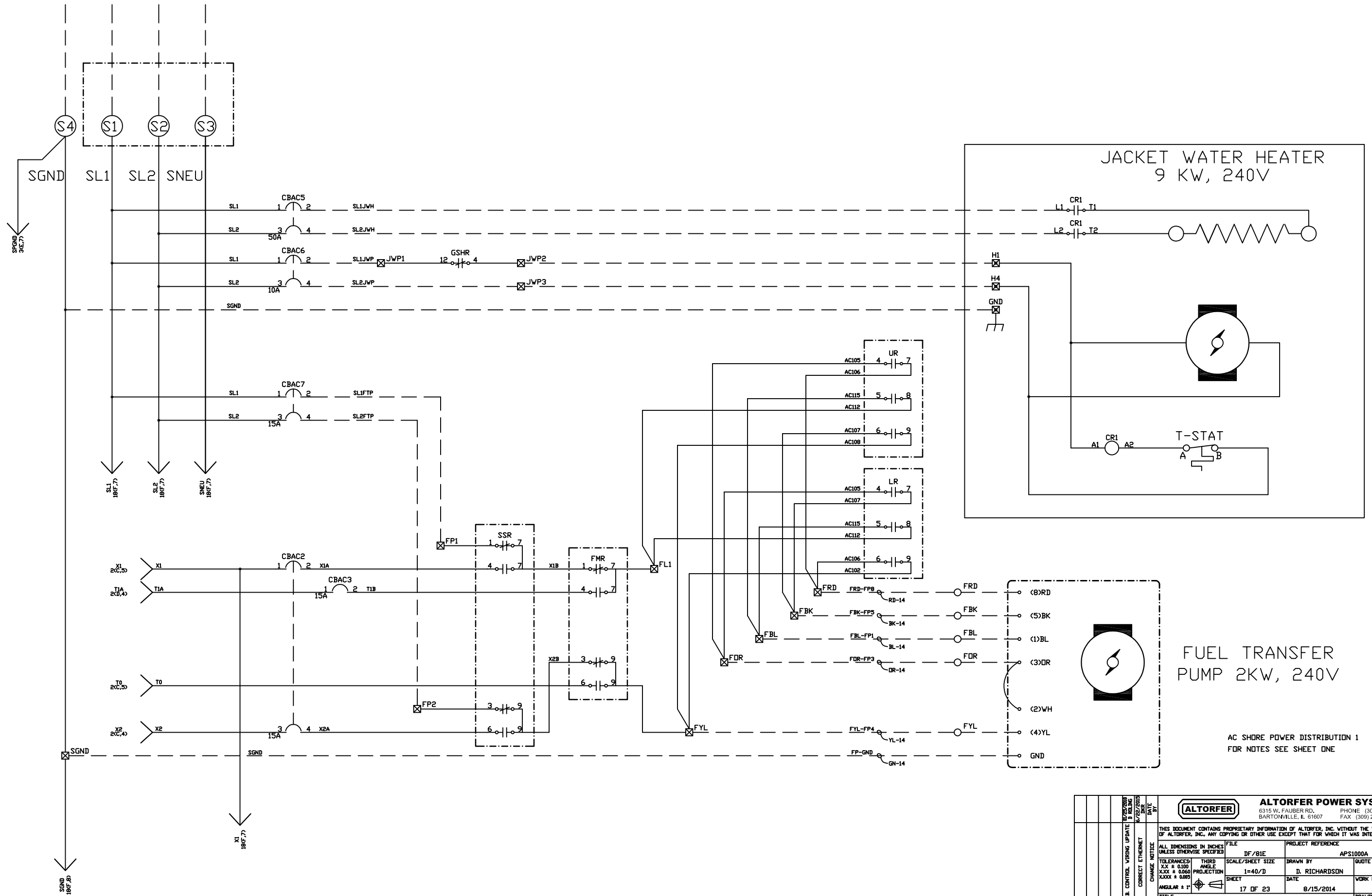
BEST BATTERY POSITIVE

LEGACY MODE SIGNAL

PARALLELING INTERCONNECT
CABLE
FOR NOTES SEE SHEET ONE

| | | | |
|---|--|---|-------------------------------|
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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | TOLERANCES: XX ± 0.100 XXX ± 0.050 XXXX ± 0.025 ANGULAR ± 1° | FILE DF/81E | PROJECT REFERENCE APS1000A |
| SCALE/SHEET SIZE 1=40/D | THIRD ANGLE PROJECTION | DRAWN BY D. RICHARDSON | QUOTE NUMBER - |
| SHEET 16 OF 23 | DATE 8/15/14 | WORK ORDER NUMBER - | DRAWING NUMBER 81E500-02 |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | | DRAWING NUMBER 81E500-02 | |

100A 240V

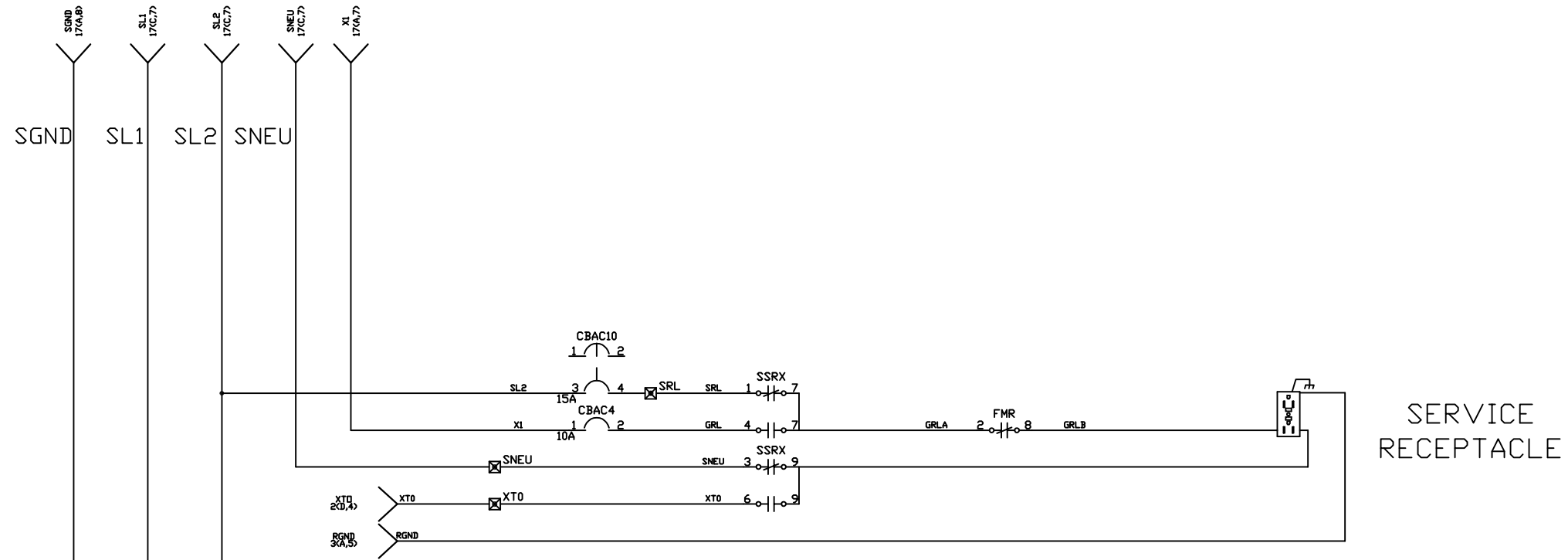


JACKET WATER HEATER
9 KW, 240V

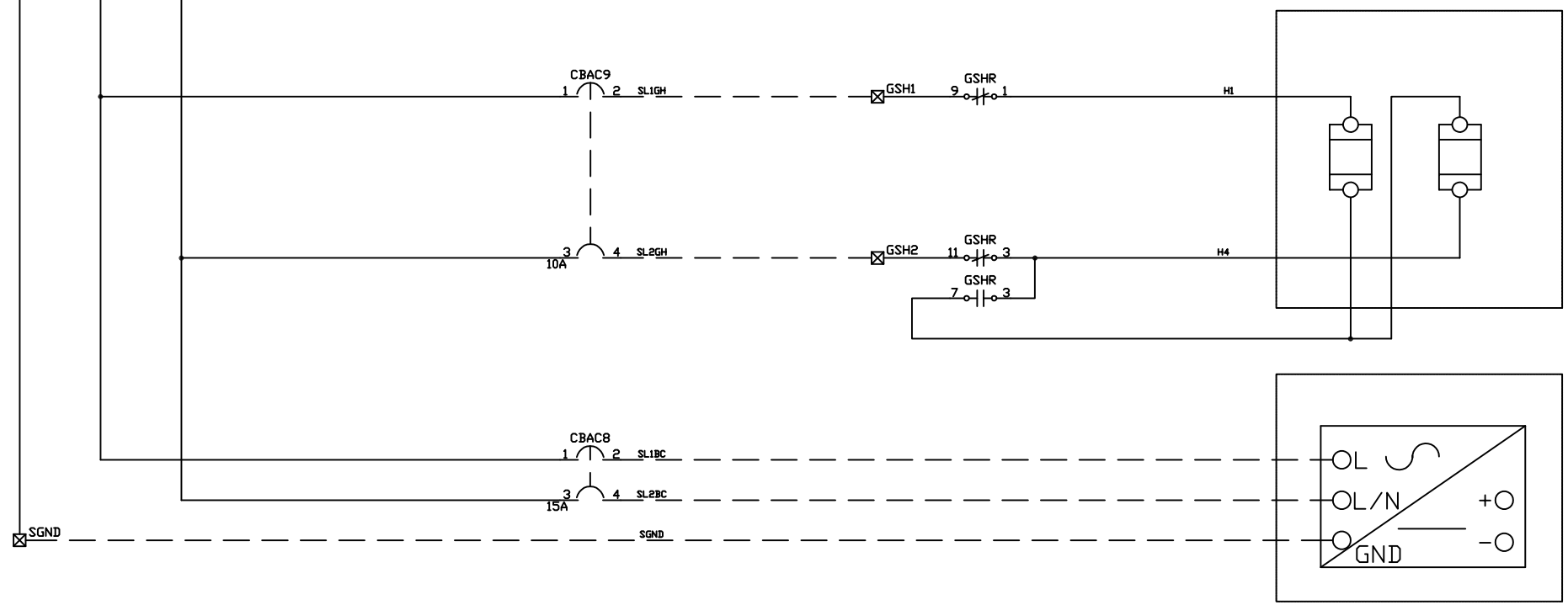
FUEL TRANSFER PUMP 2KW, 240V

AC SHORE POWER DISTRIBUTION 1
FOR NOTES SEE SHEET ONE

| | | | |
|---|-------------------------|--|----------------------------------|
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| <small>ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED</small> | <small>FILE</small> | <small>PROJECT REFERENCE</small> | |
| <small>TOLERANCES: XX ± 0.100 ANGLE THIRD PROJECTION</small> | <small>DF/81E</small> | <small>SCALE/SHEET SIZE</small> | <small>DRAWN BY</small> |
| <small>XX ± 0.060</small> | <small>1=40/D</small> | <small>DATE</small> | <small>QUOTE NUMBER</small> |
| <small>ANGULAR ± 1'</small> | <small>17 OF 23</small> | <small>8/15/2014</small> | <small>WORK ORDER NUMBER</small> |
| <small>TITLE</small> | <small>SCHMATIC</small> | <small>DRAWING NUMBER</small> | |
| <small>APPS1000A EMCP 4.4</small> | | <small>81E500-02</small> | |



SERVICE RECEPTACLE

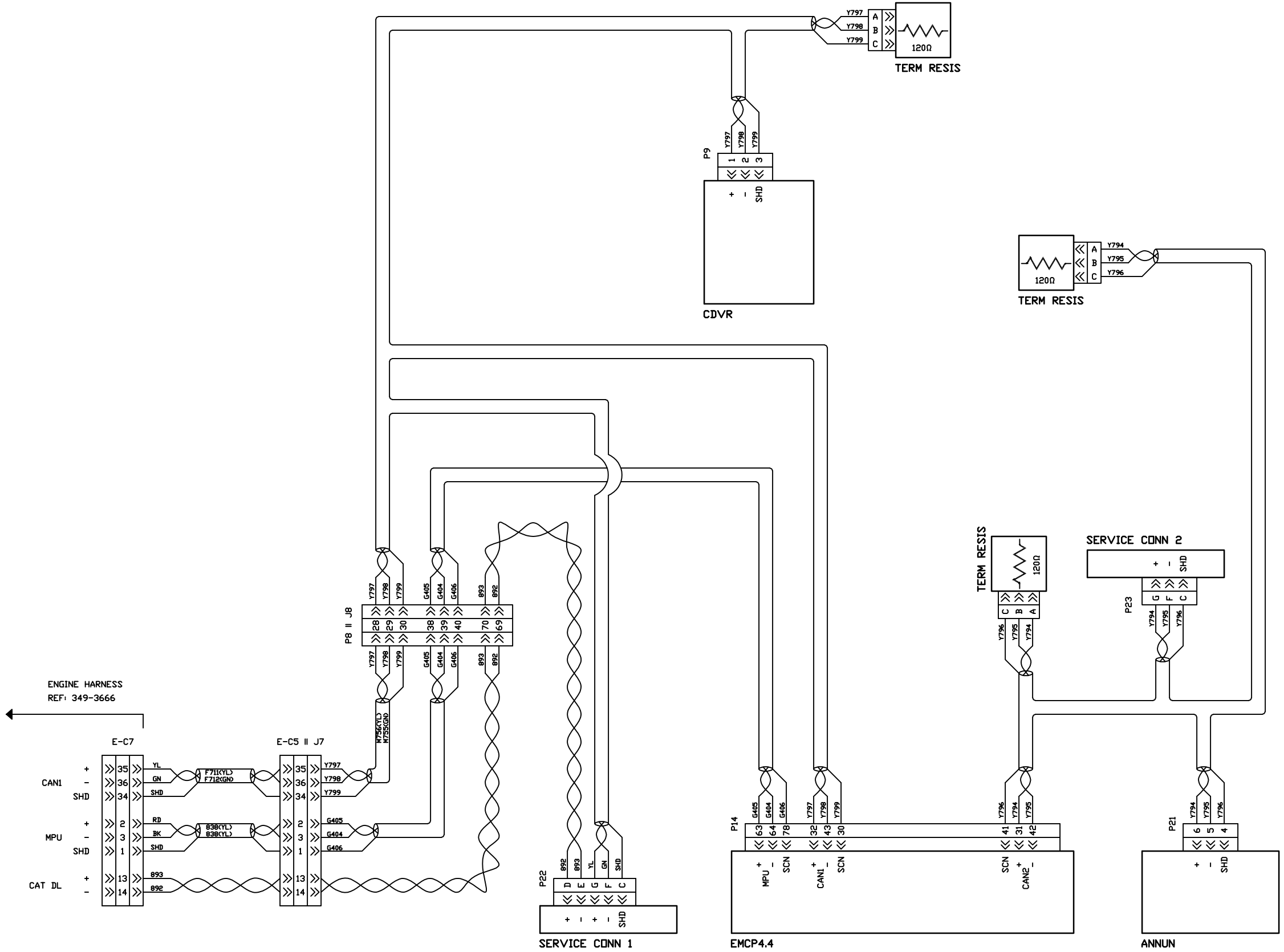


SPACE HEATER
1.2 KW, 240V

BATTERY CHARGER
240V

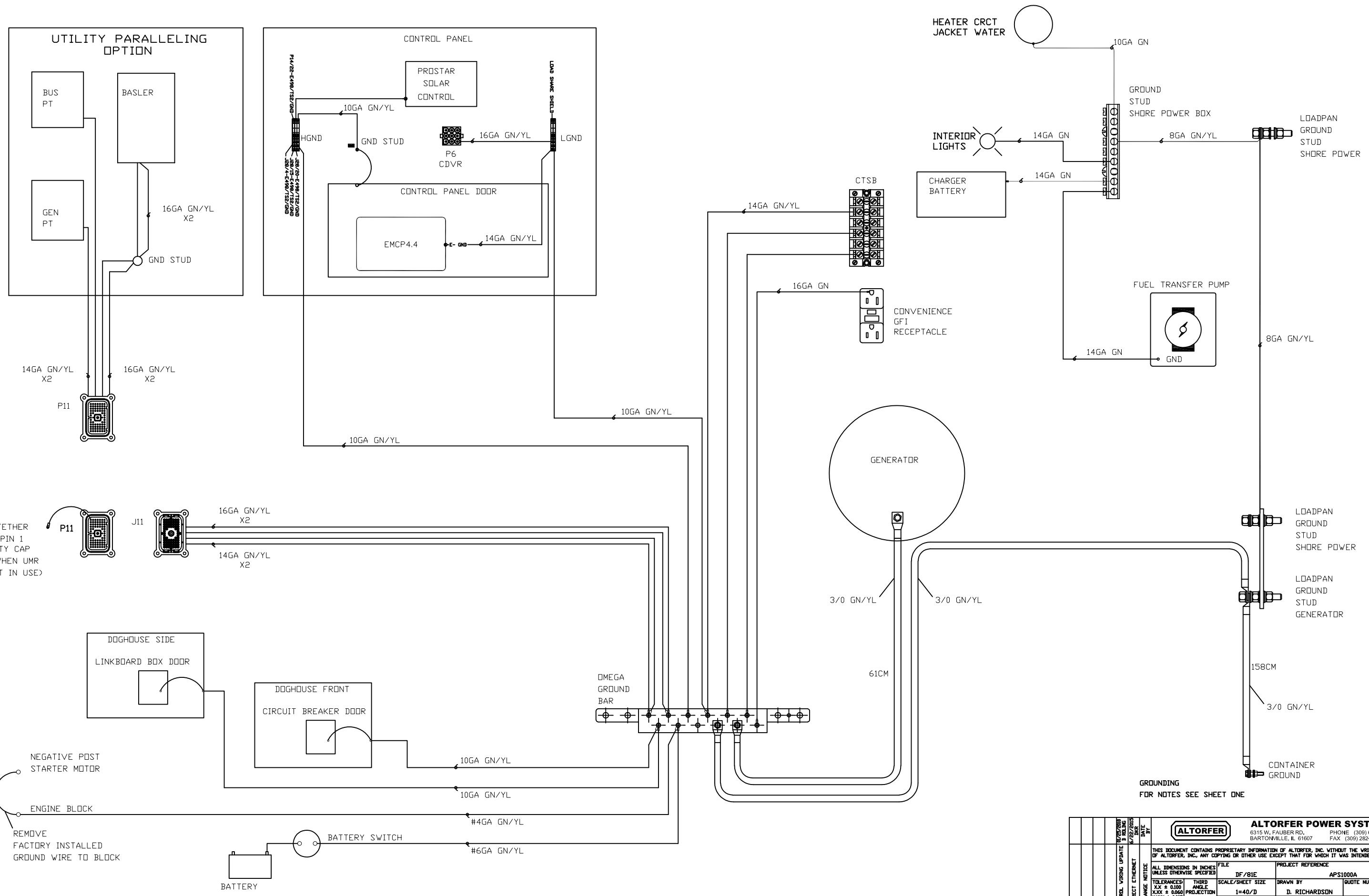
AC SHORE POWER DISTRIBUTION 2
FOR NOTES SEE SHEET ONE

| | | | |
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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | | PROJECT REFERENCE APS1000A | |
| TOLERANCES: XX ± 0.100 XXX ± 0.050 XXXX ± 0.025 ANGULAR ± 1° | | SCALE/SHEET SIZE 1=40/D SHEET 18 OF 23 | |
| THIRD ANGLE PROJECTION | | DRAWN BY D. RICHARDSON | |
| DATE 8/15/2014 | | QUOTE NUMBER - | |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | | WORK ORDER NUMBER - | |
| DRAWING NUMBER 81E500-02 | | DATE 8/15/2014 | |



COMMUNICATIONS
FOR NOTES SEE SHEET ONE

| | | | |
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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | | FILE PROJECT REFERENCE DF/81E APS1000A | |
| TOLERANCES: .XX ± 0.100 ANGLE .XXX ± 0.050 PROJECTION .XXX ± 0.005 SHEET ANGULAR ± 1° | | SCALE/SHEET SIZE DRAWN BY QUOTE NUMBER 1=40/D D. RICHARDSON - DATE WORK ORDER NUMBER 8/15/14 - | |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | | DRAWING NUMBER 81E500-02 | |



P11C TETHER WIRE PIN 1 (SAFETY CAP FOR WHEN UMR IS NOT IN USE)

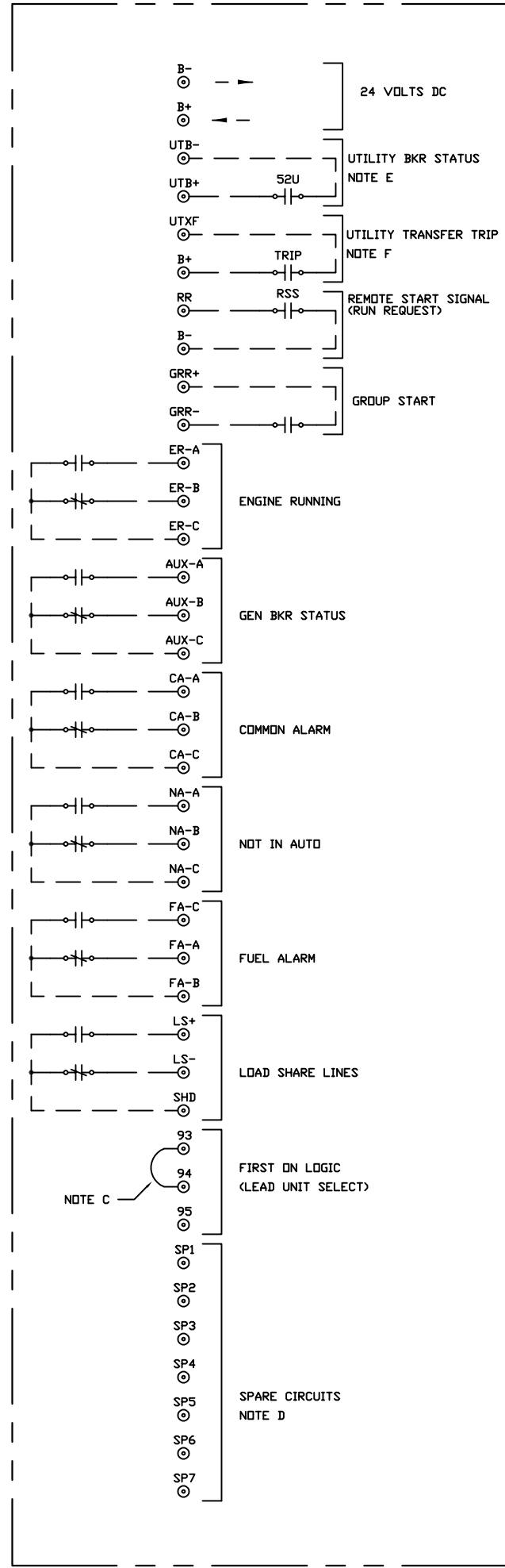
NEGATIVE POST STARTER MOTOR
ENGINE BLOCK

REMOVE FACTORY INSTALLED GROUND WIRE TO BLOCK

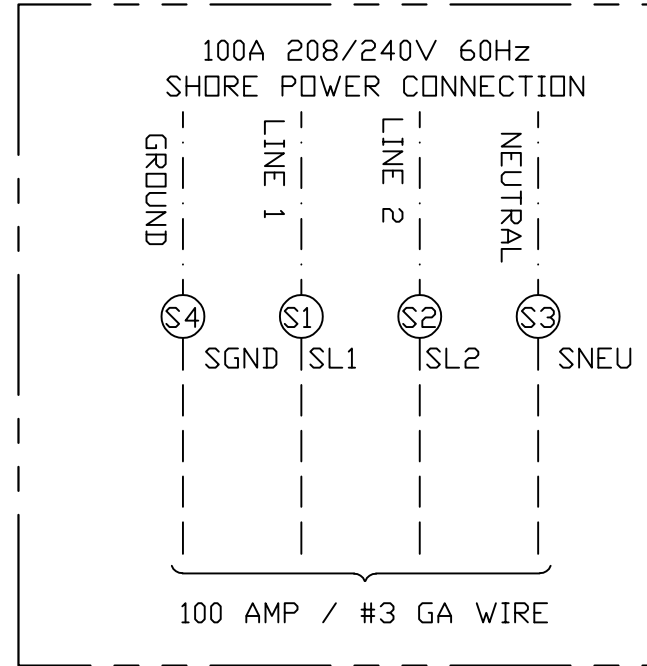
GROUNDING FOR NOTES SEE SHEET ONE

| | | | |
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| <small>ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED</small> | <small>TOLERANCES: XX ± 0.100 ANGLE THIRD PROJECTION</small> | <small>SCALE/SHEET SIZE 1=40/D</small> | <small>PROJECT REFERENCE APS1000A</small> |
| <small>DATE 8/22/2015</small> | <small>BY [Signature]</small> | <small>SHEET 20 OF 23</small> | <small>DRAWN BY D. RICHARDSON</small> |
| <small>1</small> | <small>CHANGE NOTICE</small> | <small>DATE 8/15/14</small> | <small>QUOTE NUMBER -</small> |
| <small>2</small> | <small>C.B. CONTROL WIRING UPDATE</small> | <small>TITLE SCHEMATIC</small> | <small>WORK ORDER NUMBER -</small> |
| <small>3</small> | <small>NEG</small> | <small>APPS1000A EMCP 4.4</small> | <small>DRAWING NUMBER 81E500-02</small> |

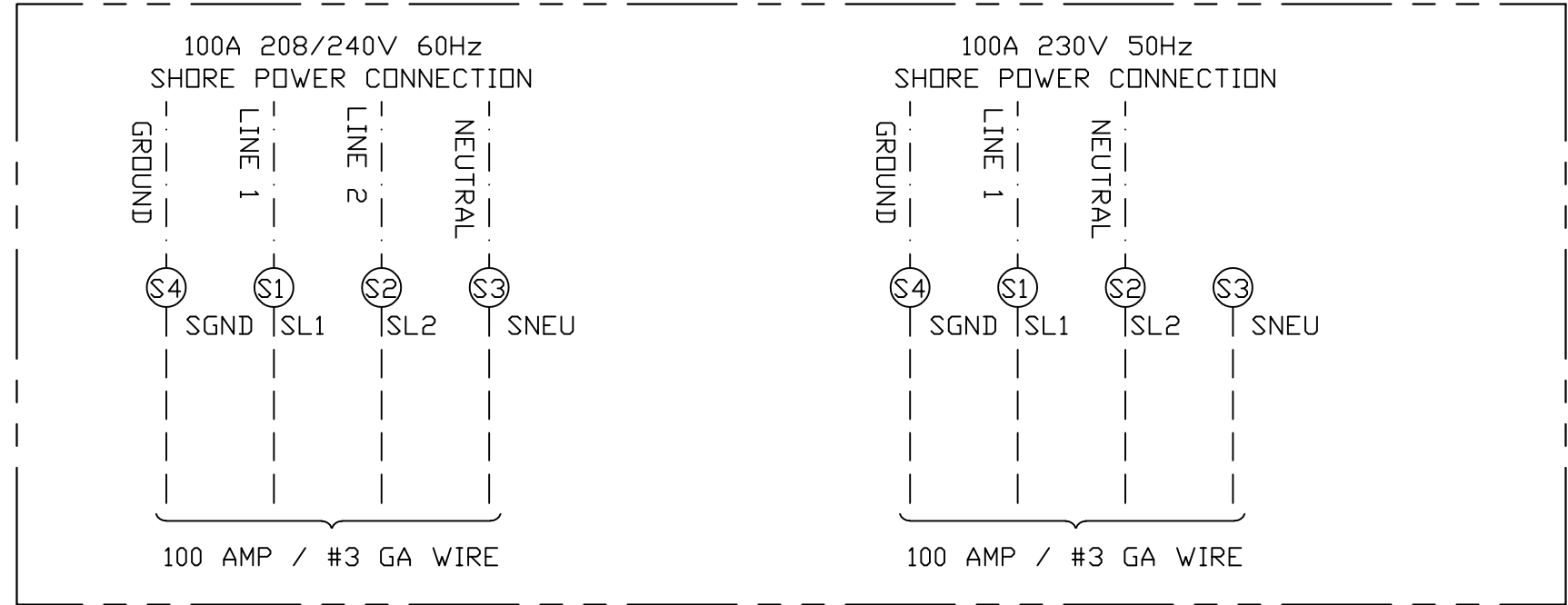
POWER MODULE INTERCONNECT BOX- DC TERMINALS



SHORE POWER CONNECTION



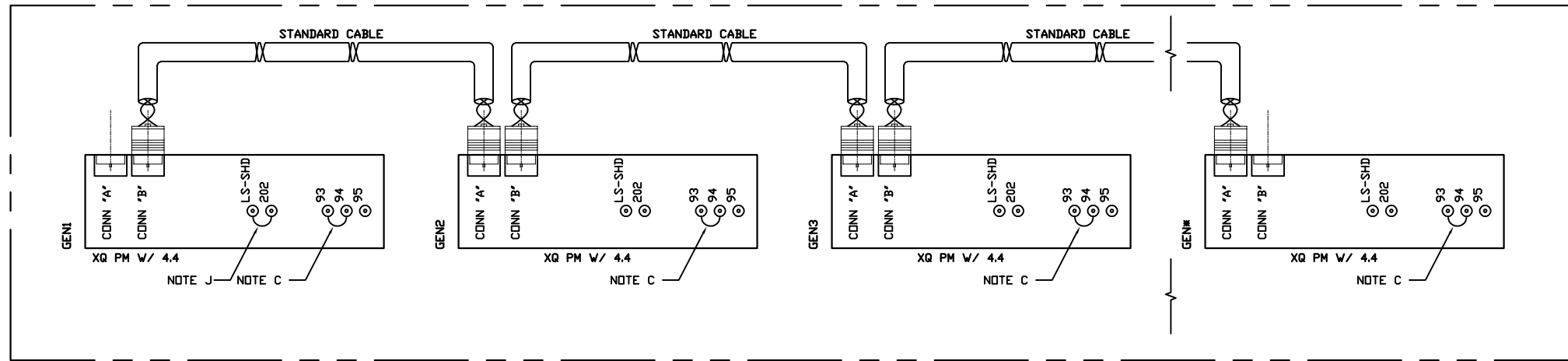
POWER MODULE INTERCONNECT BOX - AC TERMINALS



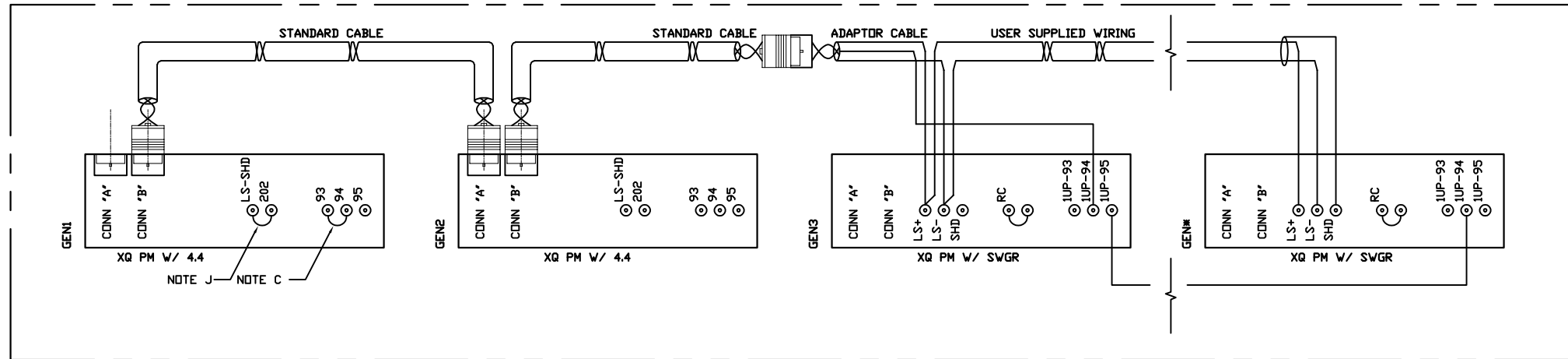
CUSTOMER CONNECTIONS
FOR NOTES SEE SHEET ONE

| | | | |
|---|--|--|--|
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| PROJECT REFERENCE APS1000A | | DRAWN BY D. RICHARDSON | QUOTE NUMBER - |
| DATE 8/15/14 | | WORK ORDER NUMBER - | DRAWING NUMBER 81E500-02 |

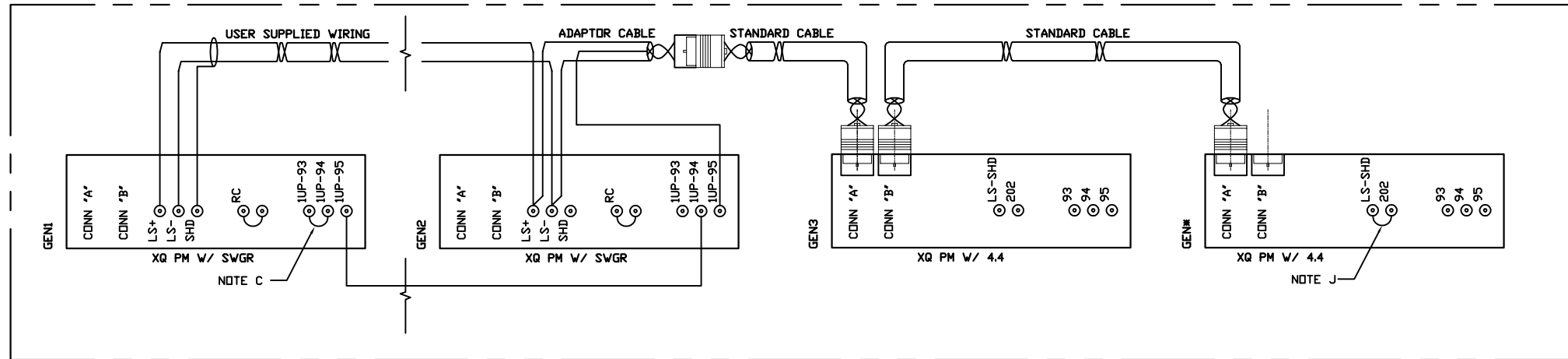
LOAD SHARE CONNECTIONS-(ALL EMCP 4.4 UNITS)



LOAD SHARE CONNECTIONS-(EMCP 4.4 AND LEGACY UNITS) (EMCP 4.4 LEAD UNIT SELECT)

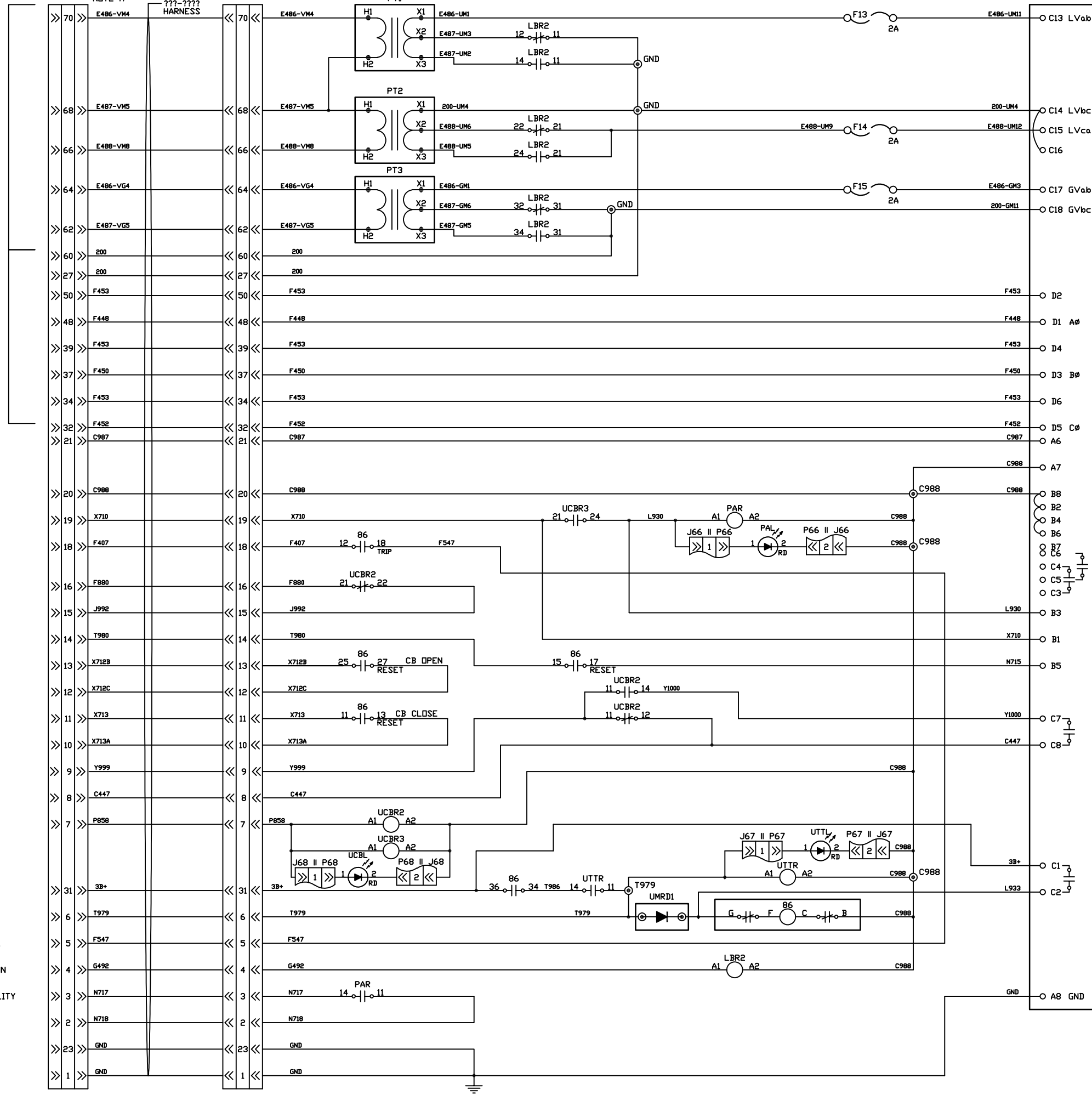


LOAD SHARE CONNECTIONS-(EMCP 4.4 AND LEGACY UNITS) (LEGACY LEAD UNIT SELECT)



CUSTOMER PARALLELING CONNECTIONS
FOR NOTES SEE SHEET ONE

| | | | |
|--|------------------------|--|---------------------------|
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| ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED | | PROJECT REFERENCE APS1000A | |
| TOLERANCES: XX ± 0.100 XXX ± 0.050 XXXX ± 0.025 | THIRD ANGLE PROJECTION | SCALE/SHEET SIZE 1=40/D | DRAWN BY D. RICHARDSON |
| SHEET 22 OF 23 | | DATE 8/15/14 | WORK ORDER NUMBER - |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | | DRAWING NUMBER 81E500-02 | |



UTILITY MULTIFUNCTION RELAY
OPTION
FOR NOTES SEE SHEET ONE

| | | | |
|--|------------------------|--|-------------------------------|
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| TOLERANCES XX ± 0.009 XXX ± 0.005 ANGLE ANGULAR ± 1° | THIRD ANGLE PROJECTION | FILE DF/B1E | PROJECT REFERENCE APS1000A |
| SCALE/SHEET SIZE 1=40/D | SHEET 23 OF 23 | DRAWN BY D. RICHARDSON | QUOTE NUMBER - |
| DATE 8/15/14 | SHEET 23 OF 23 | WORK ORDER NUMBER - | DRAWING NUMBER B1E500-02 |
| TITLE SCHEMATIC APS1000A EMCP 4.4 | | DRAWING NUMBER B1E500-02 | |