

THREE PHASE WIRING FOR ASCO® 7000 SERIES AUTOMATIC CLOSED TRANSITION TRANSFER SWITCHES TYPE 7ASLS RATED 150, 260 & 400 AMPERES

FEATURES, SETTINGS, OPERATION, ACCESSORIES & NOTES

THE FOLLOWING FEATURES AND RELATED SETTINGS ARE PART OF THE GROUP 5 CONTROL PANEL'S USER CONFIGURABLE PARAMETERS. FOR DETAILED INFORMATION REGARDING THE CONFIGURATION OF THESE PARAMETERS AND OTHER FEATURES OF THE GROUP 5 CONTROL PANEL, REFER TO THE GROUP 5 CONTROL PANEL FOR ASCO® 7000 SERIES AUTOMATIC TRANSFER SWITCHES USER'S GUIDE (PART NO. 381333-126) PROVIDED WITH EVERY 7000 SERIES AUTOMATIC TRANSFER SWITCH.

THE NOMINAL OPERATING VOLTAGE & FREQUENCY IS PRE-PROGRAMMED AT THE FACTORY BASED ON THE NAMEPLATE DATA PRINTED ON THE TRANSFER SWITCH & CONTROL PANEL NAMEPLATES.

VOLTAGE & FREQUENCY SENSING

THE FOLLOWING SETTINGS ARE EXPRESSED AS A PERCENTAGE OF THE CONTROL PANEL'S NOMINAL VOLTAGE SETTING UNLESS STATED OTHERWISE. ALL SETTINGS ARE ADJUSTABLE IN INCREMENTS OF 1%.

A. RMS VOLTAGE SENSING ON ALL PHASES OF THE NORMAL & EMERGENCY SOURCES.

| PARAMETER                           | RANGE OF SETTINGS               | DEFAULT SETTING |
|-------------------------------------|---------------------------------|-----------------|
| NORMAL VOLTAGE DROPOUT              | 70-98%                          | 85%             |
| NORMAL VOLTAGE PICKUP               | 85-100%                         | 90%             |
| NORMAL OVER VOLTAGE TRIP            | 102-115%                        | OFF             |
| NORMAL VOLTAGE UNBALANCE            | YES/NO                          | NO              |
| NORMAL VOLTAGE UNBALANCE DROPOUT    | 5-20% OF AVG. NORMAL VOLTAGE    | 20% (if ON)     |
| NORMAL VOLTAGE UNBALANCE PICKUP     | 3-18% OF AVG. NORMAL VOLTAGE    | 10% (if ON)     |
| EMERGENCY VOLTAGE DROPOUT           | 70-98%                          | 75%             |
| EMERGENCY VOLTAGE PICKUP            | 85-100%                         | 90%             |
| EMERGENCY OVER VOLTAGE TRIP         | 102-115%                        | OFF             |
| EMERGENCY VOLTAGE UNBALANCE         | YES/NO                          | NO              |
| EMERGENCY VOLTAGE UNBALANCE DROPOUT | 5-20% OF AVG. EMERGENCY VOLTAGE | 20% (if ON)     |
| EMERGENCY VOLTAGE UNBALANCE PICKUP  | 3-18% OF AVG. EMERGENCY VOLTAGE | 10% (if ON)     |

B. FREQUENCY SENSING OF THE NORMAL & EMERGENCY SOURCES.

| PARAMETER                     | RANGE OF SETTINGS | DEFAULT SETTING |
|-------------------------------|-------------------|-----------------|
| NORMAL FREQUENCY DROPOUT      | 85-98%            | 90%             |
| NORMAL FREQUENCY PICKUP       | 90-100%           | 95%             |
| NORMAL OVER FREQUENCY TRIP    | 102-110%          | OFF             |
| EMERGENCY FREQUENCY DROPOUT   | 85-98%            | 90%             |
| EMERGENCY FREQUENCY PICKUP    | 90-100%           | 95%             |
| EMERGENCY OVER FREQUENCY TRIP | 102-110%          | OFF             |

TIME DELAYS

THE FOLLOWING TIME DELAY SETTINGS ALL HAVE AN ADJUSTABLE RANGE OF 0-60 min 59 sec UNLESS STATED OTHERWISE. ADJUSTABLE IN INCREMENTS OF 1 sec.

NOTE: SOME TIME DELAYS MAY BE EFFECTED BY CUSTOMER REQUESTED ACCESSORIES PROVIDED WITH THE UNIT. REFER TO THE DESCRIPTIONS PROVIDED UNDER THE "ACCESSORIES" NOTES ON THIS PAGE.

| FEATURE | NAME                                                          | DEFAULT SETTING |
|---------|---------------------------------------------------------------|-----------------|
| 1C      | NORMAL SOURCE FAILURE TO ENGINE START                         | 1 sec           |
| 2B      | TRANSFER TO EMERGENCY ON AVAILABILITY OF EMERGENCY SOURCE     | 0 sec           |
| 1F      | EMERGENCY SOURCE FAILURE RETRANSFER (NORMAL SOURCE AVAILABLE) | 0 sec           |
| 2E      | ENGINE COOLDOWN FOLLOWING RETRANSFER TO NORMAL                | 5 min           |
| 3A      | RETRANSFER TO NORMAL (NORMAL FAILURE MODE)                    | 30 min          |
| 3A      | RETRANSFER TO NORMAL (TEST MODE)                              | 30 sec          |
| -       | DELAYED TRANSFER (LOAD "OFF" TIME), [0-5 min 59 sec]          | 3 sec           |

DESCRIPTIONS OF TIME DELAYS:

FEAT. 1C - DELAY ON NORMAL SOURCE OUTAGE. STARTS ON FAILURE OF NORMAL SOURCE. RESETS IF NORMAL SOURCE IS ACCEPTED BEFORE EXPIRATION. INHIBITS ENGINE STARTING AND AUTOMATIC TRANSFER UNTIL EXPIRATION.

FEAT. 2B - DELAY PRIOR TO TRANSFER TO THE EMERGENCY SOURCE. DELAY STARTS ON EXPIRATION OF FEAT. 1C AND WHEN THE EMERGENCY SOURCE HAS BEEN ACCEPTED. DELAY RESETS IF THE EMERGENCY SOURCE FAILS PRIOR TO EXPIRATION. ON EXPIRATION, TRANSFER TO EMERGENCY IS INITIATED UNLESS THE NORMAL SOURCE HAS RECOVERED AND THE "COMMIT TO TRANSFER" FEATURE IS SET TO "NO" COMMIT. PROVIDES A PERIOD FOR EMERGENCY SOURCE STABILIZATION OR STAGING OF MULTIPLE TRANSFER SWITCH CONTROLLED LOADS TO THE EMERGENCY SOURCE.

FEAT. 1F - DELAY ON RETRANSFER TO NORMAL IN THE EVENT OF EMERGENCY SOURCE FAILURE. DELAY BEGINS ON FAILURE OF THE EMERGENCY SOURCE IF THE NORMAL SOURCE IS ACCEPTABLE. ON EXPIRATION, RETRANSFER TO NORMAL WILL BE INITIATED.

FEAT. 2E - DELAY ON ENGINE SHUTDOWN (ENGINE COOL DOWN PERIOD). DELAY STARTS FOLLOWING RETRANSFER TO THE NORMAL SOURCE. PROVIDES A PERIOD FOR THE ENGINE-GENERATOR SET TO RUN UNLOADED PRIOR TO SHUTDOWN.

FEAT. 3A - RETRANSFER TO NORMAL DELAY (NORMAL FAILURE MODE) DELAY STARTS WHEN NORMAL SOURCE IS ACCEPTED (FOLLOWING IT'S FAILURE) AND WHILE THE LOAD IS CONNECTED TO EMERGENCY. RESETS IF NORMAL FAILS PRIOR TO EXPIRATION OR IF THE EMERGENCY SOURCE FAILS BEFORE EXPIRATION AND FEAT. 1F EXPIRES (AUTOMATIC BYPASS ON EMERGENCY SOURCE FAILURE). PROVIDES A PERIOD FOR THE NORMAL SOURCE TO STABILIZE PRIOR TO RETRANSFER.

FEAT. 3A - RETRANSFER TO NORMAL DELAY (TEST MODE) DELAY STARTS WHEN THE "TRANSFER TEST" SWITCH IS RESET TO "AUTO" (FOLLOWING A USER INITIATED TRANSFER TEST) AND WHILE THE LOAD IS CONNECTED TO EMERGENCY. RESETS IF NORMAL FAILS PRIOR TO EXPIRATION OR IF THE EMERGENCY SOURCE FAILS BEFORE EXPIRATION AND FEAT. 1F EXPIRES (AUTOMATIC BYPASS ON EMERGENCY SOURCE FAILURE).

IN SYNC - IN SYNC TIME DELAY BEGINS BEFORE A CLOSED TRANSITION TRANSFER FOLLOWING ACCEPTANCE OF THE SOURCE TO WHICH TRANSFER IS BEING MADE. ON EXPIRATION OF THE DELAY, THE LOGIC AWAITS AN IN SYNC CONDITION FOR SUBSEQUENT CLOSED TRANSITION TRANSFER.

EXTENDED PARALLEL - EXTENDED PARALLEL TIMER BEGINS WHEN THE SOURCES ARE PARALLELED (CN & CE CLOSED). IF THE TWO SOURCES REMAIN IN PARALLEL WHEN THE DELAY EXPIRES, THE CONTROL LOGIC TAKES THE FOLLOWING ACTIONS:

- THE LOGIC WILL ATTEMPT TO OPERATE THE TRANSFER SWITCH TO A "SAFE" STATE WHERE THE SOURCES WILL NO LONGER BE PARALLELED AND THE LOAD WILL BE SERVICED BY AN AVAILABLE SOURCE.
- THE CONTROL PANEL IS LOCKED OUT FROM ANY FURTHER AUTOMATIC OPERATION.
- THE "TS LOCKED OUT" INDICATOR (RED LED) IS LIT.
- THE EXTENDED PARALLEL ALARM TIMER LOCATED ON THE DUAL OPERATOR CONTROL (DOC) IS ENABLED.
- THE UNIT WILL REMAIN LOCKED OUT UNTIL THE "TS LOCKED OUT" PUSH-BUTTON IS DEPRESSED FOR RESET.

FAIL TO SYNC - FAILURE TO SYNC TIMER BEGINS WHEN THE LOGIC BEGINS TO CHECK FOR AN IN SYNC CONDITION FOR WHICH TO ALLOW CLOSED TRANSITION TRANSFER. IF THE DELAY EXPIRES PRIOR TO AN IN SYNC CONDITION OCCURRING, THE "FAILURE TO SYNCHRONIZE" SIGNAL IS ACTIVATED (RED LED) AND CLOSURE OF THE TFR RELAY CONTACT AVAILABLE AT THE FIELD CONNECTIONS TERMINAL BLOCK (TB).

FEAT. 62F - EXTENDED PARALLEL ALARM TIMER BEGINS TIMING WHEN THE SOURCES ARE PARALLELED (CN & CE CLOSED). THE ENABLING OF THE EXTENDED PARALLEL ALARM TIMER OCCURS AT THE SAME TIME THAT THE CONTROLLER'S EXTENDED PARALLEL TIMER BEGINS.

THE FEATURE 62F EXTENDED PARALLEL ALARM TIMER IS INDEPENDENT OF THE CONTROLLER'S EXTENDED PARALLEL TIMER DESCRIBED UNDER "DESCRIPTION OF TIME DELAYS".

ON EXPIRATION OF THE FEATURE 62F EXTENDED PARALLEL ALARM TIME DELAY, OUTPUT RELAY (RL3) (2) FORM C CONTACTS, CONNECTED TO THE FIELD CONNECTIONS TERMINAL BLOCK (TB), TRANSFER.

THE FEATURE 62F EXTENDED PARALLEL ALARM DELAY IS ADJUSTABLE VIA POTENTIOMETER (P2) LOCATED ON THE DUAL OPERATOR CONTROL (DOC) WHICH IS ADJUSTABLE FROM 0-1 SECOND. FACTORY SET AT 1 SEC.

NOTE: THE TIMER SHOULD BE SET ABOVE 0.7 SECONDS TO PERMIT THE CONTROLLER TO ATTEMPT TO OPERATE THE TRANSFER SWITCH TO A "SAFE" STATE WHERE THE SOURCES WILL NO LONGER BE PARALLELED. THE TIMER CAN BE SET LOWER TO BE USED TO ISOLATE THE TWO SOURCES WITH AN EXTERNALLY CONTROLLED FEEDER CIRCUIT BREAKER. HOWEVER THE CONTROLLER MAY NOT BE ABLE TO PLACE THE TRANSFER SWITCH IN A "SAFE" STATE.

ENGINE EXERCISER

THE ENGINE EXERCISER FEATURE PROVIDES A MEANS TO PERFORM AUTOMATIC EXERCISING OF THE ENGINE-GENERATOR SET EITHER WITH OR WITHOUT LOAD TRANSFER.

THE USER CAN PROGRAM UP TO SEVEN DIFFERENT EXERCISE ROUTINES. EACH ROUTINE INCLUDES:

1. ENABLE OR DISABLE THE ROUTINE
2. ENABLE OR DISABLE TRANSFER OF THE LOAD DURING THE ROUTINE
3. SET START TIME OF ROUTINE -
  - TIME OF DAY
  - DAY OF WEEK
  - WEEK OF MONTH (1st, 2nd, 3rd, 4th, ALTERNATE OR ALL)
4. SET THE DURATION OF THE ROUTINE

| PARAMETER                    | RANGE OF SETTING                        | DEFAULT SETTING       |
|------------------------------|-----------------------------------------|-----------------------|
| MONTH (CLOCK SET)            | OCT NOV MAR APR MAY JUN JUL AUG SEP     | CURRENT DATE          |
| DAY                          | OCT NOV DEC                             |                       |
| YEAR                         | 1-31                                    |                       |
| HOUR                         | 00-99                                   |                       |
| MINUTE                       | 0-23                                    |                       |
| ENABLE ROUTINE (ROUTINE 1-7) | 0-59                                    | Eastern Standard Time |
| TRANSFER LOAD                | YES/NO                                  | NO                    |
| START HOUR                   | YES/NO                                  | NO                    |
| START MINUTE                 | 0-23                                    | 0                     |
| RUN WEEK                     | 0-59                                    | 0                     |
| RUN DAY                      | ALL, ALTERNATE, 1st, 2nd, 3rd, 4th, 5th | ALL                   |
| DURATION HOURS               | SUN MON TUE WED THU FRI SAT             | SUN                   |
| DURATION MINUTES             | 0-23                                    | 0                     |
|                              | 0-59                                    | 0                     |

OPERATION

IF THE NORMAL SOURCE FAILS, THE TRANSFER SWITCH INITIATES STARTING OF THE ENGINE-GENERATOR SET. WHEN PROPER VOLTAGE AND FREQUENCY HAVE BEEN ATTAINED, THE LOAD WILL BE TRANSFERRED IN AN OPEN TRANSITION (BREAK BEFORE MAKE) OPERATION TO THE EMERGENCY SOURCE.

WHEN THE NORMAL SOURCE IS RESTORED FOR THE DURATION OF THE FEATURE 3A, RETRANSFER TO NORMAL TIME DELAY SETTING, THE CONTROLS WILL BEGIN MONITORING PHASE, FREQUENCY, AND VOLTAGE DIFFERENTIAL BETWEEN NORMAL AND EMERGENCY SOURCES.

WHEN THE TWO SOURCES ARE APPROACHING SYNCHRONISM, A CLOSED TRANSITION (MAKE BEFORE BREAK) TRANSFER TO THE NORMAL SOURCE WILL BE INITIATED. THE NORMAL AND EMERGENCY CONTACTORS (CN & CE) WILL BE IN AN OVERLAP CONDITION FOR LESS THAN 0.1 SECONDS.

CLOSED TRANSITION TRANSFER WILL ALSO BE INITIATED DURING A TRANSFER TEST OPERATION CAUSED BY OPERATION OF THE FEATURE 5 TRANSFER TEST SELECTOR SWITCH. RETRANSFER WILL ALSO OCCUR IN A CLOSED TRANSITION MANNER AT THE END OF THE TEST.

CLOSED TRANSITION BYPASS OPERATION: THE "CT BYPASS OPTIONS" DISPLAY OF THE CONTROL PANEL ALLOWS SETTING THE TRANSFER SWITCH'S CLOSED TRANSITION BYPASS BEHAVIOR. CLOSED TRANSITION BYPASS CAUSES THE TRANSFER SWITCH TO INTERRUPT POWER TO THE LOAD DURING TRANSFER. THE AVAILABLE OPTIONS ARE:

- **FAIL TO SYNC AUTO BYPASS ENABLE** - CAUSES A "FAILURE TO SYNCHRONIZE" CONDITION TO RESULT IN AN AUTOMATIC CLOSED TRANSITION BYPASS. DEFAULT SETTING IS NO AUTOMATIC BYPASS.
- **CT BYPASS** - ALLOWS SELECTIONS AS TO WHETHER THE CLOSED TRANSITION BYPASS WILL OCCUR WITH OR WITHOUT A DELAYED TRANSITION (LOAD "OFF" TIME). DEFAULT SETTING IS OPEN TRANSITION (NO DELAY).
- **DT BYPASS** - SETS THE LENGTH OF THE DELAYED TRANSFER (LOAD "OFF" TIME) IF THE PREVIOUS PARAMETER HAS BEEN SELECTED TO OPERATE WITH DELAYED TRANSITION. THE DELAY ("OFF" PERIOD) BEGINS FOLLOWING THE OPENING OF THE SOURCE CONTACTOR, (CN OR CE), CONNECTED TO THE SOURCE FROM WHICH TRANSFER IS BEING MADE. UPON EXPIRATION, CLOSURE OF THE OPPOSITE SOURCE CONTACTOR IN INITIATED.

| BASE CATALOG NUMBER |                |             |                   | CATALOG NUMBER SUFFIXES                                                      |            |                    |                                                          |
|---------------------|----------------|-------------|-------------------|------------------------------------------------------------------------------|------------|--------------------|----------------------------------------------------------|
| CATALOG TYPE        | NEUTRAL TYPE   | PHASE POLES | AMPS              | VOLT CODE                                                                    | CONTROLLER | OPTIONAL ACCESSORY | ENCLOSURE CODE                                           |
| 7ASLS               | A              | 3           | 150<br>260<br>400 | A<br>B<br>C<br>D<br>E<br>F<br>G<br>H<br>J<br>K<br>L<br>M<br>N<br>P<br>Q<br>R | 5          | X                  | C<br>E<br>F<br>G<br>H<br>J<br>K<br>L<br>M<br>N<br>P<br>Q |
|                     | BLANK FOR NONE |             |                   |                                                                              |            | BLANK FOR NONE     | BLANK FOR OPEN TYPE                                      |

SIGNALS & AUXILIARIES

- A. FEATURES 7 & 8- ENGINE START SIGNAL  
SIGNAL INITIATED BY DROPOUT OF CONTROL PANEL RELAY (NR) FOLLOWING EXPIRATION OF THE FEATURE 1C TIME DELAY (DELAY TO OVERRIDE MOMENTARY NORMAL SOURCE OUTAGES). FEATURE 7 CLOSES TO SIGNAL ENGINE START. FEATURE 8 OPENS TO SIGNAL ENGINE START. ENGINE STARTING SIGNAL RESETS FOLLOWING RETRANSFER TO THE NORMAL SOURCE AND EXPIRATION OF THE FEATURE 2E (ENGINE COOL DOWN) TIME DELAY. FEATURES 7 & 8 ARE PROVIDED AS A SINGLE FORM C CONTACT CONNECTED TO THE FIELD CONNECTIONS TERMINAL BLOCK (TB). CONTACT RATED 5 AMPS AT 32 VDC/120VAC RESISTIVE.
- B. FEATURES 14A & 14B - TRANSFER SWITCH AUXILIARY POSITION INDICATING CONTACTS. ONE (1) FORM A CONTACT TO INDICATE CONNECTION OF THE TRANSFER SWITCH TO NORMAL (14A) AND ONE (1) FOR EMERGENCY (14B). CONTACTS CONNECTED TO THE FIELD CONNECTIONS TERMINAL BLOCK (TB). CONTACTS RATED 10 AMPS, 32 VDC, 250 VAC.
- C. FEATURE 17 - REMOTE TRANSFER TO EMERGENCY.  
REQUIRES A CUSTOMER SUPPLIED NORMALLY OPEN CONTACT. CLOSING OF THE CONTACT CAUSES ENGINE START AND TRANSFER TO THE EMERGENCY SOURCE. OPENING OF THE CONTACT ACTIVATES THE FEATURE 3A (RETRANSFER TO NORMAL) DELAY PRIOR TO RETRANSFER. IN THE EVENT THE EMERGENCY SOURCE FAILS WHILE THE TRANSFER SWITCH IS CONNECTED TO EMERGENCY AND THE REMOTE CONTACT IS CLOSED, THE TRANSFER SWITCH WILL RETRANSFER TO THE NORMAL SOURCE. CONNECTED TO THE FIELD CONNECTIONS TERMINAL BLOCK (TB).

USER CONTROLS AND INDICATIONS

A. FEATURES 5 & 6B - TRANSFER TEST/RETRANSFER TIME DELAY BYPASS CONTROLS.

TRANSFER TEST:  
OPERATION CAUSES A NORMAL SOURCE FAILURE SEQUENCE. ACTIVATE AND HOLD FOR AT LEAST 15 SECONDS TO ALLOW TIME FOR THE ENGINE-GENERATOR TO START.

RETRANSFER TIME DELAY BYPASS:  
OPERATION WILL BYPASS THE FEATURE 3A (RETRANSFER TO NORMAL DELAY).

- B. FEATURES 9A & 9B - TRANSFER SWITCH POSITION INDICATORS.  
FEATURE 9A: TRANSFER SWITCH CLOSED ON NORMAL (GREEN LED)  
FEATURE 9B: TRANSFER SWITCH CLOSED ON EMERGENCY (RED LED)

- C. FEATURES 9C & 9D - SOURCE ACCEPTANCE INDICATORS.  
FEATURE 9C: NORMAL SOURCE ACCEPTED (GREEN LED)  
FEATURE 9D: EMERGENCY SOURCE ACCEPTED (RED LED)

- D. EXTENDED PARALLEL TIME - INDICATES THAT THE MAIN CONTACTORS (CN & CE) HAVE BEEN SIMULTANEOUSLY CLOSED FOR A PERIOD EXCEEDING THE TIME ALLOTTED. (RED LED)  
E. FAILURE TO SYNCHRONIZE - INDICATES THE THE TWO SOURCES DID NOT MEET THE PARAMETERS REQUIRED FOR A CLOSED TRANSITION TRANSFER. (RED LED)

- F. TS LOCKED OUT - INDICATES THAT A FAILURE OF THE TRANSFER SWITCH OPERATOR HAS OCCURRED AND THAT THE TRANSFER SWITCH HAS TAKEN CORRECTIVE ACTION AS REQUIRED. ONCE THIS FAILURE RECOVERY OPERATION TAKES PLACE, THE TRANSFER SWITCH IS PREVENTED FROM FURTHER OPERATION UNTIL THE CONDITION IS CORRECTED. ONCE THE CONDITION IS CORRECTED, THE TS LOCKED OUT SWITCH MAY BE DEPRESSED TO RESET THE CONTROL PANEL (RED LED).

- G. ALARM RESET SWITCH - RESETS FAILURE TO SYNCHRONIZE AND EXTENDED PARALLEL ALARMS.

- H. CLOSED TRANSITION BYPASS SWITCH - BYPASSES CLOSED TRANSITION TRANSFER WHEN OPERATED DURING THE PERIOD WHILE THE TRANSFER SWITCH CONTROL PANEL IS MONITORING FOR AN INPHASE CONDITION. CAUSES OPEN TRANSITION TRANSFER TO THE OPPOSITE SOURCE IF CONDITIONS PERMIT.

GENERAL NOTES

1. SWITCH SHOWN DE-ENERGIZED AND CONNECTED TO THE NORMAL SOURCE.
2. DEVICE SYMBOLS AND DESIGNATIONS ARE IN ACCORDANCE WITH NEMA PUBLICATION ICS 1-1983, PART 1-101A.
3. ALL WIRING IS #16 AWG, TINNED, STRANDED COPPER UNLESS OTHERWISE INDICATED.
4. ○ ON TERMINAL BLOCKS INDICATES AVAILABLE FIELD CONNECTION POINT.
5. ● ON TERMINAL BLOCKS INDICATES FACTORY CONNECTION POINT.
6. CONTROL AND ACCESSORY WIRING IS ROUTED IN ACCORDANCE WITH ASCO ASSEMBLY PROCEDURE GS451261.
7. AN OPERATOR'S MANUAL IS FURNISHED WITH EACH AUTOMATIC TRANSFER SWITCH. REFER TO THIS PUBLICATION PRIOR TO INSTALLATION AND OPERATION OF THE UNIT.

7000 SERIES SOFT LOAD TRANSFER SYSTEM

THE SOFT LOAD CONTROL SYSTEM CONSISTS OF THE FOLLOWING ASSEMBLIES

7000 SERIES CLOSED TRANSITION TRANSFER SWITCH INCLUDING GROUP 5 CONTROLS.

ASCO SOFT LOAD CONTROLLER WITH THE FOLLOWING FEATURES

SINGLE BOARD COMPUTER  
LOCAL COMMUNICATIONS FOR INTEGRATED CONTROL  
GRAPHICAL USER INTERFACE (GUI) WITH TOUCH SCREEN INTERFACE  
TRIPLE REDUNDANT ON BOARD POWER SUPPLY TO SELECT POWER FROM UTILITY, GENERATOR OR GENERATOR BATTERY SOURCE.  
ANALOG CONTROL OUTPUTS FOR CONTROL OF ENGINE-GENERATOR ELECTRONIC SPEED GOVERNING AND VOLTAGE REGULATION CONTROLS.

ASCO "POWERMANAGER" TRANSDUCER CONNECTED TO UTILITY SOURCE TERMINALS AND CURRENT TRANSFORMERS TO PROVIDE CONTINUOUS MONITORING OF UTILITY ELECTRICAL PARAMETERS INCLUDING

VOLTS  
AMPERES  
FREQUENCY  
INSTANTANEOUS WATTS  
INSTANTANEOUS VARS  
INTERVAL WATT DEMAND  
AND OTHER FEATURES

LOCAL COMMUNICATIONS TO INTERFACE WITH SOFT LOAD CONTROLLER  
MULTI-FUNCTIONAL PROTECTIVE RELAYING FUNCTIONS

Phase directional over current (device 67).  
Reverse power (device 32).  
Negative sequence over current (device 46).  
Negative sequence voltage (device 47).  
Under/over frequency (device 81).  
Under/over voltage (devices 27/59).  
Device 86 lockout

ASCO "POWERMANAGER" TRANSDUCER CONNECTED TO GENERATOR SOURCE TERMINALS AND CURRENT TRANSFORMERS TO PROVIDE CONTINUOUS MONITORING OF GENERATOR ELECTRICAL PARAMETERS INCLUDING

VOLTS  
AMPERES  
FREQUENCY  
INSTANTANEOUS WATTS  
INSTANTANEOUS VARS  
INTERVAL WATT DEMAND  
AND OTHER FEATURES

LOCAL COMMUNICATIONS TO INTERFACE WITH SOFT LOAD CONTROLLER  
MULTI-FUNCTIONAL PROTECTIVE RELAYING FUNCTIONS

Reverse power (device 32).  
Excessive reverse VAR for loss of excitation (device 40)  
KW overload prealarm  
KW overload alarm  
Over/under voltage (27/59)  
Over/under frequency (81)

REFER TO THE OPERATOR'S MANUAL FOR ASCO SERIES 7SLTS SOFT-LOAD TRANSFER SWITCHES

NOTE: (FEAT 6B BECOMES PUSH BUTTON)

CATALOG NUMBER \_\_\_\_\_

ASCO® CERTIFIED TO S.O. \_\_\_\_\_

BY: \_\_\_\_\_

DATE: \_\_\_\_\_

FORM REV B

PROJECT NAME: \_\_\_\_\_

WIRING DIAGRAM  
7000 SERIES (E7ASLS) 3PH 150-400 AMPS  
"B" FRAME, GROUP 5 CONTROLS

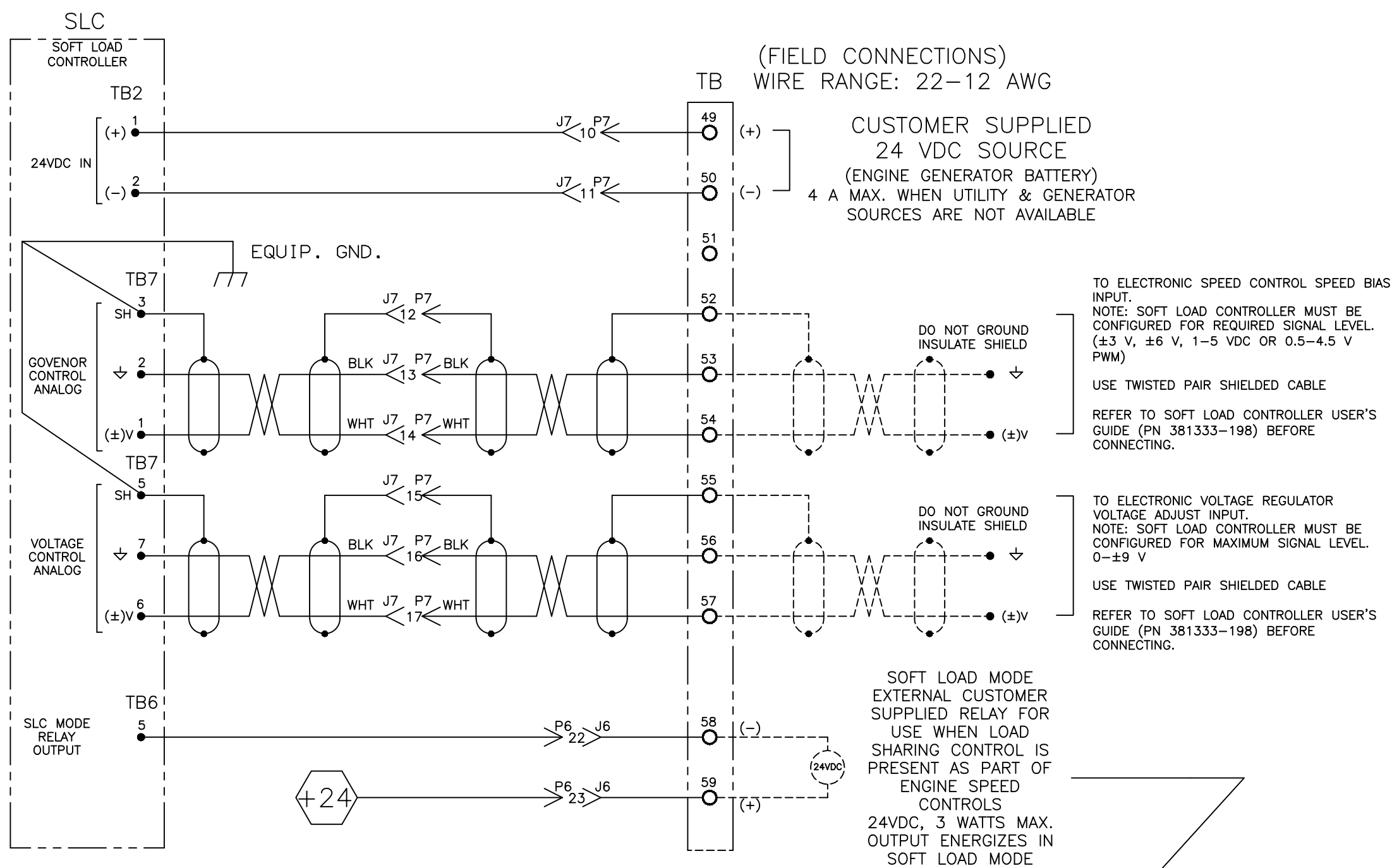
|                  |     |          |                                                                                                                       |                 |                                        |
|------------------|-----|----------|-----------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------------------|
| DRAWN BY         | DJB | 12/31/03 | MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005             | ASSEM. REF. NO. | COMPUTER GENERATED DRAWING             |
| CHECKED          | BK  | 12/31/03 | PROPERTY OF ASCO POWER TECHNOLOGIES. USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED. |                 | SCALE NONE SIZE DS                     |
| PROJECT APPROVAL | WK  | 12/31/03 |                                                                                                                       |                 | DWG. NO. 725701                        |
| FINAL APPROVAL   |     |          |                                                                                                                       |                 | DRAWING B REV. NO. 278841 SHEET 1 OF 8 |



- SERIAL COMM. NOTES:
1. GROUND SHIELD AT HOST DEVICE ONLY.
  2. FIELD WIRING: USE UL LISTED, STRANDED, TWISTED PAIRS. OVERALL FOIL SHIELD WITH STRANDED DRAIN WIRE SUITABLE FOR RS-422 EQUIVALENT TO:  
  
(STANDARD 80°C) BELDEN 9842 OR 9829  
OR ALPHA 6202C OR 6222C  
  
(PLENUM RATED) BELDEN 89729 OR 82729  
OR ALPHA 58902
- HOST DEVICE TERMINATIONS

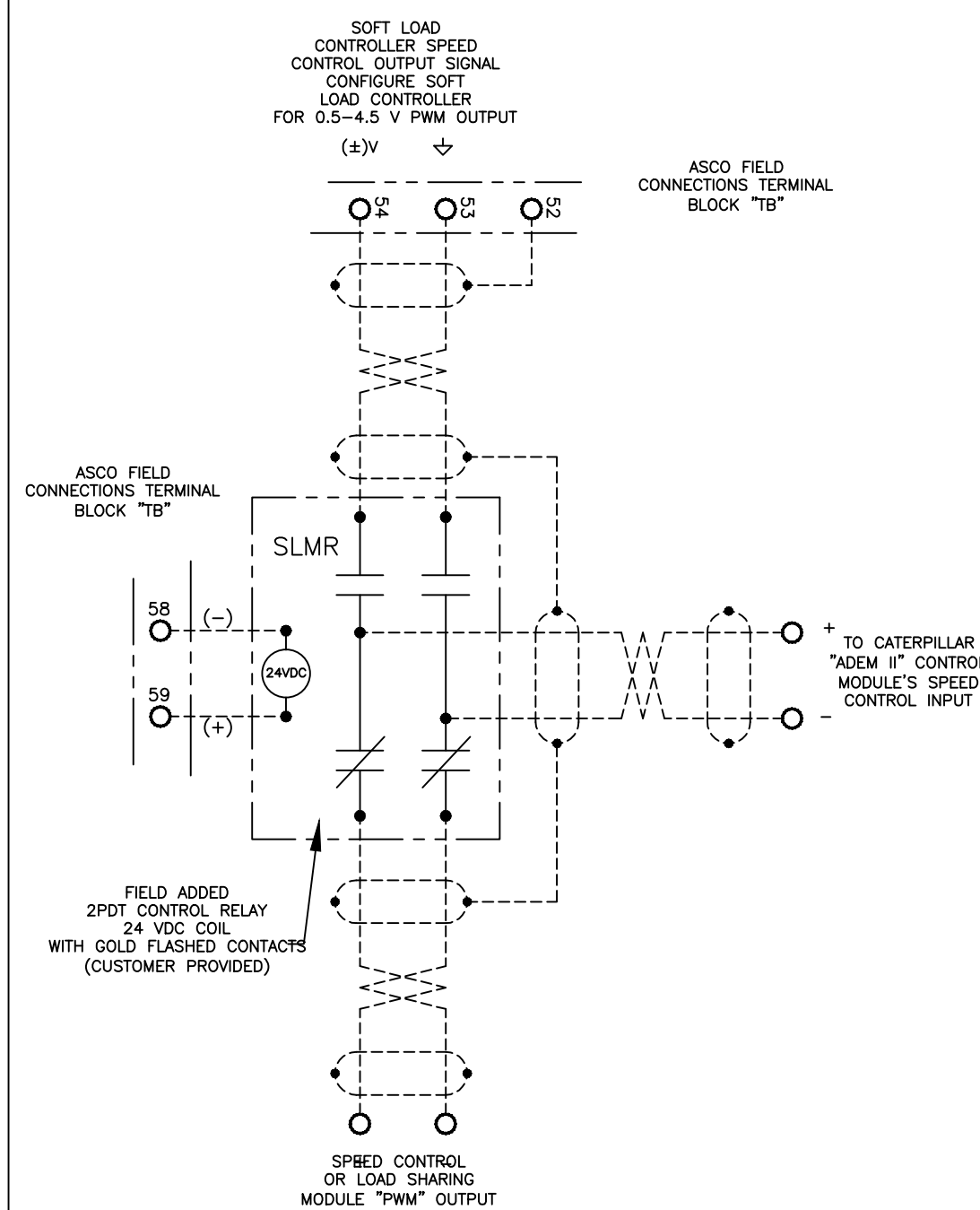
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FIELD CONNECTIONS



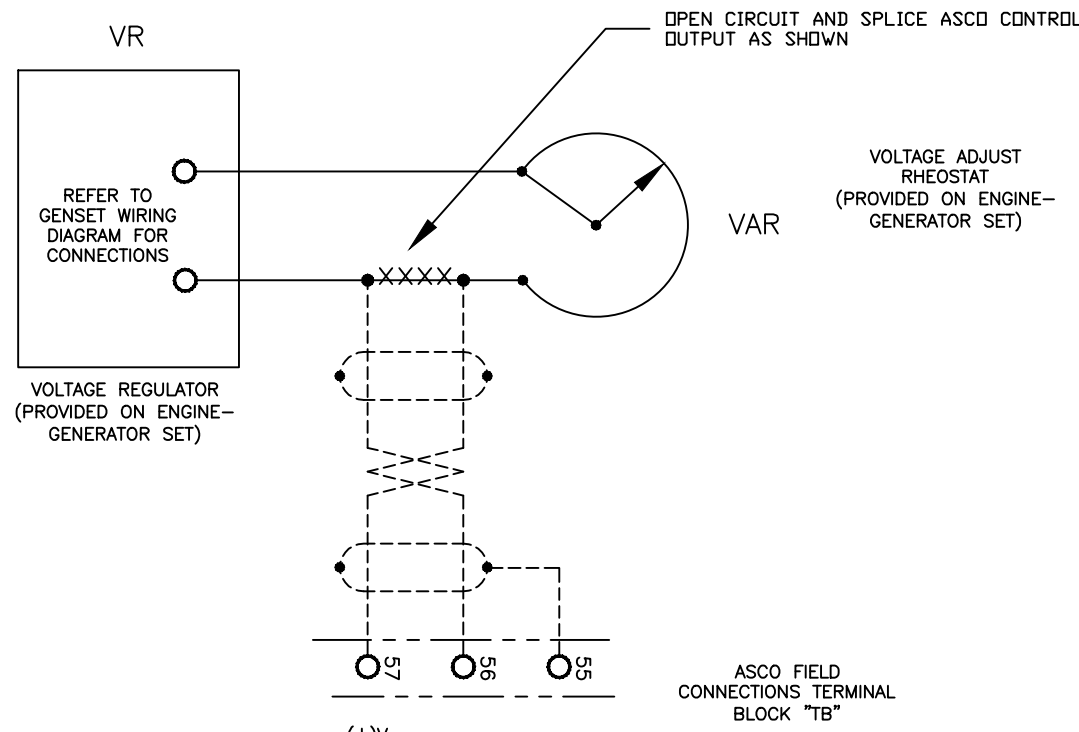
TYPICAL INTERFACE CONNECTIONS

CATERPILLAR "ADEM II" ENGINE CONTROLLER INTERFACE



VOLTAGE REGULATOR INTERFACE

TYPICAL CONNECTIONS FOR:  
BASLER SR4  
CATERPILLAR VR3  
CATERPILLAR DIGITAL VOLTAGE REGULATOR  
CONSULT FACTORY FOR OTHER TYPES



NOTES:

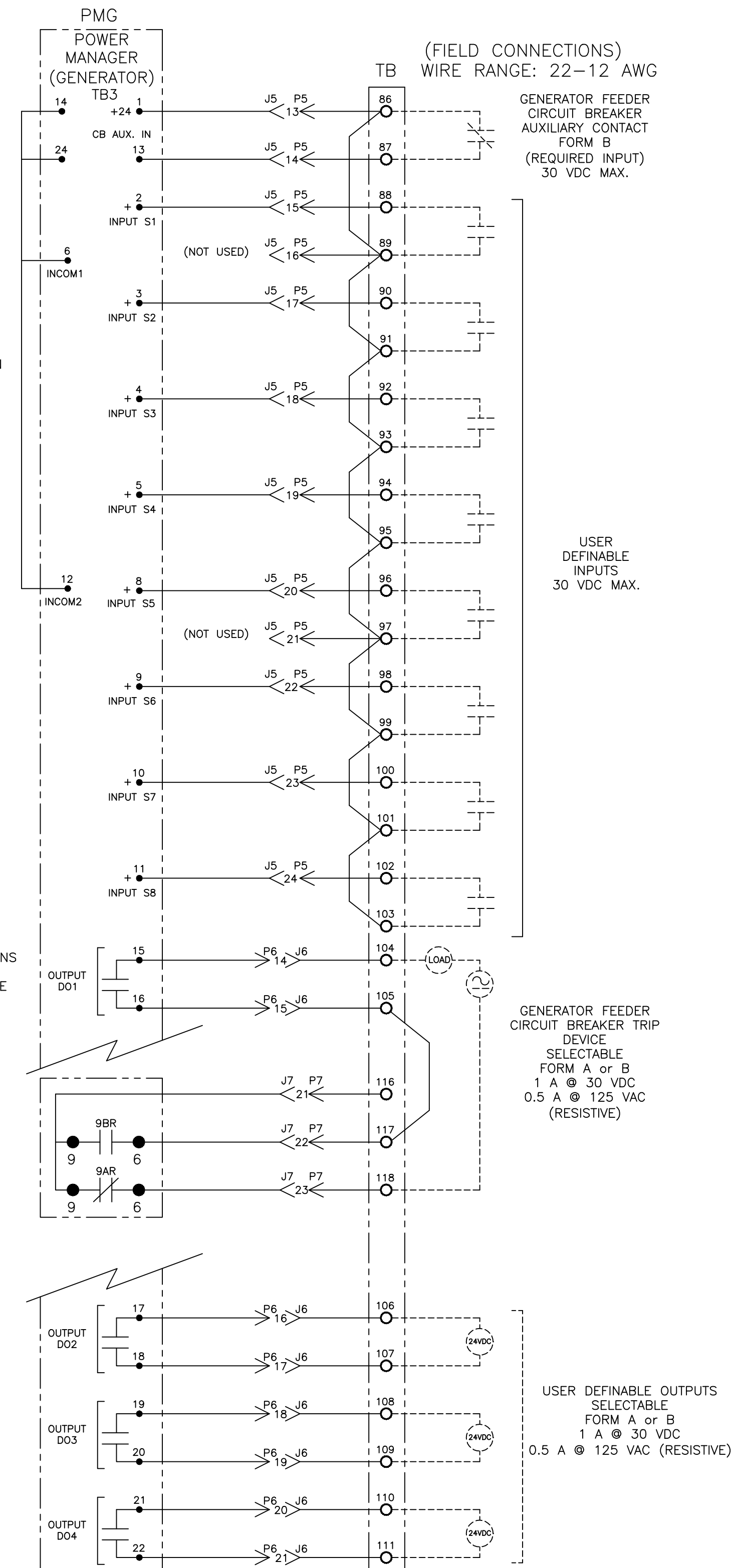
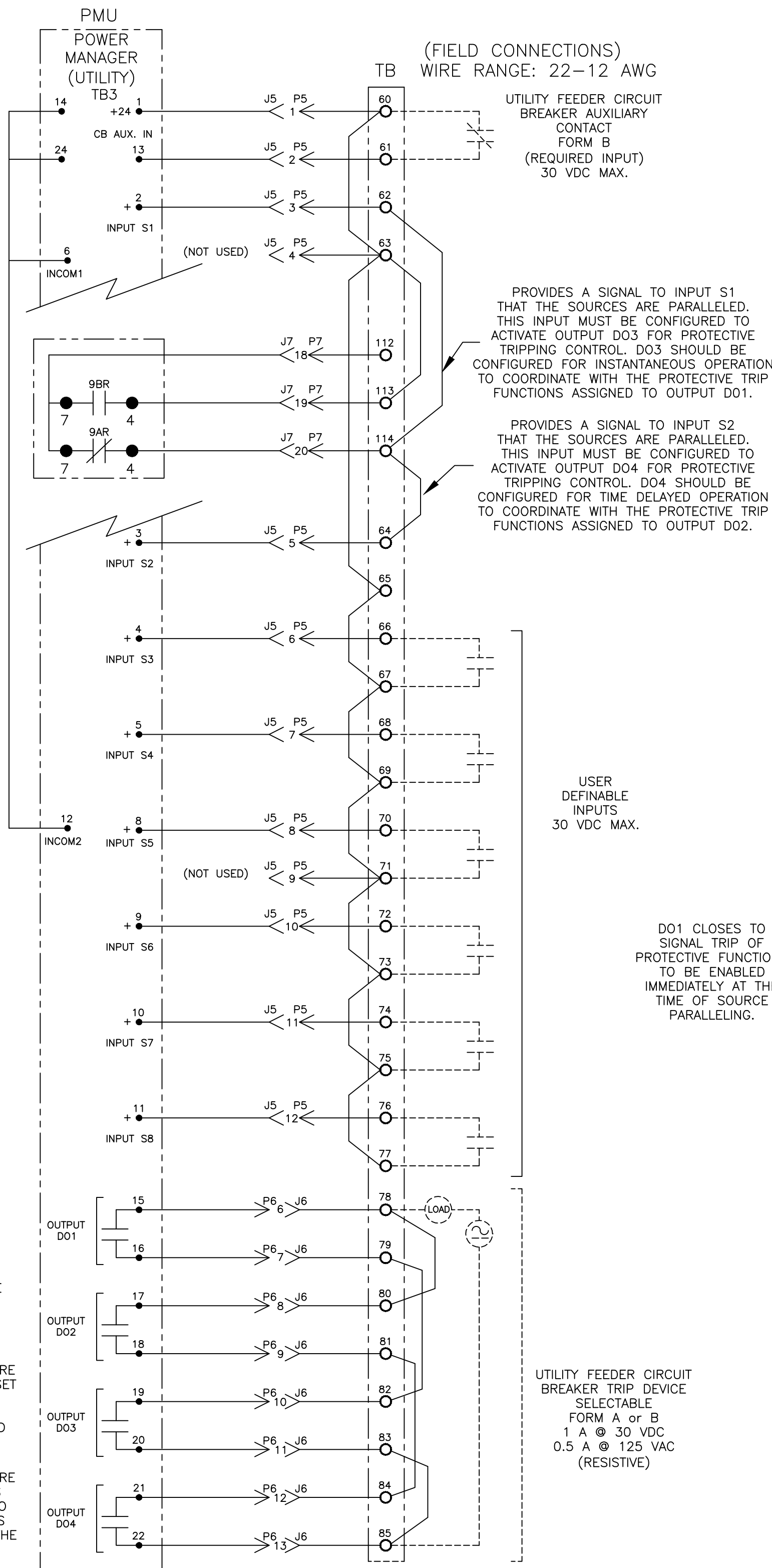
- DO NOT USE EXTERNAL VAR/PF CONTROLLER.
- REVERSE CONNECTIONS TO TB-56 & TB-57 IF IMPROPER VOLTAGE CONTROL OCCURS DURING SOFT LOAD OPERATING MODE.

DO1 CLOSES TO SIGNAL  
TRIP OF PROTECTIVE  
FUNCTIONS TO BE ENABLED  
IMMEDIATELY AT THE  
TIME OF SOURCE PARALLELING.

DO2 CLOSES TO SIGNAL TRIP OF PROTECTIVE  
FUNCTIONS TO BE ENABLED AFTER  
A TIME DELAY FROM THE  
TIME OF SOURCE PARALLELING.

DO3 CLOSES TO SIGNAL THAT THE SOURCES ARE  
IN PARALLEL AS SENSED BY INPUT S1. IT IS SET  
TO ACTIVATE INSTANTANEOUSLY  
TO COORDINATE WITH THE PROTECTIVE  
FUNCTIONS ASSIGNED TO DO1 AS CONFIGURED  
THROUGH THE SOFT LOAD CONTROLLER.

DO4 CLOSES TO SIGNAL THAT THE SOURCES ARE  
IN PARALLEL AS SENSED BY INPUT S2. IT IS  
SET TO ACTIVATE FOLLOWING A TIME DELAY TO  
COORDINATE WITH THE PROTECTIVE FUNCTIONS  
ASSIGNED TO DO2 AS CONFIGURED THROUGH THE  
SOFT LOAD CONTROLLER.



|                                       |     |                               |          |                                                                                                                          |                 |                            |
|---------------------------------------|-----|-------------------------------|----------|--------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------|
| PROJECT NAME:                         |     | REV. TO SHEET                 | ECN NO.  | BY                                                                                                                       | APP.            | DATE                       |
| WIRING                                |     | DIAGRAM                       |          |                                                                                                                          |                 |                            |
| 7000 SERIES (E7ASLS) 3PH 150-400 AMPS |     |                               |          |                                                                                                                          |                 |                            |
| "B" FRAME, GROUP 5 CONTROLS           |     |                               |          |                                                                                                                          |                 |                            |
| DRAWN BY                              | DJB | DATE                          | 12/31/03 | MANUFACTURING TOLERANCES TO BE IN<br>ACCORDANCE WITH ASCO PROCEDURE MP-1-003.<br>FOR PLASTIC PARTS SEE MP-1-005          | ASSEM. REF. NO. | COMPUTER GENERATED DRAWING |
| CHECKED                               | BK  | DATE                          | 12/31/03 | PROPERTY OF ASCO POWER TECHNOLOGIES. USE PERMITTED FOR OUR<br>WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED. | SCALE           | NONE                       |
| PROJECT<br>APPROVAL                   | WK  | DATE                          | 12/31/03 |                                                                                                                          | DWG. NO.        | 725701                     |
| FINAL<br>APPROVAL                     |     |                               |          |                                                                                                                          | DRAWING B       | REV. 1                     |
| ASCO                                  |     | ASCO POWER TECHNOLOGIES, L.P. |          | FLORHAM PARK, NEW JERSEY 07932 U.S.A.                                                                                    |                 |                            |
|                                       |     |                               |          | ECN NO. 278841                                                                                                           |                 |                            |
|                                       |     |                               |          | SHEET 3 OF 8                                                                                                             |                 |                            |

D

C

B

A

D

C

B

A

MAIN POWER POLES

TS OPERATOR CIRCUIT

EMERGENCY

NORMAL

LOAD

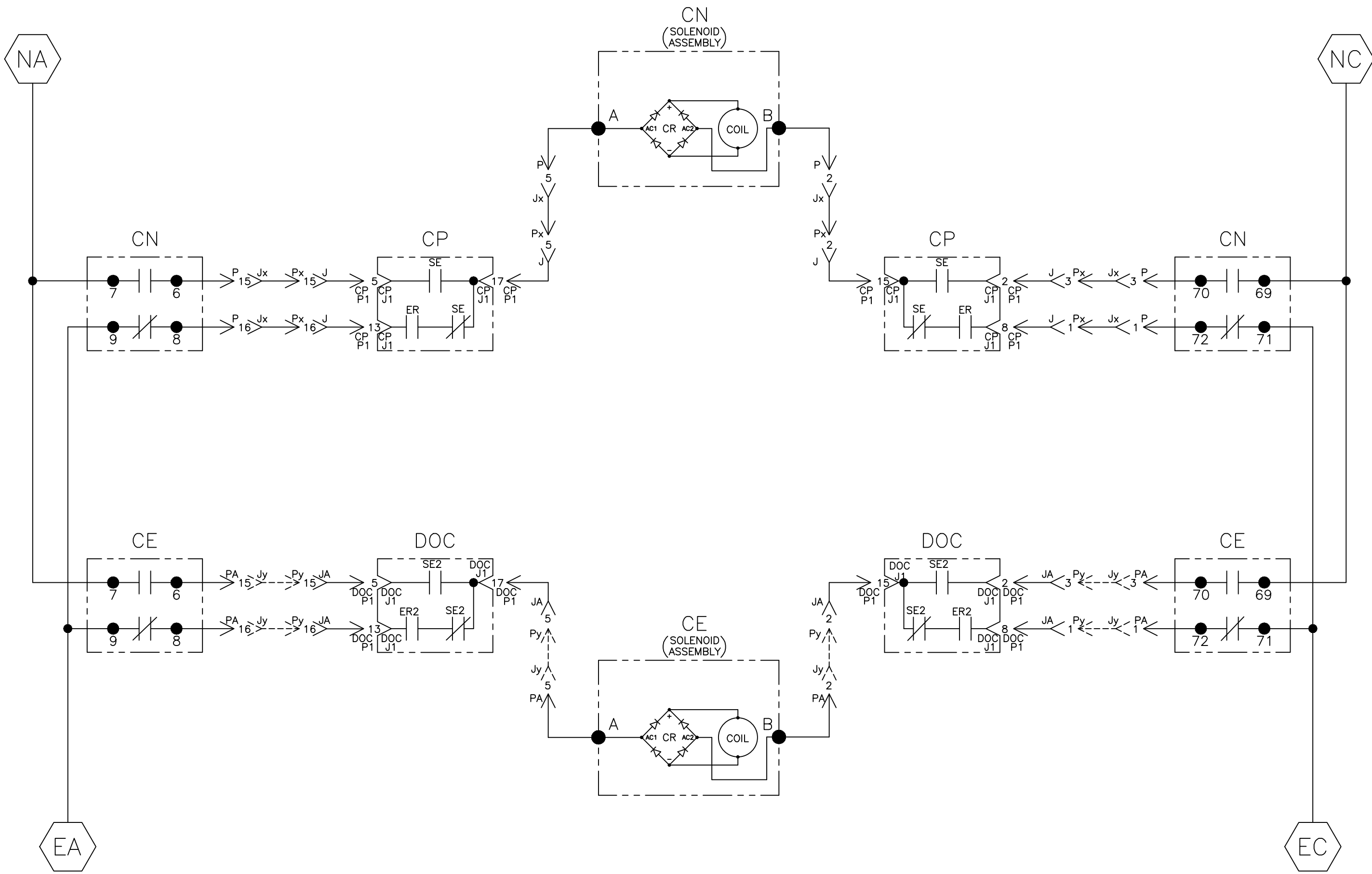
EMERGENCY

NORMAL

OPTIONAL NEUTRAL TYPES  
REFER TO "EXPLANATION OF CATALOG NUMBER CODES"  
IN CATALOG NUMBER CHART ON SHEET 1.

- NONE
- OVERLAPPING CONTACTS
- SOLID BUS PLATE

NOTE:  
ATS SHOWN CLOSED ON  
NORMAL SOURCE.



| CN (MUS) CONTACTS |                      |              |              |               |              |              |
|-------------------|----------------------|--------------|--------------|---------------|--------------|--------------|
| MUS               | SOLENOID POSITION    |              |              |               |              |              |
|                   | CLOSED BEFORE NORMAL | BEFORE TDC > | < BEFORE TDC | CLOSED EMERG. | BEFORE TDC > | < BEFORE TDC |
| 7-6               |                      |              |              |               |              |              |
| 69-70             |                      |              |              |               |              |              |
| 8-9               |                      |              |              |               |              |              |
| 71-72             |                      |              |              |               |              |              |

| CE (MUS) CONTACTS |                   |              |              |               |              |              |
|-------------------|-------------------|--------------|--------------|---------------|--------------|--------------|
| MUS               | SOLENOID POSITION |              |              |               |              |              |
|                   | OPEN              | BEFORE TDC > | < BEFORE TDC | CLOSED EMERG. | BEFORE TDC > | < BEFORE TDC |
| 7-6               |                   |              |              |               |              |              |
| 69-70             |                   |              |              |               |              |              |
| 8-9               |                   |              |              |               |              |              |
| 71-72             |                   |              |              |               |              |              |

|                                       |  |               |                                                                                                                       |         |                                       |      |          |
|---------------------------------------|--|---------------|-----------------------------------------------------------------------------------------------------------------------|---------|---------------------------------------|------|----------|
| PROJECT NAME:                         |  | REV. TO SHEET |                                                                                                                       | ECN NO. | BY                                    | APP. | DATE     |
| WIRING                                |  | DIAGRAM       |                                                                                                                       | 278841  | TR                                    | BK   | 05/17/19 |
| 7000 SERIES (E7ASLS) 3PH 150-400 AMPS |  |               |                                                                                                                       | 212278  | MJB                                   | JPB  | 3/5/07   |
| "B" FRAME, GROUP 5 CONTROLS           |  |               |                                                                                                                       | 165821  | AE                                    | WK   | 12/31/03 |
|                                       |  |               |                                                                                                                       | ISSUE   |                                       |      |          |
| DRAWN BY                              |  | DATE          | MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005             |         | COMPUTER GENERATED DRAWING            |      |          |
| CHECKED BY                            |  | DATE          | PROPERTY OF ASCO POWER TECHNOLOGIES, USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED. |         | SCALE NONE SIZE DS                    |      |          |
| PROJECT APPROVAL                      |  | DATE          | ASCOT                                                                                                                 |         | DWG. NO. 725701                       |      |          |
| FINAL APPROVAL                        |  | DATE          | ASCOT                                                                                                                 |         | DRAWING B ECN NO. 278841 SHEET 4 OF 8 |      |          |

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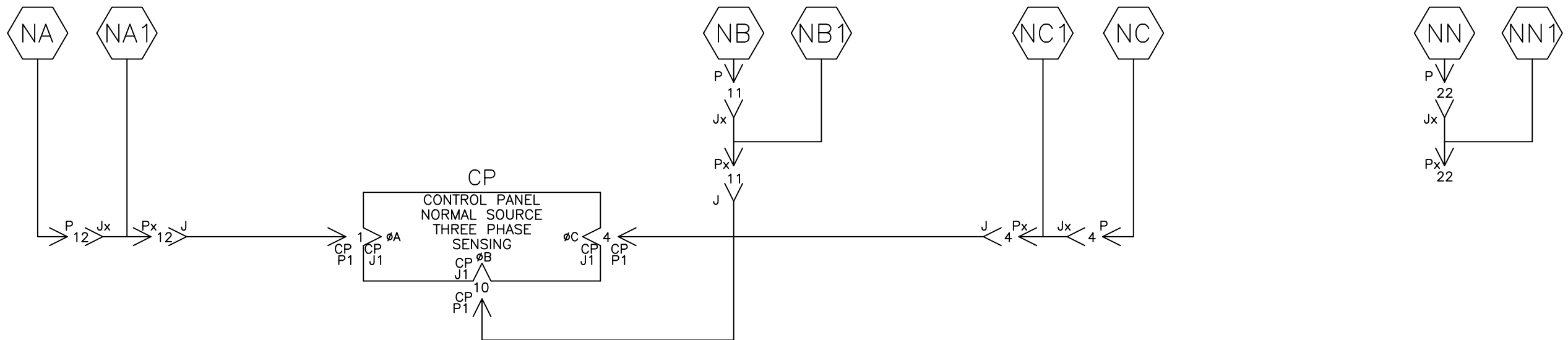
C

B

A

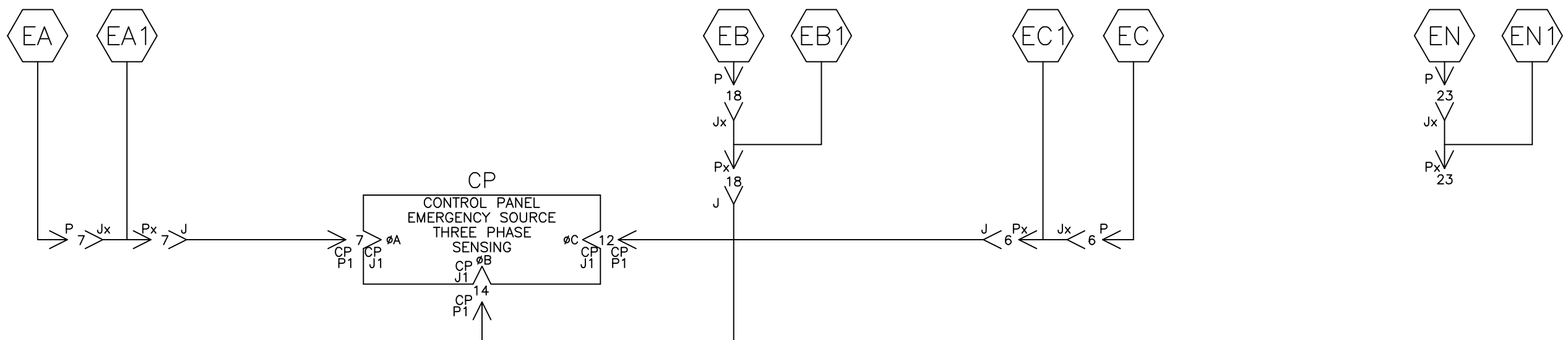
NORMAL SOURCE CIRCUITS

NORMAL



EMERGENCY SOURCE CIRCUITS

EMERGENCY



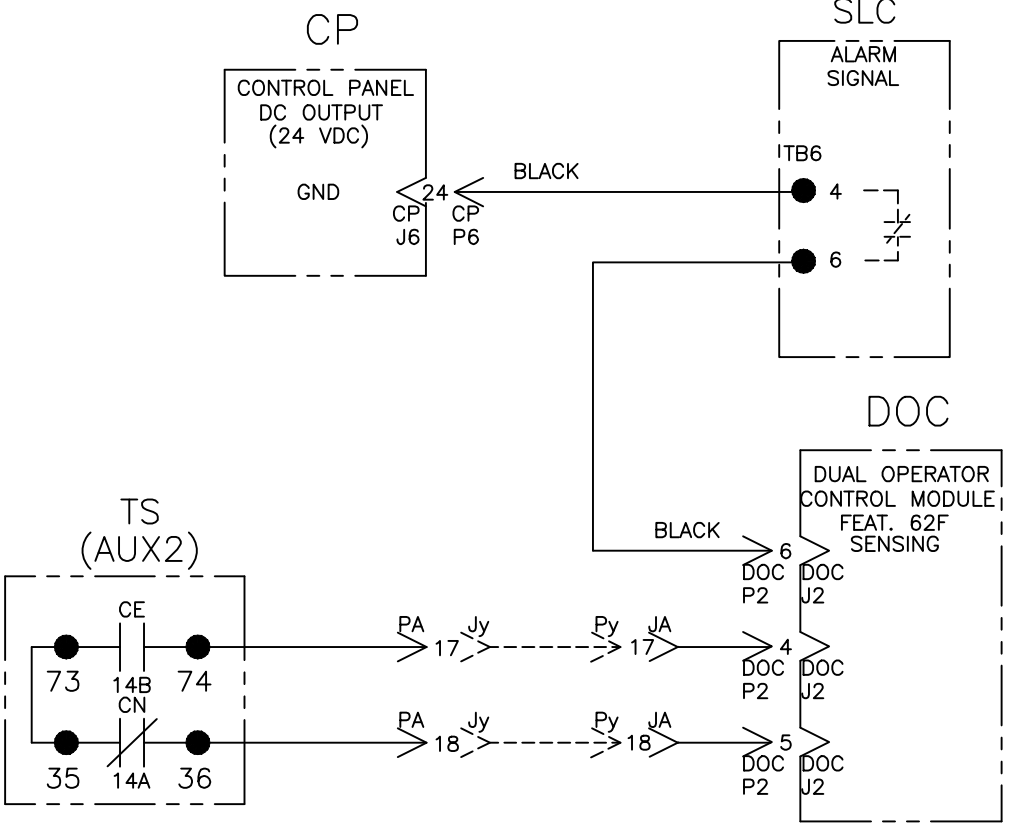
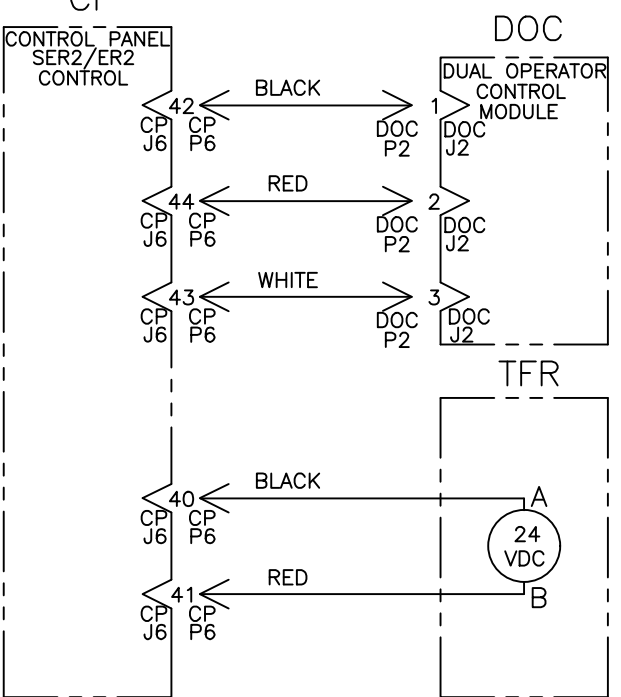
LOAD TERMINAL CIRCUITS

LOAD

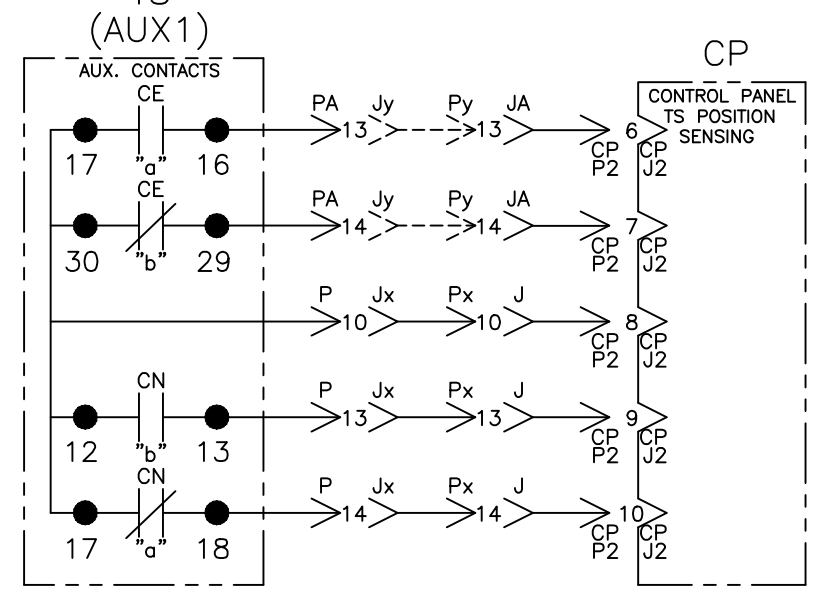


CONTROL SIGNALS & INDICATION

SER2/ER2 CONTROL

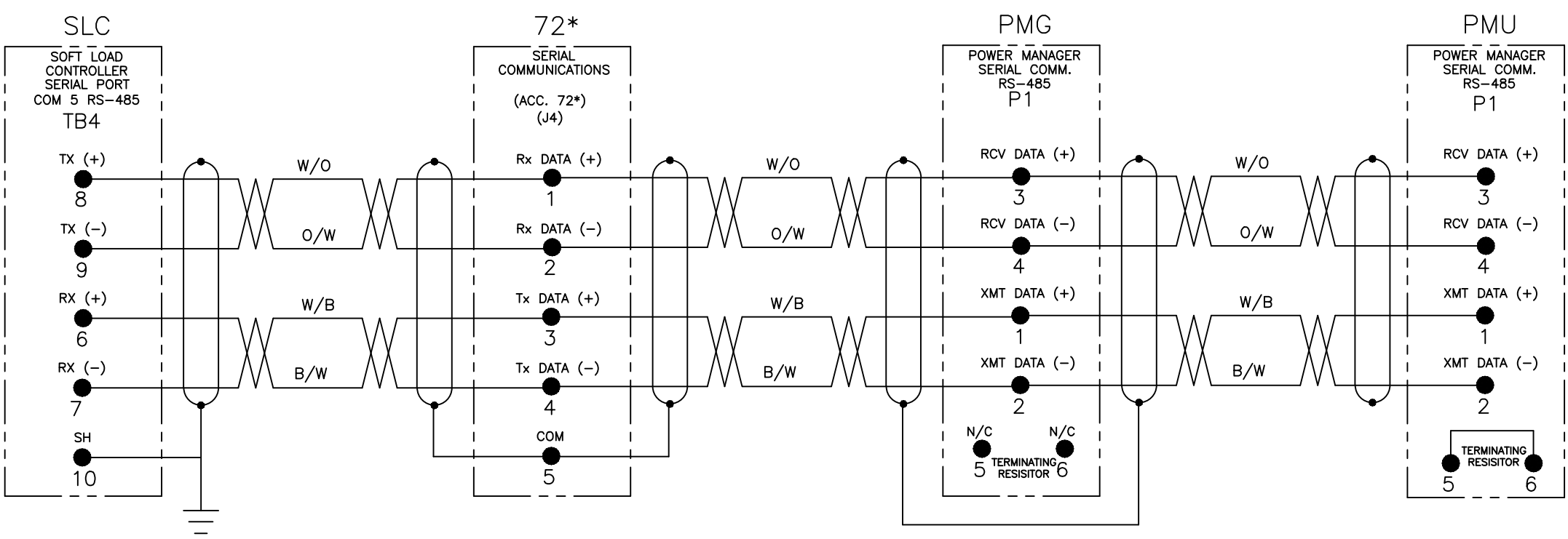


TS POSITION SENSING

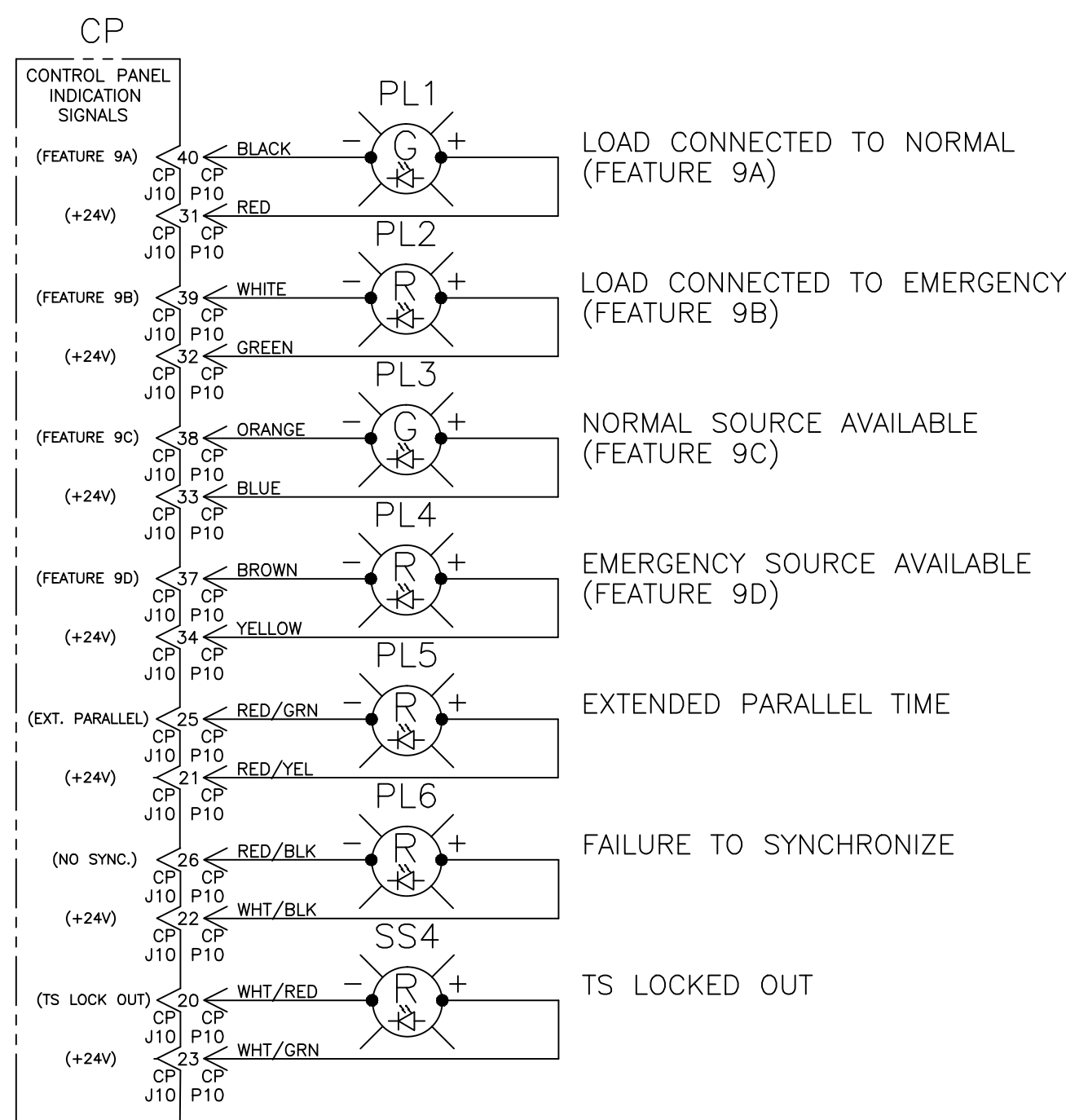
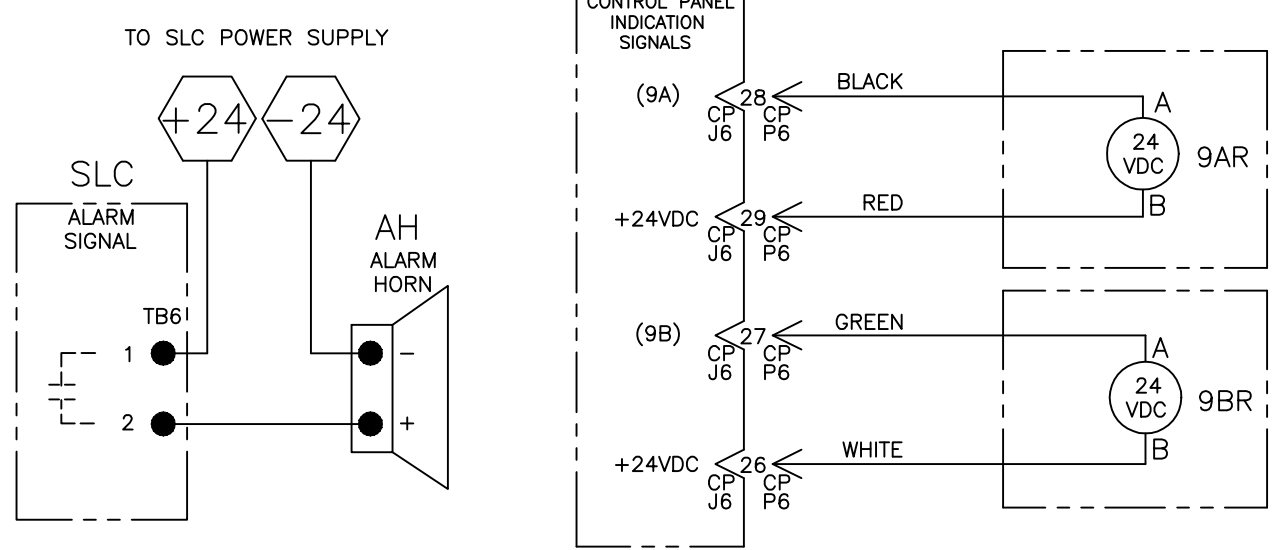


CONTROL SIGNALS & INDICATION

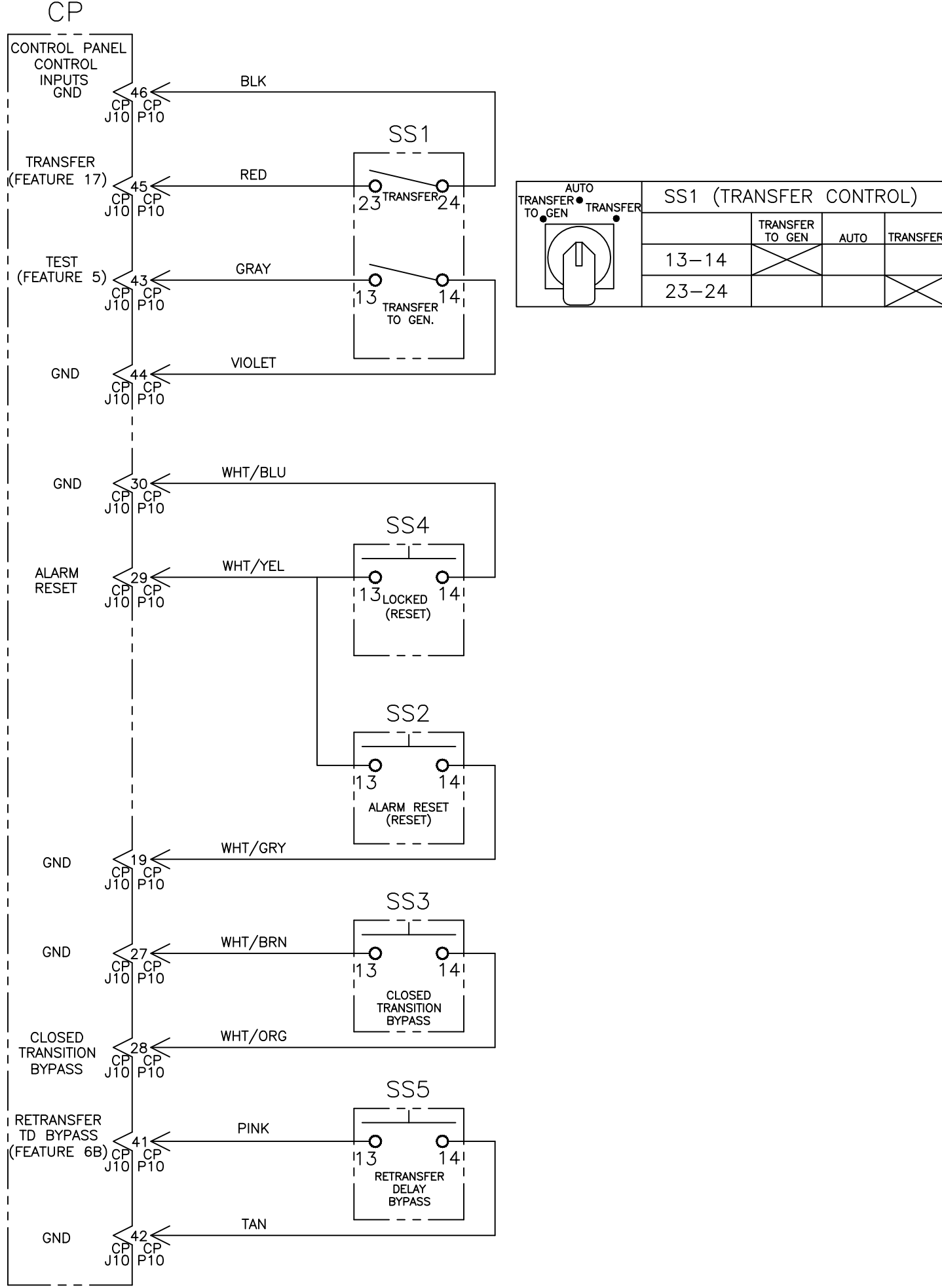
LOCAL COMMUNICATIONS



AUDIBLE ALARM



USER CONTROLS



|   |  |               |         |        |              |
|---|--|---------------|---------|--------|--------------|
| B |  | 278841        | TR      | BK     | 05/17/19     |
| A |  | 212278        | MJB     | JPB    | 3/5/07       |
| — |  | 165821        | AE      | WK     | 12/31/03     |
|   |  | ISSUE         |         |        |              |
|   |  | REV. TO SHEET | ECN NO. | BY     | APP.         |
|   |  | DATE          |         |        |              |
|   |  | SCALE         | NONE    | SIZE   | DS           |
|   |  | DWG. NO.      | 725701  |        |              |
|   |  | DRAWING BY    | ECN NO. | 278841 | SHEET 5 OF 8 |
|   |  | REV.          |         |        |              |

PROJECT NAME:

WIRING

7000 SERIES (E7ASLS) 3PH 150-400 AMPS

"B" FRAME, GROUP 5 CONTROLS

BY

DJB

DATE

12/31/03

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005.

ASSEM. REF. NO.

COMPUTER GENERATED DRAWING

SCALE

NONE

SIZE

DS

DWG. NO.

725701

PROPERTY OF ASCO POWER TECHNOLOGIES, USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.

ASCOPower Technologies, L.P.

FLORHAM PARK, NEW JERSEY 07932 U.S.A.

DRAWN BY

DJB

CHECKED

BK

12/31/03

PROJECT APPROVAL

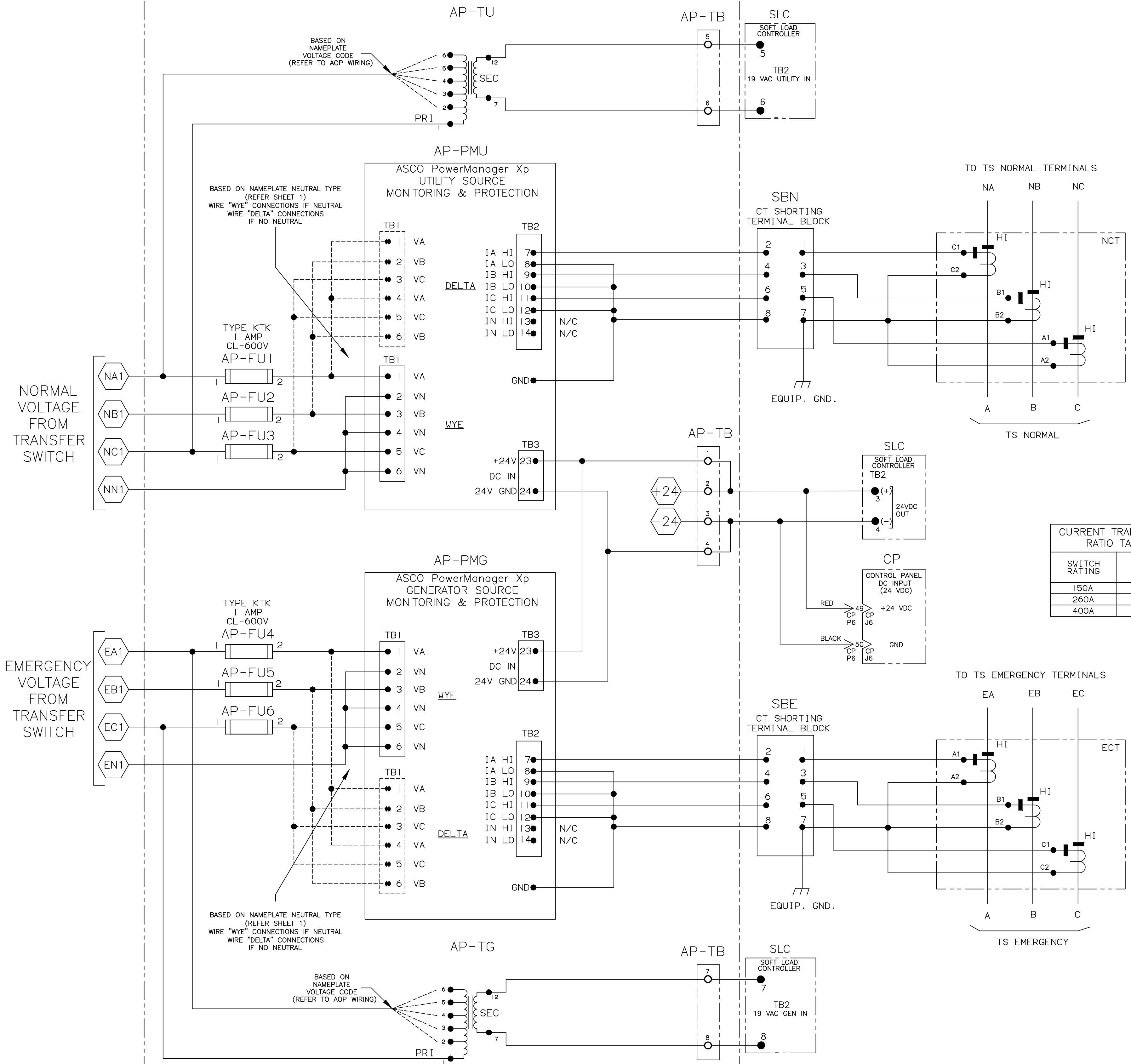
WK

12/31/03

FINAL APPROVAL

ADDITIONAL CONTROL CIRCUITS

SOFT LOAD CONTROL ADD-ON PANEL



|   |  |        |     |     |          |
|---|--|--------|-----|-----|----------|
| B |  | 278841 | TR  | BK  | 05/17/19 |
| A |  | 212278 | MJB | JPB | 3/5/07   |
| — |  | 165821 | AE  | WK  | 12/31/03 |
| — |  | ISSUE  |     |     |          |

|                                       |        |          |
|---------------------------------------|--------|----------|
| PROJECT NAME:                         | WIRING | DIAGRAM  |
| 7000 SERIES (E7ASLS) 3PH 150-400 AMPS |        |          |
| "B" FRAME, GROUP 5 CONTROLS           |        |          |
| DRAWN BY                              | BY     | DATE     |
| DJB                                   | DJB    | 12/31/03 |
| CHECKED                               | BK     | 12/31/03 |
| PROJECT APPROVAL                      | WK     | 12/31/03 |
| FINAL APPROVAL                        |        |          |

|                                                                                                                       |  |                 |
|-----------------------------------------------------------------------------------------------------------------------|--|-----------------|
| MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005.            |  | ASSEM. REF. NO. |
| PROPERTY OF ASCO POWER TECHNOLOGIES, USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED. |  | DWG. NO.        |
| 725701                                                                                                                |  | SCALE           |
| NONE                                                                                                                  |  | SIZE            |
| DS                                                                                                                    |  | REV.            |
| ASCO® ASCO POWER TECHNOLOGIES, L.P. FLORHAM PARK, NEW JERSEY 07932 U.S.A.                                             |  | ECN NO. 278841  |
| SHEET 6 OF 8                                                                                                          |  |                 |

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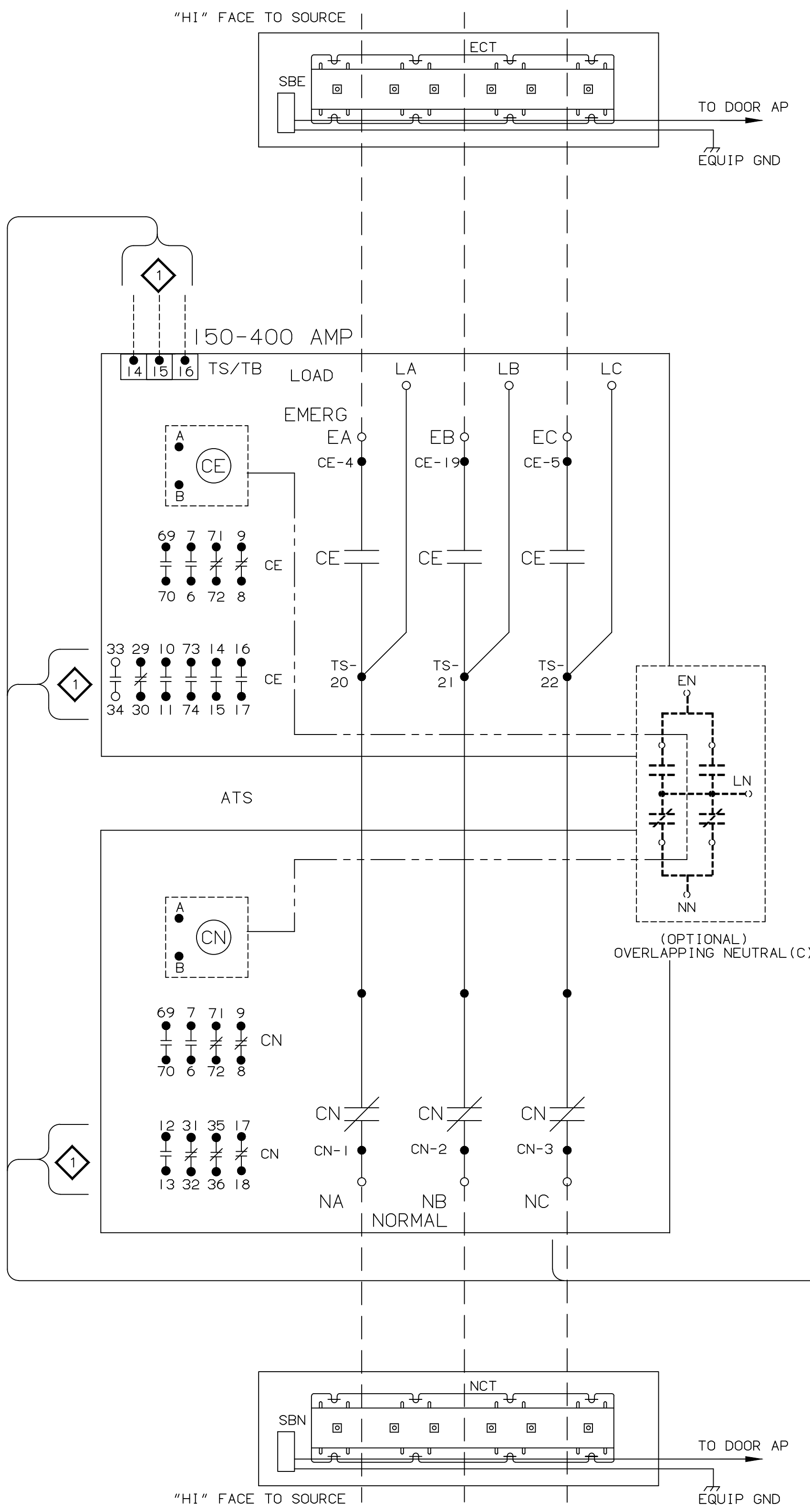
C

B

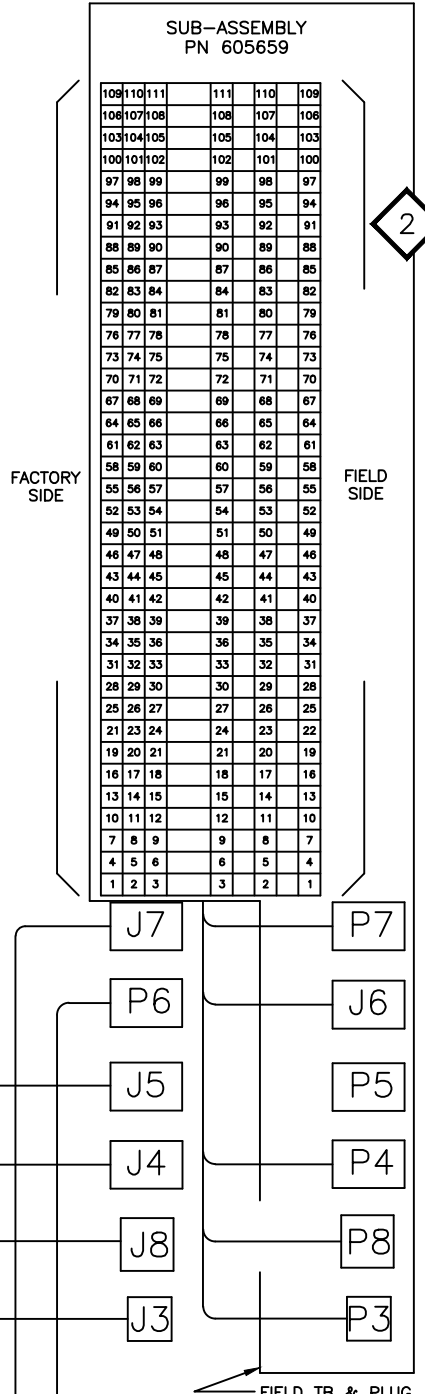
A

PHYSICAL DIAGRAM

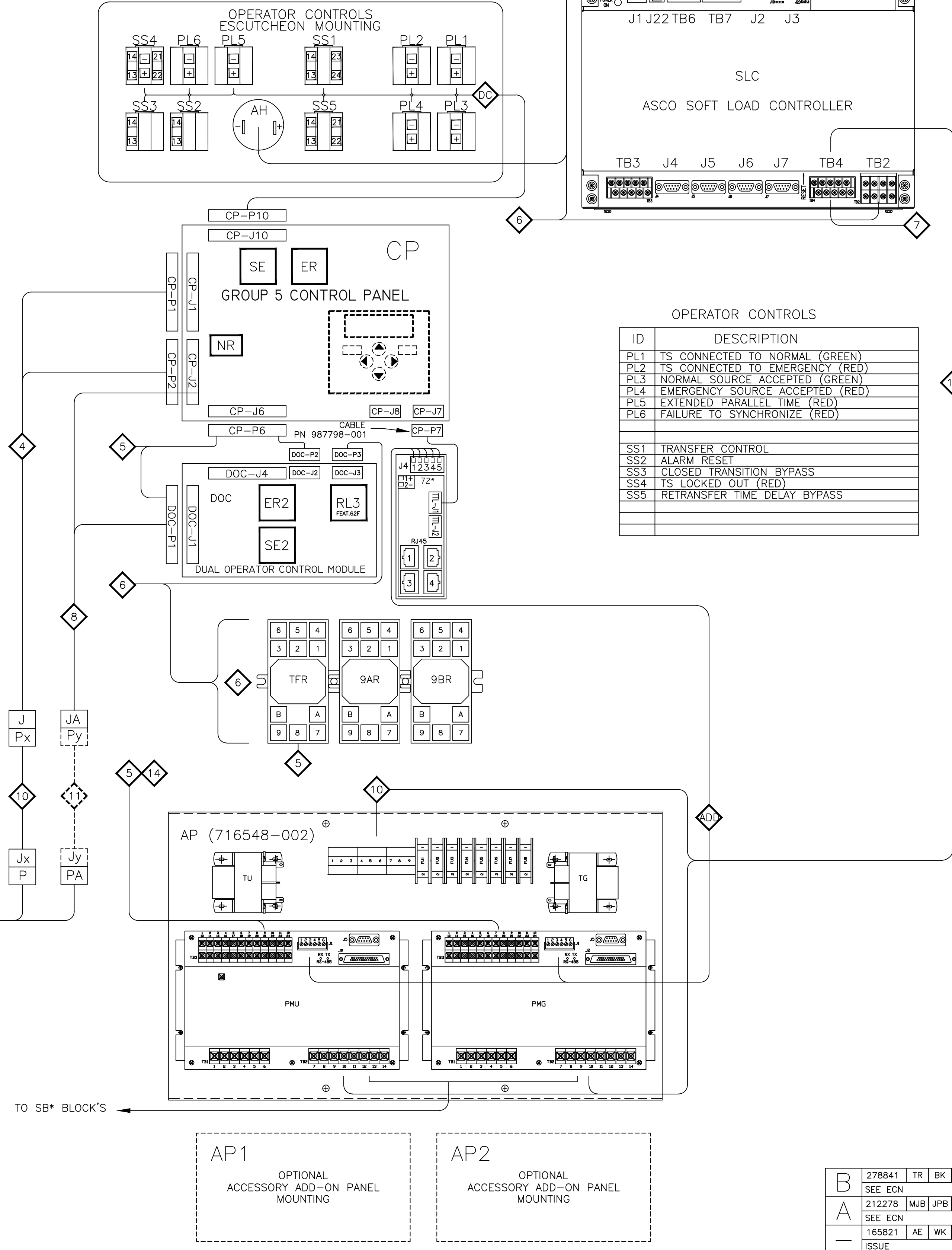
ENCLOSURE



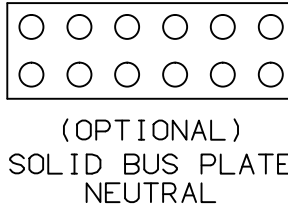
TB



DOOR (INSIDE)



| ID  | DESCRIPTION                     |
|-----|---------------------------------|
| PL1 | TS CONNECTED TO NORMAL (GREEN)  |
| PL2 | TS CONNECTED TO EMERGENCY (RED) |
| PL3 | NORMAL SOURCE ACCEPTED (GREEN)  |
| PL4 | EMERGENCY SOURCE ACCEPTED (RED) |
| PL5 | EXTENDED PARALLEL TIME (RED)    |
| PL6 | FAILURE TO SYNCHRONIZE (RED)    |
| SS1 | TRANSFER CONTROL                |
| SS2 | ALARM RESET                     |
| SS3 | CLOSED TRANSITION BYPASS        |
| SS4 | TS LOCKED OUT (RED)             |
| SS5 | RETRANSFER TIME DELAY BYPASS    |



BONDING STRAP  
PN 098323-019

|                                       |      |                                                                                                                       |                 |                            |    |
|---------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------|----|
| PROJECT NAME:                         |      | WIRING                                                                                                                |                 | DIAGRAM                    |    |
| 7000 SERIES (E7ASLS) 3PH 150-400 AMPS |      |                                                                                                                       |                 |                            |    |
| "B" FRAME, GROUP 5 CONTROLS           |      |                                                                                                                       |                 |                            |    |
| DRAWN BY                              | DATE | MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005             | ASSEM. REF. NO. | COMPUTER GENERATED DRAWING |    |
| CHKD BY                               | DATE | PROPERTY OF ASCO POWER TECHNOLOGIES, USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED. | SCALE           | SIZE                       | DS |
| PROJECT APPROVAL                      | DATE |                                                                                                                       |                 |                            |    |
| FINAL APPROVAL                        | DATE |                                                                                                                       |                 |                            |    |
| ASCO                                  |      | ASCO POWER TECHNOLOGIES, L.P.                                                                                         |                 | DRAWING NO. 725701         |    |
| FLORHAM PARK, NEW JERSEY 07932 U.S.A. |      | ECN NO. 278841                                                                                                        |                 | SHEET 7 OF 8               |    |

# WIRE RUN LISTING

| WIRE No.  | HARNESS 619510-012 (P,PA,J4) MAIN TS | CLR | AWG |
|-----------|--------------------------------------|-----|-----|
| 1         | P-1,CN-72                            |     | 16  |
| 2         | P-2,CN-B                             |     |     |
| 3         | P-3,CN-70                            |     |     |
| 4         | P-4,CN-3                             |     |     |
| 4         | CN-3,CN-69                           |     |     |
| 4         | CN-89,CE-69                          |     |     |
| 5         | P-5,CN-A                             |     |     |
| 6         | P-6,CE-6                             |     |     |
| 6         | CE-5,CE-71                           |     |     |
| 6         | CE-71,CN-71                          |     |     |
| 7         | P-7,CE-4                             |     |     |
| 7         | CE-4,CE-9                            |     |     |
| 7         | CE-9,CN-9                            |     |     |
| 8         | P-8,TS/TB-14                         |     |     |
| 8         | TS/TB-14,CE-14                       |     |     |
| 9         | P-9,TS/TB-15                         |     |     |
| 9         | TS/TB-15,CE-15                       |     |     |
| 10        | P-10,CN-12                           |     |     |
| 10        | CN-12,CN-17                          |     |     |
| 10        | CN-17,CE-30                          |     |     |
| 10        | CE-30,CE-17                          |     |     |
| 11        | P-11,CN-2                            |     |     |
| 12        | P-12,CN-1                            |     |     |
| 12        | CN-1,CN-7                            |     |     |
| 12        | CN-7,CE-7                            |     |     |
| 13        | P-13,CN-13                           |     |     |
| 14        | P-14,CN-18                           |     |     |
| 15        | P-15,CN-6                            |     |     |
| 16        | P-16,CN-8                            |     |     |
| 17        | P-17,TS/TB-16                        |     |     |
| 18        | P-18,CE-19                           |     |     |
| 19        | P-19,TS-20                           |     |     |
| 20        | P-20,TS-21                           |     |     |
| 21        | P-21,TS-22                           |     |     |
| 22        | P-22,CN-NN                           |     |     |
| 23        | P-23,CE-EN                           |     |     |
| 24        | P-24,TS-LN                           |     |     |
| 31        | PA-1,CE-72                           |     |     |
| 32        | PA-2,CE-B                            |     |     |
| 33        | PA-3,CE-70                           |     |     |
| 35        | PA-5,CE-A                            |     |     |
| 43        | PA-13,CE-16                          |     |     |
| 44        | PA-14,CE-29                          |     |     |
| 45        | PA-15,CE-6                           |     |     |
| 46        | PA-16,CE-8                           |     |     |
| 47        | PA-17,CE-74                          |     |     |
| 48        | PA-18,CN-36                          |     |     |
| 61        | J4-1,CN-31                           |     |     |
| 62        | J4-2,CN-32                           |     |     |
| 63        | J4-3,CE-10                           |     |     |
| 64        | J4-4,CE-11                           |     |     |
| 250       | CN-35,CE-73                          |     |     |
| 8         | J3-1,TS/TB-14                        |     |     |
| 9         | J3-2,TS/TB-15                        |     |     |
| 17        | J3-3,TS/TB-16                        |     |     |
| ADD WIRES |                                      |     |     |
| 25        | J3-4                                 |     |     |
| 65        | J4-5                                 |     |     |
| 66        | J4-6                                 |     |     |
| 67        | J4-7                                 |     |     |
| 68        | J4-8                                 |     |     |
| 69        | J4-9                                 |     |     |
| 70        | J4-10                                |     |     |
| 71        | J4-11                                |     |     |
| 72        | J4-12                                |     |     |
| 73        | J4-13                                |     |     |
| 74        | J4-14                                |     |     |
| 75        | J4-15                                |     |     |
| 76        | J4-16                                |     |     |
| 77        | J4-17                                |     |     |
| 78        | J4-18                                |     |     |
| 79        | J4-19                                |     |     |
| 80        | J4-20                                |     |     |
| 81        | J4-21                                |     |     |
| 82        | J4-22                                |     |     |
| 83        | J4-23                                |     |     |
| 84        | J4-24                                |     |     |
| 34        | PA-4                                 |     |     |
| 36        | PA-6                                 |     |     |
| 37        | PA-7                                 |     |     |
| 38        | PA-8                                 |     |     |
| 39        | PA-9                                 |     |     |
| 40        | PA-10                                |     |     |
| 41        | PA-11                                |     |     |
| 42        | PA-12                                |     |     |
| 49        | PA-19                                |     |     |
| 50        | PA-20                                |     |     |
| 51        | PA-21                                |     |     |
| 52        | PA-22                                |     |     |
| 53        | PA-23                                |     |     |
| 54        | PA-24                                |     |     |

| WIRE No. | SUB-ASSEMBLY 605659-001 (P3,PA,J6,P7,P8,P5,TB) SL FIELD TB | CLR          | AWG       |
|----------|------------------------------------------------------------|--------------|-----------|
| 8        | TB-1,P3-1                                                  |              | 16        |
| 9        | TB-2,P3-2                                                  |              |           |
| 17       | TB-3,P3-3                                                  |              |           |
| 61       | TB-4,P4-1                                                  |              |           |
| 62       | TB-5,P4-2                                                  |              |           |
| 63       | TB-6,P4-3                                                  |              |           |
| 64       | TB-7,P4-4                                                  |              |           |
| 65       | TB-8,P4-5                                                  |              |           |
| 66       | TB-9,P4-6                                                  |              |           |
| 67       | TB-10,P4-7                                                 |              |           |
| 68       | TB-11,P4-8                                                 |              |           |
| 69       | TB-12,P4-9                                                 |              |           |
| 70       | TB-13,P4-10                                                |              |           |
| 71       | TB-14,P4-12                                                |              |           |
| 72       | TB-15,P4-11                                                |              |           |
| 73       | TB-16,P4-13                                                |              |           |
| 74       | TB-17,P4-15                                                |              |           |
| 75       | TB-18,P4-14                                                |              |           |
| 76       | TB-19,P4-18                                                |              |           |
| 77       | P7-21,TB-116                                               |              |           |
| 78       | TB-21,P4-17                                                |              |           |
| 79       | TB-22,P4-19                                                |              |           |
| 80       | TB-23,P4-21                                                |              |           |
| 81       | TB-24,P4-20                                                |              |           |
| 82       | TB-25,P4-22                                                |              |           |
| 83       | TB-26,P4-24                                                |              |           |
| 84       | TB-27,P4-23                                                |              |           |
| 121      | TB-28,J6-1                                                 |              |           |
| 122      | TB-29,J6-2                                                 |              |           |
| 123      | TB-30,J6-3                                                 |              |           |
| 124      | TB-31,J6-4                                                 |              |           |
| 125      | TB-32,J6-5                                                 |              |           |
| 151      | TB-34,P7-1                                                 |              |           |
| 152      | TB-35,P7-2                                                 |              |           |
| 153      | TB-36,P7-3                                                 |              |           |
| 181      | TB-37,P8-1                                                 | SHLD         | 24 (COND) |
| 182      | TB-38,P8-2                                                 | WHT/ORG      |           |
| 183      | TB-39,P8-3                                                 | ORG/WHT      |           |
| 184      | TB-40,P8-4                                                 | WHT/BLU      |           |
| 185      | TB-41,P8-5                                                 | BLU/WHT      |           |
| 154      | TB-43,P7-4                                                 |              | 16        |
| 155      | TB-44,P7-5                                                 |              |           |
| 156      | TB-45,P7-6                                                 |              |           |
| 157      | TB-46,P7-7                                                 |              |           |
| 158      | TB-47,P7-8                                                 |              |           |
| 159      | TB-48,P7-9                                                 |              |           |
| 160      | TB-49,P7-10                                                |              |           |
| 161      | TB-50,P7-11                                                |              |           |
| 162      | TB-52,P7-12                                                |              |           |
| 163      | TB-53,P7-13                                                | SHLD         | 16 (COND) |
| 164      | TB-54,P7-14                                                | BLK          |           |
| 165      | TB-55,P7-15                                                | WHT          |           |
| 166      | TB-56,P7-16                                                | SHLD         | 16 (COND) |
| 167      | TB-57,P7-17                                                | BLK          |           |
| 142      | TB-58,J6-22                                                | WHT          |           |
| 143      | TB-59,J6-23                                                |              |           |
| 260      | TB-60,P5-1                                                 |              | 16        |
| 261      | TB-61,P5-2                                                 |              |           |
| 262      | TB-62,P5-3                                                 |              |           |
| 263      | TB-63,P5-4                                                 |              |           |
| 264      | TB-64,P5-5                                                 |              |           |
| 265      | TB-66,P5-6                                                 |              |           |
| 266      | TB-68,P5-7                                                 |              |           |
| 267      | TB-70,P5-8                                                 |              |           |
| 268      | TB-71,P5-9                                                 |              |           |
| 269      | TB-72,P5-10                                                |              |           |
| 270      | TB-74,P5-11                                                |              |           |
| 271      | TB-76,P5-12                                                |              |           |
| 126      | TB-78,J6-6                                                 |              |           |
| 127      | TB-79,J6-7                                                 |              |           |
| 128      | TB-80,J6-8                                                 |              |           |
| 129      | TB-81,J6-9                                                 |              |           |
| 130      | TB-82,J6-10                                                |              |           |
| 131      | TB-83,J6-11                                                |              |           |
| 132      | TB-84,J6-12                                                |              |           |
| 133      | TB-85,J6-13                                                |              |           |
| 272      | TB-86,P5-13                                                |              |           |
| 273      | TB-87,P5-14                                                |              |           |
| 274      | TB-88,P5-15                                                |              |           |
| 275      | TB-89,P5-16                                                |              |           |
| 276      | TB-90,P5-17                                                |              |           |
| 277      | TB-92,P5-18                                                |              |           |
| 278      | TB-94,P5-19                                                |              |           |
| 279      | TB-96,P5-20                                                |              |           |
| 280      | TB-97,P5-21                                                |              |           |
| 281      | TB-98,P5-22                                                |              |           |
| 282      | TB-100,P5-23                                               |              |           |
| 283      | TB-102,P5-24                                               |              |           |
| 134      | TB-104,J6-14                                               |              |           |
| 135      | TB-105,J6-15                                               |              |           |
| 136      | TB-106,J6-16                                               |              |           |
| 137      | TB-107,J6-17                                               |              |           |
| 138      | TB-108,J6-18                                               |              |           |
| 139      | TB-109,J6-19                                               |              |           |
| 140      | TB-110,J6-20                                               |              |           |
| 141      | TB-111,J6-21                                               |              |           |
| JUMPERS  |                                                            |              |           |
|          | TB-28,TB-29                                                | FIELD SIDE   |           |
|          | TB-29,TB-30                                                | FIELD SIDE   |           |
| 260      | TB-60,TB-63                                                | FACTORY SIDE |           |
| 260      | TB-63,TB-65                                                | FACTORY SIDE |           |
| 260      | TB-65,TB-67                                                | FACTORY SIDE |           |
| 260      | TB-67,TB-69                                                | FACTORY SIDE |           |
| 260      | TB-69,TB-71                                                | FACTORY SIDE |           |
| 260      | TB-71,TB-73                                                | FACTORY SIDE |           |
| 260      | TB-73,TB-75                                                | FACTORY SIDE |           |
| 260      | TB-75,TB-77                                                | FACTORY SIDE |           |

| WIRE No.  | SUB-ASSEMBLY 605659-001 CONTINUED... | CLR          | AWG |
|-----------|--------------------------------------|--------------|-----|
| 126       | TB-78,TB-80                          | FIELD SIDE   | 16  |
| 127       | TB-79,TB-82                          | FIELD SIDE   |     |
| 129       | TB-81,TB-84                          | FIELD SIDE   |     |
| 131       | TB-83,TB-85                          | FIELD SIDE   |     |
| 272       | TB-86,TB-89                          | FACTORY SIDE |     |
| 273       | TB-89,TB-91                          | FACTORY SIDE |     |
| 272       | TB-91,TB-93                          | FACTORY SIDE |     |
| 272       | TB-93,TB-95                          | FACTORY SIDE |     |
| 272       | TB-95,TB-97                          | FACTORY SIDE |     |
| 272       | TB-97,TB-99                          | FACTORY SIDE |     |
| 272       | TB-99,TB-101                         | FACTORY SIDE |     |
| 272       | TB-101,TB-103                        | FACTORY SIDE |     |
| ADD WIRES |                                      |              |     |
| 25        | P3-4                                 |              |     |
| 168       | P7-18,TB-112                         |              |     |
| 169       | P7-19,TB-113                         |              |     |
| 170       | P7-20,TB-114                         |              |     |
| 171       | P7-21,TB-116                         |              |     |
| 172       | P7-22,TB-117                         |              |     |
| 173       | P7-23,TB-118                         |              |     |
| 174       | P7-24                                |              |     |
| 144       | J6-24                                |              |     |
| 186       | P8-6                                 |              |     |
| 187       | P8-7                                 |              |     |
| 188       | P8-8                                 |              |     |
| 189       | P8-9                                 |              |     |
| 262       | TB-62,TB-114                         | FIELD SIDE   |     |
| 262       | TB-114,TB-64                         | FIELD SIDE   |     |
| 263       | TB-63,TB-113                         | FIELD SIDE   |     |
| 63        | TB-105,TB-117                        | FIELD SIDE   |     |

| WIRE No.  | HARNESS 483763 (J,CP-P1,CP-P2) CONTROL PANEL | CLR | AWG |
|-----------|----------------------------------------------|-----|-----|
| 1         | J-1,CP-P1-8                                  |     | 16  |
| 2         | J-2,CP-P1-15                                 |     |     |
| 3         | J-3,CP-P1-2                                  |     |     |
| 4         | J-4,CP-P1-4                                  |     |     |
| 5         | J-5,CP-P1-17                                 |     |     |
| 6         | J-6,CP-P1-12                                 |     |     |
| 7         | J-7,CP-P1-7                                  |     |     |
| 8         | J-8,CP-P2-2                                  |     |     |
| 9         | J-9,CP-P2-3                                  |     |     |
| 10        | J-10,CP-P2-8                                 |     |     |
| 11        | J-11,CP-P1-10                                |     |     |
| 12        | J-12,CP-P1-1                                 |     |     |
| 13        | J-13,CP-P2-9                                 |     |     |
| 14        | J-14,CP-P2-10                                |     |     |
| 15        | J-15,CP-P1-5                                 |     |     |
| 16        | J-16,CP-P1-13                                |     |     |
| 17        | J-17,CP-P2-1                                 |     |     |
| 18        | J-18,CP-P1-14                                |     |     |
| ADD WIRES |                                              |     |     |
| 19        | J-19                                         |     |     |
| 20        | J-20                                         |     |     |
| 21        | J-21                                         |     |     |
| 22        | J-22                                         |     |     |
| 23        | J-23                                         |     |     |
| 24        | J-24                                         |     |     |

| WIRE No.  | HARNESS 619510-049 (P6) FIELD INPUTS/OUTPUTS | CLR | AWG       |
|-----------|----------------------------------------------|-----|-----------|
| 121       | P6-1,CP-P6-21                                | WHT | 22 (COND) |
| 122       | P6-2,CP-P6-22                                | WHT |           |
| 123       | P6-3,CP-P6-23                                | WHT |           |
| 124       | P6-4,CP-P6-9                                 | WHT |           |
| 125       | P6-5,CP-P6-10                                | WHT |           |
| 126       | P6-6,PMU-TB3-15                              |     | 16        |
| 127       | P6-7,PMU-TB3-16                              |     |           |
| 128       | P6-8,PMU-TB3-17                              |     |           |
| 129       | P6-9,PMU-TB3-18                              |     |           |
| 130       | P6-10,PMU-TB3-19                             |     |           |
| 131       | P6-11,PMU-TB3-20                             |     |           |
| 132       | P6-12,PMU-TB3-21                             |     |           |
| 133       | P6-13,PMU-TB3-22                             |     |           |
| 134       | P6-14,PMG-TB3-15                             |     |           |
| 135       | P6-15,PMG-TB3-16                             |     |           |
| 136       | P6-16,PMG-TB3-17                             |     |           |
| 137       | P6-17,PMG-TB3-18                             |     |           |
| 138       | P6-18,PMG-TB3-19                             |     |           |
| 139       | P6-19,PMG-TB3-20                             |     |           |
| 140       | P6-20,PMG-TB3-21                             |     |           |
| 141       | P6-21,PMG-TB3-22                             |     |           |
| 142       | P6-22,SLC-TB6-5                              |     |           |
| 143       | P6-23,AP-TB-2                                |     |           |
| 144       | P6-24                                        |     |           |
| ADD WIRES |                                              |     |           |
| 257       | CP-P6-24,SLC-TB6-4                           | BLK | 22        |
| 257       | SLC-TB6-5,DOC-P2-6                           | BLK | 22        |
| 287       | CP-P6-50,AP-TB-3                             | BLK | 22        |
| 288       | CP-P6-49,AP-TB-2                             | RED | 2 (COND)  |
| 351       | CP-P6-28,9AR-A                               | BLK |           |
| 352       | CP-P6-29,9AR-B                               | RED | 22 (COND) |
| 353       | CP-P6-27,9BR-A                               | GRN | 4 (COND)  |
| 354       | CP-P6-26,9BR-B                               | WHT |           |

| WIRE No.     | HARNESS 713083-003 (CP-P10) DOOR CONTROLS & INDICATORS | CLR     | AWG         |
|--------------|--------------------------------------------------------|---------|-------------|
| 190          | CP-P10-40,PL1(-)                                       | BLK     | 22 (2 COND) |
| 191          | CP-P10-31,PL1(+)                                       | RED     |             |
| 192          | CP-P10-39,PL2(-)                                       | WHT     |             |
| 193          | CP-P10-32,PL2(+)                                       | GRN     |             |
| 194          | CP-P10-38,PL3(-)                                       | ORG     |             |
| 195          | CP-P10-33,PL3(+)                                       | BLU     |             |
| 196          | CP-P10-37,PL4(-)                                       | GRN     |             |
| 197          | CP-P10-34,PL4(+)                                       | YEL     |             |
| 198          | CP-P10-25,PL5(-)                                       | RED/GRN |             |
| 199          | CP-P10-21,PL5(+)                                       | RED/YEL |             |
| 200          | CP-P10-26,PL6(-)                                       | RED/BLK |             |
| 201          | CP-P10-22,PL6(+)                                       | WHT/YEL |             |
| 202          | CP-P10-43,SS1-23                                       | GRY     |             |
| 203          | CP-P10-44,SS1-24                                       | VIO     |             |
| 204          | CP-P10-41,SS1-13                                       | PNK     |             |
| 205          | CP-P10-42,SS1-14                                       | TAN     |             |
| 206          | CP-P10-19,SS2-14                                       | WHT/GRY |             |
| 207          | CP-P10-27,SS3-13                                       | WHT/BRN |             |
| 208          | CP-P10-28,SS3-14                                       | WHT/ORG |             |
| 209          | CP-P10-20,SS4(-)                                       | WHT/RED |             |
| 210          | CP-P10-23,SS4(+)                                       | WHT/GRN |             |
| 211          | CP-P10-29,SS4-13                                       | WHT/YEL |             |
| 211          | SS4-13,SS2-13                                          | WHT/YEL |             |
| 212          | CP-P10-30,SS4-14                                       | WHT/BLU |             |
| REMOVE WIRES |                                                        |         |             |
| 203          | CP-P10-44,SS1-24                                       | VIO     |             |
| 202          | CP-P10-43,SS1-23                                       | GRY     |             |
| 204          | CP-P10-41,SS1-13                                       | PNK     |             |
| 205          | CP-P10-42,SS1-14                                       | TAN     |             |
| ADD WIRES    |                                                        |         |             |
| 203          | CP-P10-44,SS1-24                                       | VIO     |             |
| 202          | CP-P10-43,SS1-23                                       | GRY     |             |
| 204          | CP-P10-41,SS1-13                                       | RED     |             |
| 205          | CP-P10-42,SS1-14                                       | BLK     |             |
| 700          | CP-P10-41,SS5-13                                       | PNK     |             |
| 701          | CP-P10-42,SS5-14                                       | TAN     |             |

| WIRE No. | HARNESS 619510-050 (J7) FIELD INPUTS/OUTPUTS | CLR</ |
|----------|----------------------------------------------|-------|
|----------|----------------------------------------------|-------|