



ZBTSCT SERIES WITH MX250 MICROPROCESSOR-BASED CONTROL PANEL BYPASS/ISOLATION TRANSFER SWITCH 1600-3000 AMP	REVISIONS			
	REV.	DESCRIPTION	DATE	APPROVED
FOR USE ON EMERGENCY OR STANDBY SYSTEMS - RATED FOR TOTAL SYSTEM & MOTOR LOAD	H	S-8604	REVISED SHEET 2	04/12/07 YJS MES

**A. LEGEND**  
 MX Series Microprocessor-Based Control Panel Standard Features:  
 DT.....Time Delay to SOURCE 1  
 DW.....Time Delay to SOURCE 2  
 L1.....SOURCE 2 Position Light  
 L2.....SOURCE 1 Position Light  
 L3.....SOURCE 1 Available Light  
 L4.....SOURCE 2 Available Light

Controls Power Supply (CPS)  
 XE1,XE2.....Control Transformer, SOURCE 2  
 XN1,XN2.....Control Transformer, SOURCE 1

Power Panel  
 N1,2,3,(N).....SOURCE 1 Line \_\_\_\_\_  
 E1,2,3,(N).....SOURCE 2 Line \_\_\_\_\_

T1,2,3,(N).....Load Connections  
 CE.....Transfer Operator, SOURCE 2  
 CEO.....Transfer Operator, Open SOURCE 2.  
 CN.....Transfer Operator, SOURCE 1  
 CNO.....Transfer Operator, Open SOURCE 1  
 DS.....Disconnect Switch  
 GND.....Ground  
 NB.....Neutral Bar (if required)  
 SCR-E.....SCR, Source 2  
 SCR-EO.....SCR, Source 2 Open  
 SCR-N.....SCR, Source 1  
 SCR-NO.....SCR, Source 1 Open  
 SE.....SOURCE 2 Position Limit Switch  
 SEO.....SOURCE 2 OPEN Position Limit Switch  
 SN.....SOURCE 1 Position Limit Switch  
 SNO.....SOURCE 1 OPEN Position Limit Switch

**B. OPERATION (OPEN TRANSITION)**

When SOURCE 1 line voltage drops below the preset "Fail" values, the SOURCE 1 voltage sensing circuit initiates the engine start circuit.

When SOURCE 2 line voltage and frequency reach the preset "restore" values, the MX controller initiates a transfer signal through the SCR-NO to operate the transfer operator. The load will be transferred to the OPEN position. After a set time delay, the MX controller initiates a transfer signal through the SCR-E to operate the transfer operator. The load will be transferred to the SOURCE 2 position. The transfer switch is mechanically locked. The SN limit switch awaits the next operation to SOURCE 1.

When SOURCE 1 line voltage and Frequency reach the preset "Restore" values, the MX controller initiates a transfer signal through the SCR-EO to operate the transfer operator. The load will be transferred to the OPEN position. After a set time delay, the MX controller initiates a transfer signal through the SCR-N to operate the transfer operator. Load will be re-transferred back to the SOURCE 1 position. The transfer switch is mechanically locked. The SE limit switch awaits the next operation to SOURCE 2.

**Test Switch**

The Test Switch simulates a SOURCE 1 line failure when activated. To test, activate the Test Switch, thus allowing the transfer switch to Transfer to the SOURCE 2 position. De-activate the Test Switch. The transfer switch will transfer to the SOURCE 1 position. Testing at least once a month is recommended. For hospital EMERGENCY systems, test once a week.

**Disconnect Switch (DS)**

When the Disconnect Switch is placed in the INHIBIT position, the circuits to the transfer operators are opened and transfer cannot take place.

**C. PARALLELING REQUIREMENTS**

1. The unit is Factory set to accomplish transfer within 5 electrical degrees.
2. Requires an Isochronous Governor with an operating frequency of 60 ± 0.2 Hz.
3. Requires a shunt trip breaker on the Generator set with a response time not exceeding 50ms.

**D. OPERATION (CLOSED TRANSITION)**

Zenith Closed Transition Transfer Switches are designed to Transfer load between two available sources, without interrupting power to the load (make-before-break). Paralleling of the two sources occurs within a predefined window of synchronization and lasts less than 100ms. The initial source is then disconnected.

To test the ATS, activate the test switch to drop out the Engine Start Relay (P1). The ATS closes into SOURCE 2 only after the SYNC Check ensures the proper phase relationship between both sources. After the ATS closes into SOURCE 2, the SE limit switch becomes activated. The controller initiates a transfer signal through the SCR-NO, which opens the ATS out of SOURCE 1. When the ATS has opened out of SOURCE 1, the SNO limit switch activates. The ATS has now closed into the SOURCE 2 position without interrupting the load.

Deactivating the Test switch initiates the retransfer. The ATS closes into SOURCE 1 only after the SYNC ensures proper phase relationship between both sources. After the ATS closes into SOURCE 1 the SN limit switch becomes activated. The controller initiates a transfer signal through the SCR-EO which opens the ATS out of SOURCE 2. When the ATS has opened out of SOURCE 2, the SEO limit switch activates. The ATS has now closed back into the SOURCE 1 position without interrupting the load.

The ATS defaults to an open transition transfer when SOURCE 1 source fails. This signals the generator to start. After the generator voltage and frequency reach the preset "Restore" values, the ATS transfers to SOURCE 2. Closed transition transfer is not possible with one source available. One can select an Open Transition transfer via the optional Transition Mode Selector (TMS) for testing.

If while in Closed Transition Mode, the ATS fails to open the source it is attempting to "transfer out of", the source that the ATS just closed into will be opened leaving the ATS in its initial source while disabling all other transfer operations until the problem is corrected and the "Fail to Open Lockout Reset" has been pressed. Also a dry contact (STE) to shunt trip the generator circuit breaker is available to remove the generator from the bus if neither operator opened.

**ACCESSORY GROUP PACKAGES:**

- E. (STDS) GROUP PACKAGE**  
6, A3, A4, CALIBRATE, CDT DS, DT, DW, E, EL/P, KP, L1, L2, L3, L4, LN, P1, R50, S13, T, U, VI, W AND YEN.
- F. (EXES) OPTION PACKAGE**  
6, A1, A1E, A3, A4, CALIBRATE, CDP DS, DT, DW, E, EL/P, KP, L1, L2, L3, L4, LN, P1, Q2, R16, R50, S13, T, U, VI, W & YEN.
- G. (CONS) OPTION PACKAGE**  
6, A1, A1E, A3, A4, CALIBRATE, CDP, DS, DT, DW, E, EL/P, KP, L1, L2, L3, L4, LN, P1, Q2, Q3, Q7, R16, R50, S13, T, T3/W3, U, UMD, VI, W AND YEN.
- H. (SENS) OPTION PACKAGE**  
6, A1, A1E, A3, A4, CALIBRATE, CDP, DS, DT, DW, E, EL/P, KP, L1, L2, L3, L4, LN, P1, Q2, Q7, R1-1/R1-3, R16, R50, S12, S13, T, U, VI, W AND YEN.
- I. (SPES) OPTION PACKAGE**  
6, A1, A1E, A3, A4, CALIBRATE, CDP, DS, DT, DW, E, EL/P, KP, L1, L2, L3, L4, LN, P1, Q2, Q3, Q7, R1-1/R1-3, R16, R50, S5, S13, T, T3/W3, U, UMD, VI, W AND YEN.
- J. (PSGS) OPTION PACKAGE**  
6, A1, A1E, A3, A4, CALIBRATE, CDP, DS, DT, DW, E, EL/P, KP, L1, L2, L3, L4, LN, P1, Q2, Q3, Q7, R1-1/R1-3, R15, R16, R50, S12, S13, T, T3/W3, U, UMD, VI, W AND YEN.

**NOTES:**

1. **CAUTION:** In using a 3 phase, 4 wire delta or open delta power supply (usually 120/240 volts, sometimes listed as 120/208 volts) with one leg having a grounded center tap, one line will be 160 to 208 volts to ground. When such a system is used it is necessary to connect the high leg to N2. DO NOT CONNECT 120 VOLT LOAD CIRCUIT TO THE HIGH LEG.
2. **GROUNDING TERMINAL:** A grounding terminal (GND) is provided. When installing open type switches connect this terminal to the metal enclosure or on equivalent earth ground.
3. **WARNING - TO ENSURE AGAINST SHOCK OR ACCIDENT HAZARD, DISCONNECT ALL SOURCES OF SUPPLY BEFORE SERVICING.**
4. OPEN TRANSITION OPERATION CAN BE SELECTED WITH BOTH SOURCES AVAILABLE. OPEN TRANSITION OCCURS BY DEFAULT WHEN THE LOAD-CONNECTED SOURCE FAILS.
5. ON SINGLE PHASE UNITS WHERE THE SOURCE 2 SOURCE IS A UTILITY LINE, CONNECT SOURCE 2 LINE SO THAT MINIMUM VOLTAGE IS MEASURED FROM N1 TO E1.
6. ON SINGLE PHASE (2 POLE) UNITS, THE CENTER POLE, 47N & 47E ARE NOT SUPPLIED.  
3Ø 27/59N & E ARE REPLACED BY 1Ø 27/59N & E.

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	THIRD ANGLE PROJECTION 	DRAWING FILE: 76a-3000-h-1.dwg MODEL / ASSEMBLY FILE: ZBTSCT(1600-3000 AMP) # CTQs CRITICAL TO QUALITY CHARACTERISTIC	SCALE: NA SHEET 1 OF 8





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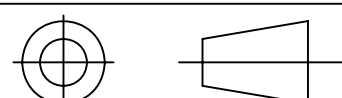
FOR USE ON EMERGENCY OR STANDBY SYSTEMS-RATED FOR TOTAL SYSTEM & MOTOR LOAD

**K. ACCESORIES DEFINITION.**

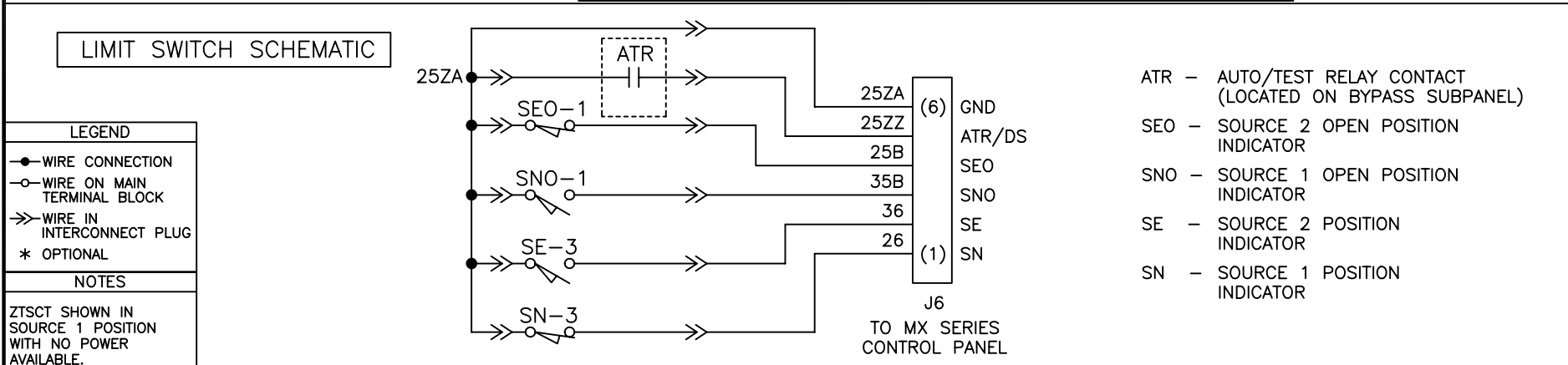
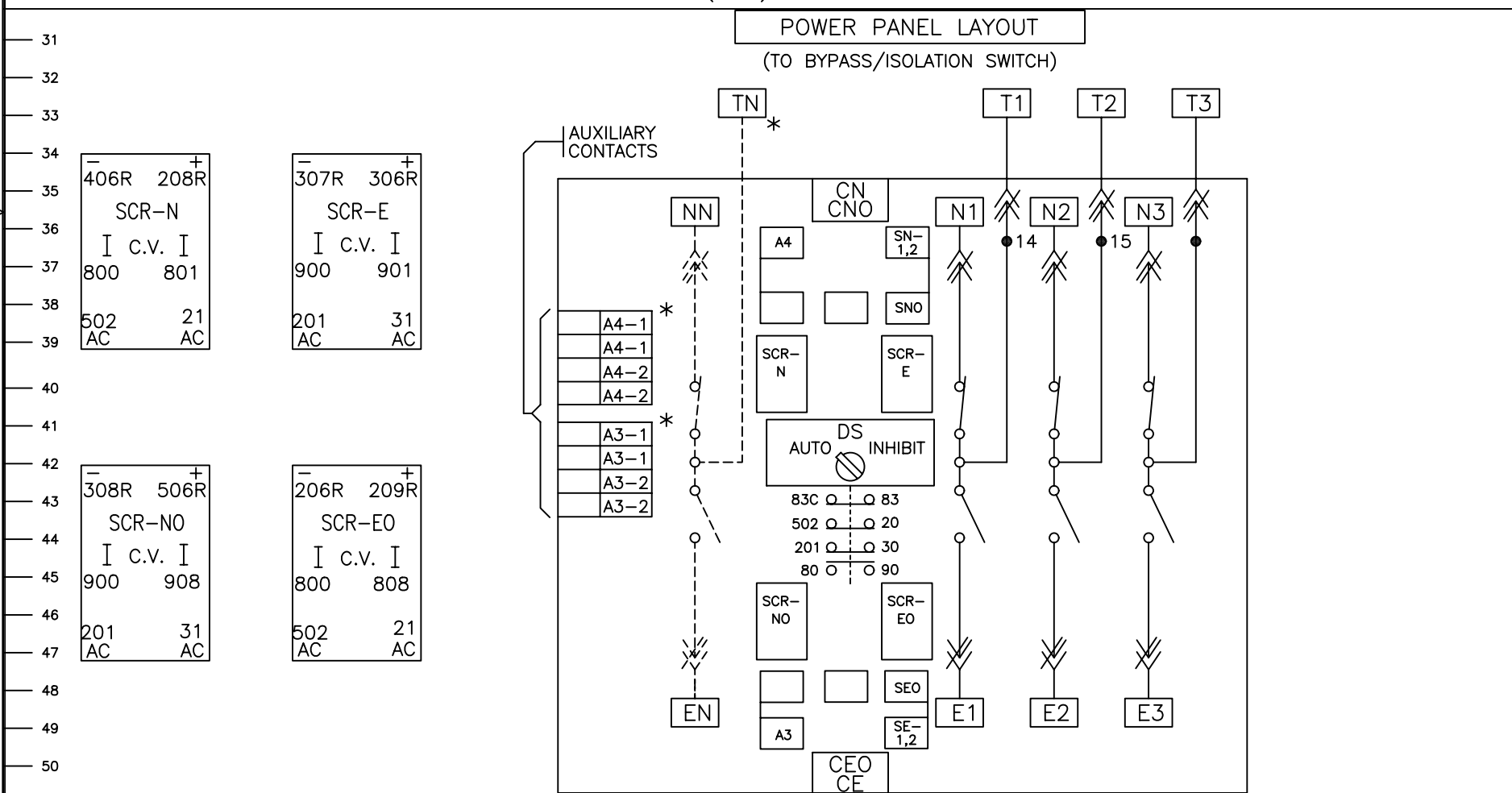
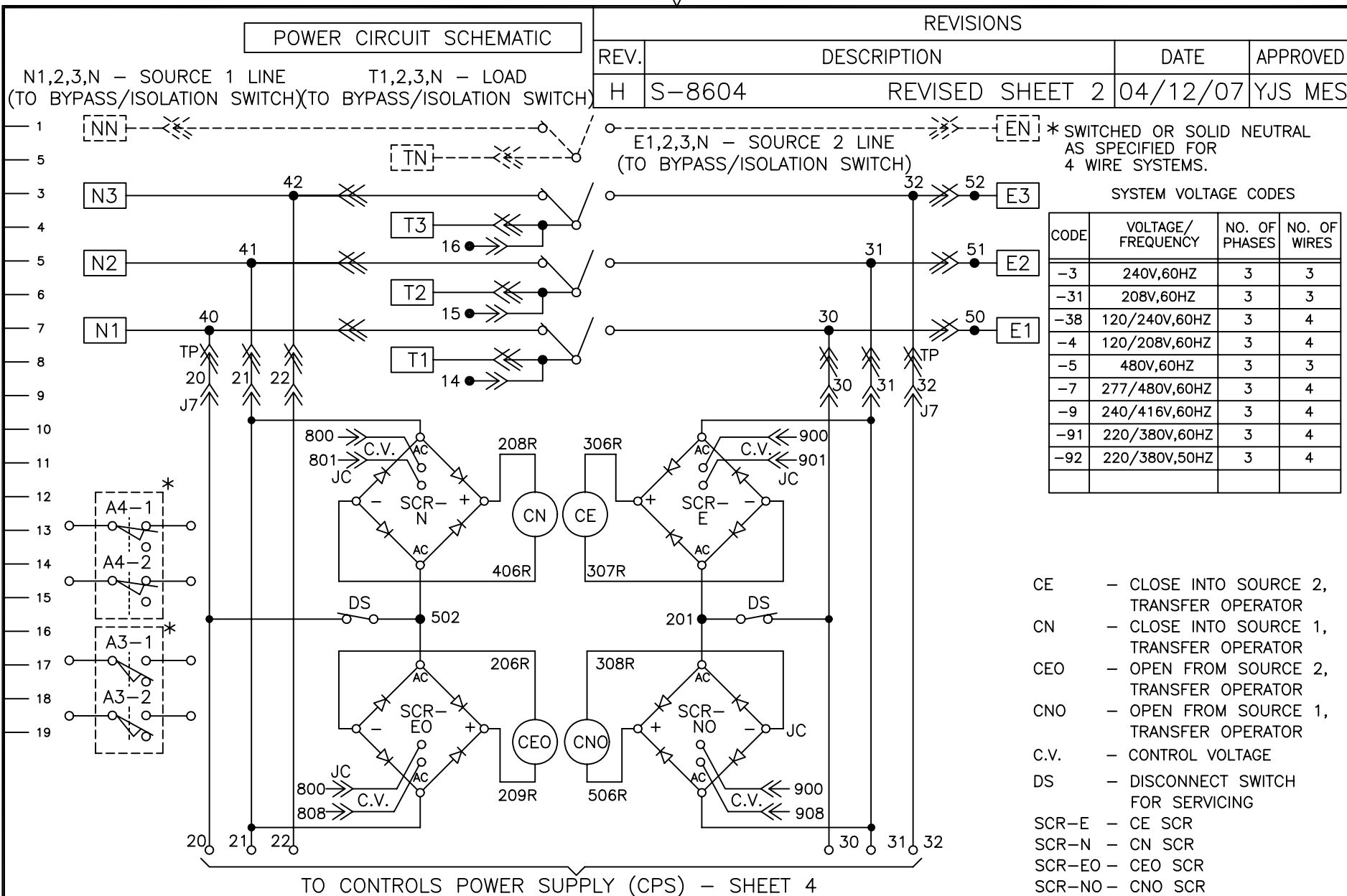
- 6 Test Switch, Momentary.
- 6A Test Switch, Maintained/Momentary. Door mount.
- 6AP Test Switch Maintained/Momentary Utilizing Keypad.
- 6B Test Switch, Maintained-Auto/Momentary-test, Key Operated.
- 6C Test Switch, Maintained-Auto/Mantained-test, Key Operated.
- A1 Auxiliary Contact, Operates on Source 1 line failure.
- A1E Auxiliary Contact, Operates on Source 2 line failure.
- A3 Auxiliary Contact Closed when the switch is in Source 2 position.
- A4 Auxiliary Contact Closed when the switch is in Source 1 position.
- A62 Sequential Universal Motor load Disconnect Circuit.
- B9 Battery charger.
- CALIBRATE Source 1 & Source 2 Calibrate capabilities for voltage a frequency.
- CDP Clock Exerciser Load / No Load, one event: allows the Generator to start and run unloaded or simulate a power failure, start Generator and run under load. Can be configured by end user for a 1, 7, 14, 28, or 365 day cycle. A total of 7 independent exercise periods (up to 10 hours each) can be programmed for each of the daily, weekly, 14-day, and 28-day Exercisers. A total of 12 independent exercise periods (up to 10 hours each) can be programmed for the 365-day Exerciser. When exercise is impending, (\*E\*) appears in the upper right hand corner of LCD screen. configured via CFG menu and set via SET menu.
- CDT Timer Exerciser Load / No Load, one event: allows the Generator to start and run unloaded or simulate a power failure, start Generator and run under load. Can be configured by end user for a 1, 7, 14, or 28 day cycle. Exercise duration can be set between 5 and 60 minutes in 1 minute increments. Factory default is 20 minutes. When exercise is impending, (\*E\*) appears in the upper right hand corner of LCD screen. configured via CFG menu and set via SET menu.
- CTAP Alarm Panel on transfer to Source 2 w/Silence button.
- DS Disconnect Switch, Auto /Inhibit. Inhibits transfer in either direction when in inhibit. Allows automatic operation when in Auto.
- DT Time delay from Neutral switch position to Source 1 position.
- DW Time delay from Neutral switch position to Source 2 position.
- E Engine Start Contact.
- EL/P Event Log: Sequentially Numbered Log of 16 events that track date, time, reason and action taken.  
System Data: Total Life Transfers (N2P)  
Days Powered Up  
Total Transfers to S2  
Total S1 Failures  
Total S1 available in Hrs  
Total S2 available in Hrs. (NIP)
- F Fan contact operates when generator is running.
- HT Heater and Thermostat.
- K Frequency Meter, Door mount.
- KP Frequency, LCD-Indication S1 & S2
- L Indicating LED lights.  
L1 Indicates Switch in Source 2 position.  
L2 Indicates Switch in Source 1 position.  
L3 Indicates Source 1 available.  
L4 Indicates Source 2 available.  
LN center-off position LCD-indicator.

- M1 Single Phase Amp Meter
- M2 Three Phase Amp Meter
- M3 Single Phase Volt Meter
- M4 Three Phase Volt Meter
- M90 2000 Digital Power Monitor  $\Delta$
- M91 EPM 6000 Digital Power Meter w/RS485  $\Delta$
- N1 Running Time meter, Door Mount.
- N2 Operation Counter meter, Door Mount.
- P1 Time Delay Source 2 Start. Adjustable 0 to 10 sec.
- P2 Time Delay Source 2 Start. Adjustable 1/6 to 300 sec.
- Q2 Peak Shave/Remote Load Test:Input for Peak Shave or Remote Load Test. Includes automatic return to Source 1 if Source 2 fails and Source 1 present.
- Q3 Inhibit Transfer to Source 2 Circuit.
- Q7 Inhibit Transfer to Source 1 Circuit.
- R2E Under voltage sensing of Source 2 for single-phase. (R17 replaces R2E for Utility to Utility switches)
- R1-1/R1-3 Source 1 Over Voltage sensing for single and three phase systems.
- R16 Phase Rotation Sensing
- R26 Interruptable Power Rate Provisions
- R50 In-Phase Monitor. Prevents transfer until two sources are in-phase.
- S5 Auto/Semi Manual selector, Utilizing keypad
- S12 Auto/Manual selector, Utilizing keypad
- S13 Transfer Commit or no Commit to transfer upon Engine start.
- S14 Test/Auto/Source 1 Selector, Door mount
- SW1 Auto/Off/Start Engine control selector Door mount
- SW2 Auto/Off Engine control selector Door mount
- SW3 Source Priority Selector Switch Door mount
- T Time Delay to SOURCE 1 stable timer
- T3/W3 Elevator Pre-Signal Auxiliary Contacts: Open 0-60 sec. prior to transfer to either direction, re-closes after transfer.
- U Source 2 Stop Delay Timer.
- UMD Universal Motor Load Disconnect Circuit.
- VI Voltage Imbalance Sensing (Three Phase)
- W Time Delay (S2) Source 2 Stable Timer. To delay transfer to Source 2.
- YEN Bypass T amd W Timers utilizing keypad.
- ZNET Network Communication Interface Card.



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	THIRD ANGLE PROJECTION 	AutoCad Generated	



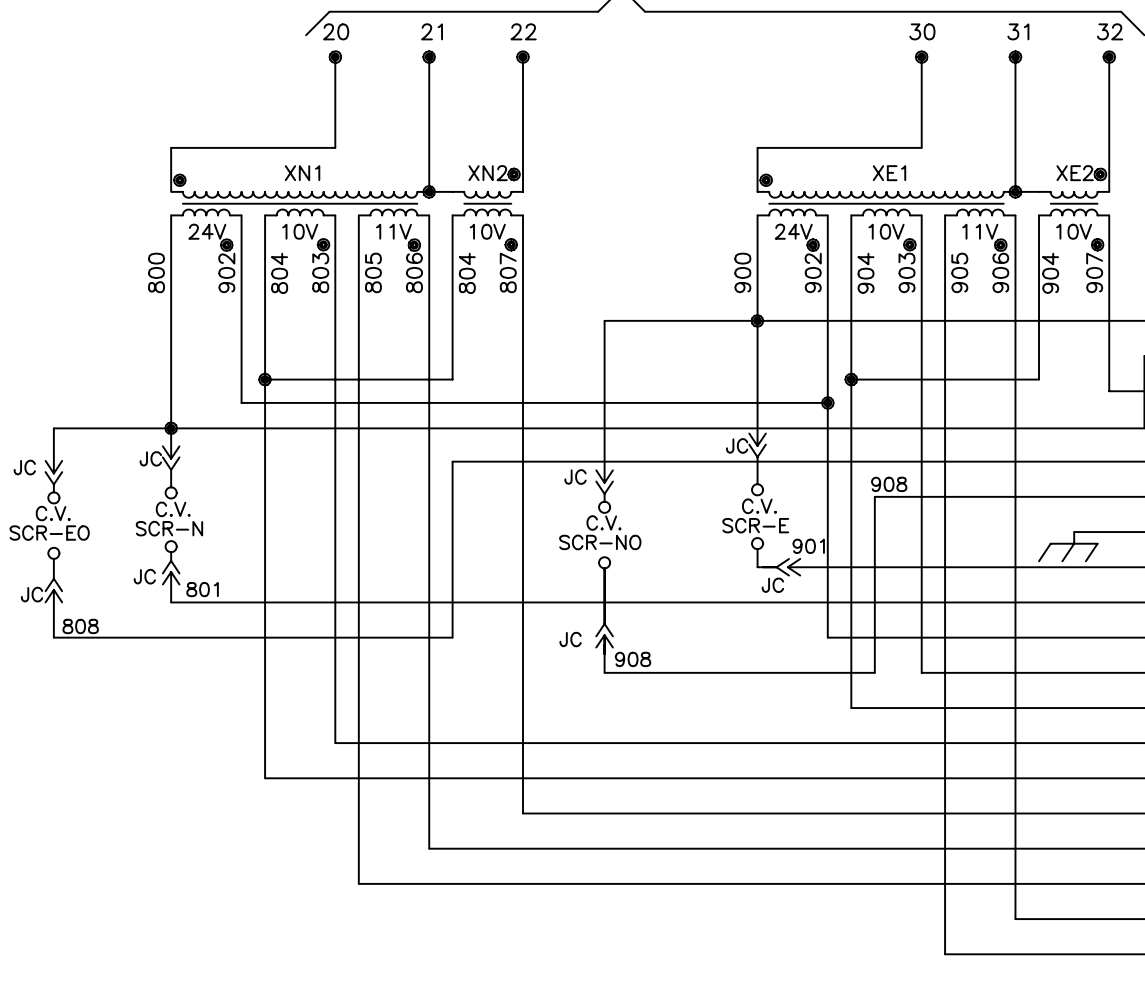


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CONTROLS POWER SUPPLY (CPS) SCHEMATIC

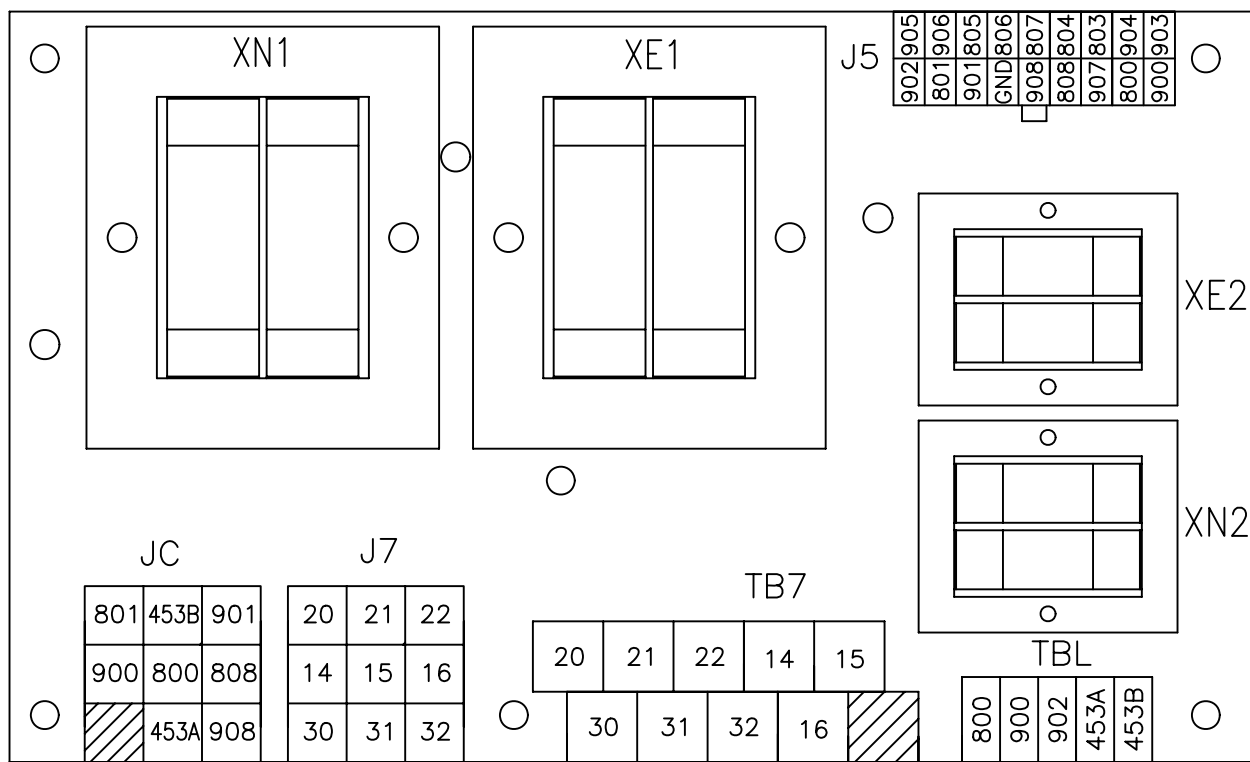
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
H	S-8604	04/12/07	YJS MES

TO POWER CIRCUIT SCHEMATIC - SHEET 3

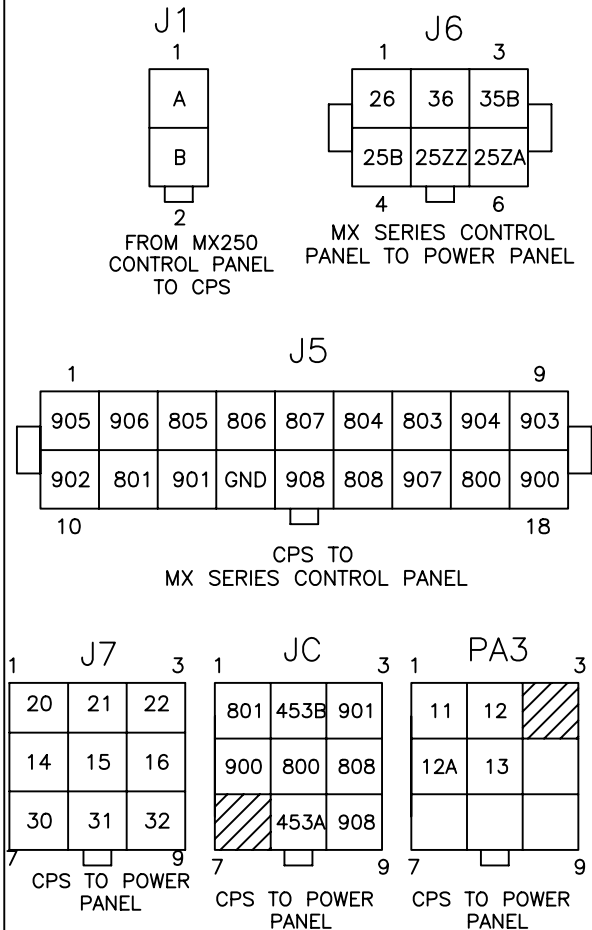


- XN1 - SOURCE 1 CONTROL TRANSFORMER
  - XN2 - SOURCE 1 3 PHASE SENSING TRANSFORMER
  - XE1 - SOURCE 2 CONTROL TRANSFORMER
  - XE2 - SOURCE 2 3 PHASE SENSING TRANSFORMER
- |     |      |   |
|-----|------|---|
| 900 | (18) | SOURCE 2 24V OUTPUT                         |
| 800 |      | SOURCE 1 24V OUTPUT                         |
| 907 |      | 3-PHASE SOURCE 2 SENSING                    |
| 808 |      | C.V. SCR-E0 CONTROL VOLTAGE (OPEN SOURCE 2) |
| 908 |      | C.V. SCR-NO CONTROL VOLTAGE (OPEN SOURCE 1) |
| GND |      | GROUND                                      |
| 901 |      | GROUND                                      |
| 801 |      | C.V. SCR-E CONTROL VOLTAGE (SOURCE 2)       |
| 902 |      | C.V. SCR-N CONTROL VOLTAGE (SOURCE 1)       |
| 903 |      | COMMON                                      |
| 904 | }    | SINGLE PHASE SOURCE 2 SENSING               |
| 803 |      |   |
| 804 |      |   |
| 807 | }    | 3-PHASE SOURCE 1 SENSING                    |
| 806 |      |   |
| 805 |      |   |
| 906 | }    | SOURCE 1 CONTROL POWER                      |
| 905 |      |   |
| 905 | }    | SOURCE 2 CONTROL POWER                      |
| J5  |      |   |

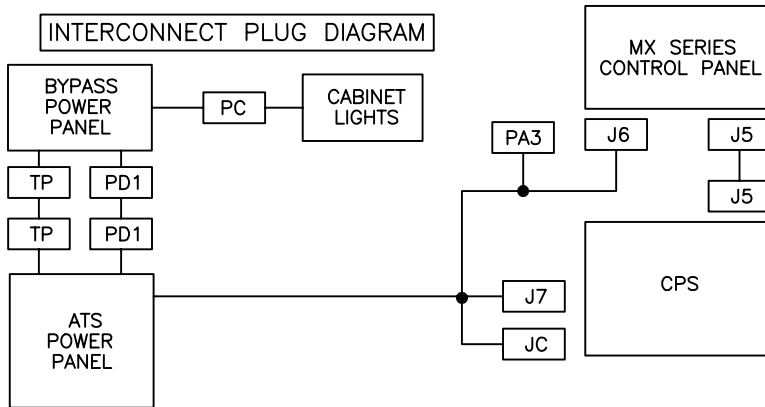
CONTROLS POWER SUPPLY (CPS)



INTERCONNECT PLUGS



INTERCONNECT PLUG DIAGRAM

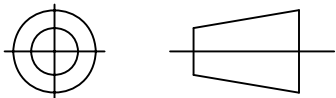


LEGEND

- WIRE CONNECTION
- \* OPTIONAL

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THIRD ANGLE PROJECTION



FOR ADDITIONAL INFO REFER TO APPLIED PRACTICES UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON:  
 2 PL. DECIMALS ± .020  
 3 PL. DECIMALS ± .005  
 ANGLES ± 1°  
 FRACTIONS ± 1/64

FINISH ✓

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SIGNATURES		DATE
MODEL	GG	05/06/03
DETAIL		
CHECKED		
ENGRG	FS	
MFG		
QUALITY		
ISSUED		
DRAWING FILE:	76a-3000-h-4.dwg	
MODEL / ASSEMBLY FILE:	ZBTSCT(1600-3000 AMP)	
# CTQs	⊖	CRITICAL TO QUALITY CHARACTERISTIC



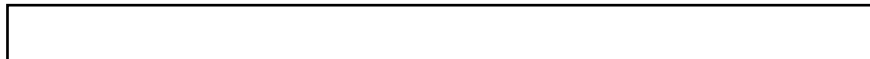
**GE Zenith Controls**

CONTROLS POWER SUPPLY(CPS) & INTERCONNECT PLUGS

TITLE		FIRST MADE FOR: ZBTSCT(1600-3000 AMP)	
SIZE	CAGE CODE	DWG NO	
B		76A-3000	
SCALE: NA	SHEET		4 OF 8



REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
H	S-8604	04/12/07	YJS MES



Manually operated Bypass Disconnect Switch (DS)

Open bottom cabinet door and Turn Bypass Selector Switch

Move the Manual Bypass

Bypass per above instructions. Rotate crank mechanism

Turn DS to "AUTO". Test Switch (TS) on of ATS.

Bypass per above instructions. Rotate crank mechanism

Bypass and Isolate per Disconnect multipin plugs

3. Slide four corner latches of ATS to innermost position.  
4. ATS can now be removed from cabinet.

1. Roll cart back into cabinet.  
2. Slide four corner latches of ATS to outermost position. Turn DS Switch to "INHIBIT". Manually position ATS into Switch.  
Reconnect multipin plugs and Rotate crank mechanism

Turn DS Switch to "AUTO" and

Turn DS to "INHIBIT". Rotate crank mechanism

Turn DS to "AUTO" and open  
ATS is now fully automatic

DS in "INHIBIT" will prevent  
DO NOT use excessive force  
Above Figures depict Bypass  
When ATS is in TEST or  
To operate Bypass Switch  
ISOLATE:  
Move MBH downward (to  
Turn BSS to opposite  
Move MBH upward to

LEGEND: BYPASS/ISOLATION SWITCH (BP)

Load Line connections -----  
Bypass SOURCE 2 contacts  
Bypass SOURCE 1 contacts  
BSS..... Bypass Selector Switch  
MBH..... Manual Bypass Handle

Limit switch held actuated in Auto location of ATS, Non-actuated Test and Isolated locations.  
Limit switch, actuated in Bypass SOURCE 2 position  
Limit switch, actuated in Bypass SOURCE 1 position  
Limit switch, switches Engine Start from ATS control to bypass control during ATS Isolate  
AI-1,2..... Limit switch, actuated in Isolate location  
Limit switch, actuated in Test location  
Auto/Test Relay, Energized in AUTO and TEST locations  
AUTO..... Auto location relay, Energized in Auto location  
BR-1,2,3..... Bridge Rectifier  
Capacitor: RNH  
CBC..... Crank Solenoid  
CBE..... SOURCE 2 Bypass Permissive Solenoid  
CBN..... SOURCE 1 Bypass Permissive Solenoid  
CH-1..... Limit switch actuated when crankhandle is engaged  
D..... Diode  
Resistor: RNH  
Relay SOURCE 1ly held, 24 VDC coil, 3PDT  
SOURCE 2 line control transformer  
SOURCE 1 line control transformer

SOURCE 1 available  
SOURCE 2 available  
Bypass SOURCE 1 (BN closed)  
Bypass SOURCE 2 (BE closed)  
ATS in Test location  
ATS in Isolate location  
ATS Inhibit  
ATS DS switch in INHIBIT position

**OPERATION:**  
1. BP-Bypass switch (indicated by contacts BN/BE) is a 3 position switch.  
2. ATS-Automatic Transfer Switch.

**LEGEND:**  
1. Indicator off during automatic operation of ATS.  
2. Four pole includes neutral lugs.

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	TOLERANCES ON: 2 PL. DECIMALS ± .020 3 PL. DECIMALS ± .005 ANGLES ± 1° FRACTIONS ± 1/64 FINISH ✓	CHECKED ENGRG FS MFG QUALITY ISSUED	
THIRD ANGLE PROJECTION 	DRAWING FILE: 76a-3000-h-5.dwg MODEL / ASSEMBLY FILE: ZBTSC(1600-3000 AMP)	FIRST MADE FOR: ZBTSC(1600-3000 AMP) SIZE B CAGE CODE DWG NO 76A-3000	SCALE: NA SHEET 5 OF 8
	# CTOS CRITICAL TO QUALITY CHARACTERISTIC		

