



GE Zenith Controls



Authorized Service

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Introduction

GE Zenith Transfer Switches are used to provide a continuous source of power for lighting and other critical loads by automatically transferring from the normal source of power to an emergency source of power in the event that the normal source voltage falls below preset limits.

Voltage sensing and system control is performed via a state-of-the-art microcontroller located on the cabinet door. It is designed to give highly accurate control of the transfer switch system.

All GE Zenith transfer switches are designed for use on emergency or standby systems, and are rated for total system or motor loads. Transfer switches are UL Listed under Standard 1008 and CSA Certified under Standard C22.2 No. 178 and IEC Listed under Standard 947.

Safety

⚠ DANGER ⚠

HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

The safe operation of your switch is GE Zenith's focus. The proper storage, installation, operation and maintenance will help increase the life of the switch.

⚠ CAUTION ⚠

Due to hazardous voltage and current, GE Zenith recommends that a GE Zenith Certified technician or a qualified electrician must perform the installation and maintenance of the switch.

Equipment Inspection and Storage

Once you have received the transfer switch, inspect it for any damage. This includes damage to the enclosure, power panel, control panel and wiring harness. If any damage is found or suspected, file a claim as soon as possible with the carrier and notify the nearest GE Zenith representative.

Before installation, it is necessary to store the transfer switch in a clean dry place, protected from dirt and water. Provide ample air circulation and heat, if necessary, to prevent condensation.

Storage Temperature	Operating Temperature (Ambient):	Humidity
-30°C to +75°C (-22°F to +167°F)	40-400 AMP (molded shell) -20°C to +65°C (-4°F to +149°F)	5% to 95% (non-condensing)
	40-4000 AMP (all other frame and panel types) -20°C to +60°C (-4°F to +140°F)	

Final Equipment Inspection

Prior to energizing the transfer switch:

1. Remove any debris incurred, with a vacuum, due to shipment or installation.

⚠ WARNING ⚠

Do not use a blower since debris may become lodged in the electrical and mechanical components and cause damage.

2. Verify that all cabled connections are correct and that phase rotation of both sources match.
3. Check engine start connections.
4. Verify the correct connection of all control wires.
5. Check settings of all timers and adjust as necessary.
6. Adjust any optional accessories as required.
7. Check the lug torque values of the power connections.

NOTE: Lug torque values are specified in the power panel manual.

8. Make sure that all covers and barriers are installed and properly fastened.

NOTE: Power panels ship from GE Zenith in the Normal Position.

Installation

⚠ DANGER ⚠

HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Each GE Zenith transfer switch is factory wired and tested. A complete information package is furnished with each switch which includes:

- Sequence of operation.
- Description and operation of all accessories supplied.
- Power panel connection diagram and schematic.
- Description and identification of all customer field connections.

Installation of GE Zenith transfer switches includes:

- Mounting the transfer switch cabinet.
- Connection of all Normal, Emergency, and Load cables or bus bars.
- Connection of external control circuits as required.

Mounting

Adequate lifting means must be used to mount the transfer switch into place. The recommended method for moving the transfer switch using the lifting eyes, where supplied, and a spreader bar is illustrated in *Figure 1*. Enough room should be allowed to open the cabinet doors fully for inspection and servicing of the switch per NEC and local codes.

⚠ CAUTION ⚠

Before drilling conduit entry holes or any accessory mounting holes, cover and protect the switch and control panel to prevent dirt and metal fragments from entering the mechanical and electrical components.

Failure to do so may result in damage and malfunction of the switch.

Power Connections

GE Zenith transfer switches are supplied with UL listed solderless screw type terminals as standard for the Normal, Emergency and Load power connections. *Table 1* lists the number and sizes of cable lugs supplied as standard for each switch amp rating.

Connect the Normal, Emergency, and Load conductors to the clearly marked terminals on the transfer switch. Remove surface oxides from cables by cleaning with a wire brush. Verify that all connections are correct before tightening the lugs. All cable lug connections must be tightened to the proper torque values as shown in *Table 2*.

NOTE: Do not run cables or wiring behind front-connected transfer switches.

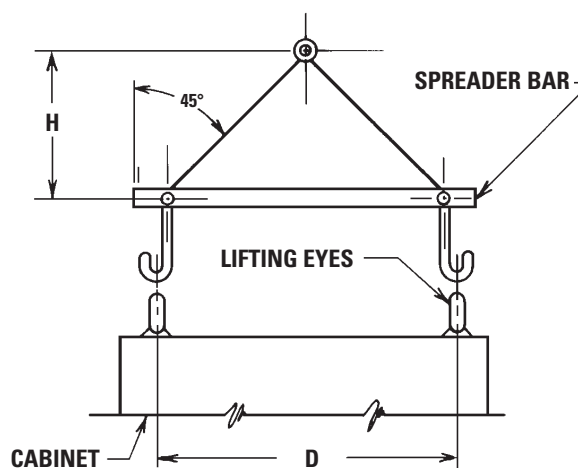


Figure 1

NOTE: When lifting the switch using a spreader bar, height H must be equal to half of distance D.

Installation *(cont'd)*

Screw Type Terminals for External Power Connections

Switch Size (Amps)	Normal, Emergency & Load Terminals		Neutral Bar (When Required)	
	Cable Per Pole	Range of Wire Sizes	No. of Cables	Range of Wire Sizes
40	1	#8 to 1/0 AWG	3	#8 to 1/0 AWG
80	1	#8 to 1/0 AWG	3	#8 to 1/0 AWG
100	1	#8 to 1/0 AWG	3	#8 to 1/0 AWG
150	1	#8 to 3/0 AWG	3	#8 AWG to 300 MCM
200, 225, 250 ^{*(1)}	1	#6 AWG to 250 MCM	3	#6 AWG to 300 MCM
260, 300*, 400	1	#4 AWG to 600 MCM	3	#4 AWG to 300 MCM
600	2	#2 AWG to 600 MCM	8	#2 AWG to 600 MCM
800, 1000, 1200	4	#2 AWG to 600 MCM	12	#2 AWG to 600 MCM
1600, 2000 2600, 3000	8	#2 AWG to 600 MCM	12	#2 AWG to 600 MCM

Table 1 ⁽¹⁾ 200 amp unit utilizes #6 to 250 MCM wire effective approximately 11/1/00.

Engine Start Control Connections

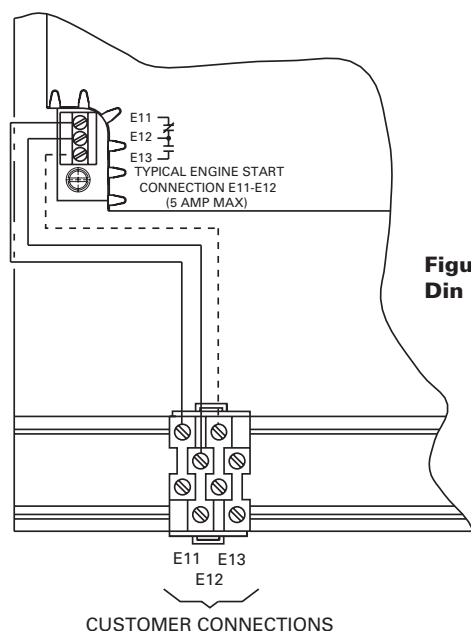
Engine-start control wires connect to control terminals below of the MX100. Engine start terminals are indicated by a schematic symbol (the symbol indicates the contact state for a de-energized Normal source). *Figure 2* shows the engine-start contacts.

Make all other necessary control connections to the control panel terminal blocks per the schematics supplied with the ATS.

NOTE: All control wires (18-12 AWG) must be torqued to 19 in/lbs.

Tightening Torque for Lugs		
Socket Size Across Flats	Torque	
	Lb. - In.	Lb. - Ft.
1/8	45	4
5/32	100	8
3/16	120	10
7/32	150	12
1/4	200	17
5/16	275	23
3/8	375	31
1/2	500	42
9/16	600	50

Table 2



**Figure 2 -
Din Rail**

The engine-start terminals are clearly identified by a label on the microcontroller backplate. In the case of manual transfer switches, or in other applications not requiring the microprocessor, clearly marked terminal blocks are provided in the upper left corner of the control panel for the engine start control wires.

Terminals for field connections to the A3 Emergency auxiliary contacts and the A4 Normal auxiliary contacts are also provided. These terminals are clearly marked and appear on the side of the power panel (right hand side for 30-400 A switch). On 400 amp metal frame units these terminals appear on the bracket above the operator handle.

* IEC Ratings Only

Installation (cont'd)

⚠ DANGER ⚠

HAZARDOUS VOLTAGE
(Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Functional Test

Functional testing of the ATS consists of electrical tests described in this section. Before proceeding, refer to the information package supplied with the ATS and read and understand the information on all accessories provided.

! CAUTION !

Certain accessories, per specific schematics, can inhibit automatic transfer.

1. Unlock the enclosure.
2. Open the enclosure.
3. Verify the correct system voltage.

NOTE: The equipment rating nameplate on the transfer switch lists the voltage. See *Figure 3*.

4. Close the Normal source circuit breaker.

NOTE: The controller will illuminate the Normal Available LED if proper voltage is sensed.

WARNING – HIGH VOLTAGE SET

5. Verify the phase to phase voltages at the Normal line terminals.
6. Close the Emergency source circuit breaker.
7. Start the generator's engine.

NOTE: The controller will illuminate the Emergency Available LED when preset voltage and frequency levels are reached.

8. Verify the phase to phase voltages at the Emergency line terminals.
9. Verify that the phase rotation of the Emergency source is the same as the phase rotation of the Normal source.
10. Shut down the generator's engine.
11. Place the starting control in the Automatic position.
12. Complete the visual inspection of the transfer switch.
13. Close the enclosure.
14. Lock the enclosure.

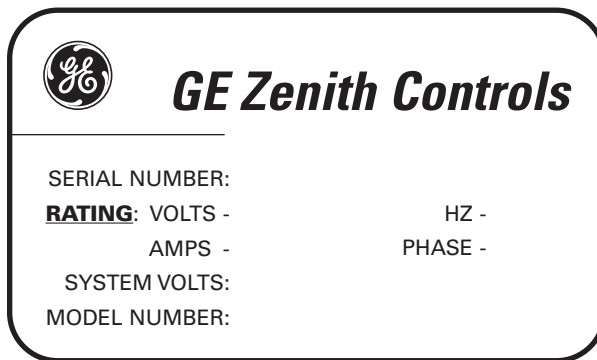


Figure 3

! CAUTION !

Engine Gen-Set could start when engine control wires are attached.

Installation *(cont'd)*

Initial Energization

After all options and accessories are checked and verified, follow these steps to set up the ATS. Refer to MX100 display *Figure 4*. The annunciation LEDs illuminate to indicate (1) source availability, (2) ATS position, and (3) MX100 control function (timing).

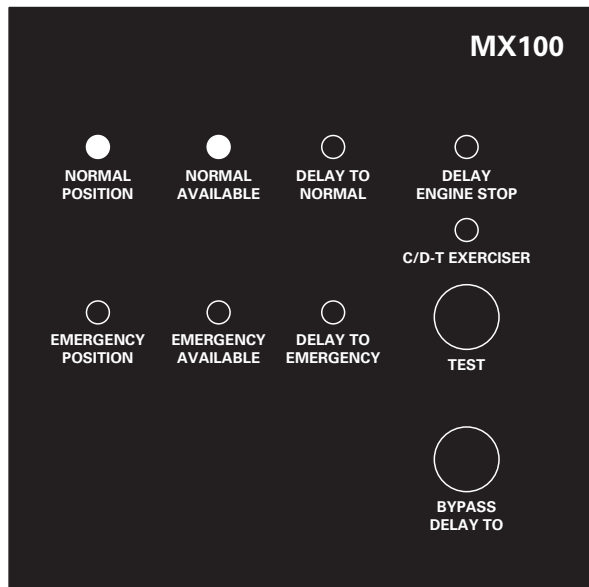


Figure 4 – Standard Transition Annunciation LEDs and Test Switch

NOTE: If LEDs are flashing, refer to Troubleshooting and Diagnostics.

1. Unlock the enclosure.
2. Open the enclosure.
3. Place the Disconnect Switch in the Inhibit.

NOTE: This step is only performed if the “DS” Option was purchased.

4. Close the external (up-stream) Normal circuit breaker.

NOTE: The normal Available and Normal Position LED’s will illuminate.

NOTE: If the Normal Available LED does not illuminate, verify that the Normal Source Voltage is above the preset pick-up value.

NOTE: On the initial start-up, the Delay to Engine Stop Timing LED will illuminate for the duration of its setting.

NOTE: The Gen-Set will start and run while Delay to Engine Stop is timing.

5. Close the External (up-stream) Emergency line circuit breaker.
6. Start the engine generator in MANUAL mode.

NOTE: When the voltage and frequency reach preset values, the Emergency Available LED will illuminate.

7. Verify the phase to phase voltages at the Emergency line terminals.
8. Verify that the phase rotation of the Emergency source is the same as the phase rotation of the Normal source. (either A-B-C or A-C-B.)
9. Shut down the generator's engine. (Place in Automatic Mode.)

NOTE: The Emergency Available LED will turn off.

NOTE: The engine generator will continue to run if the Delay to Engine Stop LED is illuminated.

10. Place the disconnect switch to ENABLE.
11. Complete the visual inspection of the transfer switch.
12. Close the enclosure.
13. Lock the enclosure.

Operation and Testing

Standard Transition ATS Testing (w/o A6 or T3/W3)

For this test description, please refer to MX100 standard transition display *Figure 4*.

Initiate testing with the ATS in Normal position and Normal power available (Normal Position and Normal Available LEDs illuminated).

Step 1: Press and hold the test switch until transfer.

NOTE: Releasing the test switch prematurely will abort the test.

The delay to engine start timer (P) begins its timing cycle. After the P timer has completed its timing cycle, the engine start contacts close to start the generator.

When Emergency voltage and frequency reach preset pickup points the Emergency Available LED illuminates. Simultaneously, the delay to emergency timer (W) begins its timing cycle and the Delay to Emergency LED illuminates. When the W time delay is completed the switch will transfer to emergency. The Delay to Emergency and Normal Position LEDs go off, and the Emergency Position LED illuminates.

Step 2: Release the test switch to start retransfer to Normal.

The delay to normal timer (T) begins its timing cycle illuminating the Delay to Normal LED. When the T timer has completed its timing cycle the switch will transfer into Normal. The Delay to Normal and Emergency Position LEDs go off, and the Normal Position LED illuminates. The delay engine stop timer (U) begins its timing cycle and the Delay Engine Stop LED illuminates. The generator runs unloaded for the duration of the U timing cycle. When the timer completes its timing cycle, the generator will stop. The Delay Engine Stop and the Emergency Available LEDs go off.

NOTE: A periodic test of the transfer switch under load conditions is recommended to insure proper operation. (See National Electric Code articles 700 and 701).

Delayed Transition ATS Testing

Refer to Delayed Transition display *Figure 5*. Initiate testing with the ATS in Normal position and Normal power available (Normal Position and Normal Available LEDs illuminated).

Step 1: Press and hold the test switch until transfer (releasing the test switch prematurely will abort the test).

The delay to engine start timer (P) begins its timing cycle. After the P time delay the engine start contacts close to start the generator.

When Emergency voltage and frequency reach the preset pickup points the Emergency Available LED illuminates. Simultaneously, the delay to open normal timer (W) begins its timing cycle and the Delay to Open Normal LED illuminates. After the W time delay the ATS transfers out of Normal position into the Open position. The Delay to Open Normal and Normal Position LEDs go off, and the Open Position and Delay to Emergency LEDs illuminate.

Step 2: Release the test switch.

Time delay to emergency (DW) then begins. When the DW time delay is completed the switch will transfer to Emergency. The Delay to Emergency and Open Position LEDs go off, and the Emergency Position LED illuminates.

The MX100 microcontroller will automatically begin the retransfer sequence to Normal. The delay to open emergency (T) timer begins its timing cycle and the Delay to Open Emergency LED illuminates. When the T timer has completed its timing cycle, the ATS transfers to the open position. The Delay to Open Emergency and the Emergency Position LEDs turn off, and the Open Position and the Delay to Normal LEDs illuminate. The delay to normal timer (DT) then begins its timing cycle illuminating the Delay to Normal LED. When the DT timer has completed its timing cycle the ATS will transfer out of the open position into the Normal position. Delay to Normal and the Open Position LEDs turn off, and the Normal Position LED illuminates.

The delay engine stop timer (U) begins its timing cycle and the Delay Engine Stop LED illuminates. The generator runs unloaded for the duration of the U timing cycle. Upon completion of the U time delay, the generator will stop. The Delay Engine Stop and the Emergency Available LEDs go off.

Operation and Testing *(cont'd)*

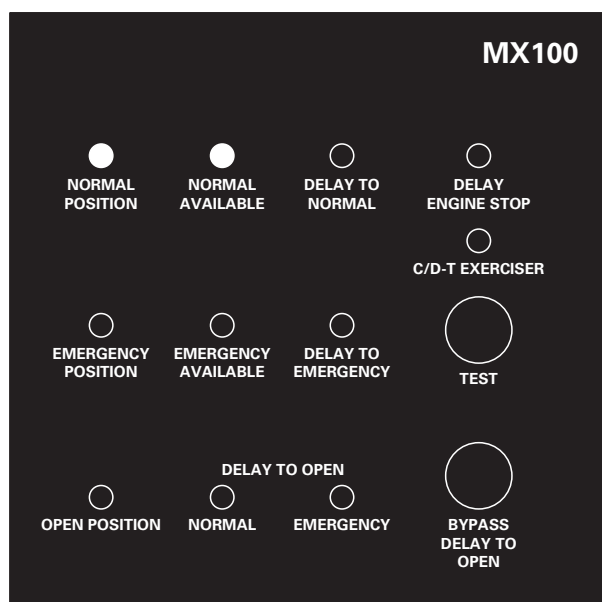


Figure 5 – Delayed Transition Annunciation LEDs and Test Switch

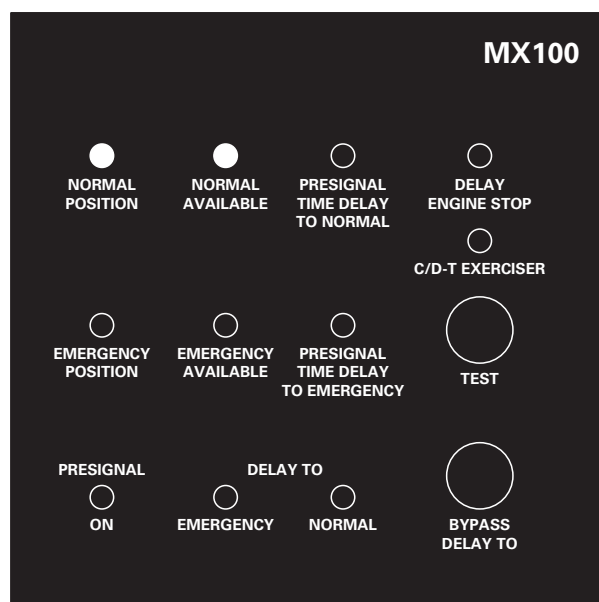


Figure 6 – Standard Transition w/A6 Annunciation LEDs and Test Switch

LED Annunciation Status							
Standard Transition Transfer Sequence (w/o A6 or T3/W3)	Normal Position	Normal Available	Emergency Position	Emergency Available	Delay to Normal	Delay to Emergency	Delay Engine Stop
Normal Position	●	●					
W Time Delay	●	○		●		●	
Emergency Position		○	●	●			
T Time Delay		●	●	●	●		
Normal Position/Engine Overrun Timer	●	●		●			●

○ Illuminated only when running TEST, not on Normal power failure

LED Annunciation Status										
Delay Transition Transfer Sequence	Normal Position	Normal Available	Emergency Position	Emergency Available	Delay to Normal	Delay to Emergency	Delay Engine Stop	Open Position	Delay to Open Normal	Delay to Open Emergency
Normal Position	●	●								
W Time Delay	●	○		●					●	
Open Position/DW Time Delay		○		●		●		●		
Emergency Position		○	●	●						
T Time Delay		●	●	●						●
Open Position/DT Time Delay		●		●	●			●		
Normal Position/Engine Overrun Timer	●	●		●			●			

○ Illuminated only when running TEST, not on Normal power failure

Operation and Testing *(cont'd)*

Standard Transition ATS Testing (w/A6 or T3/W3)

Refer to Standard Transition w/A6 or T3/W3 display *Figure 6*. Initiate testing with the ATS in Normal position and Normal power available (Normal Position and Normal Available LEDs illuminated).

Press and hold the test switch until transfer (releasing the test switch prematurely will abort the test).

The delay to engine start timer (P) begins its timing cycle. After the P time delay the engine start contacts close to start the generator.

When Emergency voltage and frequency reach the preset pickup points the Emergency Available LED illuminates. Simultaneously, the delay to emergency timer (W) begins its timing cycle and the Delay to Emergency LED illuminates. After the W time delay the ATS presignal is initiated. The Delay to Emergency and Normal Position LEDs go off, and the Presignal On and Presignal Time Delay to Emergency LEDs illuminate.

Release the test switch.

Presignal Time Delay to emergency (TA6) then begins. When the TA6 time delay is completed, the switch will transfer to Emergency. The Presignal Time Delay to Emergency and Presignal On LEDs go off, and the Emergency Position LED illuminates.

The MX100 microcontroller will automatically begin the retransfer sequence to Normal. The delay to normal (T) timer begins its timing cycle and the Delay to Normal LED illuminates. When the T timer has completed its timing cycle, the ATS presignal is initiated. The Delay to Normal and the

Emergency Position LEDs turn off, and the Presignal On and the Presignal Time Delay to Normal LEDs illuminate. The Presignal Time Delay to normal (TA5) then begins. When the TA5 timer has completed its timing cycle, the ATS will transfer to the Normal position. Presignal Time Delay to Normal and Presignal On LEDs turn off, and the Normal Position LED illuminates.

The delay engine stop timer (U) begins its timing cycle and the Delay Engine Stop LED illuminates. The generator runs unloaded for the duration of the U timing cycle. Upon completion of the U time delay, the generator will stop. The Delay Engine Stop and the Emergency Available LEDs go off.

The MX100 continuously monitors source voltage. In the event that Normal voltage falls below a preset drop-out value, the unit will perform in exactly the same way as noted in the test procedure (either standard transition or delayed transition).

NOTE: A periodic test of the transfer switch under load conditions is recommended to insure proper operation. (See National Electric Code articles 700 and 701).

⚠ WARNING ⚠

When performing a hi-pot or dielectric test on the power section, **DISCONNECT** the control panel plugs from the microprocessor to avoid potential damage.

LED Annunciation Status										
Standard Transition Transfer w/A6 or T3/W3 Sequence	Normal Position	Normal Available	Emergency Position	Emergency Available	Presignal Time Delay to Normal	Presignal Time Delay to Emergency	Delay Engine Stop	Presignal On	Delay to Emergency	Delay to Normal
Normal Position	●	●								
W Time Delay	●	○		●					●	
Open Position/TA6 Time Delay		○		●		●		●		
Emergency Position		○	●	●						
T Time Delay		●	●	●						●
Open Position/TA5 Time Delay		●		●	●			●		
Normal Position/Engine Overrun Timer	●	●		●			●			

○ Illuminated only when running TEST, not on Normal power failure

Sequence of Operation - Standard Transition

Operation Sequence

Normal Power Failure. When Normal voltage has fallen below the preset dropout value, the engine start (P) timer begins its timing cycle (factory set 3 seconds). The P timer allows for momentary under-voltage conditions in the Normal source without triggering the generator to start. If the Normal voltage remains below the dropout point throughout the P timing cycle, a generator start signal will be sent. The MX100 then monitors generator voltage and frequency to determine if they are within preset parameters. When the generator voltage and frequency reach acceptable limits the W timer begins its timing cycle. The W timer governs either the time delay for transfer to Emergency or to the open position (standard or delayed transition, respectively). The W timer (typically 1 second) assures that the generator voltage and frequency are stable before transfer. The transfer to Emergency sequence is then completed as follows:

Standard Transition—after the W time delay, the ATS transfers to Emergency position and load power is supplied by the generator.

Delayed Transition—following the W time delay, the switch opens out of Normal to the Open position. The DW timer is activated. The DW time delay is typically set to 5 seconds. After the DW time delay, the switch completes transfer to Emergency.

Standard Transition w/A6 or T3/W3—following the W time delay, the presignal is initiated. The TA6 timer is started. The TA6 time delay is typically set to 5 seconds. After the TA6, the ATS transfers to Emergency.

When the W time is completed, the CCE relay energizes the CE solenoid to close the transfer switch into the emergency source. The SE limit switch activates to de-energize the CCE relay.

Restoration of Normal Power. When Normal power reaches the preset pickup value, the T timer begins its timing cycle (factory set 30 minutes). The T timer is used to ensure that the Normal source has fully restored before retransfer. If Normal voltage remains above the pickup values for the duration of the T timer, transfer to Normal position is performed. Retransfer is accomplished as follows:

Standard Transition—ATS transfers to the Normal position and the load power is supplied by utility.

Delayed Transition—the switch opens out of Emergency to the Open position. The DT timer activates,

typically set to 5 seconds. After the DT time delay, the switch completes transfer to Normal.

Standard Transition w/A6 or T3/W3—following the T time delay, the presignal is initiated. The TA5 timer is started. The TA5 time delay is typically set to 5 seconds. After the TA5, the ATS transfers to Normal.

When the T time delay is completed, the CCN relay energizes the CN solenoid to retransfer the switch into the normal source. The SN limit switch activates to de-energize the CCN relay. Simultaneously, the engine over-run timer U begins its timing cycle. This timer provides a period of time for the engine generator to run without load and cool down before shutdown.

Control Features

A6. Motor load disconnect capability (standard transition only). Ensures that closing into the oncoming source does not create a large disturbance due to phase angle difference between the load and the oncoming source. Motor loads can be disconnected for an adjustable period of 0-60 seconds prior to transfer of the main contacts. This feature includes LEDs to indicate when the motor load is disconnected.

CDT Exerciser. A built in 7 day exerciser timer is incorporated into the MX100, (standard feature, all models). Pressing the initiate switch will start a timer that will continue for 167 hours and 40 minutes. Along with initiating the timer, an LED will illuminate to indicate that the timer has been started. After 167 hours and 40 minutes, a load test (ATS transfers to Emergency) or a no load test (ATS signals the genset to start but does not transfer) occurs. The exercise mode is determined by the MX100 PCboard jumper location (TSL = load, TSNL = no load). The test lasts for 20 minutes. The CDT Exerciser LED will flash when the exercising is in progress. This 20 minute exercise does not include the time delay to retransfer to normal (T timer) when the ATS is transferred (load test) or the time delay engine stop (U timer) for either load or no load tests. Disabling the exercise event is done by pressing the disable/enable switch. When this is done the exercise event will not occur, although the timer will not be affected. The CDT Exerciser LED will turn off when the disable/enable switch is pressed for the first time after initiating the timer. Pressing the disable/enable switch again will re-enable the exercise event while turning the CDT Exerciser LED back on. The time of the exercise event can be changed by re-initiating the event. The time that the button is pressed will be the end of the exercise event one week later.

Sequence of Operation - Standard Transition *(cont'd)*

CDT Exerciser Notes

1. To avoid unintentional initiating/disabling the button should be held down for 3 seconds when pressed.
2. A 9V battery is supplied to prevent CDT exercise timer from losing it's "set exercise time" in the event of an extended power outage. The battery can back up the processor for up to 8 hours. The battery should be replaced if it has supplied power to the microprocessor for an extended outage.
3. The 9V battery cannot be plugged into a PCboard that is deenergized. The PCboard includes large capacitors that the battery will not be able to charge. If the capacitors are charged, the battery will still discharge eventually due to the load of the PCboard. Therefore, do not install a battery until the PCboard is energized. The battery will then be able to maintain the CDT "set exercise time" in the event of an extended outage.

R50. In-phase monitor (standard transition w/o A6 only). R50 ensures that the phase angle difference between the load voltage and the oncoming source voltage is minimal (live source-to source transfers). The feature requires a fast acting transfer switch, therefore is only available with a standard transition ATS. The in-phase monitor is suitable for isochronous through 3% droop governors. The microprocessor anticipates the synchronized condition by monitoring the phase angle and frequency differential between the sources. Then it signals a transfer at the precise moment to ensure minimal phase difference between the sources at the completion of transfer. R50 also includes a PCboard-mounted switch to override the in-phase monitor function if necessary. The override toggle switch is located below the MX100 cover, but the toggle position to enable or disable the function is clearly indicated on the cover.

YEN. Pushbutton time delay transfer/retransfer bypass.

Control Options

Six control input options can be used with the MX100:

- 6A
- C
- C/D
- D
- Q2
- ZNET100

Note: Consult the factory when field adding Q2 option.

6A. Maintained test switch. An auxiliary two position maintained test switch is located on the cabinet door. This is in addition to the standard test switch found on all MX100 models. When the auxiliary test switch is activated in the TEST position, it will simulate a Normal line failure. The transfer switch will automatically transfer the load to the Emergency position. When the test switch is returned to the AUTOMATIC position the transfer switch will restore the load to the Normal position. Should Emergency fail while ATS is in Emergency position the ATS will transfer back to Normal immediately, if Normal is available.

C. *Plant Exerciser.* Automatically starts generator for selected time intervals. Runs generator unloaded.

C/D. *Plant Exerciser.* Automatically starts generator to run unloaded, or simulate a power failure and starts generator to run under load.

D. *Plant Exerciser.* Automatically starts generator for select time intervals. Simulates a power failure and runs generator under load.

Q2. *Connections for remote peak shave or area protection.* Includes bypass for immediate return to Normal if Emergency line fails and Normal is available.

ZNET100. *Communication Capability.* The MX100 can be equipped with an optional network card that allows digital communication of ATS position, source availability, control timers and test mode. A test signal can also be initiated from a remote PC or annunciator panel. Communication is via one twisted pair of wires.

Sequence of Operation - Delayed Transition

Transfer of the load to the Emergency source begins automatically when any phase of the Normal source falls below the preset dropout point and this under-voltage failure condition is detected by the MX100 microcontroller. The engine start timer P begins its timing cycle. The P time delay is provided to override momentary outages and to prevent nuisance starting of the engine generator. If the Normal source voltage returns above the pickup setting, the P timing cycle is reset, and the transfer sequence is stopped.

If the normal source voltage does not return before the P time delay is completed, the P timer drops out and sends a starting signal to the engine generator. The microcontroller senses the voltage and frequency of the Emergency source. When both the voltage and the frequency of the Emergency source reach the preset values timer W begins its timing cycle. The W timer provides an adjustable transfer delay to the Emergency source as required.

When the W time is completed, the CCNO relay energizes the CNO solenoid to open the transfer switch out of the Normal source. The switch is now in a neutral (both sources open) position. The switch remains in a neutral position for the duration of the DW time delay. DW is an adjustable time delay between the opening of the Normal source and closing into the Emergency source.

After the DW time delay has elapsed, the CCE relay energizes. The switch then completes transfer to the Emergency source by energizing the CE solenoid. The SE limit switch activates to de-energize the CCE relay.

The sequence for retransfer to the Normal source begins automatically when the microcontroller detects that the voltage on all phases of the Normal source has been restored.

When the Normal source restores, switching to the Normal source is initiated by energizing timer T, beginning its timer cycle. The T timer provides an adjustable delay to insure that the Normal source has stabilized before reconnection to the load. If the Normal source fails before the T time delay completes, the retransfer sequence is stopped.

When the T time delay is completed, the CCEO relay energizes the CEO solenoid to open the switch out of Emergency and into a neutral position. The switch remains in neutral for the DT time delay. When the DT time delay has elapsed, the CCN relay energizes the CN solenoid to complete retransfer of the switch into the normal source. The SN limit switch activates to de-energize the CCN relay. Simultaneously, the engine overrun timer U begins its timing cycle. This timer provides a period of time for the engine generator to run without load and cool down before shutdown.

User Settings

All user settings are adjustable on the back of the MX100 display. *Figure 6* shows the MX100 user adjustments.

Voltage and Frequency Pickup/Dropout Adjustments

Normal Pickup Voltage %: Pickup voltage is adjustable from 85 to 100% of nominal line voltage. Standard factory setting is 90%.

Normal Dropout Voltage %: The dropout voltage is adjustable from 75 to 98% of nominal line voltage. Standard factory setting is 80%. Dropout must be a minimum of 2% below Normal pickup voltage under all conditions. *Note:* The microprocessor will automatically set the Normal dropout voltage 2% below the Normal pickup voltage if it is not properly set by the user.

Normal Pickup Frequency %: The pickup frequency is adjustable from 90 to 100% of nominal line frequency. Standard factory setting is 90%.

Emergency Pickup Voltage %: The pickup voltage is adjustable 85 to 100% of nominal line voltage. The standard factory setting is 90%.

Emergency Dropout Voltage %: The dropout voltage is adjustable from 75 to 98% of nominal line voltage. Standard factory setting is 80%. Emergency dropout voltage must be a minimum of 2% below emergency pickup voltage under all conditions. *Note:* The microprocessor will automatically set the Emergency dropout voltage 2% below the Emergency pickup voltage if it is not properly set by the user.

Emergency Pickup Frequency %: The pickup frequency is adjustable from 90 to 100% of nominal line frequency. Dropout is fixed at 2 Hz below pick-up. Dropout has a 5 second delay. Standard factory setting is 95%.

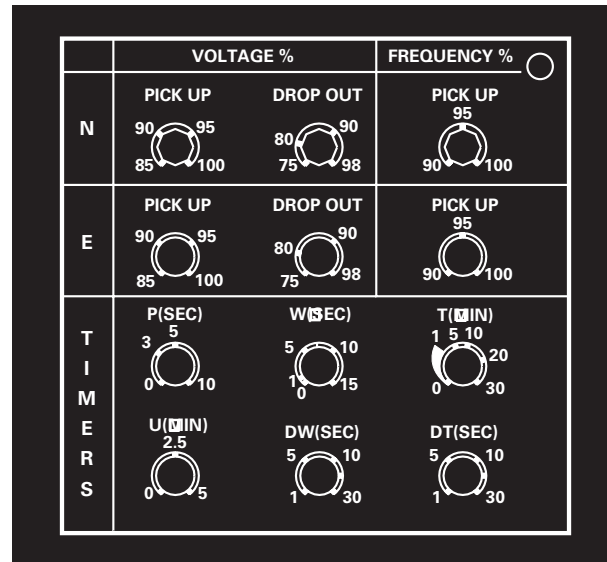


Figure 7 – Delayed Transition User Adjustments

Factory Settings of Voltage, Frequency and Timer Adjustments	
Normal Pickup Voltage	90% Nominal V
Normal Dropout Voltage	80% Nominal V
Normal Pickup Frequency	90% Nominal F
Emergency Pickup Voltage	90% Nominal V
Emergency Dropout Voltage	80% Nominal V
Emergency Pickup Frequency	95% Nominal F
P Timer	3 seconds
W Timer	1 second
T Timer	30 minutes
U Timer	5 minutes
DW Timer *	5 seconds
DT Timer *	5 seconds
TA5 **	5 seconds
TA6 **	5 seconds

* Delayed

V = Line Voltage

** Standard w/A6 or T3/W3

F = Line Frequency

NOTE: All adjustments are factory preset to values in the table above, unless otherwise specified by the user.

User Settings *(cont'd)*

Timer Adjustments

P Timer (delay to engine start). Time delay before engine start after Normal voltage failure: adjustable 0 to 10 seconds. P timer is designed to avoid engine starts on momentary Normal source failures. Standard factory setting is 3 seconds.

W Timer (delay to Emergency or delay to open Normal timer). Time delay before initiating transfer to Emergency: adjustable 0 to 15 seconds. Standard factory setting is 1 second. After the successful acquisition of correct Emergency voltage and frequency, the W timer function provides a time delay before initiating transfer to Emergency. This permits the Emergency source to stabilize. On completion of the time out, transfer to Emergency is initiated.

Transfer to Emergency is non-commit. This means that should the Normal voltage be restored before the timeout of the W timer, the ATS will remain in the Normal position and initiate the delay to engine stop timer.

T Timer (delay to Normal or delay to open Emergency). Time delay before initiating retransfer to Normal: adjustable 0 to 30 minutes. Standard factory setting is 30 minutes. On return of acceptable Normal voltage the time delay is initiated. T time delay ensures Normal source has stabilized before transferring to Normal position. On completion of the time out, transfer to Normal is initiated. Should Emergency power fail when the ATS is in the Emergency position, the T timer function will be bypassed when normal power is restored.

U Timer (delay engine stop). Time delay to engine stop, after retransfer to Normal, for purpose of cooling the engine after the load is removed: adjustable 0 to 5 minutes. Standard factory setting is 5 minutes.

DW Timer (time delay from Open position to Emergency position). Delayed Transition Transfer only: adjustable 0 to 30 seconds. Standard factory setting is 5 seconds. DW timer activates when the switch enters open position on a transfer from Normal to Emergency. After time out, the transfer to Emergency is complete.

DT Timer (time delay from Open position to Normal position). Delayed Transition Transfer only: adjustable 0 to 30 seconds. Standard factory setting is 5 seconds. DT timer activates when the switch enters the open position on transfer from Emergency to Normal. After time out, the transfer to Normal is complete.

MX100, Standard Transition w/A6 or T3/W3
(A6 = motor load disconnect circuit)
(T3/W3 = elevator presignal circuit)

TA5 (presignal time delay to normal). Time delay is available only on standard transition ATSs specifically configured with the presignal circuit. Adjustable 0 to 30 seconds. Standard factory setting is 5 seconds.

TA6 (presignal time delay to emergency). Time delay is available only on standard transition ATSs specifically configured with the presignal circuit. Adjustable 0 to 30 seconds. Standard factory setting is 5 seconds.

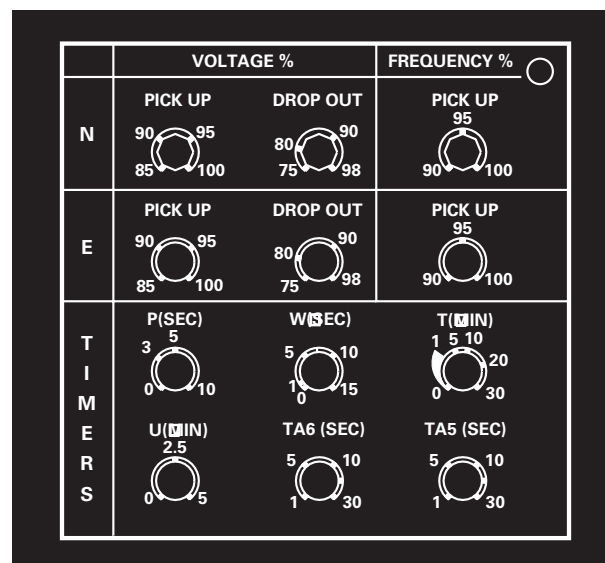


Figure 8 - Standard Transition w/A6 or T3/W3 User Adjustments

Maintenance and Testing

⚠ CAUTION ⚠

Due to hazardous voltage and current, GE Zenith recommends that a GE Zenith Certified technician or a qualified electrician must perform the installation and maintenance of the switch.

⚠ WARNING ⚠

Both power sources must be disconnected before manual operation of the switch.

A preventive maintenance program will insure high reliability and long life for the transfer switch. The preventive maintenance program for the transfer switch should include the following items:

Inspection and Cleaning

The switch should be inspected for any accumulation of dust, dirt, or moisture, and should be cleaned by vacuuming or wiping with a dry cloth or soft brush. do not use a blower since debris may become lodged in the electrical and mechanical components and cause damage.

Remove the transfer switch barriers and check the condition of the contacts. Any surface deposits must be removed with a clean cloth (do not use emery cloth or a file). If the contacts are pitted or worn excessively, they should be replaced. A general inspection of mechanical integrity should be made to include loose, broken or badly worn parts.

Servicing

All worn or inoperative parts must be replaced using GE Zenith recommended replacement parts. Please refer to the Replacement Parts manual for specific part information and ordering procedures. Please contact the GE Zenith Technical Services Department for the Replacement Parts manual.

The operating mechanism of the transfer switch is lubricated with Lubriplate 105. The lubricant applied at the factory provides adequate lubrication for the lifetime of the switch. Should debris contaminate the mechanism, clean and apply additional Lubriplate.

GE Zenith can provide complete preventative maintenance services. Please contact the GE Zenith Technical Services Department for additional information.

Testing

A manual operator handle is provided with the transfer switch for maintenance purposes only. Manual operation of the switch must be checked before it is operated electrically. **Both power sources must be disconnected before manual operation of the switch.** Insert the handle and operate the transfer switch between the Normal and Emergency positions. The transfer switch should operate smoothly without binding. Return the switch to the Normal position, remove the handle, and return it to the holder provided.

After completing the inspection, cleaning and servicing of the transfer switch, reinstall the switch cover, and close and lock the cabinet door. Reclose the circuit breakers feeding the utility and generator sources to the switch.

Initiate the electrical transfer test by activating the TS test switch. P timer will time out and the microcontroller will send an engine start signal. When the W time has elapsed, the switch will complete its transfer by closing into the Emergency source.

Deactivating the test switch will start retransfer to the Normal source. The switch will complete its retransfer to Normal after the time delay of the T timer. The U engine overrun timer allows the engine generator to run unloaded for a preset cool down period.

NOTE: A periodic test of the transfer switch under load conditions is recommended to insure proper operation. (See National Electric Code articles 700 and 701).

⚠ WARNING ⚠

When performing a hi-pot or dielectric test on the power section, DISCONNECT the control panel plugs from the microprocessor to avoid potential damage.

Troubleshooting and Diagnostics

⚠ DANGER ⚠

HAZARDOUS VOLTAGES CAN CAUSE SEVERE INJURY OR DEATH.

These charts may indicate problems that require authorized GE Zenith service personnel.
Hazardous voltages may exist on termination plugs other than those that go into the MX100.

General Troubleshooting

The following troubleshooting guide is used to recognize, and determine basic faults. When using this guide, it will ask several questions about the condition of the switch. This guide will then list an order of the possible faults. You will then look at the first suspected fault to determine if it is the problem. If it is not a fault, you go to the second suspected fault. If you go through all of the suspected faults, or the chart instructs you to, call a GE Zenith Representative for further assistance.

NOTE: When you use the troubleshooting charts, the Annunciation column refers to the LED's on the control panel.

Symptom	Annunciation	Possible Cause(s)	Corrective Action
No engine start	EMERGENCY AVAILABLE LED off	Engine start wires not properly connected	Check engine start connections (Figure 2).
		Generator is in OFF position	Place Engine Control Switch in AUTO.
No engine stop	DELAY TO ENGINE STOP LED on	U timing cycle not complete	Check U timer setting.
	NORMAL AVAILABLE, NORMAL POSITION, and EMERGENCY AVAILABLE LEDs on	Engine start wires not properly connected	Check engine start connections (Figure 2).
		Generator in MANUAL	Place Engine Control Switch in AUTO.
ATS will not transfer to EMERGENCY	EMERGENCY AVAILABLE LED off	Emergency voltage or frequency not within settings	Check: engine start connections, generator breaker closed, generator output (compare to MX100 settings) and place engine control switch in AUTO.
	All LEDs off	Power supply harness unplugged (18 pin connector on MX100)	Plug in harness.
	NORMAL POSITION and EMERGENCY POSITION flashing	Limit switch harness unplugged	Plug in harness.
	DELAY TO OPEN NORMAL LED on	W timing cycle not complete	Check W Timer setting.
ATS will not transfer to NORMAL	NORMAL AVAILABLE LED off	Normal voltage or frequency not within acceptable parameters	Check: normal voltage within MX100 settings; verify Normal breaker source breaker is closed.
	All LEDs off	Power supply harness unplugged (18 pin connector on MX100)	Plug in harness.
	NORMAL POSITION and EMERGENCY POSITION LEDs flashing	Limit switch harness unplugged	Plug in harness.
	DELAY TO OPEN EMERGENCY LED on	T timing cycle not complete	Check T Timer setting.
Improper LED annunciation	Neither source available LEDs illuminate, position LED only	MX100 PC board may be configured for wrong frequency (60 Hz vs. 50 Hz)	1. Verify source voltage and frequency. 2. Consult GE Zenith Controls for information to reconfigure hardware.
	NORMAL and/or EMERGENCY AVAILABLE LEDs on when frequency is below the present pick up value	MX100 PC board may be configured for wrong frequency (60 Hz vs. 50 Hz)	1. Verify source voltage and frequency. 2. Consult GE Zenith Controls for information to reconfigure hardware.

Troubleshooting and Diagnostics *(cont'd)*

Diagnostic Annunciation

The MX100 controller incorporates diagnostics that allows ease of troubleshooting. Diagnostic annunciations are flashing position LEDs. The symptoms that the diagnostic annunciation indicate include inhibiting transfer or incorrect transfer sequence. A more general troubleshooting chart that addresses system problems precedes these charts.

⚠ DANGER ⚠

HAZARDOUS VOLTAGES CAN CAUSE SEVERE INJURY OR DEATH.

These charts may indicate problems that require authorized GE Zenith service personnel.

Hazardous voltages may exist on termination plugs other than those that go into the MX100.

Standard Transition ATS

**(Two Position ATS—Normal and Emergency)
(Not for Standard Transition w/A6)**

⚠ WARNING ⚠

If limit switch plug is disconnected or reconnected and power is available, the switch may transfer.

Use caution when servicing.

Symptom	Annunciation	Possible Cause(s)	Corrective Action
ATS will not transfer out of Normal	Flashing NORMAL POSITION LED	Solenoid circuit	Contact authorized GE Zenith service representative.
ATS will not transfer out of Emergency	Flashing EMERGENCY POSITION LED	Solenoid circuit	Contact authorized GE Zenith service representative.
ATS will not transfer; ATS is not in a defined position as indicated by the limit switch contact (no SN or SE limit switch input)	Flashing NORMAL POSITION and EMERGENCY POSITION LEDs	1. Limit switch plugs not connected 2. Limit switches not within adjustment	1. Connect all plugs to the MX100. 2. Contact authorized GE Zenith service representative.

Troubleshooting and Diagnostics *(cont'd)*

Delayed Transition ATS

(Three Position ATS—Normal, Open and Emergency)

⚠ WARNING ⚠

If limit switch plug is disconnected or reconnected and power is available, the switch may transfer.

Use caution when servicing.

Symptom	Annunciation	Possible Cause(s)	Corrective Action
ATS will not transfer out of Normal	Flashing NORMAL POSITION LED	Solenoid circuit	Put ZTG in AUTO. Disconnect and reconnect MX100 18 pin plug. Contact authorized GE Zenith service representative.
ATS will not transfer out of Emergency	Flashing EMERGENCY POSITION LED	Solenoid circuit	Put ZTG in AUTO. Disconnect and reconnect MX100 18 pin plug. Contact authorized GE Zenith service representative.
ATS will not transfer out of Open position	Flashing OPEN POSITION LED	Solenoid circuit	Put ZTG in AUTO (ref. ZTC Power Panel Manual 51R-1000). Disconnect and reconnect MX100 18 pin plug. Contact authorized GE Zenith service representative.
ATS is not in a defined position as indicated by the limit switch contacts (no SN or SNO limit switch inputs)	Flashing NORMAL POSITION and OPEN POSITION LEDs	Limit switches not registered as opened or closed	Contact authorized GE Zenith service representative.
ATS is not in a defined position as indicated by the limit switch contacts (no SN or SEO limit switch inputs)	Flashing EMERGENCY POSITION and OPEN POSITION LEDs	Limit switches not registered as opened or closed	Contact authorized GE Zenith service representative.
ATS is not in a defined position as indicated by the limit switch contacts (no SN, SE, SNO, or SEO limit switch inputs)	Flashing NORMAL POSITION, OPEN POSITION and EMERGENCY POSITION LEDs	1. Limit switch plugs not connected 2. Limit switches not registered as opened or closed	Connect all plugs to the MX100.

Troubleshooting and Diagnostics *(cont'd)*

Standard Transition ATS (with A6)

⚠ WARNING ⚠

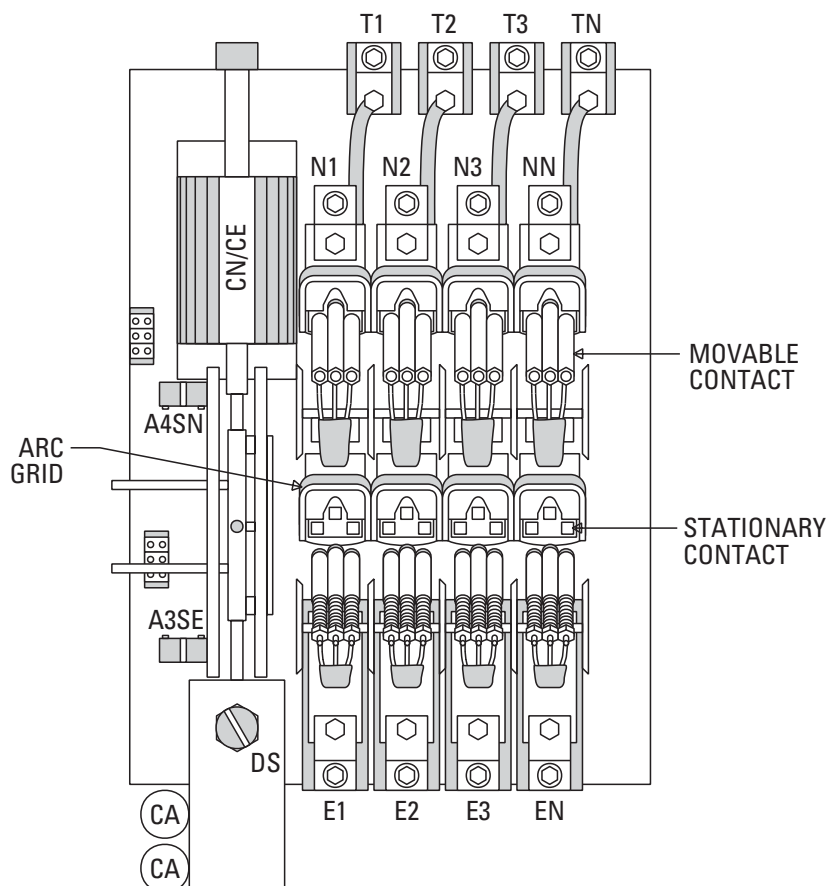
If limit switch plug is disconnected or reconnected and power is available, the switch may transfer.

Use caution when servicing.

Symptom	Annunciation	Possible Cause(s)	Corrective Action
ATS will not transfer out of Normal; motor load still connected	Flashing NORMAL POSITION LED	Motor load disconnect relay is <u>not</u> latching	Check connections to RA6 relay.
ATS will not transfer out of Emergency; motor load still connected	Flashing EMERGENCY POSITION LED	Motor load disconnect relay <u>is</u> latched	Check connections to RA6 relay.
ATS will not transfer after motor load disconnect operated	Flashing MOTOR CONTROL OFF LED	Solenoid circuit	Contact authorized GE Zenith service representative.
ATS is not in a defined position as indicated by the limit switch contacts (no SN or RA6 limit switch inputs)	Flashing NORMAL POSITION and MOTOR CONTROL OFF LEDs	Limit switches not registered as closed or RA6 contact is not registered	Contact authorized GE Zenith service representative.
ATS is not in a defined position as indicated by the limit switch contacts (no SE or RA6 limit switch inputs)	Flashing EMERGENCY POSITION and MOTOR CONTROL OFF LEDs	Limit switches not registered as closed or RA6 contact is not registered	Contact authorized GE Zenith service representative.
ATS is not in a defined position as indicated by the limit switch contacts (no SN, SE, SNO, or SEO limit switch inputs)	Flashing NORMAL POSITION, OPEN POSITION and EMERGENCY POSITION LEDs	1. Limit switch plugs not connected 2. Limit switches not registered as opened or closed	Connect all plugs to the MX100.

Replacement Parts

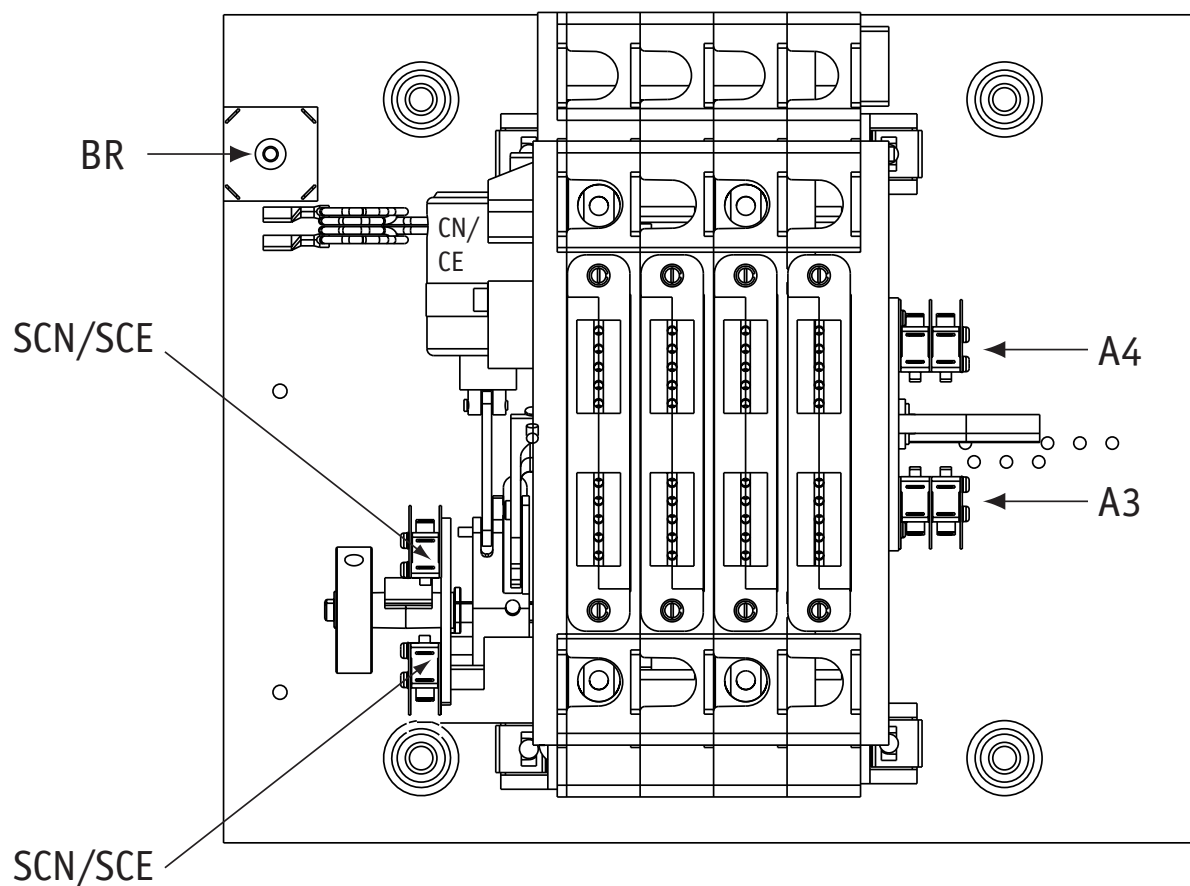
Power Panel — 40 to 260 Amps Linear Actuator Type



Tag	Description	Recommended as Spares	Stock Numbers by Amperage					
			40	80	100	150	225	260
N 1,2,3, N E 1,2,3, N T 1,2,3, N	Cable Connection Lug		PS-4419	PS-4423	PS-4423	27P-1128	27P-1126	27P-1127
	Wire Size		#14-2	#14-1/0	#14-1/0	#8-3/0	#6 to 250 MCM	#6 to 350 MCM
	Stationary Contact Assembly Kit		27P-1141	27P-1141	27P-1141	27P-1111	27P-1111	27P-1111
	Stationary Load Contact Assembly Kit		27P-1140	27P-1140	27P-1140	27P-1109	27P-1109	27P-1109
	Arc Grid Assembly Kit		27P-1142	27P-1142	27P-1142	27P-1142	27P-1142	27P-1142
	Movable Contact Assembly Kit		27P-1036	27P-1036	27P-1036	27P-1037	27P-1037	27P-1037
CN/CE, CA	Linear Actuator and Capacitors	*						
	Note: 2S denotes two capacitors wired in series		Coil Volts	Poles	CN/CE	Quantity	Part	mf
			120	2	K-2104PN	1	PS-4007	340-408
			240	2	K-2105PN	1	PS-4016	108-130
				3				
			208	3	K-2141PN	1	PS-4084	145-174
				4	K-2142PN	1	PS-4084	145-174
			575/600	3	K-2198PN	2S	PS-4083	36-43
				4	K-2197PN	2S	PS-4083	36-43
			480	3	K-2119PN	2S	PS-4008	72-86
				4	K-2111PN	2S	PS-4008	72-86
			416	3	K-2190PN	2S	PS-4008	72-86
SN	CN1 Cut-out Switch		L-5022					
SE	CE1 Cut-out Switch		L-5022					
A3	Emergency Position Auxiliary Contact		SPDT, L-5022; DPDT, L-5021					
A4	Normal Position Auxiliary Contact		SPDT, L-5022; DPDT, L-5021					
DS	Disconnect Switch (older versions)	*	Operator L-4018; Contact Block L-1028					

Replacement Parts *(cont'd)*

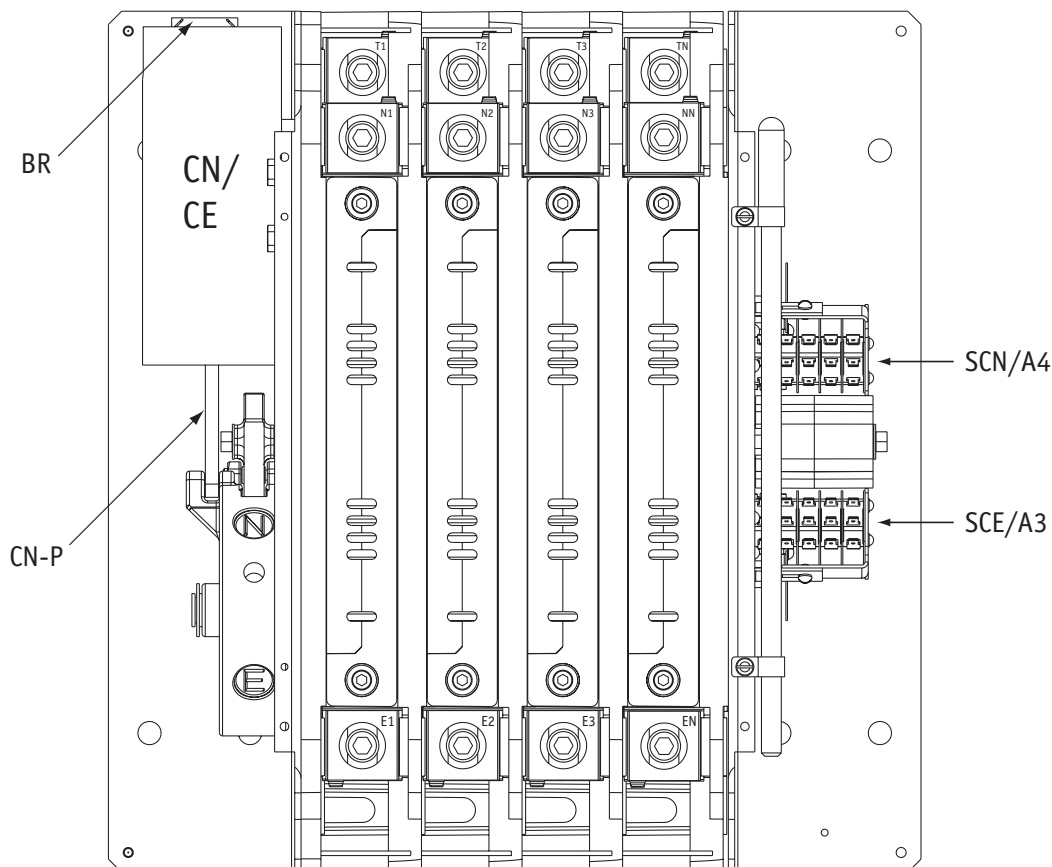
Power Panel — 40 to 225 Amps Solenoid Type



Tag	Description	Recommended as Spares	40 to 225 Amps	
CN/CE	Solenoid	*	120	K-2207
			208	K-2208
			220	K-2208
			240	K-2228
			277	K-2211
			380/416	K-2212
			440/480	K-2209
			575/600	K-2213
	Solenoid Plunger and Link	*	ALL	57P-1030
SCN/SCE	Coil Cutout Switch		120-480V	L-3078
SCN/SCE	Coil Cutout Switch		600V	L-4027
BR	Rectifier	*	ALL	PS-5152
A3/A4	Auxiliary Contacts			L-3078

Replacement Parts *(cont'd)*

Power Panel – 225 to 400 Amps Molded Type

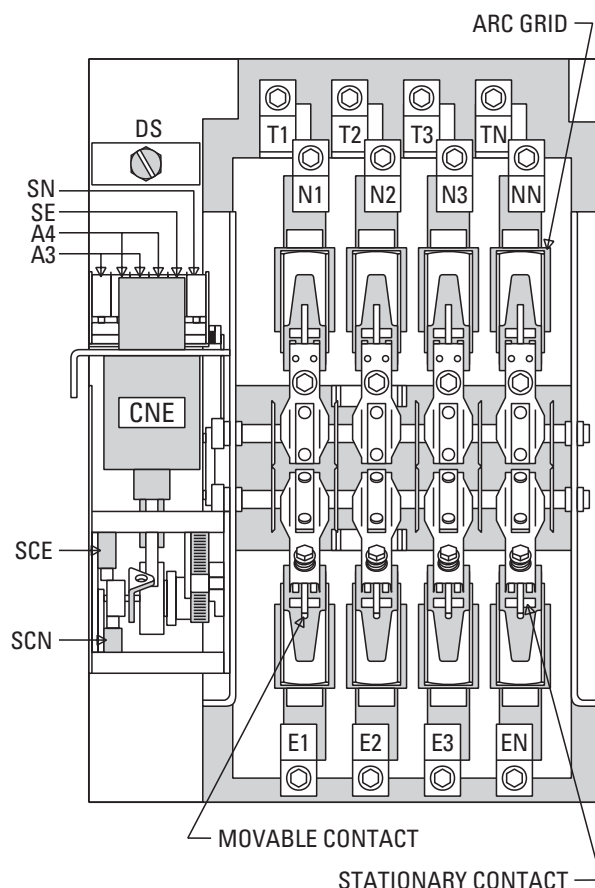


Tag	Description	Recommended as Spares	Stock		
			225, 250*	260, 300*	400
N 1,2,3 N E 1,2,3 N T 1,2,3 N	Cable Connection Lug		S-2701	S-2701	S-2701
	Wire Size			#4-600 MCM	#4-600 MCM
			Coil Volts		
CN/CE	Solenoid	*	120	K-2229	
			208/220	K-2230	
			240	K-2231	
			277	K-2232	
			380/416	K-2233	
			440/480	K-2234	
			575/600	K-2235	
CN-P	Solenoid Plunger and Link	*	58P-1029		
SCN/SCE	Coil Cutout Switches		L-3079		
A3/A4	Auxiliary Contacts		L-3078		
BR	Rectifier	*	PS-5152		

* IEC ratings only

Replacement Parts *(cont'd)*

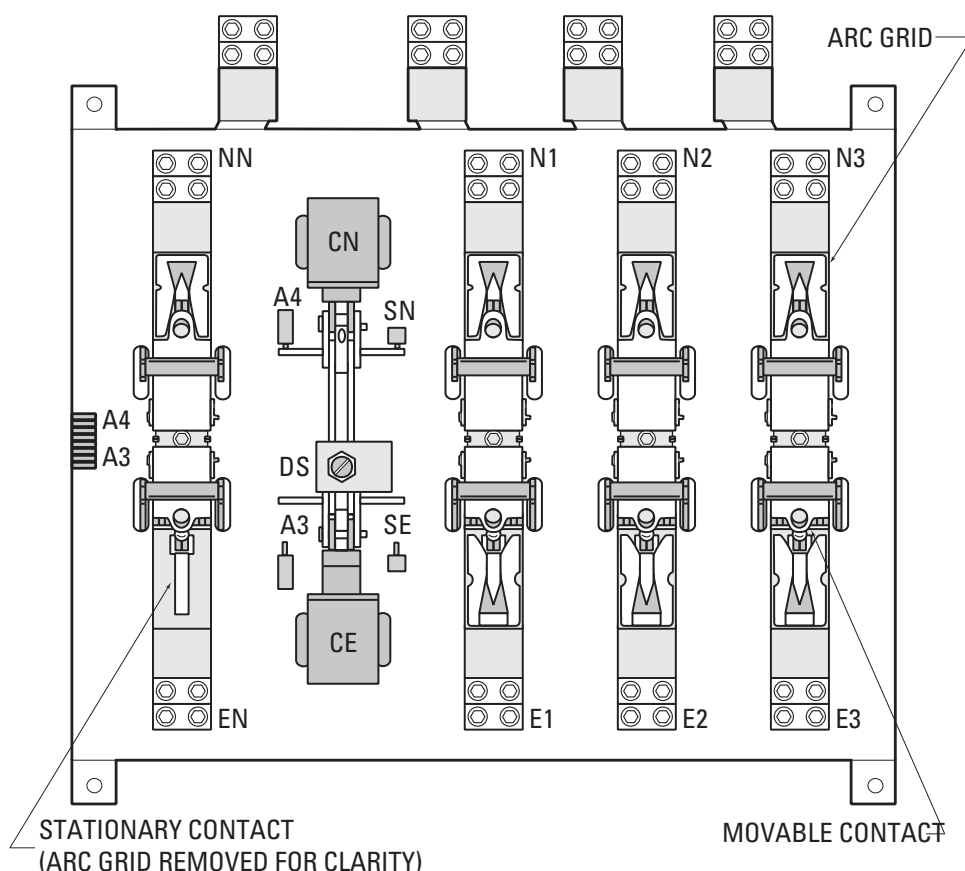
Power Panel — 400 Amps Metal Frame Type



Tag	Description			Recommended as Spares	Part Number
400					
N 1,2,3, N E 1,2,3, N T 1,2,3, N	Normal	Cable Connection Lugs #4-600 MCM			PS-1815F
	Emergency				
	Load				PS-1815
	Normal Side Line Contact Kit				46P-1100E
	Normal Side Neutral Contact Kit				46P-1101E
	Emergency Side Line Contact Kit				46P-1102E
	Emergency Side Neutral Contact Kit				46P-1103E
	Arc Chute and Runner				46P-1140
CNE	Main ATS Operating Coils	Coil Volts	Poles	*	
		120	2		K-2178
		240	2,3,4		K-2189
		208	2,3,4		K-2177
		575/600	2,3,4		K-2196
		480	2,3,4		K-2176
		416	2,3,4		K-2188
		380	2,3,4		K-2188
SN	CN1 Limit Switch			L-5021	
SE	CE1 Limit Switch				
A3	ATS Emergency Position Switch				
A4	ATS Normal Position Switch				
SCN/SCE	CNE Limit Switches			L-3079	
DS	ATS Solenoid Disconnect Switch				
	Operator 2 – Position Maintain			L-4018	
	Contact Block N.C. (1)			L-1029	
BR	Rectifier			PS-5152	

Replacement Parts *(cont'd)*

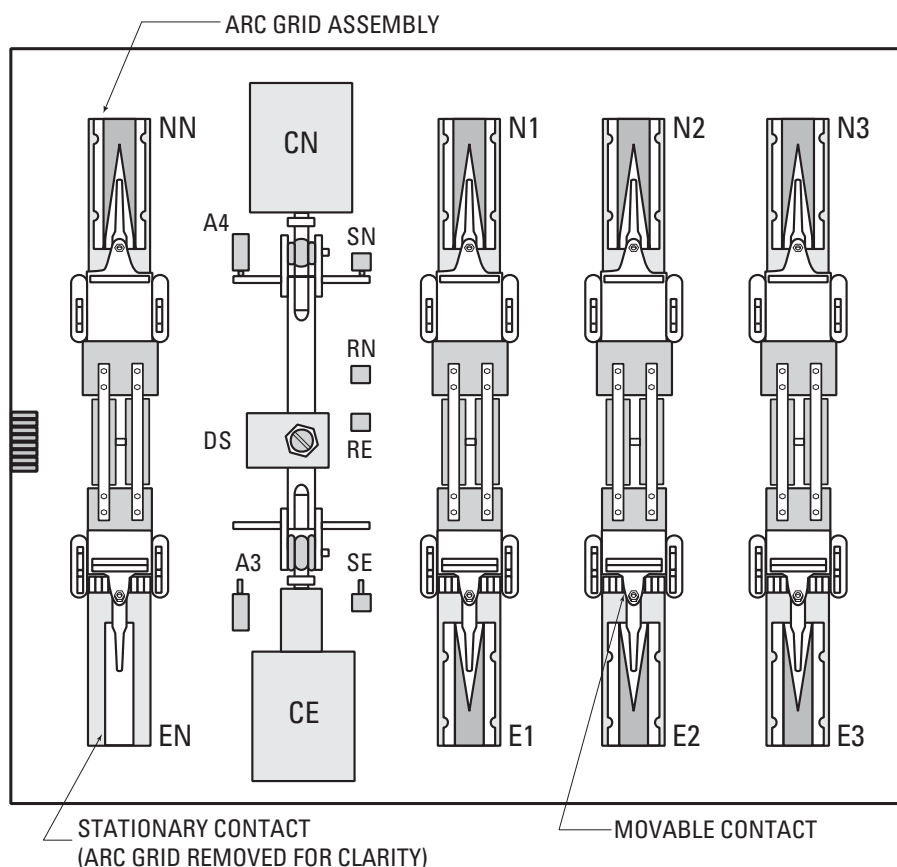
Power Panel — 600 to 1200 Amps



Tag	Description	Recommended as Spares	Stock Numbers by Amperage					
			600	800	1000	1200		
N 1,2,3, N E 1,2,3, N T 1,2,3, N	Cable Connection Lug		S1393F (2)	S1392F (4)	S1392F (4)	S1392F (4)		
	Wire Size		#2-600 MCM	#2-600 MCM	#2-600 MCM	#2-600 MCM		
	Stationary Contact Assembly Kit		Consult Factory					
	Arc Grid Assembly Kit		23P-1366					
	Movable Contact Assembly Kit		Consult Factory					
CN/CE	Main Operating Coils	Coil Volts	Poles	*				
		120	2		K-2090F	K-2073F	K-2073F	K-2073F
		240	2		K-2092F	K-2070F	K-2070F	K-2070F
			3		K-2078F	K-2070F	K-2070F	K-2070F
			4		K-2091F	K-2074F	K-2074F	K-2074F
		208	3,4		K-2091F	K-2074F	K-2074F	K-2074F
		575/600	3		K-2095F	K-2095F	K-2155F	K-2155F
			4		K-2094	K-2094	K-2155F	K-2155F
		480	3		K-2080F	K-2071F	K-2071F	K-2071F
			4		K-2079F	K-2071F	K-2071F	K-2071F
		416	3		K-2080F	K-2071F	K-2071F	K-2071F
		SN	CCN Cutout Switch	23P-1333		23P-1333		
		SE	CCE Cutout Switch	23P-1327		23P-1327	23P-1452	
A3	Emergency Position Auxiliary Contact	(Qty 1) 23P-1327 (Qty 2) 23P-1328 (Qty 3) 23P-1334 (Qty 4) 23P-1336						
A4	Normal Position Auxiliary Contact	(Qty 1) 23P-1333 (Qty 2) 23P-1334 (Qty 3) 23P-1328 (Qty 4) 23P-1330						
DS	Disconnect Switch (older versions)	Operator L-4009; Contact Block L-1020	*	Operator L-4009; Contact Block L-1020				

Replacement Parts *(cont'd)*

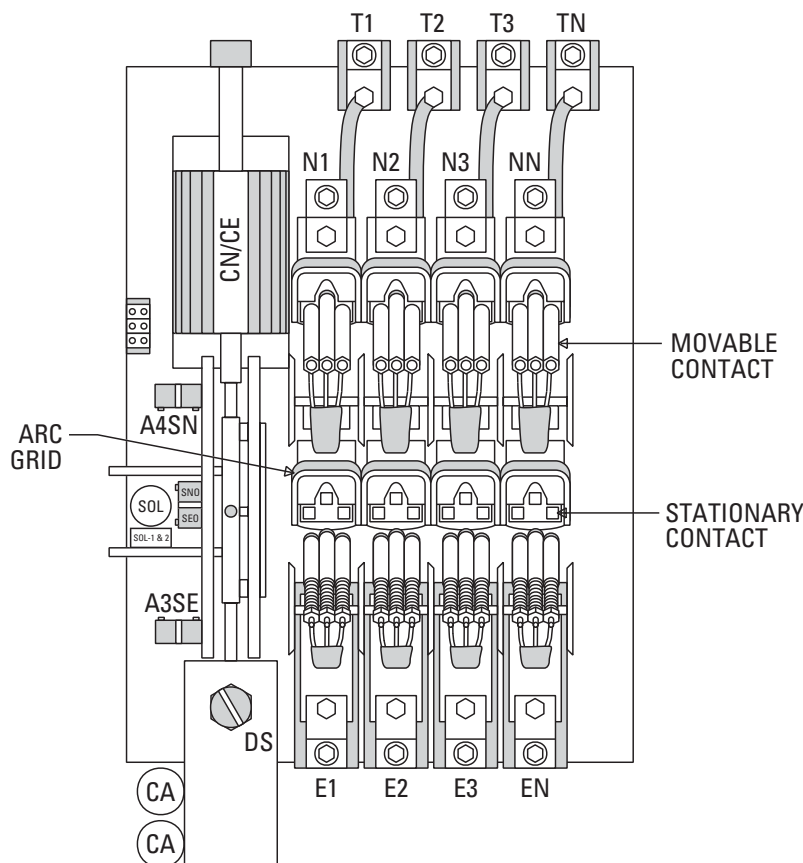
Power Panel — 1600 to 3000 Amps



Tag	Description	Recommended as Spares	Stock Numbers by Amperage		
			1600	2000	3000
N 1,2,3 E 1,2,3 T 1,2,3	Cable Connection Lug		S1126F (2) Optional	S1126F (2) Optional	S1126F (2) Optional
	Wire Size		(8) #2-600 MCM	(8) #2-600 MCM	(8) #2-600 MCM
	Stationary Contact Assembly Kit		23P-1587	23P-1587	23P-1618
	Arc Grid Assembly Kit		23P-1171	23P-1171	23P-1171
	Movable Contact Assembly Kit		23P-1400	23P-1400	23P-1400
CN/CE					
	Main Operating Coils	Coil Volts			
		120	2		
		240	2,3		
		208	4		
		208	3		
		575/600	4		
		480	3		
		416	4		
SN	CCN Cutout Switch	23P-1352		23P-1352	
SE	CCE Cutout Switch	23P-1356		23P-1356	
A3	Emergency Position Auxiliary Contact	(Qty 1) 23P-1356 (Qty 2) 23P-1357 (Qty 3) 23P-1353 (Qty 4) 23P-1355			
A4	Normal Position Emergency Contact	(Qty 1) 23P-1352 (Qty 2) 23P-1353 (Qty 3) 23P-1357 (Qty 4) 23P-1359			
DS	Disconnect Switch (older version)	Operator L-4009; Contact Block L-1020	*	Operator L-4009; Contact Block L-1020	
RN, RE	Rectifier	PS-5151 (Up to 240V); PS-5151 (Up to 600V)	*	PS-5151 (Up to 240V); PS-5151 (Up to 600V)	

Replacement Parts *(cont'd)*

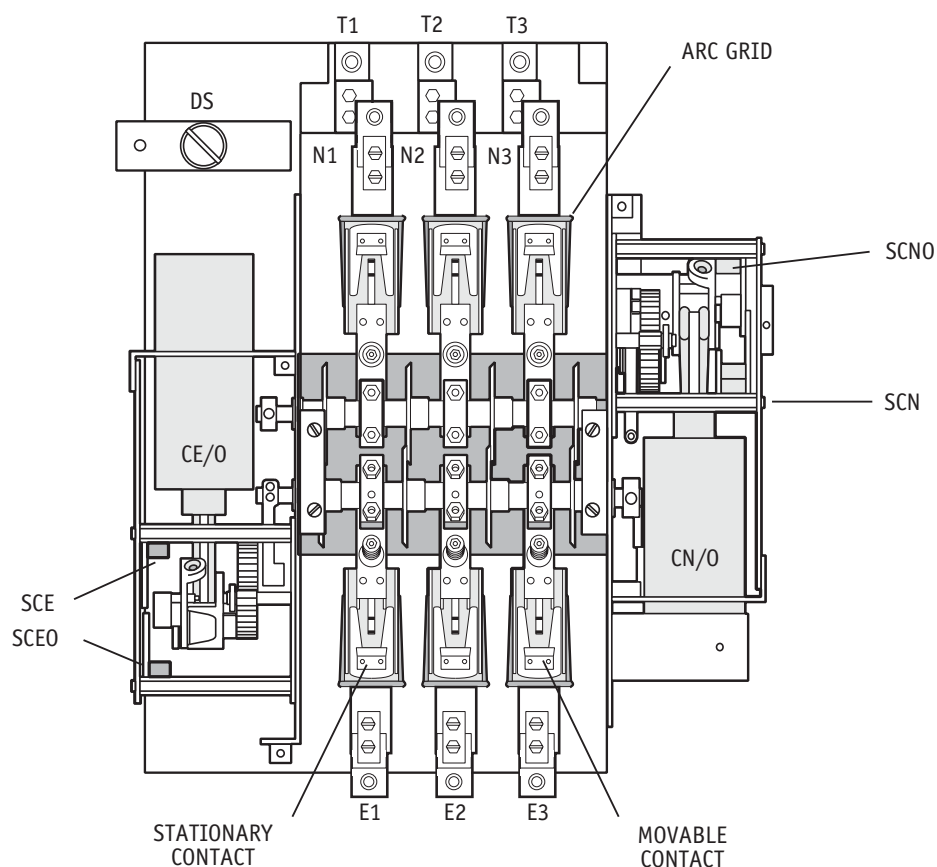
Delayed Transition — 40 to 260 Amps



Tag	Description	Recommended as Spares	Stock Numbers by Amperage					
			40	80	100	150	225	260
N 1,2,3, N E 1,2,3, N T 1,2,3, N	Cable Connection Lug		PS-4419	PS-4423	PS-4423	27P-1128	27P-1126	27P-1127
	Wire Size		#14-2	#14-1/0	#14-1/0	#8-3/0	#6 to 250 MCM	#6 to 350 MCM
	Stationary Contact Assembly Kit		27P-1141	27P-1141	27P-1141	27P-1111	27P-1111	27P-1111
	Stationary Load Contact Assembly Kit		27P-1140	27P-1140	27P-1140	27P-1109	27P-1109	27P-1109
	Arc Grid Assembly Kit		27P-1142	27P-1142	27P-1142	27P-1142	27P-1142	27P-1142
	Movable Contact Assembly Kit		27P-1036	27P-1036	27P-1036	27P-1037	27P-1037	27P-1037
CN/CE, CA	Linear Actuator and Capacitors	*	CA (See Note)					
	Note: 2S denotes two capacitors wired in series		Coil Volts	Poles	CN/CE	Quantity	Part	mf
			120	2	K-2104PN	1	PS-4007	340-408
			240	2	K-2105PN	1	PS-4016	108-130
				3				
			208	3	K-2141PN	1	PS-4084	145-174
				4	K-2142PN	1	PS-4084	145-174
			575/600	3	K-2198PN	2S	PS-4083	36-43
				4	K-2197PN	2S	PS-4083	36-43
			480	3	K-2119PN	2S	PS-4008	72-86
				4	K-2111PN	2S	PS-4008	72-86
			416	3	K-2190PN	2S	PS-4008	72-86
SN	CN1 Cut-out Switch		L-5022					
SE	CE1 Cut-out Switch		L-5022					
A3	Emergency Position Auxiliary Contact		SPDT, L-5022; DPDT, L-5021					
A4	Normal Position Auxiliary Contact		SPDT, L-5022; DPDT, L-5021					
DS	Disconnect Switch (older version)		Operator L-4018; Contact Block L-1028					
SOL	Center Position Solenoid		K-2204					

Replacement Parts *(cont'd)*

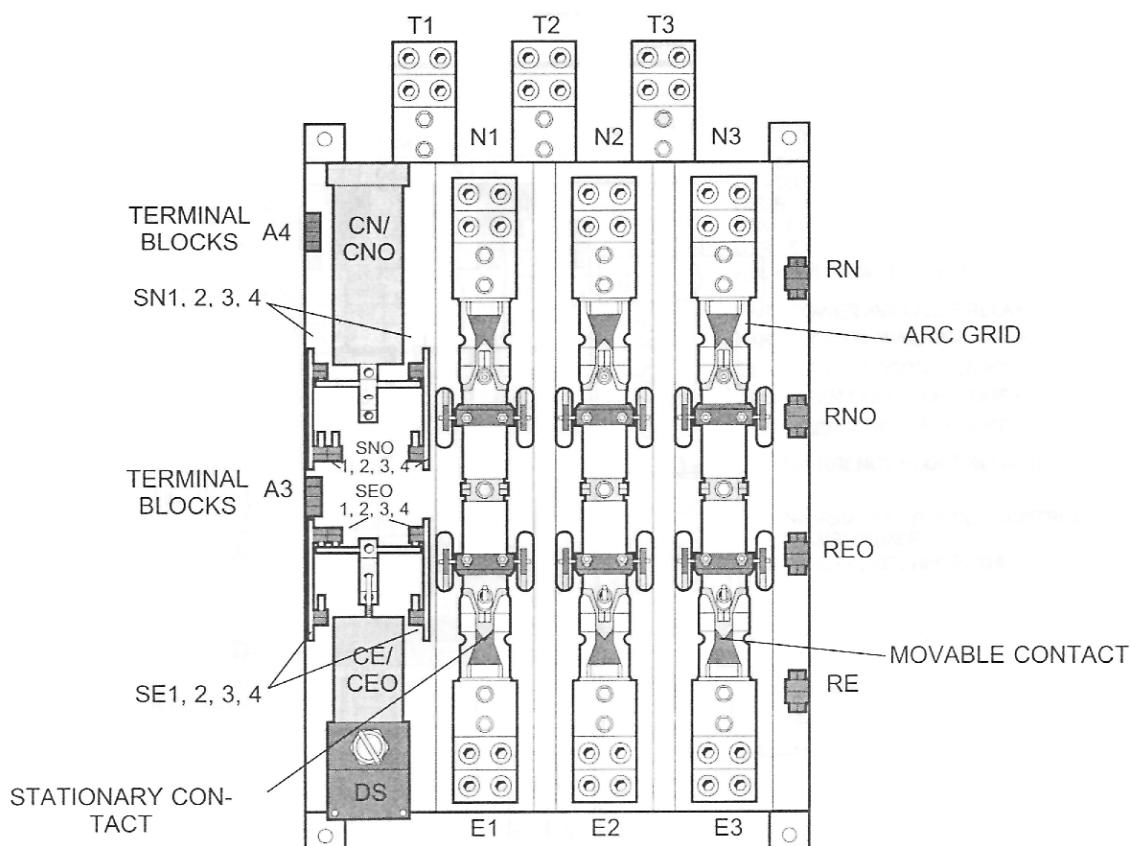
Delayed Transition — 400 Amps



Tag	Description	Recommended as Spares	Stock Numbers by Amperage		
			400		
NL 1,2,3 EL 1,2,3 T 1,2,3 NLN,ELN,TN	Cable Connection Lug, CU Wire		S-1422		
NL 1,2,3	Movable and Stationary Contact Assembly (For 3P Units)		46P-1100E		
NLN			46P-1101E		
EL 1,2,3			46P-1102E		
ELN			46P-1103E		
	Arc Grid Assembly Kit		46P-1099		
RTN/RTE	Coil Rectifier	*	PS-5152		
SCN/SCNO	Sol Limit Switch		L-3079		
SCE/SCE	Sol Limit Switch		L-3079		
SN/SNO	Emergency Position Contact		46P-1133		
SE/SEO	Normal Position Contact		46P-1133		
DS	Disconnect Switch	*	Operator: L-4018; Contact Block: L-1029		
CN/CNO CE/CEO	Main Operator Solenoids	*	See Chart Below		
Voltage System					
Volts	Ph	Wire	Coil VDC	Pole	Solenoid Part No. VDC
240	3	3	240	3	K-2189
120/208	3	4	208	3,4	K-2177
480	3	3	480	3	K-2176
277/480	3	4	480	3,4	K-2176
240/416	3	4	416	3	Consult Factory

Replacement Parts *(cont'd)*

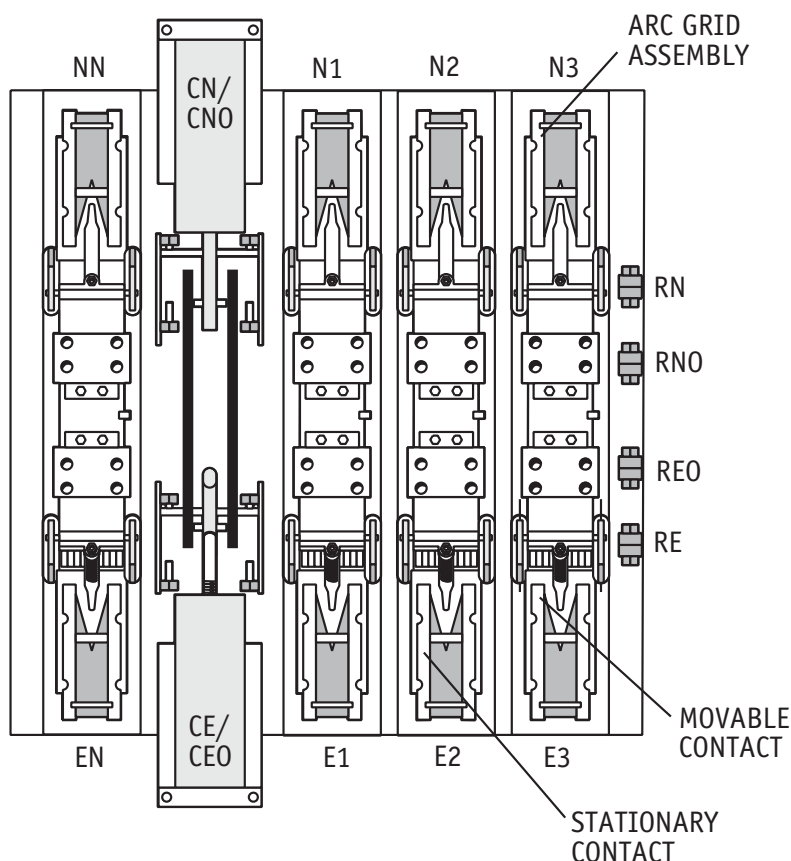
Delayed Transition — 600 to 1200 Amps



Tag	Description	Recommended as Spares	Stock Numbers by Amperage			
			600	800-1200		
NL 1,2,3 EL 1,2,3 T 1,2,3 NN, EN, TN	Cable Connection Lug, CU Wire		S-1393F (2) 600MCM-2	S-1392F (4) 600MCM-2		
	Stationary Contact Assembly Kit		23P-1471	26P-1336		
	Arc Grid Assembly Kit		23P-1366	23P-1366		
	Movable Contact Assembly Kit		23P-1469	26P-1334		
	Movable Contact		23P-1470	26P-1335		
RN/RNO RE/REO	Coil Rectifier	*	PS-5151 (Up to 240 VAC) PS-5151 (Up to 600 VAC)			
SN/SNO	Limit Switch		23P-1535(L); 23P-1533(R)			
SE/SEO	Limit Switch		23P-1536(L); 23P-1534(R)			
A3	Emergency Position Auxiliary Contact		23P-1536			
A4	Normal Position Auxiliary Contact		23P-1535			
DS	Disconnect Switch	*	Operator: L-4009; Contact Block: L-1020			
CN/CNO CE/CEO	Main Operator Solenoids	*	See Chart Below			
Voltage System				Solenoid Part No.		
Volts	Ph	Wire	Coil VDC	Pole	600	800-1200
240	3	3	240	3	K-2146	K-2147
120/208	3	4	208	3,4	K-2146	K-2147
480	3	3	480	3	K-2158	K-2157
277/480	3	4	480	3,4	K-2158	K-2157
240/416	3	4	416	3	Consult Factory	

Replacement Parts *(cont'd)*

Delayed Transition — 1600 to 3000 Amps

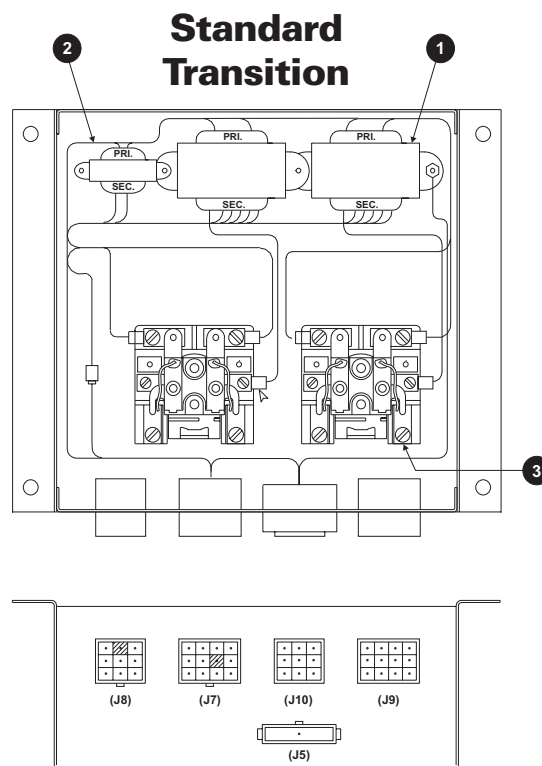


Tag	Description	Recommended as Spares	Stock Numbers by Amperage			
			1600	2000	3000	
N 1,2,3 E 1,2,3 T 1,2,3 NLN,ELN	Cable Connection Lug, CU Wire		S-1126F(2) Optional (8) 600MCM-2			
	Stationary Contact Assembly Kit		23P-1587	23P-1587	23P-1618	
	Arc Grid Assembly Kit		23P-1171	23P-1171	23P-1171	
	Movable Contact Assembly Kit		23P-1400	23P-1400	23P-1344	
CN/CNO CE/CEO	Main Operator Solenoids	*	See Chart Below			
Voltage System						
Volts	Ph	Wire	Coil VDC	Pole	Solenoid Part No.	
120	1	2	120	2	S.P.O.	S.P.O.
120/240	1	3	240	2,3	K-2151	K-2151
240	3	3	240	3	K-2151	K-2151
120/208	3	4	208	3,4	K-2151	K-2151
480	3	3	480	3	K-2160	K-2160
575	3	3	575/600	3	S.P.O.	S.P.O.
277/480	3	4	480	3,4	K-2160	K-2160
120/240	2	4	240	4	K-2151	K-2151
240/416	3	4	416	3	Consult Factory	
Operating Coil Hardware Kit						
SN/SNO-1,2		Switch Bracket Assembly		23P-1540	23P-1540	23P-1540
SE/SEO-1,2		Switch Bracket Assembly		23P-1541	23P-1541	23P-1541
SN/SNO-3,4		Switch Bracket Assembly		23P-1542	23P-1542	23P-1542
SE/SEO-3,4		Switch Bracket Assembly		23P-1543	23P-1543	23P-1543

Relay/Transformer Box (R/T Box)

Each MX100 microprocessor based ATS controller requires a relay/transformer box to apply line voltage to the ATS operator via coil control relays. Also required is a means to power the MX100 printed circuit board and a means to apply sensing voltage proportional to line voltage. This is accomplished by the relay transformer box. This method of switching operator voltage and applying power and sensing voltage to the printed circuit board isolates the MX100 from the line voltage, further protecting the controller from harmful line transients. Two versions of the R/T box exist depending on the type of ATS (standard transition or delayed transition).

The following layout drawings of the R/T box components (standard and delayed transition) include a bill of materials for replacement parts. Schematics are included to indicate proper wiring.



40-400 Amp Molded Power Section

R/T Box Assembly Part No.	Primary Voltage at 50/60 Hz	1VA XFMR Part No.	25VA XFMR Part No.
50P-1015	120V	K-3216	K-3224
50P-1016	208-220V	K-3217	K-3225
50P-1017	230-240V	K-3218	K-3226
50P-1018	277V	K-3219	K-3227
50P-1019	380-400V	K-3220	K-3228
50P-1020	416-440V	K-3221	K-3229
57P-1121	460-480V	K-3222	K-3230
57P-1122	575-600V	K-3223	K-3231

40-4000 Amp - All Other Standard Types

R/T Box Assembly Part No.	Primary Voltage at 50/60 Hz	1VA XFMR Part No.	25VA XFMR Part No.
50P-1005	120V	K-3216	K-3224
50P-1006	208-220V	K-3217	K-3225
50P-1007	230-240V	K-3218	K-3226
50P-1008	277V	K-3219	K-3227
50P-1009	380-400V	K-3220	K-3228
50P-1010	416-440V	K-3221	K-3229
50P-1011	460-480V	K-3222	K-3230
50P-1012	575-600V	K-3223	K-3231

Bill of Material

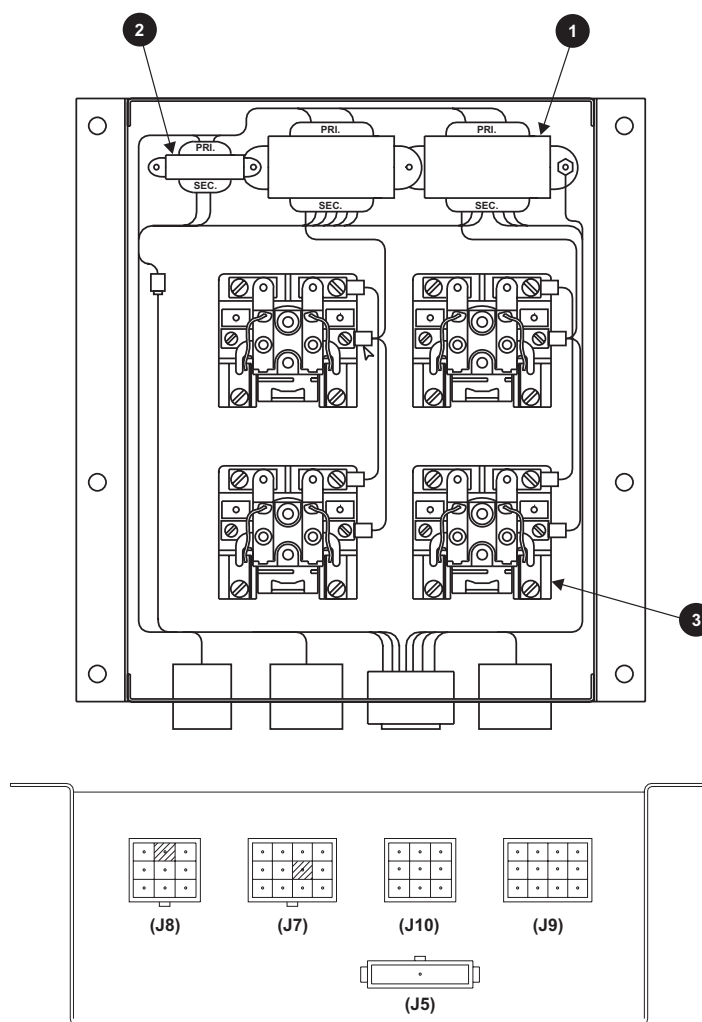
Item	Part No.	Description	Qty
1	See Chart	Transformer (1 VA)	2
2	See Chart	Transformer (25 VA)	2
3	K-1274	Relay Flange Mounted	2

Bill of Material

Item	Part No.	Description	Qty
1	See Chart	Transformer, 25VA	2
2	See Chart	Transformer, 1VA	1
3	K-1260	Coil Control Relay, 24V	2

Relay/Transformer Box (R/T Box) *(cont'd)*

Delayed Transition



Bill of Material

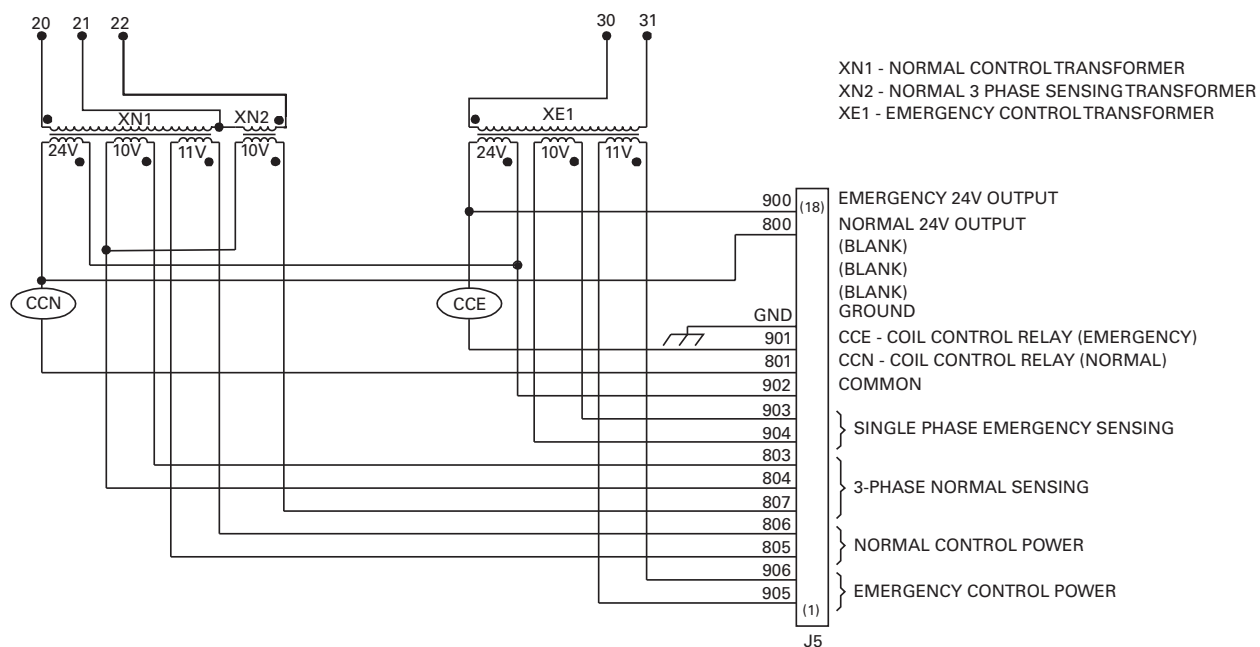
Item	Part No.	Description	Qty
1	See Chart	Transformer, 25VA	2
2	See Chart	Transformer, 1VA	1
3	K-1260	Coil Control Relay, 24V	4

Transformer Usage

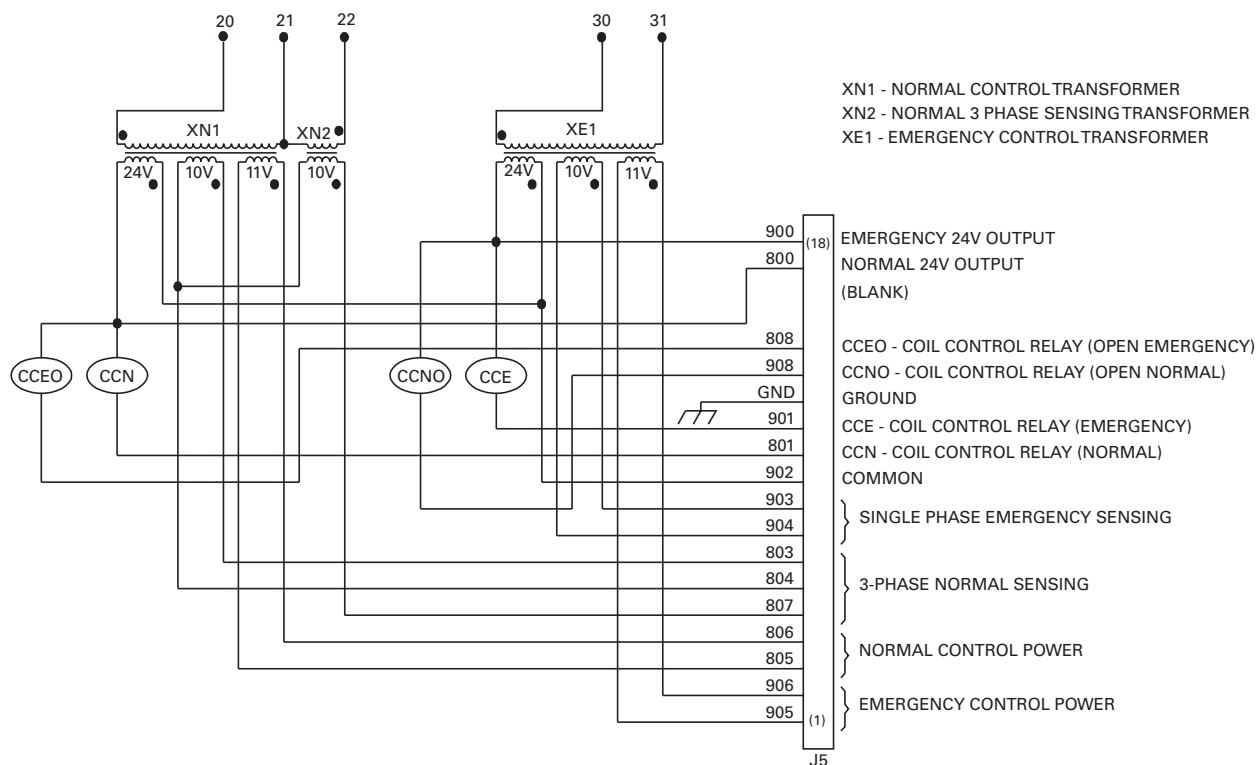
R/T Box Assembly Part No.	Primary Voltage at 50/60 Hz	1VA XFMR Part No.	25VA XFMR Part No.
50P-1013	120V	K-3216	K-3224
50P-1014	208-220V	K-3217	K-3225
50P-1015	230-240V	K-3218	K-3226
50P-1016	277V	K-3219	K-3227
50P-1017	380-400V	K-3220	K-3228
50P-1018	416-440V	K-3221	K-3229
50P-1019	460-480V	K-3222	K-3230
50P-1020	575-600V	K-3223	K-3231

Relay/Transformer Box (R/T Box) *(cont'd)*

Standard Transition R/T Box Schematic



Delayed Transition R/T Box Schematic



Standard Drawings Technical Reference

Standard Drawings

GE Zenith Transfer Switch — ZTG(D)K series				
Transfer Switch Amperage	Legend Operation Accessories	Power Circuit and Layout	Power Circuit and Layout (2 Pole)	MX100 Door View
30-200	52A-0900	52A-7000	52A-7001	50A-1000
225-260		52A-1000	52A-1001	
400		52A-2000	52A-2001	
600-1200		52A-3000	52A-3001	
1600-3000		52A-8000	52A-8001	
D 40-260	52A-0900D	52A-4000	52A-4001	50A-1000D
D 400		52A-5000	52A-5001	50A-1000
D 600-3000		52A-6000	52A-6001	

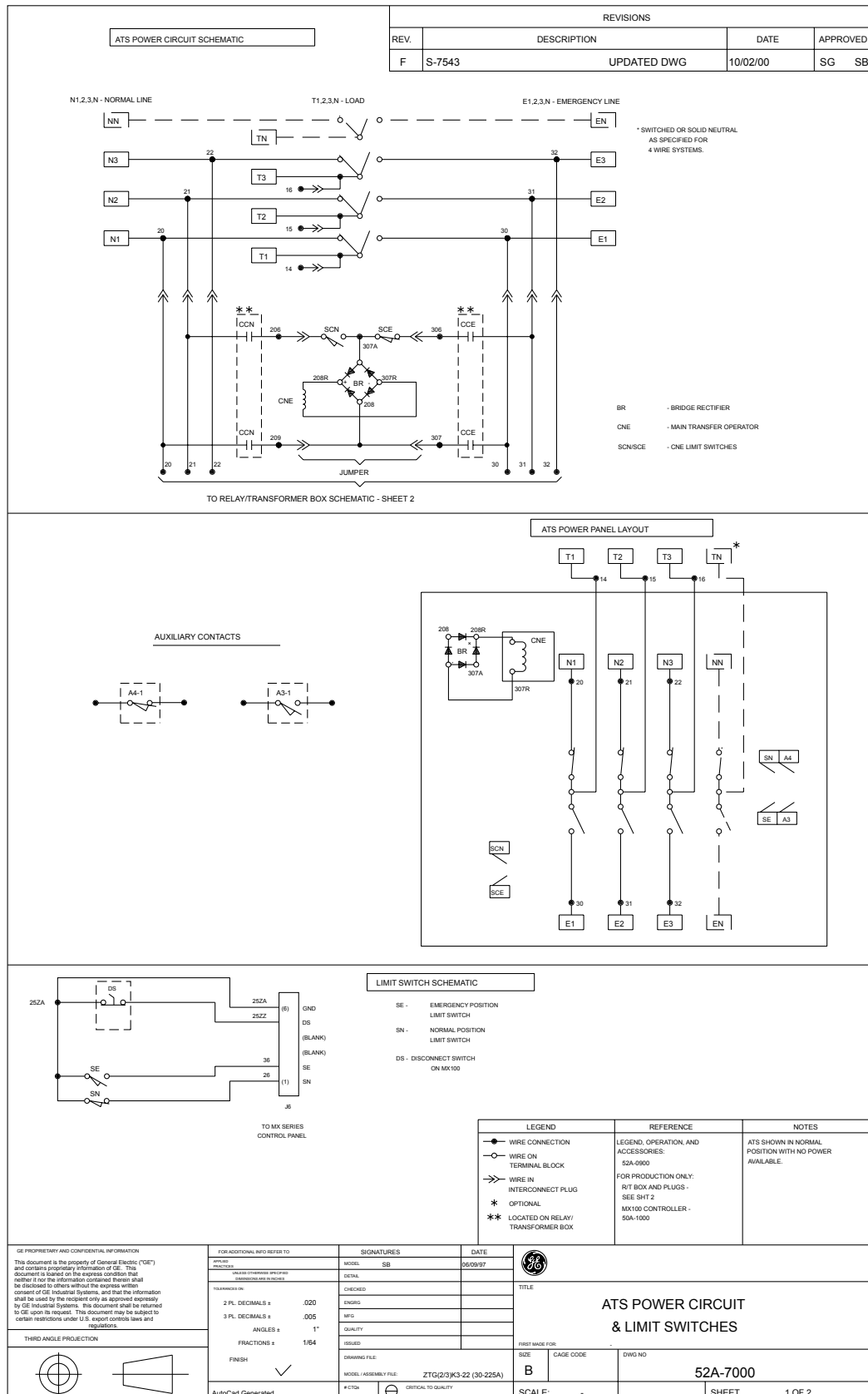
GE Zenith Transfer Switch — ZTG(2)K series				
Transfer Switch Amperage	Legend Operation Accessories	Power Circuit and Layout	Power Circuit and Layout (2 Pole)	MX100 Door View
225-400	52A-0900	54A-1000	54A-1001	50A-1000

Accessory Drawings

Microprocessor — MX100		
Option Code	Drawing #	ZTG(D)K
C	50R-1006	X
C/DT	(INTERNAL TO MX100)	X
C/D	50R-1002	X
C/D 365 DAYS	50R-1003	X
D	50R-1006	X
HT	50R-1008	X
	50R-1009	
Q2	50R-1001	X
Q3	50R-1024	X
6A	50R-1010	X
YEN	(INTERNAL TO MX100)	X
ZNET (F32)	50R-1022	X
A6 or T3/W3	50R-1012	X
CTAP	50R-1020	X
MANUAL	50R-1026	X
Q2K	50R-1001	X
Q2M	50R-1001	X
R50	(INTERNAL TO MX100)	X

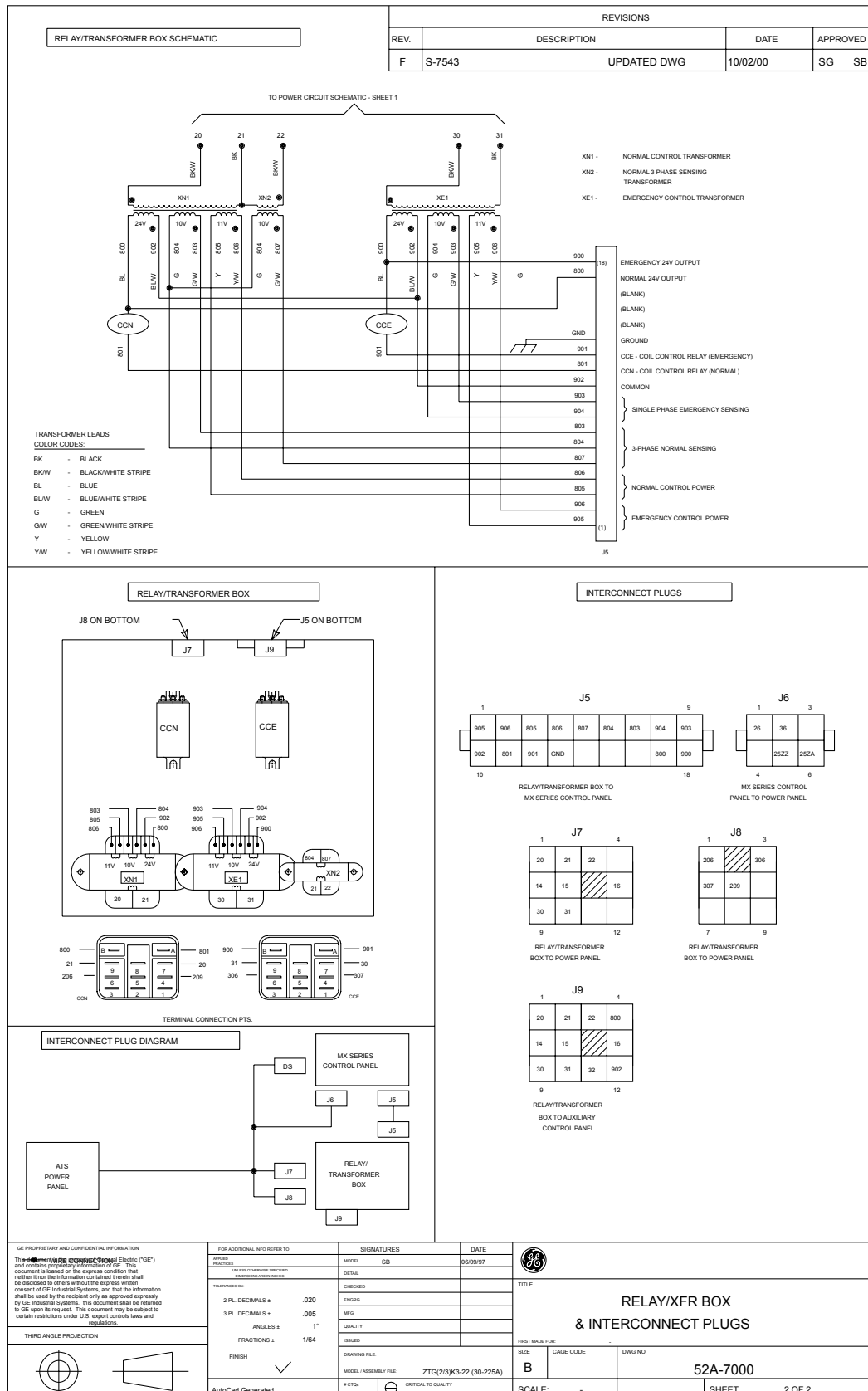
Standard Drawings

Drawing #52A-7000, Page 1



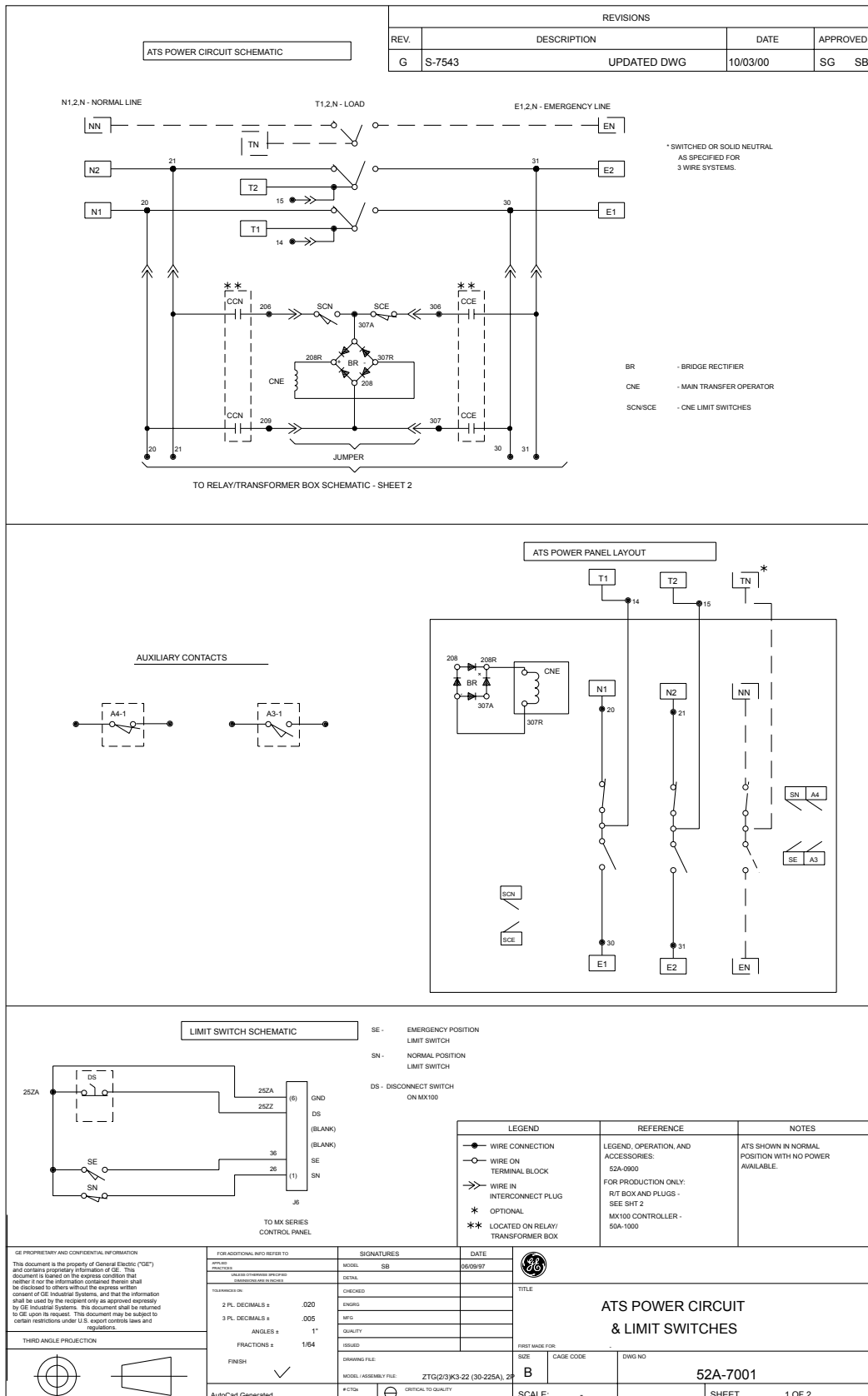
Standard Drawings (cont'd)

Drawing #52A-7000, Page 2



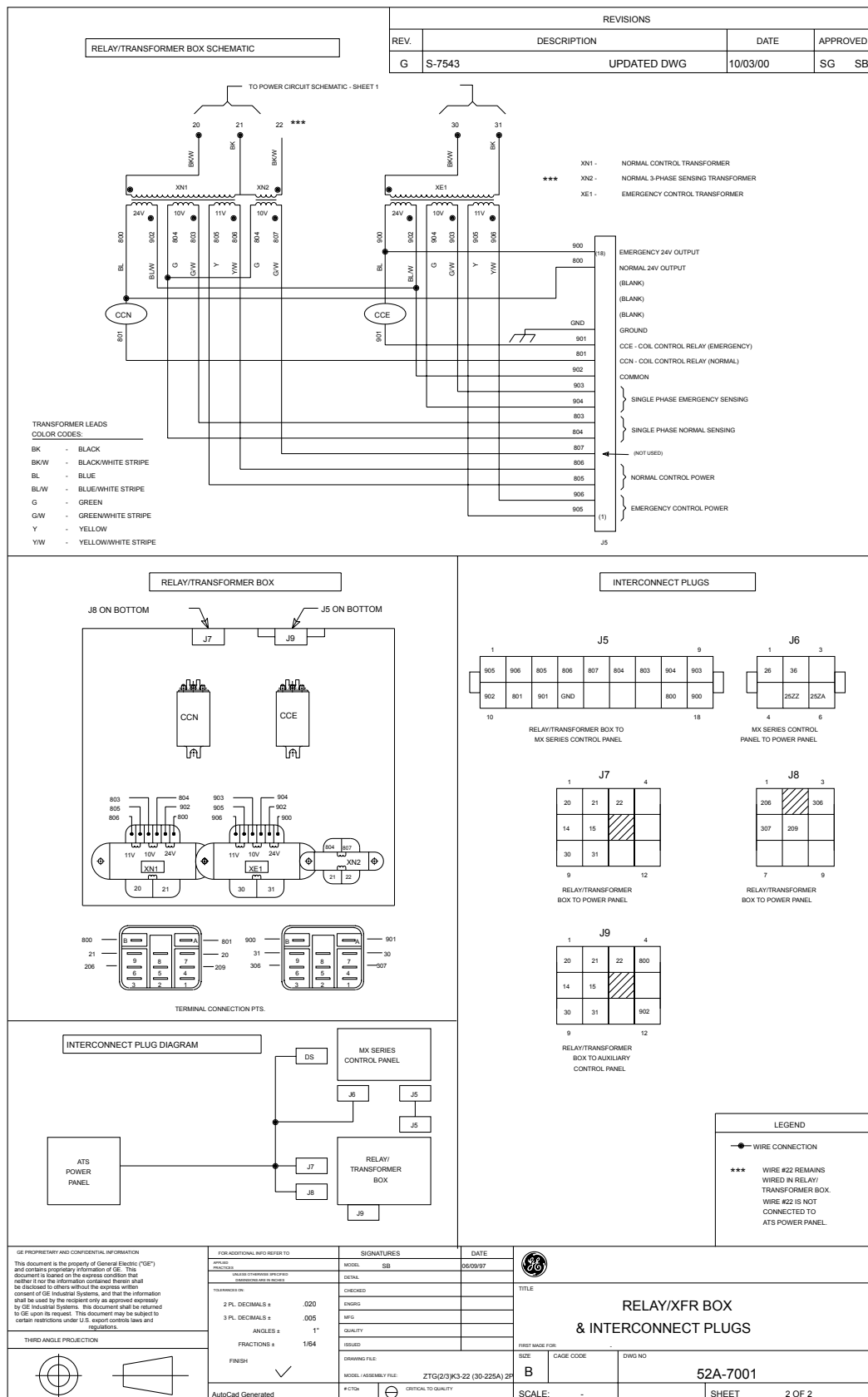
Standard Drawings (cont'd)

Drawing #52A-7001, Page 1



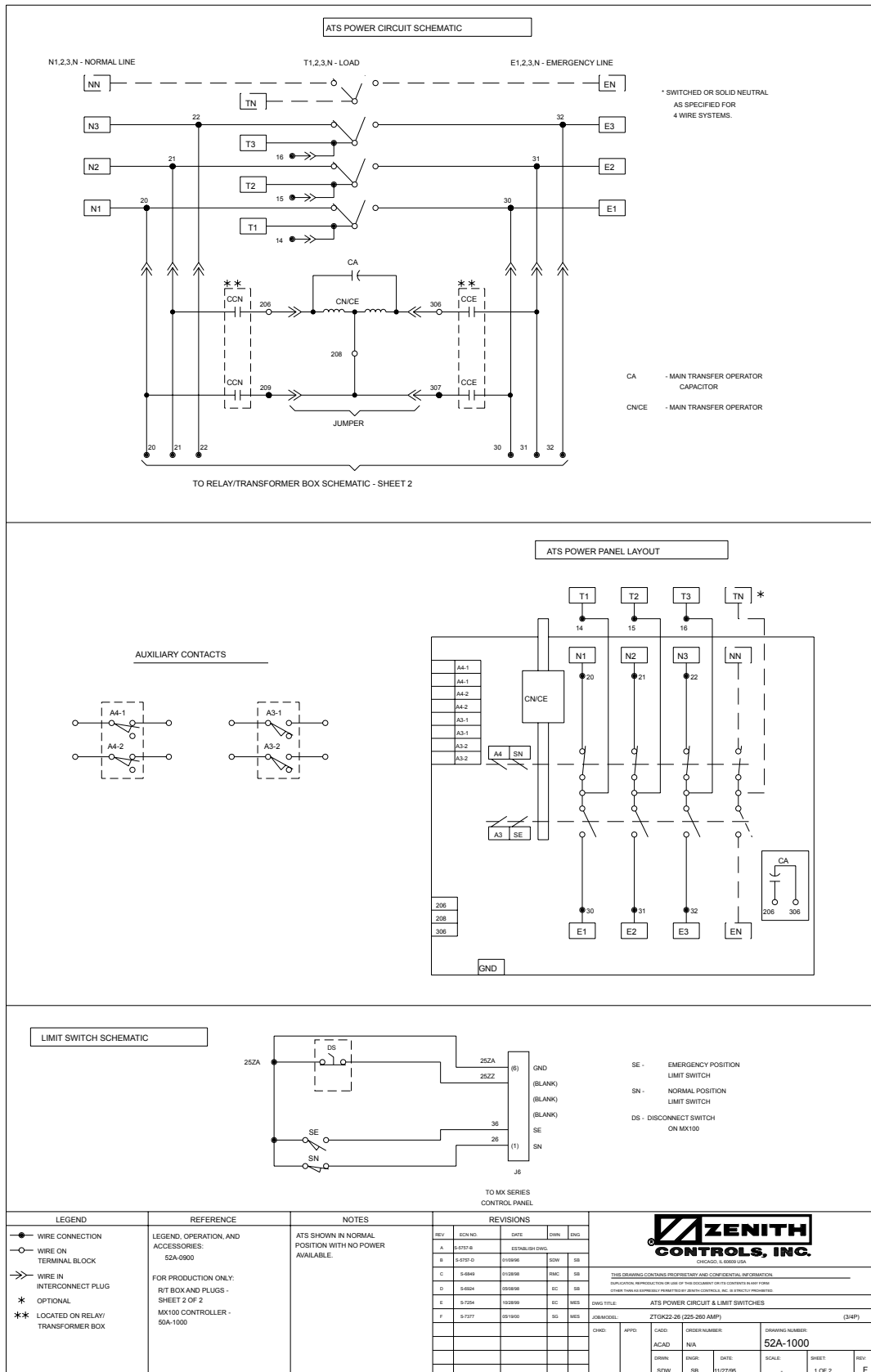
Standard Drawings (cont'd)

Drawing #52A-7001, Page 2



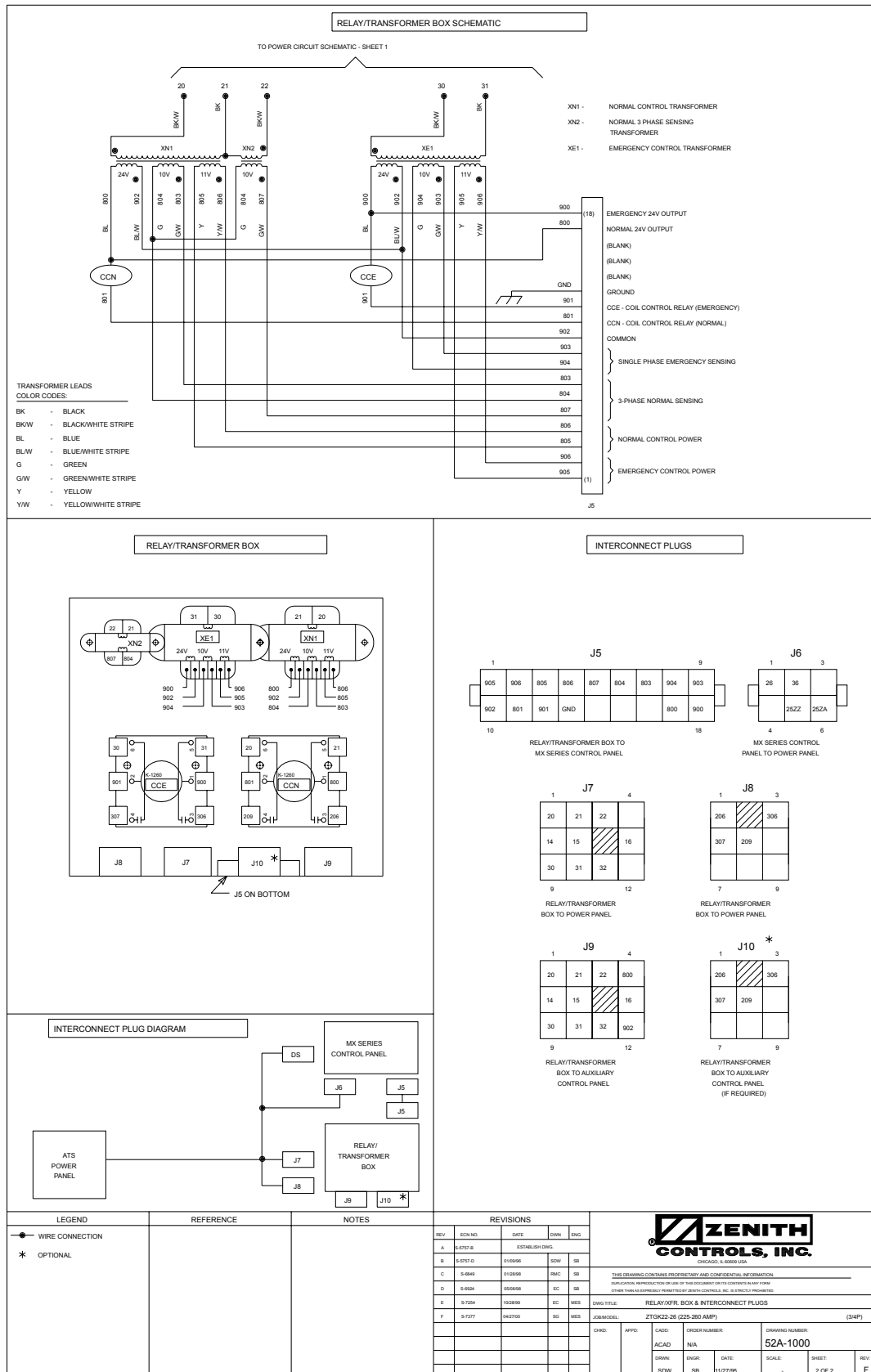
Standard Drawings (cont'd)

Drawing #52A-1000, Page 1



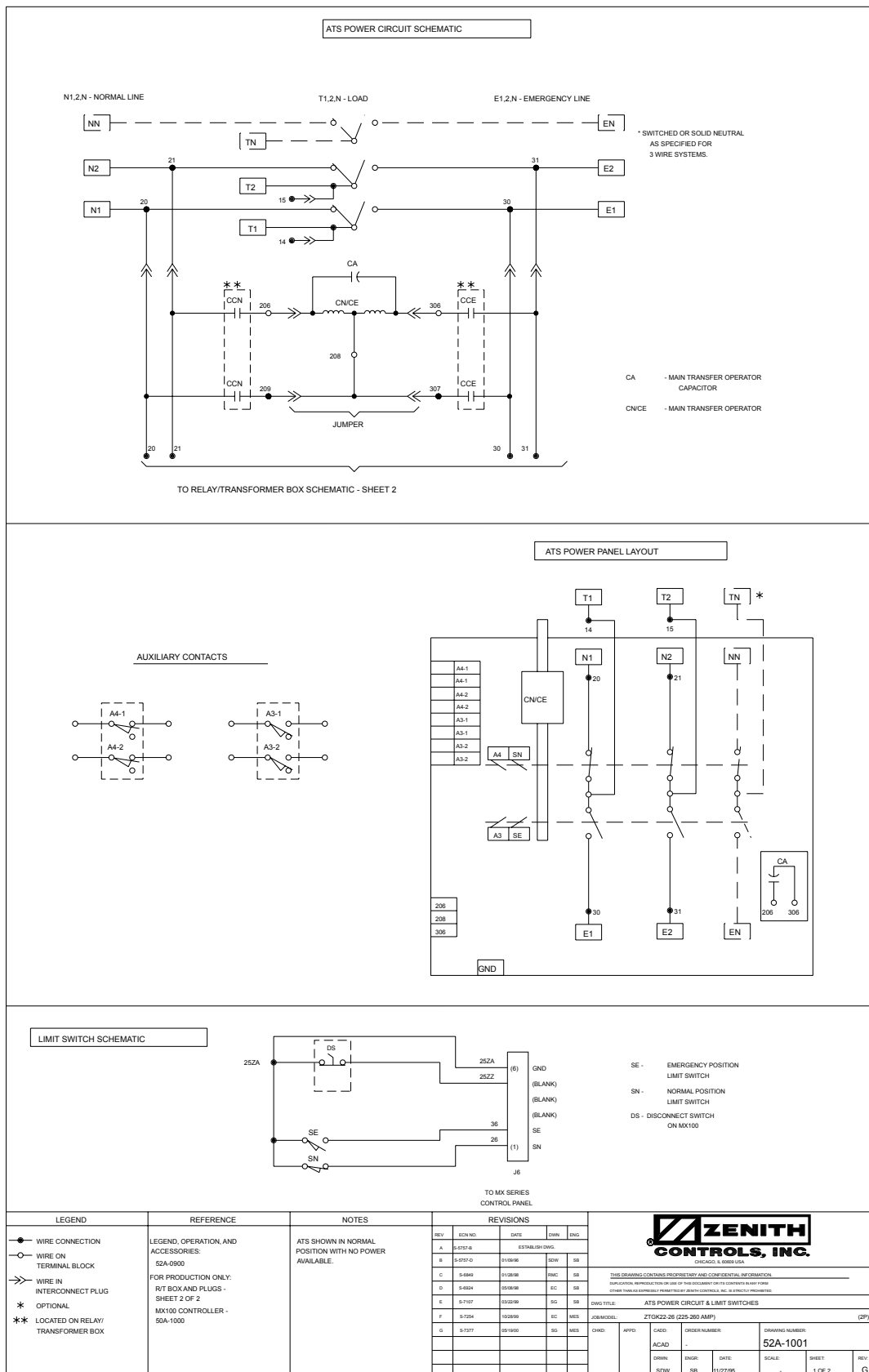
Standard Drawings (cont'd)

Drawing #52A-1000, Page 2



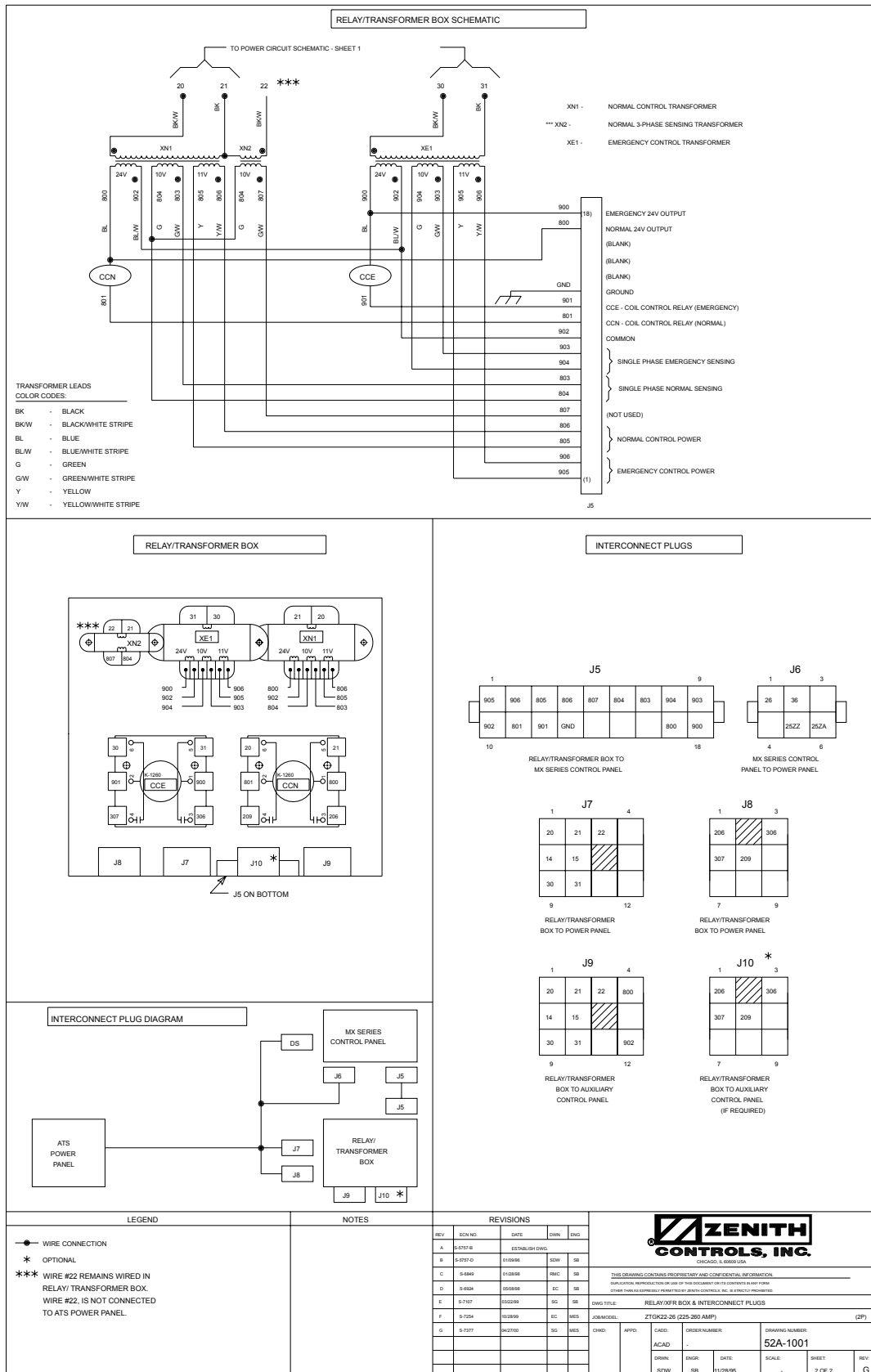
Standard Drawings (cont'd)

Drawing #52A-1001, Page 1



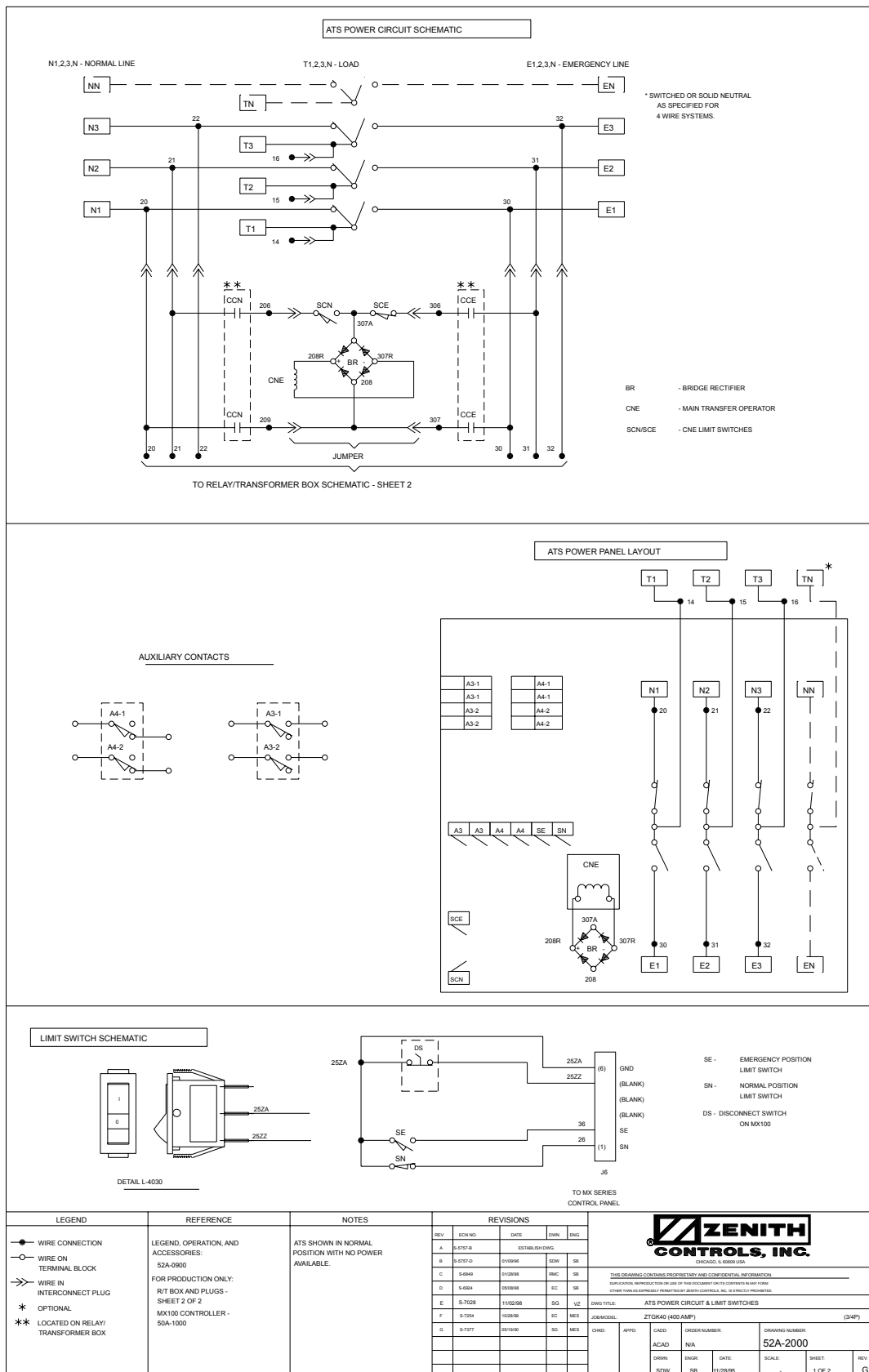
Standard Drawings (cont'd)

Drawing #52A-1001, Page 2



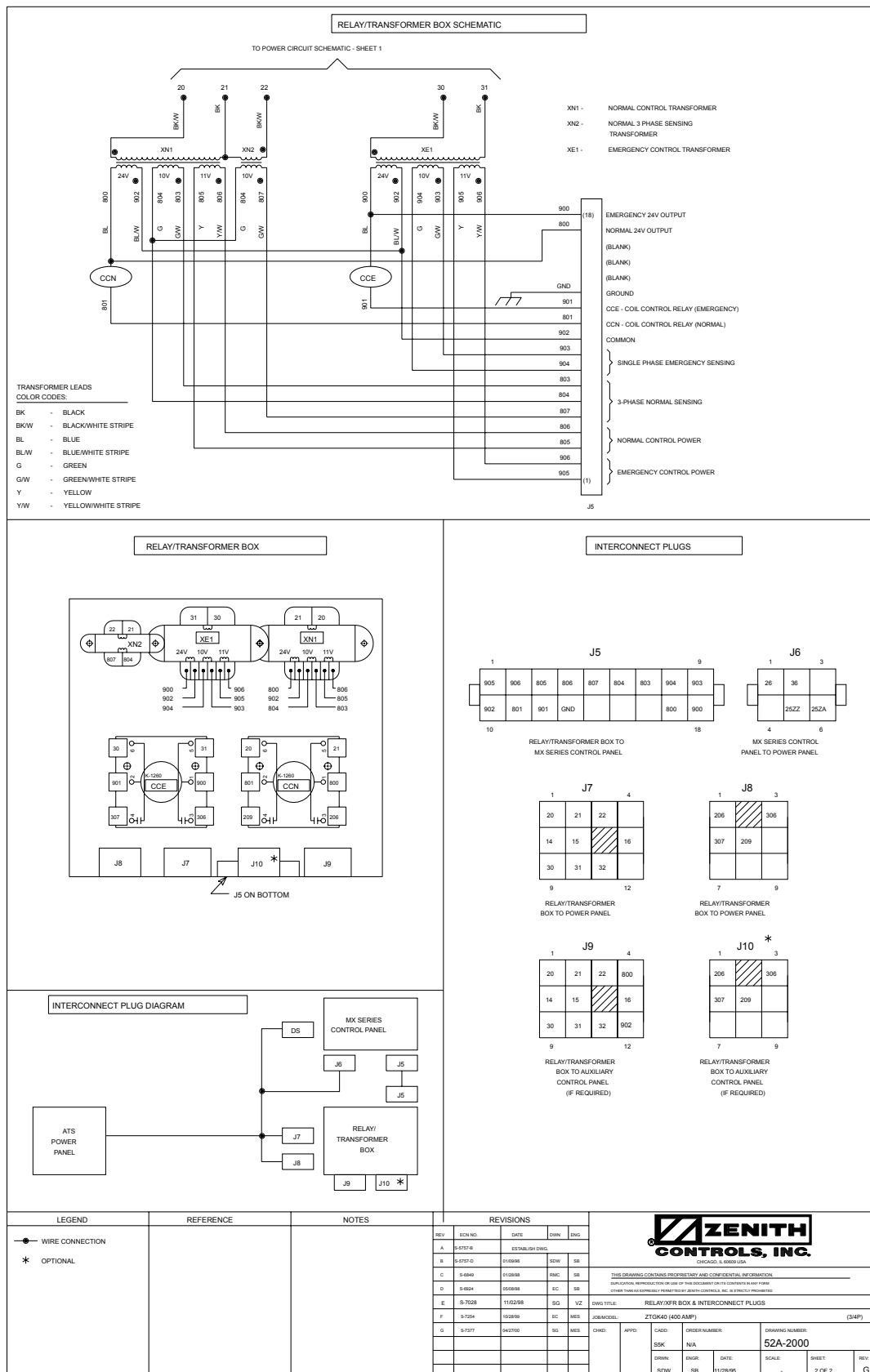
Standard Drawings (cont'd)

Drawing #52A-2000, Page 1



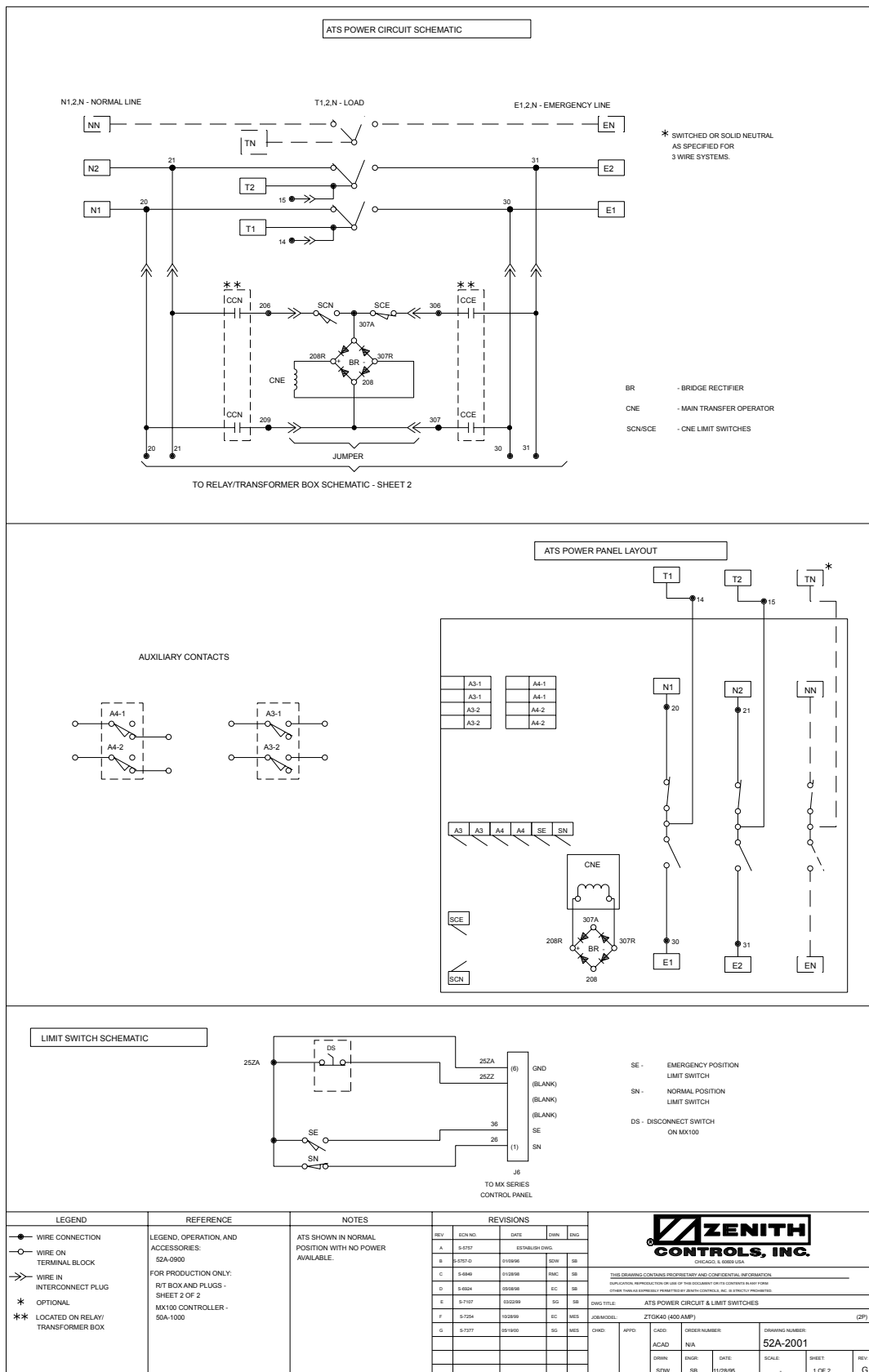
Standard Drawings (cont'd)

Drawing #52A-2000, Page 2



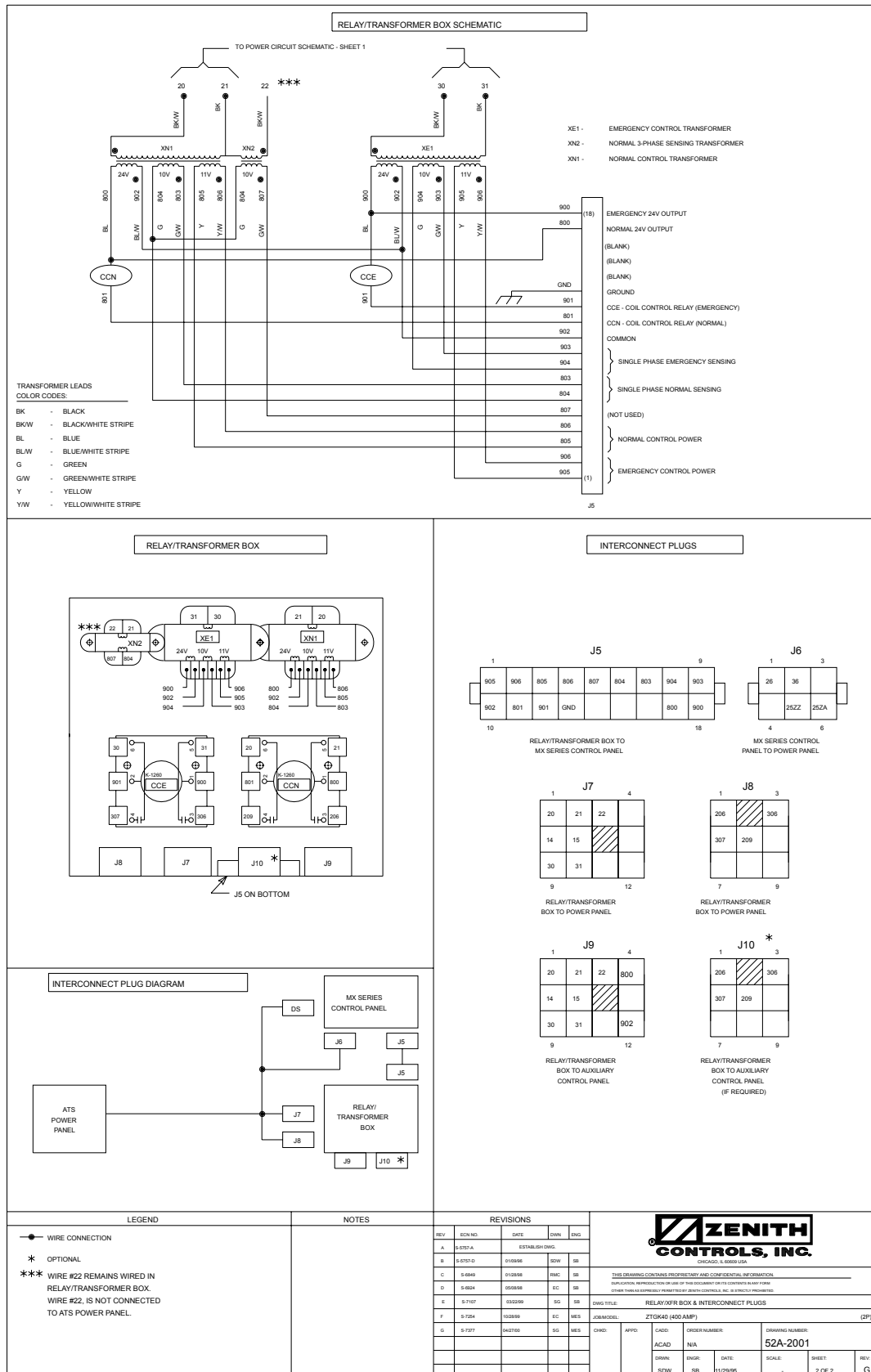
Standard Drawings (cont'd)

Drawing #52A-2001, Page 1



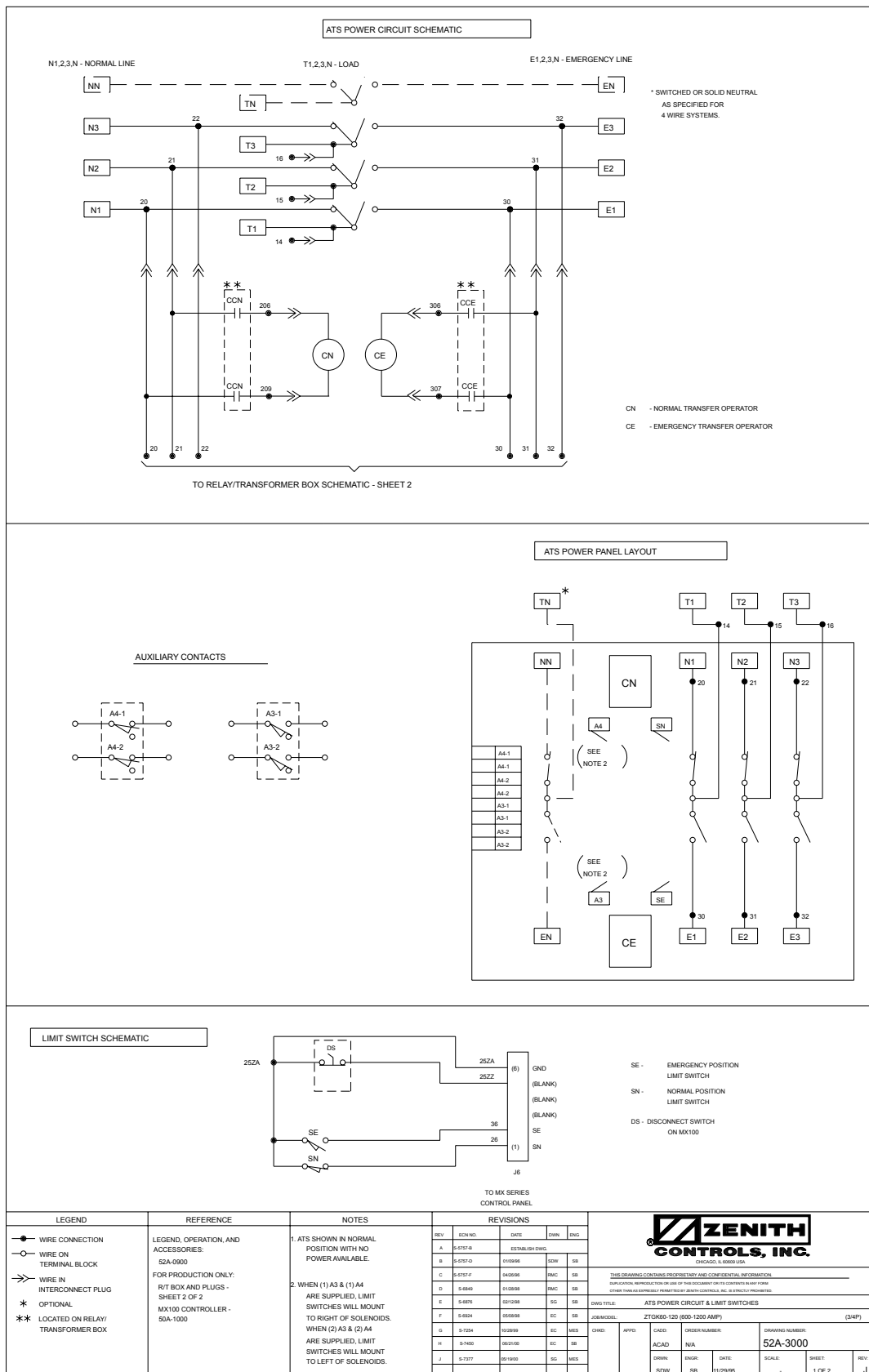
Standard Drawings (cont'd)

Drawing #52A-2001, Page 2



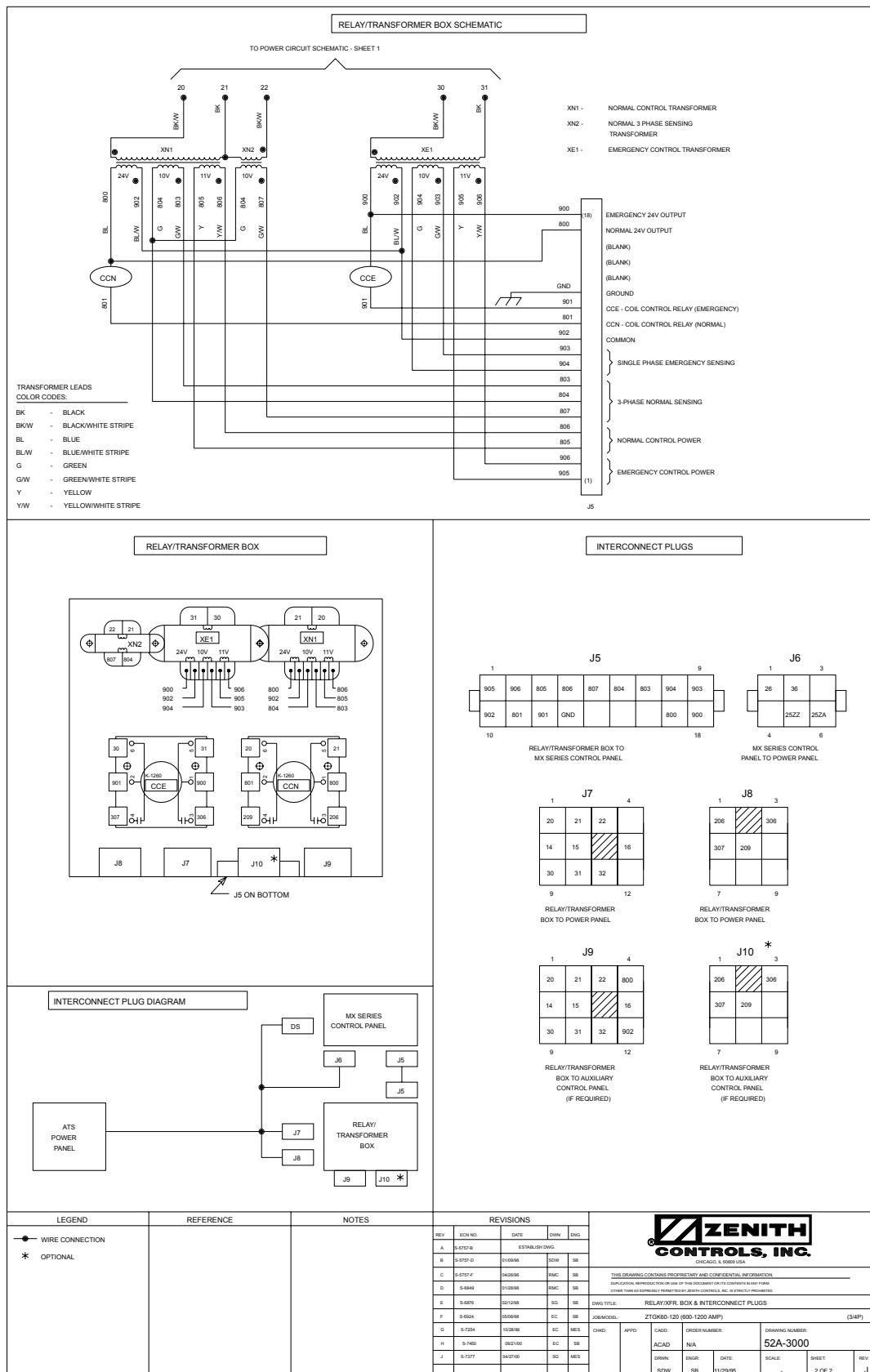
Standard Drawings (cont'd)

Drawing #52A-3000, Page 1



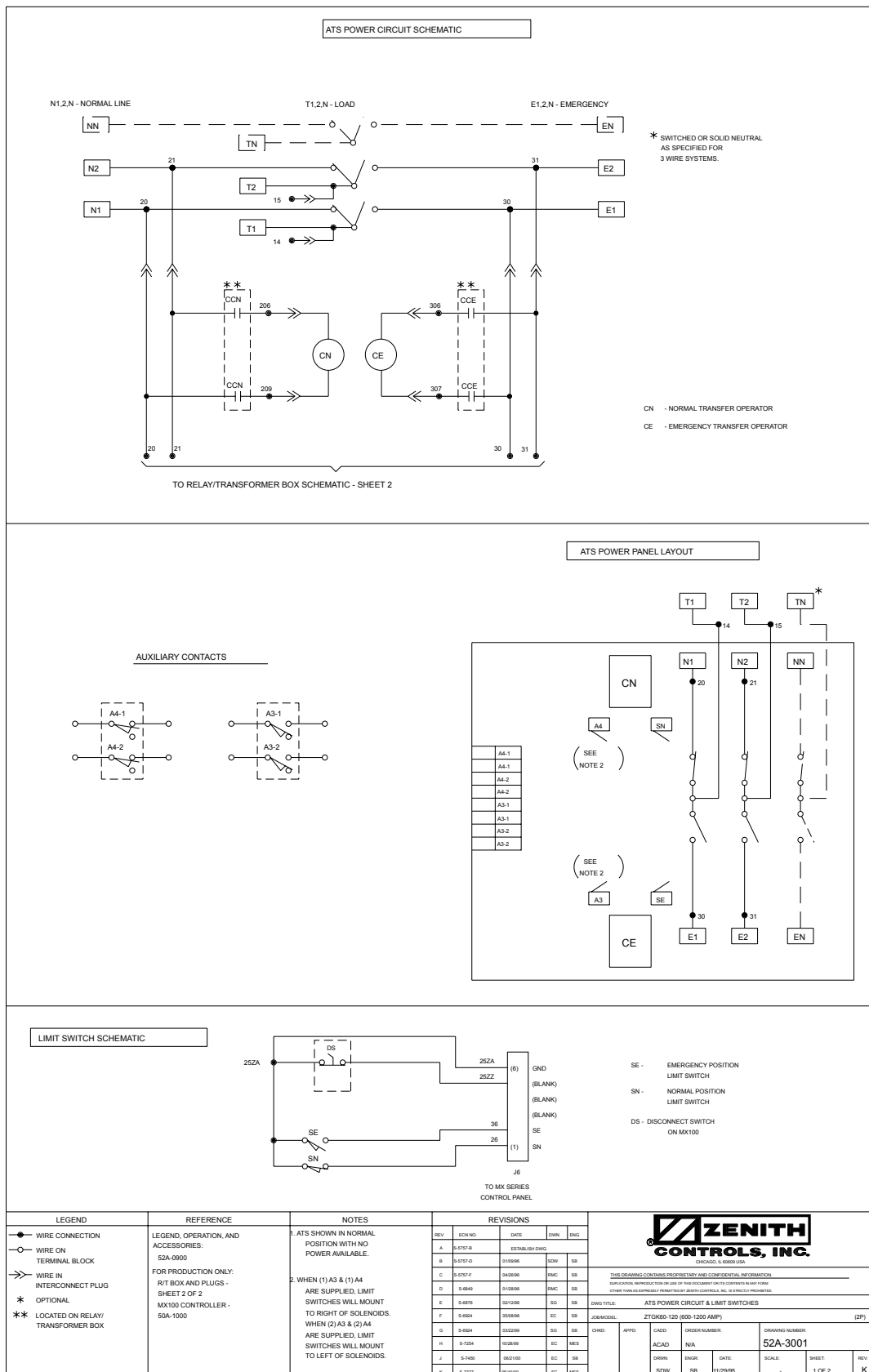
Standard Drawings (cont'd)

Drawing #52A-3000, Page 2



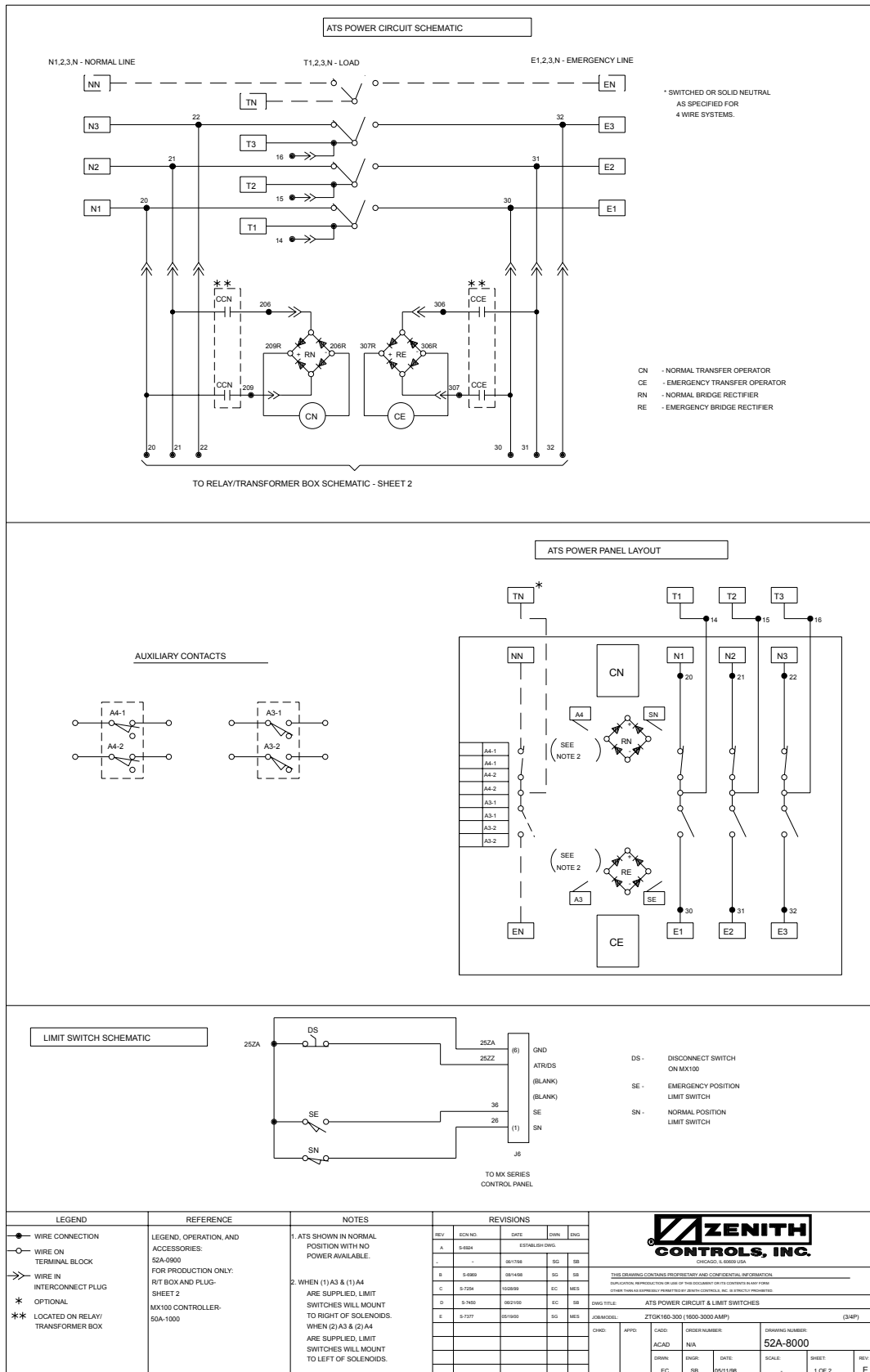
Standard Drawings (cont'd)

Drawing #52A-3001, Page 1



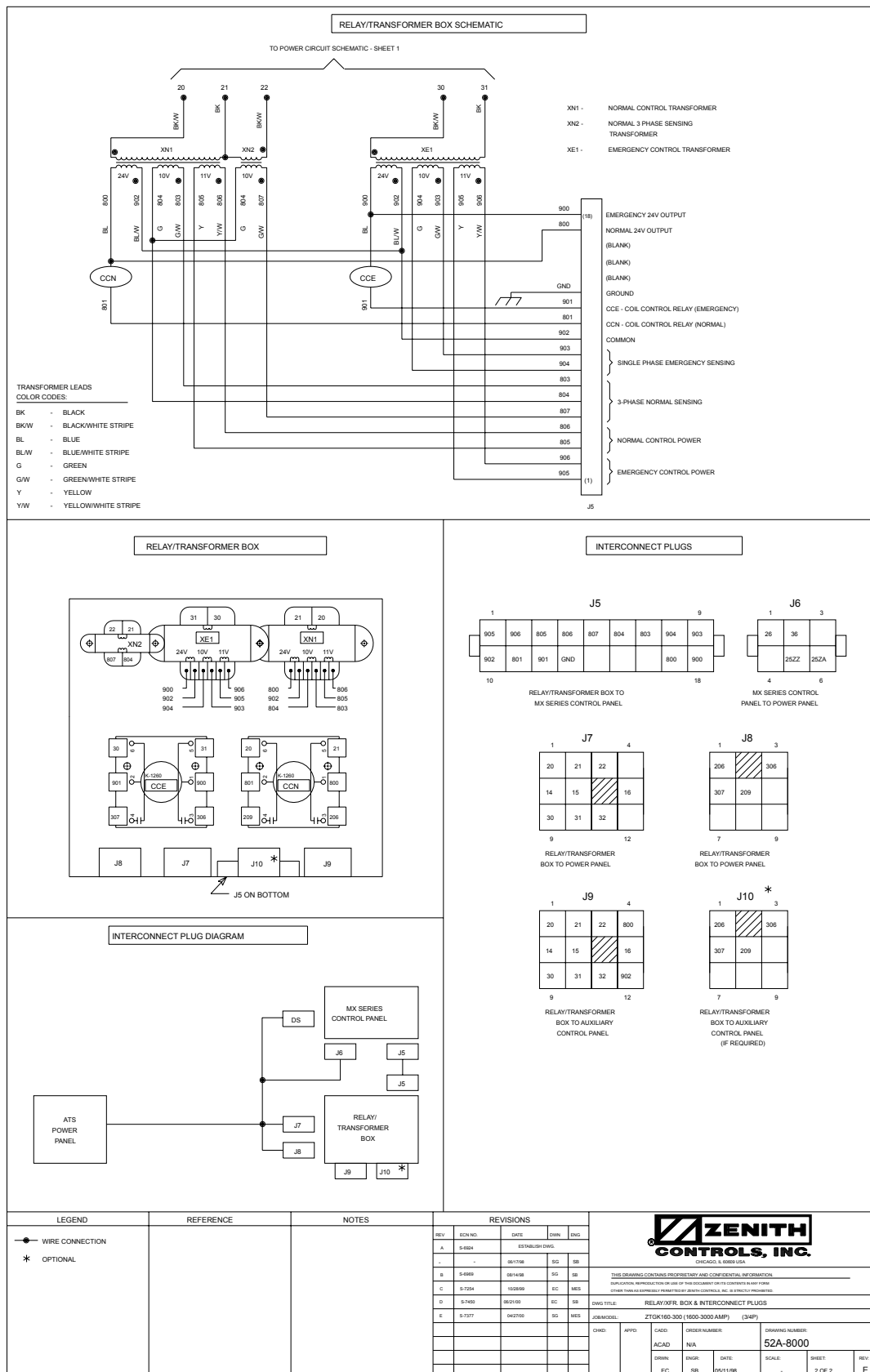
Standard Drawings (cont'd)

Drawing #52A-8000, Page 1



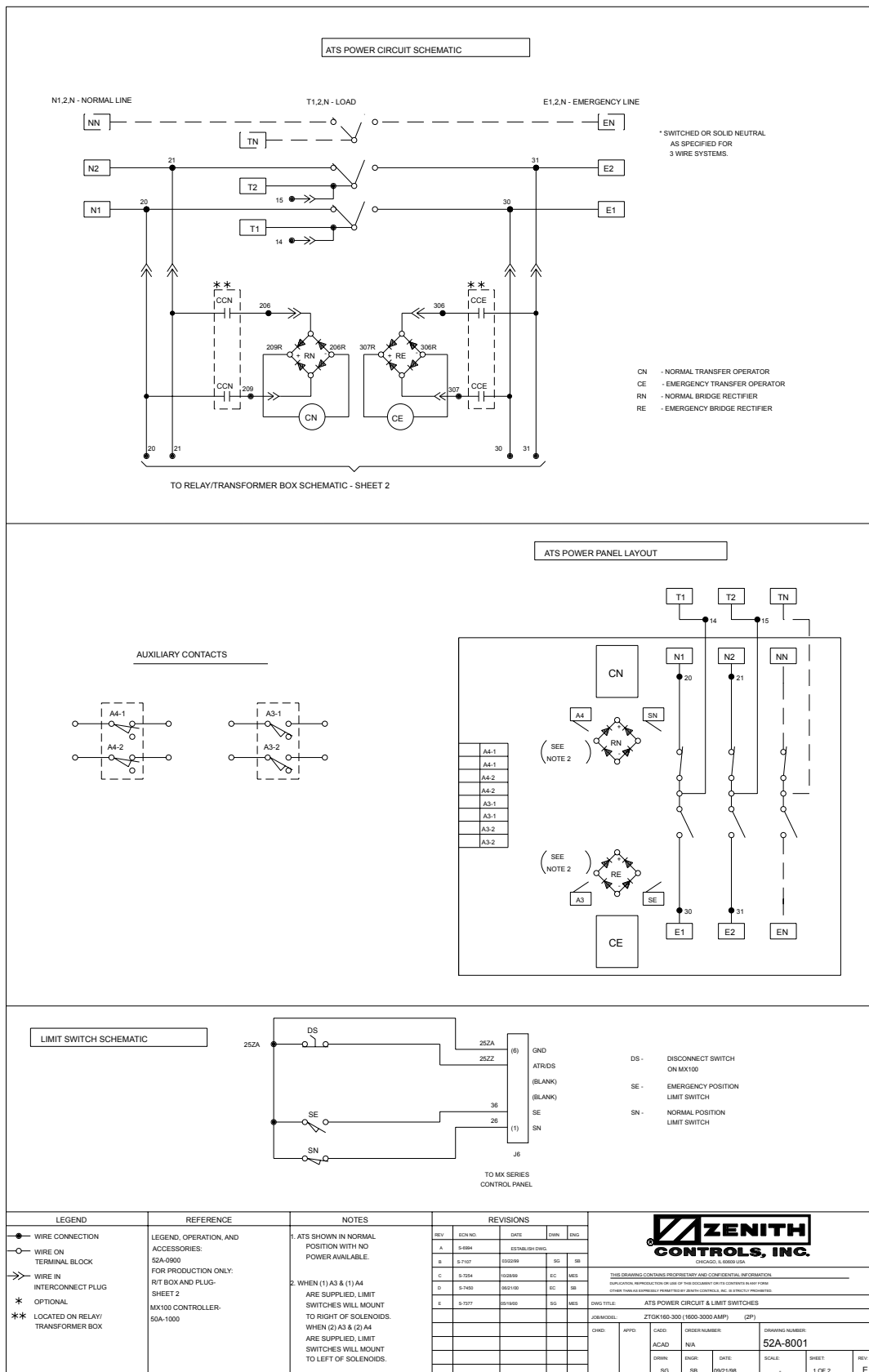
Standard Drawings (cont'd)

Drawing #52A-8000, Page 2



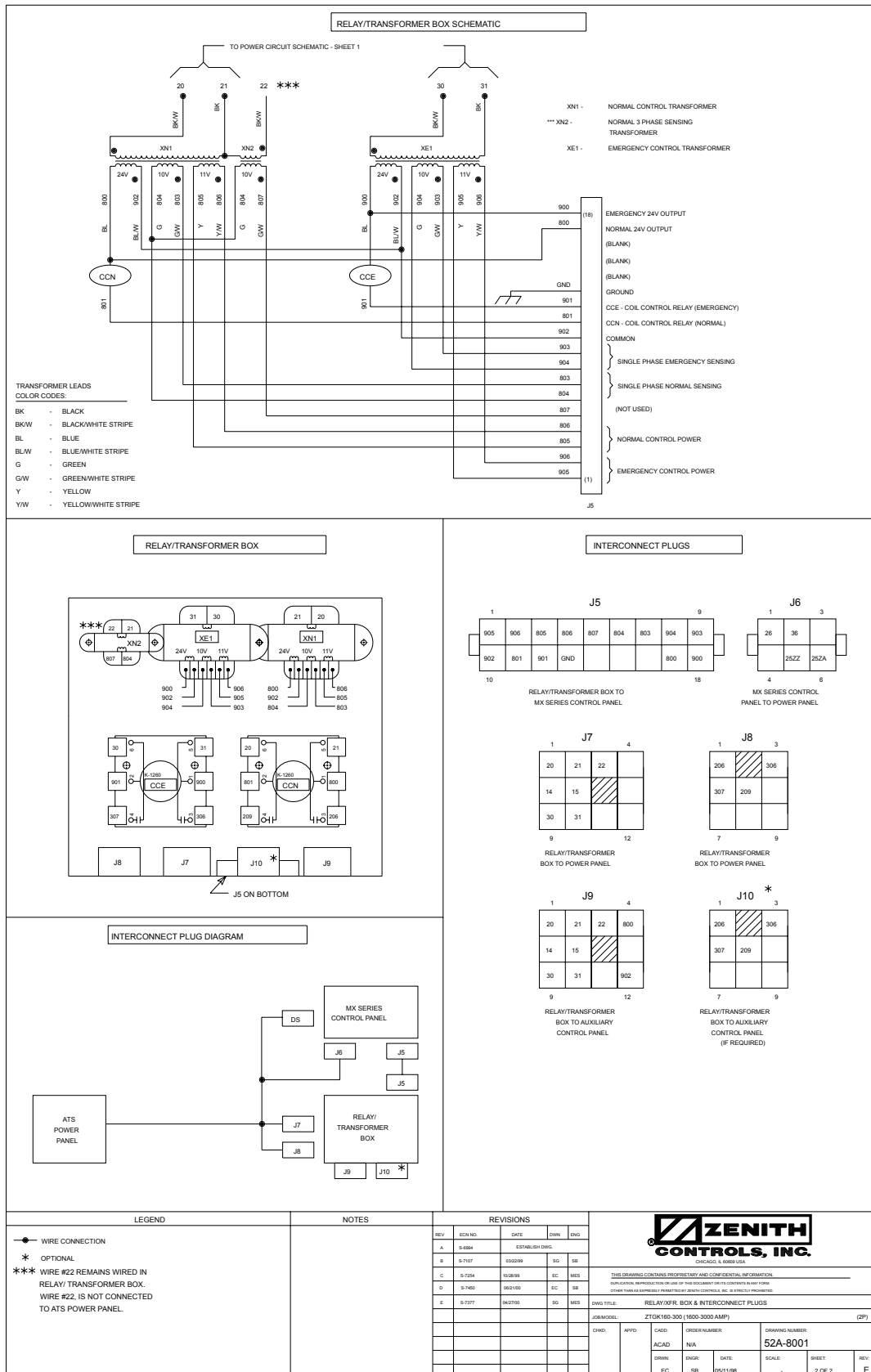
Standard Drawings (cont'd)

Drawing #52A-8001, Page 1



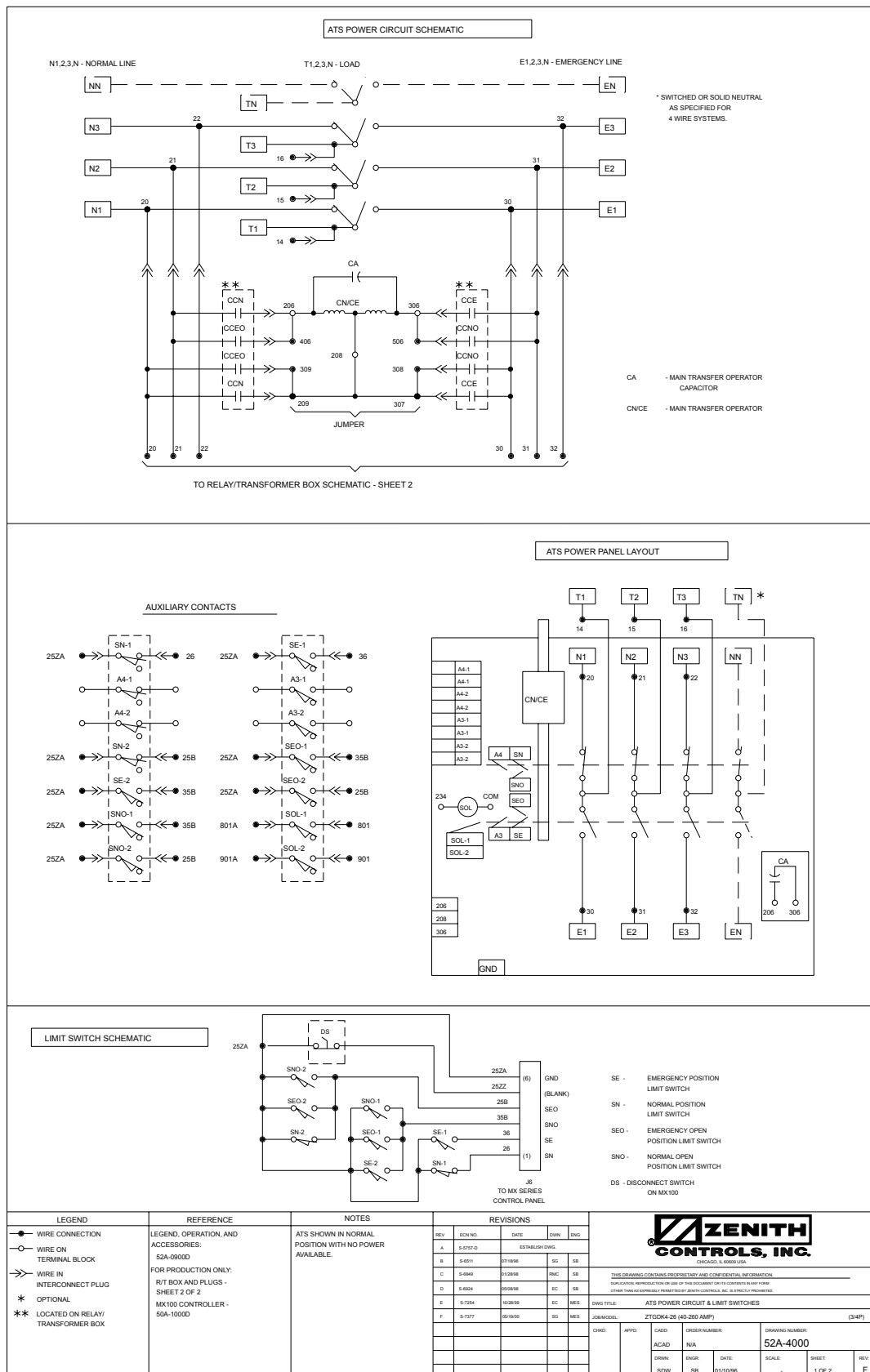
Standard Drawings (cont'd)

Drawing #52A-8001, Page 2



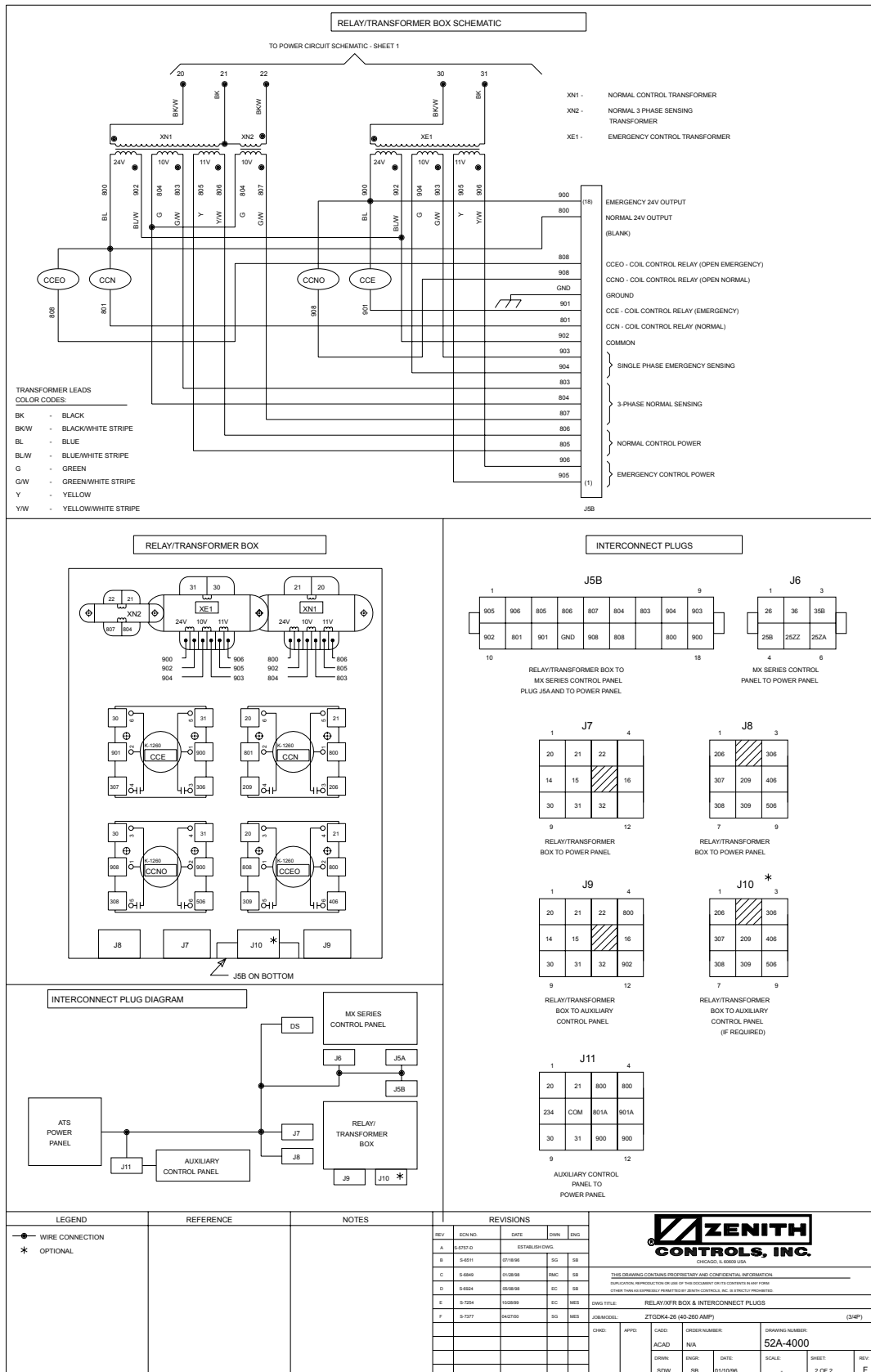
Standard Drawings (cont'd)

Drawing #52A-4000, Page 1



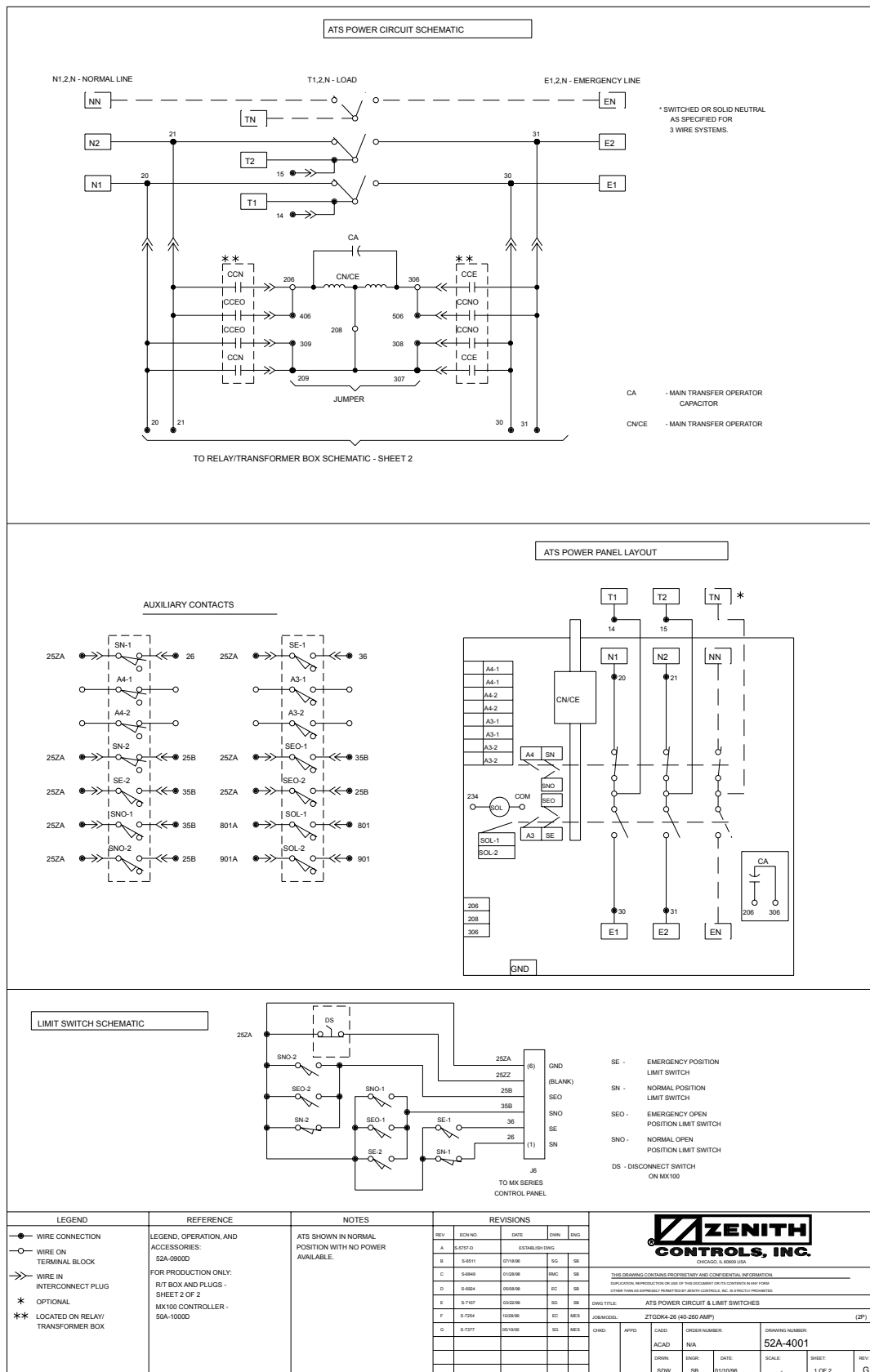
Standard Drawings (cont'd)

Drawing #52A-4000, Page 2



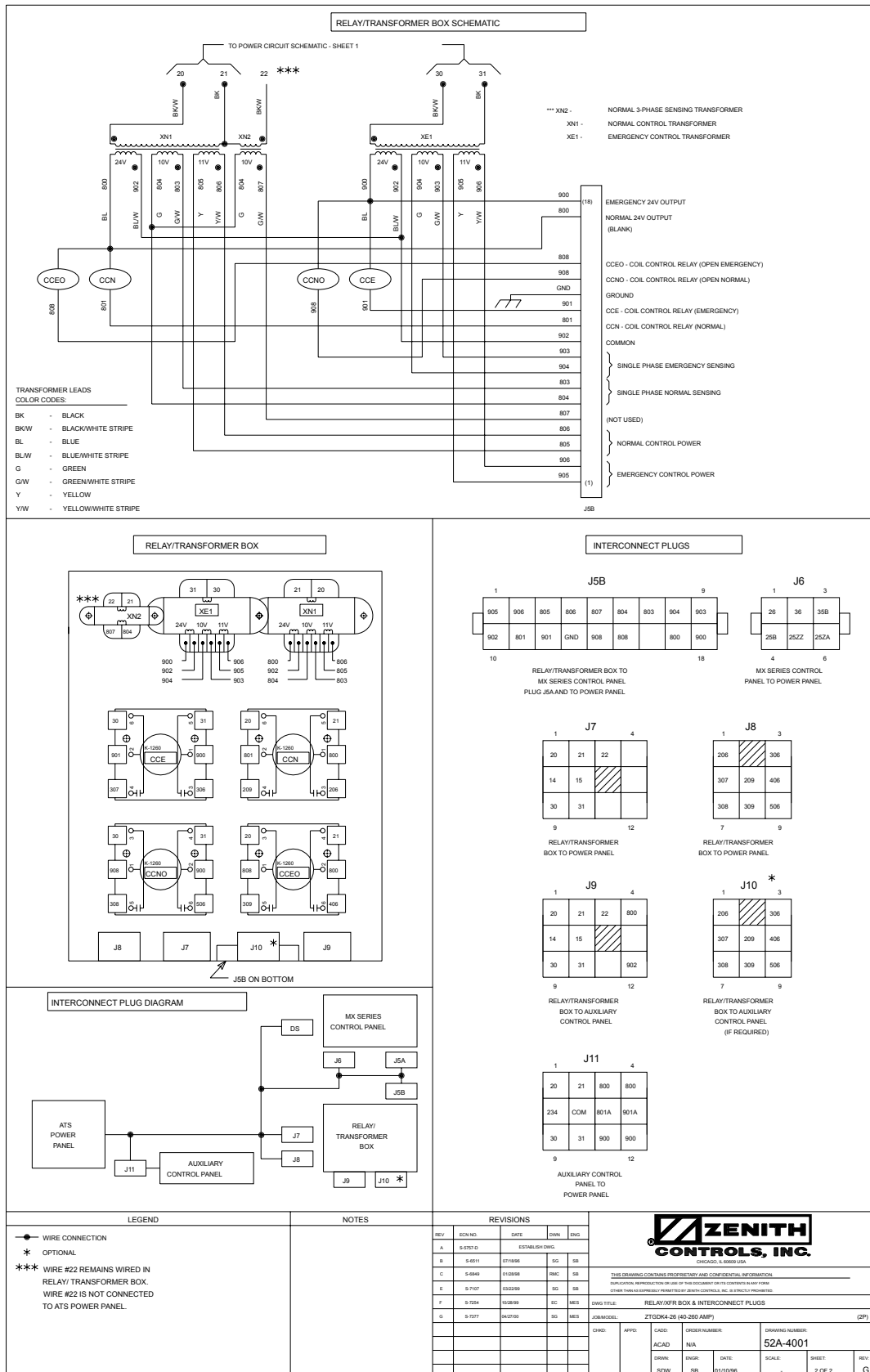
Standard Drawings (cont'd)

Drawing #52A-4001, Page 1



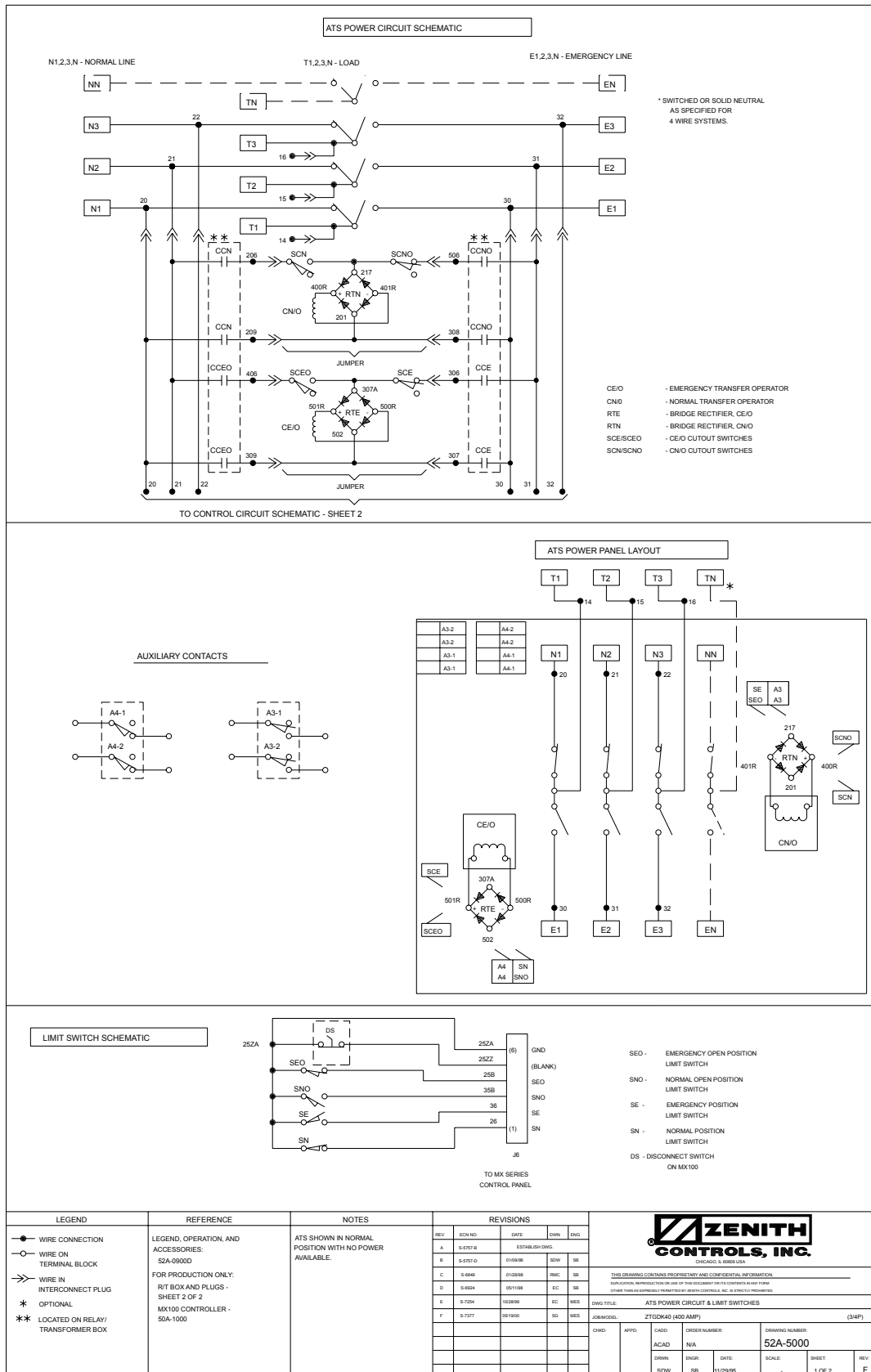
Standard Drawings (cont'd)

Drawing #52A-4001, Page 2



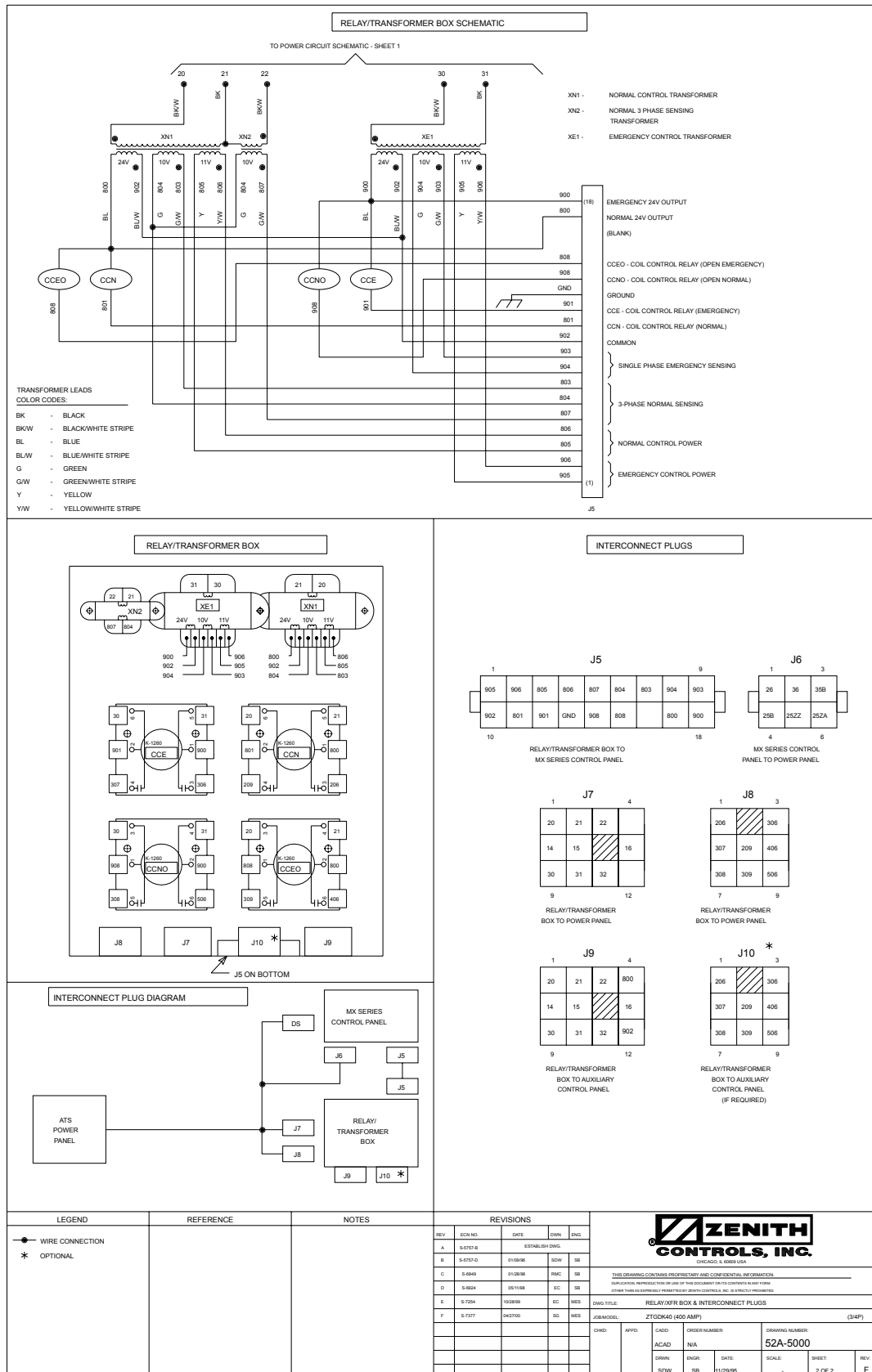
Standard Drawings (cont'd)

Drawing #52A-5000, Page 1



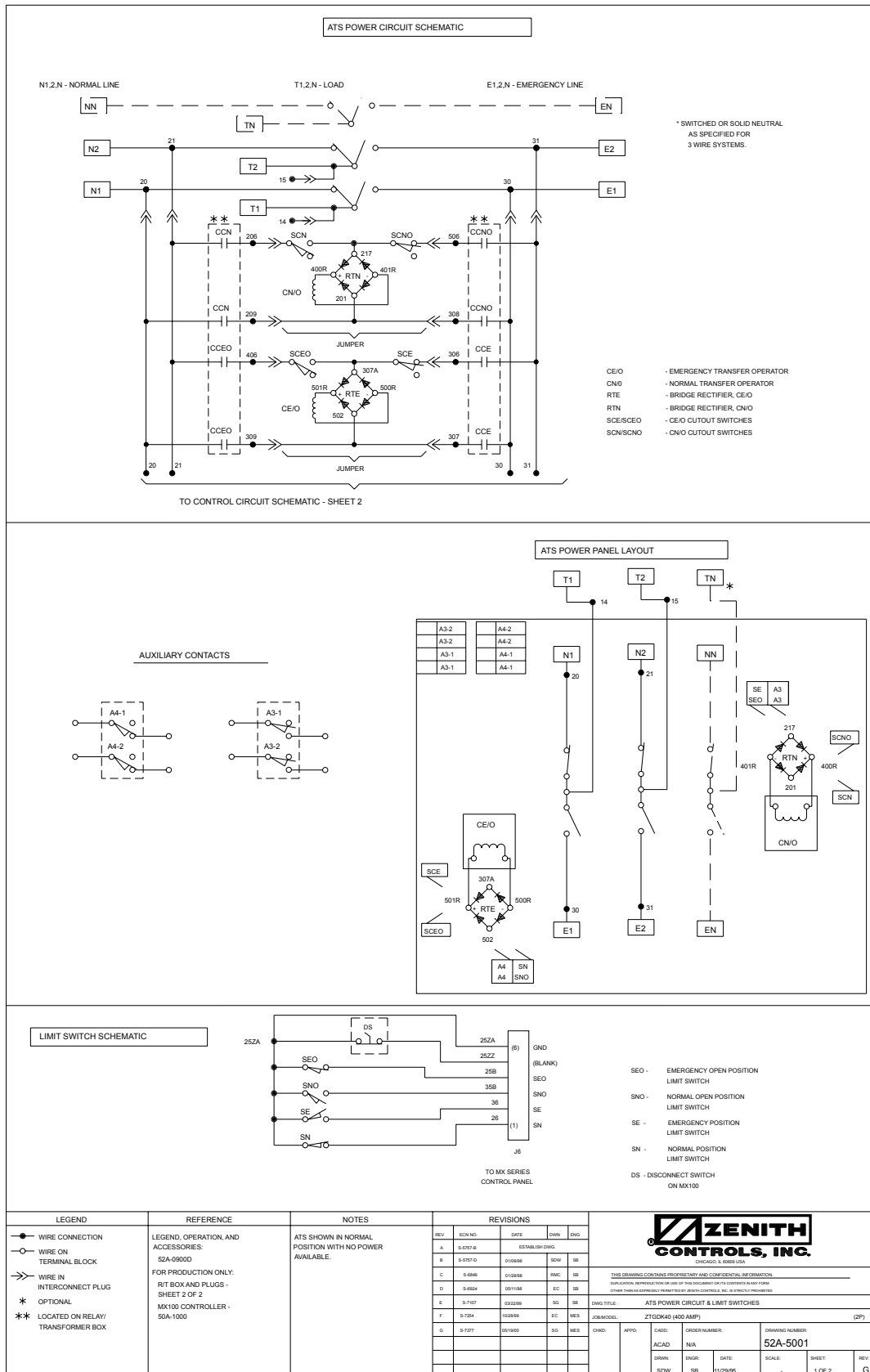
Standard Drawings (cont'd)

Drawing #52A-5000, Page 2



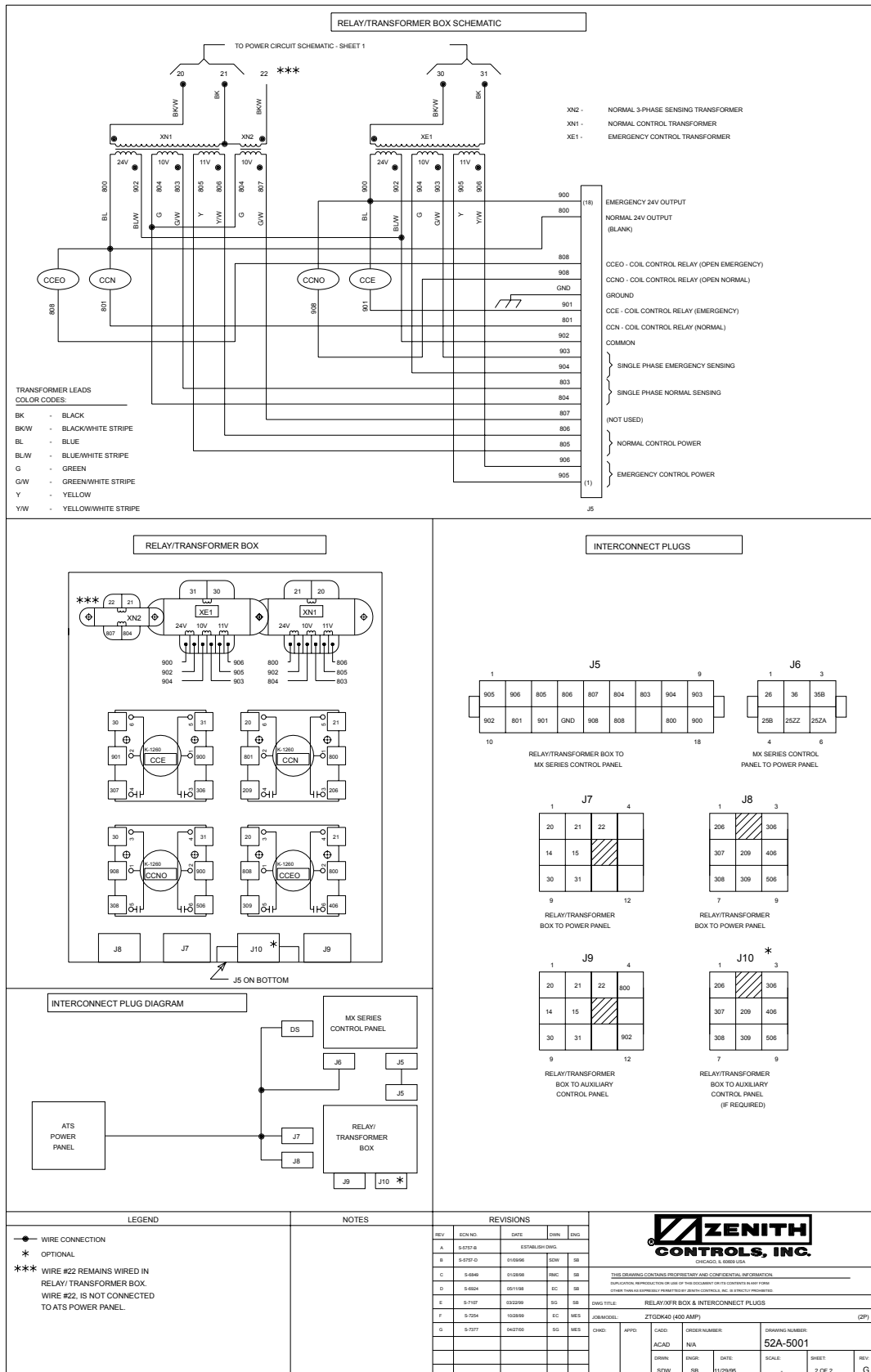
Standard Drawings (cont'd)

Drawing #52A-5001, Page 1



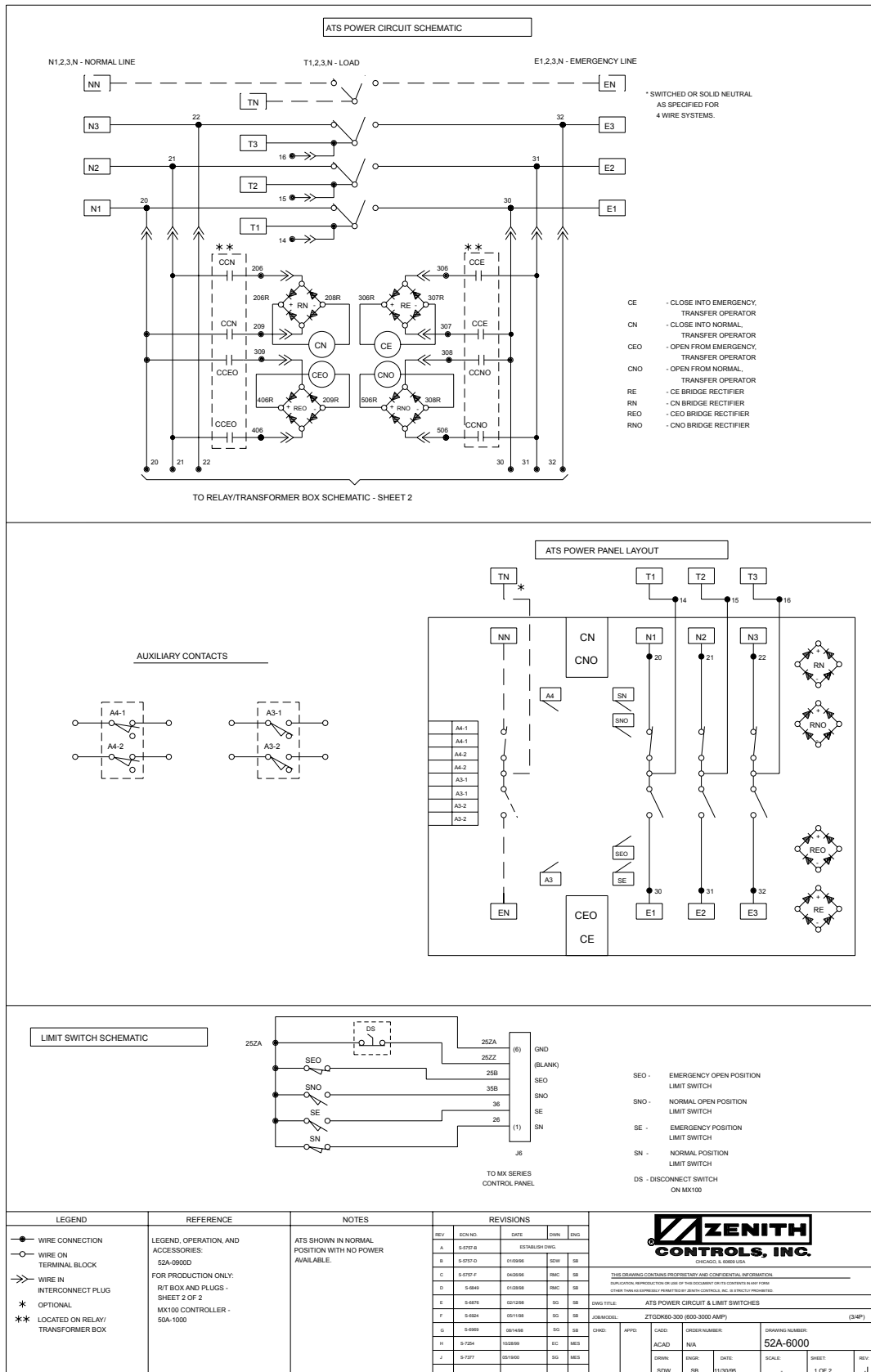
Standard Drawings (cont'd)

Drawing #52A-5001, Page 2



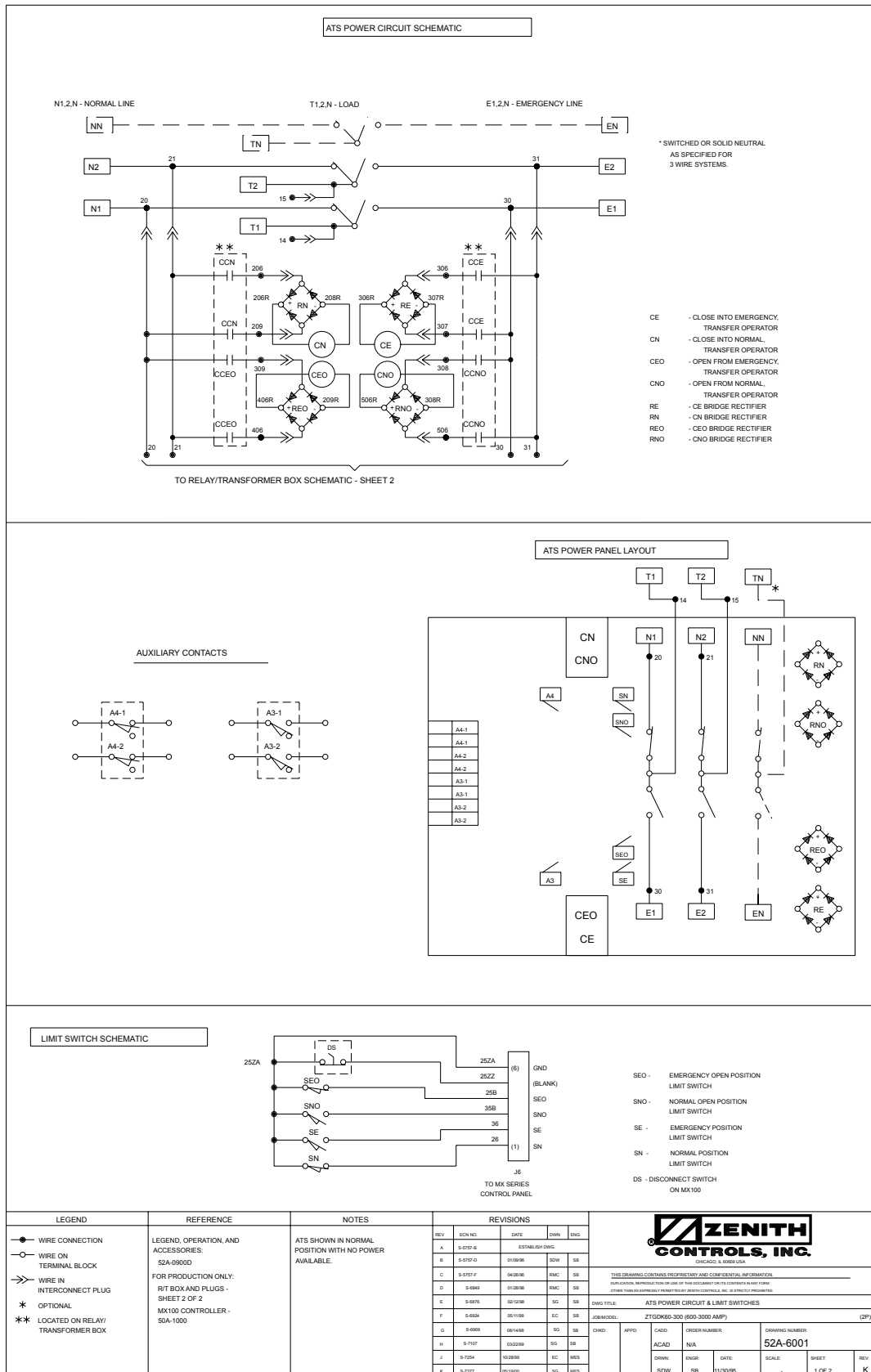
Standard Drawings (cont'd)

Drawing #52A-6000, Page 1



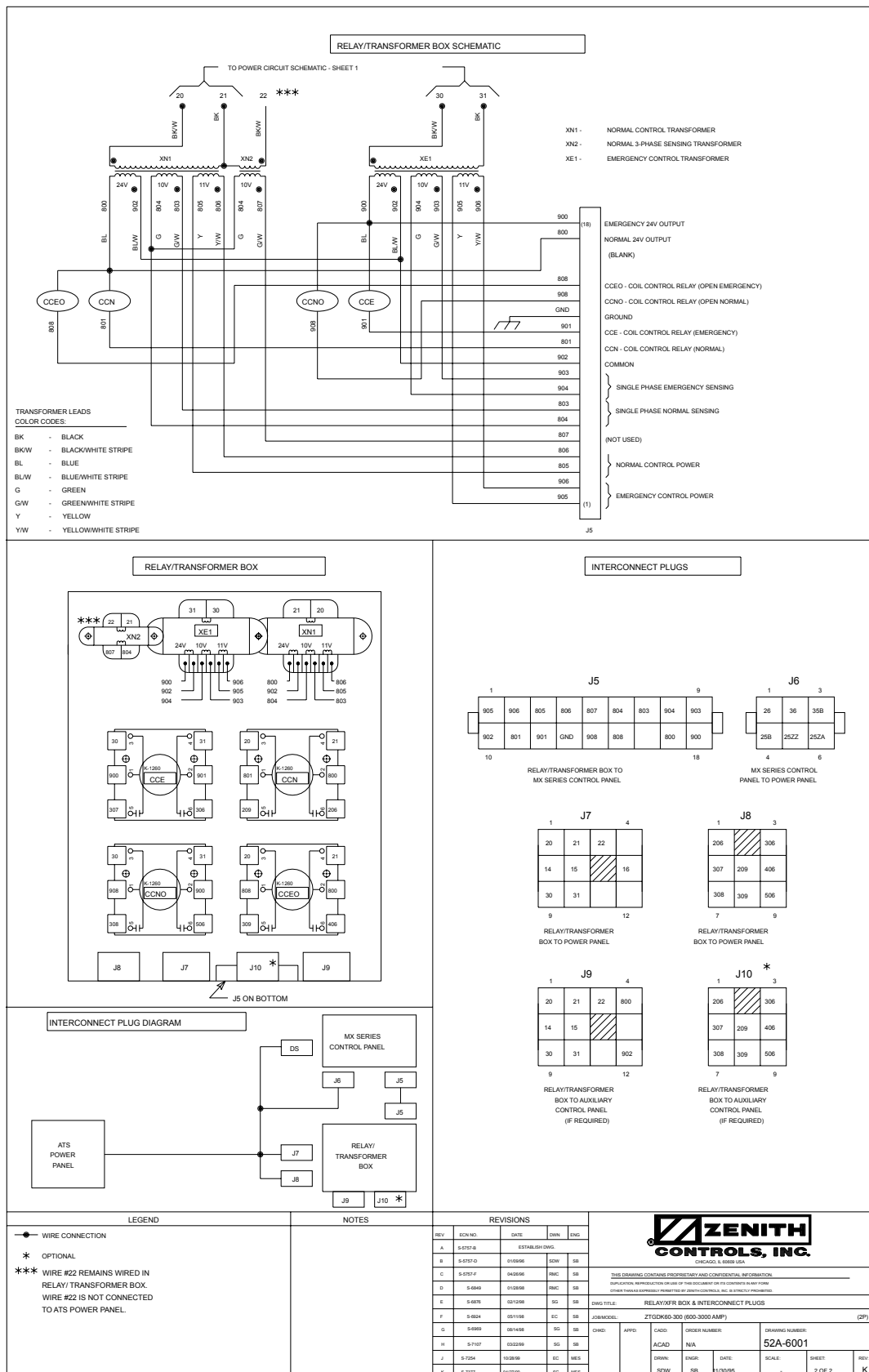
Standard Drawings (cont'd)

Drawing #52A-6001, Page 1



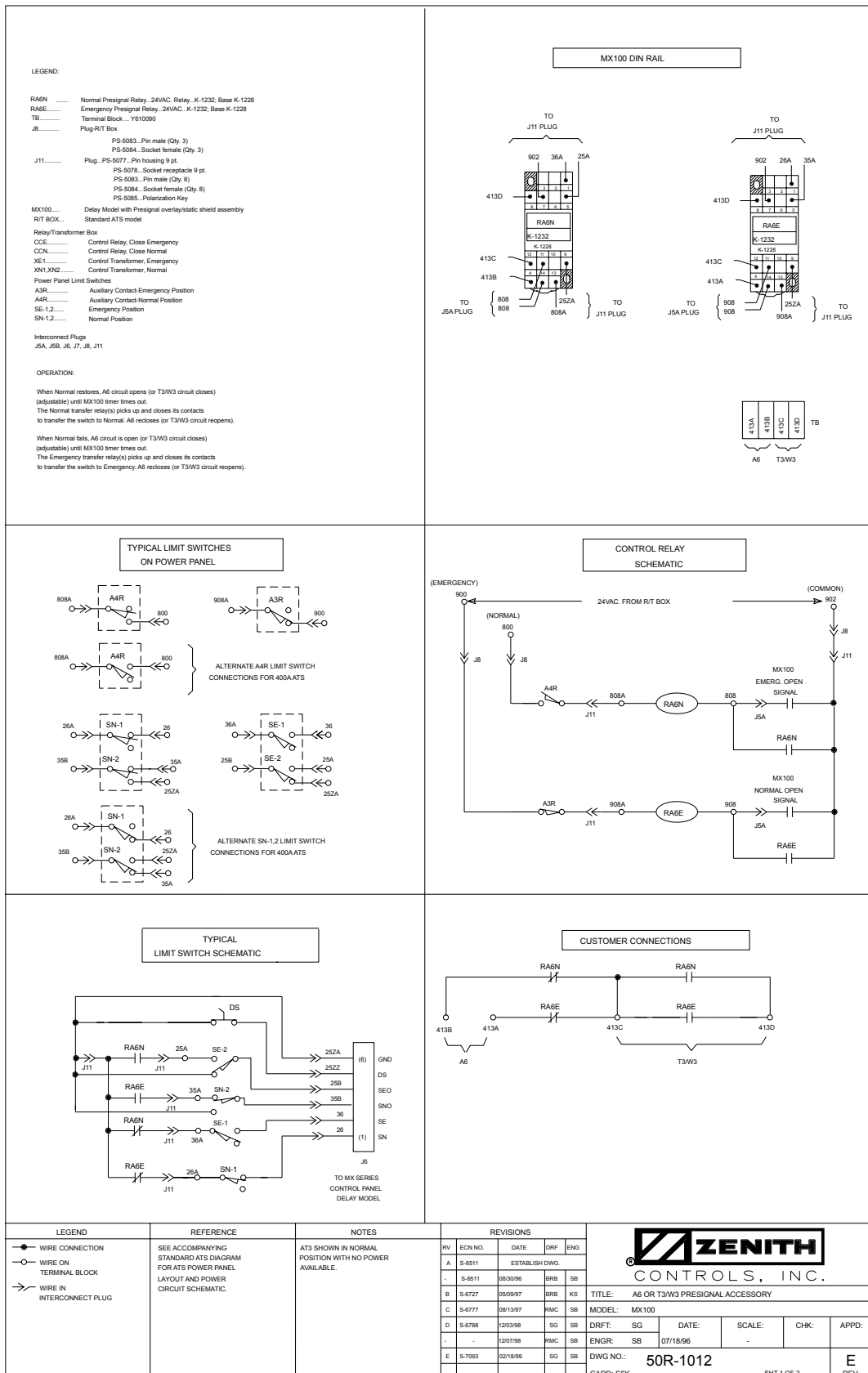
Standard Drawings (cont'd)

Drawing #52A-6001, Page 2



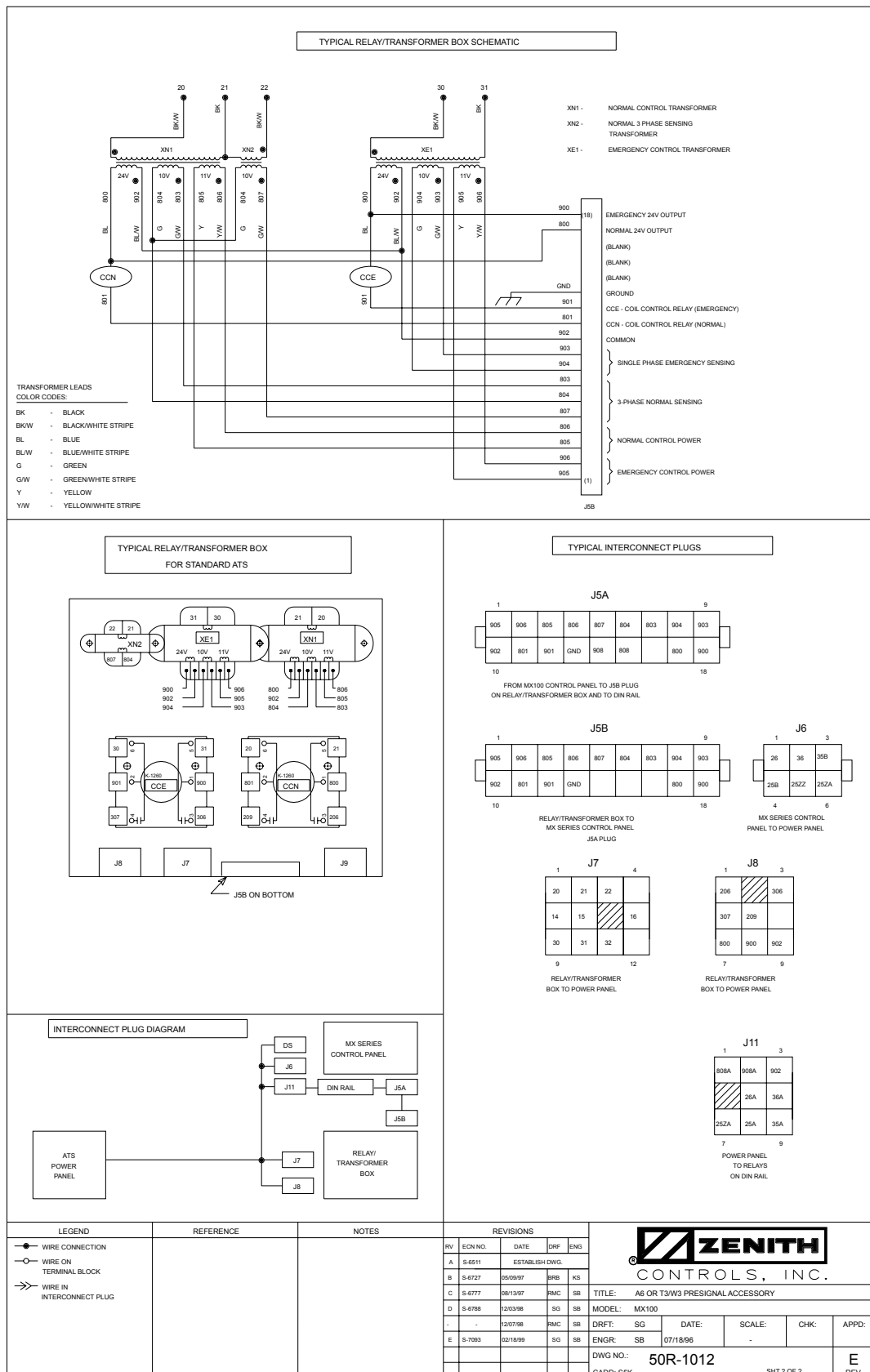
Standard Drawings (cont'd)

Drawing #50R-1012, Page 1



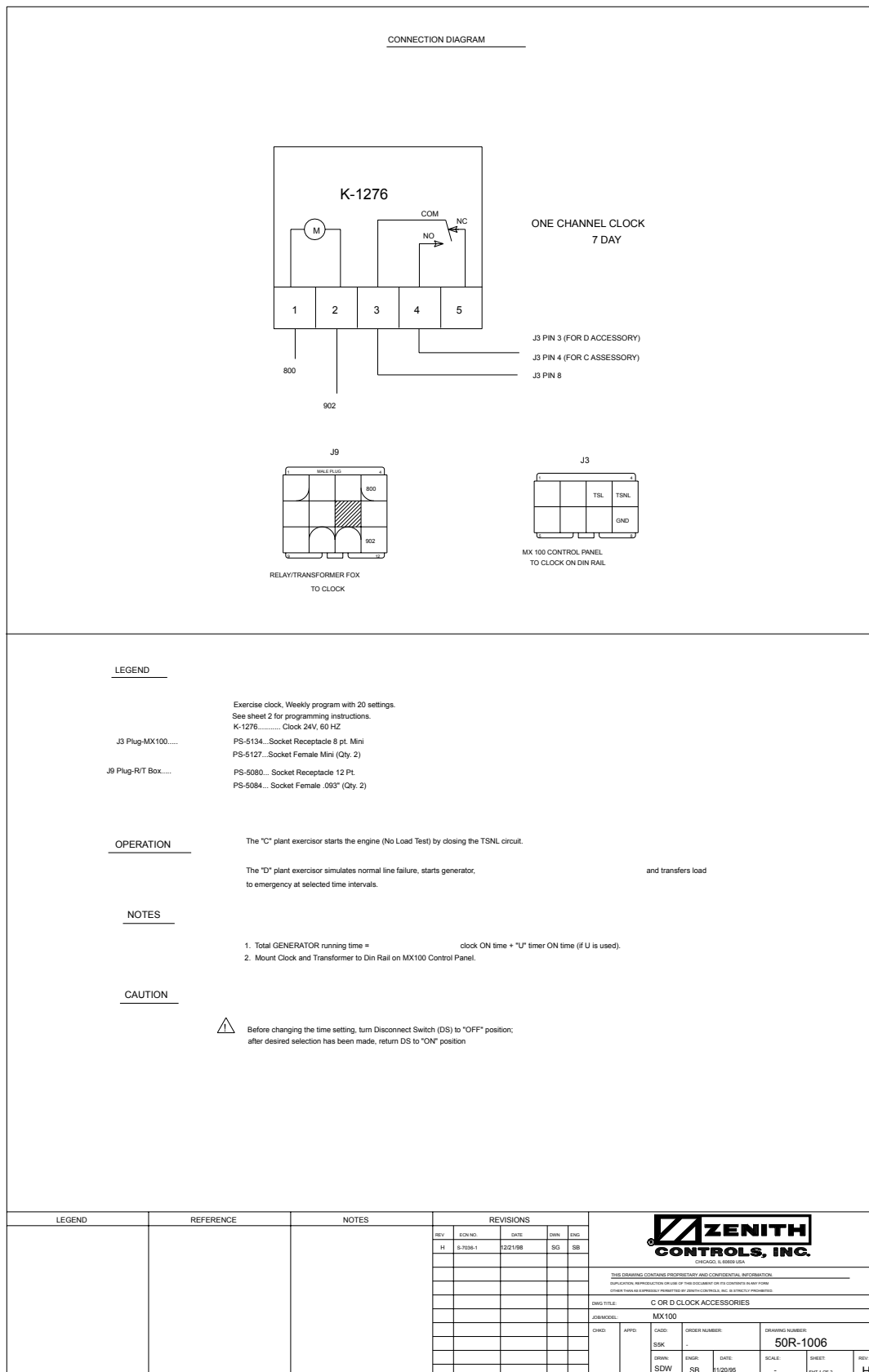
Standard Drawings (cont'd)

Drawing #50R-1012, Page 2



Standard Drawings (cont'd)

Drawing #50R-1006, Page 1



Standard Drawings (cont'd)

Drawing #50R-1006, Page 2

Digi 20 PROGRAMMING INSTRUCTIONS

The circular keypads are positioned to provide a sequential path for programming. Starting with Prog. to select a program, clockwise to  to select ON or OFF. Then h for hour, m for minute, and finally Day to select day or days of the week. If an input is missing or incomplete, the missing segments will flash when the  or program key is depressed. (For example, if no ON or OFF is selected, the ON symbol will flash). The missing entry must be completed before programming can resume. While programming, pressing the h, m or Day key longer than 2 seconds will cause a rapid roll of the parameter. A program consists of: 1. ON or OFF command, 2. Hour and minute, and 3. Day or multiple days on which it is to occur.

Note: A flashing display indicates either incomplete data entry or the battery is low. Check to see if days and ON or OFF times are entered, and check the power supply to the time control.

IMPORTANT: Depress reset key (Res.) before beginning to set time and program

SETTING TIME AND DAY OF CLOCK

1. Select military (24:00 hr.) or AM/PM (12:00 hr.) time mode by depressing and holding h key while pressing ± 1 h key to toggle between military and AM/PM. (AM appears in display when in AM/PM mode).
2. Press and hold down  key.
3. If setting the time when daylight savings time is in effect, press ± 1 h key once (± 1 h will appear in display).
4. Set hour with h key. If AM or PM does not appear in display, the unit is in see note above to change display.
5. Set minutes with m key.
6. Press Day key repeatedly to the day of the week (1 is Monday, 7 is Sunday).
7. Release  key, colon will begin flashing. If the days are flashing, the day of the week was not entered. (See step 6).

PROGRAMMING

1. Press Prog. key  will appear in display. (Pressing Prog. key again, display will show the number of free programs: Fr 20). Press again to advance to 1st program.
2. Press  key,  ON symbol will appear. Pressing the key again will toggle to OFF . Select ON or OFF for the program with the  key.
3. Press h to select hour for switching time.
4. Press m to select minute for switching time.
5. If the program is to occur every day of the week, (24 hour time control) ignore Day key and press Prog. key to advance to next program.
6. If 7 day time control is desired, press Day key. 1 2 3 4 5 6 (Mon. thru Sat.) block of days appears in display. Pressing Day key again, 1 2 3 4 5 (Mon. thru Fri.) appears in display. Press Day key again, 6 7 (Sat. & Sun.) appears in display. Pressing Day key again, 1 (Mon.) appears in display. Repeated presses will cycle through all days of the week, and back to 1 thru 7 (Mon. thru Sun.). Select day or block of days desired with the Day key.
7. Press Prog. key and repeat steps 2 thru 6 to enter additional programs of ON and OFF times. Note that more than one OFF time program may be entered, enabling automatic control of manual overrides.
8. Press  key to enter run mode.

IMPORTANT: THE OUTPUT RELAYS WILL SWITCH ON (OR OFF) ONLY AT THE PROGRAMMED TIMES, AFTER PROGRAMMING IS COMPLETED. IF A CHANNEL SHOULD BE ON, IT MUST BE MANUALLY TURNED ON WITH THE  KEY. FOR EXAMPLE: PROGRAMMING IS COMPLETED AT 2PM AND CH1 WAS PROGRAMMED TO BE ON AT 8AM AND OFF AT 5PM. AFTER PRESSING THE  KEY, CH1 WILL BE OFF; PRESS  TO TURN IT ON. IT WILL ASSUME AUTOMATIC OPERATION AT THE 5PM OFF TIME.

REVIEW AND CHANGE OF PROGRAMS

1. To review a program at any time press Prog. key. Programs will be displayed in the sequence they were entered with repeated presses of Prog. key.
2. To change a program, select the program to be changed with Prog. key, and enter the new time of day and/or days of week just as in the programming steps shown above. The old program is overwritten with the new selections. Press Prog. to store the new program.
3. To delete an individual program, select the program as in step 1 and press the m key and then the h key until "----" appears in display. Press either Prog. or  key until "----" flashes. The program is deleted after a few seconds.

MANUAL OVERRIDE

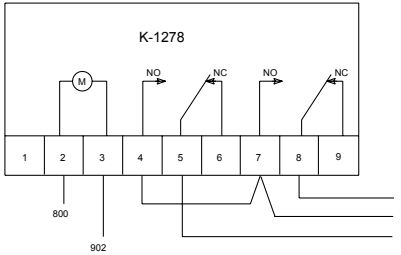
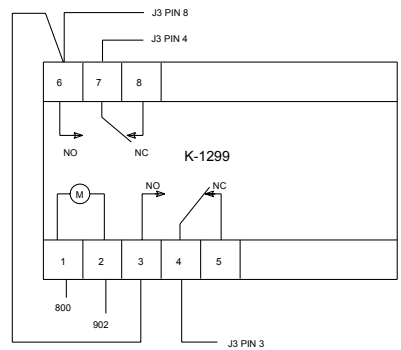
While in Run mode, ( symbol is in display), pressing the  key will reverse the load status (switch load OFF if it is ON, or switch ON if it is OFF). A hand symbol appears in display to indicate the override is active. At the next scheduled switching time, automatic time control will resume, eliminating the override. Pressing the  key a second time  appears in the display indicating the load is switched permanently ON. Pressing the  key a third time  appears in the display indicating the load is switched permanently OFF. Pressing the  key a fourth time returns to automatic,  appears in the display.

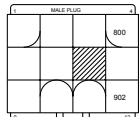
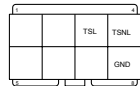
LEGEND	REFERENCE	NOTES	REVISIONS								
			REV	ECN NO.	DATE	DFT	ENG				
			H	S-7036-1	12/21/98	SG	SB	THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION. DUPLICATION, REPRODUCTION OR USE OF THIS DOCUMENT OR ITS CONTENTS IN ANY FORM OTHER THAN AS EXPRESSLY PERMITTED BY ZENITH CONTROLS, INC. IS STRICTLY PROHIBITED.			
								DWG. TITLE: C OR D CLOCK ACCESSORIES			
								JOB/MODEL: MX100			
								CHKD:	APPD:	CADD:	ORDER NUMBER:
										ACAD:	DRAWING NUMBER:
								DRWN:	ENGR:	DATE:	SCALE:
								SDW:	SB	11/20/95	N/A
										SHEET:	2 OF 2
										REV:	H

Standard Drawings (cont'd)

Drawing #50R-1003, Page 1

CONNECTION DIAGRAM		REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED		
J	S-7625	ADD GRASSLIN TIMER	02/13/01	KK	

DIGI 322-45/2Y	MFR: GRASSLIN
OPERATING INSTRUCTIONS - SEE SHEETS 2 & 3.	TALENTO 892
	

J9	J3
	
RELAY/TRANSFORMER BOX TO CLOCK	MX100 CONTROL PANEL TO CLOCK ON DIN RAIL

LEGEND	
C/D.....	Exercise clock, 365 day program. See sheets 2 & 3 for programming instructions. K-1278..... Clock 24V, 60 Hz (No longer available). K-1299..... Clock 24V, 60 Hz
J3 Plug-MX100.....	PS-5134...Socket Receptacle 8 pt. Mini PS-5127...Socket Female Mini (Qty. 3)
J9 Plug-R/T Box.....	PS-5080... Socket Receptacle 12 Pt. PS-5084... Socket Female .093" (Qty. 2)

OPERATION	
C-MODE:	The "C" plant excisor starts the engine (No Load Test) by closing the TSNL circuit "C2".
D-MODE:	The "D" plant excisor simulates normal line failure, starts generator, and transfers load to emergency at the selected time intervals.

NOTES	
1.	Total GENERATOR running time = "C" ON time + "U" timer ON time (if U is used).
2.	Mount Clock and Transformer to Din Rail on MX100 Control Panel.

CAUTION	
	Before changing the time setting, turn Disconnect Switch (DS) to "INHIBIT" position; after desired selection has been made, return DS to "AUTO" position

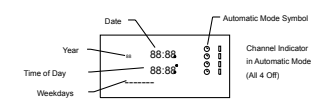
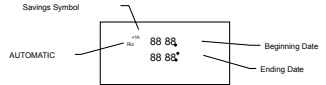
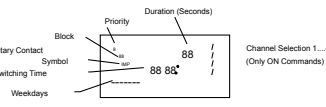
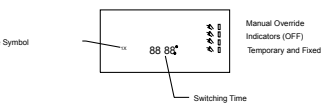
FOR ADDITIONAL INFO REFER TO		SIGNATURES		DATE	
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APPROVED	DESIGNED	DESIGNED	DATE	DATE	TITLE
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3 PL. DECIMALS x .005	3 PL. DECIMALS x .005	3 PL. DECIMALS x .005	3 PL. DECIMALS x .005	3 PL. DECIMALS x .005	C/D WITH 365 DAY CLOCK
ANGLES x 1"	ANGLES x 1"	ANGLES x 1"	ANGLES x 1"	ANGLES x 1"	
FRACTIONS x 1/64	FRACTIONS x 1/64	FRACTIONS x 1/64	FRACTIONS x 1/64	FRACTIONS x 1/64	FIRST MADE FOR:
FINISH	FINISH	FINISH	FINISH	FINISH	
AutoCad Generated	AutoCad Generated	AutoCad Generated	AutoCad Generated	AutoCad Generated	SIZE
					B
					CAGE CODE
					DWG NO
					50R-1003
					SHEET
					1 OF 14

Standard Drawings (cont'd)

Drawing #50R-1003, Page 2

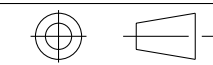
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
J	S-7625	ADD GRASSLIN TIMER	02/13/01 KK

DIGI 322-45/2 Y-24	
KEYPAD DESCRIPTION	
Mo-Su	- Day selector
* Reset	- Closes all programs and actual time
* S/W	- Switch for daylight savings time functions
Prior.	- Sets priorities
Year	- Sets year when setting actual time
CL	- To cancel an individual program step
R	- Used to review the program
1X	- Used to enter a one time schedule
N	- Used to enter an intermediate step in a program block
⌚	- Recalls actual time (Time of Day)
S	- Used to store the final step in a program block
⏏	- Sets the momentary contact (IMP)
→	- Used to set the end of a multiday holiday period
Day	- Used to set the day of the month
Month	- Used to set the month
h+	- Hour advance
h-	- Hour reverse
m+	- Minute advance
m-	- Minute reverse
IO	- Sets ON(1), OFF(0) command for each channel
⚡	- Manual override for each channel
*	- Recessed buttons - use a long pen point

LCD DISPLAY ELEMENTS	
The LCD incorporates a number of different elements to display various data and information.	
1. Example: Actual date and time of day	
	
2. Example: Daylight savings time	
	
3. Example: Momentary Contact	
	
4. Example: Other displays	
	

BLOCK FORMATION	
The purpose of the blocks is to simplify the programming. i.e. switching times that are repeated for different holidays or periods need not be repeated. Likewise, when programming ON and OFF times the date need only be entered once.	
The time switch assigns a block number to each program or date block entered from 00 to 99. All programs without a date (7-day programs) automatically receive the block number 00.	
Programs with dates - individual days or period of days - are assigned an ascending block number (01, 02, ... 99). All programs within a block are stored by pressing "N".	
The last program or portion of a program within a block is entered by pressing "S", thus closing the block.	

EXECUTION OF PROGRAMS	
At beginning of each day the microprocessor determines which of the stored programs for that day have the highest priority. Only the highest priority program(s) will be executed. Once the digi 322 is programmed, it will automatically "look back" and assume the correct ON or OFF switch position.	
PRIORITY	
The microprocessor automatically assigns the lowest priority - "0" - to standard 7-day programs. Holiday programs with a duration of more than one day automatically receive priority "1". Holiday programs for one day only automatically receive priority "2". A higher priority can be manually assigned to any holiday program by using the "Prior." key.	
PROGRAM STORAGE CAPACITY	
The digi 322 can store up to 322 programs. These 322 programs can be freely assigned to different dates or periods, switching times or channels. A storage position is used each time the button "N" or "S" is pressed. If all storage positions are used up, four 8's will be shown in the display.	
If a program step is not complete and storage is attempted with the "N" or "S" button, the missing components will blink in the LCD.	
SETTING THE TIME	
[Example: 8:15 AM, July 10, 1991] Press "Reset" to clear the time and all programs. While holding : ⌚ Press "Year" to 91 Press "Month" to 7 (July) Press "Day" to 10 Press "h+" to 8 (AM) Press "h-" to 15 Release the ⌚. The current date and time will be displayed, as will the day of the week; the time colon will blink. Channel setting and override status will be indicated on the right and the +1h indicates that Daylight Saving Time is in effect, if appropriate.	
DAYLIGHT SAVINGS TIME (DST) FUNCTIONS	
The digi 322 is pre-programmed for DST to begin on the last Sunday in March and to end on the last Sunday in September every year. You can program a different DST as follows: To cancel pre-programmed DST: Press "S/W" (dates will appear) Press "CL" to cancel - (zeros will appear) Press "S" to store Press ⌚ to display the time of day To program different dates for DST: [Example: For 1991, April until October 27] Press "S/W" the dates 03:31 to 09:29 are displayed Press "CL" the display shows zeros Press "Month" to 4 (April) Press "Day" to 7 Press → to set the ending date Press "Month" to 10 (October) Press "Day" to 27 Press "S" to store Press ⌚ to display the time of day	
PROGRAMMING 7-DAY SCHEDULES	
NOTE: The actual time of day must be set prior to programming. Check DST. We recommend that all programs be first written out on the enclosed program worksheets. [Example: Channel 1 on at 7 AM and off at 6 PM, Monday thru Friday] Press "h+" to 7 AM (press 9 times) Press "h-" to 00 (once) to omit Saturday Press "Su" to omit Sunday Press "IO" (for channel 1) to 1 (ON) Press "N" to store Press "h+" to 6 PM Press "h-" to 00 (once) to omit Saturday Press "Su" to omit Sunday Press "IO" (for channel 1) twice to 0 (OFF) Press "S" to store Weekly program steps are automatically assigned to block "00" and priority "0".	

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THIRD ANGLE PROJECTION	
	

FOR ADDITIONAL INFO REFER TO	
REVISED	50R-1003-2
REVISIONS	2 PL. DECIMALS ± .020 3 PL. DECIMALS ± .005 ANGLES ± 1° FRACTIONS ± 1/64
FINISH	✓
AutoCad Generated	

SIGNATURES	
DESIGNER	SD
CHECKED	KK
QUALITY	
ISSUED	
DRAWING FILE: 50R-1003-2.dwg	
MODEL/ASSEMBLY FILE: MX100	
# C/D	⊖
CRITICAL TO QUALITY CHARACTERISTIC	

DATE	
02/13/01	
TITLE	
C/D WITH 365 DAY CLOCK DIGI 322-45/2 Y-24	
POST NAME FOR:	
SIZE	CAGE CODE
B	DWG NO
50R-1003	
SCALE:	SHEET 2 OF 14

Standard Drawings (cont'd)

Drawing #50R-1003, Page 3

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
J	S-7625 ADD GRASSLING TIMER	02/13/01	KK

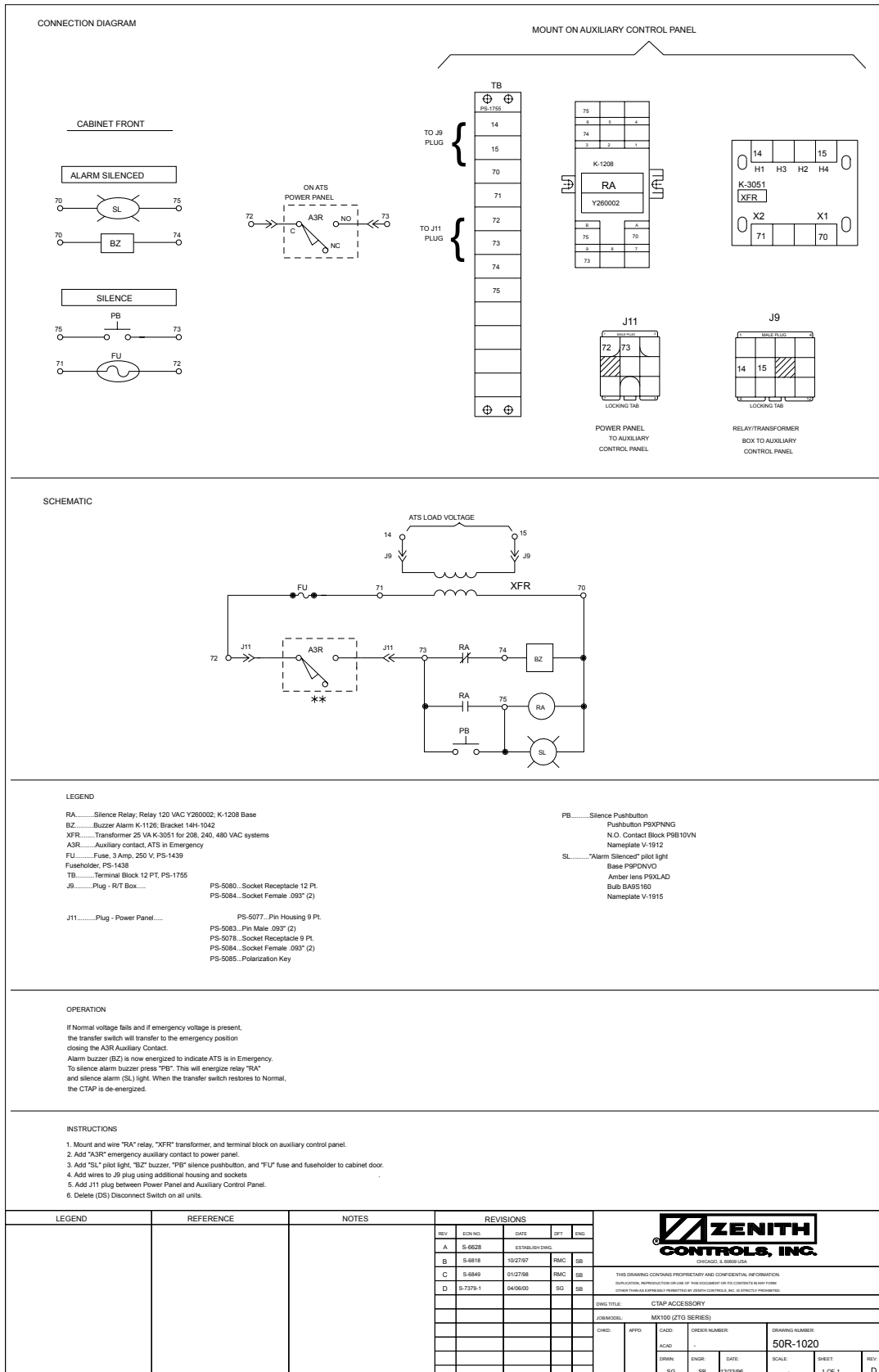
PROGRAMMING INDIVIDUAL HOLIDAYS [Example: July 4th - fixed date holiday; Labor Day (September 2, 1991) - 1-time schedule; Channel 1 off at 12:01 AM] NOTE: Fixed day holidays will stay in the program until the year 2079 when the internal clock stops. As one time holiday commands are executed the month and day go to zero (visible if you review the program). The month and day for the next year can be substituted for the zeros. For example: If you have a holiday program for Thanksgiving 1991 it is executed on November 28. If you review the program on November 29th you will see 00.00 not 11.28; you can enter 11.28, and press the "N" key to program Thanksgiving for 1992. <table border="0"><tr><td>Press "Month"</td><td>to 07 (July)</td></tr><tr><td>Press "Day"</td><td>to 04</td></tr><tr><td>Press "N"</td><td>to store</td></tr><tr><td>Press "Month"</td><td>to 09 (September)</td></tr><tr><td>Press "Day"</td><td>to 02</td></tr><tr><td>Press "IX"</td><td>1-time schedule only</td></tr><tr><td>Press "N"</td><td>to store</td></tr><tr><td>Press "h+"</td><td>to 12 AM</td></tr><tr><td>Press "m+"</td><td>to 01</td></tr><tr><td>Press "IO"</td><td>(for channel 1) twice to 0 (OFF)</td></tr><tr><td>Press "S"</td><td>to store this and close the block</td></tr></table> Individual Holiday programs are automatically assigned priority 2. NOTE: Ignore the days of the week indicator. PROGRAMMING MULTIDAY HOLIDAY PERIODS [Example: Channel 1 off (we will use an OFF command at 12:01 AM) each day from June 22, 1991 until September 3, 1991 inclusive]. The daily program will resume September 4. As this "School Summer Vacation" will be different in 1992 this becomes a 1X (one time) schedule. <table border="0"><tr><td>Press "Month"</td><td>to 06 (June)</td></tr><tr><td>Press "Day"</td><td>to 22</td></tr><tr><td>Press "→"</td><td>to set the end date</td></tr><tr><td>Press "Month"</td><td>to 09 (September)</td></tr><tr><td>Press "Day"</td><td>to 03</td></tr><tr><td>Press "IX"</td><td>to set one time</td></tr><tr><td>Press "N"</td><td>to store</td></tr><tr><td>Press "h+"</td><td>to 12 AM</td></tr><tr><td>Press "m+"</td><td>to 01</td></tr><tr><td>Press "IO"</td><td>(for channel 1) twice to 0 (OFF)</td></tr><tr><td>Press "S"</td><td>to store this and close the block</td></tr></table> Multiday holiday program are automatically assigned priority 1. These periods can be programmed with a 7-day schedule that is different than the standard 7-day schedule. Simply follow the above procedure and add the respective Monday thru Sunday keys for the desired days of the week before selecting the hours. If no ON or OFF times are programmed for some or all days of the week during a multiday holiday period, the standard 7-day schedule will be executed. REPEAT CHANNEL SELECTION The control of loads is not restricted to a single channel. All loads can be turned on or off at the same time. For example, load 1 can be turned OFF simultaneous to load 2 being turned ON. SPECIAL PROGRAM FUNCTIONS MOMENTARY CONTACT PROGRAM Short duration programs in 1-second intervals up to 59 seconds can be programmed for loads such as bells. [Example: A noon whistle (channel 2) for six seconds Monday thru Friday] <table border="0"><tr><td>Press "h+"</td><td>to 12 PM - noon</td></tr><tr><td>Press "m+"</td><td>once to 00</td></tr><tr><td>Press "IO"</td><td>(channel 2) once to 1</td></tr><tr><td>Press "Pulse"</td><td>to 6 (seconds)</td></tr><tr><td>Press "Sa, Su"</td><td>to eliminate Saturday & Sunday</td></tr><tr><td>Press "S"</td><td>to store</td></tr></table> NOTE: This can only be used for ON commands.	Press "Month"	to 07 (July)	Press "Day"	to 04	Press "N"	to store	Press "Month"	to 09 (September)	Press "Day"	to 02	Press "IX"	1-time schedule only	Press "N"	to store	Press "h+"	to 12 AM	Press "m+"	to 01	Press "IO"	(for channel 1) twice to 0 (OFF)	Press "S"	to store this and close the block	Press "Month"	to 06 (June)	Press "Day"	to 22	Press "→"	to set the end date	Press "Month"	to 09 (September)	Press "Day"	to 03	Press "IX"	to set one time	Press "N"	to store	Press "h+"	to 12 AM	Press "m+"	to 01	Press "IO"	(for channel 1) twice to 0 (OFF)	Press "S"	to store this and close the block	Press "h+"	to 12 PM - noon	Press "m+"	once to 00	Press "IO"	(channel 2) once to 1	Press "Pulse"	to 6 (seconds)	Press "Sa, Su"	to eliminate Saturday & Sunday	Press "S"	to store	PRIORITIES Pressing the "Prior" key after entering the date for a holiday program permits the assignment of a higher priority (the highest is 5). This allows that standard holiday programs with priority 1 or 2 are overridden with special programs. MANUAL OVERRIDE The digi 322 provides temporary and fixed overrides. Each channel has an elongated button below the display will change to indicating an override condition. This is a temporary override which will in turn be overridden by the next program change. For example, if lights are programmed to turn off at 4 PM and they are turned on manually at 2 PM, they will turn off at 4 PM. Pushing the button again will give a FIX 1 (ON) and pushing it another time will give a FIX 0 (OFF). These are permanent ON or OFF commands which will not be overridden by the program. Pushing the elongated button one more time will return to automatic operation. PROGRAM REVIEW The program can be reviewed by pushing the "R" key successively. Block 00 is reviewed first and each weekly ON/OFF command will be displayed on successive screens. A blank screen indicates the end of block 00. Block 01 is reviewed next. The first screens show the holidays followed by a blank screen. The ON/OFF commands for those days are not followed by another blank screen which indicates the end of block 01. Block 02 and any additional blocks are reviewed in the same manner. Press the to return to the TOD display anytime. CANCELLING PROGRAMS Use the "R" key to find the program step to be cancelled. Pressing the "CL" key will cancel that step and it is deleted from memory. To delete holidays from the program you must clear both the date and the time/on/off positions. The next key will cancel all program steps and also the current time of day, date etc. EDITING PROGRAMS Use the "R" key to find the program step to be corrected. Make the changes as in normal programming and then use the "N" key to store the change. BATTERY-POWERED RESERVE In case of power failure, the built-in nickel-cadmium battery maintains the time of day, program storage and the LCD display of 150 hours (6+ days). During this time, all programmed switching events will be carried out but the relays will not operate. The battery reserve operates to its full capacity only if the digi 322 has been connected to electrical power for at least 140 hours. NOTES: - When power is restored after a power failure, the digi 322 "looks back" and assumes the correct ON or OFF switch position. - After entering a time of day and pressing the display may still show the hour that was entered. For example: if 2:00 PM had been entered, the display may show "PM 02:--" after pressing the h+ key. To enter the next time of day program, it is necessary to change the hour with the h+ or h- key even if the next time of day program is to be the same hour as previously entered. If the hour is not changed, the Dig322 will not accept the next program. For example: After entering a 2:00 PM program, if the next time of day program is to be 2:30 PM, press the h+ key to 3 PM, and then the h- key back to 2 PM, and then press the m+ key to :30.
Press "Month"	to 07 (July)																																																								
Press "Day"	to 04																																																								
Press "N"	to store																																																								
Press "Month"	to 09 (September)																																																								
Press "Day"	to 02																																																								
Press "IX"	1-time schedule only																																																								
Press "N"	to store																																																								
Press "h+"	to 12 AM																																																								
Press "m+"	to 01																																																								
Press "IO"	(for channel 1) twice to 0 (OFF)																																																								
Press "S"	to store this and close the block																																																								
Press "Month"	to 06 (June)																																																								
Press "Day"	to 22																																																								
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Press "IO"	(for channel 1) twice to 0 (OFF)																																																								
Press "S"	to store this and close the block																																																								
Press "h+"	to 12 PM - noon																																																								
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Press "IO"	(channel 2) once to 1																																																								
Press "Pulse"	to 6 (seconds)																																																								
Press "Sa, Su"	to eliminate Saturday & Sunday																																																								
Press "S"	to store																																																								

FOR ADDITIONAL INFO REFER TO		SIGNATURES		DATE
SECTION	REVISIONS	DESIGN	DATE	02/13/01
REVISIONS	REVISIONS	DESIGN	DATE	
2 PL. DECIMALS ±	.020	DESIGN	KK	
3 PL. DECIMALS ±	.005	DESIGN		
ANGLES ±	1"	DESIGN		
FRACTIONS ±	1/64	DESIGN		
FINISH	✓	DESIGN		
AutoCad Generated		DESIGN		

C/D WITH 365 DAY CLOCK	
DIGI 322-45/2 Y-24	
SIZE	B
CAGE CODE	
DWG NO	50R-1003
SHEET	3 OF 14

Standard Drawings (cont'd)

Drawing #50R-1020



Standard Drawings (cont'd)

Drawing #50R-1001, Page 1

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
L	S-7636 REVISED DWG	02/15/01	SB

CONNECTION DIAGRAM	SCHEMATIC
TO GND (J3 PIN 8) TO TSL (J3 PIN 3) CUSTOMER SUPPLIED INPUT VOLTAGE J3 SOLE PLUS TSL GND LOCKING TAB MX100 CONTROL PANEL TO Q2 RELAY ON DIN RAIL	CUSTOMER SUPPLIED INPUT VOLTAGE Q2 PIN 8 PIN 3 MX100 INPUT

LEGEND	
Q2 Relay.....	K-1232, 24VAC; K-1242, 24VDC; K-1204, 120VAC K-1228, Base PS-6161 Din Rail
J3 Plug - MX100.....	PS-5134 Socket Receptacle 8 pt. Mini PS-5127 Socket Female Mini (Qty. 2)

OPERATION	
Q2	Remote Peak Shave or Area Protection Circuit Energize Q2 Relay to simulate a normal line failure causing the Generator to start and transfer the load to Emergency. Should Emergency fail during this operation, the transfer switch will retransfer back to Normal.

INSTRUCTIONS	
Mount Q2 Relay on Din Rail on MX100 Control Panel.	

FOR ADDITIONAL INFO REFER TO		SIGNATURES		DATE	TITLE		
REVISED	DESCRIPTION	APPROVED	DATE	DATE			
2 PL. DECIMALS ±	.020	DESIGNED	SB	02/15/01	Q2 ACCESSORY		
3 PL. DECIMALS ±	.005	ENGINEER	SB				
ANGLES ±	1°	QA					
FRACTIONS ±	1/64	QC					
FINISH	✓	DRAWING FILE:	50R-1001-I-1.dwg		SIZE	CAGE CODE	DWG NO.
AutoCad Generated		MODEL/ASSEMBLY FILE:	MX100		B		50R-1001
		# CTR	⊖	CRITICAL TO QUALITY	SCALE:	-	SHEET 1 OF 3

Standard Drawings (cont'd)

Drawing #50R-1001, Page 3

		REVISIONS			
		REV.	DESCRIPTION	DATE	APPROVED
L		S-7636	REVISED DWG	02/15/01	SB

CONNECTION DIAGRAM	SCHEMATIC								
TO GND (J3 PIN 8) TO TSL (J3 PIN 3) EXTERNAL CONTACT N.C. (CUSTOMER SUPPLIED) RELAY/TRANSFORMER BOX TO XFR ON DIN RAIL MX100 CONTROL PANEL TO Q2M RELAY ON DIN RAIL	20 21 NORMAL VOLTAGE FROM R/T BOX XFR 24VAC 20A 21A Q2M EXTERNAL CONTACT N.C. (CUSTOMER SUPPLIED) Q2M J3 PIN 8 PIN 3 MX100 INPUT * NOTE - MAX DISTANCE EXTERNAL CONTACT CAN BE LOCATED FROM CONTROLLER <table border="1"><thead><tr><th>AWG</th><th>MAX FT</th></tr></thead><tbody><tr><td>18</td><td>400</td></tr><tr><td>16</td><td>650</td></tr><tr><td>14</td><td>1000</td></tr></tbody></table>	AWG	MAX FT	18	400	16	650	14	1000
AWG	MAX FT								
18	400								
16	650								
14	1000								

LEGEND	
Q2M RELAY.....	K-1232, 24 VAC K-1228, Base PS-6161 Din Rail
J3 Plug - MX100.....	PS-5134 Socket Receptacle 8 pt. Mini PS-5127 Socket Female Mini (Qty: 2)
J9 Plug-R/T Box.....	PS-5080..... Socket Receptacle 12 Pt. PS-5084..... Socket Female .093" (Qty: 2)
XFR.....	Transformer 10VA K-3102 208/24 VAC K-3103 240/24 VAC K-3104 277/24 VAC K-3105 480/24 VAC K-3107 575/24 VAC

OPERATION	
Q2M	Remote Peak Shave or Area Protection Circuit Open external N.C. contact to simulate a normal line failure causing the Generator to start and transfer the load to Emergency. Should Emergency fail during this operation, the transfer switch will retransfer back to Normal.

INSTRUCTIONS	
1. Add temporary Q2M jumper. Identify with tag marked "TEMPORARY Q2M JUMPER".	
2. Mount Q2M Relay and XFR Transformer on Din Rail on MX100 Control Panel.	

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THIRD ANGLE PROJECTION	
AutoCad Generated	

FOR ADDITIONAL INFO REFER TO		SIGNATURES		DATE
REVISED	MDL	SD		02/15/01
DESIGNED	SB			
CHANGED				
ENGRD				
MRG				
QUALITY				
ISSUED				
DRAWING FILE: 50-1001-I-3.dwg		SIZE: B		DWG NO: 50R-1001
MODEL/ASSEMBLY FILE: MX100		CAGE CODE		SHEET 3 OF 3
# CTOA		SCALE: -		

Standard Drawings (cont'd)

Drawing #50R-1024

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
D	S-7636	REVISD DWG	02/15/01 SB

CONNECTION DIAGRAM

CUSTOMER SUPPLIED
INPUT VOLTAGE

J3
MALE PLUG
LOCKING TAB
MX100 CONTROL PANEL
TO Q3 RELAY ON DIN RAIL

PS-1838
PS-4587
TO Q3
(J3 PIN 6)
ADD TAG PER
INSTRUCTIONS BELOW

SCHEMATIC

CUSTOMER SUPPLIED
INPUT VOLTAGE

Q3

PIN 8 PIN 6
MX100 INPUT

LEGEND

Q3 Relay.....	K-1232, 24VAC; K-1242, 24VDC; K-1204, 120VAC K-1228, Base PS-6161 Din Rail
J3 Plug - MX100.....	PS-5134 Socket Receptacle 8 pt. Mini PS-5127 Socket Female Mini (Qty. 2)

OPERATION

Q3 - Remote Inhibit Transfer to Emergency Circuit.

Voltage applied to Q3 input will allow transfer to Emergency, conversely, no input on Q3 will result in no transfer to Emergency. To enable Q3 option engage Q3 jumper.

INSTRUCTIONS

- Add tag marked "TO ENABLE Q3 OPTION ENGAGE Q3 JUMPER".
- Q3 Relay on Din Rail on MX100 Control Panel.

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FOR ADDITIONAL INFO REFER TO	
REVISED	REVISIONS
2 PL. DECIMALS ± .020	2 PL. DECIMALS ± .005
ANGLES ± 1°	FRACTIONS ± 1/64
FINISH ✓	

AutoCad Generated

SIGNATURES		DATE
DESIGNED	SB	02/15/01
ENGINEER	SB	
WFO		
QUALITY		
ISSUED		

DRIVING FILE: 50R-1024-d-1.dwg

MODEL/ASSEMBLY FILE: MX100

CTRN

THIRD ANGLE PROJECTION

Q3 ACCESSORY

POST MADE FOR:

SIZE	CAGE CODE	DWG NO
B		50R-1024

SCALE: - SHEET 1 OF 1

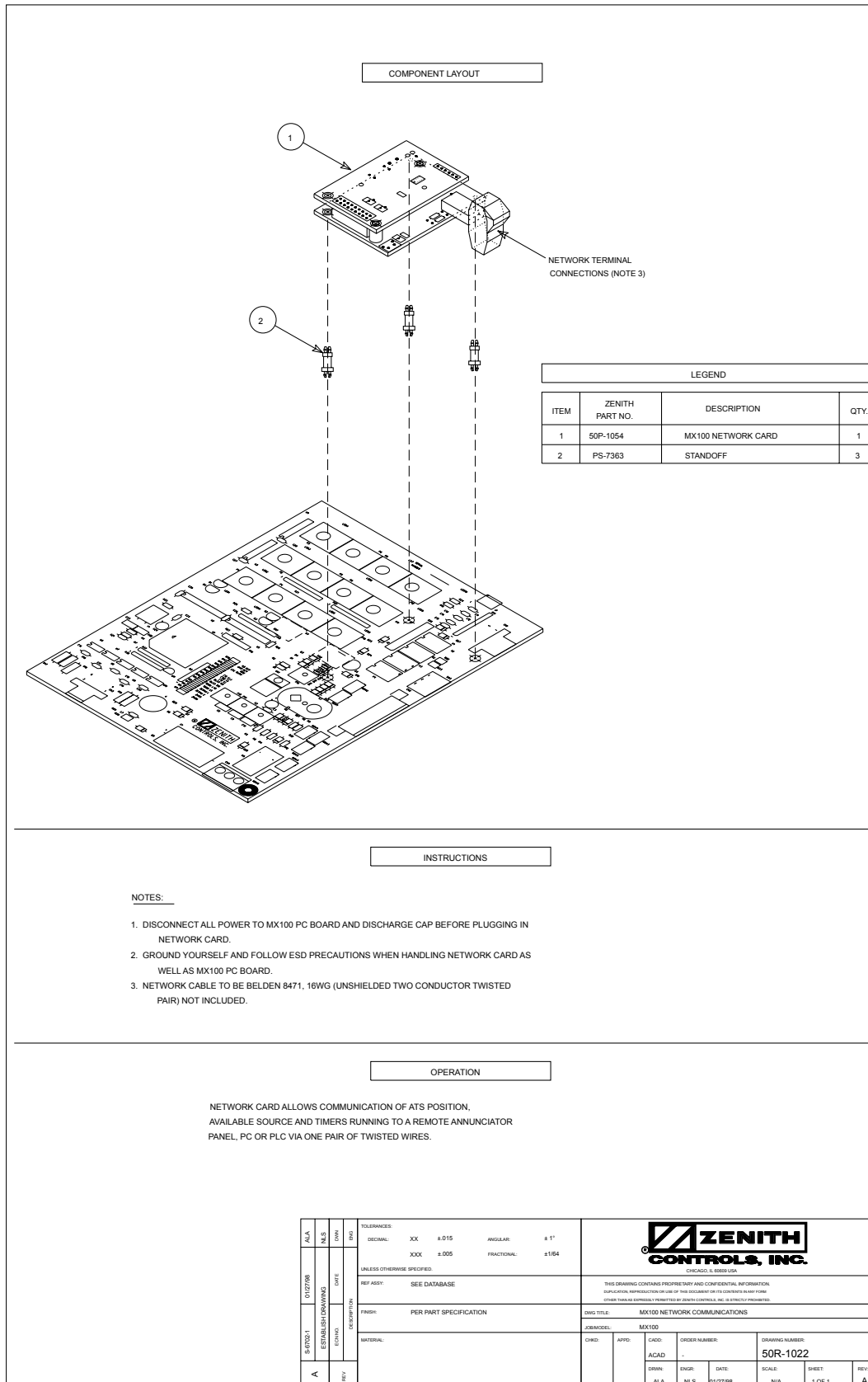
Standard Drawings (cont'd)

Drawing #50R-1010

LEGEND	REFERENCE	NOTES	REVISIONS	ZENITH CONTROLS, INC. CHICAGO, ILL. 60606 USA			
			REV. SON NO. DATE DFT ENG	THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION. REPRODUCTION OR USE OF THIS DOCUMENT OR ITS CONTENTS IN ANY FORM OTHER THAN AS EXPRESSLY PERMITTED BY ZENITH CONTROLS, INC. IS EXPRESSLY PROHIBITED. DWG TITLE: 6A TEST SWITCHES JOB/MODEL: MX100 ORDER NUMBER: 50R-1010 CHRG: ALA ENGR: SB DATE: 25/15/96 SCALE: 1 OF 1 REV: B			
			A 5-6449 ESTABLISHED ON: BG BB				
			B 6-7375-1 04/08/00				
CONNECTION TO MX100 CONTROL PANEL:							
TS MOUNTED ON DOOR OF ENCLOSURE			MX100 CONTROL PANEL TO TEST SWITCH CONTACT				
LEGEND:							
6A..... Maintained Test Switch P9XSMD0N, 2 Pos. Operator P9B10VN, N.O. Contact Block V-1505, Nameplate							
J3..... Plug - MX100 PS-5134...Socket Receptacle 8 pt. Mini PS-5127...Socket Female Mini (Qty. 2)							
OPERATION:							
When activated in the TEST position, TS will simulate a normal line failure. The TS will automatically transfer the load to the emergency position. When the test switch is returned to the AUTOMATIC position, the transfer switch will restore the load to the normal line position. Should Emergency fail while the ATS is in the Emergency position, the ATS will transfer back to Normal.							

Standard Drawings (cont'd)

Drawing #50R-1022





GE Zenith Controls

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