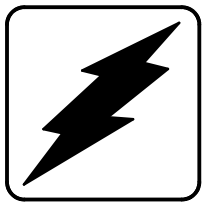
Operation and Installation Manual

Automatic Transfer Switches



Model:

ZCB

Contactors:

150-3000 Amperes

KOHLER® POWER SYSTEMS

ISO 9001 KOHLER GENERATORS INTERNATIONALLY REGISTERED

TP-5665 9/94a

Table of Contents

Safety Precautions and Instructions

A transfer switch, like any other electromechanical device, can pose potential dangers to life and limb if improperly maintained or imprudently operated. The best way to prevent accidents is to be aware of the potential dangers and to always use good common sense. In the interest of safety, some general precautions relating to operating of a transfer switch follow. Below are some general precautions relating to the operation of a transfer switch. SAVE THESE INSTRUCTIONS.

DANGER

Danger indicates the presence of a hazard that *will* cause *severe* personal injury, death, or substantial property damage if the danger is ignored.

WARNING

Warning indicates the presence of a hazard that *can* cause *severe* personal injury, death, or substantial property damage if the warning is ignored.

CAUTION

Caution indicates the presence of a hazard that *will* or *can* cause *minor* personal injury or property damage if the caution is ignored.

NOTE

Note is used to notify people of installation, operation, or maintenance information that is important but not hazard-related.

Safety decals are affixed to the transfer switch in prominent places to advise the operator or service technician of potential hazards. The decals are reproduced here to improve operator recognition. For a further explanation of decal information, refer to the safety precautions throughout this manual. Before operating or servicing the transfer switch, be sure you understand the messages of these decals. Replace decals if missing or damaged.

Hazardous Voltage/ Electrical Shock

⚠ DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect power sources before servicing. Barrier must be installed after adjustments, maintenance, or servicing.

Hazardous voltage can cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage**.** Do not contact electrical connections with tools or jewelry while adjustments are made. Remove wristwatch, rings, and jewelry that can cause short circuits.

Hazardous voltage can cause severe injury or death. Keep unauthorized persons away from the generator set and take precautions to prevent unqualified personnel from tampering with the transfer switch. Have the generator set and electrical circuits serviced only by qualified technicians. Wiring should be inspected at the recommended interval shown in the service schedule– replace leads that are frayed or in poor condition. Do not operate electrical when standing in water or on wet ground.

Hazardous voltage can cause severe injury or death. To prevent the possibility of electrical shock, disconnect harness plug before installing any accessories involving connection to transformer assembly primary terminals 76, 77, 78, and 79. Terminals are at line voltage!

Hazardous voltage can cause severe injury or death. To prevent the possibility of electrical shock, disconnect harness plug before installing any accessories involving connection to transformer assembly primary terminals on microprocessor logic models. Terminals are at line voltage!

NOTE

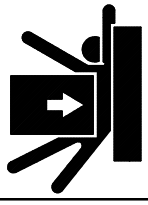
Hardware Damage! Transfer switch may use both American standard and metric hardware. Use the correct size tools to prevent rounding of bolt heads and nuts.

NOTE

When replacing hardware, do not substitute with inferior grade hardware. Screws and nuts are available in different hardness ratings. American Standard hardware uses a series of markings and metric hardware uses a numeric system to indicate hardness. Check markings on bolt head and nuts for proper identification.

Heavy Equipment

⚠ WARNING



Unbalanced weight.
Improper lift can cause severe injury, death, or equipment damage.

Use adequate lifting capacity.
Never leave automatic transfer switch standing upright unless it is securely bolted in place.

Introduction

This manual provides operation and initial installation instructions for Kohler automatic transfer and bypass/isolation switches that use a 150- to 3000-ampere contactor as the power switching device.

Read through this manual and carefully follow all procedures and safety precautions to ensure safe, reliable operation of your automatic transfer switch. Keep a copy of this manual with the automatic transfer switch for future reference.

All information found in this publication is based on data available at time of printing. The manufacturer reserves the right to make changes to this literature and the products represented at any time without notice and without incurring obligation.

List of Related Manuals

The group of power switching devices covered by this manual is part of a family of related devices. Separate operation and installation manuals are available for each group within the overall family. Be sure this manual is the correct manual for the automatic transfer switch.

A controller is included with each transfer switch. There are two types of controllers and each type of controller is covered in a separate operation and installation manual. To be complete, the power switching device operation and installation manual must be accompanied by a copy of the operation and installation manual for the controller used in that transfer switch. Available controllers and the related manual numbers are as follows:

Power Switch Device	Operation/ Installation Manual
Controller, S340+ (Solid State)	TP-5663
Controller, M340+ (Microprocessor)	TP-5664

Service Assistance

For service or information, consult the yellow pages of the telephone directory under the heading GENERATORS– ELECTRIC for the Authorized Kohler Service Distributor/Dealer.

KOHLER CO., Kohler, Wisconsin 53044
Phone 414-565-3381
Fax 414-459-1646 (North American Sales)
414-459-1614 (International Sales)
For Sales and Service in U.S.A. and Canada
Phone 1-800-544-2444

In communications regarding the automatic transfer switch, please include the PART and SERIAL numbers provided on the nameplate attached to the transfer switch. Enter the numbers in the spaces provided below. This information will enable the authorized Kohler service distributor/dealer to supply the correct part or information for your particular model.

Part No. _____

Serial No._____

Notes

Section 1. Specifications

Transfer Switch Description

Purpose of Automatic Transfer Switch

An Automatic Transfer Switch (ATS) is a device used for transferring critical electrical loads from a normal (preferred) source of electrical power to an emergency (standby) source. This transfer occurs automatically when the normal source voltage fails, or is substantially reduced, and the emergency source's voltage has reached an acceptable level.

Upon normal source failure, the automatic transfer switch controller signals the generator set(s) to start and transfer to the emergency source. The automatic transfer switch controller continuously senses for an acceptable normal source and will retransfer the load to the normal source after it has been restored to an acceptable level. After retransfer of the load, the generator set start signal is removed and the generator set(s) is allowed to shut down.

Purpose of Bypass/Isolation Switch

A bypass/isolation switch is a manually operated device used in conjunction with an ATS to provide a means of directly connecting load conductors to either a normal (preferred) power source or to an emergency (standby) power source. It is also used to disconnect the automatic transfer switch from the power sources and the load for inspection and maintenance.

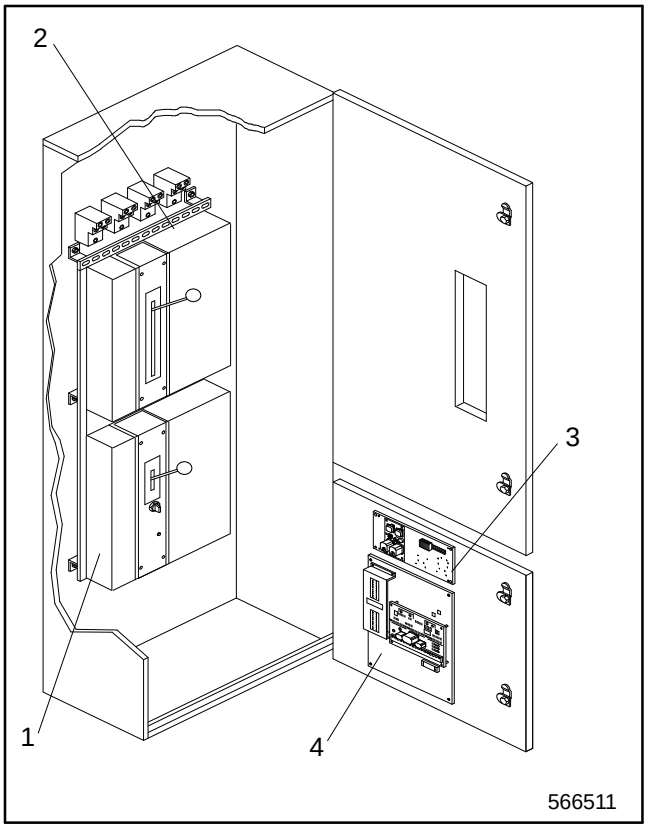
The bypass switch also functions as a manual transfer switch, allowing transfer of the load from one source to the other, if required, with the automatic transfer switch removed from the system.

Components of Switch

A typical bypass/isolation transfer switch includes the actual power switching device, the bypass/isolation switching device and the logic controller to perform power monitoring and transfer sequencing tasks. See Figure 1-1.

The basic switching device used in these models is a true power transfer switch. The switch is electrically actuated and then mechanically latched in the selected position. However, the switch also includes provisions for manual mechanical operation in emergency conditions. Within the switch, there are two sets of multipole contactors. One set is used to select power from the normal source while the other set is used to select power from the emergency source. The two sets of contacts are mechanically interlocked within the switch so that only one set of contactors can be closed at a time. With this feature it is possible to select one power source to feed the load without crosscoupling that power source to the other power source.

The four functional units that make up the automatic transfer switch are mounted in an enclosure with a hinged front door. The controller mounts on the back of the door so its controls and indicators are available to an operator. A signal cable with inline connectors to facilitate component replacement and door removal connects the controller to the interface board and the switching devices.



1. ATS
2. Bypass/Isolation Switch
3. Interface Panel
4. Logic Controller

Figure 1-1. Transfer Switch Components

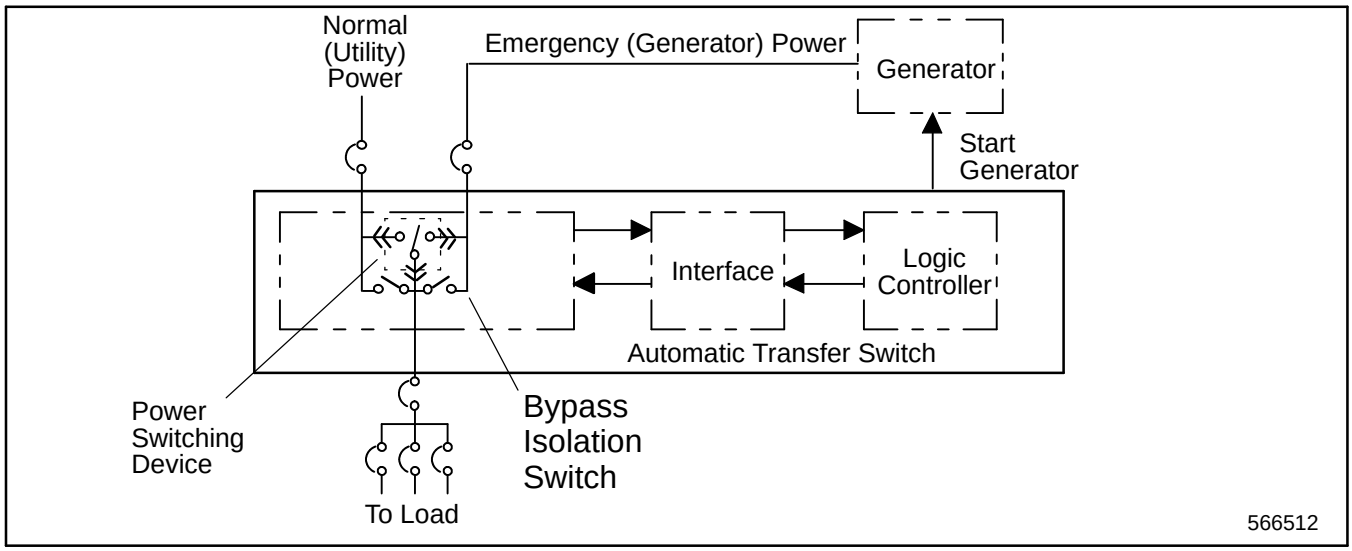


Figure 1-2. Basic Bypass/Isolation Transfer Switch Block Diagram

Ratings

A nameplate is attached to the automatic transfer switch enclosure. See Figure 1-3. The nameplate label includes a factory part number coded to provide characteristic and rating information that affects installation and operation. Copy the part number into the blank spaces provided in the introduction and then use the key in Figure 1-5 to interpret the part number.

Also copy the part number and serial number from the nameplate into the spaces provided in the **Service Assistance** section of this manual for use when requesting service or parts.

NOTE

The automatic transfer switch and bypass/isolation switch have identical current ratings.

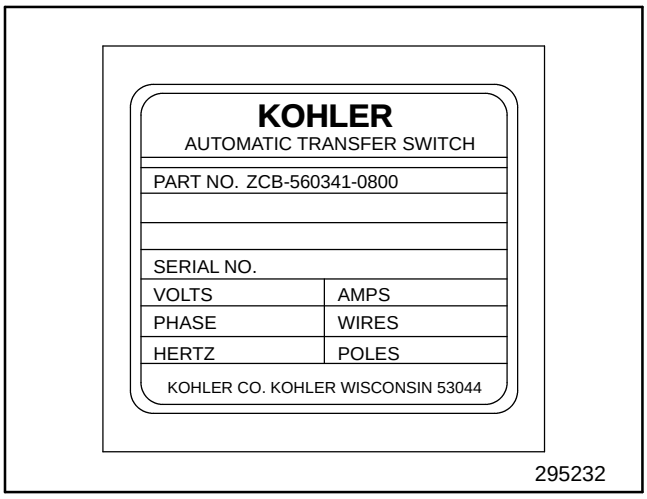


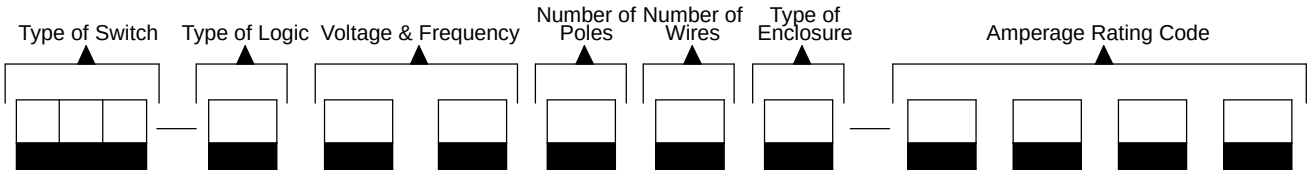
Figure 1-3. Transfer Switch Nameplate

UL-1008 Switch Ratings	Standard and Programmed Transition Models Withstand and Closing Ratings When Coordinated With Any Current-Limiting Fuse		Standard Models Withstand and Closing Ratings With Coordinated Molded-Case Circuit Breakers		Standard Models Withstand and Closing Ratings For 3 Cycles per UL-1008 (Any Breaker)	Programmed Transition Models Withstand and Closing Ratings With Coordinated Molded-Case Circuit Breakers		Programmed Transition Models Withstand and Closing Ratings For 3 Cycles per UL-1008 (Any Breaker)
	Max. Fuse Size (Amps)	Max. Circuit (Amps)	Max. Circuit Breaker Size (Amps)	Max. Circuit (Amps)	Max. Circuit (Amps)	Max. Circuit Breaker Size (Amps)	Max. Circuit (Amps)	Max. Circuit (Amps)
150	200	200,000				350	50,000	35,000
225	300	200,000				350	50,000	35,000
260	350	200,000				350	50,000	35,000
400	600	200,000				500	50,000	35,000
600	750	200,000				800	65,000	50,000
800	1000	200,000	1600	85,000	50,000	1600	85,000	50,000
1000	1250	200,000	1600	85,000	50,000	1600	85,000	50,000
1200	1500	200,000	1600	85,000	50,000	1600	85,000	50,000
1600	2000	200,000	2000	100,000	100,000	2500	100,000	100,000
2000	2500	200,000	2500	100,000	100,000	2500	100,000	100,000
2500	2500	200,000	2500	100,000	100,000	2500	100,000	100,000
3000	4000	200,000	4000	100,000	100,000	4000	100,000	100,000

Figure 1-4. Withstand and Current Closing Ratings

Interpreting a Transfer Switch Part Number

Record the transfer switch part number in the boxes below. The transfer switch part number defines characteristics and ratings as explained in the accompanying chart.



Kohler Part Number Key

This chart explains the Kohler Transfer Switch part numbering code system. The sample part number shown is for a bypass/isolation switch with M340+ Logic rated at 600 Volts, 60 Hertz, 3-phase, 3-pole, and 4 wires in a NEMA 1 enclosure with an amperage rating of 80 amperes.

SAMPLE PART NUMBER

ZCB-560341-0800

Classification of Power Switch
Z: Power Switch

Type of Power Switch
C: Contactor

Type of Switch
B:Bypass/Isolation

Type of Logic
1: S340+
3: S340+ with Programmed Transition
5: M340+
6: M340+ with Programmed Transition

Voltage Code

60: 600 Volt, 60 Hz	66: 480 Volt, 60 Hz
62: 120 Volt, 60 Hz	68: 208 Volt, 60 Hz
63: 220 Volt, 50 Hz	71: 380 Volt, 50/60 Hz
64: 240 Volt, 60 Hz	

Number of Poles
2: 2 Pole, 1 Phase
3: 3 Pole, 3 Phase
6: 4 Pole, Fully Rated

Number of Wires
3: 3 Wire
4: 4 Wire

Enclosure
NEMA type 1

Amperes
Numbers Indicate Ampere Rating of Switch

Figure 1-5. Transfer Switch Model Designations Key

Specifications

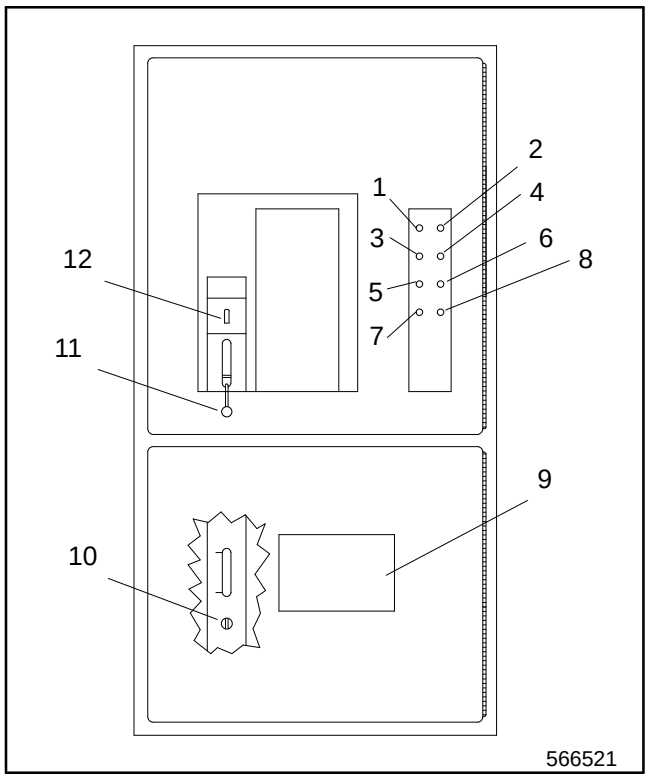
Specifications for automatic transfer switches covered by this manual are listed below:

- The transfer switch is provided as a complete automatic transfer switch with S340+ (solid state logic) or M340+ (microprocessor logic) controller in a NEMA type 1 enclosure.
- Transfer switch meets UL and CSA standards.
- Transfer switch is rated voltage up to 600 vac.
- Transfer switch is rated from 150 to 3000 amps.
- Transfer switch is available with ZCS standard or programmed transition automatic transfer switches.
- The switching device is electrically and mechanically interlocked.
- Switch is available in two pole, three pole, and four-pole configuration.
- Four-pole switch is fully rated.
- The load is not interrupted during bypass operation.

Notes

Section 2. Operation

Switches and Indicators



1. LBE
2. LEA
3. LBN
4. LNA
5. LAI
6. LAI
7. LIT/LAH
8. LDS
9. Logic Controls
10. Disconnect Switch
11. Manual Bypass Handle
12. Bypass Selector Switch

Figure 2-1. Bypass/Isolation Switch

Disconnect Switch. The disconnect switch controls the ATS coil operation. In the auto position the ATS operation is controlled by the logic controller. In the inhibit position, the logic controller cannot energize the ATS coils.

ATS Location Pointer. The ATS location pointer indicates the three positions of the ATS switch.

Auto: The ATS is connected to all of the buses.

Test: The ATS is disconnected from the load bus but connected to the normal and emergency buses.

Isolate: The ATS is disconnected from all buses.

Description of the Bypass/Isolation Cabinet Lights

Bottom Door

The switches and indicators for the automatic transfer switch are determined by the controller used in that switch. For details on this subject, refer to the respective Logic Controller Operation and Installation Manual. See **List of Related Manuals** in the Introduction.

Top Door

LNA Lamp. Lamp illuminates when the normal power source is available.

LEA Lamp. Lamp illuminates when the emergency power source is available.

LBN Lamp.* Lamp illuminates when the normal bypass contacts are closed.

LBE Lamp.* Lamp illuminates when the emergency bypass contacts are closed.

LAT Lamp.* Lamp illuminates when the ATS is in the test location.

LAI Lamp.* Lamp illuminates when the ATS is isolated from the switch.

LAH Lamp.* Lamp illuminates when the ATS is not in the automatic mode (600-1200 amp switches only).

LIT Lamp.* Lamp illuminates when the ATS is not in the automatic mode (all except 600-1200 amp switches).

LDS Lamp.* Lamp flashes when the ATS coils are prevented from operating by the disconnect switch.

* These lamps will illuminate when any of the following are true.

1. The disconnect switch is in the inhibit position.
2. The bypass selector switch is in the normal or emergency position.
3. The ATS is not in the auto location.

Description of Bypass/Isolation Switch Components

Bypass Normal Contacts. The bypass normal contact connects the load directly to the normal source, bypassing the ATS.

Bypass Emergency Contacts. The bypass emergency contacts connect the load directly to the emergency source, bypassing the ATS.

Bypass Operator. The bypass operator opens and closes the bypass normal or emergency contacts.

Manual Bypass Handle. The manual-bypass handle actuates the bypass operator. In the lower (open) position, the bypass normal and emergency contacts are open. In the upper (bypass) position, the bypass normal or emergency contacts are closed.

Bypass Selector Switch. The bypass selector switch determines which contacts the manual bypass handle actuates. Turn the bypass selector switch to the right to close the bypass normal contacts, center to open the bypass normal and emergency contacts, and left to close the bypass emergency contacts.

ATS Location Handle (150- to 400-amp switches only). The position of the ATS location handle determines the ATS mode of operation: auto, test or isolate. The ATS location handle can be moved only when the manual bypass handle is in the bypass position.

Crank Mechanism (600- to 3000-amp switches only). The crank mechanism determines the ATS mode of operation: auto, test or isolate. Turn the crank mechanism clockwise to raise the ATS and counterclockwise to lower the ATS through the three positions. The crank mechanism can be rotated only when the manual bypass handle is in the bypass position.

ATS Sequence of Operation

Operation of the typical automatic transfer switch is divided into two separate sequences: (1) failure of normal power and the resulting transfer to emergency power and (2) restoration of normal power and the resulting transfer back to normal power. A brief description of both sequences is provided below. Note that these sequences may be affected by accessories described in the applicable controller operation and installation manual. In addition, for more specific details on circuit operation including time delays, refer to the applicable Logic Controller Operation and Installation Manual. See **List of Related Manuals** in the Introduction.

- **Failure of Normal Power,** either loss or deterioration of one or more phases (logic depending), is detected by monitors within the controller. The monitor that detects the failure starts a time delay called Time Delay Engine Start (TDES). If power is restored before the time delay expires, the timer is reset. But, if the failure persists and the time delay expires, the controller issues a signal to start the standby (emergency) power generator. This time delay scheme is used to prevent starting of the generator set during short power interruptions.

  A second set of monitors within the controller checks the status of the emergency power. When the voltage and frequency of the emergency (generator) power are acceptable, these monitors start a timing cycle called Time Delay Normal to Emergency (TDNE) which allows the generator outputs to stabilize. At the end of this timing cycle, the controller issues a signal to the transfer switch operators to remove normal power and then connect emergency power to the load.

  Once the power is switched, the transfer switch is mechanically latched in the emergency position, supplying emergency source power to the load until normal power is restored.

- **Restoration of Normal Power** automatically begins a sequence that transfers the load back to the normal power source. The monitors within the controller continue to check the status of the normal power, even when the load is operating on emergency power. When these monitors detect stable normal power, a time delay called Time Delay Emergency to Normal (TDEN) is started. If the normal power fails again before the time delay expires, the time delay is reset. This timing period is included to ensure that the normal power is stabilized before it is reconnected to the load.

  If the normal power remains acceptable and the time delay expires, the controller will issue a signal to the transfer switch to remove emergency power and reconnect normal power to the load. After switching, the transfer switch is mechanically latched in the normal position. Depending upon which logic is used, the controller starts a timer called Time Delay Engine Cooldown (TDEC) simultaneously with the power transfer. After this time delay expires, the generator engine is stopped.

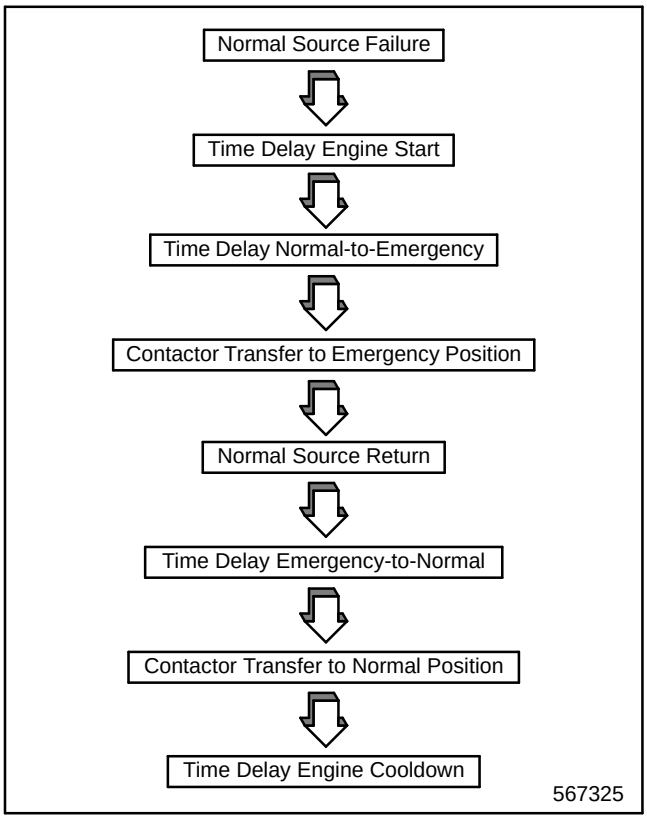


Figure 2-2. Logic Board Operation

Manual Operation of the Automatic Transfer Switch

Manually operate the automatic transfer switch when the controller fails or to test/troubleshoot the unit. An operator handle is provided for manual operation.

⚠ DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect power sources before servicing. Barrier must be installed after adjustments, maintenance, or servicing.

1. Disconnect or turn off both the normal and emergency power sources.
2. Open enclosure door of automatic transfer switch.
3. Set the disconnect switch (DS) to disconnect the controller from the switch solenoid(s).
4. Insert the operator handle and set the switch shown in Figure 2-3 to the desired position.
5. Remove and stow the operator handle.
6. Close the enclosure door.
7. Reconnect or turn on the applicable (normal or emergency) power source.

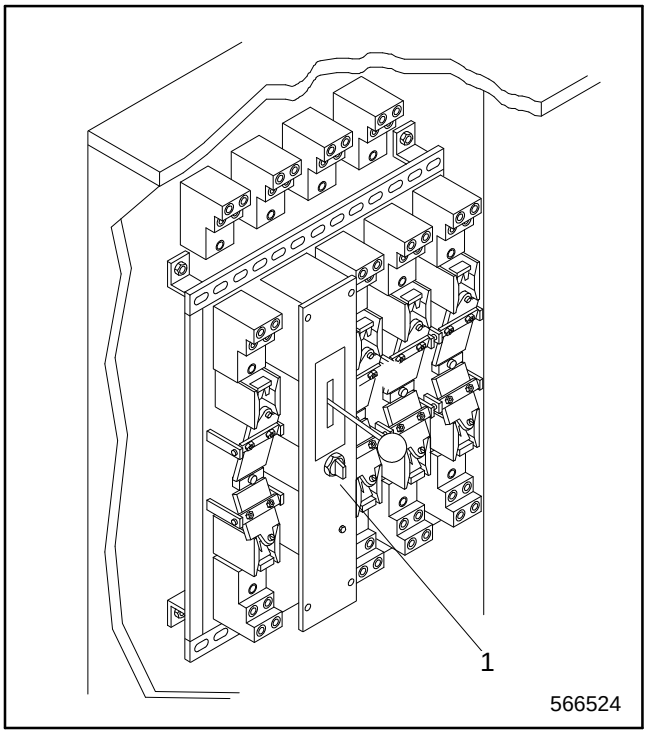
Automatic Operation

Initial Settings

Before turning on the power for the first time or when returning from manual operation to automatic operation, manually operate the automatic transfer switch to select the normal power source as described in **Manual Operation** above. Before closing the enclosure door and activating the normal power source, return the disconnect (DS) switch to its normal position to reconnect the logic controller to the transfer switch solenoids.

Automatic Operation Procedures

Automatic operation is a function of the logic controller installed in the unit. For automatic operation details and procedures, refer to the appropriate Logic Controller Operation and Installation Manual. See **List of Related Manuals** in the Introduction.



1. Disconnect Switch

Figure 2-3. Manual Operation of Automatic Transfer Switch

Operation of the Bypass/Isolation Switch

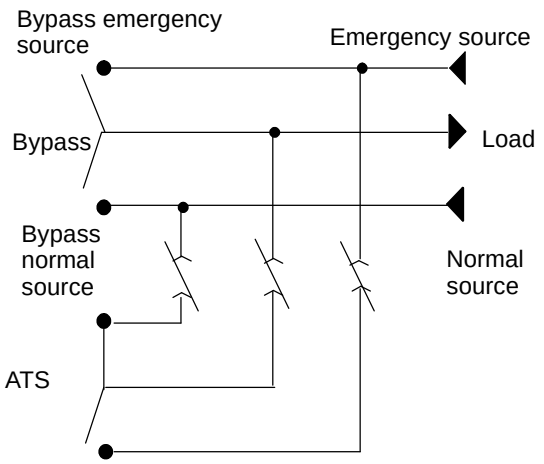
To place the ATS in the Automatic Mode

For 150- to 400-amp switches

1. Verify that the ATS contacts are in the same position as the bypass contacts.
2. Turn the disconnect switch to the inhibit position.
3. Move the ATS location handle to the auto position.
4. Move the manual bypass handle to the open position.
5. Turn the disconnect switch to the auto position.

For 600- to 3000-amp switches

1. Verify that the ATS contacts are in the same position as the bypass contacts.
2. Turn the disconnect switch to the inhibit position.
3. Rotate the crank mechanism clockwise until the ATS is in the auto position.
4. Move the manual bypass handle to the open position.
5. Turn the bypass selector switch to the off position.
6. Turn the disconnect switch to the auto position.



Bypass in the open position and ATS in the normal position

567326

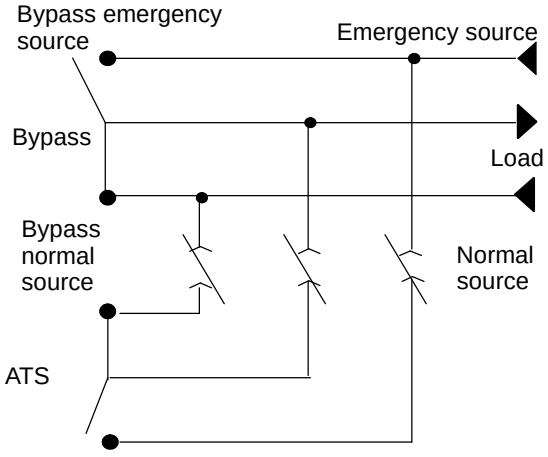
To Bypass the ATS

For 150- to 400-amp switches

1. Open the bottom cabinet door and turn the disconnect switch to the inhibit position.
2. Position the manual bypass handle to the same power source as the ATS. Note: The bypass switch uses safety interlocks to prevent cross phasing.

For 600- to 3000-amp switches

1. Open the bottom cabinet door and turn the disconnect switch to the inhibit position.
2. Position the bypass-selector switch to the same power source as the ATS. Note: The bypass switch uses safety interlocks to prevent cross phasing.
3. Move the manual-bypass handle to the BYPASS POSITION.



Bypass in the normal position and ATS in the normal position

567327

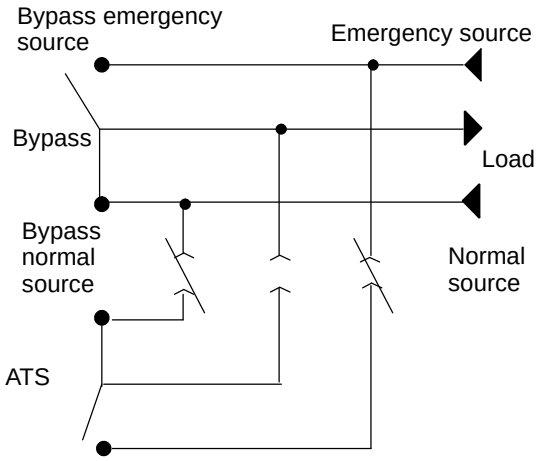
To Test the ATS

For 150- to 400-amp switches

1. Open the bottom cabinet door and turn the disconnect switch to the inhibit position.
2. Position the manual bypass handle to the ATS power source.
3. Move the ATS location handle to the test position.
4. Turn the disconnect switch to the auto position.
5. Move and hold the test switch on the logic controller to the test position.
6. Once the ATS transfers to the emergency position release the test switch.
7. The ATS will transfer back to the normal position.

For 600- to 3000-amp switches

1. Open the bottom cabinet door and turn the disconnect switch to the inhibit position.
2. Position the bypass-selector switch to the source that powers the ATS.
3. Move the manual bypass handle to the bypass position.
4. Rotate the crank mechanism counterclockwise until the ATS location pointer is aligned with isolate; the ATS isolate position lamp will illuminate.
5. Turn the disconnect switch to the auto position.
6. Move and hold the test switch on the logic controller to the test position.
7. Once the ATS transfers to the emergency position release the test switch.
8. The ATS will transfer back to the normal position.



Bypass in the normal position and ATS in the test position (ATS load connection is open)

567328

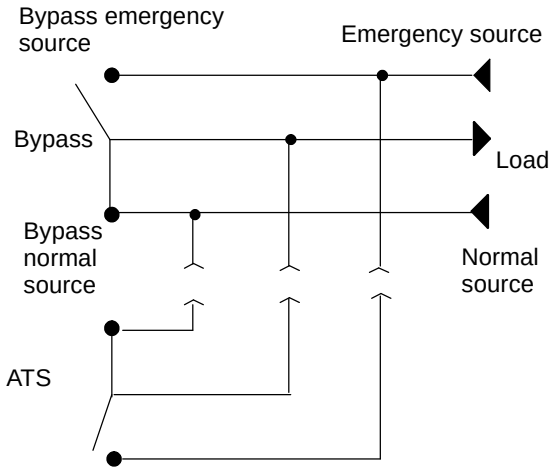
To Isolate the ATS

For 150- to 400-amp switches

1. Open the bottom cabinet door and turn the disconnect switch to the inhibit position.
2. Position the manual bypass handle to the power source that powers the ATS.
3. Move the ATS location handle to the isolate position; the ATS isolate position lamp will illuminate.

For 600- to 3000-amp switches

1. Open the bottom cabinet door and turn the disconnect switch to the inhibit position.
2. Position the bypass-selector switch to the source that powers the ATS.
3. Move the manual bypass handle to the bypass position.
4. Rotate the crank mechanism counterclockwise until the ATS location pointer is aligned with isolate; the ATS isolate position lamp will illuminate.



Bypass in the normal position and ATS in the isolate position

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Bypass/Isolation Switch Operation Notes

1. When the ATS is in the test or isolate position the bypass switch acts as a manual transfer switch. The transfer from the bypass emergency contacts to the bypass normal contacts results in a momentary loss of power to the load while the bypass switch is open.
2. The ATS will not operate if any of the following are true:
   a. The harness plugs are not connected.
   b. The disconnect switch is in the inhibit position.
   c. The ATS is not in the auto or test positions.
   d. The ATS is in the auto position and the bypass switch is not open.
3. The manual-bypass handle will not close in the bypass position if any of the following are true:

100- to 400-amp switches

   a. The ATS location handle is not engaged in one of the following positions: auto, test, or isolate.
   b. The source selected is opposite of the ATS position while in the auto position.
   c. The ATS is in the test or isolate position and the selected source is not available.

600- to 3000-amp switches

   a The bypass selector switch is turned to the source opposite the ATS.
   b The bypass selector switch is turned to the source opposite the ATS.
   c The ATS location handle is not engaged in one of the following positions: auto, test, or isolate.
   d The source selected is opposite of the ATS position while in the auto position.
   e The ATS is in the test or isolate position and the source selected is not available.

4. The manual bypass handle will not open the bypass if any of the following are true:

600- to 3000-amp switches only

   a. The ATS is not in one of the following positions: auto, test, or isolate.
   b. The ATS is in the test or isolate position and the opposite source is not available.

5. The ATS location handle will not operate if any of the following are true:

100- to 400-amp switches only

a. The bypass switch and ATS are not positioned to the same source.

b. Power is not available.

c. The harness plugs are not connected.

d. The ATS has reached its limit of travel in the auto or isolate positions

6. The crank handle will not operate if any of the following are true:

600- to 3000-amp switches only

a. The bypass switch and ATS are not positioned to the same source.

b. Power is not available.

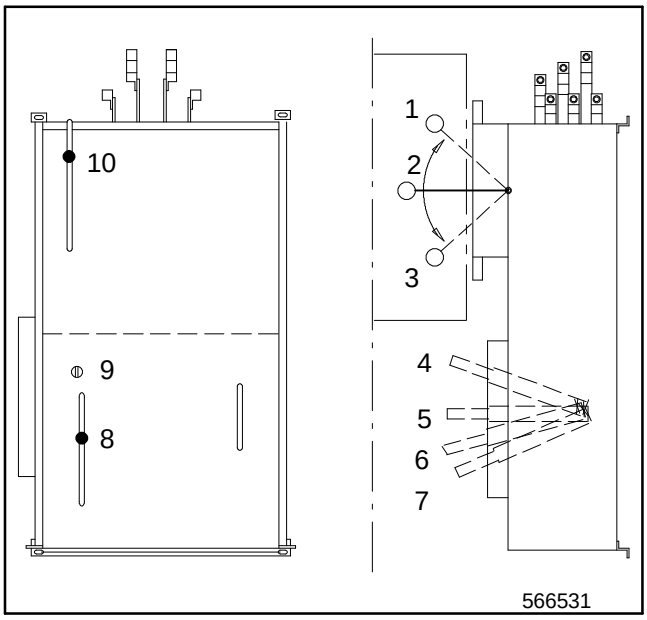
c. The harness plugs are not connected.

d. The ATS has reached its limit of travel in the auto or isolate positions (clutch device on the crank mechanism slips).

Section 3. Removal and Reconnection of the ATS

To Remove the ATS in 150- to 400-amp switches

1. Open the cabinet door and turn the disconnect switch to the inhibit position. See Figure 3-1.
2. Position the manual bypass handle to the same power source as the ATS.
3. Move the ATS location handle to the release position.
4. Disconnect the multipin plugs and external connections from the ATS.
5. Lift the ATS out of its drawer.



1. Manual Bypass Handle EMERGENCY Position
2. Manual Bypass Handle OPEN Position
3. Manual Bypass Handle NORMAL Position
4. Release Position
5. Isolate Position
6. Test Position
7. Auto Position
8. ATS Location Handle
9. Disconnect Switches
10. Manual Bypass Handle

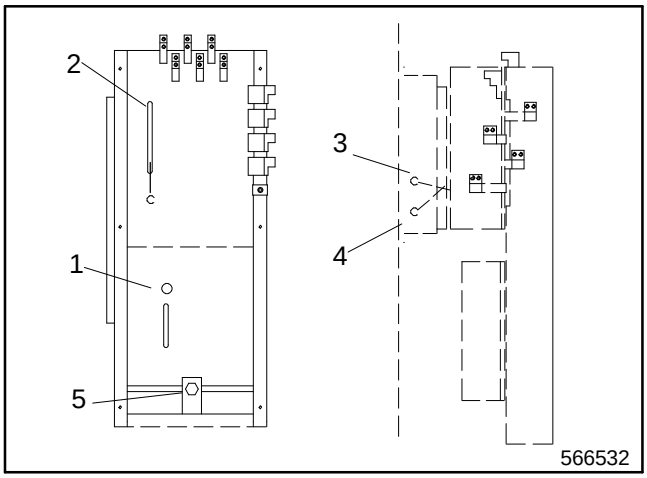
Figure 3-1. Bypass Switch Handle Positions

To Reconnect the ATS in 150- to 400-amp switches

1. Turn the disconnect switch to the inhibit position.
2. Place the ATS into its drawer slots (front rollers first).
3. Manually position the ATS to the same source as the bypass switch.
4. Reconnect the multipin plugs and external connections to the ATS.
5. Push the ATS inward to engage the carriage.
6. Move the ATS location handle to the test position.
7. Turn the disconnect switch to the auto position and use the test switch on the logic controller to electrically operate the ATS.
8. Move the ATS location handle to the auto position.
9. Turn the disconnect to the auto position and move the manual bypass handle to the open position.
10. To ensure correct ATS operation use the test steps in Section 2– **Transfer Switch Operation**.

To Remove the ATS in 600- to 1200-amp switches

1. Open the cabinet door and turn the disconnect switch to the inhibit position. See Figure 3-2.
2. Move the bypass selector switch to the source that powers the ATS.
3. Move the manual bypass handle to the BYPASS position.
4. Rotate the crank mechanism counterclockwise until the ATS location pointer is aligned with isolate.
5. Disconnect the multipin plugs and external connections from the ATS.
6. Rotate the four panel latches to the vertical position. See Figure 3-3.
7. Pull the ATS outward until the slide brackets are fully extended.
8. Engage the slide locks to prevent movement of the brackets.
9. Connect a lift bar to the ATS lifting brackets



1. Disconnect Switch
2. Bypass Selector Switch
3. Bypass Selector Switch BYPASS POSITION
4. Bypass Selector Switch OPEN POSITION
5. Crank Mechanism

Figure 3-2. Bypass Switch Crank Mechanism Location

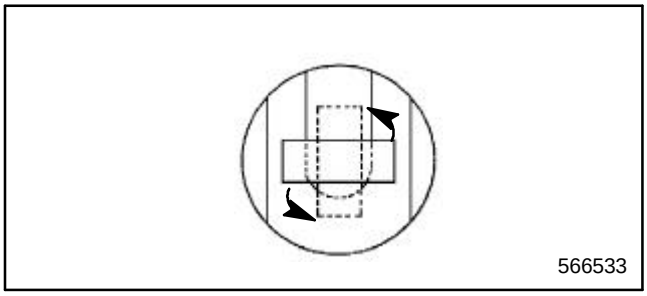


Figure 3-3. Rotation Of The Panel Latch

To Reconnect the ATS in 600- to 1200-amp switches

1. Turn the disconnect switch to the inhibit position.
2. Seat the ATS on the slide brackets.
3. Remove the lift bar assembly.
4. Release the slide locks (Note: Raise the slide locks approximately 60 ° to disengage.) See Figure 3-4.
5. Push the ATS in until the power panel latches can be engaged and rotated to the horizontal position.
6. Confirm that the bypass switch is in the isolate position.
7. Reconnect the multipin harness plugs.
8. Rotate the crank mechanism clockwise until the ATS is in the auto position.
9. Move the manual-bypass handle to the AUTO position.
10. Turn bypass-selector switch to the off position.
11. Turn the disconnect switch to the auto position.
12. To insure correct ATS operation use the step in Section 2– **Transfer Switch Operation**.

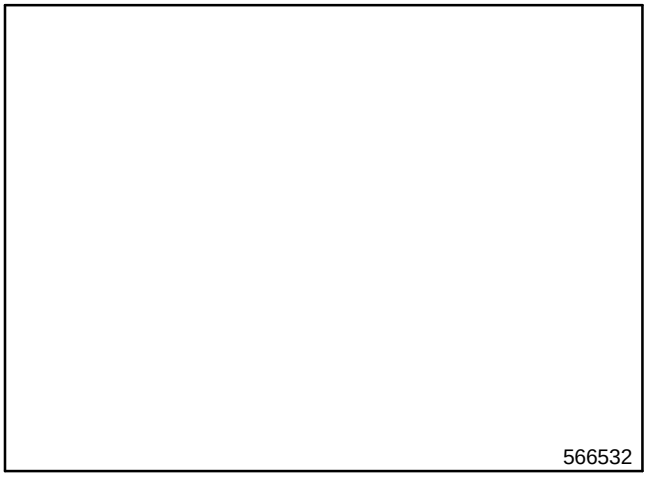


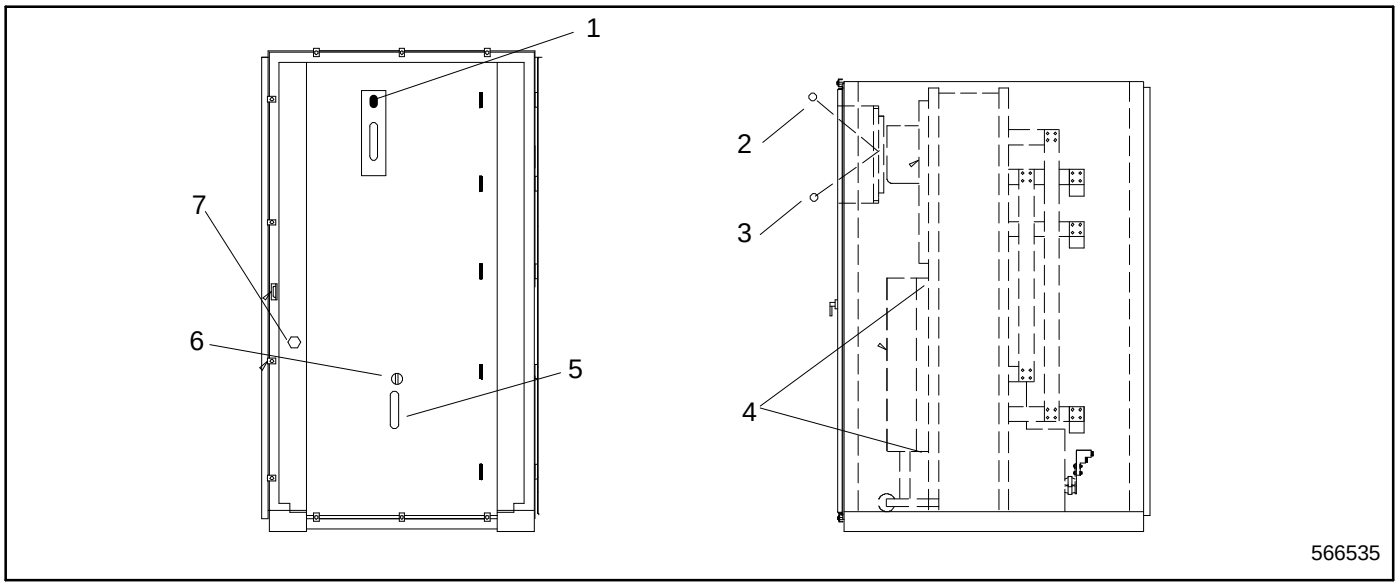
Figure 3-4. Panel Latch

To Remove the ATS in 1600- to 3000-amp switches

1. Open the cabinet door and turn the disconnect switch to the inhibit position.
2. Move the bypass-selector switch to the source that powers the ATS.
3. Move the manual-bypass handle to the bypass position.
4. Rotate the crank mechanism counterclockwise until the ATS location pointer is aligned with isolate.
5. Disconnect the multipin plugs and external connections from the ATS.
6. Slide the four corner latches of the ATS to the innermost position.
7. The ATS can now be rolled out of the cabinet on the built-in cart.

To Reconnect the ATS in 1600- to 3000-amp switches

1. Turn the disconnect switch to the inhibit position.
2. Roll cart back in the cabinet.
3. Slide the four corner latches of the ATS to the outermost position.
4. Turn the disconnect switch to the inhibit position.
5. Manually position the ATS to the same source as the bypass switch.
6. Reconnect the multipin harness plugs.
7. Rotate the crank mechanism clockwise until the ATS is in the auto location.
8. Move the manual bypass switch to the OPEN position.
9. Turn the disconnect switch to the auto position.
10. To ensure correct ATS operation use the step in Section 2– **Transfer Switch Operation**.



1. Bypass Selector Switch
2. Manual Bypass Handle BYPASS Position
3. Manual Bypass Handle OPEN Position
4. Corner Latches
5. Manual ATS Handle
6. Disconnect Switch
7. Crank Mechanism

Figure 3-5. 1600-3000 Amp Bypass Handle Positions

Notes

Section 4. Accessories

Programmed Transition

NOTE

Do not use this section for ATS utilizing the microprocessor logic control. The programmed transition function is accomplished within the microprocessor and therefore no time relays are required. See TP-5664 for operational details on the programmed transition for the microprocessor controller. Relays K3 and K4 on the interface board used with the microprocessor controller are replaced with a standard C-form relay.

Description

The programmed transition accessory consists of two timing relays that plug into the interface board. See Figure 4-1. If these relays are present, power transfers from normal to emergency or emergency to normal power sources in three steps: (1) the switch or circuit breaker for the previously connected power source opens, (2) there is a delay period, adjustable from 1 to 40 seconds, to allow any residual voltage in the load circuit to decay, and (3) the switch or circuit breaker for the new power source is closed.

Adjustment

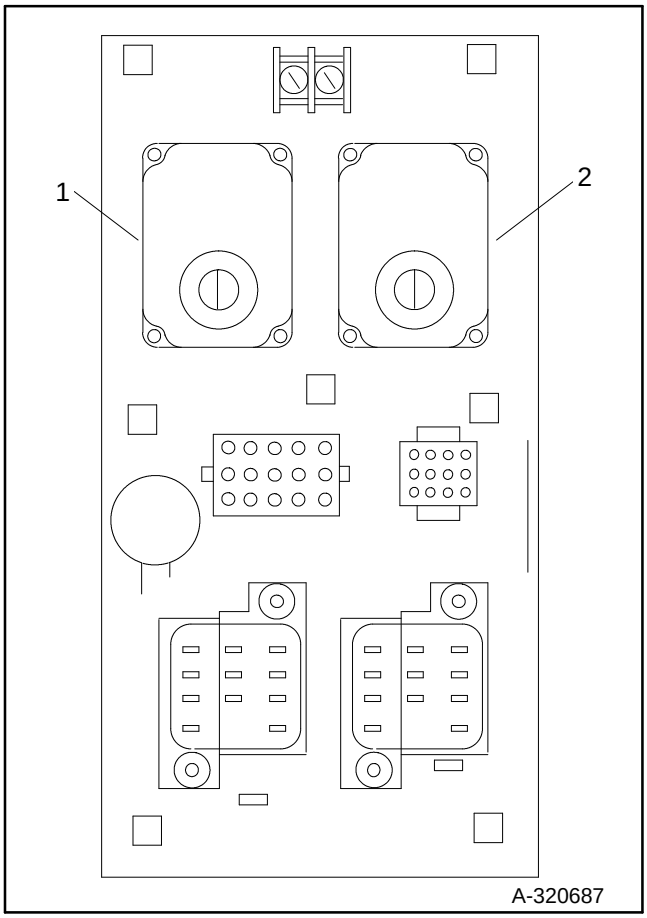
Two separate timing relays are used. One relay, K4 (TDOE), produces the time delay for the normal to emergency power transfer. The other relay, K3 (TDON), produces the time delay for the emergency to normal power transfer. Each relay has a separate adjustment. To make the adjustment, proceed as follows:

⚠ DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect power sources before servicing. Barrier must be installed after adjustments, maintenance, or servicing.

1. Disconnect both the normal and emergency power sources.
2. Open automatic transfer switch enclosure door.
3. Locate the appropriate relay on the interface circuit board. See Figure 4-1.
4. Insert a screwdriver into the slot of the adjustment screw visible through the cover of the relay and turn the adjustment screw to the desired time delay period. Turn clockwise to increase time, counterclockwise to decrease time.
5. Close the enclosure door.
6. Reconnect the applicable (normal or emergency) power source.
7. Operate the automatic transfer switch automatically and check the time delay period to ensure that the delay is achieved.



1. K3 (TDON) 2. K4 (TDOE)

Figure 4-1. Interface Circuit Board with Time Delay Off Relays

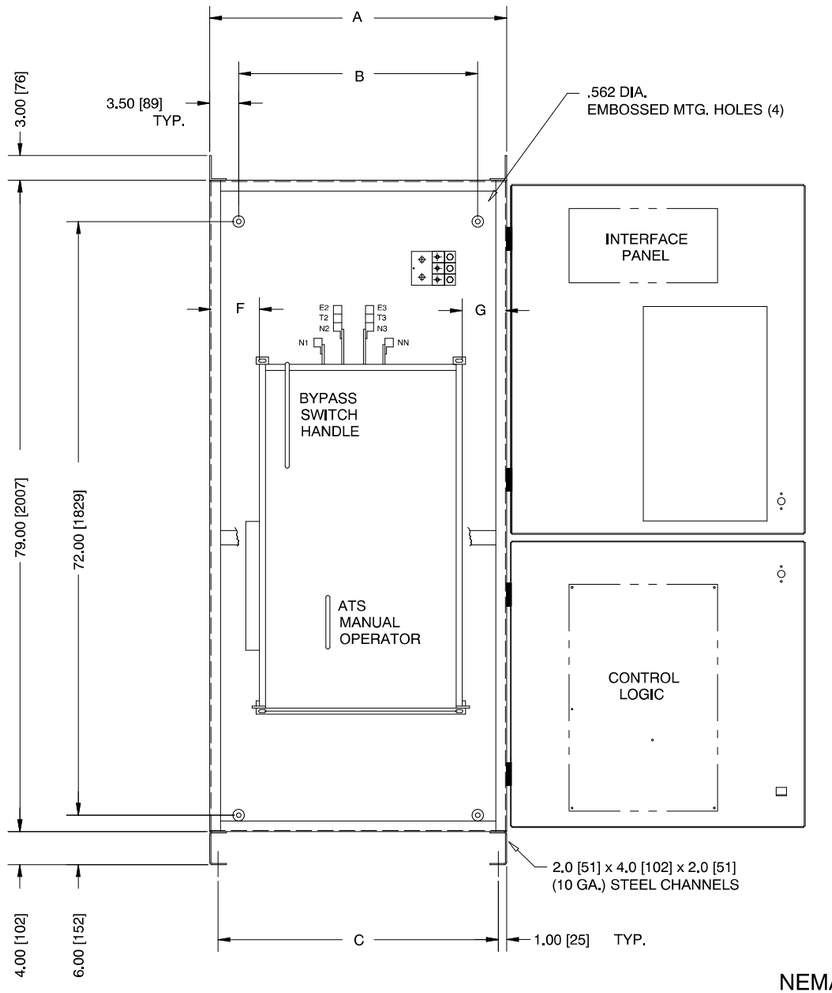
Other Accessories

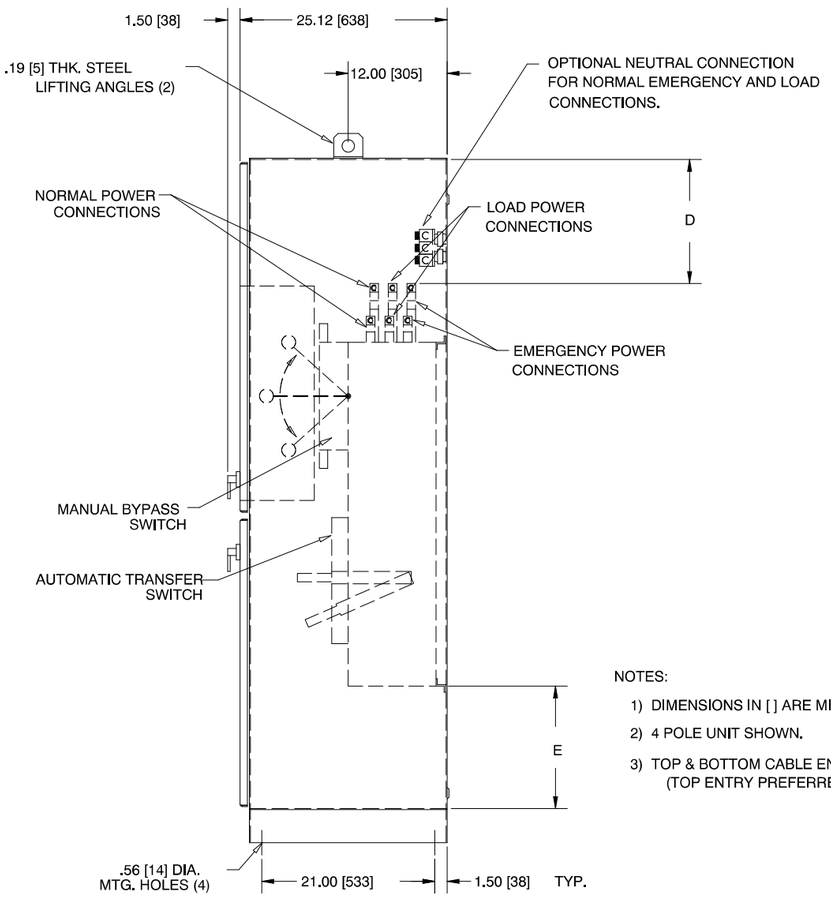
With the exception of the Time Delay Off accessory, all other accessories for this automatic transfer switch are controller accessories. For controller accessory information and procedures, refer to the respective Logic Controller Operation and Installation Manual. See **List of Related Manuals** in the Introduction.

Section 5. Diagrams and Drawings

Notes

BYPASS STANDARD SWITCH	NO. POLES	CABINET DIMENSIONS			LUG RANGE	WIRE BENDING SPACE		WIRE GUTTERS	
		A	B	C		D (TOP)	E (BOTTOM)	F (LEFT)	G (RIGHT)
100–225 AMP	2,3	30.00 [762]	23.00 [584]	28.00 [711]	3/0–250 MCM	15.25 [387]	13.88 [353]	4.38 [111]	1.38 [35]
	4	36.00 [914]	29.00 [737]	34.00 [864]					5.00 [127]
260–400 AMP	2,3	30.00 [762]	23.00 [584]	28.00 [711]	3/0–250 MCM	15.25 [387]	13.88 [353]	4.38 [111]	1.38 [35]
	4	36.00 [914]	29.00 [737]	34.00 [864]					5.00 [127]
BYPASS PROGRAMMED TRANSITION SWITCH									
100–225 AMP	2,3	30.00 [762]	23.00 [584]	28.00 [711]	3/0–250 MCM	15.25 [387]	13.88 [353]	4.38 [111]	1.38 [35]
	4	36.00 [914]	29.00 [737]	34.00 [864]					5.00 [127]
260–400 AMP	2,3	30.00 [762]	23.00 [584]	28.00 [711]	3/0–250 MCM	15.25 [387]	13.88 [353]	4.38 [111]	1.38 [35]
	4	36.00 [914]	29.00 [737]	34.00 [864]					5.00 [127]





NOTES:

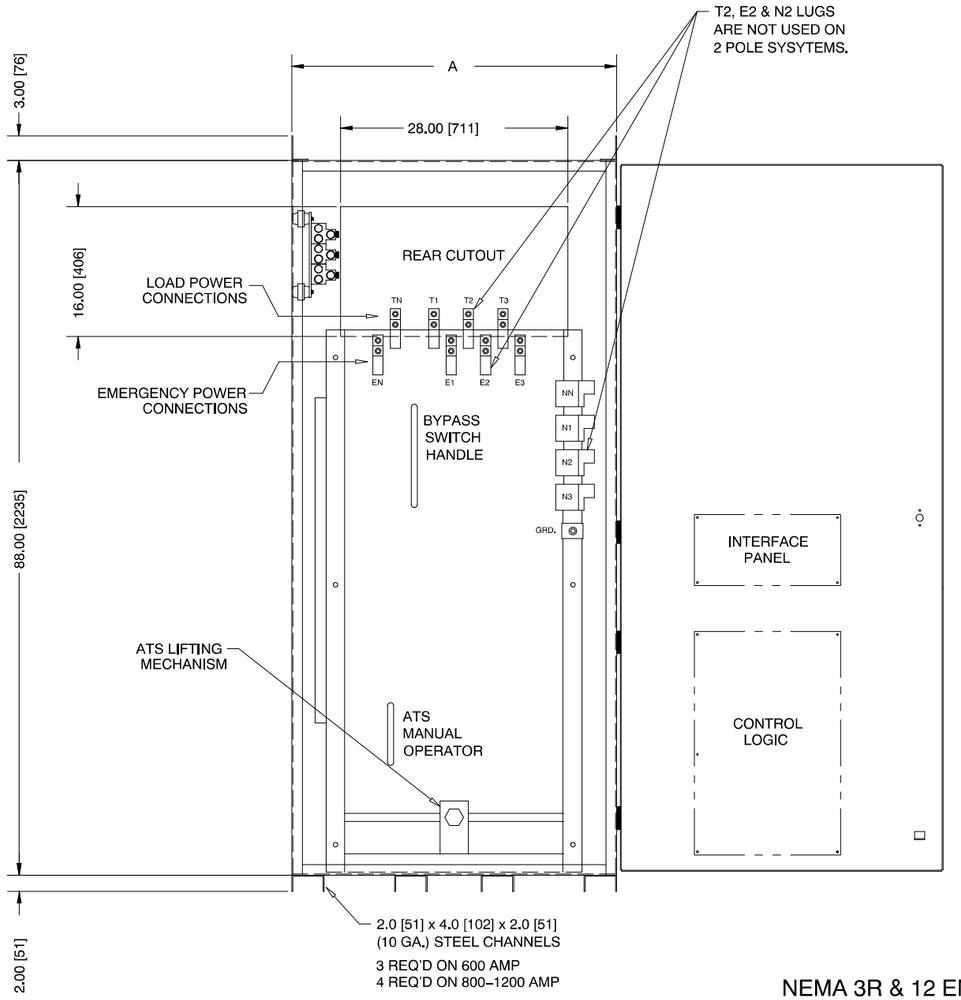
1) DIMENSIONS IN [ ] ARE MILLIMETER EQUIVALENTS.
2) 4 POLE UNIT SHOWN.
3) TOP & BOTTOM CABLE ENTRY ACCEPTABLE (TOP ENTRY PREFERRED)

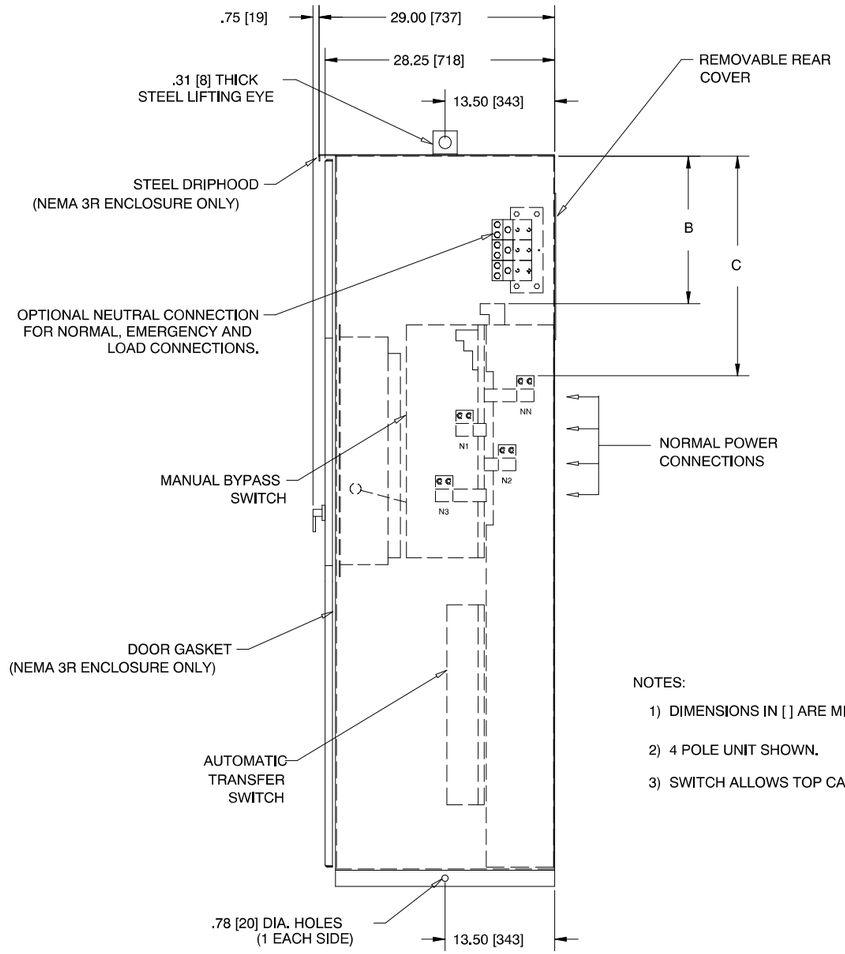
NEMA **1** ENCLOSURE

ADV-5958A-

NEMA Type 1 Enclosure, 150-400 Amp

STANDARD BYPASS SWITCH	NO. POLES	CABINET DIMENSIONS	LUG RANGE	WIRE BENDING SPACE	
		A		B (LOAD/EMERG.)	C (NORMAL)
600 AMP	2,3	36.00 [914]	#2–600 MCM (2)	17.88 [454]	31.00 [787]
	4	40.00 [1016]		17.88 [454]	26.75 [679]
800–1200 AMP	2,3	40.00 [1016]	#2–600 MCM (4)	17.88 [454]	29.25 [743]
	4	46.00 [1168]		17.88 [454]	24.75 [629]
PROGRAMMED TRANSITION BYPASS SWITCH					
600 AMP	2,3	36.00 [914]	#2–600 MCM (2)	17.88 [454]	31.00 [787]
	4	40.00 [1016]		17.88 [454]	26.75 [679]
800–1200 AMP	2,3	40.00 [1016]	#2–600 MCM (4)	17.88 [454]	29.25 [743]
	4	46.00 [1168]		17.88 [454]	24.75 [629]





NOTES:

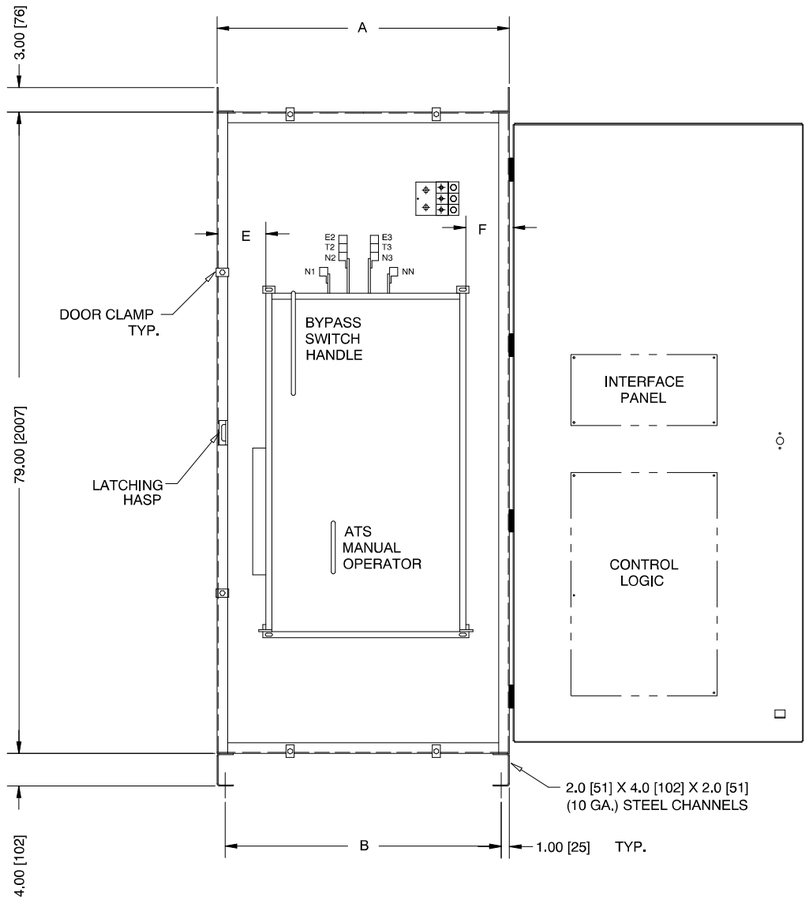
1) DIMENSIONS IN [ ] ARE MILLIMETER EQUIVALENTS.
2) 4 POLE UNIT SHOWN.
3) SWITCH ALLOWS TOP CABLE ENTRY ONLY.

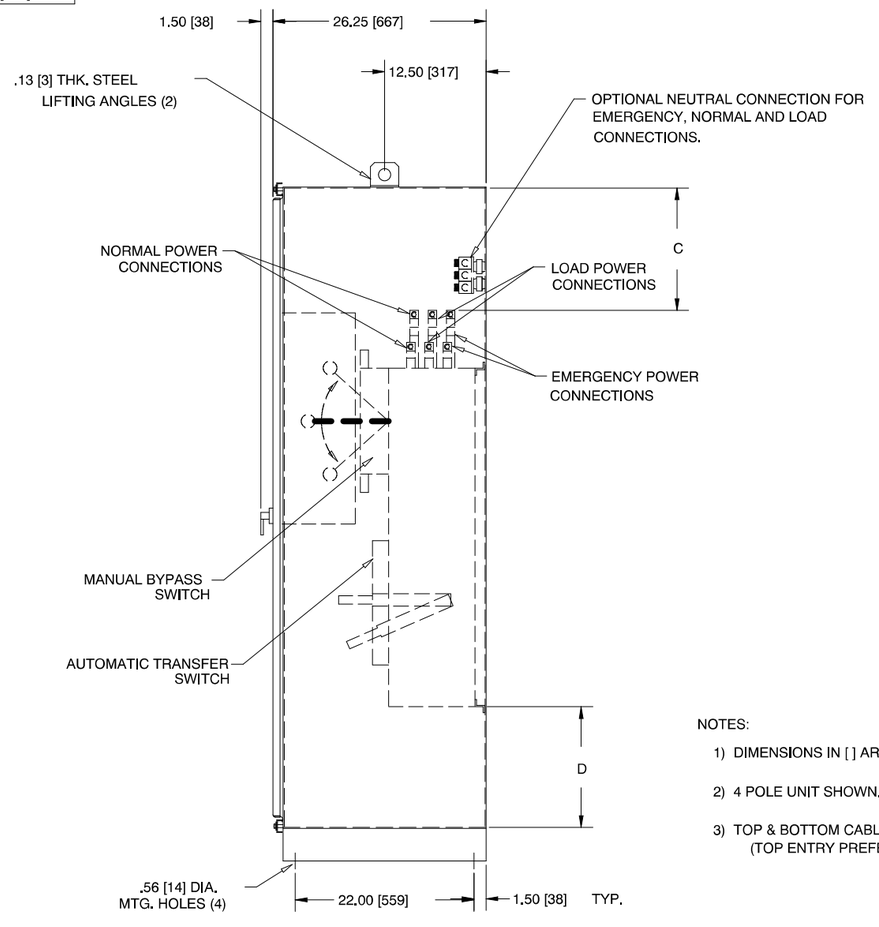
NEMA 3R & 12 ENCLOSURES

ADV-5958B-

NEMA Type 3R AND 12 Enclosure, 100-400 Amp

STANDARD BYPASS SWITCH	NO. POLES	CABINET DIMENSIONS		LUG RANGE	WIRE BENDING SPACE		WIRE GUTTERS	
		A	B		C (TOP)	D (BOTTOM)	E (LEFT)	F (RIGHT)
100–225 AMP	2,3	30.00 [762]	28.00 [711]	3/0–250 MCM	15.25 [209]	13.88 [353]	4.38 [111]	1.38 [35]
	4	36.00 [914]	34.00 [867]					5.00 [127]
260–400 AMP	2,3	30.00 [762]	28.00 [711]	3/0–250 MCM	15.25 [387]	13.88 [353]	4.38 [111]	1.38 [35]
	4	36.00 [914]	34.00 [867]					5.00 [127]
PROGRAMMED TRANSITION BYPASS SWITCH								
100–225 AMP	2,3	30.00 [762]	23.00 [584]	3/0–250 MCM	15.25 [209]	13.88 [353]	4.38 [111]	1.38 [35]
	4	36.00 [914]	29.00 [737]					5.00 [127]
260–400 AMP	2,3	30.00 [762]	23.00 [584]	3/0–250 MCM	15.25 [387]	13.88 [353]	4.38 [111]	1.38 [35]
	4	36.00 [914]	29.00 [737]					5.00 [127]





NOTES:

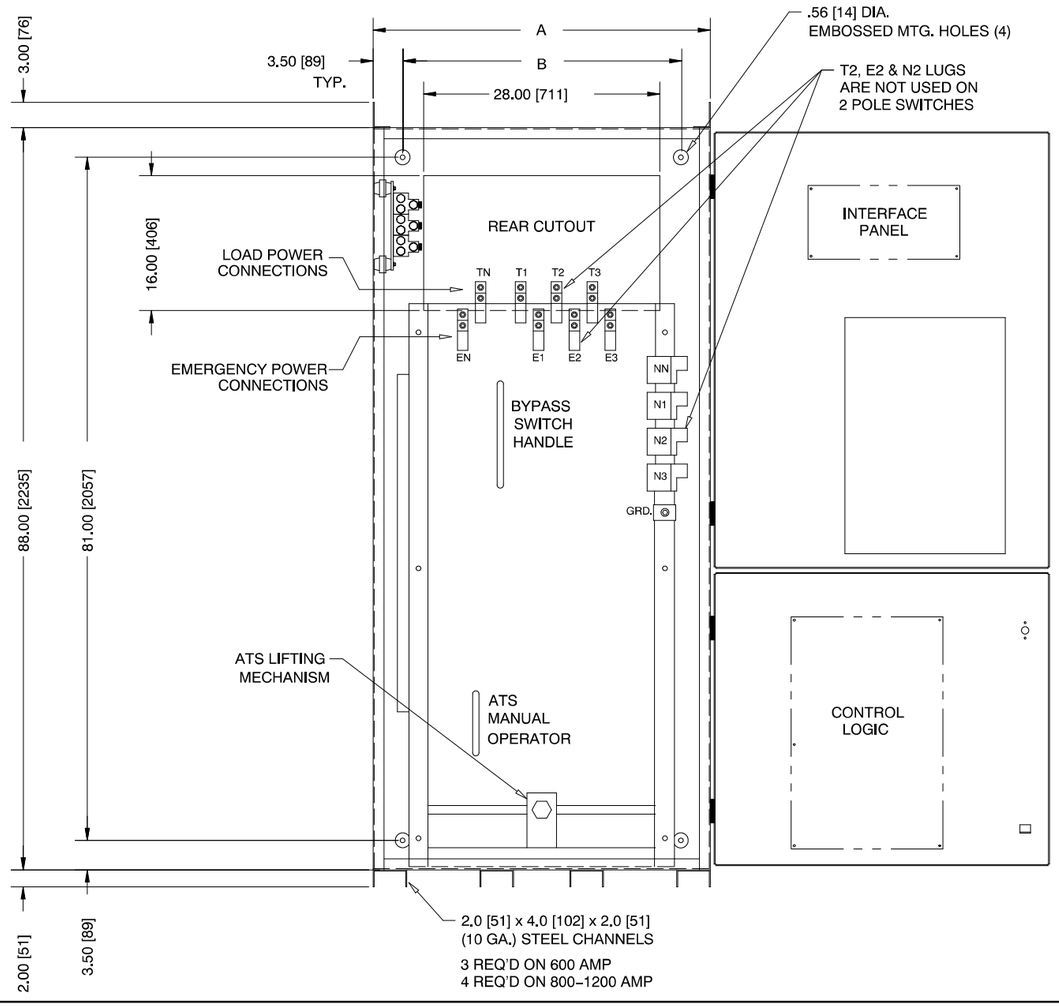
1) DIMENSIONS IN [ ] ARE MILLIMETER EQUIVALENTS.
2) 4 POLE UNIT SHOWN.
3) TOP & BOTTOM CABLE ENTRY ACCEPTABLE (TOP ENTRY PREFERRED).

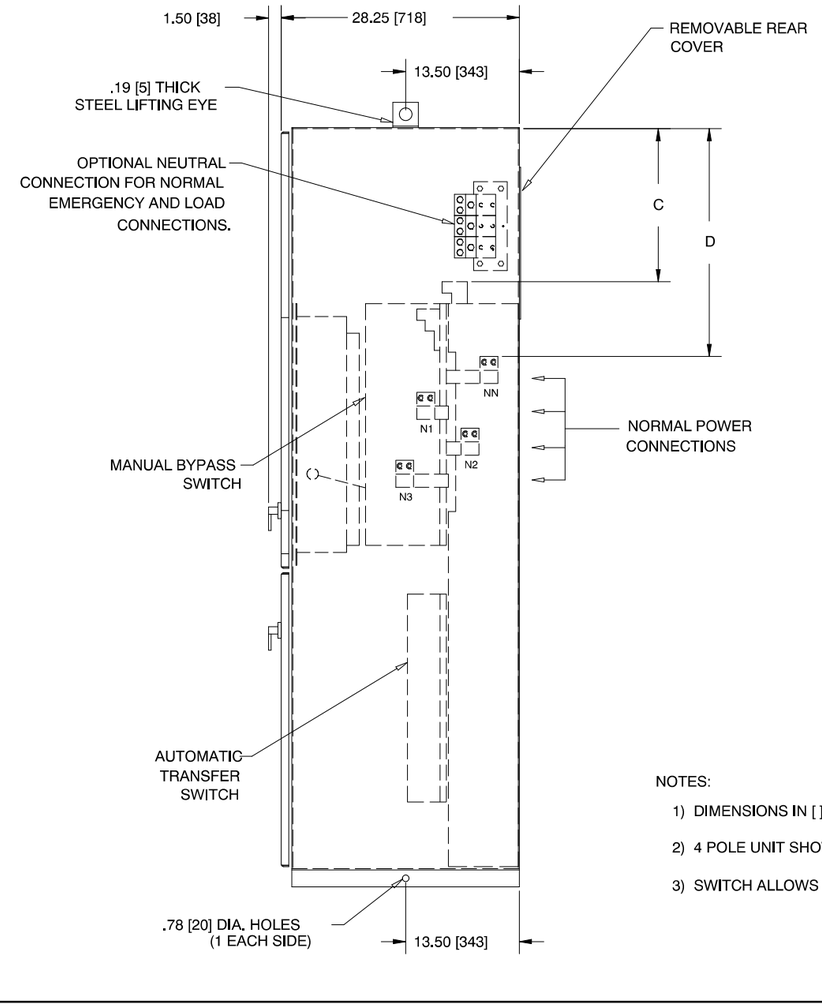
NEMA 4 ENCLOSURE

ADV-5958C-

NEMA Type 4 Enclosure, 100-400 Amp

STANDARD BYPASS SWITCH	NO. POLES	CABINET DIMENSIONS		LUG RANGE	WIRE BENDING SPACE	
		A	B		C (LOAD/EMERG.)	D (NORMAL)
600 AMP	2,3	36.00 [914]	29.00 [737]	#2–600 MCM (2)	18.25 [464]	31.38 [797]
	4	40.00 [1016]	33.00 [838]		18.25 [464]	27.12 [689]
800–1200 AMP	2,3	40.00 [1016]	33.00 [838]	#2–600 MCM (4)	18.25 [464]	29.62 [752]
	4	46.00 [1168]	39.00 [991]		18.25 [464]	25.12 [638]
PROGRAMMED TRANSITION BYPASS SWITCH						
600 AMP	2,3	36.00 [914]	29.00 [737]	#2–600 MCM (2)	18.25 [464]	31.38 [797]
	4	40.00 [1016]	33.00 [838]		18.25 [464]	27.12 [689]
800–1200 AMP	2,3	40.00 [1016]	33.00 [838]	#2–600 MCM (4)	18.25 [464]	29.62 [752]
	4	46.00 [1168]	39.00 [991]		18.25 [464]	25.12 [638]





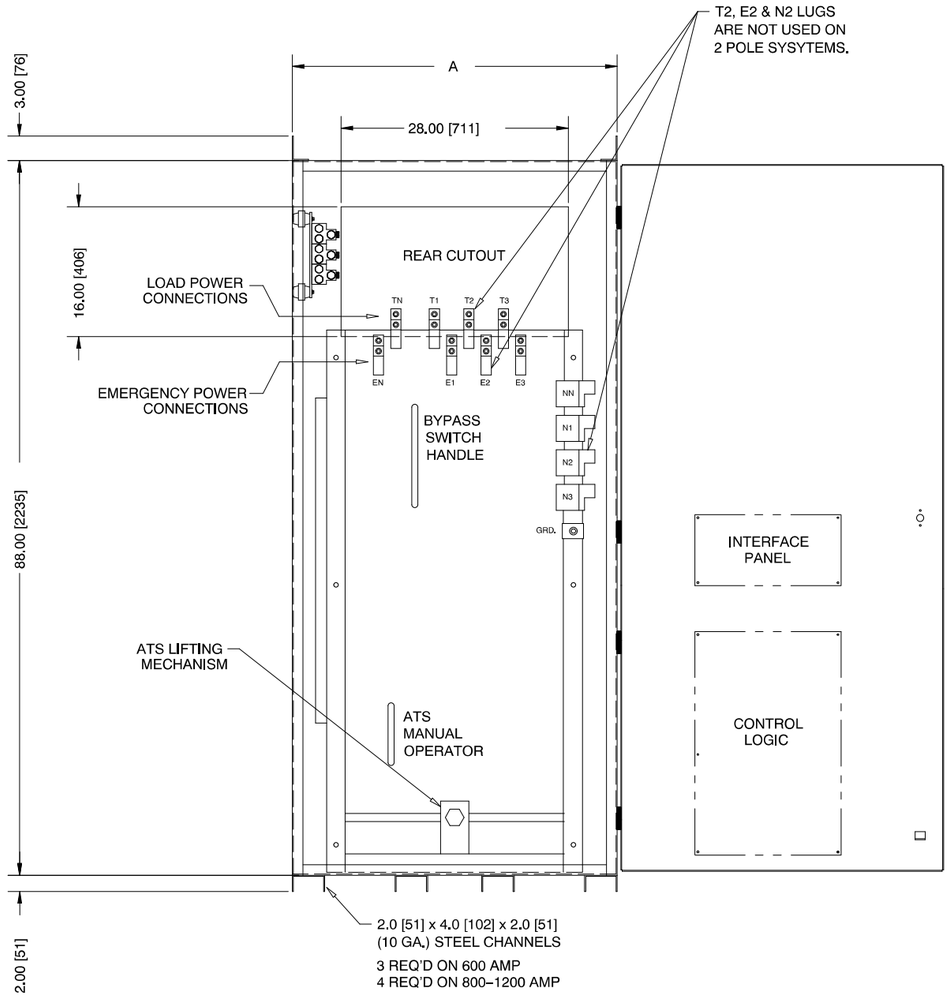
NOTES:

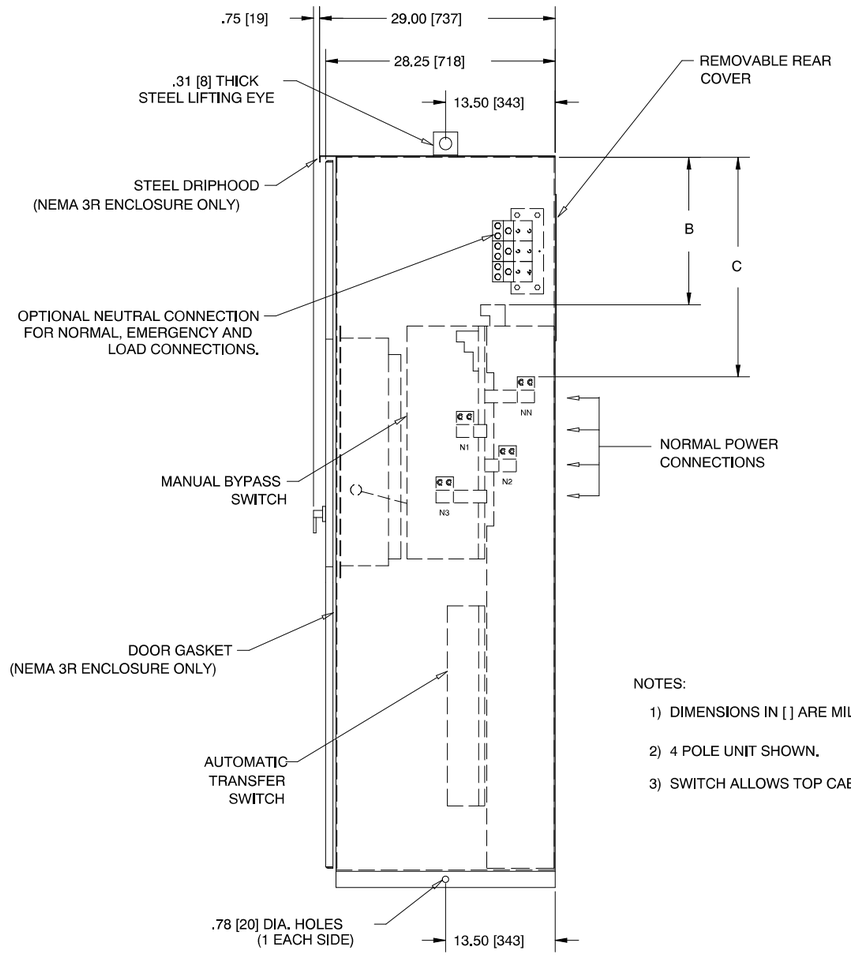
1) DIMENSIONS IN [ ] ARE MILLIMETER EQUIVALENTS.
2) 4 POLE UNIT SHOWN.
3) SWITCH ALLOWS TOP CABLE ENTRY ONLY.

ADV-5959A-

NEMA Type 1 Enclosure, 600-1200 Amp

STANDARD BYPASS SWITCH	NO. POLES	CABINET DIMENSIONS A	LUG RANGE	WIRE BENDING SPACE B (LOAD/EMERG.)	WIRE BENDING SPACE C (NORMAL)
600 AMP	2,3	36.00 [914]	#2–600 MCM (2)	17.88 [454]	31.00 [787]
	4	40.00 [1016]		17.88 [454]	26.75 [679]
800–1200 AMP	2,3	40.00 [1016]	#2–600 MCM (4)	17.88 [454]	29.25 [743]
	4	46.00 [1168]		17.88 [454]	24.75 [629]
PROGRAMMED TRANSITION BYPASS SWITCH					
600 AMP	2,3	36.00 [914]	#2–600 MCM (2)	17.88 [454]	31.00 [787]
	4	40.00 [1016]		17.88 [454]	26.75 [679]
800–1200 AMP	2,3	40.00 [1016]	#2–600 MCM (4)	17.88 [454]	29.25 [743]
	4	46.00 [1168]		17.88 [454]	24.75 [629]





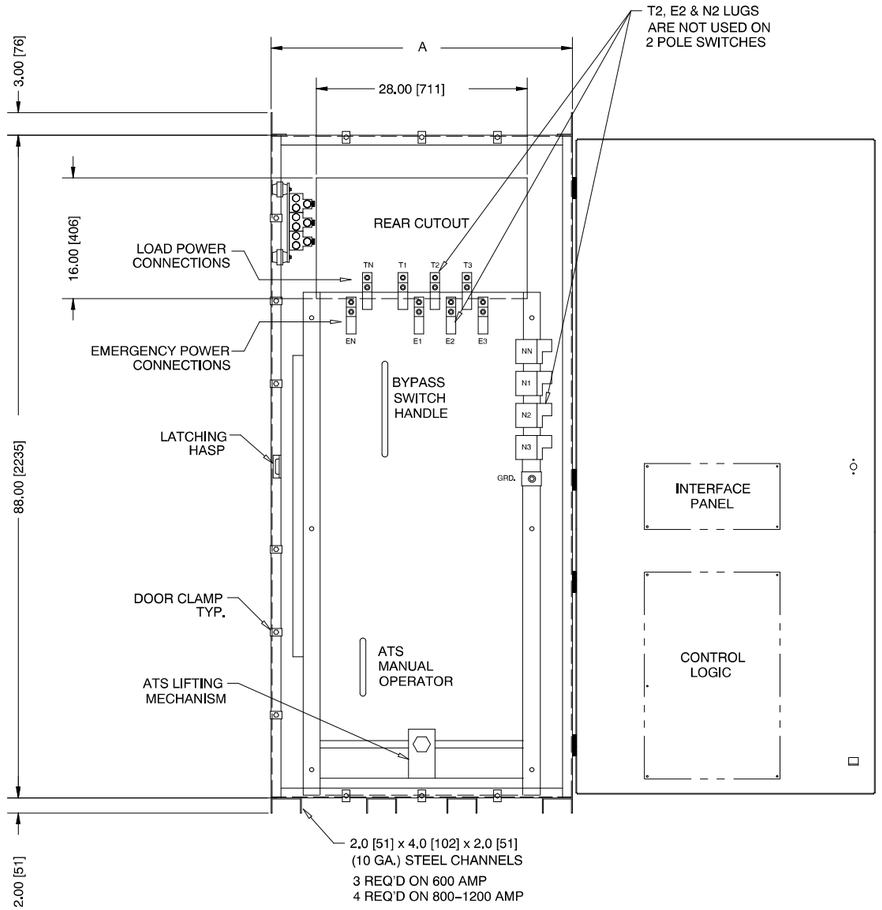
NOTES:

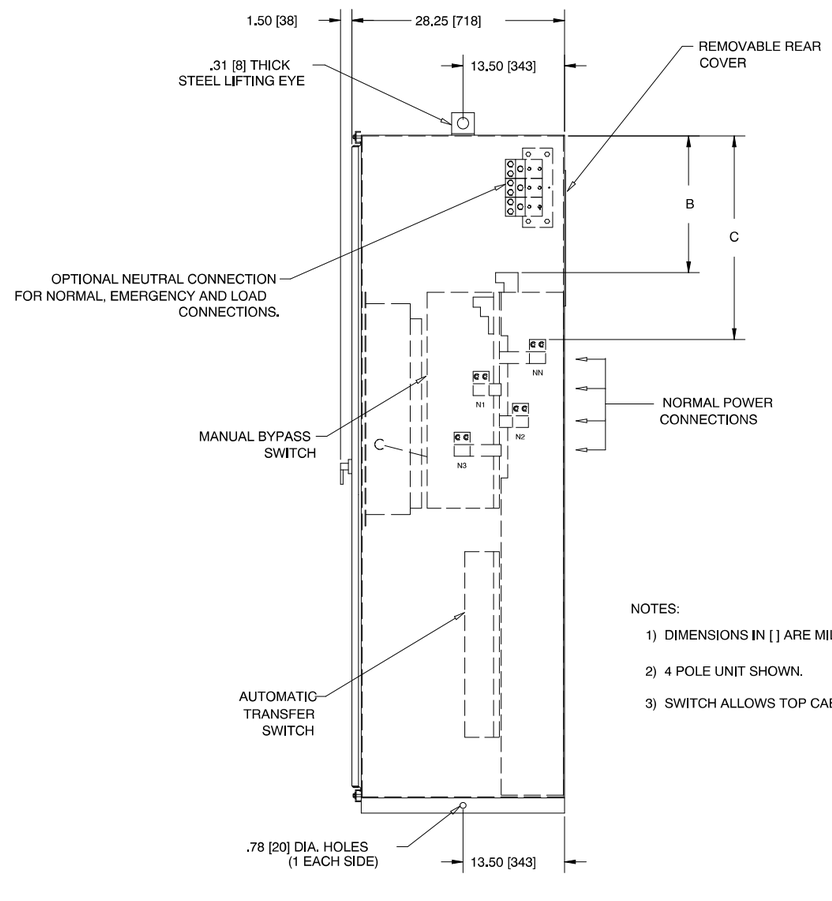
1) DIMENSIONS IN [ ] ARE MILLIMETER EQUIVALENTS.
2) 4 POLE UNIT SHOWN.
3) SWITCH ALLOWS TOP CABLE ENTRY ONLY.

ADV-5959B-

NEMA Type 3R and 12 Enclosures, 600-1200 Amp

STANDARD BYPASS SWITCH	NO. POLES	CABINET DIMENSIONS	LUG RANGE	WIRE BENDING SPACE	
		A		B (LOAD/EMERG.)	C (NORMAL)
600 AMP	2,3	36.00 [914]	#2–600 MCM (2)	17.88 [454]	31.00 [787]
	4	40.00 [1016]		17.88 [454]	26.75 [679]
800–1200 AMP	2,3	40.00 [1016]	#2–600 MCM (4)	17.88 [454]	29.25 [743]
	4	46.00 [1168]		17.88 [454]	24.75 [629]
PROGRAMMED TRANSITION BYPASS SWITCH					
600 AMP	2,3	36.00 [914]	#2–600 MCM (2)	17.88 [454]	31.00 [787]
	4	40.00 [1016]		17.88 [454]	26.75 [679]
800–1200 AMP	2,3	40.00 [1016]	#2–600 MCM (4)	17.88 [454]	29.25 [743]
	4	46.00 [1168]		17.88 [454]	24.75 [629]





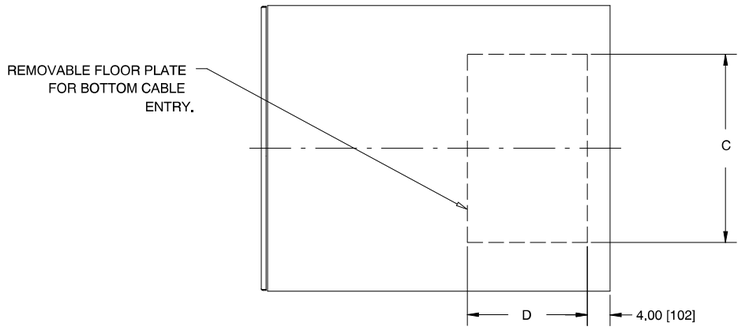
NOTES:

1) DIMENSIONS IN [ ] ARE MILLIMETER EQUIVALENTS.
2) 4 POLE UNIT SHOWN.
3) SWITCH ALLOWS TOP CABLE ENTRY ONLY.

ADV-5959C-

NEMA Type 4 Enclosure, 600-1200 Amp

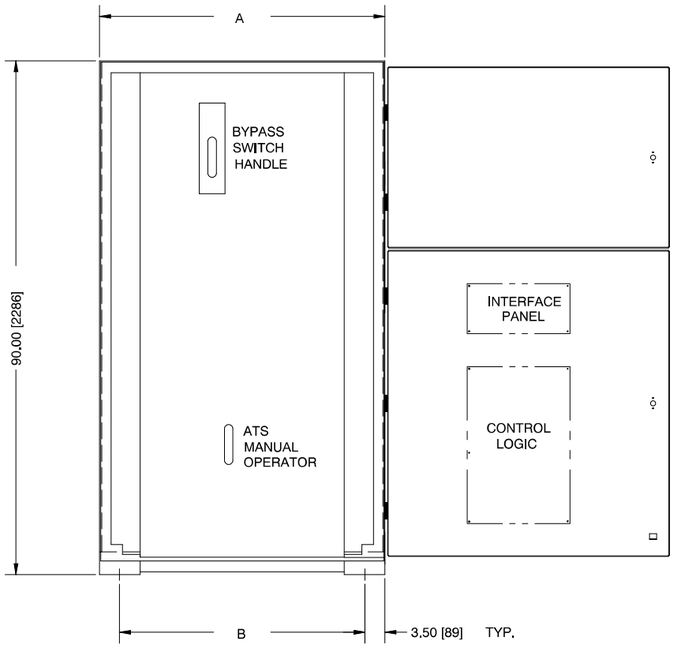
STANDARD BYPASS SWITCH	NO. POLES	CABINET DIMENSIONS						LUG RANGE	WIRE BENDING SPACE (TOP ENTRY)			WIRE BENDING SPACE (BOTTOM ENTRY)			WIRE GUTTERS	
		A	B	C	D	E	F		G (LOAD)	H (NORMAL)	J (EMERG.)	K (LOAD)	L (NORMAL)	M (EMERG.)	N LEFT	P (RIGHT)
1600–2000 AMP	2,3	40.00 [1016]	33.00 [838]	26.00 [660]	21.00 [533]	61.12 [1552]	14.00 [356]	#2–600 MCM (8)	17.34 [440]	27.75 [705]	64.75 [1645]	63.16 [1604]	52.75 [1340]	15.75 [400]	11.75 [298]	15.12 [384]
	4	50.00 [1270]	43.00 [1092]	36.00 [914]	21.00 [533]	61.12 [1552]	14.00 [356]									12.00 [305]
3000 AMP	2,3	40.00 [1016]	33.00 [838]	26.00 [660]	33.00 [838]	73.12 [1857]	21.00 [533]	#2–600 MCM (8)	18.34 [466]	28.75 [730]	65.75 [1670]	62.16 [1579]	51.75 [1314]	14.75 [375]	11.75 [298]	15.12 [384]
	4	50.00 [1270]	43.00 [1092]	36.00 [914]	33.00 [838]	73.12 [1857]	21.00 [533]									12.00 [305]
PROGRAMMED TRANSITION BYPASS SWITCH																
1600–2000 AMP	2,3	40.00 [1016]	33.00 [838]	26.00 [660]	21.00 [533]	61.12 [552]	61.12 [552]	#2–600 MCM (8)	17.34 [440]	27.75 [705]	64.75 [1645]	63.16 [1604]	52.75 [1340]	15.75 [400]	11.75 [298]	15.12 [384]
	4	50.00 [1270]	43.00 [1092]	36.00 [914]	21.00 [533]	61.12 [552]	61.12 [552]									12.00 [305]
3000 AMP	2,3	40.00 [1016]	33.00 [838]	26.00 [660]	33.00 [838]	73.12 [1857]	73.12 [1857]	#2–600 MCM (8)	18.34 [466]	28.75 [730]	65.75 [1670]	62.16 [1579]	51.75 [1314]	14.75 [375]	11.75 [298]	15.12 [384]
	4	50.00 [1270]	43.00 [1092]	36.00 [914]	33.00 [838]	73.12 [1857]	73.12 [1857]									12.00 [305]

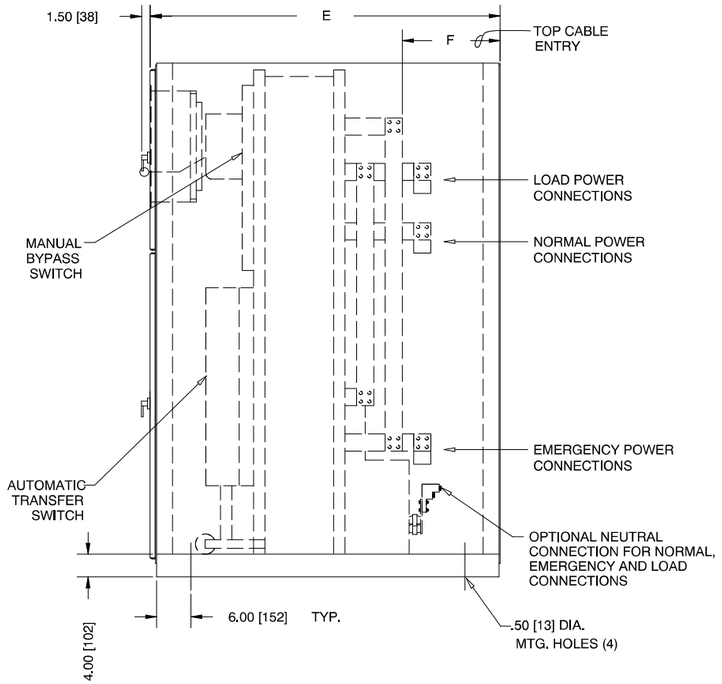


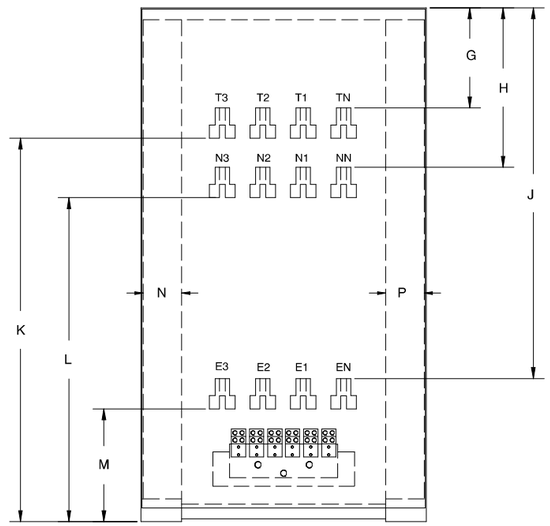
NOTES:

1) DIMENSIONS IN [ ] ARE MILLIMETER EQUIVALENTS.

2) 4 POLE UNIT SHOWN.



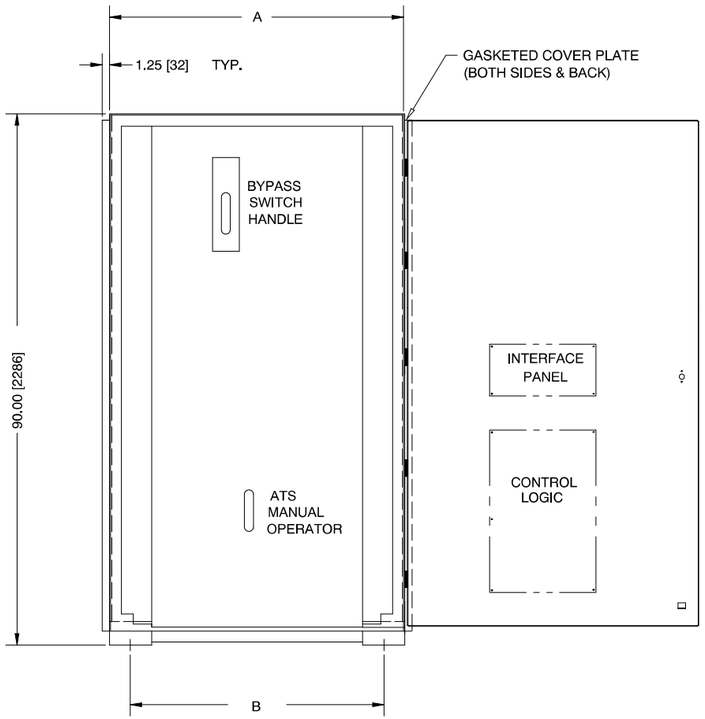


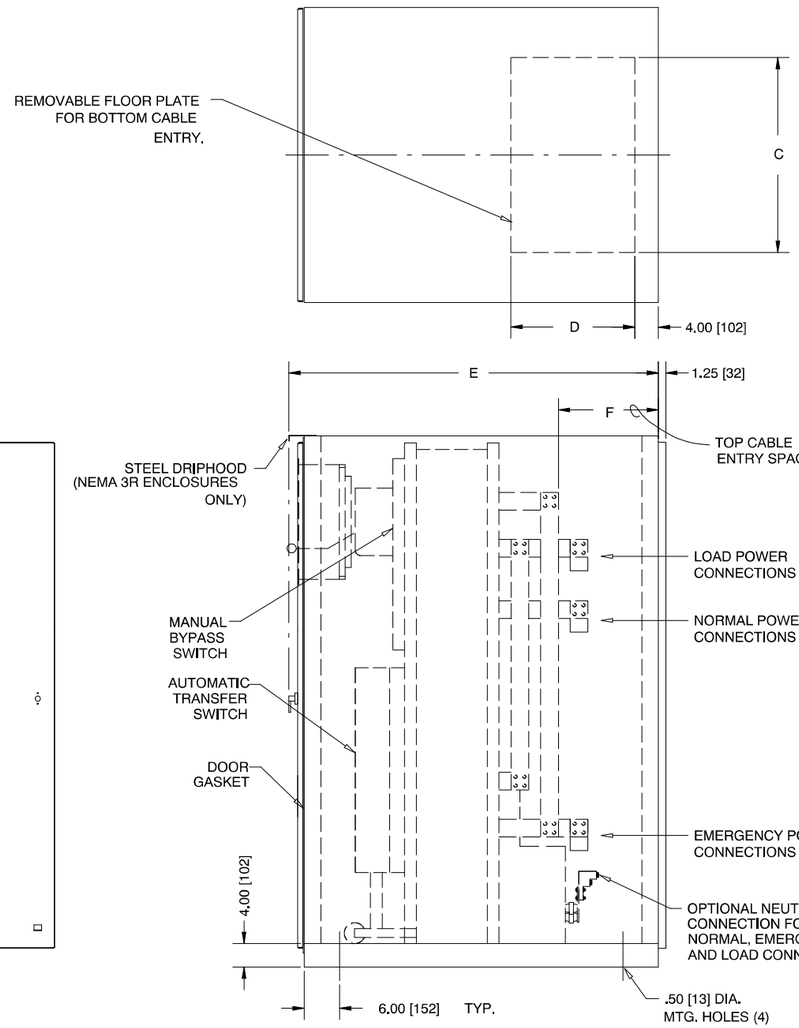


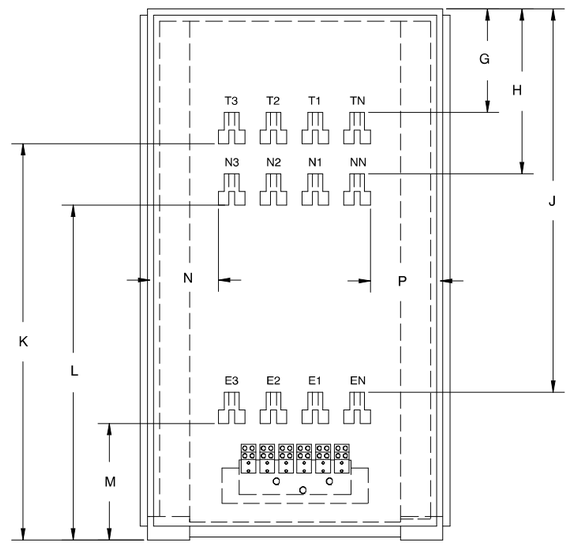
ADV-5960A-

NEMA Type 1 Enclosure, 1600-3000 Amp

STANDARD BYPASS SWITCH	NO. POLES	CABINET DIMENSIONS						LUG RANGE	WIRE BENDING SPACE (TOP ENTRY)			WIRE BENDING SPACE (BOTTOM ENTRY)			WIRE GUTTERS	
		A	B	C	D	E	F		G (LOAD)	H (NORMAL)	J (EMERG.)	K (LOAD)	L (NORM.)	M (EMERG.)	N (LEFT)	P (RIGHT)
1600–2000 AMP	2,3	43.75 [1111]	34.25 [870]	26.00 [660]	21.00 [533]	62.62 [1591]	14.00 [356]	#2–600 MCM (8)	17.34 [440]	27.75 [705]	64.75 [1645]	63.16 [1604]	52.75 [1340]	15.75 [400]	11.75 [298]	15.12 [384]
	4	53.75 [1365]	44.25 [1124]	36.00 [914]	21.00 [533]	62.62 [1591]	14.00 [356]									12.00 [305]
3000 AMP	2,3	43.75 [1111]	34.25 [870]	26.00 [660]	33.00 [838]	74.62 [1895]	21.00 [533]	#2–600 MCM (8)	18.34 [466]	28.75 [730]	65.75 [1670]	62.16 [1579]	51.75 [1314]	14.75 [375]	11.75 [298]	15.12 [384]
	4	53.75 [1365]	44.25 [1124]	36.00 [914]	33.00 [838]	74.62 [1895]	21.00 [533]									12.00 [305]
PROGRAMMED TRANSITION BYPASS SWITCH																
1600–2000 AMP	2,3	43.75 [1111]	34.25 [870]	26.00 [660]	21.00 [533]	62.62 [1591]	14.00 [356]	#2–600 MCM (8)	17.34 [440]	27.75 [705]	64.75 [1645]	63.16 [1604]	52.75 [1340]	15.75 [400]	11.75 [298]	15.12 [384]
	4	53.75 [1365]	44.25 [1124]	36.00 [914]	21.00 [533]	62.62 [1591]	14.00 [356]									12.00 [305]
3000 AMP	2,3	43.75 [1111]	34.25 [870]	26.00 [660]	33.00 [838]	74.62 [1895]	21.00 [533]	#2–600 MCM (8)	18.34 [466]	28.75 [730]	65.75 [1670]	62.16 [1579]	51.75 [1314]	14.75 [375]	11.75 [298]	15.12 [384]
	4	53.75 [1365]	44.25 [1124]	36.00 [914]	33.00 [838]	74.62 [1895]	21.00 [533]									12.00 [305]







NOTES:

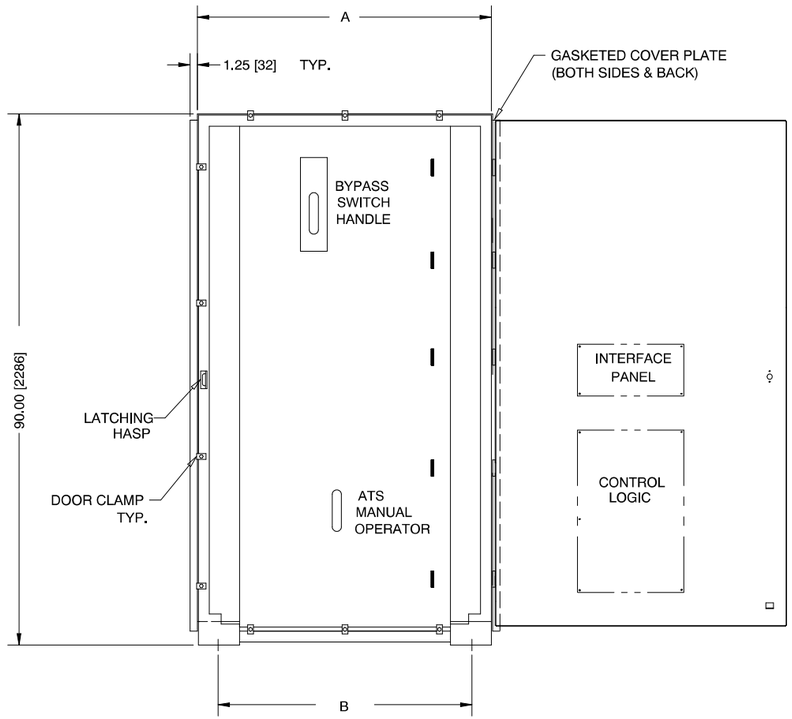
1) DIMENSIONS IN [ ] ARE MILLIMETER EQUIVALENTS.

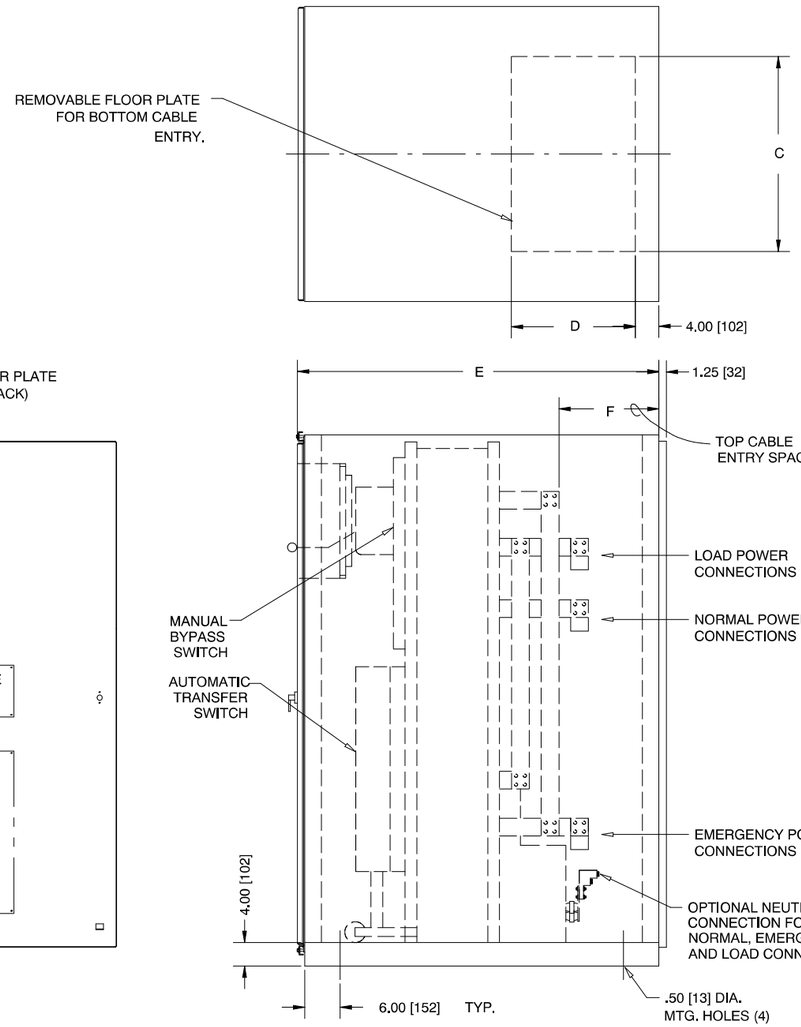
2) 4 POLE UNIT SHOWN.

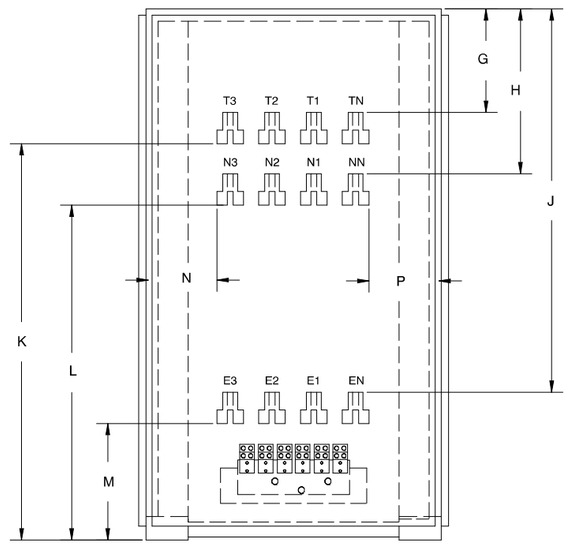
ADV-5960B-

NEMA Type 3R and 12 Enclosures, 1600-3000 Amp

STANDARD BYPASS SWITCH	NO. POLES	CABINET DIMENSIONS						LUG RANGE	WIRE BENDING SPACE (TOP ENTRY)			WIRE BENDING SPACE (BOTTOM ENTRY)			WIRE GUTTERS	
		A	B	C	D	E	F		G (LOAD)	H (NORMAL)	J (EMERG.)	K (LOAD)	L (NORM.)	M (EMERG.)	N (LEFT)	P (RIGHT)
1600–2000 AMP	2,3	43.75 [1111]	34.25 [870]	26.00 [660]	21.00 [533]	61.12 [1552]	14.00 [356]	#2–600 MCM (8)	17.34 [440]	27.75 [705]	64.75 [1645]	63.16 [1604]	52.75 [1340]	15.75 [400]	11.75 [298]	15.12 [384]
	4	53.75 [1365]	44.25 [1124]	36.00 [914]	21.00 [533]	61.12 [1552]	14.00 [356]									12.00 [305]
3000 AMP	2,3	43.75 [1111]	34.25 [870]	26.00 [660]	33.00 [838]	73.12 [1857]	21.00 [533]	#2–600 MCM (8)	18.34 [466]	28.75 [730]	65.75 [1670]	62.16 [1579]	51.75 [1314]	14.75 [375]	11.75 [298]	15.12 [384]
	4	53.75 [1365]	44.25 [1124]	36.00 [914]	33.00 [838]	73.12 [1857]	21.00 [533]									12.00 [305]
PROGRAMMED TRANSITION BYPASS SWITCH																
1600–2000 AMP	2,3	43.75 [1111]	34.25 [870]	26.00 [660]	21.00 [533]	61.12 [1552]	14.00 [356]	#2–600 MCM (8)	17.34 [440]	27.75 [705]	64.75 [1645]	63.16 [1604]	52.75 [1340]	15.75 [400]	11.75 [298]	15.12 [384]
	4	53.75 [1365]	44.25 [1124]	36.00 [914]	21.00 [533]	61.12 [1552]	14.00 [356]									12.00 [305]
3000 AMP	2,3	43.75 [1111]	34.25 [870]	26.00 [660]	33.00 [838]	73.12 [1857]	21.00 [533]	#2–600 MCM (8)	18.34 [466]	28.75 [730]	65.75 [1670]	62.16 [1579]	51.75 [1314]	14.75 [375]	11.75 [298]	15.12 [384]
	4	53.75 [1365]	44.25 [1124]	36.00 [914]	33.00 [838]	73.12 [1857]	21.00 [533]									12.00 [305]







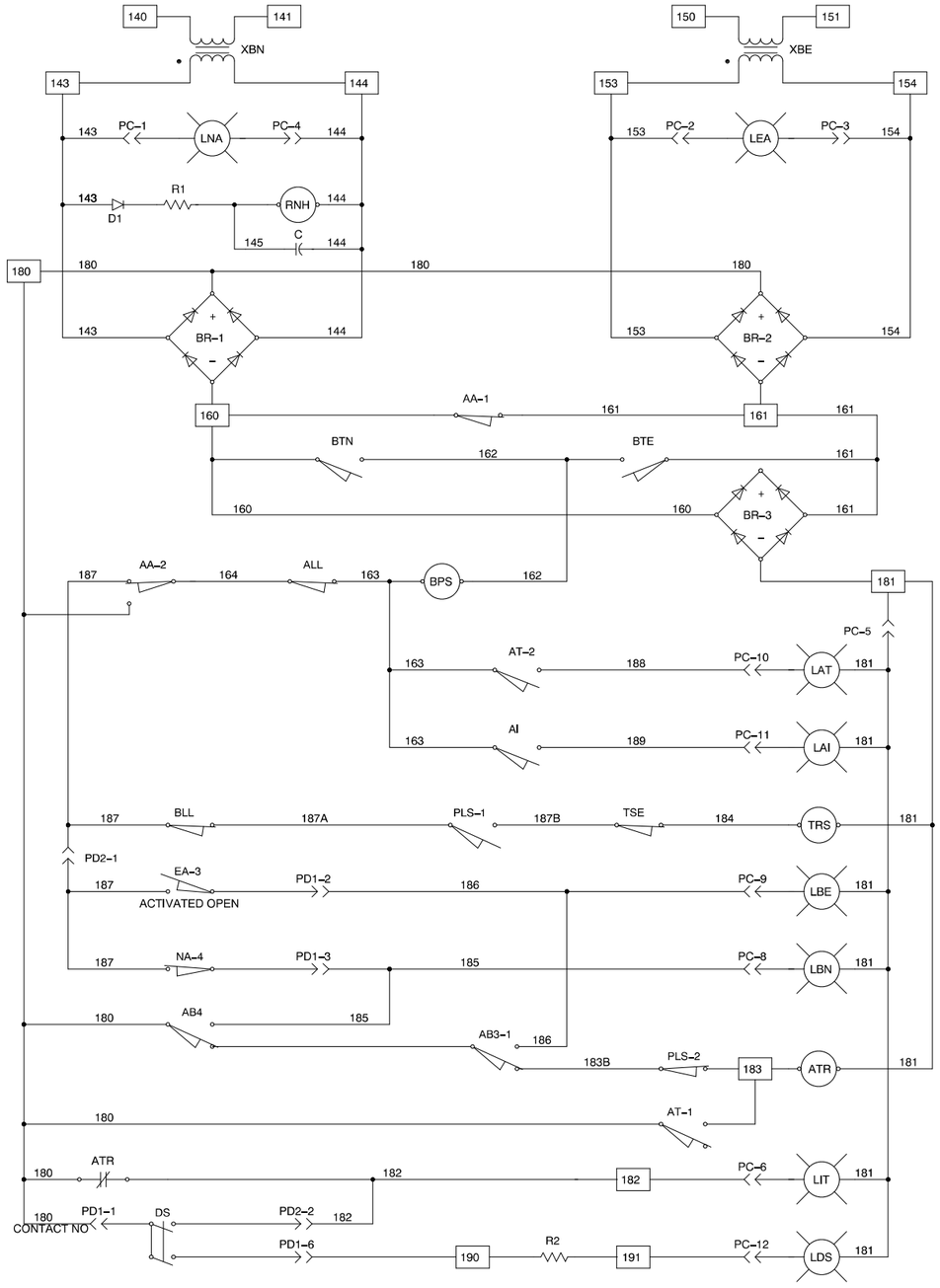
NOTES:

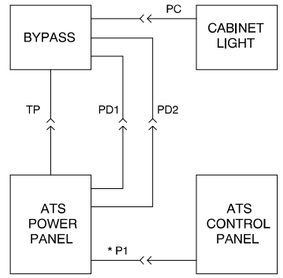
1) DIMENSIONS IN [ ] ARE MILLIMETER EQUIVALENTS.

2) 4 POLE UNIT SHOWN.

ADV-5960C-

NEMA Type 4 Enclosure, 1600-2000 Amp





* SEE ATS POWER CIRCUIT SCHEMATIC, LIGHTS & PLUGS

LIMIT SWITCH CHART

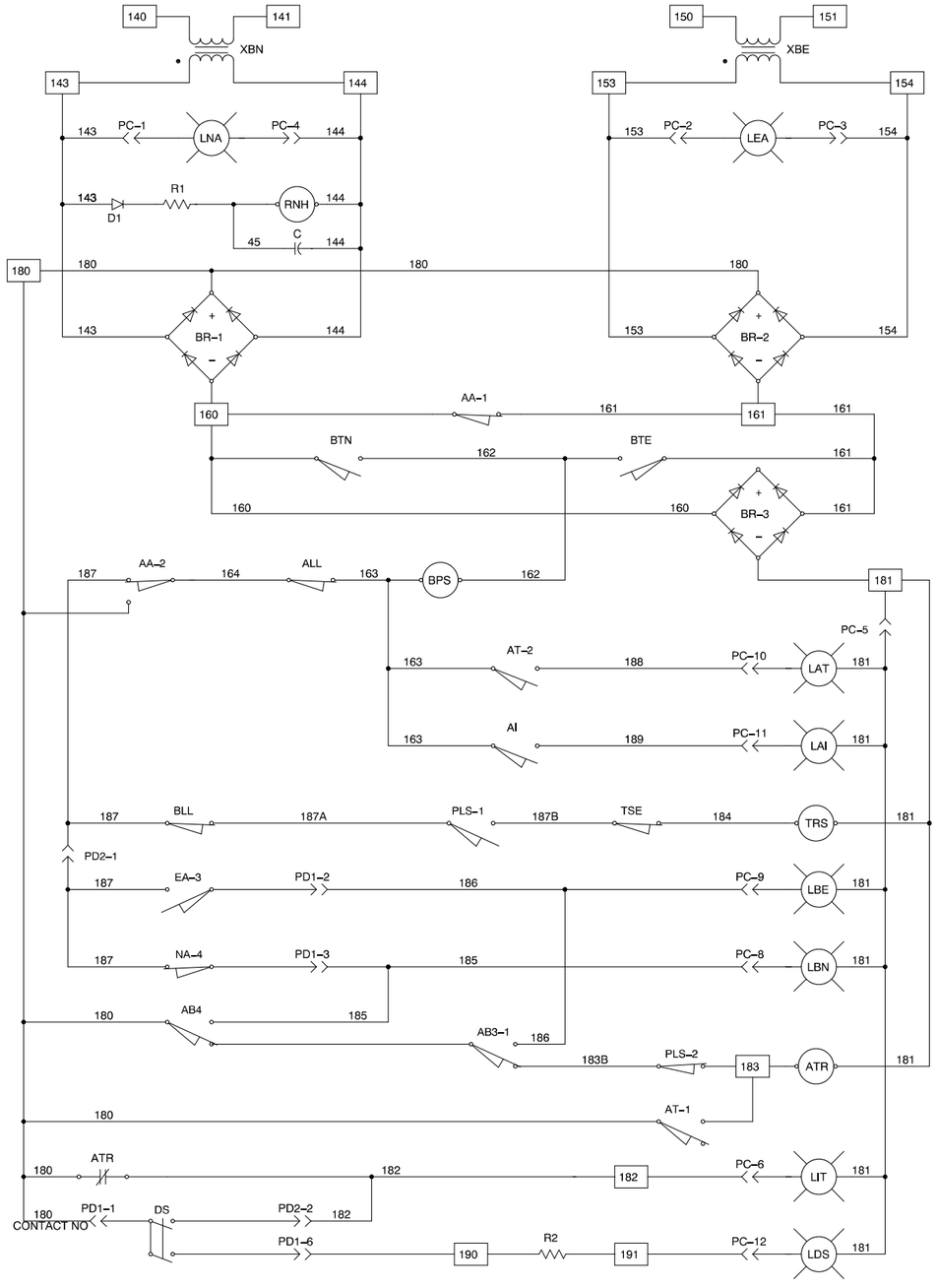
X = ACTUATED	ATS LOCATION				ATS MODE		BYPASS MODE		
	AUTO	TEST	ISO	REMOVE	NORM	EMERG.	NORM	EMERG.	OPEN
AA	X								
AT		X							
AI			X	X					
ALL	X	X	X	X					
TSE	X	X	X						
AE			X	X					
NA					X				
EA						X			
AB4							X		
AB3								X	
BLL							X	X	X
PLS	ACTIVATED WHEN ALH IS OPERATED								

LEGEND

AA–1,2	LIMIT SWITCH, ATS AUTO LOCATION
AB3–1	LIMIT SWITCH, BYPASS EMERGENCY
AB4	LIMIT SWITCH, BYPASS NORMAL
AI	LIMIT SWITCH, ATS IN ISOLATE
ALH	ATS LOCATION HANDLE
ALL	LIMIT SWITCH, ATS LOCK LOCATION
AT–1,2	LIMIT SWITCH, ATS TEST LOCATION
ATR	AUTO/TEST RELAY
BLL	LIMIT SWITCH, BYPASS LOCK LOCATION
BPS	BYPASS SOLENOID
BTE	LIMIT SWITCH, BYPASS TRANSFER EMERGENCY (MBH MOVEMENT TO NORMAL)
BTN	LIMIT SWITCH, BYPASS TRANSFER NORMAL (MBH MOVEMENT TO EMERGENCY)
BR	BRIDGE RECTIFIER
DS	ATS DISCONNECT SWITCH
EA–3	LIMIT SWITCH, ATS IN EMERGENCY
LBE	BYPASS EMERGENCY LIGHT
LBN	BYPASS NORMAL LIGHT
LAI	ATS ISOLATE LIGHT
LAT	ATS TEST LOCATION
LDS	DISCONNECT SWITCH INHIBIT POSITION
LEA	EMERGENCY AVAILABLE LIGHT
LIT	ATS INHIBIT LIGHT
LNA	NORMAL AVAILABLE LIGHT
NA–4	LIMIT SWITCH, ATS IN NORMAL
PLS–1,2	PERMISSIVE LIMIT SWITCH
RNH	NORMAL VOLTAGE RELAY
TRS	SOLENOID, TRANSFER RELEASE
TSE	LIMIT SWITCH, TRANSFER SWITCH ENGAGED
81	TERMINAL ON BYPASS SUBPANEL

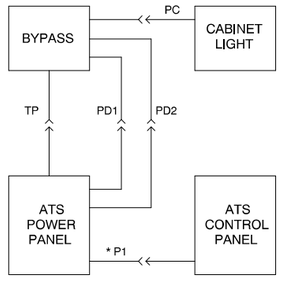
321443-

Transfer Switch Lamps, 100-400 Amp with Programmed Transition



LIMIT SWITCH CHART

X = ACTUATED	ATS LOCATION				ATS MODE		BYPASS MODE		
	AUTO	TEST	ISO	REMOVE	NORM	EMERG.	NORM	EMERG.	OPEN
AA	X								
AT		X							
AI			X	X					
ALL	X	X	X	X					
TSE	X	X	X						
AE			X	X					
NA					X				
EA						X			
AB4							X		
AB3								X	
BLL							X	X	X
PLS	ACTIVATED WHEN ALH IS OPERATED								



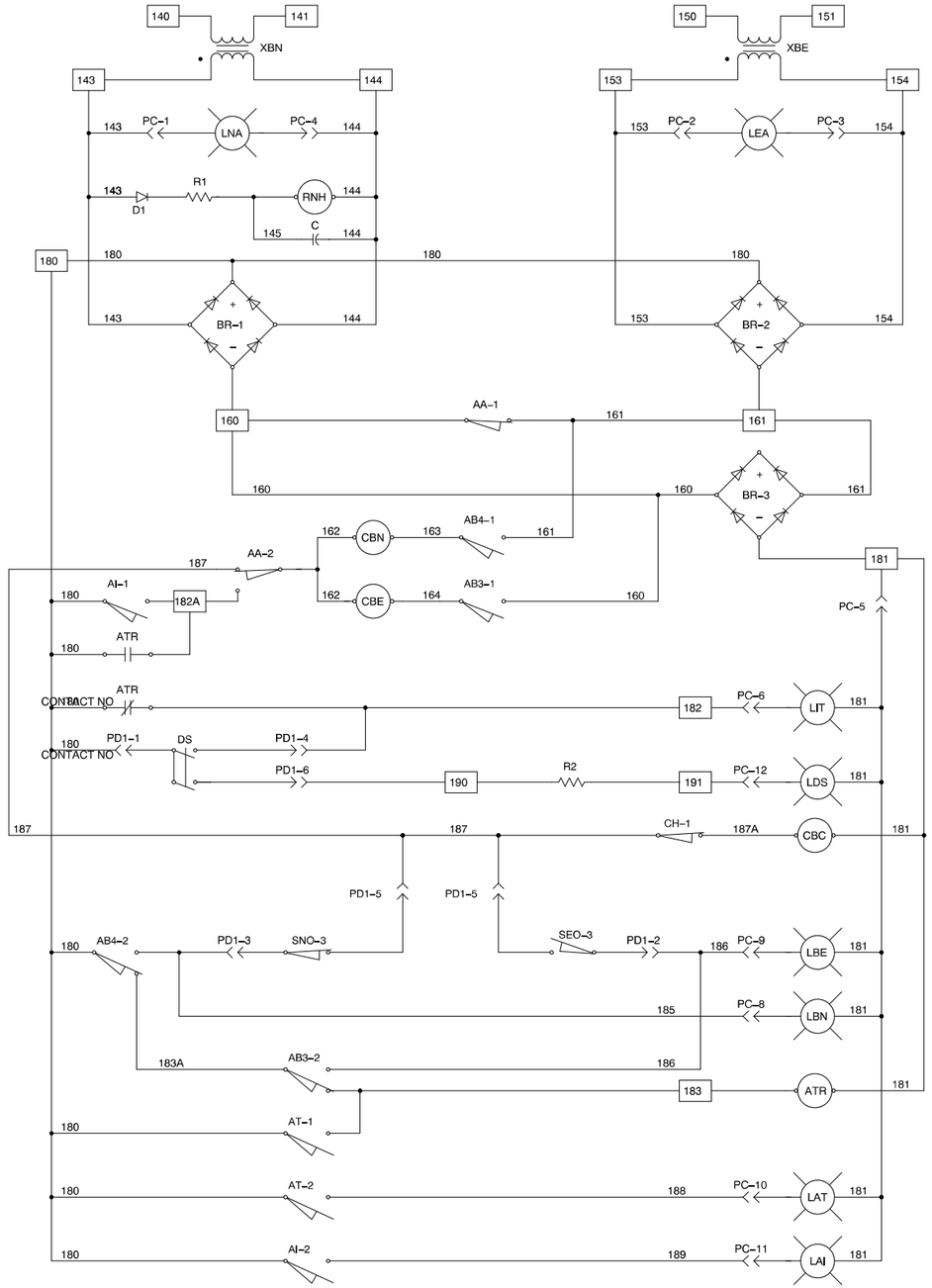
* SEE ATS POWER CIRCUIT SCHEMATIC, LIGHTS & PLUGS

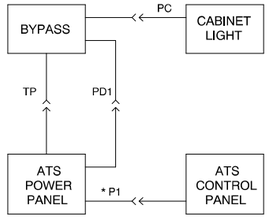
LEGEND

AA–1,2	LIMIT SWITCH, ATS AUTO LOCATION
AB3–1	LIMIT SWITCH, BYPASS EMERGENCY
AB4	LIMIT SWITCH, BYPASS NORMAL
AI	LIMIT SWITCH, ATS IN ISOLATE
ALH	ATS LOCATION HANDLE
ALL	LIMIT SWITCH, ATS LOCK LOCATION
AT–1,2	LIMIT SWITCH, ATS TEST LOCATION
ATR	AUTO/TEST RELAY
BLL	LIMIT SWITCH, BYPASS LOCK LOCATION
BPS	BYPASS SOLENOID
BTE	LIMIT SWITCH, BYPASS TRANSFER EMERGENCY (MBH MOVEMENT TO NORMAL)
BTN	LIMIT SWITCH, BYPASS TRANSFER NORMAL (MBH MOVEMENT TO EMERGENCY)
BR	BRIDGE RECTIFIER
DS	ATS DISCONNECT SWITCH
EA–3	LIMIT SWITCH, ATS IN EMERGENCY
LBE	BYPASS EMERGENCY LIGHT
LBN	BYPASS NORMAL LIGHT
LAI	ATS ISOLATE LIGHT
LAT	ATS TEST LOCATION
LDS	DISCONNECT SWITCH INHIBIT POSITION
LEA	EMERGENCY AVAILABLE LIGHT
LIT	ATS INHIBIT LIGHT
LNA	NORMAL AVAILABLE LIGHT
NA–4	LIMIT SWITCH, ATS IN NORMAL
PLS–1,2	PERMISSIVE LIMIT SWITCH
RNH	NORMAL VOLTAGE RELAY
TRS	SOLENOID, TRANSFER RELEASE
TSE	LIMIT SWITCH, TRANSFER SWITCH ENGAGED
81	TERMINAL ON BYPASS SUBPANEL

321444-

Transfer Switch Lamps, 100-400 Amp





* SEE ATS POWER CIRCUIT SCHEMATIC, LIGHTS & PLUGS

LIMIT SWITCH CHART

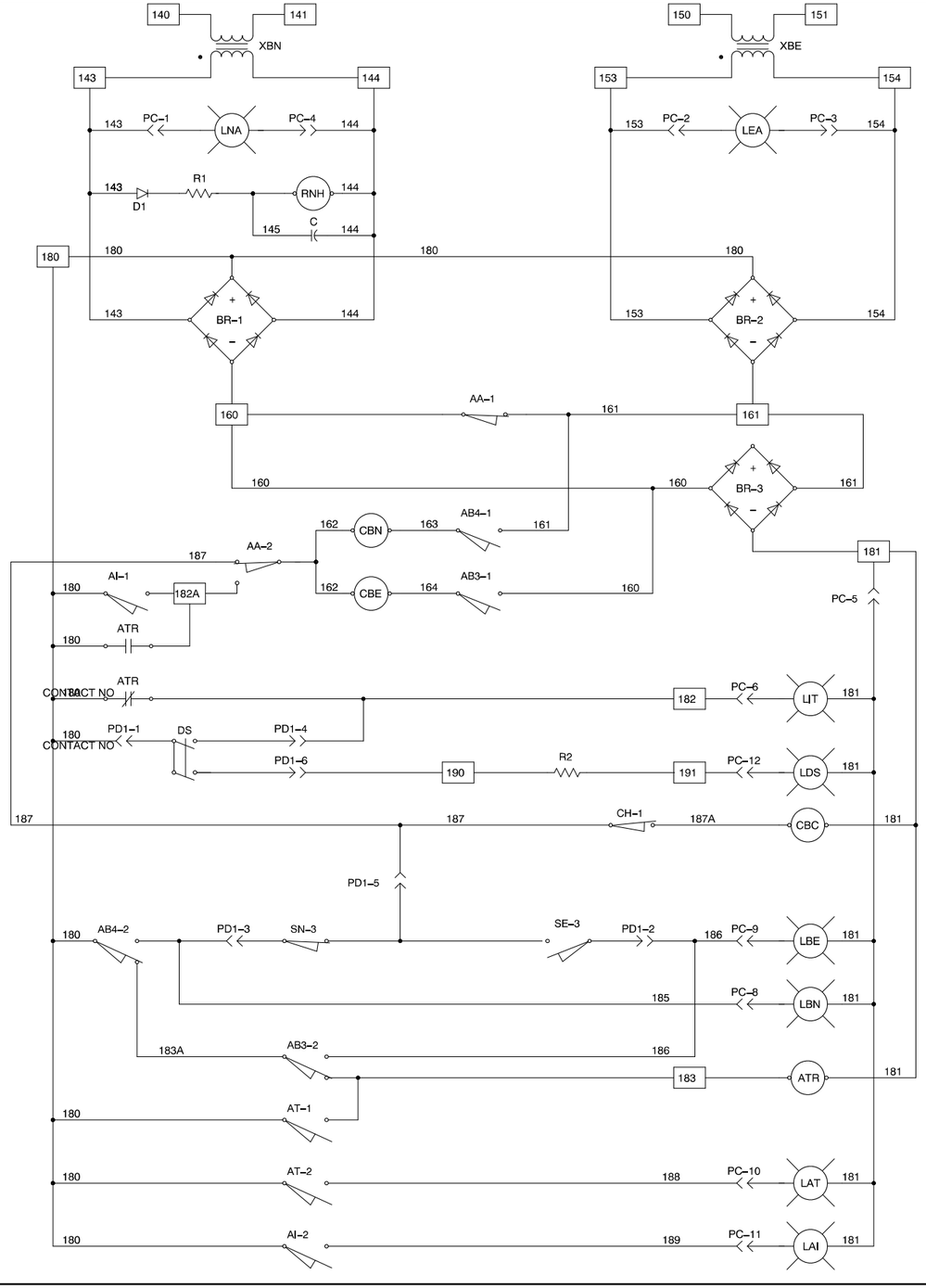
X = ACTUATED	ATS LOCATION				ATS MODE		BYPASS MODE	
	AUTO	TEST	ISO	REMOVE	NORM	EMERG.	NORM	EMERG.	OPEN
AA	X								
AT		X							
AI			X	X					
AE			X	X					
SN					X				
SE						X			
AB4							X		
AB3								X	

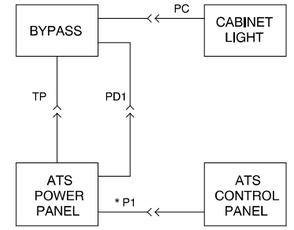
LEGEND

AA–1,2,3	LIMIT SWITCH, ATS AUTO LOCATION
AB3–1,2	LIMIT SWITCH, BYPASS EMERGENCY
AB4–1,2	LIMIT SWITCH, BYPASS NORMAL
AI–1,2,3	LIMIT SWITCH, ATS IN ISOLATE
AT–1,2	LIMIT SWITCH, ATS TEST LOCATION
ACD	LIMIT SWITCH, CRANK HANDLE ENGAGED
ACU	LIMIT SWITCH, CRANK HANDLE ENGAGED
ATR	AUTO/TEST RELAY
BR	BRIDGE RECTIFIER
CBC	CRANK SOLENOID
CBE	EMERGENCY TRANSFER OPERATOR
CBN	NORMAL TRANSFER OPERATOR
DS	ATS DISCONNECT SWITCH
LBE	BYPASS EMERGENCY
LBN	BYPASS NORMAL LIGHT
LAI	ATS ISOLATE LIGHT
LAT	ATS TEST LOCATION
LDS	DISCONNECT SWITCH
LEA	EMERGENCY AVAILABLE LIGHT
LIT	ATS INHIBIT LIGHT
LNA	NORMAL AVAILABLE LIGHT
RNH	NORMAL VOLTAGE RELAY
81	TERMINAL ON BYPASS SUBPANEL

321445-

Transfer Switch Lamps, 1600-3000 Amp with Programmed Transition





* SEE ATS POWER CIRCUIT SCHEMATIC, LIGHTS & PLUGS

LIMIT SWITCH CHART

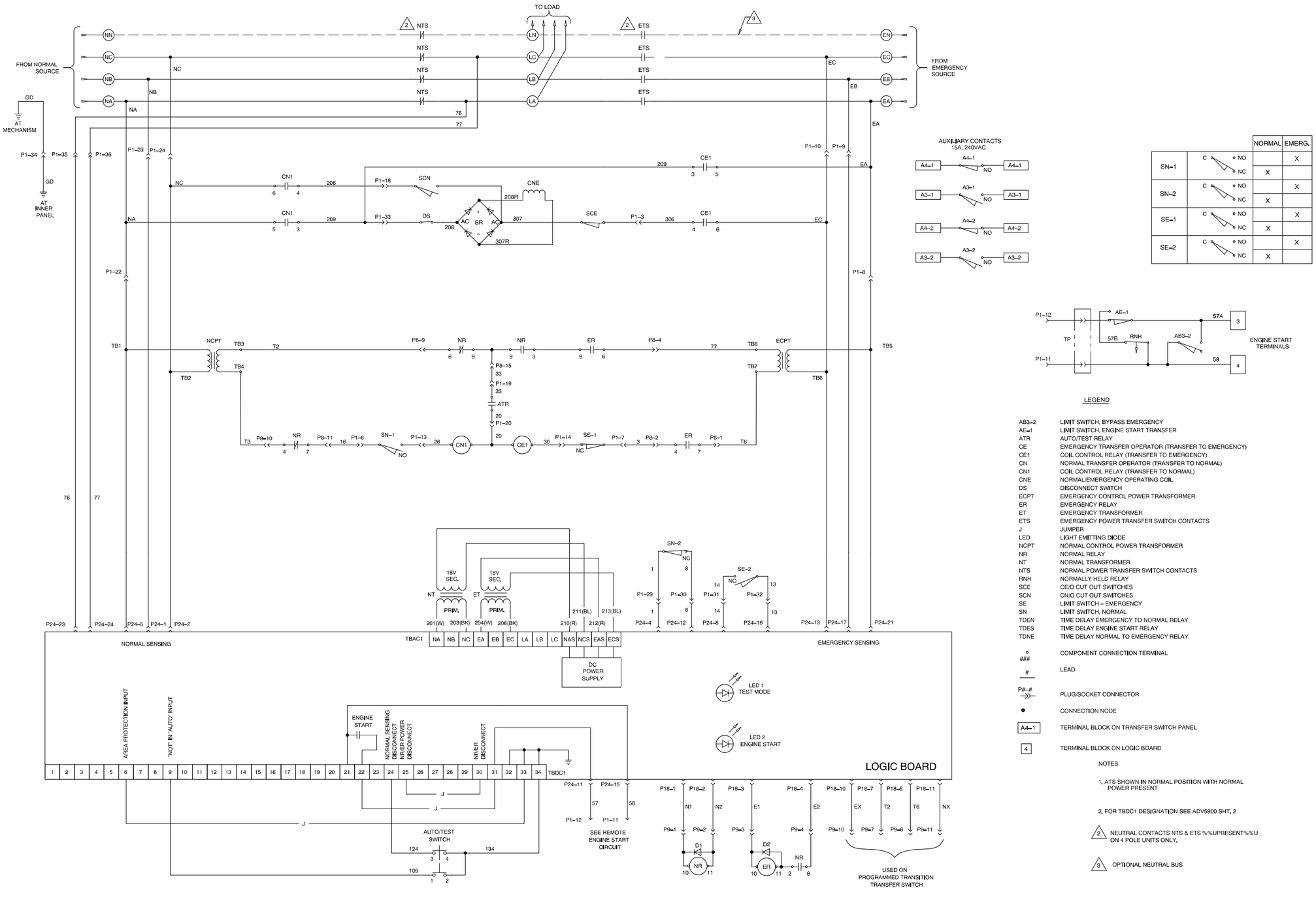
X = ACTUATED	ATS LOCATION				ATS MODE		BYPASS MODE	
	AUTO	TEST	ISO	REMOVE	NORM	EMERG.	NORM	EMERG.	OPEN
AA	X								
AT		X							
AI			X	X					
AE			X	X					
SN					X				
SE						X			
AB4							X		
AB3								X	

LEGEND

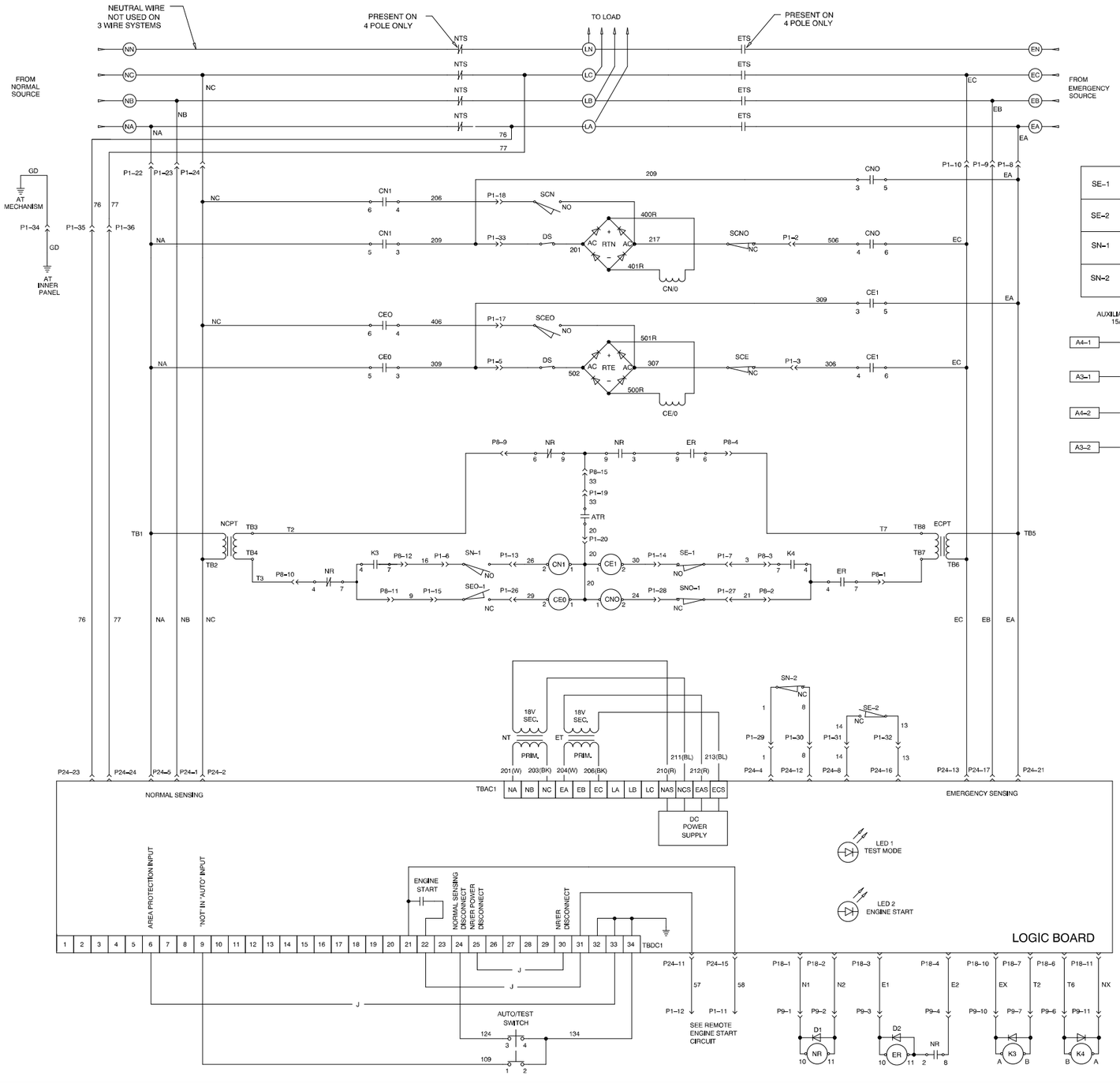
AA–1,2,3	LIMIT SWITCH, ATS AUTO LOCATION
AB3–1,2	LIMIT SWITCH, BYPASS EMERGENCY
AB4–1,2	LIMIT SWITCH, BYPASS NORMAL
AI–1,2,3	LIMIT SWITCH, ATS IN ISOLATE
AT–1,2	LIMIT SWITCH, ATS TEST LOCATION
ACD	LIMIT SWITCH, CRANK HANDLE ENGAGED
ACU	LIMIT SWITCH, CRANK HANDLE ENGAGED
ATR	AUTO/TEST RELAY
BR	BRIDGE RECTIFIER
CBC	CRANK SOLENOID
CBE	EMERGENCY TRANSFER OPERATOR
CBN	NORMAL TRANSFER OPERATOR
DS	ATS DISCONNECT SWITCH
LBE	BYPASS EMERGENCY
LBN	BYPASS NORMAL LIGHT
LAI	ATS ISOLATE LIGHT
LAT	ATS TEST LOCATION
LDS	DISCONNECT SWITCH
LEA	EMERGENCY AVAILABLE LIGHT
LIT	ATS INHIBIT LIGHT
LNA	NORMAL AVAILABLE LIGHT
RNH	NORMAL VOLTAGE RELAY
81	TERMINAL ON BYPASS SUBPANEL

321454-

Transfer Switch Lamps, 1600-3000 Amp with Programmed Transition



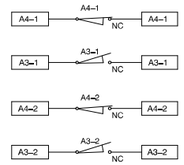
Schematic Diagram, M340 Logic, 100-400 Amp

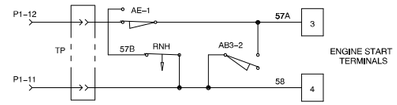


		NORMAL	OFF	EMERG.
SE-1	C NO	X		
	NC		X	X
SE-2	C NO	X		
	NC		X	X
SN-1	C NO			X
	NC	X	X	
SN-2	C NO			X
	NC	X	X	

		NORMAL	OFF	EMERG.
SE0-1	C NO	X		
	NC		X	X
SE0-2	C NO	X		
	NC		X	X
SNO-1	C NO			X
	NC	X	X	
SNO-2	C NO			X
	NC	X	X	

AUXILIARY CONTACTS 15A, 240VAC





LEGEND

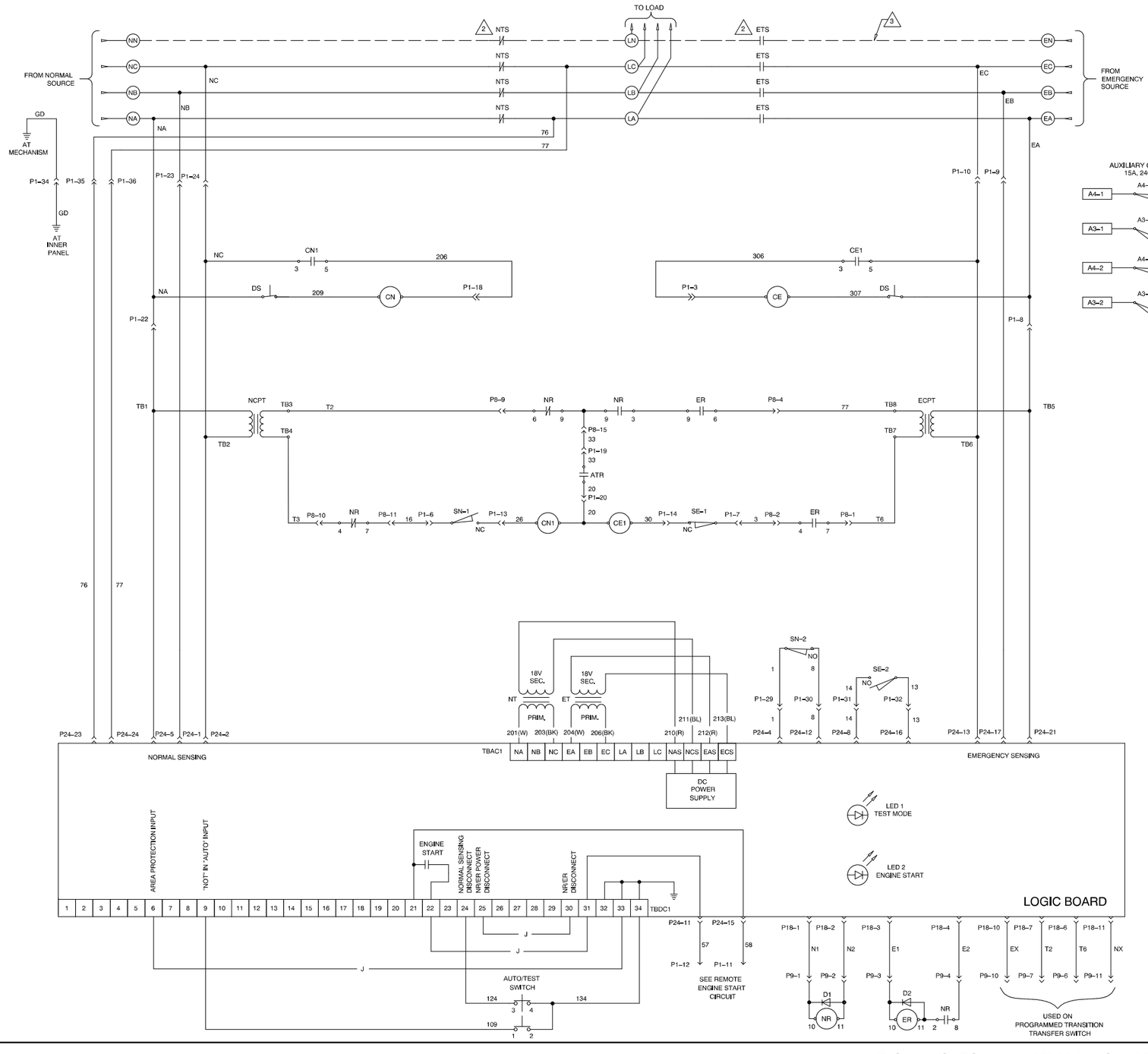
AB3-2	LIMIT SWITCH, BYPASS EMERGENCY
AE-1	LIMIT SWITCH, ENGINE START TRANSFER
ATR	AUTO/TEST RELAY
CC1	COIL CONTROL RELAY – NORMAL
CE1	TRANSFER OPERATOR – CLOSE TO EMERGENCY
CEO	COIL CONTROL RELAY – EMERGENCY OPEN TRANSFER OPERATOR
CE/O	EMERGENCY TRANSFER OPERATOR
CN1	TRANFER OPERATOR – CLOSE TO NORMAL
CNO	COIL CONTROL RELAY – NORMAL OPEN TRANSFER OPERATOR
CN/O	NORMAL TRANSFER OPERATOR
DS	DISCONNECT SWITCH
ECPT	EMERGENCY CONTROL POWER TRANSFORMER
ER	EMERGENCY RELAY
ET	EMERGENCY TRANSFORMER
ETS	EMERGENCY POWER TRANSFER SWITCH CONTACTS
J	JUMPER
K3	TIME DELAY TO NORMAL RELAY
K4	TIME DELAY TO EMERGENCY RELAY
LED	LIGHT EMITTING DIODE
NCPT	NORMAL CONTROL POWER TRANSFORMER
NR	NORMAL RELAY
NT	NORMAL TRANSFORMER
RE	BRIDGE RECTIFIER – EMERGENCY TRANSFER OPERATOR
RN	BRIDGE RECTIFIER – NORMAL TRANSFER OPERATOR
RNH	NORMALLY HELD RELAY
SCE	CE/O CONTACT SWITCH
SCN	CN/O CONTACT SWITCH
SCEO	CE/O CONTACT SWITCH
SCNO	CN/O CONTACT SWITCH
SE,SEO	LIMIT SWITCH – EMERGENCY
SN,SNO	LIMIT SWITCH, NORMAL
TDEN	TIME DELAY EMERGENCY TO NORMAL RELAY
TDES	TIME DELAY ENGINE START RELAY
TDNE	TIME DELAY NORMAL TO EMERGENCY RELAY
TP	TEST PLUG
○ ###	COMPONENT CONNECTION TERMINAL
#	LEAD
P#-#	PLUG/SOCKET CONNECTOR
●	CONNECTION NODE
A4-1	TERMINAL BLOCK ON TRANSFER SWITCH PANEL
4	TERMINAL BLOCK ON LOGIC BOARD

NOTES:

1. ATS SHOWN IN NORMAL POSITION WITH NORMAL POWER PRESENT
2. FOR TBDC1 DESIGNATION SEE ADV5900 SHT. 2
2. NEUTRAL CONTACTS NTS & ETS %%UPRESENT%%U ON 4 POLE UNITS ONLY.
3. OPTIONAL NEUTRAL BUS

321470-

Schematic Diagram, M340 Logic, 150-400 Amp with Programmed Transition



LEGEND

AB3-3	LIMIT SWITCH, BYPASS EMERGENCY
AE-1	LIMIT SWITCH, ENGINE START TRANSFER
ATR	AUTO/TEST RELAY
CE	EMERGENCY TRANSFER OPERATOR (TRANSFER TO EMERGENCY)
CE1	COIL CONTROL RELAY (TRANSFER TO EMERGENCY)
CN	NORMAL TRANSFER OPERATOR (TRANSFER TO NORMAL)
CN1	COIL CONTROL RELAY (TRANSFER TO NORMAL)
DS	DISCONNECT SWITCH
ECPT	EMERGENCY CONTROL POWER TRANSFORMER
ER	EMERGENCY RELAY
ET	EMERGENCY TRANSFORMER
ETS	EMERGENCY POWER TRANSFER SWITCH CONTACTS
J	JUMPER
LED	LIGHT EMITTING DIODE
NCPT	NORMAL CONTROL POWER TRANSFORMER
NR	NORMAL RELAY
NT	NORMAL TRANSFORMER
NTS	NORMAL POWER TRANSFER SWITCH CONTACTS
RNH	NORMALLY HELD SWITCH
SE	LIMIT SWITCH – EMERGENCY
SN	LIMIT SWITCH, NORMAL
TDEN	TIME DELAY EMERGENCY TO NORMAL RELAY
TDES	TIME DELAY ENGINE START RELAY
TDNE	TIME DELAY NORMAL TO EMERGENCY RELAY
TP	TEST PLUG
###	COMPONENT CONNECTION TERMINAL
#	LEAD
P#–#	PLUG/SOCKET CONNECTOR
	CONNECTION NODE
A4–1	TERMINAL BLOCK ON TRANSFER SWITCH PANEL
4	TERMINAL BLOCK ON LOGIC BOARD

NOTES:

1. ATS SHOWN IN NORMAL POSITION WITH NORMAL POWER PRESENT

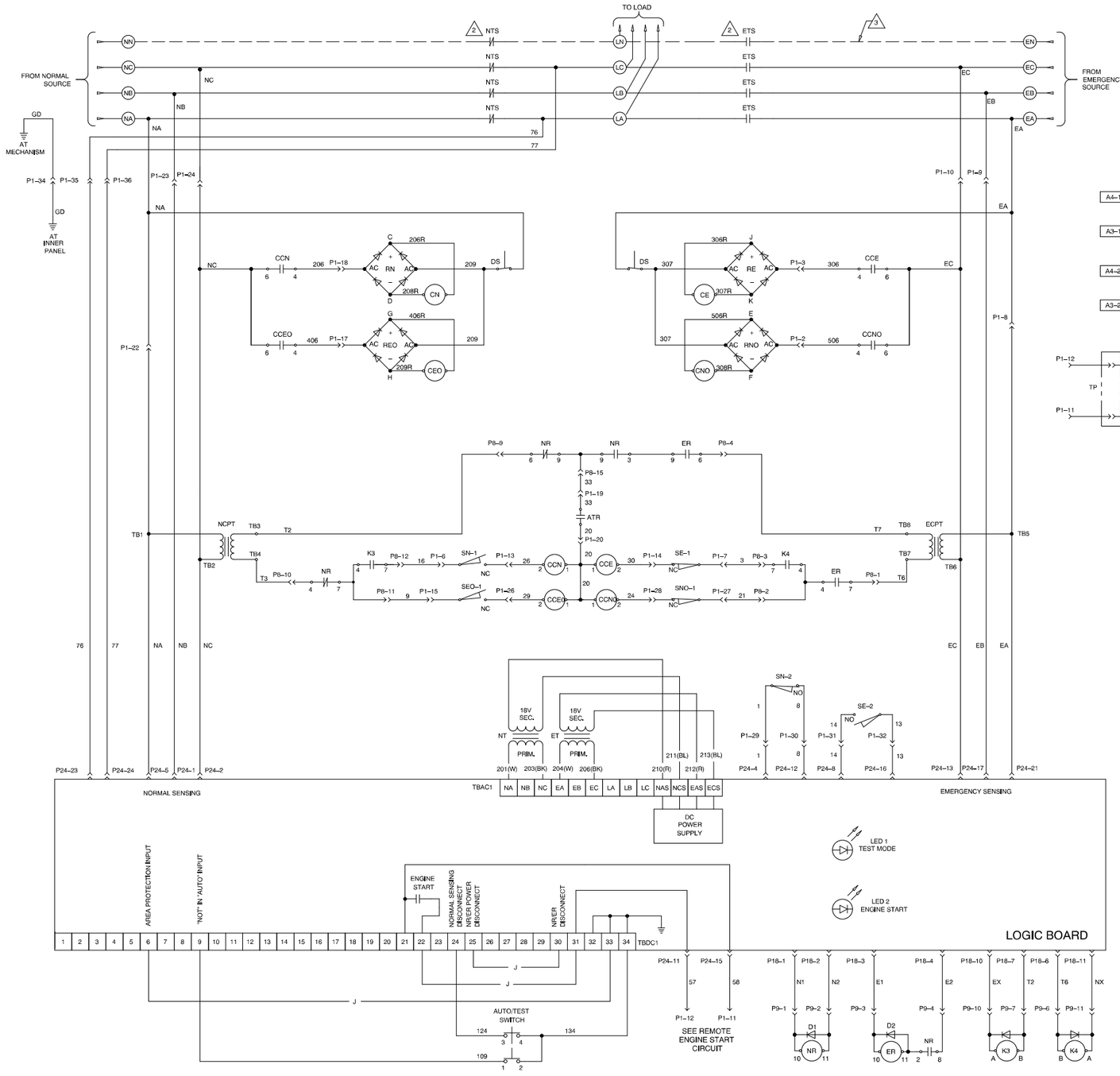
2. FOR TBDC1 DESIGNATION SEE ADV5900 SHT. 2

2 NEUTRAL CONTACTS NTS & ETS %%UPRESENT%%U ON 4 POLE UNITS ONLY.

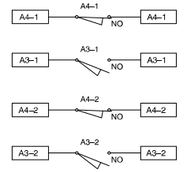
3 OPTIONAL NEUTRAL BUS

321471-

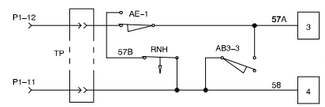
Schematic Diagram, M340 Logic , 600-1200 Amp



AUXILIARY CONTACTS
15A, 240VAC



		NORMAL	OFF	EMERG.
SN–1	C NO	X		
	NC		X	X
SN–2	C NO	X		
	NC		X	X
SE–1	C NO			X
	NC	X	X	
SE–2	C NO			X
	NC	X	X	
SEO–1	C NO	X	X	
	NC			X
SNO–1	C NO		X	X
	NC	X		



LEGEND

AB3–3	LIMIT SWITCH, BYPASS EMERGENCY
AE–1	LIMIT SWITCH, ENGINE START TRANSFER
ATR	AUTO/TEST RELAY
CCE	CLOSE EMERGENCY RELAY
CCEO	CEO COIL CONTROL RELAY
CCN	CLOSE NORMAL RELAY
CCNO	CNO COIL CONTROL RELAY
CE	EMERGENCY TRANSFER OPERATOR (TRANSFER TO EMERGENCY)
CEO	OPEN EMERGENCY RELAY
CN	NORMAL TRANSFER OPERATOR (TRANSFER TO NORMAL)
CNO	OPEN NORMAL RELAY
DS	DISCONNECT SWITCH
ECPT	EMERGENCY CONTROL POWER TRANSFORMER
ER	EMERGENCY RELAY
ET	EMERGENCY TRANSFORMER
ETS	EMERGENCY POWER TRANSFER SWITCH CONTACTS
J	JUMPER
K3	TIME DELAY TO NORMAL RELAY
K4	TIME DELAY TO EMERGENCY RELAY
LED	LIGHT EMITTING DIODE
NCPT	NORMAL CONTROL POWER TRANSFORMER
NR	NORMAL RELAY
NT	NORMAL TRANSFORMER
NTS	NORMAL POWER TRANSFER SWITCH CONTACTS
SE	LIMIT SWITCH – EMERGENCY
SN	LIMIT SWITCH, NORMAL
TDEN	TIME DELAY EMERGENCY TO NORMAL RELAY
TDES	TIME DELAY ENGINE START RELAY
TDNE	TIME DELAY NORMAL TO EMERGENCY RELAY
TP	TEST PLUG
RE	CE BRIDGE RECTIFIER
REO	CEO BRIDGE RECTIFIER
RN	CN BRIDGE RECTIFIER
RNO	CNO BRIDGE RECTIFIER
° ###	COMPONENT CONNECTION TERMINAL
#	LEAD
P#–#	PLUG/SOCKET CONNECTOR
	CONNECTION NODE
A4–1	TERMINAL BLOCK ON TRANSFER SWITCH PANEL
4	TERMINAL BLOCK ON LOGIC BOARD

NOTES:

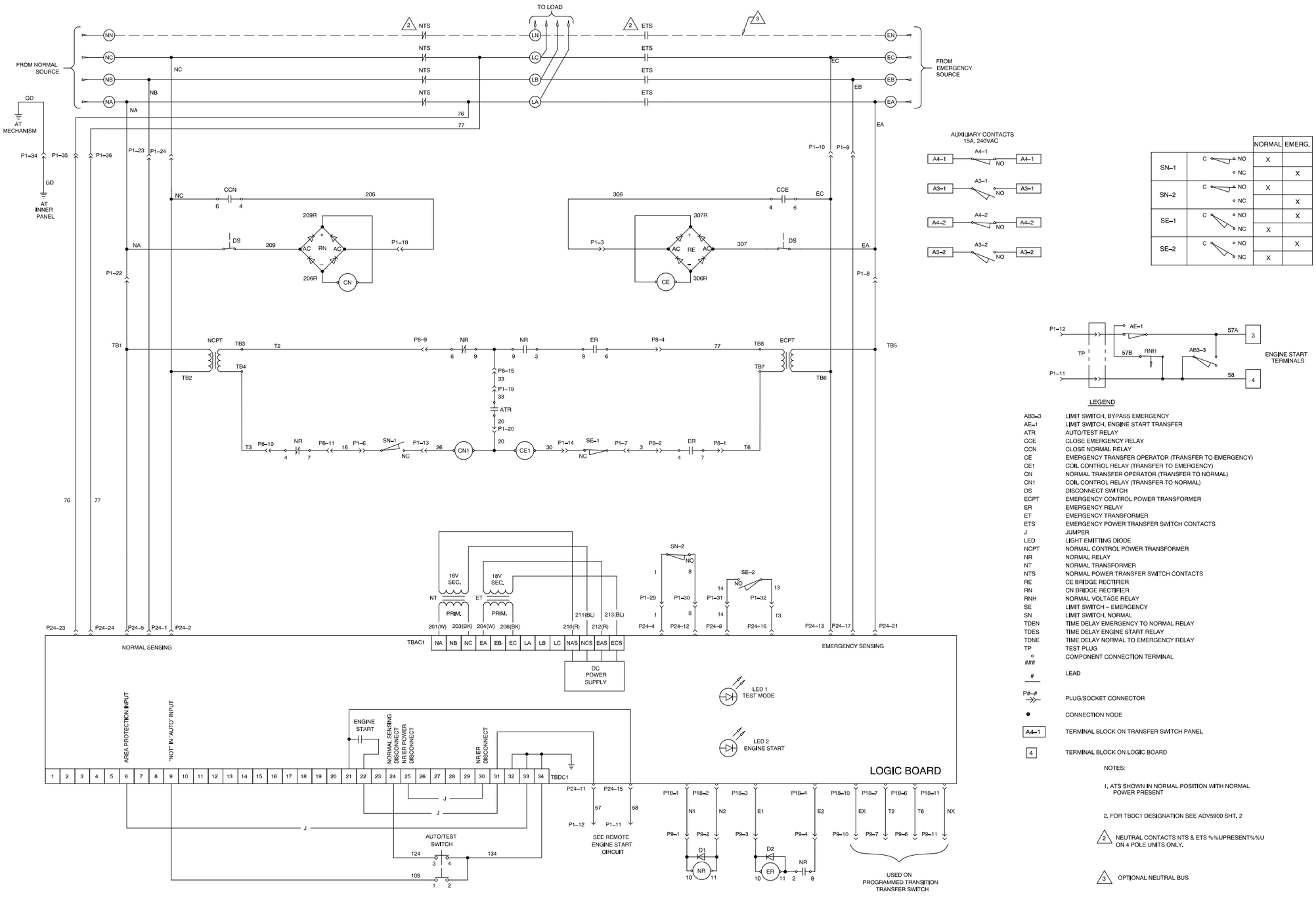
1. ATS SHOWN IN NORMAL POSITION WITH NORMAL POWER PRESENT
2. FOR TBDC1 DESIGNATION SEE ADV5900 SHT. 2

△2 NEUTRAL CONTACTS NTS & ETS %%UPRESENT%%U ON 4 POLE UNITS ONLY.

△3 OPTIONAL NEUTRAL BUS

321472-

Schematic Diagram, M340 Logic, 600-3000 Amp with Programmed Transition



AUXILIARY CONTACTS
15A, 240VAC

		NORMAL	EMERG.
SN–1	C NO	X	
	NC		X
SN–2	C NO	X	
	NC		X
SE–1	C NO		X
	NC	X	
SE–2	C NO		X
	NC	X	

LEGEND

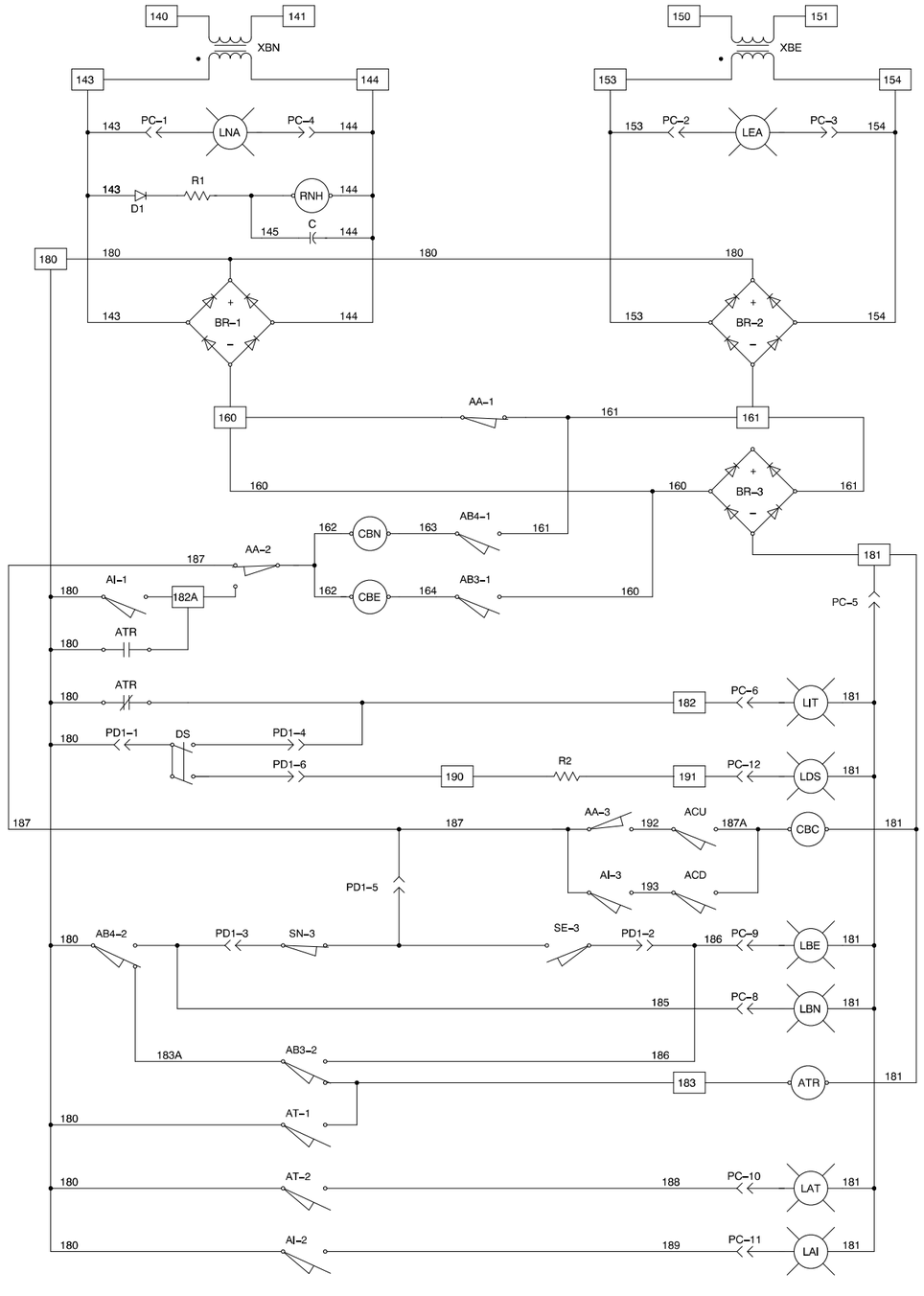
AB3–3	LIMIT SWITCH, BYPASS EMERGENCY
AE–1	LIMIT SWITCH, ENGINE START TRANSFER
ATR	AUTO/TEST RELAY
CCE	CLOSE EMERGENCY RELAY
CCN	CLOSE NORMAL RELAY
CE	EMERGENCY TRANSFER OPERATOR (TRANSFER TO EMERGENCY)
CE1	COIL CONTROL RELAY (TRANSFER TO EMERGENCY)
CN	NORMAL TRANSFER OPERATOR (TRANSFER TO NORMAL)
CN1	COIL CONTROL RELAY (TRANSFER TO NORMAL)
DS	DISCONNECT SWITCH
ECPT	EMERGENCY CONTROL POWER TRANSFORMER
ER	EMERGENCY RELAY
ET	EMERGENCY TRANSFORMER
ETS	EMERGENCY POWER TRANSFER SWITCH CONTACTS
J	JUMPER
LED	LIGHT EMITTING DIODE
NCPT	NORMAL CONTROL POWER TRANSFORMER
NR	NORMAL RELAY
NT	NORMAL TRANSFORMER
NTS	NORMAL POWER TRANSFER SWITCH CONTACTS
RE	CE BRIDGE RECTIFIER
RN	CN BRIDGE RECTIFIER
RNH	NORMAL VOLTAGE RELAY
SE	LIMIT SWITCH – EMERGENCY
SN	LIMIT SWITCH, NORMAL
TDEN	TIME DELAY EMERGENCY TO NORMAL RELAY
TDES	TIME DELAY ENGINE START RELAY
TDNE	TIME DELAY NORMAL TO EMERGENCY RELAY
TP	TEST PLUG
○ ###	COMPONENT CONNECTION TERMINAL
#	LEAD
P#–#	PLUG/SOCKET CONNECTOR
●	CONNECTION NODE
A4–1	TERMINAL BLOCK ON TRANSFER SWITCH PANEL
4	TERMINAL BLOCK ON LOGIC BOARD

NOTES:

1. ATS SHOWN IN NORMAL POSITION WITH NORMAL POWER PRESENT
2. FOR TBDC1 DESIGNATION SEE ADV5900 SHT. 2
2. NEUTRAL CONTACTS NTS & ETS %%UPRESENT%%U ON 4 POLE UNITS ONLY.
3. OPTIONAL NEUTRAL BUS

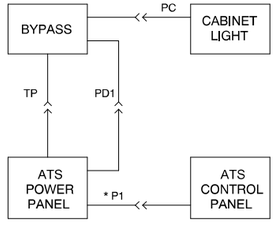
321473-

Schematic Diagram, M340+ Logic, 1600-3000 Amp



LIMIT SWITCH CHART

X = ACTUATED	ATS LOCATION				ATS MODE		BYPASS MODE	
	AUTO	TEST	ISO	REMOVE	NORM	EMERG.	NORM	EMERG.	OPEN
AA	X								
AT		X							
AI			X	X					
AE			X	X					
SN					X				
SE						X			
AB4							X		
AB3								X	



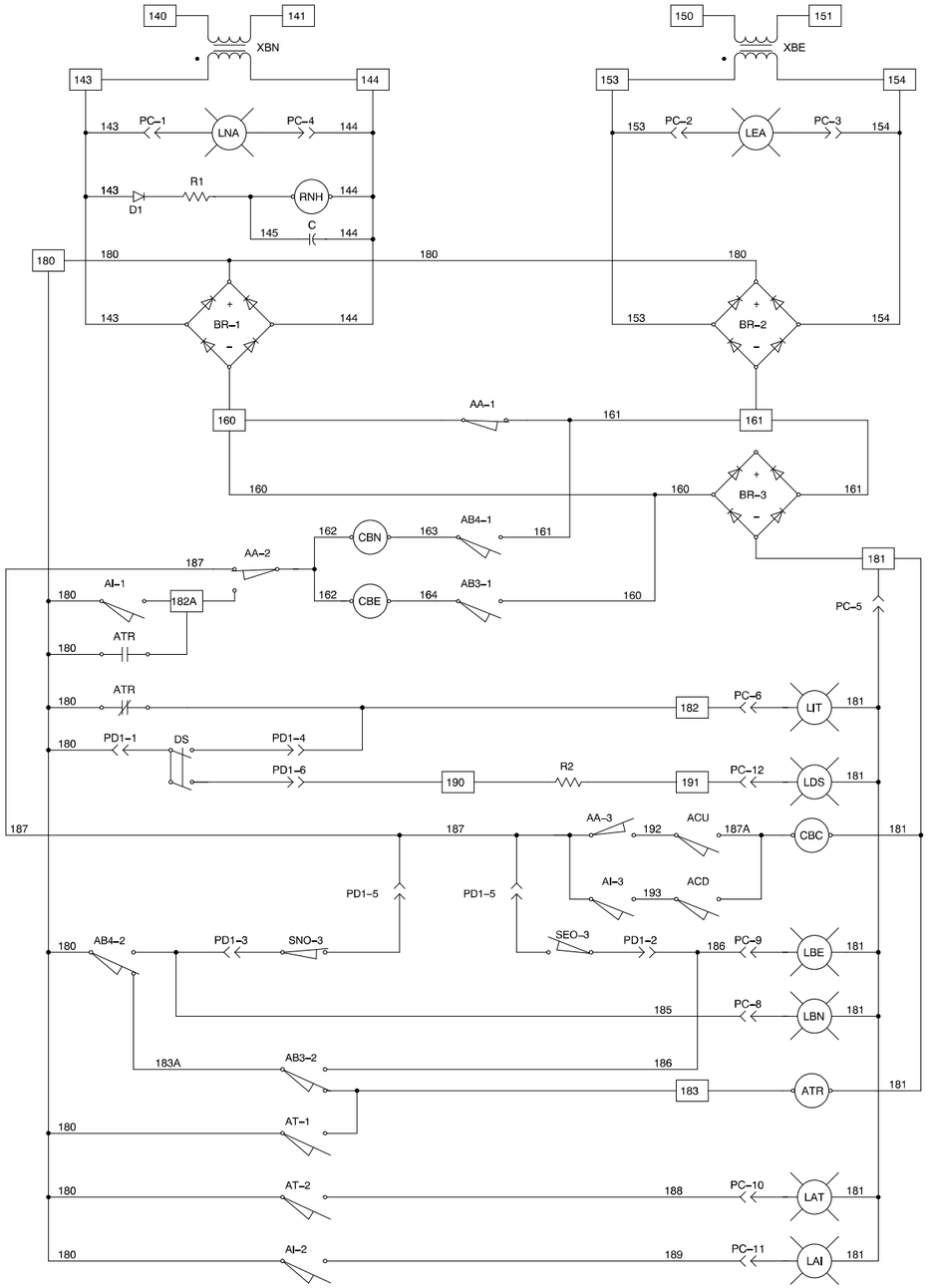
* SEE ATS POWER CIRCUIT SCHEMATIC, LIGHTS & PLUGS

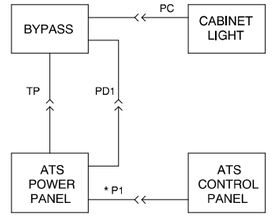
LEGEND

AA–1,2,3	LIMIT SWITCH, ATS AUTO LOCATION
AB3–1,2	LIMIT SWITCH, BYPASS EMERGENCY
AB4–1,2	LIMIT SWITCH, BYPASS NORMAL
AI–1,2,3	LIMIT SWITCH, ATS IN ISOLATE
AT–1,2	LIMIT SWITCH, ATS TEST LOCATION
ACD	LIMIT SWITCH, CRANK HANDLE ENGAGED
ACU	LIMIT SWITCH, CRANK HANDLE ENGAGED
ATR	AUTO/TEST RELAY
BR	BRIDGE RECTIFIER
CBC	CRANK SOLENOID
CBE	EMERGENCY TRANSFER OPERATOR
CBN	NORMAL TRANSFER OPERATOR
DS	ATS DISCONNECT SWITCH
LBE	BYPASS EMERGENCY
LBN	BYPASS NORMAL LIGHT
LAI	ATS ISOLATE LIGHT
LAT	ATS TEST LOCATION
LDS	DISCONNECT SWITCH
LEA	EMERGENCY AVAILABLE LIGHT
LIT	ATS INHIBIT LIGHT
LNA	NORMAL AVAILABLE LIGHT
RNH	NORMAL VOLTAGE RELAY
81	TERMINAL ON BYPASS SUBPANEL

321484-

Transfer Switch Lamps, 600-1200 Amp





* SEE ATS POWER CIRCUIT SCHEMATIC, LIGHTS & PLUGS

LIMIT SWITCH CHART

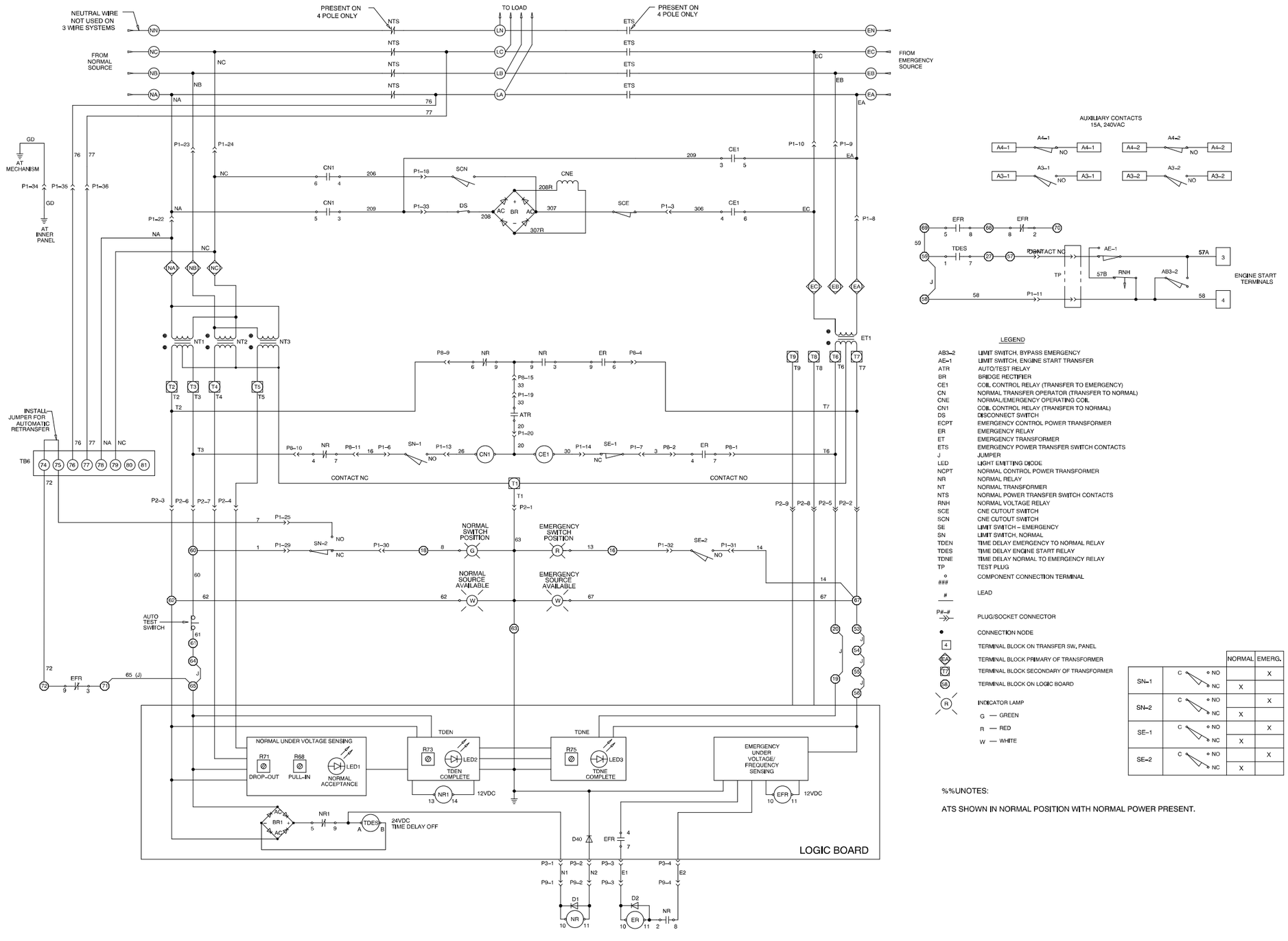
X = ACTUATED	ATS LOCATION				ATS MODE		BYPASS MODE	
	AUTO	TEST	ISO	REMOVE	NORM	EMERG.	NORM	EMERG.	OPEN
AA	X								
AT		X							
AI			X	X					
AE			X	X					
SN					X				
SE						X			
AB4							X		
AB3								X	

LEGEND

AA–1,2,3	LIMIT SWITCH, ATS AUTO LOCATION
AB3–1,2	LIMIT SWITCH, BYPASS EMERGENCY
AB4–1,2	LIMIT SWITCH, BYPASS NORMAL
AI–1,2,3	LIMIT SWITCH, ATS IN ISOLATE
AT–1,2	LIMIT SWITCH, ATS TEST LOCATION
ACD	LIMIT SWITCH, CRANK HANDLE ENGAGED
ACU	LIMIT SWITCH, CRANK HANDLE ENGAGED
ATR	AUTO/TEST RELAY
BR	BRIDGE RECTIFIER
CBC	CRANK SOLENOID
CBE	EMERGENCY TRANSFER OPERATOR
CBN	NORMAL TRANSFER OPERATOR
DS	ATS DISCONNECT SWITCH
LBE	BYPASS EMERGENCY
LBN	BYPASS NORMAL LIGHT
LAI	ATS ISOLATE LIGHT
LAT	ATS TEST LOCATION
LDS	DISCONNECT SWITCH
LEA	EMERGENCY AVAILABLE LIGHT
LIT	ATS INHIBIT LIGHT
LNA	NORMAL AVAILABLE LIGHT
RNH	NORMAL VOLTAGE RELAY
81	TERMINAL ON BYPASS SUBPANEL

321490-

Transfer Switch Lamps, 600-1200 Amp With Programmed Transition



LEGEND

AB3-2	LIMIT SWITCH, BYPASS EMERGENCY
AE-1	LIMIT SWITCH, ENGINE START TRANSFER
ATR	AUTO/TEST RELAY
BR	BRIDGE RECTIFIER
CE1	COIL CONTROL RELAY (TRANSFER TO EMERGENCY)
CN	NORMAL TRANSFER OPERATOR (TRANSFER TO NORMAL)
CNE	NORMAL/EMERGENCY OPERATING COIL
CN1	COIL CONTROL RELAY (TRANSFER TO NORMAL)
DS	DISCONNECT SWITCH
EQPT	EMERGENCY CONTROL POWER TRANSFORMER
ER	EMERGENCY RELAY
ET	EMERGENCY TRANSFORMER
ETS	EMERGENCY POWER TRANSFER SWITCH CONTACTS
J	JUMPER
LED	LIGHT EMITTING DIODE
NCPT	NORMAL CONTROL POWER TRANSFORMER
NR	NORMAL RELAY
NT	NORMAL TRANSFORMER
NTS	NORMAL POWER TRANSFER SWITCH CONTACTS
RNH	NORMAL VOLTAGE RELAY
SCE	CNE CUTOUT SWITCH
SCN	CNE CUTOUT SWITCH
SE	LIMIT SWITCH – EMERGENCY
SN	LIMIT SWITCH, NORMAL
TDEN	TIME DELAY EMERGENCY TO NORMAL RELAY
TDES	TIME DELAY ENGINE START RELAY
TDNE	TIME DELAY NORMAL TO EMERGENCY RELAY
TP	TEST PLUG
° ###	COMPONENT CONNECTION TERMINAL
#	LEAD
P#-#	PLUG/SOCKET CONNECTOR
	CONNECTION NODE
4	TERMINAL BLOCK ON TRANSFER SW. PANEL
EA	TERMINAL BLOCK PRIMARY OF TRANSFORMER
17	TERMINAL BLOCK SECONDARY OF TRANSFORMER
58	TERMINAL BLOCK ON LOGIC BOARD
R	INDICATOR LAMP
	G — GREEN
	R — RED
	W — WHITE

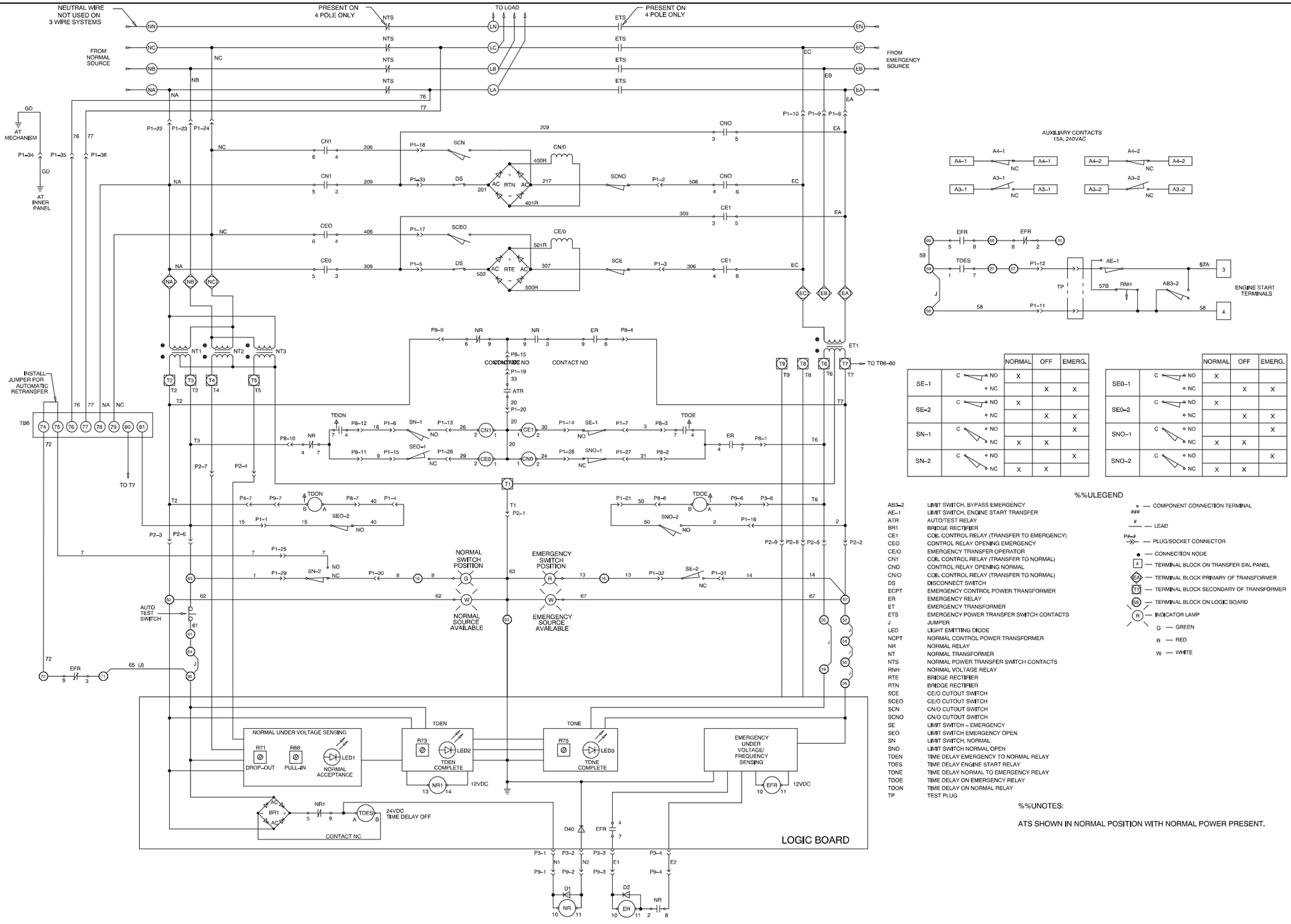
		NORMAL	EMERG.
SN-1	C NO		X
	NC	X	
SN-2	C NO		X
	NC	X	
SE-1	C NO		X
	NC	X	
SE-2	C NO		X
	NC	X	

%%UNOTES:

ATS SHOWN IN NORMAL POSITION WITH NORMAL POWER PRESENT.

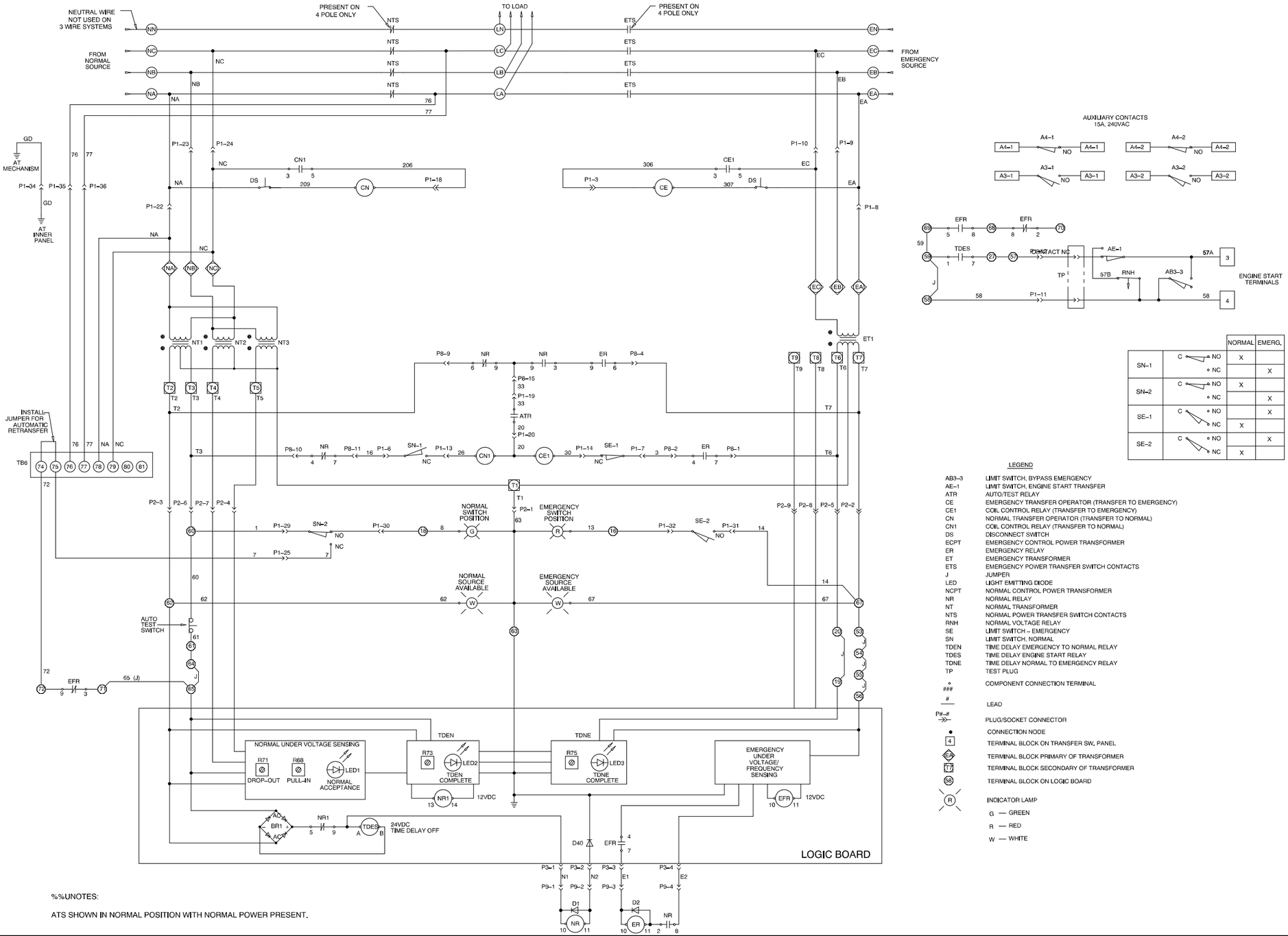
321491-

Schematic Diagram, S340+ Logic, 150-400 Amp



321492-

Schematic Diagram, S340+ Logic, 150-400 Amp with Programmed Transition



		NORMAL	EMERG.
SN-1	C NO	X	
	NC		X
SN-2	C NO	X	
	NC		X
SE-1	C NO		X
	NC	X	
SE-2	C NO		X
	NC	X	

LEGEND

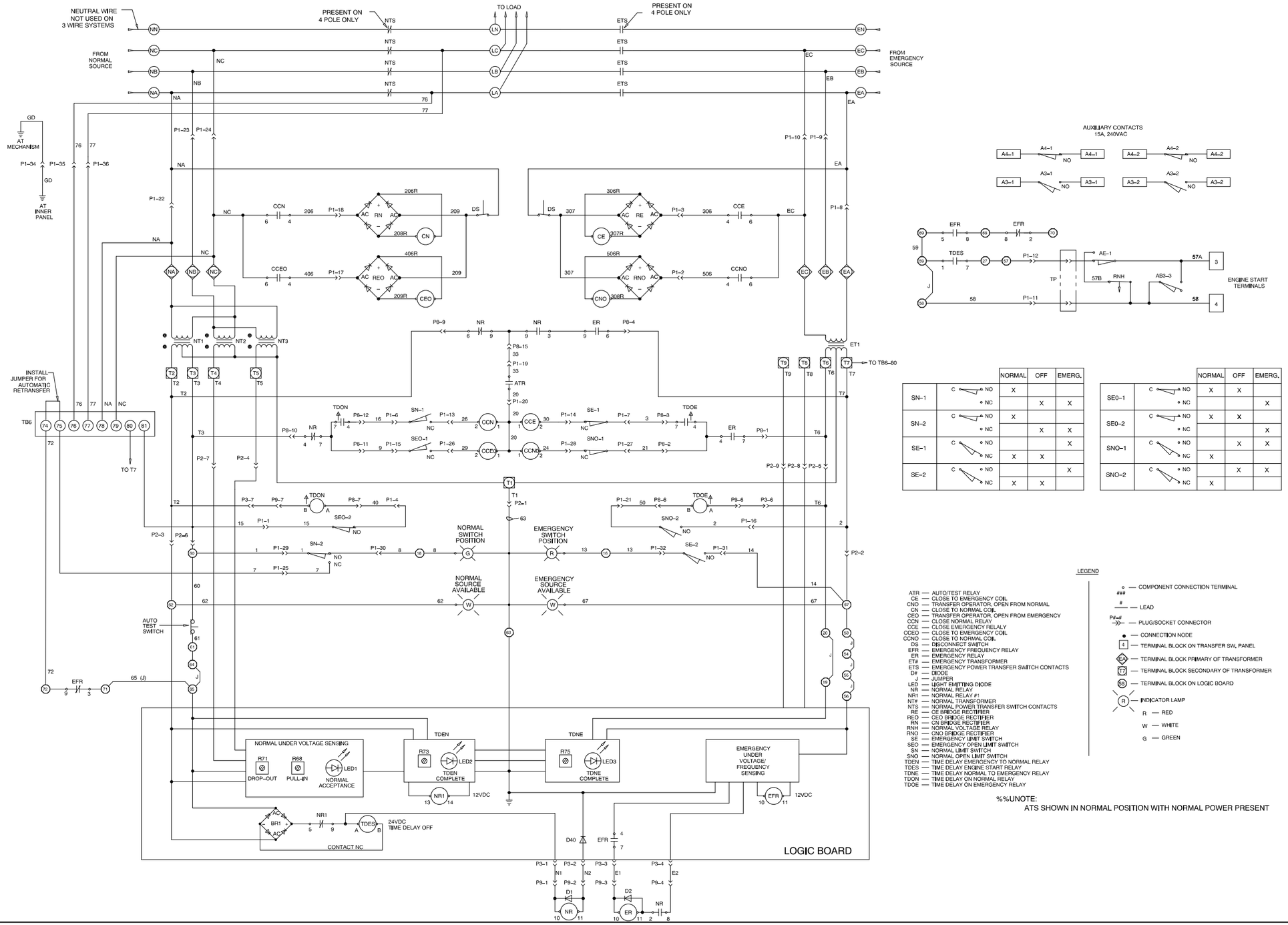
AB3-3	LIMIT SWITCH, BYPASS EMERGENCY
AE-1	LIMIT SWITCH, ENGINE START TRANSFER
ATR	AUTO/TEST RELAY
CE	EMERGENCY TRANSFER OPERATOR (TRANSFER TO EMERGENCY)
CE1	COIL CONTROL RELAY (TRANSFER TO EMERGENCY)
CN	NORMAL TRANSFER OPERATOR (TRANSFER TO NORMAL)
CN1	COIL CONTROL RELAY (TRANSFER TO NORMAL)
DS	DISCONNECT SWITCH
ECPT	EMERGENCY CONTROL POWER TRANSFORMER
ER	EMERGENCY RELAY
ET	EMERGENCY TRANSFORMER
ETS	EMERGENCY POWER TRANSFER SWITCH CONTACTS
J	JUMPER
LED	LIGHT EMITTING DIODE
NCPT	NORMAL CONTROL POWER TRANSFORMER
NR	NORMAL RELAY
NT	NORMAL TRANSFORMER
NTS	NORMAL POWER TRANSFER SWITCH CONTACTS
RNH	NORMAL VOLTAGE RELAY
SE	LIMIT SWITCH – EMERGENCY
SN	LIMIT SWITCH, NORMAL
TDEN	TIME DELAY EMERGENCY TO NORMAL RELAY
TDES	TIME DELAY ENGINE START RELAY
TDNE	TIME DELAY NORMAL TO EMERGENCY RELAY
TP	TEST PLUG
###	COMPONENT CONNECTION TERMINAL
#	LEAD
P#–#	PLUG/SOCKET CONNECTOR
	CONNECTION NODE
4	TERMINAL BLOCK ON TRANSFER SW. PANEL
EA	TERMINAL BLOCK PRIMARY OF TRANSFORMER
17	TERMINAL BLOCK SECONDARY OF TRANSFORMER
58	TERMINAL BLOCK ON LOGIC BOARD
R	INDICATOR LAMP
G	— GREEN
R	— RED
W	— WHITE

%%UNOTES:

ATS SHOWN IN NORMAL POSITION WITH NORMAL POWER PRESENT.

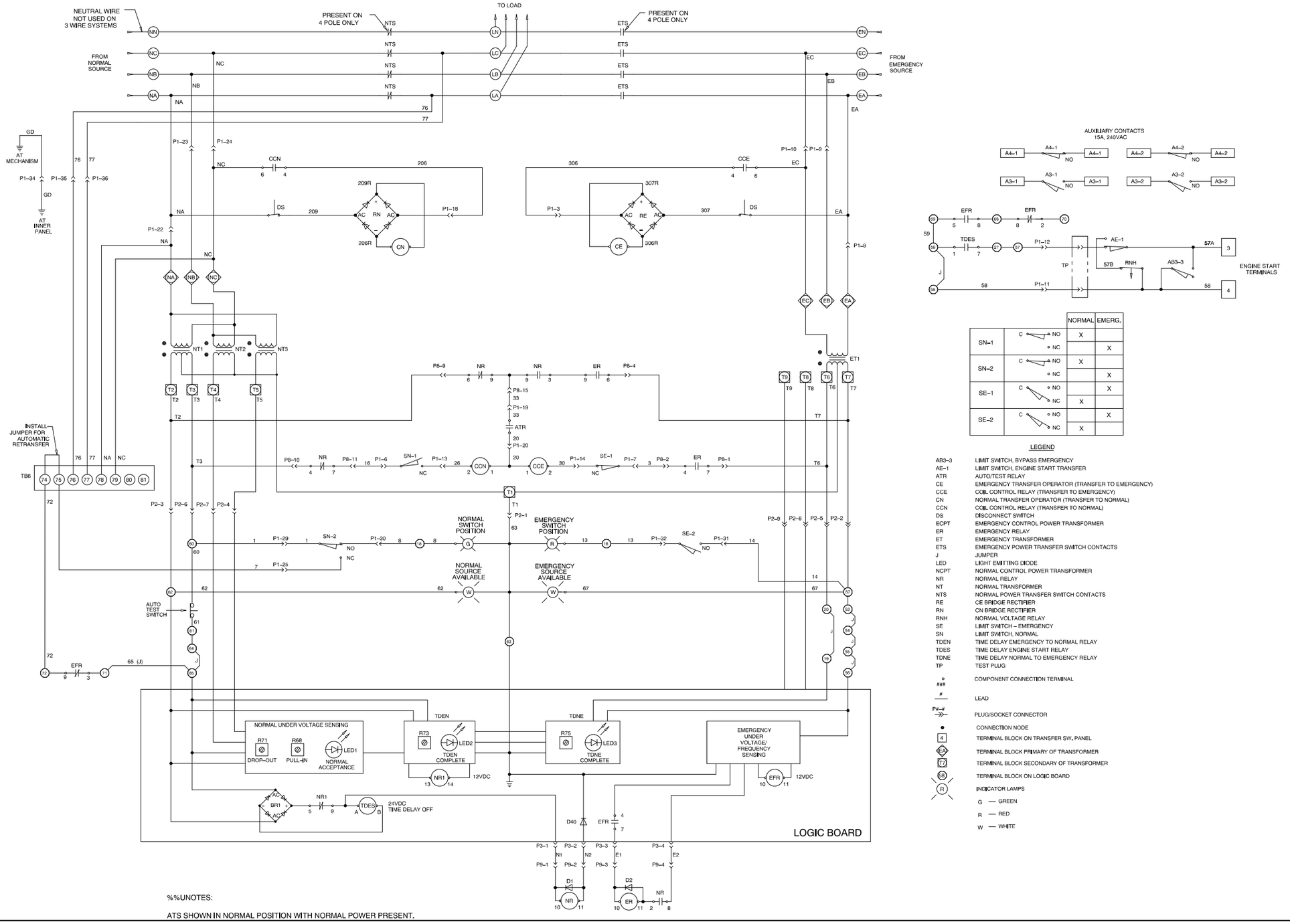
321493-

Schematic Diagram, S340+ Logic, 600-1200 Amp



321494-

Schematic Diagram, S340+ Logic, 600-3000 Amp with Programmed Transition



		NORMAL	EMERG.
SN-1	C NO	X	
	C NC		X
SN-2	C NO	X	
	C NC		X
SE-1	C NO		X
	C NC	X	
SE-2	C NO		X
	C NC	X	

LEGEND

AB3-3	LIMIT SWITCH, BYPASS EMERGENCY
AE-1	LIMIT SWITCH, ENGINE START TRANSFER
ATR	AUTO/TEST RELAY
CE	EMERGENCY TRANSFER OPERATOR (TRANSFER TO EMERGENCY)
CCE	COIL CONTROL RELAY (TRANSFER TO EMERGENCY)
CN	NORMAL TRANSFER OPERATOR (TRANSFER TO NORMAL)
CCN	COIL CONTROL RELAY (TRANSFER TO NORMAL)
DS	DISCONNECT SWITCH
ECPT	EMERGENCY CONTROL POWER TRANSFORMER
ER	EMERGENCY RELAY
ET	EMERGENCY TRANSFORMER
ETS	EMERGENCY POWER TRANSFER SWITCH CONTACTS
J	JUMPER
LED	LIGHT EMITTING DIODE
NCPT	NORMAL CONTROL POWER TRANSFORMER
NR	NORMAL RELAY
NT	NORMAL TRANSFORMER
NTS	NORMAL POWER TRANSFER SWITCH CONTACTS
RE	CE BRIDGE RECTIFIER
RN	CN BRIDGE RECTIFIER
RNH	NORMAL VOLTAGE RELAY
SE	LIMIT SWITCH – EMERGENCY
SN	LIMIT SWITCH, NORMAL
TDEN	TIME DELAY EMERGENCY TO NORMAL RELAY
TDES	TIME DELAY ENGINE START RELAY
TDNE	TIME DELAY NORMAL TO EMERGENCY RELAY
TP	TEST PLUG
###	COMPONENT CONNECTION TERMINAL
#	LEAD
P#-#	PLUG/SOCKET CONNECTOR
	CONNECTION NODE
4	TERMINAL BLOCK ON TRANSFER SW. PANEL
T2A	TERMINAL BLOCK PRIMARY OF TRANSFORMER
T7	TERMINAL BLOCK SECONDARY OF TRANSFORMER
58	TERMINAL BLOCK ON LOGIC BOARD
R	INDICATOR LAMPS
	G — GREEN
	R — RED
	W — WHITE

321495-

Schematic Diagram, S340+ Logic, 1600-3000 Amp

Section 6. Installation

Kohler automatic transfer switches are shipped factory wired and tested, ready for installation. The actual installation process consists of mechanically mounting and electrically wiring the unit to the normal and emergency power sources, to the load circuits, and to the generator set.

Upon Receipt of Unit

Unpacking

Allow the equipment to warm up to room temperature for 24 hours (minimum) prior to unpacking to prevent condensation on the electrical apparatus from surrounding moist air if it is uncrated after cold weather storage.

Unpack the transfer switch as soon as possible after receipt since failure to do so may cause difficulty in making claims for damage not evident upon receipt. Carefully unpack to avoid damaging any of the transfer switch components. Remove all packing material and dirt that may have accumulated in the transfer switch or any of its components.

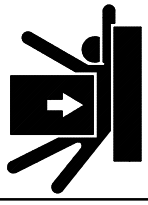
Inspection

Carefully unpack or uncrate the automatic transfer switch and check for shipping damage. If damage is discovered, immediately file damage claims with the shipping company and notify the distributor/dealer.

Lifting

The approximate weight of each automatic transfer switch covered by this manual is given in Figure 6-1. For lifting, use a spreader bar. Attach the bar only to the enclosure's mounting holes or lifting brackets; do not lift the unit at any other points. Ensure the front door is in place and latched closed when moving or mounting the unit.

⚠ WARNING



Unbalanced weight.
Improper lift can cause severe injury, death, or equipment damage.

Use adequate lifting capacity.
Never leave automatic transfer switch standing upright unless it is securely bolted in place.

Storage

Protect the automatic transfer switch at all times from excessive moisture, construction grit, and metal chips. Avoid storage in low temperature, high humidity areas where moisture could condense on the unit.

Mechanical Installation

To plan the installation, use the dimensions given on the enclosure dimension drawings in Section 5. Select the mounting site to match local electrical code restrictions for the enclosure type. Mount the automatic transfer switch as near the load and power sources as possible. Also be sure to allow adequate space for switch servicing and full opening of the enclosure door.

Mounting

The 150- and 225-amp transfer switches covered by this manual must be mounted vertically to a rigid supporting structure such as a wall. Keyhole slots for mounting purposes are provided in the mounting brackets on the top and bottom of each unit. When mounting these units, plumb the enclosure to ensure that the door hinges are vertical to avoid any distortion of the enclosure or door. Place washers behind the mounting bracket keyholes to shim the enclosure to a plumb condition.

The 260 through 1200 amp transfer switches covered by this manual can be floor mounted or attached to a rigid supporting structure such as a wall. For floor mounting, bolt the mounting feet to the floor, shimming the mounting feet as needed to plumb the enclosure so that the door hinges are vertical to avoid any distortion of the enclosure or door. Keyhole slots for wall mounting are provided in the rear panel of the enclosure. When mounting these units, plumb the enclosure to ensure that that the door hinges are vertical to avoid any distortion of the enclosure or door. Place washers behind the mounting bracket keyholes to shim the enclosure to a plumb condition.

The 1600 through 3000 ampere transfer switches covered by this manual are intended to be bolted directly to floor mounting pads. When mounting one of these units, it is important to accurately level the mounting pads so that the door hinges are plumb when the unit is installed in order to avoid any distortion of the enclosure or door.

Number of Poles	Amperes	Weight lbs. (kg)	Dimensions H x W x D in. (mm)
2	150, 225, 260, 400	755 (340)	83 x 30 x 25 (2110 x 760 x 640)
	600	1220 (549)	90 x 36 x 28 (2290 x 910 x 720)
	800	1355 (610)	90 x 40 x 28 (2290 x 1020 x 720)
3	150, 225, 260, 400	755 (340)	83 x 30 x 25 (2110 x 760 x 640)
	600	1220 (549)	90 x 36 x 28 (2290 x 910 x 720)
	800, 1000, 1200	1355 (610)	90 x 40 x 28 (2290 x 1020 x 720)
	1600, 2000	3100 (1345)	90 x 40 x 61 (2290 x 1020 x 1506)
	2500, 3000	3900 (1755)	90 x 40 x 73 (2290 x 1020 x 1860)
4	150, 225, 260, 400	895 (408)	83 x 36 x 25 (2110 x 910 x 640)
	600	1365 (614)	90 x 40 x 28 (2290 x 1020 x 720)
	800, 1000, 1200	1570 (707)	90 x 46 x 28 (2290 x 1170 x 720)
	1600, 2000	4000 (1800)	90 x 50 x 61 (2290 x 1270 x 1560)
	2500, 3000	5000 (2200)	90 x 50 x 73 (2290 x 1270 x 1860)

Figure 6-1. Transfer Switch Weight

Electrical Wiring

All internal electrical connections are prewired. The only wiring necessary when installing the transfer switch is the connections from the transfer switch to the external devices.

⚠ DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect power sources before servicing. Barrier must be installed after adjustments, maintenance, or servicing.

NOTE

For easy access during installation wiring, the front door of the enclosure can be removed. Simply disconnect the cable plug that connects the front door components to the internal components and then lift the door off its hinge pins.

Power Connections

Schematic diagrams are furnished in Section 5 of this manual.

All conductors should enter the enclosure at recommended locations as noted on the drawings. When drilling entry holes for any conductors, cover the transfer switch components for protection from metal chips and construction grit. Remove any debris from the enclosure with a vacuum cleaner– *using compressed air for this purpose can lodge contaminants in components and cause damage.*

Connection points for the normal power, emergency power, and load are clearly marked on contactor assembly and are also shown on the drawings in **Section 5. Be sure to note the phase markings (A, B, C, and N).**

⚠ WARNING

Connect source and load phases as indicated by the markings and drawings.

Improper connections may cause short circuits. Improper connections can also cause phase-sensitive load devices to run backwards or prevent load devices from starting.

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. Tighten all cable lug connections to the torque values shown in Figure 6-2.

In cases where the Normal, Emergency, and Load connections are made to a rear connected bus bar, a compression washer, flat washer, and a grade 5 bolt (minimum) must be used and torqued to the values in Figure 6-3.

Socket Size Across Flat	Torque		
	Lb.-In.	Lb.-Ft.	Nm
1/8	45	4	5.1
5/32	100	8	11.3
3/16	120	10	13.6
7/32	150	12	17.0
1/4	200	17	22.6
5/16	275	23	31.1
3/8	375	31	42.3
1/2	500	42	56.5
9/16	600	50	67.8

Figure 6-2. Tightening Torque for Lugs

Bolt Size	Torque Bolt (Grade 5)		
	in. lbs.	ft. lbs.	Nm
1/4-20	72	6	8.1
5/16-18	132	11	14.9
3/8-16	300	25	33.9
1/2-13	720	60	81.4

Figure 6-3. Tightening Torque for Bus Bars

Start Generator Connection

The generator start signal connections are located on a terminal block on the transfer switch contactor. The location of terminal block is marked by a red decal within the enclosure. Connect the generator conductors for the start signal to terminals 3 and 4 as shown in the enclosure dimension drawings provided in Section 5 of this manual.

Other Accessory Connections

Any external connections necessary for accessories are described in the applicable Logic Controller Operation and Installation Manual. See **List of Related Manuals** in the Introduction.

Appendix A. Glossary of Abbreviations

Abbreviations are used throughout this manual. Normally they will appear in the text in complete form with the abbreviation following in parentheses the first time they are used. After that they will appear in the abbreviated form. The commonly used abbreviations are shown below. Some items may not apply to this application.

Abbreviation	Description
ABDC	after bottom dead center
AC	alternating current
AISI	American Iron and Steel Institute
AHWT	anticipatory high water temp.
ALOP	anticipatory low oil pressure
AM	amplitude modulation
amp	ampere
amps	amperes
ANSI	American National Standard Institute
API	American Petroleum Institute
approx.	approximate, approximately
A/R	as required, as requested
A/S	as supplied, as stated, as suggested
ASA	American Standards Association (former name of ANSI)
ASME	American Society of Mechanical Engineers
assy.	assembly
ASTM	American Society for Testing Materials
ATDC	after dead top center
aux.	auxiliary
A/V	audio–visual
AWG	American Wire Gage
AWM	appliance wiring material
BBDC	before bottom dead center
BDC	before dead center
BHP	brake horsepower
bmep	brake mean effective power
BTDC	before top dead center
Btu	British thermal unit
_C	Celsius degree
cc	cubic centimeter
CCA	cold cranking amps
CEC	Canadian Electrical Code
cfh	cubic feet per hour
cfm	cubic feet per minute
CID	cubic inch displacement
cm	centimeter, centimeters
cmm	cubic meters per minute
co.	company
cont'd.	continued
CPVC	chloropoly vinyl chloride
CRT	cathode ray tube
CSA	Canadian Standards Association
CT	current transformer
cu. in.	cubic inch (es)
CWC	city-water cooled
cyl.	cylinder
dB	decibel
dBA	decibels (A weighted)
DC	direct current
DCR	direct current resistance
deg.	degree
dept.	department
dia.	diameter
DIN	Deutsches Institut fur Normung e. V. (also Deutsche Industrie Normenausschuss)
e.g.	example given
EIA	Electronic Industries Association
EMI	electromagnetic interference
EPA	Environmental Protection Agency
etc.	etcetera, (and so forth)
ext.	external
_F	Fahrenheit degree
fl. oz.	fluid ounce(s)
FM	frequency modulation
ft.	foot, feet
ft. lbs.	foot pound(s)
fs	full scale
ga.	gauge (meters wire size)
gal./gals.	gallon, gallons
gph	gallons per hour
gpm	gallons per minute
gr.	grade
grd.	ground
HCHT	high cylinder head temperature
HET	high exhaust temperature
Hg.	mercury (element)
H_2O	water
HP	horsepower
hr, hrs	hour, hours
HWT	high water temperature
Hz	hertz (cycles per second)
ID	inside diameter
IEEE	Institute of Electrical and Electronic Engineers
in.	inch, inches
inc.	incorporated
in. lbs.	inch pounds
int.	internal
int.-ext.	internal–external

Abbreviation	Description
ISO	International Standards Organization
J	joule, joules
JIS	Japanese Industry Standard
kg	kilogram, kilograms
kg/cm^2	kilograms per square centimeter
kgm	kilogram meter(s)
kJ	kilojoules (btu cal)
km	kilometer, kilometers
kPa	kiloPascal, kiloPascals
kph	kilometers per hour
kV	kilovolt
kVA	kilovolt amperes
kW	kilowatt, kilowatts
kWH	kilowatt hour
L	liter, liters
LxWxH	length x width x height
LED(s)	light emitting diode(s)
lb., lbs.	pound, pounds
L/hr.	liter per hour, liters per hour
L/min.	liter(s) per minute
LOP	low oil pressure
LP	liquified petroleum
LWT	low water temperature
m	meter, meters
m^3	cubic meter, cubic meters
max.	maximum
MCM	one thousand circular mils.
meggar	megohmmeter
MHz	megahertz
mi.	mile, miles
mil	one one−thousandth of an inch
min.	minimum
misc.	miscellaneous
mJ	milli joule(s)
MJ	mega joule(s)
mm	millimeter
m^3/min	cubic meters per minute
MPa	megaPascal
mpg	miles per gallon
mph	miles per hour
MS	military standard
mW	milliwatt(s)
MW	megawatt(s)
N/A	not available
NBS	National Bureau of Standards
N.C.	normally closed
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
Nm	Newton meter(s)
N.O.	normally open
no., nos.	number, numbers
NPT	National Standard taper pipe thread per general use
N/R	not required
OC	overcrank
OD	outside diameter
OEM	original equipment manufacturer
OS	overspeed
O/S	oversize
OSHA	Occupational Safety and Health Act
OV	overvoltage
oz.	ounce, ounces
PF	power factor
PMG	permanent magnet generator
pot	potentiometer
ppm	parts per million
psi	pounds per square inch
pt., pts.	pint, pints
PVC	polyvinyl chloride
qt., qts.	quart, quarts
qty.	quantity
ref.	reference
RFI	radio frequency interference
r.h.m.	round−head machine (screw)
rms	root means square
RPM	revolutions per minute
RTV	room temperature vulcanization
RV	recreational vehicle
SAE	Society of Automotive Engineers
SCR	silicon controlled rectifier
sec.	second, seconds
spec, specs	specification
sq.	square
sq. cm.	square centimeters
sq. in.	square inch(es)
tach	tachometer
TDC	top dead center
tech. pub.	technical publications
temp.	temperature
TIF	telephone influence factor
TP, TPs	technical publications
turbo	turbocharger
UHF	ultrahigh frequency
UNC	Unified coarse thread (was NC)
UNF	Unified fine thread (was NF)
UL	Underwriter ъ Laboratories, Inc.
U/S	undersize
U.S.A.	United States of America
V	volt, volts
vac	volts alternating current
vdc	volts direct current
VHF	very high frequency
W	watt, watts

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