O & M Manual for 40-1200A (480/600 Vac)
ATC-900 3-Position, Open/Closed
Transition Contactor Based Transfer Switch
Instruction Booklet

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Section 1: Introduction

1.1 Preliminary Comments and Safety Precautions

This technical document is intended to cover most aspects associated with the installation, application, operation, and maintenance of the Automatic Transfer Controller (ATC-900) controlled contactor based ATS with ratings from 40 through 1200 amperes (A). It is provided as a guide for authorized and qualified personnel only. Please refer to the specific WARNING and CAUTION in Section 1.1.2 before proceeding. If further information is required by the purchaser regarding a particular installation, application, or maintenance activity, please contact an authorized Eaton sales representative or the installing contractor.

1.1.1 Warranty and Liability Information

No warranties, expressed or implied, including warranties of fitness for a particular purpose or merchantability, or warranties arising from course of dealing or usage of trade, are made regarding the information, recommendations and descriptions contained herein. In no event will Eaton be responsible to the purchaser or user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss whatsoever, including but not limited to damage or loss of use of equipment, plant or power system, cost of capital, loss of power, additional expenses in the use of existing power facilities, or claims against the purchaser or user by its customers resulting from the use of the information and descriptions contained herein.

1.1.2 Safety Precautions

All safety codes, safety standards, and/or regulations must be strictly observed in the installation, operation, and maintenance of this device.

WARNING

THE WARNINGS AND CAUTIONS INCLUDED AS PART OF THE PROCEDURAL STEPS IN THIS DOCUMENT ARE FOR PERSONAL SAFETY AND PROTECTION OF EQUIPMENT FROM DAMAGE. AN EXAMPLE OF A TYPICAL WARNING LABEL HEADING IS SHOWN ABOVE TO FAMILIARIZE PERSONNEL WITH THE STYLE OF PRESENTATION. THIS WILL HELP TO INSURE THAT PERSONNEL ARE ALERT TO WARNINGS, WHICH APPEAR THROUGHOUT THE DOCUMENT. IN ADDITION, WARNINGS AND CAUTIONS ARE ALL UPPER CASE AND BOLDFACE.

CAUTION

COMPLETELY READ AND UNDERSTAND THE MATERIAL PRESENTED IN THIS DOCUMENT BEFORE ATTEMPTING INSTALLATION, OPERATION, OR APPLICATION OF THE EQUIPMENT. IN ADDITION, ONLY QUALIFIED PERSONS SHOULD BE PERMITTED TO PERFORM ANY WORK ASSOCIATED WITH THIS EQUIPMENT. ANY WIRING INSTRUCTIONS PRESENTED IN THIS DOCUMENT MUST BE FOLLOWED PRECISELY. FAILURE TO DO SO COULD CAUSE PERMANENT EQUIPMENT DAMAGE.
1.2 General Information

Transfer switches are used to protect critical electrical loads against loss of power. The load’s Source 1 power source is backed up by a Source 2 power source. A transfer switch is connected to both the Source 1 and Source 2 power sources and supplies the load with power from one of the two sources. In the event that power is lost from Source 1, the transfer switch transfers the load to the Source 2 power source. This transfer is automatic. Once Source 1 power is restored, the load is automatically transferred back to the Source 1 power source (Figure 2).

![Source 1, Source 2, Load](image)

Figure 2. Typical Load Transfer Switch Schematic (Contactor Type).

In ATS equipment, the switch’s intelligence system initiates the transfer when the Source 1 power fails, falls below, or rises above a preset voltage. If the Source 2 power source is a standby generator, the ATS initiates generator startup and transfers to the Source 2 power source when sufficient generator voltage is available. When Source 1 power is restored, the ATS automatically transfers back and initiates generator shutdown.

In the event the Source 1 power source fails and the Source 2 power source does not appear, the ATS remains connected to the Source 1 power source until the Source 2 power source does appear. Conversely, if connected to the Source 2 power source and the Source 2 power source fails while the Source 1 power source is still unavailable, the ATS remains connected to the Source 2 power source.

ATSs automatically perform the transfer function and include three basic elements:

1. A power contactor to connect and disconnect the load to and from either power source.
2. Solenoids to make the transfer of the main contacts from source to source.
3. Intelligence/supervisory circuits to constantly monitor the condition of the power sources and thus provide the intelligence necessary for the switch and related circuit operation.

1.2.1 Design Configuration

The Eaton contactor based ATS is a compact design that uses a power contactor to transfer essential loads from one power source to another (Figure 3 [1200A]).

![1200A Open Transition ATS](image)

Figure 3. Typical 1200A Open Transition ATS.

The Eaton contactor based ATS is designed with easy installation and simplified maintenance in mind. Three main panels comprise the contactor based ATS design:

1. Power panel;
2. Voltage selection and transformer panel; and
3. Microprocessor-based logic panel.
Each panel is independently mounted with interconnecting wiring terminated at the connector receptacles on the ATC-900 Controller.

For open transition contactor based transfer switch, enclosure mounting is simplified by utilizing mounting flanges with elongated (teardrop) mounting holes on top and floor mount (wall supported) flanges with two standard mounting holes on the bottom.

For close transition contactor based transfer switch, enclosure is free standing and is seismic approved. Refer to Section 4 for specific mounting and modification details.

Table 1. Withstand Ratings.

<table>
<thead>
<tr>
<th>UL 1008 WITHSTAND AND CLOSE-ON RATINGS (kA)</th>
<th>480 Vac</th>
<th>600 Vac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch Rating (Amps)</td>
<td>Any Breaker (Amps)</td>
<td>Specific Breaker (Amps)</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>100A</td>
<td>50,000</td>
<td>65,000</td>
</tr>
<tr>
<td>200A</td>
<td>50,000</td>
<td>65,000</td>
</tr>
<tr>
<td>250A</td>
<td>50,000</td>
<td>65,000</td>
</tr>
<tr>
<td>320A</td>
<td>50,000</td>
<td>65,000</td>
</tr>
<tr>
<td>400A</td>
<td>50,000</td>
<td>65,000</td>
</tr>
<tr>
<td>600A</td>
<td>50,000</td>
<td>65,000</td>
</tr>
<tr>
<td>800A</td>
<td>50,000</td>
<td>65,000</td>
</tr>
<tr>
<td>1000A</td>
<td>50,000</td>
<td>65,000</td>
</tr>
<tr>
<td>1200A</td>
<td>50,000</td>
<td>65,000</td>
</tr>
</tbody>
</table>

The catalog number ATC9C3X31200XRU describes an ATS with a 3 pole, 3 position Power Contactor mounted on a baseplate within the enclosure. The intelligence represented by the logic panel is ATC-900 controller. The continuous current rating of this equipment is 1200A and applicable at 480 Vac, 60 Hz. The transfer switch equipment is enclosed in a NEMA 3R enclosure and is listed for UL applications.
### 1.4 Environmental Conditions

#### 1.4.1 Operational Conditions

Normally, an ATS is applied indoors in an electrical equipment room. In the appropriate enclosure, it can be used for outdoor applications where the equipment is subject to falling rain, freezing temperatures, and no greater than 90% humidity (non-condensing). The ambient temperature range for operation is between -20°C and 70°C (-4 to 158°F).

### 1.5 Glossary

With respect to their use within this document and as they relate to transfer switch and controller operation, the following terminology is defined.

- **Available**: A source is defined as “available” when it is within its undervoltage/overvoltage/underfrequency/overfrequency (if applicable) setpoint ranges for the nominal voltage and frequency setting.

- **Connected**: Connected is defined as when the input is shorted by an external contact or connection.

- **Failed or Fails**: A source is defined as “failed” when it is outside of the applicable voltage and frequency setpoint ranges for the nominal voltage and frequency setting.

- **Failsafe**: Failsafe is a feature that prevents disconnection from the only available power source and also forces a transfer or re-transfer operation to the only available power source.

- **Source 1**: Source 1 is the primary source (normal source, normal power source, or normal).

- **Source 2**: Source 2 is the secondary source (emergency source, emergency power source, emergency, standby, or backup source).

- **Source 1: Failed or Fails**: Source 1 is defined as “failed” when it is outside of its undervoltage/overvoltage/underfrequency/overfrequency (if applicable) setpoint ranges for the nominal voltage and frequency setting.

- **Source 2: Failed or Fails**: Source 2 is defined as “failed” when it is outside of its undervoltage/overvoltage/underfrequency/overfrequency (if applicable) setpoint ranges for the nominal voltage and frequency setting for a time exceeding 0.5 seconds after the Time Delay Emergency Fail (TDEF) time delay expires.

### Table 2. Transfer Switch Catalog Number Explanation

<table>
<thead>
<tr>
<th>Positions 1 to 2</th>
<th>Position 3</th>
<th>Position 4</th>
<th>Positions 5 to 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Device</strong></td>
<td><strong>SWITCHING DEVICE</strong></td>
<td><strong>Control Panel</strong></td>
<td><strong>SWITCHING DEVICE</strong></td>
</tr>
<tr>
<td>Automatic Transfer Switch (Open Transition)</td>
<td><strong>AT</strong></td>
<td><strong>Contactor C</strong></td>
<td><strong>ATC-900 Controller</strong></td>
</tr>
<tr>
<td>Automatic Transfer Switch (Closed Transition)</td>
<td><strong>CT</strong></td>
<td></td>
<td><strong>3 Position Power Contactor C5</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>3 Position w In-Phase to TDN C5</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Position 7</th>
<th>Position 8</th>
<th>Positions 9 to 12</th>
<th>Position 13</th>
<th>Position 14</th>
<th>Position 15</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SWITCHING DEVICE ARRANGEMENT</strong></td>
<td><strong>NUMBER OF POLES</strong></td>
<td><strong>AMPERE RATING</strong></td>
<td><strong>VOLTAGE/FREQUENCY</strong></td>
<td><strong>ENCLOSURE</strong></td>
<td><strong>LISTING</strong></td>
</tr>
<tr>
<td><strong>Fixed Mount X</strong></td>
<td>Two (2)</td>
<td>40A – 0040</td>
<td>120 Vac/60 Hz A</td>
<td>Type 1 S</td>
<td>UL/CSA Listing U</td>
</tr>
<tr>
<td></td>
<td>Three (3)</td>
<td>80A – 0080</td>
<td>208 Vac/60 Hz B</td>
<td>Type 12 J</td>
<td>No Listing X</td>
</tr>
<tr>
<td></td>
<td>Four (4)</td>
<td>100A – 0100</td>
<td>220 Vac/50 Hz G</td>
<td>Type 3R R</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>150A – 0150</td>
<td>240 Vac/60 Hz W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>200A – 0200</td>
<td>380 Vac/50 Hz H</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>225A – 0225</td>
<td>415 Vac/50 Hz D</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>260A – 0260</td>
<td>480 Vac/60 Hz X</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td>400A – 0400</td>
<td>600 Vac/60 Hz E</td>
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<td>600A – 0600</td>
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<td>800A – 0800</td>
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<td></td>
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<td>1000A – 1000</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1200A – 1200</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

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**Features**

The ATC-900 has many features that are available to the user. These features are standard and are available depending on the type of transfer switch used (i.e., Contactor, Power Case Switch/Breaker, or Molded Case Switch/Breaker, 2 or 3 position).

Appendix A of the ATC-900 manual has a list of all of the features including any acronyms used along with a brief description. There are many new features in the ATC-900 that are shown in the ATC-900 manual.

The ATC-900 connections are shown in Figure 16. Some connections, like engine start are wire to a separate terminal block.
Section 2: Receiving, Handling, and Storage

2.1 Receiving

Every effort is made to ensure that the ATS equipment arrives at its destination undamaged and ready for installation. Packing is designed to protect internal components as well as the enclosure. Care should be exercised, however, to protect the equipment from impact at all times. Do not remove the protective packaging until the equipment is ready for installation.

When the ATS equipment reaches its destination, the customer should inspect the shipping container for any obvious signs of rough handling and/or external damage that occurred during transportation. Record any external and internal damage for reporting to the transportation carrier and Eaton, once a thorough inspection is complete. All claims should be as specific as possible and include the catalog and General Order numbers.

A shipping label affixed to the shipping container includes a variety of equipment and customer information, such as General Order Number and catalog numbers. Make certain that this information matches other shipping paper information.

Each transfer switch is packaged securely with appropriate shipping materials to prevent damage during shipment. Do not remove or discard the packing material until the equipment is ready for installation.

Once the top packaging is removed from the shipment, the enclosure door can be opened. A plastic bag of documents will be found in the enclosure, usually attached to the inside of the enclosure. Important documents, such as test reports, wiring diagrams, and appropriate instruction leaflets, are enclosed within the bag and should be filed in a safe place.

2.2 Handling

As previously mentioned, ATS equipment is packaged for forklift movement. Protect the equipment from impact at all times and DO NOT double stack.

Once the equipment is at the installation location and ready to be installed, packaging material can be removed and discarded. Once the enclosure is unbolted from the wooden pallet, it can be hand moved to its installation position. Be careful not to damage the top or bottom enclosure mounting flanges. Refer to Section 4 of this manual for specific installation instructions.

2.3 Storage

Although well packaged, this equipment is not suitable for outdoor storage. The equipment warranty will not be applicable if there is evidence of outdoor storage. If the equipment is to be stored indoors for any period of time, it should be stored with its protective packaging material in place. Protect the equipment at all times from excessive moisture, construction dirt, corrosive conditions, and other contaminants.

It is strongly suggested that the package-protected equipment be stored in a climate-controlled environment with temperatures from -30 to 85°C (-22 to 185°F) and with a relative humidity of 80% or less. DO NOT, under any circumstance, stack other equipment on top of a transfer switch equipment enclosure, whether packaged or not.
Section 3: Equipment Description

3.1 General

The ATS consists of three basic panels:

1. The power panel;
2. The voltage selection and transformer panel; and
3. The microprocessor-based logic panel.

These panels are interconnected via connector plugs and mounted in an enclosure (Figure 5A & 5B).

3.2 Power Panel

The power panel is used for making load, power, and neutral connections. The power contactor is mounted on a steel baseplate (Figure 6).

3.2.1 Main Contacts

This ATS incorporates a power contactor. The main contacts connect and disconnect the load to and from the different power sources. The power contactor is mechanically and electrically interlocked to prevent the two sets of main contacts from being closed simultaneously (applicable for open transition ATS only).
3.3 Voltage Selection

3.3.1 North American Voltage Selection (120, 208, 240, 480, 600, 60 Hz)

The North American market voltage selection panel consists of multi-tap transformers, contained in a steel case mounted in the transfer switch enclosure (Figure 7). The cover has two connectors on it, with the one on the right being selectable depending on the voltage applied to S1 and S2. The transformer unit is easily removed by removing the two front screws and disconnecting the two plugs. The rear of the transformer enclosure has two flanges that are inserted into two slots. The voltage is selected by simply removing the plug from the default selected voltage on the cover plate and installing the plug to the desired available voltage. Plugs are provided for 120 to 600 Vac to satisfy any required North American market application voltage. The factory default position is 480 Vac or 600 Vac. There is a similar selection panel for international voltages.
WHEN CHANGING THE VOLTAGE SELECTION, THE POWER MUST BE REMOVED FROM THE TRANSFER SWITCH. ALWAYS VERIFY THAT NO VOLTAGE IS PRESENT ON EQUIPMENT PRIOR TO SERVICING. FAILURE TO FOLLOW THIS WARNING COULD LEAD TO DEATH OR SEVERE INJURY. WHILE ENERGIZED, AN ARC FLASH AND SHOCK HAZARD EXISTS. CONSULT NFPA 70E AND OSHA GUIDELINES FOR OPERATOR SAFETY PRIOR TO SERVICING, INSPECTING OR OPERATING EQUIPMENT.

3.4 ATC-900 Logic Panel

The ATC-900 is a microprocessor-based transfer switch logic control package. The hardware and software of the controller contain the intelligence/supervisory circuits that constantly monitor the condition of the power sources. It provides the intelligence necessary for the operation of the ATS (Figure 8). It has user-friendly menus and a color TFT display for easy verification and feature user settings.

The ATC-900 controller has an operating temperature of -20 to 70°C (-4 to 158°F).

The controller circuit board is protected by an insulating conformal coating.

The specifications, under normal operating conditions, are as follows:
- Tolerance for voltage sensing function: ± 1% of full scale.
- Tolerance for frequency sensing function: ± 0.3 Hz of setting.

Please see the ATC-900 controller’s Instruction Booklet for new features and instructions.

3.5 Features and Glossary of Terms

A variety of standard and optional features are available for Eaton ATSs. All features or combinations of features may not be available on specific ATSs. All features and/or accessories are Underwriters Laboratories (UL) listed unless noted.

3.5.1 Operational Simplicity

From installation, to programming, to usage, the ATC-900 was designed with operational simplicity in mind. Only one style needs to be considered, regardless of input/output requirements or system voltages and frequencies. ATC-900 provides the functionality of numerous other devices combined in one package that mounts in less than 7 by 11 inches of panel space.

The user-friendly front panel interface simplifies routine operation, programming, data presentation and setting adjustments. A large color display provides flexibility and ease of use. The operation of front panel membrane pushbuttons moves the ATC-900 display from function to function or step to step within menus. A
single LED at the top of the faceplate provides an immediate indication as to the device’s operational mode. An integrated Help Mode provides immediate user assistance in the form of English language messages displayed through the use of a front panel Help pushbutton.

The ATC-900 is communications ready, including Modbus 485, Ethernet (External), and USB for thumb drives (memory sticks).

3.5.2 Features and Glossary of Terms
A variety of programmable features are available to meet a wide array of application requirements. Individual features or feature combinations provide the information required to tailor switches to individual needs. Unlike earlier controllers, the ATC-900 comes with standard features that are ready to use, with the exception of Closed Transition, In-Phase, Current metering, and Ethernet. Another advancement is that there are four (4) standard inputs and four (4) standard outputs that the operator can easily program by choosing from a wide array of predefined functions. Additional inputs and outputs can be added in groups of four (4) up to sixteen (16) for a maximum of twenty (20) total. The inputs are DC wetted (50 Volts at 10 ma) connections for various functional inputs.

NOTICE
WITH RESPECT TO THEIR USE IN THIS DOCUMENT AND AS THEY RELATE TO AUTOMATIC TRANSFER SWITCH OPERATION, THE FOLLOWING WORDS OR PHRASES ARE DEFINED:

Options
The only item that is optional for the transfer switch is the closed transition optional feature. The switch type also dictates what can be programmed. For example, a two position contactor switch cannot have feature TDN (Time Delay Neutral), as it has no neutral position available. A motor MCS/MCCB type transfer switch with motor operator cannot have closed transition as the switching mechanism is not fast enough and will not meet the time line.

Standard Feature: In-Phase Type Operation
As shown in the feature list of Appendix A for In-Phase, there are three scenarios for In-Phase:

- **32C** = In-Phase default to Load Voltage Decay
- **32D** = In-Phase default to Time Delay Neutral
- **32F** = In-Phase

There is a setpoint that allows changes to the In-Phase operation:

- In-Phase = 0 Disables In-Phase (open transition)
- In-Phase = 1 Enables In-Phase Defaults to Alarm (no Transfer)
- In-Phase = 2 Enables In-Phase Defaults to Open (Time Delay Neutral for 3 position switches)

With the setpoint at “2”, a two position contactor, the switch will transfer, if no synchronisation occurs, to the other source. The three position will allow the use of TDN.

Closed Transition Types Operation
Optional Feature 47C: Closed/In-phase Transition/Load Voltage Decay
Closed Transition is a feature that will temporarily parallel two live sources in a make-before-break scheme when performing a transfer. This achieves a transfer between sources with no power interruption. Both sources must be synchronized in frequency, phase, and voltage before the transfer is initiated.

In-phase transition is a feature that will allow a transfer between two live sources only when the phase difference between the two sources is near zero. This is an open transition transfer that prevents in-rush currents from exceeding normal starting currents in the case where motor loads are being transferred.

Time Delay Load Voltage Decay utilizes the load voltage measurements to sense back EMF that is generated when the transfer switch is in the neutral position. It provides a delay in transfer in either direction if an unacceptable level is sensed as established by a customer programmed level. The transfer will not take place until the back EMF decays below the acceptable programmed level. This feature has a separate setting of enabling or disabling the operation. If disabled, the transfer switch will not delay in the neutral position and will transfer between the sources as fast as possible.

Optional Feature 47D: Closed Transition Only
Closed Transition is a feature that will temporarily parallel two live sources in a make-before-break scheme when performing a transfer.

This achieves a transfer between sources with no power interruption. Both sources must be synchronized in frequency, phase, and voltage before the transfer is initiated.

If the logic is forced into a fail safe mode (i.e. loss of connected source), the logic will perform a load voltage decay open transfer.

Optional Feature 47E: Closed/In-Phase Transition/Time Delay Neutral
Closed Transition is a feature that will temporarily parallel two live sources in a make-before-break scheme when performing a transfer. This achieves a transfer between sources with no power interruption. Both sources must be synchronized in frequency phase, and voltage before the transfer is initiated.

In-phase transition is a feature that will allow a transfer between two live sources only when the phase difference between the two sources is near zero. This is an open transition transfer that prevents in-rush currents from exceeding normal starting currents in the case where motor loads are being transferred.

Time delay neutral provides a time delay in the transfer switch neutral position when both breakers are open. This delay takes place when the load is transferred in either direction to prevent excessive in-rush currents due to out of phase switching of large motor loads.

Optional Feature 47F: Closed/Load Voltage Decay
Closed Transition is a feature that will temporarily parallel two live sources in a make-before-break scheme when performing a transfer. This achieves a transfer between sources with no power interruption. Both sources must be synchronized in frequency, phase, and voltage before the transfer is initiated.

Time Delay Load Voltage Decay utilizes the load voltage measurements to sense back EMF that is generated when the transfer switch is in the neutral position. It provides a delay in transfer in either direction if an unacceptable level is sensed as estab-
lished by a customer programmed level. The transfer will not take place until the back EMF decays below the acceptable programmed level. This feature has a separate setting of enabling or disabling the operation. If disabled, the transfer switch will not delay in the neutral position and will transfer between the sources as fast as possible.

Optional Feature 47G: Closed/Time Delay Neutral
Closed Transition is a feature that will temporarily parallel two live sources in a make-before-break scheme when performing a transfer. This achieves a transfer between sources with no power interruption. Both sources must be synchronized in frequency, phase, and voltage before the transfer is initiated.

Time delay neutral provides a time delay in the transfer switch neutral position when both breakers are open. This delay takes place when the load is transferred in either direction to prevent excessive in-rush currents due to out of phase switching of large motor loads.

Two Options for Closed Transition
If closed transition is available on the switch, the user will either receive 47 D or all of the other options 47 C, E, F, G which can be changed by the setpoints to disable or enable the function. Screen 3 of 3 in the System Setup menu (See section 3.4.1) is where the user will set the transition types of the switch. If the switch can perform closed transition the user will set up the setpoints depending on the scenario required as shown below.

- Closed Transition only (47D) or
- Closed Transition > In-Phase > TDN
- Closed Transition > In-Phase > LVD
- Closed Transition > TDN
- Closed Transition > LVD

The user can disable closed transition and just use the following:

- In-Phase > TDN
- In-Phase > LVD

Also with Closed Transition and In-Phase disabled:

- TDN or LVD

Standard Feature 3: Time Delay Emergency to Normal (TDEN)
TDEN delays the transfer to the Normal Source to permit stabilization of the Normal power source before the transfer is made. This timer will begin the countdown from its setting value when the Normal Source becomes available. During the countdown of this timer, if the Normal Source should become unavailable, the timer will be aborted. If the Preferred Source is available and the Emergency Source fails while the TDEN timer is counting down, the TDEN timer will be bypassed.

Standard Feature 4: Time Delay for Engine Cool-Off (TDEC)
TDEC permits the generator to run under a no-load condition after a transfer from the generator source has been made. Countdown timing begins when the transfer is completed. In applications where two generators are selected, the same cool-off timer setting value is used for both.

Display
There are two displays used on the ATC-900. There is the familiar MIMIC display using LEDs (see below) and the color display using the push buttons for menu operation.

Source 1 Connected - Status LED
This LED is lit green if Source 1 is connected. This is accomplished by sensing the Source 1 breaker via the S1 closed auxiliary contact.

Source 2 Connected - Status LED
This LED is lit red if Source 2 is connected. This is accomplished by sensing the Source 2 breaker via the S2 closed auxiliary contact.

Source 1 Available - Status LED
This LED is lit amber if Source 1 meets the criteria for programmed Source 1 setpoints.

Source 2 Available - Status LED
This LED is lit amber if Source 2 meets the criteria for programmed Source 2 setpoints.

Source 1 Preferred - Status LED
This LED is lit red if Source 1 is the preferred source choice.

Source 2 Preferred - Status LED
This LED is lit red if Source 2 is the preferred source choice.

Load Energized - Status LED
This LED is lit red if the load is connected to a source that is available.

CAUTION
LOAD ENERGIZE LED IS NOT A POSITIVE INDICATION THAT VOLTAGE IS NOT PRESENT ON THE LOAD TERMINALS.

CAUTION
CHANGING THE SYSTEM NOMINAL VOLTAGE OR FREQUENCY SETPOINTS WILL CAUSE PICKUP AND DROPOUT SETPOINTS TO CHANGE AUTOMATICALLY TO NEW DEFAULT VALUES.

Optional Feature 9B: Maintenance Selector Switch (MSS)
Marked “OFF”, “ON”. This feature provides selector switch disconnection of control to transfer thus allowing testing of the transfer switch control logic circuitry without initiating load transfer. Positioning the MSS in the “OFF” position isolates the control circuit, permitting manual operation of the transfer switch or testing of logic circuitry without load transfer.

Optional Feature 29G: Auto/Manual Operation
(Available for 3-Position ATS only)
This feature provides 2-position auto/manual selector switch marked “Auto/Manual” which permits the selection of automatic or manual operation. Once the selector switch is transferred to manual mode, manual transfer between Normal (S1), Neutral and Emergency (S2) can be achieved by operating 3-position selector switch marked “Normal-Off-Emergency”.

Optional Feature 29G: Auto/Manual Operation
(Available for 2-Position ATS only)
This feature provides 2-position auto/manual selector switch marked “Auto/Manual” which permits the selection of automatic or manual operation. Once the selector switch is transferred to manual mode, manual transfer between Normal (S1) and Emergency (S2) can be achieved by operating another 2-position selector switch marked “Normal-Emergency”.

For more information visit: www.eaton.com
Optional Feature 38B: Stainless Steel Cover for Controller
Provides an added level of security by providing a pad lockable stainless steel cover for use with standard transfer switch logic controllers and/or associated device panels. These covers function with Eaton’s ATC series logic controllers and device panels. The covers are designed for NEMA 1, 3R, 4X, and 12 applications.

Optional Feature 41: Space Heater With Thermostat
This feature provides a space heater and non-adjustable thermostat. External control power is not required.

Optional Feature 41a: Space Heater With Thermostat-100 Watt
This feature provides a 100 watt (W) space heater with a non-adjustable thermostat.

Optional Feature 48D: PXG200 Gateway
This feature provides communication by using Modbus 485 on the back of ATC-900 controller. The PXG200 Gateway serves as a communication protocol translator —taking in MODBUS RTU— and present data via Ethernet TCP/IP or Modbus TCP/IP. The data can then be accessed via the built-in web server, Power Xpert software or 3rd party building management systems. PXG200 Gateway has a limit of 32 INCOM devices. 24VDC is provided to PXG200 Gateway via ELC-PS02 power supply.

Optional Feature 48RAC: Remote Annunciator Control
This feature displays status information of a remotely located ATC-900 controller. The HMI type Remote Annunciator will serially communicate with the ATC-900 over the Modbus 485 or Ethernet using a twisted shielded pair cable. The remote annunciator is a user friendly color display that is also a touch screen. One can interface with up to eight transfer switches with one annunciator. External 120VAC power supply is required for operating ATC Remote Annunciator.

Optional Feature 49B: Sensing Isolation Transformer (Up to 600 VAC only)
This feature provides 3-phase, 4-wire for Source-1 and Source-2 sensing input on ATC controller for a high resistance grounded delta system.

Optional Feature 51D1: 50kA CVX Surge Device
This feature gives protection for surge current capacity rating 50kA, upto 480VAC by providing a low impedance surge path to ground while supporting rated voltage. It provides LED indication.

Optional Feature: 51F1:100kA CVX Surge Device
This feature gives protection for surge current capacity rating 100kA, upto 480VAC by providing a low impedance surge path to ground while supporting rated voltage. It provides LED indication.

3.6 Enclosure
The rugged steel ATS enclosure is supplied with three door hinges, regardless of enclosure size. They ensure proper support of the door and door mounted devices (Figure 9A and 9B). The hinges have removable hinge pins to facilitate door removal. Certain procedures, such as switch mounting, are simplified with the door removed. The doors are supplied as standard with pad-lockable latches/ handles.

Figure 9A. Typical Type 1 Open Transition ATS Enclosure (Door Closed).
The rear of the enclosure is supplied with teardrop shaped holes in the top and two standard holes on the bottom mounting flanges to facilitate mounting. Cable entry holes are the responsibility of the customer.

ATS enclosures and all internal steel mounting plates, such as the power panel mounting plate, go through a pretreatment cleaning system prior to painting to ensure a durable finish.

The standard ATS enclosure is NEMA 1 Type for general use. However, a variety of enclosures are available to address almost any environmental circumstance (see Table 3).

**Table 3. Transfer Switch Equipment Enclosures**

<table>
<thead>
<tr>
<th>NEMA TYPE</th>
<th>DESIGN</th>
<th>PROTECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>Indoor</td>
<td>Enclosed Equipment</td>
</tr>
<tr>
<td>1</td>
<td>Indoor</td>
<td>Rain, Ice Formation</td>
</tr>
<tr>
<td>3R</td>
<td>Outdoor</td>
<td>Dust, Dirt, and Non-Corrosive Liquids</td>
</tr>
</tbody>
</table>

**3.7 Standards**

Eaton ATS equipment, enclosed in any of the enclosures listed in Table 3, is listed for application by UL and ULC. In addition, Eaton ATSs are listed in File E38116 by Underwriters Laboratories, Inc. under Standard UL 1008. This standard covers requirements for automatic transfer switches intended for use in ordinary locations to provide lighting and power as follows:

a. In emergency systems, in accordance with articles 517 and 700 in the National Electrical Code, ANSI/ NFPA 70, and the National Fire Protection Association No. 76A; and/or

b. In standby systems, in accordance with article 702 of the National Electrical Code; and/or

c. In legally required standby systems in accordance with article 701 of the National Electrical Code.

Eaton ATs are available to meet NFPA 110 for emergency and standby power systems, and NFPA 99 for health care facilities when ordered with the appropriate options.

Standard UL 1008 for ATSs lists devices under the reexamination program which only require a continual physical reexamination of the components used in the product to ensure consistency with the originally submitted device. Follow-up testing is not required by UL 1008.
Section 4: Installation and Wiring

4.1 General

Eaton ATSs are factory wired and tested. Installation requires solidly mounting the enclosed unit and connecting power cables and auxiliary pilot circuits. Physical mounting procedures and power cable connections are covered in this section. All other required wiring or electrical connection references are covered in a separate Customer Wiring Booklet packaged with the ATS.

Locate the wiring schematic, review it, and keep it readily available for reference purposes during installation and testing. Once an ATS is properly installed and wired, it should be mechanically and electrically checked for proper installation and operation. The procedures for these initial mechanical and electrical checks are outlined in Section 6 of this instruction manual.

**WARNING**

BE CERTAIN THAT THE SOLID STEEL DOOR IS PROPERLY INSTALLED BEFORE THE TRANSFER SWITCH EQUIPMENT IS PUT INTO SERVICE. THE DOOR PROVIDES PROTECTION FROM DANGEROUS VOLTAGES AT THE LINE AND LOAD TERMINALS WHEN THE EQUIPMENT IS IN OPERATION. FAILURE TO DO SO COULD RESULT IN PERSONAL INJURY OR DEATH.

**CAUTION**

SINCE THE ENCLOSED ATS MUST BE LIFTED INTO PLACE FOR MOUNTING, BE CERTAIN THAT ADEQUATE RESOURCES ARE AVAILABLE FOR LIFTING TO AVOID PERSONNEL INJURIES OR EQUIPMENT DAMAGE.

4.2 Mounting Location

Choose a location that offers a flat, rigid mounting surface capable of supporting the weight of the enclosed ATS equipment. For standard ATSs, avoid locations that are moist, hot, or dusty. However, Eaton offers optional enclosure designs that can be used in special environments. If there are any doubts as to a location’s suitability, discuss them with your Eaton representative.

Check to make certain that there are no pipes, wires, or other mounting hazards in the immediate mounting area that could create a problem.

Carefully remove all packing material from the ATS at the mounting location. Even though an equipment inspection should have been made when the equipment was received, make another careful inspection of the enclosure and the enclosed ATS components as the packing material is removed and the enclosure readied for mounting. Be especially alert for distorted metal, loose wires, or damaged components.

**WARNING**

BE CERTAIN THAT THE PLASTIC COVER ON THE CONTACTOR POWER ASSEMBLY IS PROPERLY INSTALLED BEFORE THE TRANSFER SWITCH EQUIPMENT IS PUT INTO SERVICE. THE COVERS PROVIDE PROTECTION FROM DANGEROUS VOLTAGES AT THE CONTACTS. FAILURE TO DO SO COULD RESULT IN PERSONAL INJURY OR DEATH.

**CAUTION**

EXTREME CARE SHOULD BE TAKEN TO PROTECT THE TRANSFER SWITCH FROM DRILL CHIPS, FILINGS, AND OTHER CONTAMINANTS WHEN MAKING THE CABLE ENTRY HOLES. EXTREME CARE SHOULD ALSO BE TAKEN WHEN MOUNTING THE ENCLOSURE TO PREVENT COMPONENT DAMAGE OR A FUTURE MALFUNCTION.

4.3 Mounting Procedure (Open Transition Transfer Switch)

**CAUTION**

ALL EQUIPMENT ENCLOSURES AND POWER PANELS ARE OF A SIMILAR DESIGN. ONLY THE OVERALL PHYSICAL DIMENSIONS CHANGE. NOTE THAT THE ENCLOSURE IS PROVIDED WITH TWO TEARDROP (ELONGATED) MOUNTING HOLES IN THE TOP MOUNTING FLANGE AND TWO STANDARD HOLES IN THE BOTTOM.

CABLE ENTRY HOLES ARE NOT PART OF THE ENCLOSURE WHEN SHIPPED FROM THE FACTORY AND MUST BE PROVIDED IN THE FIELD, EITHER BEFORE OR AFTER MOUNTING THE ENCLOSURE. CABLE ACCESS MAY BE FROM THE TOP, BOTTOM, AND/OR SIDE.

Figure 10. Typical (40A-1200A) Open Transition Contactor Based ATS Equipment (Door Open).
With the enclosed ATS equipment unpacked and ready for mounting, proceed with the following steps.

**Step 1:** Install the required upper and lower mounting bolt anchors and the two upper mounting bolts in the mounting surface.

**Step 2:** Gently lift the enclosure, if desired to be off the floor, and guide the teardrop holes in the upper mounting flange over the upper mounting bolts. Do not completely tighten the bolts at this time. If sitting on the floor, install the bolts without lifting.

**Step 3:** While still supporting the enclosure, install the two lower mounting bolts in the lower mounting flange. Again, do not completely tighten the bolts at this time. Use shims, if required, to prevent deformation of the enclosure if the mounting surface is distorted.

**Step 4:** Tighten all four mounting bolts after any required shimming is completed.

**4.4 Mounting Procedure (Close Transition Transfer Switch)**

---

**NOTICE**

**CABLE ENTRY HOLES ARE NOT PART OF THE ENCLOSURE WHEN SHIPPED FROM THE FACTORY AND MUST BE PROVIDED IN THE FIELD, EITHER BEFORE OR AFTER MOUNTING THE ENCLOSURE.**

With the enclosed transfer switch equipment unpacked and ready for mounting, proceed with the following steps:

**Step 1:** Mounting and cabling access is best provided by removing side and rear covers (when applicable).

**Step 2:** Gently maneuver the switch into its location using all of the supplied lift brackets.

**Step 3:** Bolt the enclosure to the base. Use separate seismic washers (Option 42 only) if Seismic Uniform Building Code (UBC) Zone 4 certification is desired (Figure 11B), and secure with 1/2-13 UNC Grade 5 hex bolts.

**Step 4:** Tighten bolts to 50 ft-lbs (68 Nm).

**Step 5:** Double check to ensure that all packing and shipping material has been removed.

---

Figure 11A. Typical Mounting of the ATS to a Mounting Surface (Open Transition ATS) for Wall Mounting.

**Step 5:** Double check to ensure that all packing and shipping materials have been removed.

**Step 6:** If Seismic Uniform Building Code (UBC) is required, secure with (4) 5/16-13 UNC grade 5 or better head bolts and washers

---

Figure 11B. Seismic Tested and Approved Product Mounting Instructions for Floor Mounting.
4.5 Power Cable Connections

**WARNING**

POWER CONDUCTORS MAY HAVE VOLTAGE PRESENT THAT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. DE-ENERGIZE ALL POWER OR CONTROL CIRCUIT CONDUCTORS TO BE CONNECTED TO THE ATS EQUIPMENT BEFORE BEGINNING TO WORK WITH THE CONDUCTORS AND/OR TERMINATING THEM TO THE EQUIPMENT.

**CAUTION**

USE OF CABLE LUGS NOT DESIGNED FOR THE ATS MAY CAUSE HEATING PROBLEMS.

**CAUTION**

TO HELP PREVENT COMPONENT DAMAGE OR FUTURE MALFUNCTIONS, USE EXTREME CARE TO KEEP CONTAMINANTS OUT OF THE ATS EQUIPMENT WHEN MAKING POWER CABLE CONNECTIONS.

**CAUTION**

RUN THE POWER CABLE THROUGH THE GUTTER SPACE PROVIDED IN THE REAR OF POWER PANEL.

Test all power cables prior to connection to the unit to ensure that the conductors or cable insulation have not been damaged while being pulled into position.

Power cables are to be connected to solderless screw type lugs located on the ATS switching devices. Refer to the separate customer wiring diagram supplied with the ATS equipment for power termination. Verify that the lugs supplied will accommodate the power cables being used. Also verify that the cables comply with local electrical codes. Standard ATS equipment, as supplied from the factory, will accommodate the wire sizes shown in Table 4.

Carefully strip the insulation from the power cables to avoid nicking or ringing of the conductor strands. Prepare the stripped conductor termination end by cleaning it with a wire brush. If aluminum conductors are used, apply an appropriate joint compound to the clean conductor surface area.

Wrap line cables together with nominal 3/8 inch nylon rope or rope having tensile strength of 2,000 pounds. Wrap at 4 inches and 15 inches from the line terminals with 8 and 18 wraps respectively or every 1 inch with 1 wrap.

Repeat the above for the load cables.

![Figure 12. Cable Bracing Instructions.](image)

**WARNING**

IMPROPER POWER CABLE CONNECTIONS CAN CAUSE EXCESSIVE HEAT AND SUBSEQUENT EQUIPMENT FAILURE.

Tighten the cable lugs to the torque identified on the label affixed to the door of the unit.

<table>
<thead>
<tr>
<th>TRANSFER SWITCH AMPERE RATING</th>
<th>WIRE SIZE RANGES</th>
<th>NUMBER OF CABLES PER PHASE</th>
<th>TERMINAL TEMPERATURE RATING °C (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>#14-3/0</td>
<td>1</td>
<td>90 (194)</td>
</tr>
<tr>
<td>200</td>
<td>#6-300KCMIL</td>
<td>1</td>
<td>90 (194)</td>
</tr>
<tr>
<td>400</td>
<td>#1/0.750KCMIL</td>
<td>1</td>
<td>90 (194)</td>
</tr>
<tr>
<td>400</td>
<td>#1/0.250KCMIL</td>
<td>2</td>
<td>90 (194)</td>
</tr>
<tr>
<td>1200</td>
<td>#1/0.750KCMIL</td>
<td>4</td>
<td>90 (194)</td>
</tr>
</tbody>
</table>

* Cable must be 90°C rated but size shall be determined based on the ampacity of the wire rated at 75°C.
4.5 Wiring

**WARNING**

POWER CONDUCTORS AND CONTROL WIRING MAY HAVE VOLTAGE PRESENT THAT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. DEENERGIZE ALL POWER OR CONTROL CIRCUIT CONDUCTORS BEFORE BEGINNING TO PERFORM ANY WIRING ACTIVITY TO OR WITHIN THE ATS EQUIPMENT.

Power sources, load conductors, and control wiring should be connected to locations as indicated in the customer wiring diagram supplied with the ATS equipment.

**CAUTION**

ENSURE THE ATS VOLTAGE IS SET CORRECTLY. IT SHOULD BE THE SAME AS THE SOURCE 1 AND SOURCE 2 LINE VOLTAGES. OPERATING THE EQUIPMENT ON IMPROPER VOLTAGE CAN CAUSE EQUIPMENT DAMAGE.

Once the ATS equipment has been installed and wired, perform the initial mechanical and electrical procedures as outlined in Section 6 to verify that the equipment is installed and operating properly.

4.6 Engine Start Connection

The engine control contact connections are located on the logic panel of the ATS. Connect the engine start wires to the red terminal blocks. See the drawings for the switch. A contact closes between these terminal when an engine start signal is provided by the ATS logic. The wiring diagram provides additional engine start connection information. Use the proper wire size as listed by the generator set (Genset) manufacturer.

For the I/O connections, there are some switches that the Inputs are wired to a terminal block while others are not. When they are not, the terminal blocks on the controller are simply used, see Figure 13A. The switch and listed terminal blocks are shown below.

1200A D frame Inputs/Gen Start to terminal blocks

The I/O module is shown in Figure 13B. More on both devices can be found in the ATC-900 instruction booklet.

**NOTICE**

PRIOR TO MAKING THE ENGINE START CONNECTION TO THE SWITCH, SET THE ENGINE GENERATOR CONTROLS SELECTOR SWITCH IN THE OFF POSITION TO PREVENT AN UNWANTED ENGINE START. CONTROL WIRING, SUCH AS THE ENGINE START WIRES, MUST BE RUN IN A SEPARATE CONDUIT FROM THE POWER CABLES.
Figure 13a. ATC-900 (Top Left, and Right Side Views).

Figure 13b. I/O Module.
4.7 Voltage Selection Adjustments

Certain devices, such as the Voltage Selection Panel, sensing relays, and timers, need to be set and/or calibrated prior to placing the ATS equipment in service. Adjustments for logic devices are described in the separate instructional document dedicated to the specific logic being used. Voltage selection adjustments are described in this section.

**CAUTION**

BE SURE THAT THE CORRECT VOLTAGE IS SELECTED TO MATCH THE SYSTEM VOLTAGE. AN IMPROPER SELECTION AND/OR CONNECTION COULD RESULT IN EQUIPMENT DAMAGE.

4.7.1 North American Market Voltage Selection Panels (120, 208, 240, 480, 600 V, - 60 Hz)

The North American market voltage selection panel consists of multi-tap transformers, contained in a steel case mounted in the transfer switch enclosure (Figure 14). The cover has two connectors on it, with the one on the right being selectable depending on the voltage applied to S1 and S2. The transformer unit is easily removed by removing the two front screws and disconnecting the two plugs. The rear of the transformer enclosure has two flanges that are inserted into two slots. The voltage is selected by simply removing the plug from the default selected voltage on the cover plate and installing the plug to the desired available voltage. Plugs are provided for 120 to 600 Vac to satisfy any required North American market application voltage. The factory default position is 480 Vac or 600 Vac. There is a similar selection panel for international voltages.

**DANGER**

WHEN CHANGING THE VOLTAGE SELECTION, THE POWER MUST BE REMOVED FROM THE TRANSFER SWITCH. ALWAYS VERIFY THAT NO VOLTAGE IS PRESENT ON EQUIPMENT PRIOR TO SERVICING. FAILURE TO FOLLOW THIS WARNING COULD LEAD TO DEATH OR SEVERE INJURY. WHILE ENERGIZED, AN ARC FLASH AND SHOCK HAZARD EXISTS. CONSULT NFPA 70E AND OSHA GUIDELINES FOR OPERATOR SAFETY PRIOR TO SERVICING, INSPECTING OR OPERATING EQUIPMENT.

Figure 14. North American Market Voltage Selection Terminals (Shown Connected to the 208 Vac Plug).
Section 5: Operation

5.1 General

An ATS provides a power contactor to connect and disconnect the load to and from the Source 1 and Source 2 power sources (Section 3.2.1).

5.2 Manual Operation (Open Transition and Close Transition Transfer Switch)

**WARNING**

DO NOT ATTEMPT TO MANUALLY OPERATE THE ATS WITH SOURCE 1 OR SOURCE 2 AVAILABLE.

**WARNING**

HIGH VOLTAGES ARE PRESENT IN AND AROUND TRANSFER SWITCH EQUIPMENT. BEFORE ATTEMPTING TO MANUALLY TRANSFER, DISCONNECT THE LINE POWER FROM THE EQUIP- MENT BEING SERVICED BY OPENING AND LOCKING OUT, IF POSSI- BLE, THE NEXT HIGHEST DISCONNECT DEVICE. FAILURE TO FOLLOW THIS PROCEDURE COULD CAUSE SEVERE PERSONAL INJURY AND/OR DEATH.

ALWAYS TURN THE SOURCE 1 POWER OFF AND TURN THE SOURCE 2 (IF A GENERATOR) CONTROL SELECTOR SWITCH TO THE "OFF" POSITION BEFORE ATTEMPTING A MANUAL TRANS- FER.

To manually operate:

1. Disconnect all sources of power.
2. Disconnect the J7 connector from the ATC-900 controller.
3. Depress the “trip” button located on the operating mechanism of the contactor to bring the contactor to neutral (trip) position.
4. Locate the manual lever on the left side of the contactor.
5. Locate the handle used to manually transfer the switch.
6. Attach the handle to the manual lever (see Figure 19A & 19B).
7. Rotate the lever up to go to Source 1.
8. Depress the “trip” button located on the operating mechanism of the contactor to bring the contactor to neutral (trip) position.
9. Depress the “select” button located on the operating mechanism of the contactor and rotate the lever up keeping the “select” button depressed to go to Source 2.

![Figure 15A. ATS Manual Operating Handle in Use (Open Transition).](image1)

![Figure 15B. ATS Manual Operating Handle in Use (Close Transition).](image2)
10. Once the manual operation is complete and automatic operation is desired, connect the sources of power.

11. Check for 120 Vac at J7-2 to J7-1 if Source 1 is available.

12. Check for 120 Vac at J7-4 to J7-3 if Source 2 is available.

13. Insert the J7 connector into the controller.

14. Follow the testing procedure in Section 6 to ensure proper automatic operation.

### 5.3 Automatic Transfer

The operating sequence of an ATS is dictated by the switch’s standard features and selected options. Operation of an ATS during Source 1 power source failure and Source 1 power source restoration will be described here with only standard options included on the switch. Additional options, as described in Section 3.5.2, can change sequences and timing, depending upon the options selected. It is strongly suggested that you become familiar with additional options selected with the particular ATS and their effect on the normal operation of an ATS.

#### 5.3.1 Source 1 Power Source Failure

Standard Source 1 power source failure is defined as a reduction or loss of voltage. If this occurs, the sequence of operation is as follows.

1. Failure of Source 1 is detected by the controller intelligence.
2. When the controller detects a failure, the engine contacts close (after delay if programmed) and start the engine-driven generator.
3. When the Source 2 voltage reaches its operation rating, the K2 and K4 relays inside ATC-900 controller operate to start transfer operation to Source 2. This operating sequence causes the contactor to open Source 1 and close on Source 2.
4. The load is now transferred to the Source 2 power source.

#### 5.3.2 Source 1 Power Source Restoration

1. A return to the Source 1 power source begins when the voltage in all phases of a 3-phase sensing unit, or phase-to-phase in a single sensing unit, is restored to a preset value.
2. At the preset voltage, K1 and K3 relays inside ATC-900 controller operate to start transfer operation to Source 1.
3. During this sequence, the contactor opens Source 2 and closes on Source 1.
4. Simultaneously, the engine cool-down timer initiates the shut down of the engine driven generator.
5. Transfer of the load back to the Source 1 power source is now complete.

### Section 6: Testing and Problem Solving

#### 6.1 Testing

After the ATS equipment is initially installed or during planned outages, the installation should be tested to ensure that all equipment operates properly. This attention to detail will help avoid unexpected malfunctions. Mechanical and/or electrical tests should be performed as described in this section.

The frequency of subsequent testing should be based on recommendations of the Genset manufacturer. Use the test pushbutton on the ATC-900 controller to check the electrical operation of the switch.

**WARNING**

HIGH VOLTAGES ASSOCIATED WITH OPERATIONAL TRANSFER SWITCH EQUIPMENT PRESENT A SHOCK HAZARD THAT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. USE EXTREME CAUTION TO AVOID TOUCHING ELECTRICAL CONNECTIONS WHENEVER INSPECTING OR TESTING THE EQUIPMENT.

IN ADDITION, IMPROPER OPERATION OF THE GENERATOR SET PRESENTS A HAZARD THAT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. OBSERVE ALL SAFETY PRECAUTIONS IN YOUR GENERATOR SET OPERATIONS AND INSTALLATION MANUALS.

#### 6.1.1 Mechanical and/or Electrical Testing

**NOTICE**

SINCE FEATURE 4 (TIME DELAY ENGINE COOL-OFF), AS DESCRIBED IN SECTION 3, IS A STANDARD FEATURE, AN ENGINE START SIGNAL WILL BE PRESENT FOR A PERIOD OF TIME WHEN THE SWITCH IS FIRST ENERGIZED. THE PERIOD OF TIME IS EQUAL TO THE TIMER SETTING. TO AVOID STARTING THE ENGINE DURING THIS TIME PERIOD, TURN THE GENERATOR CONTROLS TO THE OFF POSITION.

Energize the ATS equipment as described in Sections 6.1.2 through 6.1.6. Insure that all safety precautions are taken and that all **WARNINGS** and **CAUTIONS** are observed.

#### 6.1.2 No Voltage Steps

With no voltage available on either power source, proceed as follows.

**Step 1:** The generator engine start controls should be in the OFF position to prevent an undesired start.

**Step 2:** Ensure that the ATS has been set to the proper applied system voltage (See Section 4.7).

**Step 3:** Check all ATS loads to ensure that they are ready to be energized.

#### 6.1.3 Connecting the Power Sources

**Step 1:** Close the Source 1 power source upstream protection device.

**Step 2:** Connect the engine start battery cable.

**Step 3:** With the emergency generator in the OFF position, close the Source 2 power source upstream protective device, assuming such a device used.
Step 4: Close any generator engine-start controls opened as a result of actions taken in Step 1, Section 6.1.2.

Step 5: Where required, use an accurate voltmeter to check phase-to-phase and phase-to-neutral voltages present at the transfer switch Source 1, Source 2, and/or load terminals.

6.1.4 Operational Checks

Step 1: Check to ensure that Source 1 switching device is in the CLOSED position. This should have been done in Section 6.1.3, Step 1.

Step 2: Initiate an automatic transfer operation from the Source 1 to the Source 2 power source by pressing the <Engine Test> pushbutton on the ATC-900 Controller two times.

Note: The ATC-900 Logic Controller provides the capability to set the Engine Test function to:
0. No Load Engine Test;
1. Load Engine Test; or
2. Disabled.

The factory default is set to:
1. Load Engine Test
   a. After the Time Delay Engine Starting (TDES) has timed out, the engine should start, run, and build up to normal voltage and frequency.
   b. The transfer switch will transfer to the Source 2 power source after the Time Delay Normal to Emergency (TDNE) times out.

Step 3: Initiate an automatic transfer operation back to the Source 1 power source by pressing the <Engine Test> pushbutton on the ATC-900 Controller one time.

1. After the Time Delay Emergency to Normal timer (TDEN) has timed out, the transfer switch will transfer back to the Source 1 power source.
2. The Time Delay for Engine Cool-Off (TDEC - Feature 4) will allow the engine to run unloaded for a preset time after transfer to the Source 1 power source is completed.

6.1.5 Alternate Tests

1. Alternate operational tests may be possible depending upon the options provided with any given ATS. Refer to the schematic diagram provided with the ATS equipment, along with the specification nameplate, to determine the exact options provided.

6.2 Problem Solving

A basic problem-solving effort is the first step to take prior to calling for assistance. Frequently, the effort will successfully address most problems encountered. The problem solving procedure is presented in the Troubleshooting Guide (Table 6, Section 6 of ATC-900 Controller Instruction Booklet). Remember, only qualified individuals familiar with the ATS equipment and the system in which it is applied should attempt these problem solving procedures. This includes wearing the correct PPE for the job.

If a problem persists after having completed the problem solving procedure, contact a Eaton representative for further assistance. When calling for assistance, the following is the minimum information required to properly address the need:

1. Style number of ATS, if applicable;
2. Catalog number of ATS;
3. Actual location of the ATS (type of facility, address, etc.);
4. Company name and name and position of individual representing company;
5. Basic description of the situation as it exists; and
6. Any results of the problem solving steps taken and/or readings taken.

For ATS assistance, call Eaton Care at: 877-386-2273 option 2, option 4, and then option 3
6.2.1 Transfer Switch Appears Inoperative (Manual Operation)

Step 1: Initially verify that there is no voltage on any source (Source 1 or Source 2) inside the transfer switch.

Step 2: Depress the "TRIP" button located on the operating mechanism of the contactor to bring the contactor to neutral (trip) position.

Step 3: Attach the handle to the manual lever (see Figure 16) and rotate the lever up to go to Source 1.

Step 4: Depress the "TRIP" button located on the operating mechanism of the contactor to bring the contactor to neutral (trip) position.

Step 5: Depress the "SELECT" button located on the operating mechanism of the contactor and rotate the lever up keeping the "SELECT" button depressed to go to Source 2.

Following above steps, if the transfer switch does not transfer between two sources, contact factory personnel.

Section 7: Adjustments

WARNING

HAZARDOUS VOLTAGES IN AND AROUND ATS EQUIPMENT DURING THE PROBLEM SOLVING PROCESS CAN CAUSE SEVERE PERSONAL INJURY AND/OR DEATH. AVOID CONTACT WITH ANY VOLTAGE SOURCE WHILE PROBLEM SOLVING.

7.1 General

No Adjustments are required.
Section 8: Maintenance

8.1 Introduction

⚠️ WARNING

HIGH VOLTAGES ARE PRESENT IN AND AROUND ATS EQUIPMENT. BEFORE INSPECTING OR MAINTAINING THIS EQUIPMENT, DISCONNECT THE LINE POWER FROM, THEN LOCK OUT, IF POSSIBLE, THE NEXT HIGHEST DISCONNECT DEVICE. FAILURE TO FOLLOW THIS PROCEDURE COULD CAUSE SEVERE PERSONAL INJURY AND/OR DEATH.

In general, ATS switch equipment is designed to be relatively maintenance free under normal usage. However, because of the variability of application conditions and the importance placed on dependable operation by this type of equipment, inspection and maintenance checks should be made on a regularly scheduled basis. Since equipment maintenance will consist mainly of keeping the equipment clean, the frequency of maintenance will depend to a large extent on the cleanliness of the equipment’s surroundings. If a significant amount of dust or foreign matter is present, a more frequent maintenance schedule should be followed.

It is suggested that visual inspections of the equipment be made on a regular basis, not just during scheduled periods. Always be alert for an accumulation of dirt in and around the structure; loose parts; and/or hardware, cracks, and/or discoloration to insulation; and damaged or discolored components.

8.2 Procedures

A suggested maintenance procedure is outlined in Table 5.

<table>
<thead>
<tr>
<th>Table 5. Periodic Maintenance Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP</td>
</tr>
<tr>
<td>a. Make the ATS equipment safe for inspection and/or maintenance.</td>
</tr>
<tr>
<td>b. Inspect the structure area for safety hazards or potential maintenance problems.</td>
</tr>
<tr>
<td>c. Inspect the power contactor for dust, dirt, soot, grease, moisture, or corrosion.</td>
</tr>
<tr>
<td>d. Check for material integrity, uneven wear, discoloration, or loose hardware.</td>
</tr>
<tr>
<td>e. Check the terminals and connectors for looseness or signs of overheating.</td>
</tr>
<tr>
<td>f. Contact Inspection Procedure</td>
</tr>
<tr>
<td>g. Exercise the power contactor if it is not often exercised while in operation. This will permit a &quot;wiping&quot; action by the contacts.</td>
</tr>
<tr>
<td>h. Return the ATS equipment to service.</td>
</tr>
</tbody>
</table>
Section 9: Renewal Parts Guide

9.1 General

Refer to Figure 17 for assistance with selecting and ordering selected ATS renewal parts. For more information please see Renewal Parts Publication (RP01603002E)

Example: To order the transformer pack for an ATCIC3X31200XRU transfer switch, order Catalog Number as shown in Figure 17.

<table>
<thead>
<tr>
<th>ATC-900 Controller</th>
<th>Call Factory or look at tag on harness for part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformer Pack</td>
<td>40-1200A, 480VAC, 2-Pole - Cat# 68C8241G03&lt;br&gt;40-1200A, 480VAC, 3-Pole - Cat# 68C8241G03&lt;br&gt;40-1200A, 480VAC, 4-Pole - Cat# 68C8241G03&lt;br&gt;40-1200A, 600VAC, 2-Pole - Cat# 68C8241G01&lt;br&gt;40-1200A, 600VAC, 3-Pole - Cat# 68C8241G01&lt;br&gt;40-1200A, 600VAC, 4-Pole - Cat# 68C8241G01</td>
</tr>
<tr>
<td>Power Panel (Open Transition)&lt;br&gt;(Does not include Contactor)</td>
<td>40-1200A (Domestic Switch), 480VAC, 2/3 Pole - Cat# 68C8282H01&lt;br&gt;40-1200A (Domestic Switch), 600VAC, 2/3 Pole - Cat# 68C8282H02&lt;br&gt;40-1200A (Domestic Switch), 480VAC/600VAC, 4-Pole - Cat# 68C8282H03</td>
</tr>
<tr>
<td>Power Panel (Close Transition)&lt;br&gt;(Does not include Contactor)</td>
<td>40-1200A (Domestic Switch), 480AC/600VAC, 2-Pole - Cat# 69D8080H01&lt;br&gt;40-1200A (Domestic Switch), 480AC/600VAC, 3-Pole - Cat# 69D8080H01&lt;br&gt;40-1200A (Domestic Switch), 480AC/600VAC, 4-Pole - Cat# 69D8080H02</td>
</tr>
<tr>
<td>Contactor (Open Transition)</td>
<td>40-1200A, 480VAC, 2-Pole - Cat# 67C5241G01&lt;br&gt;40-1200A, 480VAC, 3-Pole - Cat# 67C5241G02&lt;br&gt;40-1200A, 480VAC, 4-Pole - Cat# 67C5241G03&lt;br&gt;40-1200A, 600VAC, 3-Pole - Cat# 67C5241G06&lt;br&gt;40-1200A, 600VAC, 4-Pole - Cat# 67C5241G07</td>
</tr>
<tr>
<td>Contactor (Close Transition)</td>
<td>40-1200A, 480AC/600VAC, 2-Pole (Source 1) - Cat# 67C5241G11&lt;br&gt;40-1200A, 480AC/600VAC, 2-Pole (Source 2) - Cat# 67C5241G12&lt;br&gt;40-1200A, 480AC/600VAC, 3-Pole (Source 1) - Cat# 67C5241G13&lt;br&gt;40-1200A, 480AC/600VAC, 3-Pole (Source 2) - Cat# 67C5241G14&lt;br&gt;40-1200A, 480AC/600VAC, 4-Pole (Source 1) - Cat# 67C5241G15&lt;br&gt;40-1200A, 480AC/600VAC, 4-Pole (Source 2) - Cat# 67C5241G16</td>
</tr>
<tr>
<td>Wire Harness (Open Transition)</td>
<td>Call Factory or look at tag on harness for part number</td>
</tr>
<tr>
<td>Wire Harness (Close Transition)</td>
<td>Call Factory or look at tag on harness for part number</td>
</tr>
<tr>
<td>100W Space Heater</td>
<td>Domestic Switch, up to 600VAC - Cat# 8160A41G54</td>
</tr>
<tr>
<td>Lugs</td>
<td>40-100A, 480VAC - Cat# 68C8289H01 + AB-125S&lt;br&gt;40-100A, 600VAC - Cat# 68C8289H01 + AB-250S&lt;br&gt;150-200A, 480/600VAC - Cat# 68C8289H01 + AB-250S&lt;br&gt;225-400A, 480/600VAC - Cat# 68C8289H01 + AB750-4&lt;br&gt;600-1200A, 480/600VAC - Cat# 4ABV-750</td>
</tr>
</tbody>
</table>

Figure 17. Typical ATC-900 Controlled Contactor Type 40-1200A ATS.
Section 10: ATC-900 Controlled ATS
Quick Start Instructions

** WARNING **
THESE QUICK START INSTRUCTIONS ARE NOT A COMPLETE SOURCE OF INFORMATION ON THE ATC-900 CONTROLLED ATS EQUIPMENT. INSTALLATION SHOULD NOT BE STARTED UNTIL THE ENTIRE INSTRUCTION BOOK HAS BEEN REVIEWED AND UNDERSTOOD. FAILURE TO FOLLOW THE FULL INSTRUCTIONS CAN RESULT IN DEATH, SEVERE PERSONAL INJURY, OR PROPERTY DAMAGE.

** WARNING **
THESE QUICK START INSTRUCTIONS ARE PROVIDED FOR USE ONLY BY TECHNICIANS HIGHLY FAMILIAR AND EXPERIENCED WITH ATC-900 CONTROLLED ATS EQUIPMENT INSTALLATION, SET UP, AND TESTING. IT IS STRONGLY SUGGESTED THAT THE FULL INSTRUCTIONS BE FOLLOWED FOR ALL INSTALLATIONS, SET UP, AND TESTING.

Step 1: Mount the ATS on a flat rigid surface (Figure 18A & 18B). Shim if necessary.

Step 2: Install the power cables. Cables must be sized and installed per National Electrical Code, refer to NFPA70. The cables must be sized within the specified cable size range on the side of the cable connectors.

Connect the cables and torque to the correct value indicated on the label on the door in the following order:

1. Load Cables *(T1, T2, T3)*;
2. Source 1 or Utility Supply *(N1, N2, N3)*; and
3. Source 2 or Generator Supply *(E1, E2, E3)*.

For 4 pole transfer switches, connect the load cables *(TN)*, Source 1 or utility supply *(NN)*, and Source 2 or generator supply *(EN)*. Refer to Figure 19A & 19B for the location of all parts discussed in this document.

* Load cables MUST be connected and torqued BEFORE installing the SUPPLY cables (Figures 19A & 19B).
Figure 19A. 40-1200A, 3-Pole, ATS Interior Components (Open Transition).
Figure 19B. 40-1200A, 4-Pole, ATS Interior Components (Close Transition).
Step 3: Turn the generator OFF at the generator control panel.
This will prevent unexpected activation of the generator.

Step 4: The engine control contact connections are located on
the logic panel of the ATS. Connect the engine start wires to the red terminal blocks. See the drawings for
the switch. A contact closes between these terminal when an engine start signal is provided by the ATS logic.
The wiring diagram provides additional engine start connection information. Use the proper wire size as listed by
the generator set (Genset) manufacturer

For the I/O connections, there are some switches that
the Inputs are wired to a terminal block while others are
not. When they are not, the terminal blocks on the con-
troller are simply used, see Figure 13A. The switch and
listed terminal blocks are shown below.

1200A D frame Inputs/Gen Start to terminal blocks
NEVER connect directly to a starter solenoid or ignition system.

Step 5: Apply Utility (Source 1) power. If the switch is properly
applied for the system voltage ordered, the display
should work and the Source 1 Available amber LED
should light on the controller. Using a voltmeter, check
for proper system voltage on Source 1 and load termi-
nals. Check all phases on a 3-phase switch. Voltage
measurements should be taken phase to phase and
phase to neutral.

Step 6: To view the setpoints, see the ATC-900 instruction
manual.
Utility - Generator Transfer Switch

Source 1 is available

Close Source 1 contactor (Momentarily energize K3)

Source 1 is powering the load

Source 1 becomes unavailable (or Engine Test, Plant Exerciser, Go To Emergency)

TDES timer times out

Send “Engine Start” signal (Energize Gen Start relay)

Is Source 2 available yet?

N

TDEN timer times out

Open Source 1 contactor (Energize K2)

TDN timer times out (if Option 32A is enabled)

Close Source 2 contactor (Momentarily energize K4)

Source 1 is powering the load

Source 2 is powering the load

Y

TDEE timer times out

Is Source 2 available?

N

Send Pretransfer signal. TPRE times out. (if Pretransfer enabled)

Open Source 2 contactor (Energize K1)

TDN timer times out (if Option 32A is enabled)

Close Source 1 contactor (Momentarily energize K3)

Source 1 is powering the load

Send Pretransfer signal. TPRE times out. (if Pretransfer enabled)

Remove “Engine Start” signal (De-energize Gen Start relay)

Figure 20. Utility - Generator Transfer Switch.
Source 1 is available

Close Source 1 contactor  
(Momentarily energize K3)

Source 1 is powering the load

Source 1 becomes unavailable 
(or Go To Emergency)

Is Source 2 available?

TDNE timer times out

Send Pretransfer signal. TPRE times out. 
(if Pretransfer enabled)

Open Source 1 contactor  
(Energize K2)

TDN timer times out 
(if Option 32A is enabled)

Close Source 2 contactor  
(Momentarily energize K4)

Source 2 is powering the load

Is Source 1 available yet?

TDEN timer times out

Send Pretransfer signal. TPRE times out. 
(if Pretransfer enabled)

Open Source 2 contactor  
(Energize K1)

TDN timer times out 
(if Option 32A is enabled)

Close Source 1 contactor  
(Momentarily energize K4)

Source 1 is powering the load

Source 1 is powering the load

Figure 21. Dual Utility Transfer Switch.
Closed / Open Transition Flowchart

Figure 22. Closed/Open Transition Flowchart.
Notes:
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