# Description

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3000 Amp Contactor
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 transfer switch equipment with ratings from 2000 through 3000 amperes (A), except for the specific logic used to control the equipment. 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, contact an Eaton representative. For information associated with the control, refer to the separate instruction book pertaining to the logic package installed in the switch.

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**WARNING**

READ AND UNDERSTAND THE INSTRUCTIONS CONTAINED HEREFOR BEFORE ATTEMPTING TO UNPACK, ASSEMBLE, OPERATE, OR MAINTAIN THIS EQUIPMENT.

HAZARDOUS VOLTAGES ARE PRESENT INSIDE TRANSFER SWITCH ENCLOSURES THAT CAN CAUSE DEATH OR SEVERE PERSONAL INJURY. FOLLOW PROPER INSTALLATION, OPERATION, AND MAINTENANCE PROCEDURES TO AVOID THESE VOLTAGES.

TRANSFER SWITCH EQUIPMENT COVERED BY THIS INSTRUCTION BOOK IS DESIGNED AND TESTED TO OPERATE WITHIN ITS NAMEPLATE RATINGS. OPERATION OUTSIDE OF THESE RATINGS MAY CAUSE THE EQUIPMENT TO FAIL RESULTING IN DEATH, SERIOUS BODILY INJURY, AND/OR PROPERTY DAMAGE. ALL RESPONSIBLE PERSONNEL SHOULD LOCATE THE DOOR MOUNTED EQUIPMENT NAMEPLATE AND BE FAMILIAR WITH THE INFORMATION PROVIDED ON THE NAMEPLATE.

---

**NOTICE**

A FINAL INSPECTION OF THE EQUIPMENT SHOULD BE PERFORMED PRIOR TO ENERGIZING THE TRANSFER SWITCH.

---

Step 1: Remove any dirt or debris that may have collected during shipment or installation. NEVER use high pressure blowing air. This could drive dirt or other foreign objects into electrical or mechanical components which could cause damage. Use an industrial quality vacuum cleaner to remove any dirt or foreign objects.

Step 2: Be certain all cable connections are correct and that the phase rotation of both sources match.

Step 3: Inspect the engine start connections and verify the correct connection of all control wires.

Step 4: Check all programmable setpoints and adjust as necessary. In addition, adjust any optional accessories as required.

Step 5: Be certain that the actual lug torque values are in keeping with the requirements outlined in the instruction book to insure the integrity of power connections.

Step 6: Check to be sure that all covers and barriers are properly installed and fastened.

ALL POSSIBLE CONTINGENCIES WHICH MAY ARISE DURING INSTALLATION, OPERATION, OR MAINTENANCE, AND ALL DETAILS AND VARIATIONS OF THIS EQUIPMENT DO NOT PURPORT TO BE COVERED BY THESE INSTRUCTIONS. IF FURTHER INFORMATION IS DESIRED BY THE PURCHASER REGARDING HIS PARTICULAR INSTALLATION, OPERATION, OR MAINTENANCE OF PARTICULAR EQUIPMENT, CONTACT AN EATON REPRESENTATIVE.

1.1.1 Warranty and Liability Information

No warranties, expressed or implied, including warranties of fitness for a particular purpose of merchant-ability, 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 PERSONNEL 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, 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 THE EQUIPMENT. ANY WIRING INSTRUCTIONS PRESENTED IN THIS DOCUMENT MUST BE FOLLOWED PRECISELY. FAILURE TO DO SO COULD CAUSE PERMANENT EQUIPMENT DAMAGE.

⚠️ WARNING
THE CLOSED TRANSITION PRODUCT CONTAINS A SPECIAL CONTACT ARRANGEMENT (OVERLAPPING CONTACTS). MISUSE CAN RESULT IN DEATH, SEVERE PERSONAL INJURY, AND/OR PROPERTY DAMAGE.

1.2 General Information
The 3000 A contactor switch is another Eaton product which includes the “smart Eaton Switch Technology” (smartEST) for the Automatic Transfer Switch (ATS) line of products. The new capabilities are advanced, and the design includes many safety enhancements.

Transfer switches are used to protect critical electrical loads against loss of power. The Source 1 power source of the load 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 these two sources. In the event that power is lost from the Source 1 power source, the transfer switch transfers the load to the Source 2 power source. This transfer can be automatic or manual, depending upon the type of transfer switch equipment being used. Once Source 1 power is restored, the load is automatically or manually transferred back to the Source 1 power source, again depending upon the type of transfer equipment being used (Figure 1).

In addition, the Eaton closed transition transfer switch may be applied where it is desirable to avoid any momentary power interruptions. Although the closed transition switch is not a substitute for an uninterruptable power source (UPS), it does eliminate power interruptions to loads except to those caused by power sources or equipment external to the transfer switch. If both sources are acceptable as determined by the ATC-900 (or the ATC-300+) Controller’s Transfer logic, a make-before-break transfer is performed during a transfer test or retransfer operation.

1.2.1 Transfer Switch Types
There are four types of transfer switch equipment.

**Automatic Transfer Switch**
Automatic transfer switches (ATSs) automatically perform the transfer function. They consist of three basic elements:
1. Main contacts to connect and disconnect the load to and from the source of power.
2. 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.
3. A transfer mechanism to effect the transfer of the main contacts from source to source.

![Figure 1. Typical Load Transfer Switch (Switching Device Type) Schematic.](source)

**Non-Automatic Transfer Switch (Electrically Operated)**
Non-automatic transfer switches are manually initiated, electrically operated devices for applications where automatic load transfer is not required.

1.2.2 Design Configuration
The Eaton transfer switch is a rugged, compact design utilizing a dual operator, contactor based switching mechanism to transfer essential loads from one power source to another. Open transition includes a mechanical interlock to prevent both power sources from being paralleled or connected to the load simultaneously.

The enclosure is free standing, and, by using the specially supplied washers, the switch is OSHPD Seismic Certified. The terminals are mounted in the rear of the switch, permitting rear, top, bottom, side cable entry and can be accessed from the front.

The switching devices have a high withstand rating (Table 1). The table shows a 3 cycle (type F5 Short Circuit) as well as a 30 cycle (type G5 Short Time) short-circuit and short-time respectively at 600 volts. The last column shows the fuse ratings that were tested.

For more information visit: [www.eaton.com](http://www.eaton.com)
Table 1. System Coordination Information - UL1008 Withstand Closing Ratings

<table>
<thead>
<tr>
<th>TRANSFER SWITCH AMPERE RATING</th>
<th>SHORT-CIRCUIT (0.05 SEC) 600V (kA)</th>
<th>SHORT-TIME (0.50 SEC) 600V (kA)</th>
<th>FUSE PROTECTION</th>
<th>FUSE TYPES: L 600V (kA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 1008</td>
<td>2000</td>
<td>100</td>
<td>85</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>2500</td>
<td>100</td>
<td>85</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>3000</td>
<td>100</td>
<td>85</td>
<td>200</td>
</tr>
</tbody>
</table>

1.3 Contactor Fixed Switching Devices

1.3.1 General Contactor Switching Device
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 2). The Eaton contactor based ATS is designed with simplified maintenance in mind. The dual operator contactor is a three position type (Close S1, Trip, Close S2) with each source having a mechanical stored energy mechanism. The mechanisms can be charged by pumping the handle manually or automatically (by internal motor) when either source is available. The four main functional sections comprise the contactor based ATS design:

1. Contactor based switching mechanism;
2. Voltage selection and transformer pack;
3. Logic panel; and
4. Automatic Controller (not included for non-automatic configurations).

1.3.2 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.

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.

Re-Transfer
Re-transfer is defined as a change of the load connection from the Source 2 to the Source 1.

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 (0.5 does not apply to ATC-900) after the Time Delay Emergency Fail (TDEF) time delay expires.

Transfer
Transfer is defined as a change of the load connection from the Source 1 to the Source 2 power source.

Unconnected
Unconnected is defined as when the input is not shorted by an external contact or connection.
1.3.3 Contactor Fixed Switching Devices

The Contactor uses secondary connectors to allow user interface. Secondary connections are made through standard terminal blocks. These secondary terminal blocks (Figure 3) are for control, aux connections, motor control, etc. The secondary connection devices are mounted at the top front of the switching device and in front of the dead front for easy access and safety. The contactor fixed switching devices have four bolts on each side to permit the switching device to be securely mounted to the transfer switch frame.

Figure 3. Secondary Connections.

<table>
<thead>
<tr>
<th>AT</th>
<th>C</th>
<th>9</th>
<th>F5</th>
<th>X</th>
<th>3</th>
<th>3000</th>
<th>X</th>
<th>S</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>C</td>
<td>9</td>
<td>F5</td>
<td>X</td>
<td>3</td>
<td>3000</td>
<td>X</td>
<td>S</td>
<td>U</td>
</tr>
</tbody>
</table>

The catalog number ATC9F5X33000XSU example describes an ATS with a fixed, dual operator switching device mounted in the enclosure. The intelligence, represented by the ATC-900, is a microprocessor-based logic package. The F5 is for short-circuit while a G5 is for short-time. The contactor is used as the switching device and is a 3-pole. The continuous current rating of this equipment is 3000 A and is applicable at 480/277 Vac, 60 Hz. The transfer switch equipment is enclosed in a NEMA 1 enclosure and is listed for Underwriters Laboratories (UL) and Canadian Standards Association (CSA) applications. The switch has been Seismic tested, see Section 4.4 also.

Table 2. Transfer Switch Catalog Number Explanation.

For selective coordination, transfer switches can be configured with an optional UL 1008 listed short-time withstand closing rating of 85 kA (0.5 seconds) that is ideal for emergency, legally required, critical operations data systems, and critical operations power systems requiring selective coordination per the NEC.
Section 2: Receiving, Handling, and Storage

2.1 Receiving and Handling
Every effort is made to ensure that the transfer switch equipment arrives at its destination undamaged and ready for installation. Crating and packing is designed to protect internal components as well as the enclosure. Transfer switch enclosures are skid mounted and suited for fork lift movement. Care should be exercised to protect the equipment from impact at all times. Do not remove the protective packaging until the equipment is at the installation location and ready for installation. When the transfer switch equipment reaches its destination, the customer should inspect the shipping container for any obvious signs of rough handling and/or external damage incurred during transportation. Record any external and internal damage observed for reporting to the transportation carrier and Eaton, once a thorough inspection is completed. All claims should be as specific as possible and include the General Order numbers. A shipping label is affixed to the top of the shipping container which includes a variety of equipment and customer information, such as General Order Number (GO #) and Catalog Number (Cat #). Make certain that this information matches other shipping paper information. Each transfer switch enclosure is bolted to a rigid wooden pallet. Do not discard the internal washers that the internal lag bolts go through as these washers will be used to install the switch. These washers were used to pass seismic testing. A vinyl pocket of documents will be found within the enclosure, usually attached to the inside of the door. 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. Refer to Section 4 of this manual for specific installation instructions.

2.2 Storage
Although well packaged, this equipment is not suitable for storage outdoors. 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 of -30° to 80°C (-22° to 176°F) with a relative humidity of 80% or less.

2.3 Safety Enhancements, Innovative Compartment Design
Eaton’s contactor-based ATS solutions are engineered for enhanced safety and uptime, with the front door of the ATS forming an isolated compartment that houses the automatic controller, control power transformer assembly, wire harnesses, relay logic, manual pushbutton controls, manual charging handle, terminal blocks and a variety of optional features. An optional 2-position maintenance isolation switch (MIS) will remove control power inside the door. Upon opening the front door, service personnel can turn the MIS and electrically isolate the control compartment, while the transfer switch is energized (Voltage is still on the rear copper’s Source 1 and/or Source 2 and the Load). This innovative design enhances safety in the working environment when performing inspection or routine maintenance.

Section 3: Equipment Description

3.1 General
This Eaton transfer switch equipment is available in three different configurations:
- ATS (Closed and Open transition);
- Non-Automatic (Electrically Operated) (Open Transition Only);
- Auto O/T, Auto C/T, Non-Auto.

The ATS shown in Figure 4 consists of four functional sections interconnected through connector plugs and mounted in an enclosure:
- Contactor based switching mechanism;
- Voltage selection and transformer pack;
- Logic panel; and
- Automatic Controller (not included for non-automatic configurations).

![Figure 4. Typical Compartments and Components. See Figure 32 also.](image)

3.2 Power Compartments
The power compartment consists of a means for making load, power, and neutral connections. The main contacts and the transfer mechanism are all on one steel frame (Figure 4). The actual power connections are shown in Figure 5. Each switch has a chassis ground bar (Figure 6) that can house several lugs or screws for grounds. Figure 7 shows the neutral assembly for three pole applications. Figure 8 shows two CAD views of the switch with some outline configurations. The NEMA 1 is shown in Figure 8a and a NEMA 3R is shown in Figure 8b. Table 3 shows the dimensions available with the shipping weights of the switch (including pallet). Table 4 shows the information for external terminal conductors.

For more information visit: [www.eaton.com](http://www.eaton.com)
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. With an open transition type, the power contactor is mechanically and electrically (Controller) interlocked to prevent the two sets of main contacts from being closed simultaneously.

3.2.2 Switch Interlocks (Open Transition)
Eaton transfer switches are mechanically and electrically interlocked to prevent the two sets of main contacts from being closed simultaneously. If the switch is not a closed transition type (Section 3.2.3) switch, mechanical interlocks will be supplied internal to the contactor. These are standard for the open type switch.

3.2.3 Switch Interlocks (Closed Transition)
For a closed transition switch, the mechanical interlocks cannot be used as the sources must overlap for a time of under 100ms by specification. The overlapping contacts must be synchronized with the correct phase angle, frequency, and voltage before the attempt to close is made. Attempting to close both switching devices can cause damage, severe injury or death. See also Section 5.5 for more information.

3.2.4 Transfer Mechanism
The transfer switch uses Eaton contactor with a dual operator stored-energy mechanism. An electrical operator automatically recharges the mechanism after the switching device has been closed and an indicator on the switch shows whether it is in the OPEN or CLOSED position. The status of the stored energy on both mechanisms is also shown on the front of the contactor.

Without power, there are handles available for each power source to charge the mechanism.

The switching device is closed by energizing a solenoid that releases the mechanism. A trip command will open the switching device if charged.
Table 3. Dimensions and Weights

<table>
<thead>
<tr>
<th>AMPERE RATING</th>
<th>ENCLOSURE TYPE</th>
<th>A (HEIGHT)</th>
<th>B (WIDTH)</th>
<th>C (DEPTH)</th>
<th>SHIPPING WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>NEMA 1</td>
<td>90.00 (2286.0)</td>
<td>40.00 (1016.0)</td>
<td>40.00 (1016.0)</td>
<td>1356 (615)</td>
</tr>
<tr>
<td>2600</td>
<td>NEMA 1</td>
<td>90.00 (2286.0)</td>
<td>40.00 (1016.0)</td>
<td>40.00 (1016.0)</td>
<td>1356 (615)</td>
</tr>
<tr>
<td>3000</td>
<td>NEMA 1</td>
<td>90.00 (2286.0)</td>
<td>40.00 (1016.0)</td>
<td>40.00 (1016.0)</td>
<td>1356 (615)</td>
</tr>
<tr>
<td>2000</td>
<td>NEMA 3R</td>
<td>90.69 (2303.5)</td>
<td>40.00 (1016.0)</td>
<td>58.59 (1488.2)</td>
<td>1356 (615)</td>
</tr>
<tr>
<td>2600</td>
<td>NEMA 3R</td>
<td>90.69 (2303.5)</td>
<td>40.00 (1016.0)</td>
<td>58.59 (1488.2)</td>
<td>1356 (615)</td>
</tr>
<tr>
<td>3000</td>
<td>NEMA 3R</td>
<td>90.69 (2303.5)</td>
<td>40.00 (1016.0)</td>
<td>58.59 (1488.2)</td>
<td>1356 (615)</td>
</tr>
</tbody>
</table>

1 Dimension in inches (mm) and weight in lb (kg). Data is approximate and subject to change. Please reference product outline drawings(s) for latest information.
2 Standard depth extensions are available for integration into electrical distribution equipment line-up. Please contact your local Eaton sales representative for more details.
Figure 8b. CAD View of the NEMA 3R Transfer Switch Including Some Outline Dimensions.

Table 4. External Terminal Power Conductors

<table>
<thead>
<tr>
<th>AMPERE RATING</th>
<th>NORMAL</th>
<th>EMERGENCY</th>
<th>LOAD</th>
<th>NEUTRAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>(8) 1/0-750</td>
<td>(8) 1/0-750</td>
<td>(8) 1/0-750</td>
<td>(24) 1/0-750</td>
</tr>
<tr>
<td>2800</td>
<td>(12) 1/0-750</td>
<td>(12) 1/0-750</td>
<td>(12) 1/0-750</td>
<td>(36) 1/0-750</td>
</tr>
<tr>
<td>3000</td>
<td>(12) 1/0-750</td>
<td>(12) 1/0-750</td>
<td>(12) 1/0-750</td>
<td>(36) 1/0-750</td>
</tr>
</tbody>
</table>

- Standard mechanical lugs are UL listed, solderless screw-type Cu/Al. Number of conductors and size range shown is per pole.
- Two-hole compression lug or bus provisions available upon request. Please contact your local Eaton sales representative for more details.
- Only applies to wye system configuration with solid neutral. For four-pole, switched neutral configurations, the number and size of conductors supported will mimic Normal, Emergency and Load information shown.
3.3 System Voltage Selection Panel

3.3.1 Voltage Selection Connectors (208, 220, 240, 380, 415, 480, and 600 Vac, 50/60 Hz)

The voltage selection panel consists of multi-tap transformers, contained in a steel case mounted in the transfer switch enclosure (Figure 9). With the door opened it is mounted in the bottom right side of the inner compartment. The transformer can easily be removed by removing the top two bolts and by using the handle, move the unit towards the center of the switch slightly and pull up. The bottom connection is obtained by two slide-in flanges. The voltage system is selected by simply removing the connector and reconnecting to the desired voltage. The controller’s setpoints will have to be changed to the voltage selected. A connector is provided for 208, 240, 480, 600 for North America and 220, 380, 415 for International voltages. Caution should be taken before changing the voltage of the switch to assure that surge protection device, some relays, etc., are voltage specific and putting the connector on the wrong voltage source could destroy the transformer(s) and other components. Figure 10 shows the two transformers inside the enclosure Line Replaceable Unit (LRU), one for Source 1 and the other for Source 2. The factory default position is the voltage tap based on customer voltage specification.

![North American Voltage Selection Panel](image1)

![Power Transformers (Source1 & Source 2) Example.](image2)

**WARNING**

Caution should be taken before changing the voltage of the switch to assure that surge protection device, some relays, etc., are voltage specific and putting the connector on the wrong voltage source could destroy the added options.

![WARNING](image3)

**WARNING**

When changing the selected voltage, 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.

![ATC-900 type controller](image4)

3.4 Logic Panel

The logic panel contains the controller that provides the intelligence and supervisory circuits which constantly monitor the condition of both the Source 1 and Source 2 power sources, thus providing the required intelligence for transfer operations. Figure 11 shows an ATC-900 type controller. Detailed information is presented in a separate document:

- ATC-900 Instruction Book IB140012EN
- ATC-300+ Instruction Book IB01602009E
3.5 Neutrals

All transfer switches are equipped with 100% rated neutral connections (Figure 12). Different lug configurations are available.

3.6 Features & Options

Switch options, which are not part of the standard logic scheme, are available to meet a variety of other application requirements. Options are numbered with an associated description.

The ATC-900 has many features that are available to the user. These features are standard and are available. Appendix A of the ATC-900 IB (included with the switch), has a list of all of the features including any acronyms used along with a brief description. The feature numbers corresponds to the internal codes and some of these numbers may be on the product drawings. Also, see Table 5 “ATC-900 Features” for a compact list. Table 5 also includes an Inputs/Output full list with Appendix B showing the I/O descriptions.

Some of the features will have to be hard coded into a certain I/O position which cannot be changed by the user. An example of this would be a switch on the device panel on the door to Go To Neutral would be a fixed input. The programmable I/Os are covered in Section 5. The only item that is optional for the transfer switch is the closed transition optional feature. The closed transition is covered in section 1.5.3 of the ATC-900 IB. The ATC-300+ is only an open transition type controller.

The following are some of the more popular options that can be used on the contactor Switch. There are several others available which are shown in the ATC-900 instruction booklet and on the Eaton Website.

9E. Maintenance Isolation Switch (MIS)

Upon opening the front door, service personnel can turn the MIS and electrically isolate the control compartment, while the transfer switch is energized. This innovative design enhances safety in the working environment when performing inspection or routine maintenance. A 2-position, maintained contact switch marked "NORMAL OPERATION" and "MAINTENANCE" is used. When the switch is turned to the Maintenance position, the compartment power is switched off. The voltages removed are the phase sense lines, transformer, and other control wiring that contains voltages. The generator start lines are also disconnected for non false starting of the generator. The switch will not transfer and will remain where it was when the MIS switch was enabled. The Switch is shown in Figure 13.

**WARNING**

**THE VOLTAGE TO THE STABS IN BACK OF THE SWITCH ARE STILL POWERED WHEN THE MIS SWITCH IS USED.**

The MIS is placed in the "Normal Operation" position for normal automatic operation. It is located behind the door in the top right side.

![Figure 13. Maintenance Isolation Switch (MIS).](image)
29G. Automatic/Manual Operation With Selector Switch
This option shown in Figure 14a, is on the device panel on the door and provides a 2-position selector switch (labeled Auto/Manual) that permits selection of the automatic or manual transfer. When in the "Auto" position, the transfer switch operates with fully automatic transfer, retransfer and generator startup and shutdown operations. When in the "Manual" position, manual operation is required to initiate the generator startup or retransfer with generator shutdown operations. When in the manual mode of operation, push button selector switches are used to manually initiate transfer of the load to either Source 1, Source 2 or the neutral position. There are lamps to correspond to the switch’s positions.

Note: Transfer switches must have a white light lit when the switch is not in the automatic switch mode.

29G. Non-Automatic Switch
Figure 14b shows the device panel with switches and lamps with no controller as a non-automatic type. Figure 14c shows the same but with the tether option. With no controller, the lower two lamps are lit when the voltage is present on S1 or S2. “Present” means that there is a voltage but the voltage may not be “Available” since there is not a controller to analyze the voltage & frequency. The same Automatic instructions are followed except that there will be no Auto-Manual switch on the device panel since there is not a controller. If a tether is used, either of the push-button switches, on the door or the tether, could be used to operate the switch. The lamps will follow on each of the device panel or the tether.

29N. Operation with Tether
This option is the same as the previous 29G or non-automatic with the addition of a tether that plugs into the door, see Figures 14c and d. A standard 1:1 (non-crossed) RJ45 CAT5 (8 conductor) is used. The user can stand up to 40 feet (or more) away using the tether. A ten foot cable is provided. The tether is safe as there is no high voltage through the cable nor in the remote itself, only 24 VDC. See Section 5 (Operation) for more information.
Figure 14c. Non-Automatic Switch Operation (No Controller) with Optional Tether

Figure 14d. Tether Option for Remote Manual Operation.
41E. Space Heater With Thermostat
With the space heater option, a 375-watt space heater is mounted at the bottom of the structure. A separate transformer is provided for the heater as well as a thermostat.

SPD
The SPD features a Thermally Protected Metal Oxide Varistor technology. It comes with dual-colored protection status indicators for each phase and for neutral-ground protection mode. It comes with an audible alarm with silence button and a Form C contact. An optional SPD with surge counter feature package is available. When changing the voltage connector on the transformer, the surge protection device should be investigated first to assure that the voltage matches. See Section 3.3.1.

3.7 Enclosure
The rugged steel switch enclosure is supplied with four door hinges, to insure proper support of the door and door mounted devices. The hinges have removable hinge pins to facilitate door removal. The doors are supplied as standard with thumbscrew and padlock latches. Cable entry holes are the customer's responsibility. The door is used to mount a variety of lights, switches, and push buttons, depending upon the options required for a particular switch. All switch doors are supplied with two heavy duty plastic accessory device panels, whether or not external devices are required. When lights, pushbuttons, or switches are required, they are normally mounted in the device panel.

Transfer switch enclosures and some internal steel mounting plates, such as the transformer panel mounting plate, go through a pre-treatment cleaning system prior to painting to insure a durable finish. Should the enclosure become scratched and in need of touch up paint, use ANSI 61. All remaining steel is galvanized. The standard switch enclosure is NEMA Type 1 for general indoor use (Table 3).

Table 5. Transfer Switch Equipment Enclosures.

<table>
<thead>
<tr>
<th>NEMA TYPE</th>
<th>DESIGN</th>
<th>PROTECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3R</td>
<td>Outdoor</td>
<td>Rain, Ice Formation</td>
</tr>
</tbody>
</table>

3.8 Standards
Eaton transfer switch equipment is listed for application by UL and CSA. In addition, Eaton ATSs are listed in File E38116, E38116SP, E61639, and E131767.by UL, Inc., under Standard UL 1008. This standard covers requirements for ATSs intended for use in ordinary locations to provide for lighting and power as follows:

a. In emergency systems, in accordance with articles 517 and 700 in the National Electrical Code (NEC), American National Standards Institute/National Fire Protection Association (ANSI/NFPA) 70 and the NFPA No. 76A and/or
b. In stand-by systems, in accordance with article 702 of the NEC and/or
c. In legally required stand-by systems in accordance with article 701 of the NEC.
d. In critical operations power systems (COPS article 708) in accordance with article 708 of the NEC
e. OSHPD seismic standards (AC-156)

Section 4: Installation and Wiring

4.1 General
Eaton transfer switches are factory wired and tested. Installation requires solidly mounting the enclosed unit and connecting the 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 Diagram packaged with the transfer switch.

Locate the wiring booklet, review it, and keep it readily available for reference purposes during installation and testing. Once a transfer switch 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 8.1 of this instruction manual.

⚠️ WARNING

BE CERTAIN THAT THE SOLID STEEL DEAD FRONT SHIELDS ARE PROPERLY INSTALLED BEFORE THE TRANSFER SWITCH EQUIPMENT IS PUT INTO SERVICE. THE SHIELD 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.

4.2 Mounting Location
Choose a location that offers a flat, rigid mounting surface capable of supporting the weight of the enclosed transfer switch equipment. Avoid locations that are moist, hot, or dusty. However, Eaton offers enclosure designs that can be used in special environments. If there are any doubts as to the suitability of the location, discuss it with your Eaton representative.

Check to make certain that there are no pipes, wires, or other hazards in the immediate area that could create a problem. The panels provide ample room for rear cable entry from top, bottom, and sides. At no time should cable be routed to retard the action of relays or cover the logic in a way that restricts adjustments. Maintain proper electrical clearances between live metal parts and grounded metal.

For installation and maintenance purposes, the Source 1 and Source 2 power sources must have an overcurrent protective device upstream of the transfer switch. The dimensions of the transfer switch are an important consideration in determining proper location selection.

4.3 Unpackaging and Inspection

⚠️ CAUTION

SINCE THE ENCLOSED TRANSFER SWITCH MUST BE LIFTED INTO PLACE FOR MOUNTING, BE CERTAIN THAT ADEQUATE RESOURCES ARE AVAILABLE FOR LISTING TO AVOID PERSONNEL INJURIES OR EQUIPMENT DAMAGE.
Proceed with the following four steps:

**Step 1:** Carefully uncrate the transfer switch. If damage is visible, please contact your local Eaton sales representative or the factory.

**Step 2:** Open the door and visually verify that there are no broken or damaged components or evidence of distorted metal or loose wires as a result of rough handling.

**Step 3:** A label on the door provides specifications for your transfer switch. Verify that these specifications comply with your requirements.

**Step 4:** Remove any braces or packing used to protect the transfer switch or internal components during shipping.

---

### CAUTION

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

---

**4.4 Mounting Procedure**

**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. The switch conforms to the Seismic Uniform Building Code (UBC) Zone 4 certification (Figure 15). Secure with 1/2-13 UNC Grade 5 or better hex bolts. Seismic per IBC 2012, CBC 2013, OSHPD OSP-0014-10 (3200 A and below). A reminder, the outside brackets are for the shipment of the switch. They are not required to meet seismic certification but can be used if desirable and will take more room side to side. See the Outline drawing (Figure 8) for specific mounting areas for the switch.

**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. Some items that are shipped loose are found in the bottom of the switch on top of the shipping pallet.

---

**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 TRANSFER SWITCH EQUIPMENT BEFORE BEGINNING TO WORK WITH THE CONDUCTORS AND/OR TERMINATING THEM TO THE EQUIPMENT.

**CAUTION**

USE OF CABLE LUGS NOT DESIGNED FOR THE TRANSFER SWITCH APPLICATIONS MAY CAUSE HEATING PROBLEMS. IN GENERAL, CONTACTOR LUGS ONLY MOUNT TO THE CONTACTOR, WHILE TRANSFER SWITCH LUGS MOUNT TO BOTH THE CONTACTOR AND THE BUS BAR BEHIND THE CONTACTOR. FOR INSTALLATION INSTRUCTIONS, REFER TO THE INSTRUCTION LEAFLET SUPPLIED FOR THE SPECIFIC LUGS.

**CAUTION**

TO HELP PREVENT COMPONENT DAMAGE OR FUTURE MALFUNCTIONS, USE EXTREME CARE TO KEEP CONTAMINANTS OUT OF THE TRANSFER SWITCH EQUIPMENT WHEN MAKING POWER CABLE CONNECTIONS.
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 or optional compression 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 6.

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

If desired, wrap the line cables together with nominal 3/8 inch nylon rope or rope having tensile strength of 2,000 pounds.

### Table 6. Wire Size for Available Power Cable Connections

<table>
<thead>
<tr>
<th>AMPS</th>
<th>MAX # OF CONDUCTORS</th>
<th>TERMINAL SIZE</th>
<th>TORQUE FT-LB (NM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>8</td>
<td>1/0-750 CU/AL</td>
<td>32 (42)</td>
</tr>
<tr>
<td>2600-3000</td>
<td>12</td>
<td>1/0-750 CU/AL</td>
<td>32 (42)</td>
</tr>
</tbody>
</table>

**CAUTION**

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

Cables can be integrated from the top, bottom, rear, and sides. Front access is also available as shown in the four pictures in Figure 16. These pictures show, from left to right, that the panels can be removed, then the dead fronts and shelves, which will allow easy front accessibility to the terminal lugs. A few bolts will release the metal. The dead fronts have handles for ease of removal.

---

**Figure 16.**

**Installation Steps:**

**Step 1:** Verify that the line and load cables comply with applicable electrical codes.

**Step 2:** Verify that the transfer switch rated current and voltage (see identification plate on the door of the transfer switch) agree with system current and voltage.

**Step 3:** After the transfer switch is mounted, provide the conduit or cable openings as required. Ensure that no metal filings contaminate the transfer switch components.

**Step 4:** Test all power cables before connecting them to the unit to insure that the conductors or the cable insulation have not been damaged while being pulled into position.

**Step 5:** Carefully strip the insulation from the power cables. 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. Refer to Figure 8 for the approximate locations of the power connections.

**Step 6:** Make the necessary connections of any options using the wiring diagrams supplied with the unit.

**Step 7:** Connect the engine start wires to the Red Terminal blocks (normally open) for S2 Generator Start located on the lower door’s option panel.
4.6 Voltage Selection Adjustment (Non-Connector)

Certain devices, such as the voltage selection panel, sensing relays, and timers need to be set and/or calibrated prior to placing the transfer switch equipment into service. Adjustments for logic devices are described in the separate instructional document dedicated to the specific logic being used.

4.7 Voltage Selection Connectors (208, 220, 240, 380, 415, 480, and 600 Vac, 50/60 Hz)

The voltage selection panel consists of multi-tap transformers, contained in a steel case mounted in the transfer switch enclosure (Figure 17). With the door opened it is mounted in the bottom right side of the inner compartment. The transformer can easily be removed by removing the top two bolts and by using the handle, move the unit towards the center of the switch slightly and pull up. The bottom connection is obtained by two slide-in flanges. The Multi-tap voltage selector allows the transfer switch to be easily field configured for operation at different system voltages via a single quick-connect plug. See section 3.3.1 for more information. The voltage is selected by simply removing the connector and reconnecting to the desired voltage.

---

**WARNING**

WHEN CHANGING THE SELECTED VOLTAGE, 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.

---

**WARNING**

DISCONNECT ALL SOURCES OF POWER TO DISCONNECT P7/S7 PRIOR TO PERFORMING THE FOLLOWING. FAILURE TO DO SO MAY CAUSE SERIOUS INJURY OR DEATH.

- Remove the transformer pack cover by loosening the 2 screws located at the top of the transformer pack assembly. Using the handle lean to to left and pull up. The bottom of the unit has flanges for easy removal.
- The transformers are factory set on the voltage tap specified by the customer. (See illustration above for location of various taps and voltages)

---

**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.
4.8 Customer Interface Terminal Blocks

The door of the switch is shown in Figure 18 with the inside of the door shown in Figure 19 and 20. Different options will be populated in the device panel as well as the logic panel so there are differences in these locations. There are terminal blocks inside the unit for customer interface are shown in Figure 23. These terminal blocks provide a set of auxiliary form C position contacts for the contactor. They are on top of the controller and are easily accessible. The standard configuration for auxiliary contacts are 4 NO and 6 NC for both source 1 and source 2. Optional auxiliary contacts are available that will increase the amounts for both source 1 and source 2 to 6 NO and 8 NC. If the tether option is used, only the standard 4 NO and 6 NC are available. There are also terminal blocks on the logic panel for Engine Start, ATC-900 inputs, and the I/O Module expansion power connector.

Figure 18. An Example of the Front of Door with Controller and Device Panels with Some Options.

Figure 19. Rear Door, Shown with Some Options.

Figure 20. Logic Panel on Lower Door for Custom & Logic Components, Shown with Some Options.

These terminal blocks shown below are for the ATC-900 type switches.

Note: 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. A contact closes between these terminal blocks when an engine start signal is provided by the ATS logic.

The ATC-900 type switches bring the input connections also out to terminal blocks. It is best to look at the switch drawings for the terminal blocks for any special additional wiring. The following are the standard terminal blocks when the ATC-900 is used. Inspect the drawings if the ATC-300 is used.

**TB9**
1 - 8 ATC-900 USER INPUTS
- INPUT 1 TBJ9-1 & TBJ9-2
- INPUT 2 TBJ9-3 & TBJ9-4
- INPUT 3 TBJ9-5 & TBJ9-6
- INPUT 4 TBJ9-7 & TBJ9-8

**TBJ15**
1 - 6 GENERATOR START
- GEN START S1 TBJ15-1 COMMON
- GEN START S1 TBJ15-2 NO
- GEN START S1 TBJ15-3 NC
- GEN START S2 TBJ15-4 COMMON (RED)
- GEN START S2 TBJ15-5 NO (RED)
- GEN START S2 TBJ15-6 NC

**TBJ25**
1 - 4 I/O MODULE POWER
- SOURCE 1 120V TBJ25-1 LINE
- SOURCE 1 120V TBJ25-2 COMMON
- SOURCE 2 120V TBJ25-3 LINE
- SOURCE 2 120V TBJ25-4 COMMON

An example of the auxiliary contacts in a typical drawing is shown below.
4.9 Wiring

**CAUTION**

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

Power sources, load conductors, and control wiring should be connected to locations as indicated in the **Customer Wiring Diagrams** supplied with the transfer switch equipment. Figures 21 and 22 are the rear views of the ATC-300+ and ATC-900 respectively. More information can be found in their instruction booklets.

---

**Figure 21. Contactor ATS (Rear View of ATC-300+ Controller).**

**Figure 22. Contactor ATS (Rear View of ATC-900 Controller with a DCT Module).**

### 4.9.1 Parallel Limit Timer Relay (Closed Transition Only)

For a closed transition, a Time Delay Utility Parallel (TDUP) is provided with a terminal block. The TDUP (Parallel Limit Timer or Watchdog Timer) will close a dry contact (accessible at the terminal block) if the timer reaches the value preset by the user. The user can assign this terminal block contact closure to open an upstream breaker and place the controller in a Lockout mode.

If the closed transition option is ordered, the unit will arrive from the factory with the Closed Transition provided. There is the ability to make the unit into an open transition if desired by changing the setpoints in the ATC-900 controller. The user has many open transition options including In-Phase, Time Delay Neutral, and Low Voltage Decay. One can set an individual setting or have them work together in a serial fashion. See the ATC-900 instruction booklet for more information.
4.9.2 I/O Contact Terminal Blocks with ATC-900 & I/O Module(s)
All customer connections are located on the bottom of the door on the logic panel. As shown in the ATC-900 Instruction Booklet, there are 4 in and 4 out available programmable I/Os from the controller. The inputs are wired out from the ATC-900 to terminal blocks for easier access as shown in Section 4.8. When using I/O Modules, there could be up to 20 in and 20 out (Form C) available. Customer connections to the I/O module is through the terminal blocks located on the I/O module. More information on the I/O module can be obtained in the ATC-900 instruction booklet. Some I/O may be fixed depending on the options chosen i.e. service entrance needs Go to Neutral so that input would be fixed.

4.9.3 Secondary Contactor Terminal Blocks
Shown in Figure 23, the contactor secondary terminal blocks are shown in front of the deadfronts for easy accessibility. The user should only be accessing the terminal blocks for auxiliary connections if desired. Check the schematic drawing for remaining auxiliaries available for source 1 or source 2 as custom requirements and options could reduce the amount of auxiliaries remaining.

Figure 23. User Terminal Blocks Mounted Above the Contactor. See Switch Wiring Drawings.
Section 5: Operation

5.1 General

A transfer switch provides main contacts to connect and disconnect the load to and from the Source 1 and Source 2 power sources. A stored-energy type transfer mechanism provides the mechanical motion required to open and close the main contacts. The transfer switch can be manually operated. Before the main contacts can be closed, the stored energy mechanism must be charged by pumping the handle (Figure 24). Each side (S1 and S2) must be charged. S1 is in the left and the handle charges downward. S2 in on the right with the handle charging upwards. When power is available, the internal motors will charge the device. The unit is fully charged when the flags show yellow as shown in Figures 26 and 27.

When source 1 is closed, the source 2 button should never be pushed to close source 2. Likewise, when source 2 is closed, the source 1 button should never be pushed to close source 1. An indicator window shows whether the switch is open or closed.

That paddle shown directs the close for source 1 or source 2. The Green push-button opens both sides of the contactor. The optional Kirk-Key locks the mechanism in the open position.

The contactor can be used as an open transition or if ordered, a closed transition product. The contactor will have rigid mechanical interlocks inside the contactor for open transition to assure that both sources do not close at the same time. The closed transition does not have mechanical interlocks because the sources are made to overlap for a maximum of 100 msec as per the specification for Closed Transition. When a source is closed, the other source (push button) should never be closed. The trip must be inserted before any close is initiated, Figure 25. An indicator window shows whether the switch is open or closed.
5.2 Automatic Transfer Switch

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, Source 1 power source restoration, and testing is described in the associated Controller Instruction Booklet.

5.3 Tether Operation

The optional Tether (Figure 28) is used to allow the user to be some distance from the switch to manually transfer (open only) to the sources or do a trip. The cable used between the switch door and the handheld control device is a standard 1:1 (non-crossed) RJ45 cable. A 10’ cable is supplied but longer ones can be used and since the cable is a standard RJ45 CAT5 (8 conductor non-crossed) type, the user can easily acquire one. The voltage in the Tether is 24VDC.

To operate the Tether, plug in the cable into the RJ45 socket on the door. Turn the Auto - Manual switch (if the switch has a controller) that is on the door to "Manual." The white light on the door will be illuminated to show that the unit is no longer in automatic mode. The controller will now be in monitor mode and show "not in automatic." The mimic bus will follow the user’s tether inputs. If the switch has no controller, being a non-automatic type, the same instructions are followed except that there will be no Auto-Manual switch on the device panel. One could use the tether or the push buttons on the door to operate the switch.

Figure 28. Optional Tether with Illuminated Push-Button Switches.

Using the handheld control, simply push the buttons to the require state. Power is only required to be on one source for the tether to be able to control the switch to source 1, trip, or source 2. Of course the load will not be powered in some instances. The push buttons will illuminate depending on what state the switch is in. If a button is not illuminated, make sure the cable is plugged into the device and the door.

If desired, the door of the switch also has similar push buttons to manually operate the switch. When operation is complete, simply turn the Auto - Manual switch to “Auto” and the white light will go out and the controller will be in the automatic mode. The switch may go back to the preferred source if it was not already there when the switch was turned to Auto.

5.4 MIS Operation

The MIS is a 2-position, maintained contact Transfer Mode switch marked "NORMAL OPERATION" and "MAINTENANCE" (see Figure 29). When the switch is turned to the Maintenance position, the compartment power is switched off. Examples of compartment power are sense lines to the controller, power to the transformer, generator starts, and controller contactor control power. The MIS is placed in the "Normal Operation" position for normal automatic operation. The voltage to the stabs in the rear of the switch are still powered when the MIS switch is used.

Figure 29. Maintenance Isolation Switch

5.5 Closed Transition

Eaton transfer switches are mechanically and electrically interlocked to prevent the two sets of main contacts from being closed simultaneously in the open transition mode. For a closed transition switch, the interlocks cannot be used as the sources must overlap for a time of under 100ms by specification. The overlapping contacts must be synchronized with the correct phase angle, frequency, and voltage before the attempt to close is made. Attempting to close both switching devices can cause damage, severe injury or death. Figure 30 shows two labels that are used when the switch is a closed transition type.
OVERLAPPING CONTACTS SOURCE 1 AND SOURCE 2 must be Synchronized

THIS PRODUCT CONTAINS A SPECIAL CONTACT ARRANGEMENT (OVERLAPPING CONTACTS). MISUSE CAN RESULT IN DEATH SEVERE PERSONAL INJURY OR PROPERTY DAMAGE.

WARNING

OVERLAPPING CONTACTS SOURCE 1 AND SOURCE 2 must be Synchronized

DANGER

Attempting to close both switching devices simultaneously can cause severe injury or death. Follow Manual Operation Instructions Below

Manual Operation Instructions

1. Remove ALL Power Sources.
2. Disconnect Controller Power Connector
3. Open both switching devices
4. Verify "OFF" flags
5. Verify which source will be available and make sure all sources are OFF.
6. See mechanism instructions to close on S1 or S2. Close switching device on source that will be available.
7. Verify switching device is on correct source, reconnect controller power connector J7, close door(s) and then turn on source.

THESE INSTRUCTIONS ONLY PERTAIN TO MANUALLY CLOSING A SINGLE SWITCHING DEVICE. ATTEMPTING TO CLOSE BOTH SWITCHING DEVICES CAN CAUSE SEVERE INJURY OR DEATH.

Figure 30. Switching Device Closing Precautions (Closed Transition Only).
Section 6: Testing and Problem Solving

6.1 Testing

After transfer switch 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 to avoid unexpected malfunctions. Mechanical and/or electrical tests should be performed.

The frequency of subsequent testing should be based on recommendations of the generator set manufacturer. Use the test push-button to check the electrical operation of the switch. **IF A TEST SWITCH IS PROVIDED, ALWAYS RETURN THE SWITCH TO THE AUTO POSITION AFTER THE TEST IS COMPLETE.**

**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

**WARNING**

FOR MECHANICAL OPERATIONS, REFER TO SECTION 5 IN THIS INSTRUCTION BOOK. REFER TO THE APPLICABLE LOGIC INSTRUCTION BOOK FOR ELECTRICAL TESTING

6.2 Problem Solving

**WARNING**

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

**WARNING**

ONLY PROPERLY TRAINED PERSONNEL FAMILIAR WITH THE TRANSFER SWITCH EQUIPMENT AND ITS ASSOCIATED EQUIPMENT SHOULD BE PERMITTED TO PERFORM THE PROBLEM SOLVING FUNCTION. IF AN INDIVIDUAL DOES NOT FEEL QUALIFIED TO PERFORM THE PROBLEM SOLVING FUNCTION, THE INDIVIDUAL SHOULD NOT ATTEMPT TO PERFORM ANY OF THESE PROCEDURES.

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. Most problem solving procedures are outlined in the instruction manual unique to the type of logic being used. In addition, several problem solving procedures are presented here which are specific to the type of switches or switching devices used in this equipment.

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

1. General Order Number (GO #) of the transfer switch, plus related Item Number;
2. Catalog and/or Style Number of the transfer switch;
3. Actual location of transfer switch (type of facility, address, etc.);
4. Company name;
5. Name and position of individual representing company;
6. Basic description of situation as it exists; and
7. Any results of problem solving steps taken and/or readings taken.

**WARNING**

THIS CLOSED TRANSITION PRODUCT CONTAINS A SPECIAL CONTACT ARRANGEMENT (OVERLAPPING CONTACTS). MISUSE CAN RESULT IN DEATH, SEVERE PERSONAL INJURY, AND/OR PROPERTY DAMAGE.

6.2.1 Transfer Switch Appears Inoperative

**Step 1:** Verify that all plugs and sockets are properly interconnected. Verify that all wires are inserted and secure into the Terminal Blocks on top of the contactor.

**Step 2:** Verify that the correct system voltage appears at Source 1.

**Step 3:** Verify that the voltage selection plug is in the proper position to match the system voltage.

**Step 4:** Look for any obviously burned components. Determine the cause and rectify, if possible. Replace any defective components after the cause is determined.

**Step 5:** For closed transition, refer to Figure 30 for manual operating instructions. Verify whether or not the system voltage now appears on the load terminals.

If YES: Check the logic for problems in the respective logic instruction book.

If NO: Check all power connections and the switching mechanism.

**Step 5:** For open transition, press the Push-To-Close button on the Source 1 switching device. Verify whether or not the system voltage now appears on the load terminals.

If YES: Check the logic for problems in the respective logic instruction book.

If NO: Check all power connections and the switching mechanism.

For more information visit: www.eaton.com
6.2.2 Transfer Switch Will Not Automatically Transfer to Source 1
Step 1: Check for the proper line voltage on N1, N2, and N3.
Step 2: Is the Source 1 switching device charged?
   If YES: Continue with the other procedures.
   If NO: The S1 Charge pins are on S1A14 and S1A15. There should be measured a constant 120VAC.
Step 3: Is the Source 2 switch OPEN?
   If YES: Proceed to Step 5.
   If NO: Proceed to Step 4.
Step 4: Measure the voltage between terminals S2C3 and S2C4 on the Source 2 switching device (shunt trip). The controller may need to be reset so that the voltage can be measured. The controller will keep the voltage on for about 6 seconds. Does the voltage measure 120 Vac ± 10 volts?
   If YES: Check the shunt trip in the Source 2 switch.
   If NO: Check the wiring to S2C3 and S2C4.
Step 5: Measure the voltage between terminals S1A24 and S1A25 on the Source 1 switching device (spring release coil). Does the voltage measure 120 Vac ± 10 volts? Record the reading.
   If YES: Check the spring release coil in Source 1 switch.
   If NO: Check the wiring to S1A24 and S1A25.

6.2.3 Transfer Switch Will Not Automatically Transfer to Source 2
Step 1: Check for the proper line voltage on E1, E2, and E3.
Step 2: Is the Source 2 switching device charged?
   If YES: Continue with the other procedures.
   If NO: The S1 Charge pins are on S2C29 and S2C30. There should be measured a constant 120VAC.
Step 3: Is the Source 1 switching device OPEN?
   If YES: Proceed to Step 5.
   If NO: Proceed to Step 4.
Step 4: Measure the voltage between terminals S1A26 and S1A27 on the Source 1 switching device (shunt trip). The controller may need to be reset so that the voltage can be measured. The controller will keep the voltage on for about 6 seconds. Does the voltage measure 120 Vac ± 10 volts? Record the reading.
   If YES: Check the shunt trip in the Source 1 switch.
   If NO: Check the wiring to S1A24 and S1A25.
Step 5: Measure the voltage between terminals S2C1 and S2C2 on the Source 2 switching device (spring release coil). The controller may need to be reset so that the voltage can be measured. The controller will keep the voltage on for about 6 seconds. Does the voltage measure 120 Vac ± 10 volts? Record the reading.
   If YES: Check the spring release coil in Source 2 switch.
   If NO: Check the wiring to S2C1 and S2C2.

6.2.4 Transfer Switch Will Not Automatically Recharge
The S1 Charge pins are on terminal blocks S1A14 and S1A15. There should be a constant 120VAC on these pins. The S2 Charge pins are on S2C29 and S2C30. See sheet -W001. The S1A14 and S2C29 (COM) are jumpered together as well as S1A15 and S2C30 (Line). The COM is grounded and the Line goes to S13-3 and then to KV-12 on sheet -S002. KV-12 contains the line side of 120VAC.

6.2.5 Contactor’s Contact Resistance
Contact resistance should not be considered a reliable measure of a contactor’s ability to carry rated current. Contact resistance is usually measured with low currents from a low voltage supply flowing through the contacts, and the resistance value is heavily dependent on transient contact surface conditions. The transient surface conditions can vary with factors such as contact material, gaseous ambient, and the current level. The resistance can decrease with the flow of current.

The milli-volt drop procedure outlined in NEMA Standards Publication AB 4 can be used to assess the electrical integrity of connections and contacts within a contactor. Again, the millivolt drop can be affected by contact surface conditions which can change with contactor operation and arcing. The millivolt drop is only one factor in determining the thermal loading of a contactor, and the total system must be considered prior to judging a contactor to be unacceptable. If resistance and millivolt drop test data raises concerns with regard to contactor integrity, a proper thermal test must be performed. The contactors are listed to UL 1008 which does not contain specific resistance requirements. It does require specific temperature rise requirements that are to be met after overload testing.
Section 7: Maintenance

7.1 Introduction

In general, transfer 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 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 regularly 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.

7.2 Maintenance Procedures

A suggested maintenance procedure to follow is outlined in Table 6.

Table 7. Periodic Maintenance Procedures.

<table>
<thead>
<tr>
<th>STEP</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Make the transfer switch equipment safe for inspection and/or maintenance.</td>
<td>Disconnect the line power from the equipment being serviced by opening next highest disconnect device. Make certain that any accessory control power is switched off and the logic plugs are disconnected.</td>
</tr>
<tr>
<td>b. Inspect the structure area for any safety hazards or potential maintenance problems.</td>
<td>Inspect the area, especially where switching devices are installed, for any safety hazards, including personnel safety and fire hazards. Exposure to certain chemical vapors can cause deterioration of electrical connections. Inspect for accumulated dirt, loose hardware, or physical damage. Examine the primary insulation for evidence of cracking or overheating. Overheating will show as discoloration, melting or blistering of conductor insulation, or as pitting or melting of conductor surfaces due to arcing. Inspect the secondary control connections for damage and the control wiring for insulation integrity.</td>
</tr>
<tr>
<td>c. Inspect the switching devices for dust, dirt, soot, grease, moisture, or corrosion.</td>
<td>Remove the dust, dirt, soot, grease, moisture, and corrosion contamination from the surface of the switching device using a dry, soft lint-free cloth, dry, soft bristle brush, and vacuum cleaner. Do not blow debris into the switching device or nearby the contactor structure. If contamination is found, look for the source and fix the problem.</td>
</tr>
<tr>
<td>d. Check for material integrity, uneven wear, discoloration, or loose hardware.</td>
<td>Severe material cracking will require replacement and loose hardware will need to be tightened.</td>
</tr>
<tr>
<td>e. Check all terminals and connectors for looseness or signs of overheating.</td>
<td>Overheating will show as discoloration, melting, or blistering of conductor insulation. Connections that do not have signs of looseness or overheating should not be disturbed.</td>
</tr>
<tr>
<td>f. Contact Inspection Procedure</td>
<td>Loosen the arc chute retaining screws on the top rear of the contactor, see Figures 31A and 31B, then slide the molded cover toward the back of the contactor. The arc chute can then be lifted out of the molded case and the contacts can be inspected. Contact Eaton Care (1-877-ETN-CARE, Option-2, Option-4, Option-3) if the contacts have excessive wear. Reinstall the arc chute, slide the cover forward and tighten the retaining screw. For more information see section 6.2.5 on contact resistance.</td>
</tr>
<tr>
<td>g. Exercise the switching devices if they are not often exercised while in operation. This will permit a wiping action by the contacts.</td>
<td>If a switching device is used for frequent switching during normal operation, this step can be disregarded.</td>
</tr>
<tr>
<td>h. Inspect NEMA 3R filters for blockage or contamination.</td>
<td>For NEMA 3R enclosed transfer switches with venting, check that the air filters are clean and uncompromised. Replace the filters as necessary.</td>
</tr>
<tr>
<td>i. Return the transfer switch equipment to service.</td>
<td>Make certain that all barriers are in place and the doors are closed. Reapply the Source 1 and Source 2 power.</td>
</tr>
</tbody>
</table>

Figure 31A. Contacts Behind ARC Chutes.

Figure 31B. Contacts
Section 8: Renewal Parts Guide

8.1 General

Refer to Figure 32 for assistance with selecting and ordering selected ATS renewal parts.

<table>
<thead>
<tr>
<th>FUNCTION / DEVICE</th>
<th>PART NUMBER</th>
<th>QTY. PER SWITCH</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>F5 2 Pole Contactor Assy</td>
<td>66A8206G08</td>
<td>1</td>
<td>2 pole Short-Circuit rated contactor</td>
</tr>
<tr>
<td>F5 3 Pole Contactor Assy</td>
<td>66A8206G03</td>
<td>1</td>
<td>3 pole Short-Circuit rated contactor</td>
</tr>
<tr>
<td>F5 4 Pole Contactor Assy</td>
<td>66A8206G04</td>
<td>1</td>
<td>4 pole Short-Circuit rated contactor</td>
</tr>
<tr>
<td>G5 2 Pole Contactor Assy</td>
<td>66A8206G05</td>
<td>1</td>
<td>2 pole Short-circuit/Short-Time rated contactor</td>
</tr>
<tr>
<td>G5 3 Pole Contactor Assy</td>
<td>66A8206G01</td>
<td>1</td>
<td>3 pole Short-circuit/Short-Time rated contactor</td>
</tr>
<tr>
<td>G5 4 Pole Contactor Assy</td>
<td>66A8206G02</td>
<td>1</td>
<td>4 pole Short-circuit/Short-Time rated contactor</td>
</tr>
</tbody>
</table>

**Replacement Parts List**

Replacement parts can vary depending on the specifications of the unit ordered and should be based on the ACTUAL General Order Number / Catalog Number and/or Manufacturing Information generated from the Bidmanager file. This list represents some of the most common replacement parts available.

**WIRE HARNESS ASSEMBLIES**

| HARNESS | 69C2792G01 | 1 | MAIN LOGIC HARNESS W ATC-900 |
| HARNESS | 69C2793G01 | 1 | MAIN INTERCONNECT HARNESS |
| HARNESS | 69C2772G01 | 1 | INTERNAL WIRE HARNESS |
| HARNESS | 69C2775G01 | 1 | SOURCE SENSE LINE HARNESS |
| MIS Switch Harness (Option) | 69C2774G01 | 1 | MIS SWITCH HARNESS |

**CONTROLLERS**

| ATC-300+ | Call Factory | 1 | ATC-300+ CONTROLLER-CONTACTOR, 3 POSITION |
| ATC-900 | Call Factory | 1 | ATC-900 CONTROLLER-CONTACTOR, Open Transition |
| ATC-900 | Call Factory | 1 | ATC-900 CONTROLLER-CONTACTOR, Closed Transition |
## Replacement Parts List (Continued)

<table>
<thead>
<tr>
<th>FUNCTION / DEVICE</th>
<th>PART NUMBER</th>
<th>QTY. PER SWITCH</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONTROL RELAYS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>67A2579613</td>
<td>2</td>
<td>RELAY ASSEMBLY, 2POLE, 120VAC (KV Relay)</td>
</tr>
<tr>
<td><strong>LINE REPLACEABLE UNITS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENCLOSURE DOOR</td>
<td>69C2577G01</td>
<td>1</td>
<td>ATS BYPASS ISOLATION DOOR ASSY - ATC-900</td>
</tr>
<tr>
<td>TEATHER (OPTION)</td>
<td>69C2578G01</td>
<td>1</td>
<td>OPTIONAL TETHER INCLUDING 10' CABLE</td>
</tr>
<tr>
<td>TRANSFORMER</td>
<td>66A8222G01</td>
<td>1</td>
<td>TRANSFORMER BOX ASSY</td>
</tr>
<tr>
<td>MIS (OPTION)</td>
<td>69C2576G01</td>
<td>1</td>
<td>MIS SWITCH AND HARNESS</td>
</tr>
<tr>
<td>DOOR LOGIC PANEL</td>
<td>69C2576G01</td>
<td>1</td>
<td>DOOR PANEL ASSEMBLY</td>
</tr>
<tr>
<td>TERMINAL BLOCKS</td>
<td>69C2576G01</td>
<td>1</td>
<td>SECONDARY TERMINAL BLOCK ASSY</td>
</tr>
</tbody>
</table>

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