



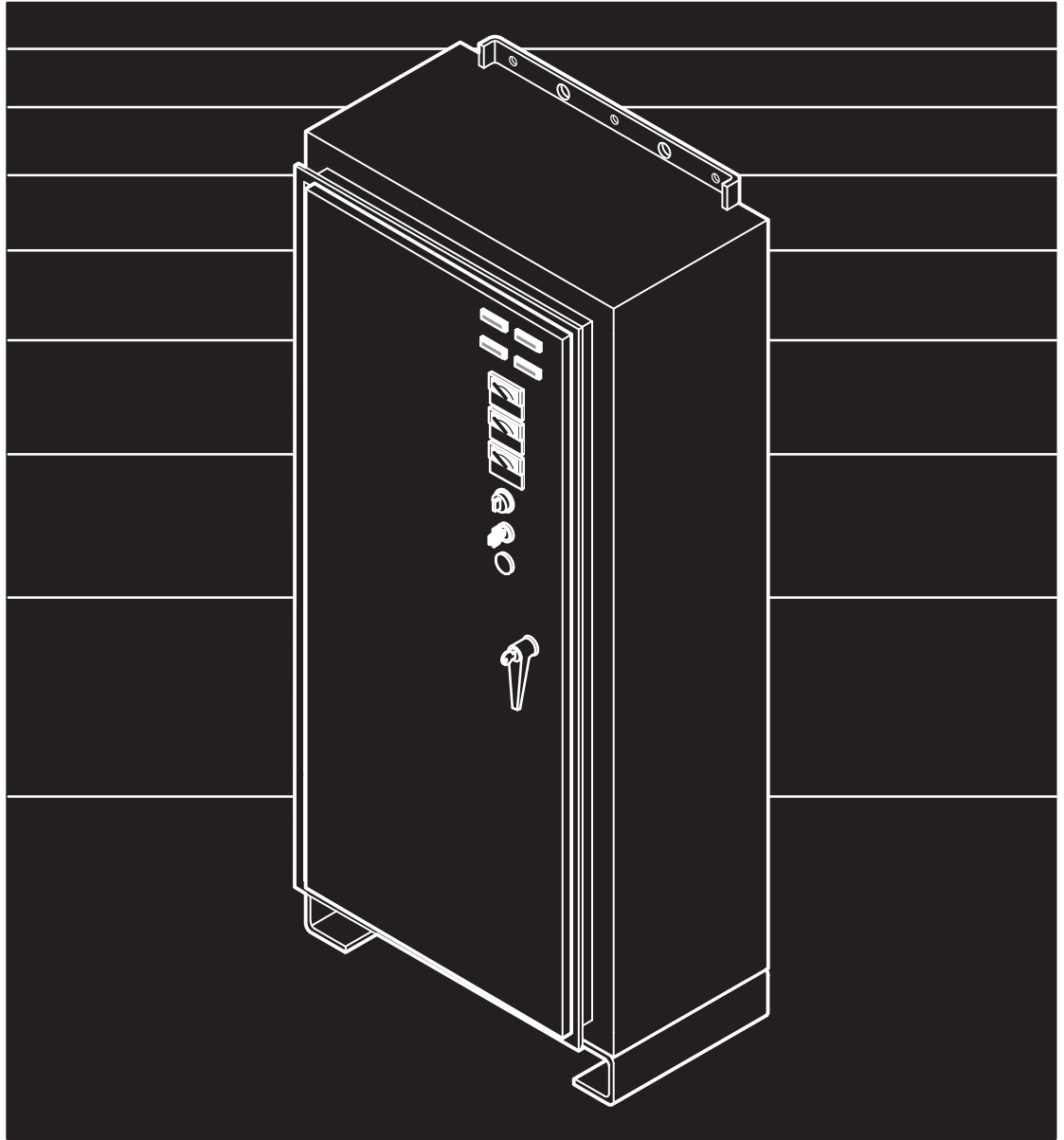
Operator's Manual

OT III

Transfer Switch

1200 to 3000 Amperes

Utility-to-Utility



Printed U.S.A.

962-0119 6-93

Table of Contents

SECTION	TITLE	PAGE
1	INTRODUCTION	1-1
	Operator's Manual	1-1
	Transfer Switch Application	1-1
	Automatic Transfer Switches	1-1
	Model Identification	1-2
	How to Obtain Service	1-2
2	DESCRIPTION	2-1
	Cabinet	2-1
	Transfer Switch	2-2
	Electronic Control System	2-4
3	OPERATION	3-1
	Automatic Operation	3-1
	Manual Operation	3-1
	Preventive Maintenance	3-3
4	TROUBLESHOOTING	4-1
	Transfer Switch Does Not Transfer Automatically	4-1
	Transfer Switch Does Not Retransfer Automatically	4-1

⚠ WARNING

INCORRECT SERVICE OR REPLACEMENT OF PARTS CAN RESULT IN DEATH, SEVERE PERSONAL INJURY, AND/OR EQUIPMENT DAMAGE. SERVICE PERSONNEL MUST BE QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE.

Safety Precautions

This manual includes the following symbols to indicate potentially dangerous conditions. Read the manual carefully and know when these conditions exist. Then take the necessary steps to protect personnel and the equipment.

⚠ DANGER *This symbol warns of immediate hazards that will result in severe personal injury or death.*

⚠ WARNING *This symbol refers to a hazard or unsafe practice that can result in severe personal injury or death.*

⚠ CAUTION *This symbol refers to a hazard or unsafe practice that can result in personal injury or product or property damage.*

AC and DC voltages in the transfer switch components present serious shock hazards that can result in severe personal injury or death. Read and follow these instructions.

Keep the transfer switch cabinet closed and locked. Make sure only authorized personnel have the cabinet and operational keys.

Due to the serious shock hazard from high voltages within the cabinet, all service and adjustments to the transfer switch must be performed only by an electrician or authorized service representative.

If the cabinet must be opened for any reason, remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

Place rubber insulative mats on dry wood platforms over metal or concrete floors when working on any electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling any electrical equipment.

Jewelry is a good conductor of electricity and should be removed before working on the electrical equipment.

Do not work on this equipment when mentally or physically fatigued, or after consuming alcohol or any drug that makes the operation of equipment unsafe.

1. Operation

OPERATOR'S MANUAL

This operator's manual provides information necessary for operation of 1200- to 3000-ampere, utility-to-utility transfer switches. The utility-to-utility control automatically directs transfer of the load from one utility power source to another, providing nearly continuous power.

TRANSFER SWITCH APPLICATION

Transfer switches are an essential part of a building's standby or emergency power system. The Normal power source (source 1) is backed up by an Emergency power source (source 2). A transfer switch supplies the electrical load with power from one of these two power sources.

The load is connected to the common of the transfer switch (Figure 1-1). Under normal conditions, the load is supplied with power from the Normal source (as illustrated). If the Normal power source is interrupted, the load is transferred to the Emergency power source. When Normal power returns, the load is retransferred to the Normal power source. The transfer and retransfer of the load are the two most basic functions of a transfer switch.

AUTOMATIC TRANSFER SWITCHES

Automatic transfer switches, capable of automatic operation without operator involvement, perform the following basic functions:

1. Sense the interruption of the Normal power source.
2. Transfer the load to the Emergency power source.
3. Sense the return of the Normal power source.
4. Retransfer the load to the Normal power source.

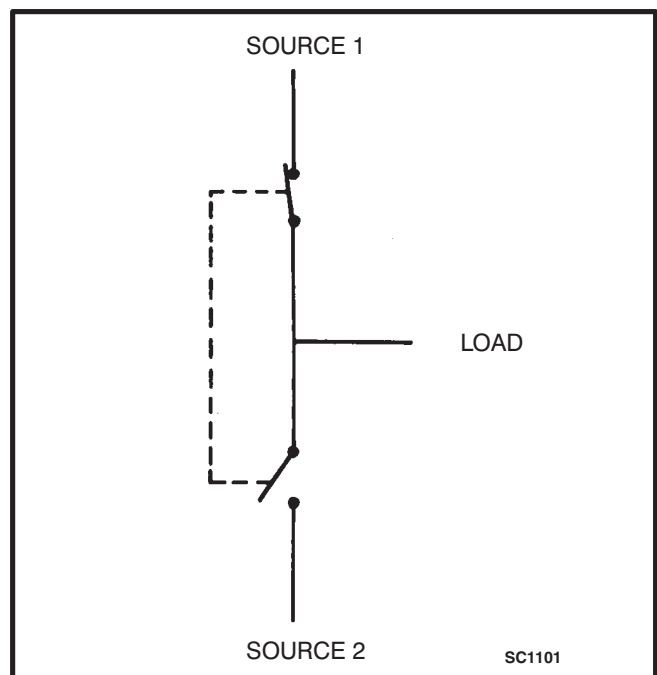


FIGURE 1-1. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

MODEL IDENTIFICATION

Identify your model by referring to the Model and Specification number as shown on the nameplate. Electrical characteristics are shown on the lower portion of the nameplate, which is located on the cabinet door.

If it is necessary to contact a dealer or distributor regarding the transfer switch, always give the complete Model, Specification, and Serial number. This information is necessary to properly identify your unit among the many types manufactured.

HOW TO OBTAIN SERVICE

When the transfer switch requires servicing, contact your nearest dealer or distributor. Factory-trained Parts and Service representatives are ready to handle all your service needs.

If unable to locate a dealer or distributor, consult the Yellow Pages. Typically, our distributors are listed under:

GENERATORS-ELECTRIC,
ENGINES-GASOLINE OR DIESEL, OR
RECREATIONAL VEHICLES-EQUIPMENT,
PARTS AND SERVICE.

For the name of your local Cummins®/Onan® or Onan-only distributor in the United States or Canada, call 1-800-888-ONAN. (This automated service utilizes touch-tone phones only.) By entering your area code and the first three digits of your local telephone number, you will receive the name and telephone number of the distributor nearest you.

For the name of your local Cummins-only distributor, or if you need more assistance, please call Onan Corporation, 1-612-574-5000, 7:30 AM to 4:00 PM, Central Standard Time, Monday through Friday.

When contacting your distributor, always supply the complete Model Number and Serial Number as shown on the nameplate.

Cummins is a registered trademark of Cummins Engine Company.

Onan is a registered trademark of Onan Corporation.

2. Description

Automatic transfer switches control transfer of the load to either Normal power source (source 1) or to Emergency power source (source 2) without operator involvement.

CABINET

The standard cabinet (Figure 2-1) meets the requirements for a UL Type 1 cabinet. This type is designated as a general-purpose, indoor cabinet.

Indicator Lamps

There are four indicator lamps on the cabinet door. The Source 1 Available and Source 2 Available lamps are lit whenever their corresponding power sources are producing power. These two lamps can be lit simultaneously.

The Source 1 Connected lamp is lit when the automatic transfer switch is in the Source 1 (normal) position.

The Source 2 Connected lamp is lit when the automatic transfer switch is in the Source 2 (emergency) position.

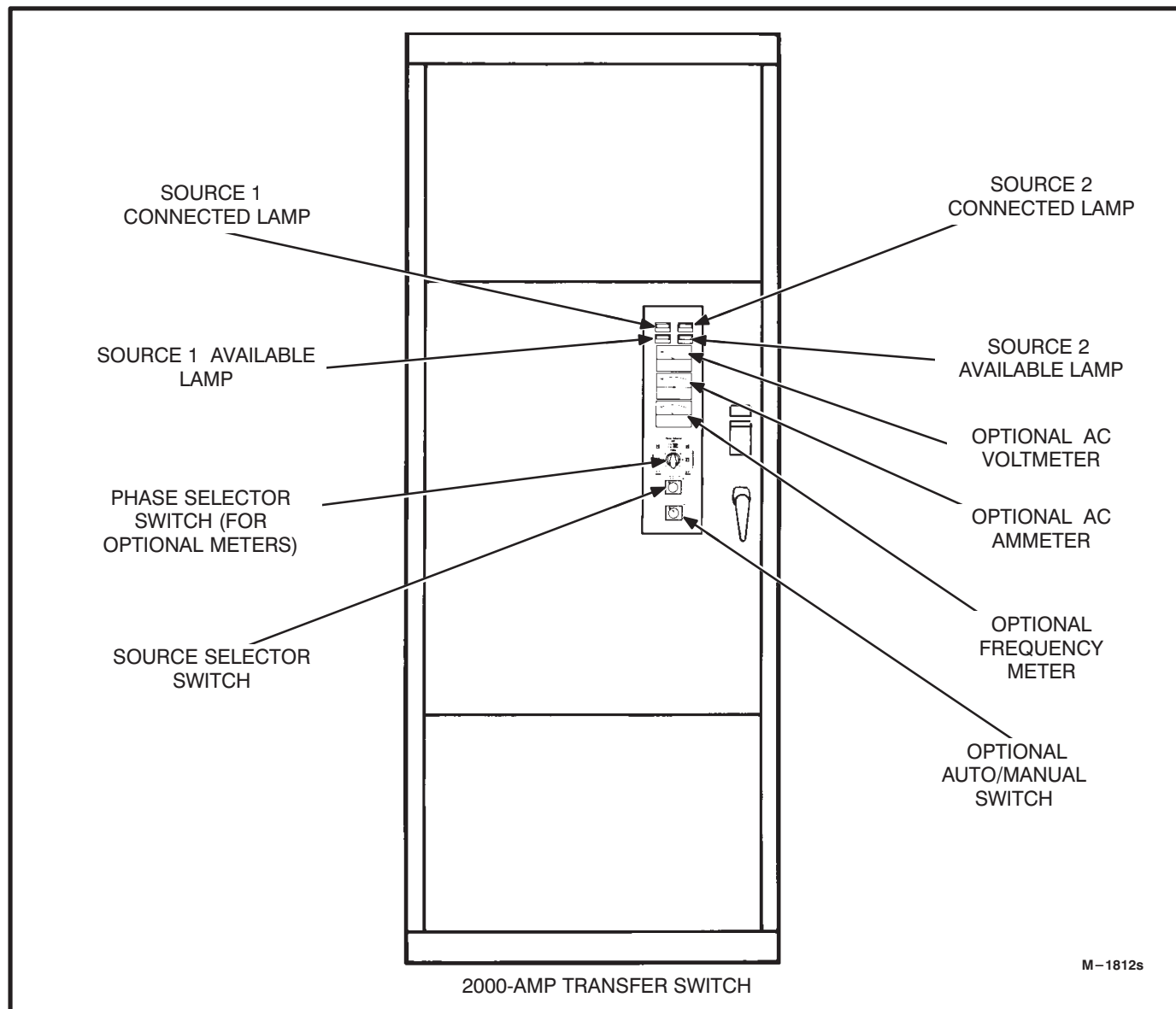


FIGURE 2-1. CABINET WITH OPTIONS

Source Selector Switch

This two-position switch is used to select which source is preferred and which source is the backup.

In the Source 1 position, the Normal power source supplies the load power until a power interruption occurs.

In the Source 2 position, the Emergency power source supplies the load power until a power interruption occurs.

Optional Auto/Manual Switch

The optional Auto/Manual switch is used to enable or disable the automatic retransfer function. This switch has two positions. In the Auto position, normal automatic retransfer is enabled. In the Manual position, automatic retransfer (from the non-preferred source back to the preferred source) is disabled; only manual retransfer (using the Preferred Source Selector switch) is possible. In the event of power source failure, however, the Power Sentry control logic will ignore the Auto/Manual switch and initiate retransfer to the other source.

When the optional Auto/Manual switch is installed, the standard Source Selector Switch is replaced with a three-position, spring-return-to-center switch.

Optional Meter Package

The optional meter package includes an AC ammeter, an AC voltmeter, a frequency meter, and a phase selector switch.

AC Voltmeter: The voltmeter measures line-to-line voltage of the selected power source.

AC Ammeter: The ammeter measures the line currents of the load.

Frequency Meter: This meter measures the output frequency of the selected power source in hertz.

Phase Selector Switch: This switch is used to select the source (1 or 2) and phase to be measured.

TRANSFER SWITCH

The transfer switch (Figure 2–2) opens and closes the contacts that transfer the load between Normal and Emergency power. The transfer switch is mechanically interlocked to prevent simultaneous closing to both power sources. The main parts of the transfer switch discussed here are the contact assemblies, linear actuators, Motor Disconnect switch, and auxiliary contacts.

Contact Assemblies

The automatic transfer switch has either three or four poles. Three pole transfer switches are provided with a neutral bar. The contact assemblies make and break the current flow. When closed to either the source 1 or the source 2 power source, the contacts are mechanically held. A mechanical interlock prevents them from closing to both power sources at the same time.

Linear Actuators

The linear actuators are the devices that move the contact assemblies between the Normal (source 1) power source and the Emergency (source 2) power source. Linear actuator operation is initiated automatically with automatic transfer switches. Refer to the *Operation* section.

CAUTION *Do not initiate rapid cycling of the linear actuators. Rapid switching will cause actuator failure. The maximum allowable cycle rate for the linear actuators is one cycle in two minutes.*

Motor Disconnect Switch

The Motor Disconnect toggle switch, on the accessory control panel, enables and disables the linear actuators. Place the switch in the Auto position to enable the linear actuators. Place the switch in the Off position to disable the linear actuators.

Auxiliary Contacts

Auxiliary contacts are provided on the Normal (source 1) and Emergency (source 2) sides of the transfer switch. They are actuated by operation of the transfer switch during transfer and retransfer. The Normal side auxiliary contact switch is actuated when the transfer switch is in the Normal position. The Emergency side auxiliary contact switch is actuated when the transfer switch is in the Emergency position. The auxiliary contacts have current ratings of 10 amperes at 250 VAC. The contacts are wired to terminal block TB1.

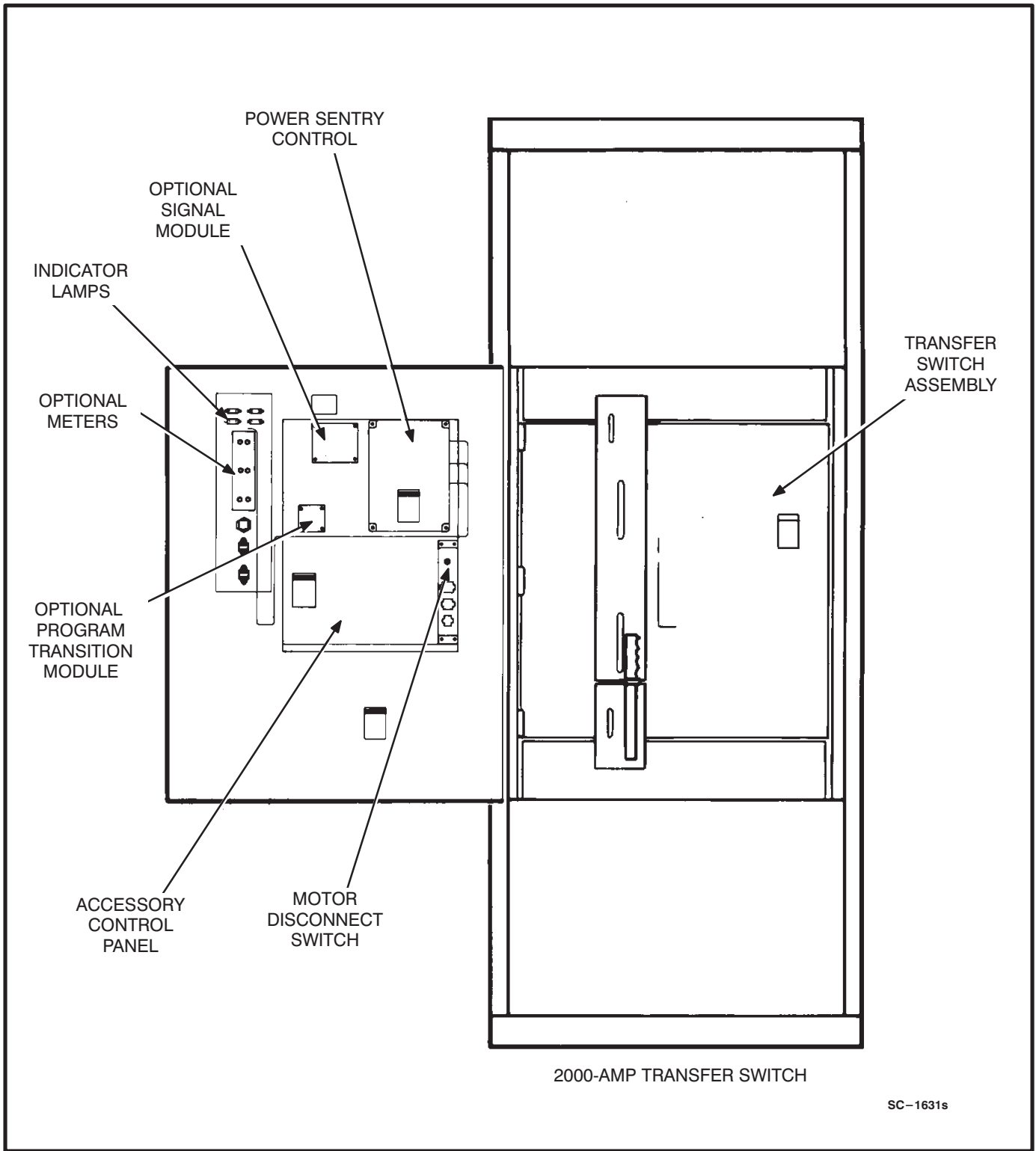


FIGURE 2-2. INTERIOR/COMPONENTS

ELECTRONIC CONTROL SYSTEM

This section describes the standard and optional components of the electronic control system.

⚠WARNING *Improper calibration or adjustment of electronic control modules can cause death, severe personal injury, and equipment or property damage. Calibration and adjustment of these components must be performed by technically qualified personnel only.*

All calibration and adjustment procedures are described in the Installation manual (which was shipped with the transfer switch) and in the Service manual (which is available through your distributor).

The most important component of the electronic control system is the Power Sentry control (Figure 2–2). The Power Sentry includes voltage sensing circuits, time delay circuits and control relays. There are also several adjustment potentiometers and indicator lamps on the Power Sentry. The adjustments must be performed only by qualified service personnel.

⚠WARNING *Accidental actuation of the linear actuators could cause severe personal injury. Disable the actuators before making any adjustments.*

Place the Motor Disconnect switch (Figure 2–2) in the Off position when making adjustments. Return the switch to the Auto position after adjustments are completed.

Power Sentry Time Delays

Transfer Time Delay: This delay prevents “nuisance” transfers to the backup power source caused by brief line fluctuations. After the delay, the transfer switch transfers the load to the backup power source. It has an adjustable range of 0 to 120 seconds.

To set this time delay, align the slot on the potentiometer with the desired marking on the Power Sentry cover.

Retransfer Time Delay: This delay begins the moment the preferred source voltage and frequency return. After the delay, the transfer switch can retransfer the load to the preferred source. The delay allows the preferred source to stabilize before retransfer. It has an adjustable range of 0 to 30 minutes.

To set this time delay, align the slot on the potentiometer with the desired marking on the Power Sentry cover.

Undervoltage Sensing

Two voltage sensors, one for the Normal side and one for the Emergency side, monitor source voltages for an undervoltage condition and generate signals, which are sent to the time delay module. If, for example, an undervoltage condition is sensed on the Normal source, the voltage sensor module sends a signal to the time delay module that initiates and controls the transfer of load.

The standard transfer switch has undervoltage sensing for all phases of the Normal and Emergency power sources.

Overvoltage and Frequency Sensing Option

Overvoltage and frequency sensing are available as a single option.

Overvoltage Sensing: With optional overvoltage sensing, the Normal and Emergency sources are monitored for an overvoltage condition.

As with the standard undervoltage sensing, the voltage sensors signal the time delay module, which controls the transfer or retransfer sequence.

An adjustable time delay (0 to 120 seconds) overrides momentary overshoots in voltage.

To set this time delay, align the slot on the potentiometer with the desired marking on the Power Sentry cover.

Frequency Sensing: With optional frequency sensing, the Normal and Emergency sources are monitored for variations in frequency. The sensors determine whether the source is within an adjustable bandwidth.

As with the standard undervoltage sensing, the frequency sensors signal the time delay module, which controls the transfer or retransfer sequence.

An adjustable time delay (0 to 15 seconds) allows the control to ignore momentary dips or rises in frequency.

To set this time delay, align the slot on the potentiometer with the desired marking on the Power Sentry cover.

Programmed Transition Option

The optional Program Transition module (Figure 2-3) is used to introduce a pause during transition. Programmed transition allows the transfer switch to assume a mid-transition position for an adjustable interval of time. In this position, the load is **not** connected to either power source. This feature allows residual voltage from inductive loads to decay to an acceptable level before transfer is completed.

The length of time that the transfer switch is in the midposition can be adjusted from 0 to 7.5 seconds or 0 to 60 seconds, depending on the timer option. The proper adjustment is a function of the load.

To set the time delay, align the slot on the potentiometer with the desired marking on the faceplate (Figure 2-3).

If a time delay is desired, make sure that the Delay/No Delay switch is in the Delay position.

Signal Module Option

The main function of the optional Signal Module is to delay transfer (or retransfer) for a preset time while operating a signal contact to give warning that a transfer (or retransfer) is about to occur. This option is typically used in elevator applications.

This module also provides three other sets of form C signal contacts.

The Signal Module has one adjustable timer. The Elevator Signal delay controls the timing of two events. It delays transfer/retransfer and energizes the Elevator Transfer Signal relay during the delay period.

This time delay is adjustable over a range of 0 to 50 seconds.

To set the time delay, align the slot on the potentiometer with the desired marking on the faceplate (Figure 2-4).

If a time delay is desired, make sure that the Delay/No Delay switch is in the Delay position.

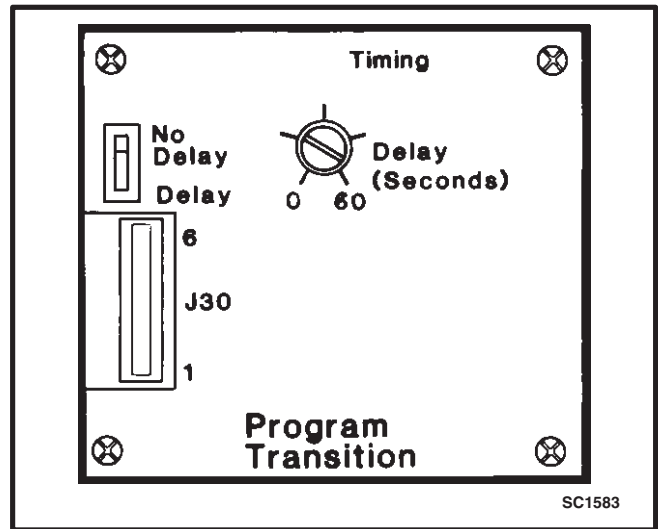


FIGURE 2-3. PROGRAM TRANSITION MODULE

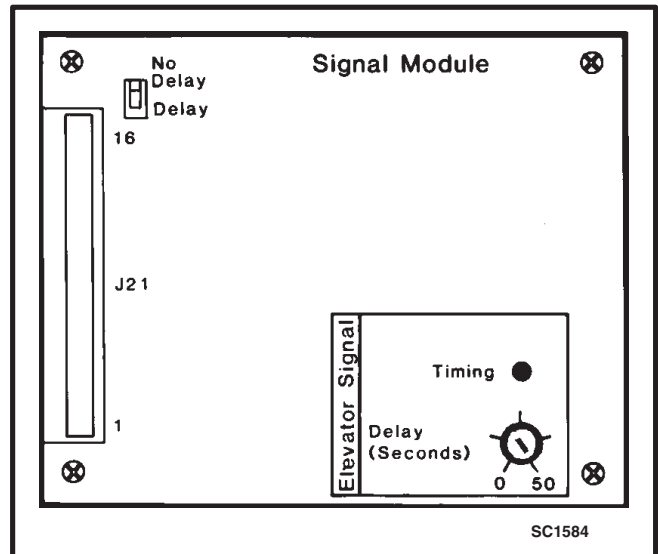


FIGURE 2-4. SIGNAL MODULE

Alarm Module Option

The optional alarm module (Figure 2-5) provides an audible indication that the transfer switch has transferred to the source 2 power source.

A push button on the alarm module provides a means to silence the horn.

The Alarm lamp indicates that the transfer switch is in the Source 2 Connected position. If the horn is silenced, the Horn Silenced lamp will also light. Both lamps will stay lit until the transfer switch moves from the Source 2 Connected position to the disconnected (neutral) or Source 1 Connected position.

Auxiliary Relay Option

Optional auxiliary relays provide contacts for energizing external alarms, remote indicators, and control equipment such as louver motors and water pumps.

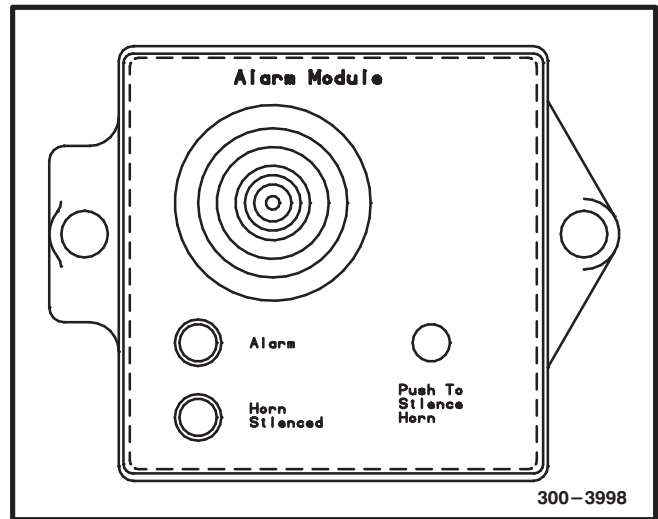


FIGURE 2-5. ALARM MODULE

3. Operation

AUTOMATIC OPERATION

The automatic transfer switch is set for automatic operation by placing control switches in the positions given below.

Motor Disconnect Switch: Auto position.

Source Selector switch: Source 1 or Source 2.

⚠ CAUTION *Do not initiate rapid cycling of the linear actuators. Rapid switching will cause actuator failure. The maximum allowable cycle rate for the linear actuators is one cycle in two minutes.*

MANUAL OPERATION

The transfer switch has operator handles that are intended for maintenance use only. Manual operation must be performed by qualified personnel under **NO-LOAD CONDITIONS ONLY**.

⚠ WARNING *Manual operation of the transfer switch under load presents a shock hazard that can cause severe personal injury or death. For this reason, do not attempt to perform manual operation of the transfer switch when it is under load. Follow the “Safety Related Work Practices” listed in NFPA 70E.*

Manual Transfer to Source 2 (Emergency)

If you determine that the Emergency (source 2) power source is available but the transfer switch will not automatically transfer (refer to the *Troubleshooting* section), perform this procedure to manually transfer to the Emergency source.

1. Open the source 1 and source 2 disconnect switches or breakers that feed the transfer switch.
2. When you are certain that neither source 1 nor source 2 power is present at the transfer switch, open the transfer switch cabinet door and turn the Motor Disconnect switch to Off.

⚠ WARNING *Manual operation of the transfer switch under load presents a shock hazard that can cause severe personal injury or death. For this reason, do not attempt to perform manual operation of the transfer switch when it is energized by either source 1 or source 2 power sources.*

3. A manual operating handle is provided with the transfer switch. The handle is a steel rod or tube, with a knob or hand grip on one end. On standard transfer switches (Figure 3-1), there are two manual operator slots—one for the Normal (source 1) contacts and one for the Emergency (source 2) contacts.

First, insert the handle in the slot for the Normal contacts and open the Normal contacts. Then, insert the handle in the slot for the Emergency contacts and close the Emergency contacts. Be certain to push the handle all the way to the LOCK position. A distinct over-center locking action can be felt. Return the handle to its storage position.

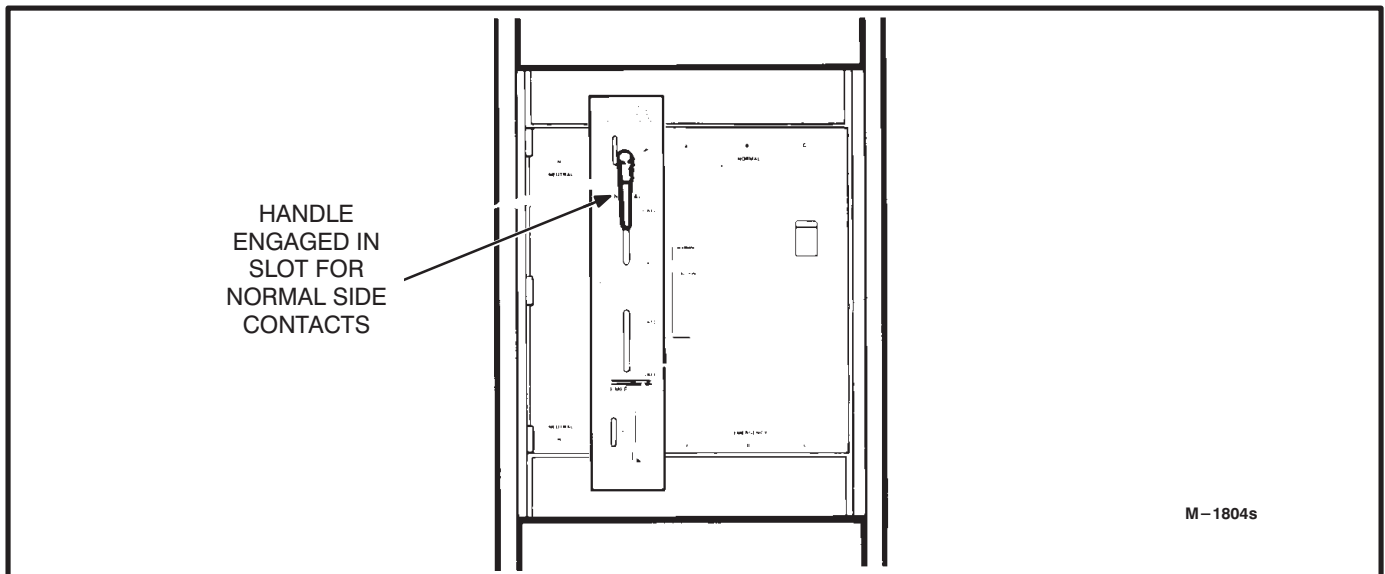


FIGURE 3-1. MANUAL OPERATION

⚠WARNING *Automatic transfer switch operation results in rapid movement of the manual operator mechanism and presents a hazard of severe personal injury if the operator handle is engaged in the mechanism. Remove the handle and place it in its storage position.*

4. After the switch has been transferred to source 2 and the operator handle has been removed from the mechanism, close and lock the cabinet door.
5. Close the Emergency (source 2) disconnect that feeds the transfer switch.

If the Motor Disconnect switch is placed back in the Auto position, the transfer switch will transfer load to the active power source. (If both power sources are available, it will transfer the load to the priority [selected] source).

6. If the transfer switch is not functioning correctly, call your dealer or distributor immediately.

Manual Transfer to Source 1 (Normal)

If you determine that the Normal (source 1) power source is available but the transfer switch will not automatically retransfer (refer to the *Troubleshooting* section), perform this procedure to manually retransfer to source 1.

1. Open the source 1 and source 2 disconnect switches or breakers that feed the transfer switch.
2. When you are certain that neither source 1 nor source 2 power is present at the transfer switch, open the transfer switch cabinet door and turn the Motor Disconnect switch to Off.

⚠WARNING *Manual operation of the transfer switch under load presents a shock hazard that can cause severe personal injury or death. For this reason, do not attempt to perform manual operation of the transfer switch when it is energized by either source 1 or source 2 power sources.*

3. A manual operating handle is provided with the transfer switch. The handle is a steel rod or tube, with a knob or hand grip on one end. On standard transfer switches (Figure 3-1), there are two manual operator slots—one for the Normal (source 1) contacts and one for the Emergency (source 2) contacts.

First, insert the handle in the slot for the Emergency contacts and open the Emergency contacts. Then, insert the handle in the slot for the Normal contacts and close the Normal contacts. Be certain to push the handle all the way to the LOCK position. A distinct over-center locking action can be felt. Return the handle to its storage position.

⚠WARNING *Automatic transfer switch operation results in rapid movement of the manual operator mechanism and presents a hazard of severe personal injury if the operator handle is engaged in the mechanism. Remove the handle and place it in its storage position.*

4. After the switch has been transferred to source 1 and the operator handle has been removed from the mechanism, close and lock the cabinet door.
5. Close the Normal (source 1) disconnect that feeds the transfer switch.

If the Motor Disconnect switch is placed back in the Auto position, the transfer switch will transfer load to the active power source. (If both power sources are available, it will transfer the load to the priority [selected] source).

6. If the transfer switch is not functioning correctly, call your dealer or distributor immediately.

PREVENTIVE MAINTENANCE

Performing the yearly preventive maintenance procedures in Table 3-1 will result in operational reliability of the transfer switch.

The following procedures must only be performed by technically qualified personnel, following the procedures provided in the Service manual (962-0513). **If repair or replacement of components is necessary, call your dealer or distributor.**

⚠WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. In addition, incorrect installation, service, or parts replacement can result in severe personal injury, death, and/or equipment damage. Therefore, all corrective service procedures must only be performed by technically qualified personnel, following the procedures provided in the Service manual (962-0513).*

⚠WARNING *The transfer switch presents a shock hazard that can cause severe personal injury or death unless all AC power is removed. Be sure to disconnect AC line power before servicing.*

TABLE 3-1. ANNUAL PREVENTIVE MAINTENANCE

1. DISCONNECT ALL SOURCES OF AC POWER:

Disconnect both AC power sources from the transfer switch before continuing.

2. CLEAN

- a. Thoroughly dust and vacuum all controls, meters, switching mechanism components, interior buswork, and connecting lugs.
- b. Close the cabinet door and wash **exterior** surfaces with a damp sponge (mild detergent and water). **Do not allow water to enter the cabinet, especially at meters, lamps, and switches.**

3. INSPECT

- a. Check buswork and supporting hardware for carbon tracking, cracks, corrosion, or any other types of deterioration. If replacement is necessary, call your dealer or distributor.
- b. Check stationary and movable contacts. If contact replacement is necessary, the procedures are described in section 4 of the Service manual (962-0513).
- c. Check system hardware for loose connections. Tighten as indicated in step 4.
- d. Check all control wiring and power cables (especially wiring between or near hinged door) for signs of wear or deterioration.
- e. Check all control wiring and power cables for loose connections. Tighten as indicated in step 4.
- f. Check the cabinet interior for loose hardware. Tighten as indicated in step 4.

4. PERFORM ROUTINE MAINTENANCE

Tighten buswork, control wiring, power cables, and system hardware, as necessary. Hardware torque values are given in section 4 of the Service manual (962-0513). Retorque all cable lug connections. Lug torque requirements are listed in section 1 of the Service manual.

5. CONNECT AC POWER AND CHECK OPERATION

- a. Connect the both AC power sources.
- c. Test system operation as described in this section. Close and lock the cabinet door.

4. Troubleshooting

The following procedures describe preliminary troubleshooting checks. If the trouble persists, call your dealer or distributor.

⚠WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. For this reason; do not touch or allow clothing, tools, or jewelry to contact exposed electrical terminals whenever the cabinet door is open. Make sure you are standing on a dry, insulating surface.*

TRANSFER SWITCH DOES NOT RETRANSFER AUTOMATICALLY

1. Check the Motor Disconnect switch. It should be in the Auto position.
2. Is the Source Selector switch in the correct position?
3. Has the transfer time delay expired?
4. Has the programmed transition time delay (if equipped) expired?
5. Is backup source voltage sufficient to trigger the backup source voltage sensor?

TRANSFER SWITCH DOES NOT RETRANSFER AUTOMATICALLY

1. Check the Motor Disconnect switch. It should be in the Auto position.
2. Is the Source Selector switch in the correct position?
3. Has the retransfer time delay expired?
4. Has the programmed transition time delay (if equipped) expired?
5. Is preferred source voltage sufficient to trigger the preferred source voltage sensor?

Cummins Power Generation
1400 73rd Avenue N.E.
Minneapolis, MN 55432
1-800-888-6626
763-574-5000 International Use
Fax: 763-528-7229

Cummins is a registered trademark of Cummins Inc.



Redistribution or publication of this document
by any means, is strictly prohibited.