

Operator's Manual

OT III

Transfer Switch

1200 to 3000 Amperes

Nonautomatic/Remote

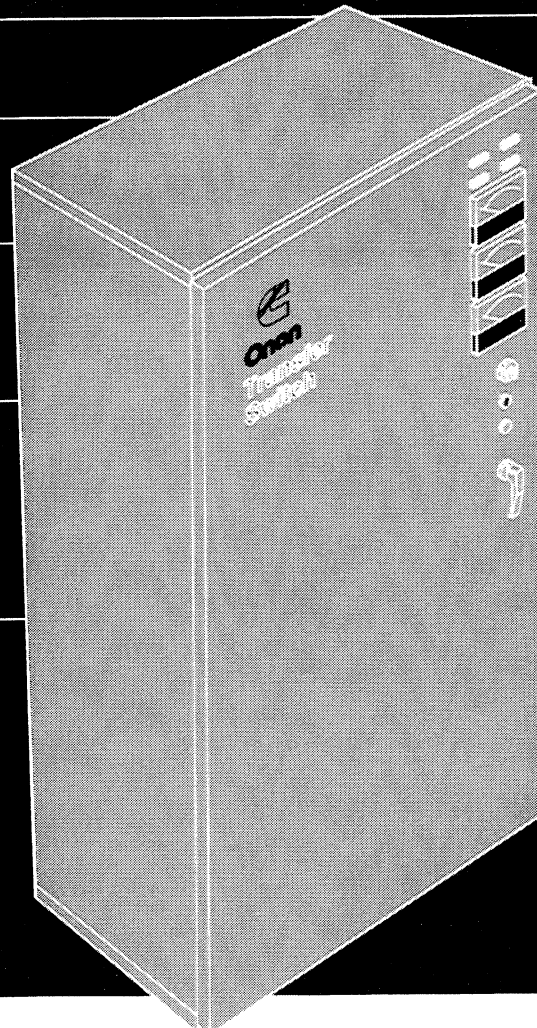


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⚠ WARNING

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:

1. Move the operation selector switch on the generator set to Stop.
2. Disconnect the starting batteries of the generator set. (Remove the negative [-] lead first to prevent arcing from igniting explosive battery gas.)
3. 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. Introduction

OPERATOR'S MANUAL

This manual provides information necessary for operation of 1200- to 3000-ampere, nonautomatic/remote transfer switches.

TRANSFER SWITCH APPLICATION

Transfer switches are an essential part of a building's standby (or emergency) power system. The Normal power source, commonly the utility line, is backed up by a Standby power source, often an electric generating set. A transfer switch supplies the electrical load with power from one of these two power sources.

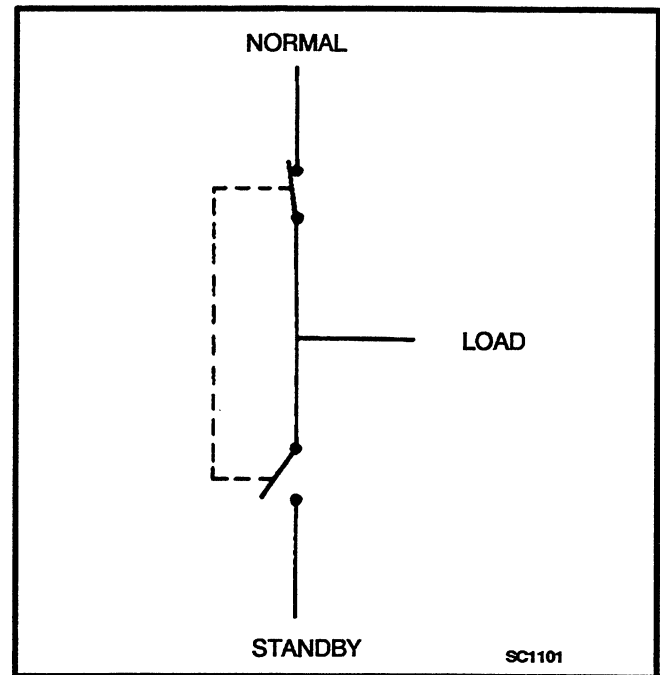
The load is connected to the common of the transfer switch (Figure 1-1). Under normal conditions, the load is supplied with power from the Normal source (as illustrated). If the Normal power source must be interrupted, the load is transferred to the Standby power source. When Normal power returns, the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

Operation of a nonautomatic/remote transfer switch is initiated either by an operator at the transfer switch or by an external signal from a remote source.

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.



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

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.

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Onan is a registered trademark of Onan Corporation.

2. Description

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 Normal Available and Standby Available lamps are lit whenever their corresponding power sources are producing power. These two lamps can be lit simultaneously.

The Normal Connected and Standby Connected lamps indicate which power source is connected to the load. Only one of these two lamps can be lit.

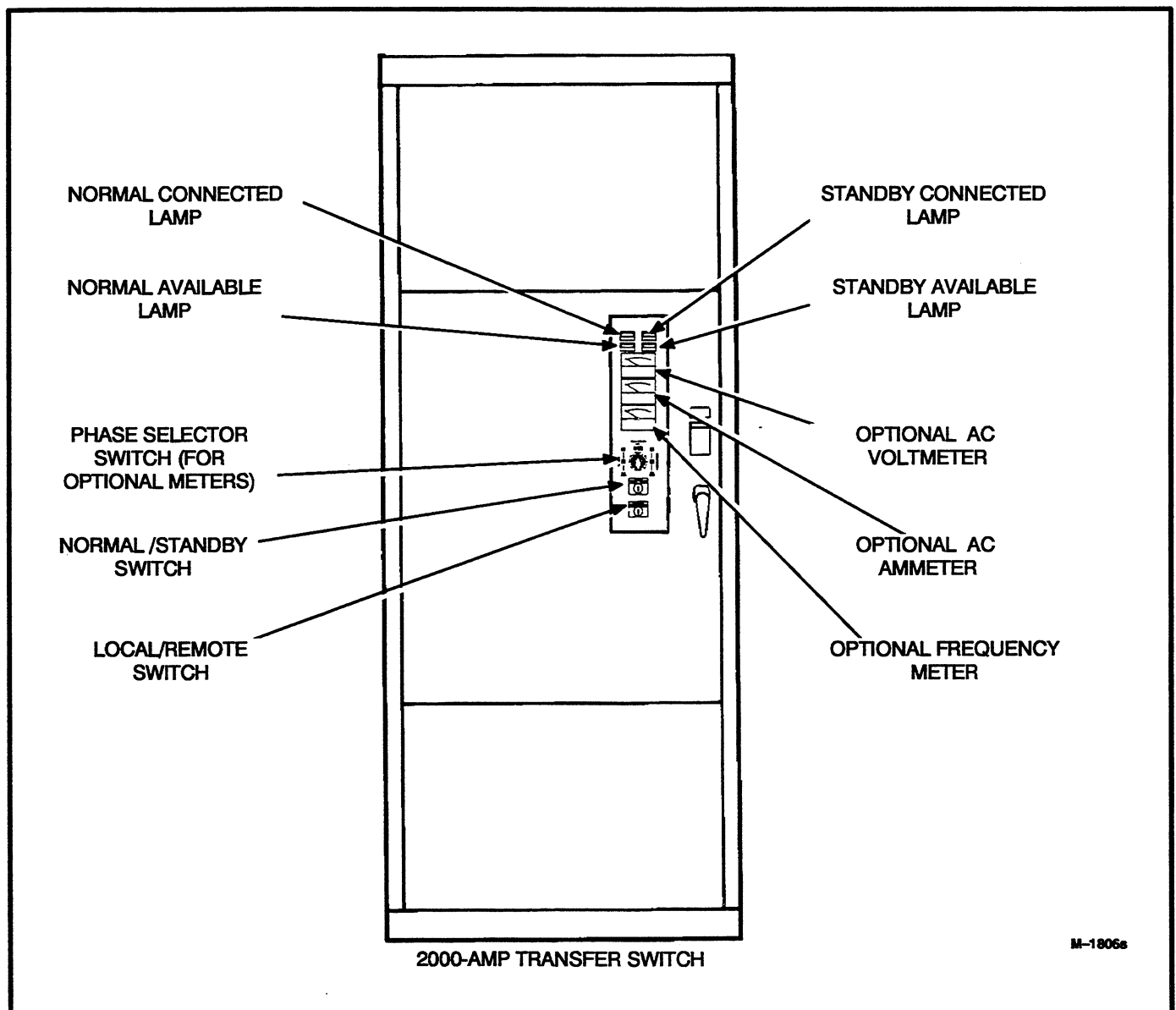


FIGURE 2-1. CABINET WITH OPTIONS

Normal/Standby Switch

This three-position (spring return to center) switch is used to electrically select which source is connected to the load. The Normal position causes the Normal source to be connected. The Standby position causes the Standby source to be connected.

Under electrical control, the transfer switch will connect to a source only if voltage is present at that source.

The Normal/Standby switch controls transfer switch position only when the Local/Remote switch is in the Local position.

Local/Remote Switch

The Local/Remote switch is used to enable the Normal/Standby switch (Local position) or the remote control inputs at TB2 (Remote position).

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 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 Standby 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 transfer switch either has 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 Normal or the Standby 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 power source and the Standby power source. Refer to Local and Remote Operation in the Operation section. Manual operation of the transfer switch is also possible. Refer to Manual Operation in 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 and Emergency (Standby) 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 (Standby) side auxiliary contact switch is actuated when the transfer switch is in the Standby position. The auxiliary contacts have current ratings of 10 amperes at 250 VAC. The contacts are wired to terminal block TB1.

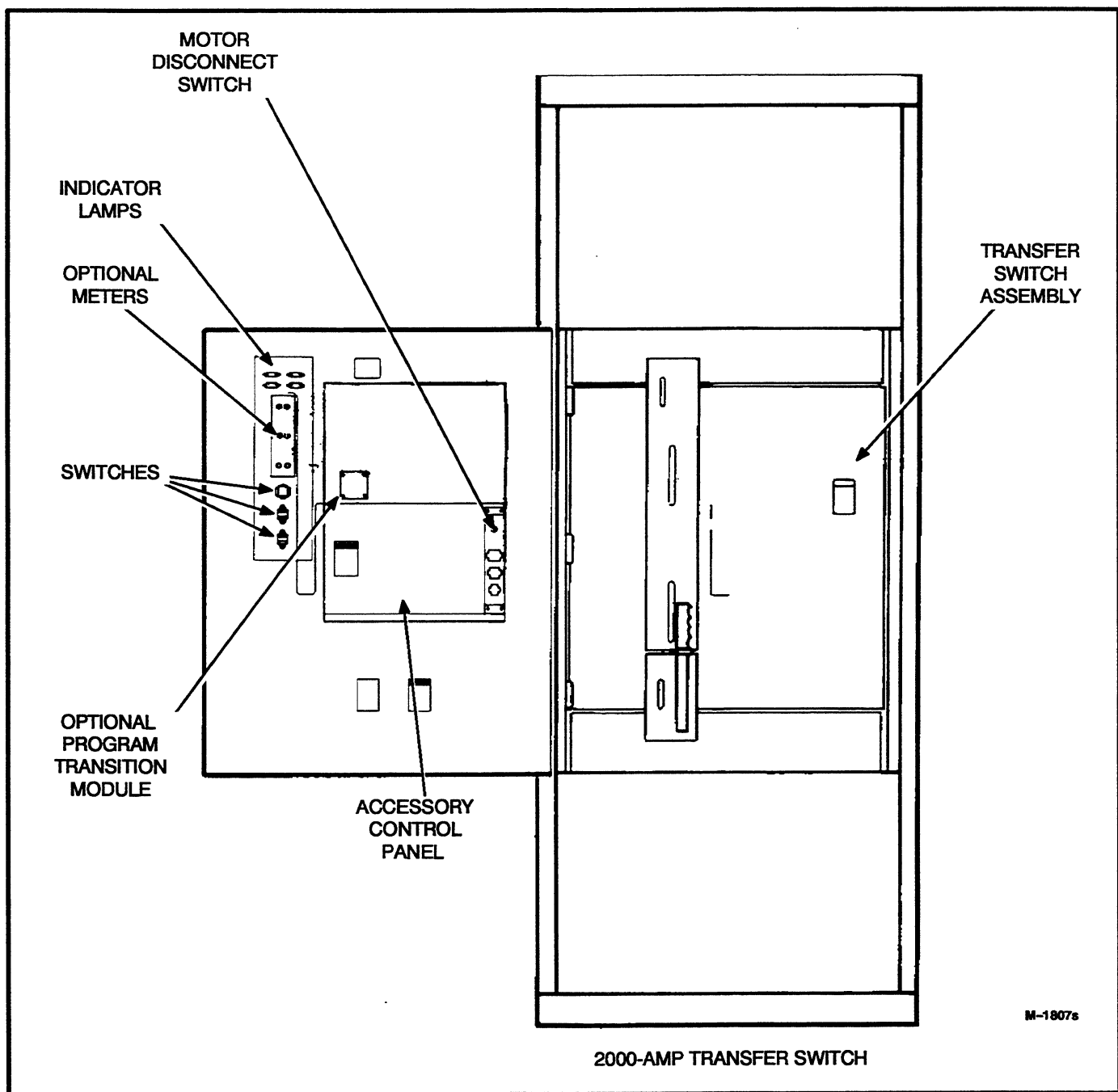


FIGURE 2-2. INTERIOR/COMPONENTS

CONTROL COMPONENTS

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

Load Shed

The Load Shed function is used to disconnect the load from an available Standby source in order to reduce the power consumed from that source. When the load shed function is initiated, the transfer switch is moved to the neutral position.

The load shed function is initiated by a customer-supplied signal.

If the load shed signal is removed, the switch will transfer back to the Standby source if the Standby source is available.

When load shedding is in effect, local or remote selection of Normal power will cause retransfer to the Normal power source if the Normal power source is available.

Auxiliary Relays Option

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

Alarm Module Option

The optional alarm module (Figure 2-4) provides an audible indication that the transfer switch has transferred to the Standby 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 Standby 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 Standby Connected position to the disconnected (neutral) or Normal Connected position.

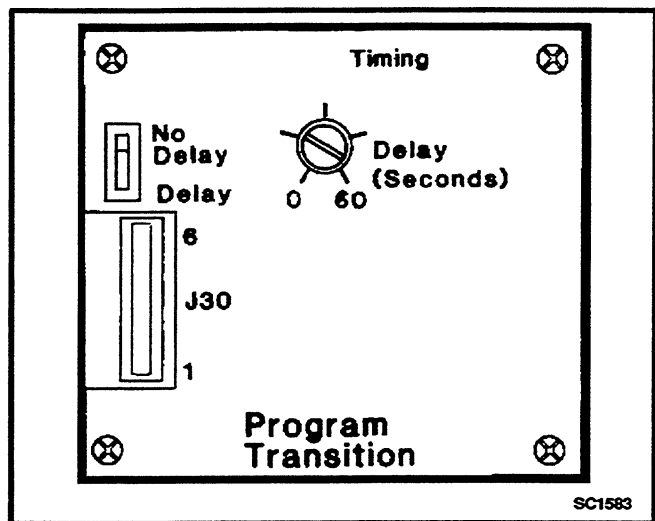


FIGURE 2-3. PROGRAM TRANSITION MODULE

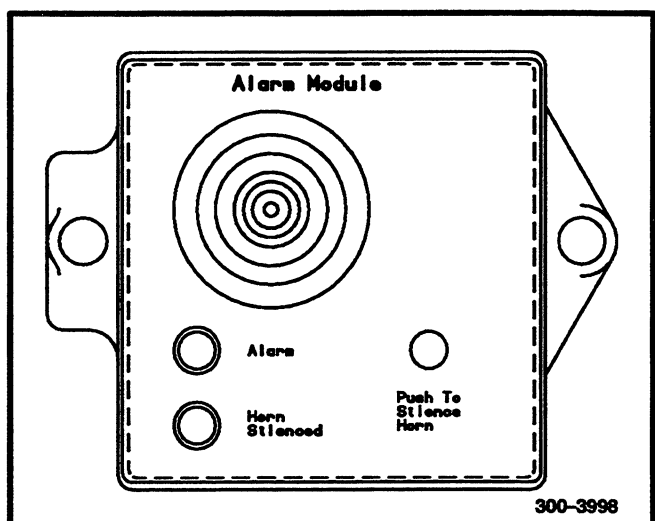


FIGURE 2-4. ALARM MODULE

3. Operation

LOCAL OPERATION

⚠WARNING *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. Before initiating any transfer of load, make sure that the handle is in its storage position and that the cabinet door is closed and locked.*

To set the transfer switch for local operation:

1. Place the Motor Disconnect switch (on the Accessory Control Panel) in the Auto position.
2. Place the Local/Remote switch in the Local position.
3. Close and lock the cabinet door.

To transfer the load to the Standby source:

1. Check that the Standby Available lamp is lit. (The transfer switch will only permit transfer to the Standby source if the Standby source voltage is available.)
2. Move the Normal/Standby switch to the Standby position and hold it there until the Standby Connected lamp is lit.

To transfer the load to the Normal source:

1. Check that the Normal Available lamp is lit. (The transfer switch will only permit transfer to the Normal source if the Normal source voltage is available.)
2. Move the Normal/Standby switch to the Normal position and hold it there until the Normal Connected lamp is lit.

REMOTE OPERATION

⚠WARNING *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. Before initiating any transfer of load, make sure that the handle is in its storage position and that the cabinet door is closed and locked.*

To set the transfer switch for remote operation:

1. Place the Motor Disconnect switch (on the Accessory Control Panel) in the Auto position.
2. Place the Local/Remote switch in the Remote position.
3. Close and lock the cabinet door.

Remotely controlled transfer to the Standby source is accomplished by closing a set of normally open contacts that are connected across terminals 1 and 3 of TB2.

The contacts must be held closed until transfer is complete.

Remotely controlled retransfer to the Normal source is accomplished by closing a set of normally open contacts that are connected across terminals 1 and 2 of TB2.

The contacts must be held closed until transfer is complete.

As with local operation, the transfer switch permits transfer and retransfer only when the selected source voltage is present.

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 The Standby Source

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

1. Open the Standby and Normal disconnect switches or breakers that feed the transfer switch. If there is no Standby side disconnect, then turn off the generator set.
2. When you are certain that neither Normal nor Standby 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 Normal or Standby 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. To manually operate the switch, insert the handle in the operating mechanism as shown in Figure 3-1.

There are two manual operator slots – one for the Normal contacts and one for the Standby 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 Standby contacts and close the Standby 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 *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 the Standby source and the operator handle has been removed from the mechanism, close and lock the cabinet door.
5. Close the Standby disconnect that feeds the transfer switch. Start the generator set if it was previously turned off.
6. If the transfer switch is not functioning correctly, call your dealer or distributor.

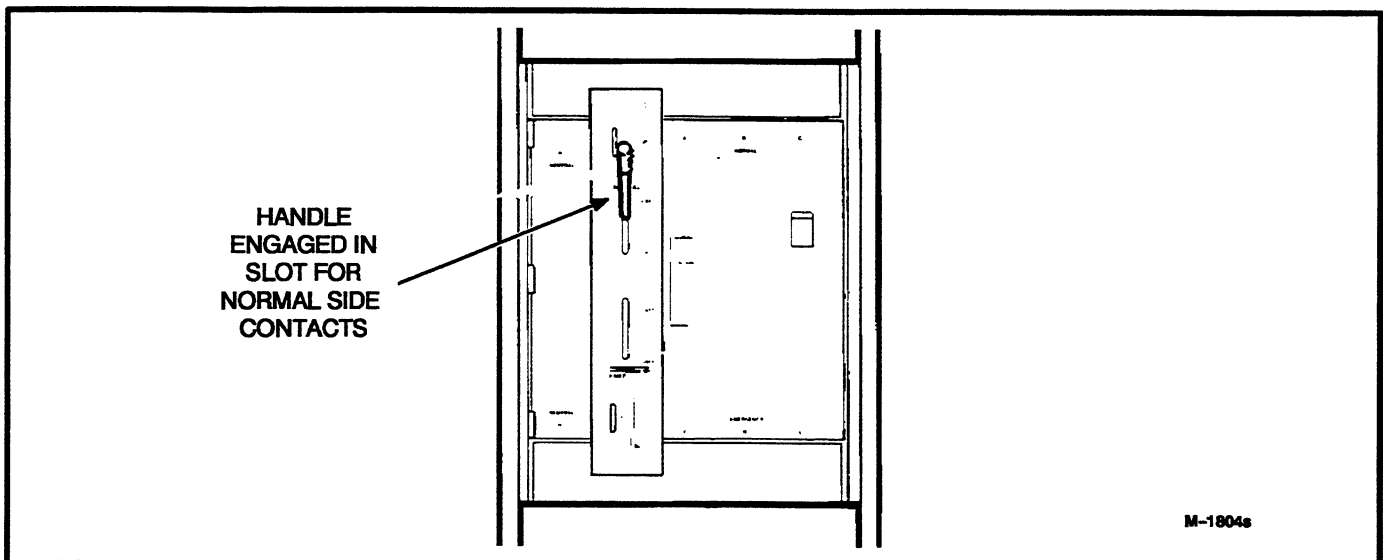


FIGURE 3-1. MANUAL OPERATION

Manual Transfer to The Normal Source

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

1. Open the Standby and Normal disconnect switches or breakers that feed the transfer switch. If there is no Standby side disconnect, then turn off the generator set.
2. When you are certain that neither Normal nor Standby 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 Normal or Standby 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. To manually operate the switch, insert the handle in the operating mechanism as shown in Figure 7-7.

There are two manual operator slots—one for the Normal contacts and one for the Standby contacts. First, insert the handle in the slot for the Standby contacts and open the Standby 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 *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 the Normal source and the operator handle has been removed from the mechanism, close and lock the cabinet door.
5. Close the Normal disconnect that feeds the transfer switch.
6. If the transfer switch is not functioning correctly, call your dealer or distributor.

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 move the generator set operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [-] lead first) before servicing.*

⚠WARNING *Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark, arc, or flame while servicing batteries.*

TABLE 3-1. ANNUAL PREVENTIVE MAINTENANCE

1. DISCONNECT ALL SOURCES OF AC POWER:

Disconnect both AC power sources from the transfer switch before continuing. Turn the generator set operation selector switch to Stop. (The selector switch is located on the generator set control panel.) ***If there is an external battery charger, disconnect it from its AC power source.*** Then disconnect the set starting battery (negative [-] lead first).

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

- a. 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.
- b. Service or replace the batteries.

5. CONNECT AC POWER AND CHECK OPERATION

- a. Connect the set starting battery (negative [-] lead last). Connect the normal AC power source, enable the backup power source. If applicable, connect power to the battery charger.
- b. 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 TRANSFER TO THE STANDBY SOURCE

1. Check the Motor Disconnect switch. It should be in the Auto position.
2. Are the Local/Remote and Normal/Standby switches in the correct positions?
3. Has the programmed transition time delay (if equipped) expired?
4. Is the Standby source voltage present? Check the Standby Available lamp. Check the Standby source voltage.
5. Manually transfer the switch. (Refer to the instructions and warnings in the *Operation* section.) Call your dealer or distributor.

TRANSFER SWITCH DOES NOT RETRANSFER TO THE NORMAL SOURCE

1. Check the Motor Disconnect switch. It should be in the Auto position.
2. Are the Local/Remote and Normal/Standby switches in the correct positions?
3. Has the programmed transition time delay (if equipped) expired?
4. Is the Normal source voltage present? Check the Normal Available lamp. Check the Normal source voltage.
5. Manually retransfer the switch. (Refer to the instructions and warnings in the *Operation* section.) Call your dealer or distributor.



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