If a power failure occurs during the exercise routine, the controller overrides the routine and transfers the load.

TRANSFER SWITCH MAINTENANCE

Performing the annual planned maintenance procedures increases reliability of the transfer switch.

The following procedures must be performed only by trained and experienced personnel, according to procedures in the Service manual (150-1000 Amp Switches: 962-0518 and 1200-3000 Amp Switches: 962-0519). If repair or component replacement is necessary, call your dealer or distributor.

Transfer switches generally do not require maintenance, but they do require regular care and testing to make sure they operate properly upon a power failure; such as starting the generator set and reliably transferring power to the alternate power source.

Power System Functional Tests

Emergency power systems are required to be tested on a regular basis, and the transfer switch is required to be tested at least once per month per NFPA 110: 6–4.5.

Weekly Inspection

Inspect the entire emergency power system, including the transfer switch, to verify all indicating lamps are functional, the control switches are in the proper (automatic operation) position, and there are no obvious indications of overheating or faulty operation.

Monthly Testing

In order to meet certain codes and standards, generator sets are required to be operated at 30% or more of rated load on a regular basis. Every month test the entire emergency power system using the transfer switch to initiate a exercise sequence.

In a standard exercise routine, the transfer switch should; signal the generator set to start, monitor the genset as it starts, and transfer load to the genset. After the genset test, the transfer switch should transfer the load back to normal service and shutdown the genset after a cool-down period. Methods to test the transfer switch can be: 1) manual operation of the Test switch on the transfer switch cabinet, 2) the automatic programmed Exercise routine, or 3) other building management systems.

The test verifies: 1) the generator set will start and carry the load, 2) the transfer switch is able to detect a power failure, 3) mechanically connect to the alternate power source, and 4) reconnect to the normal power source.

Annual Maintenance and Testing

Because a transfer switch serves critical loads 24 hours a day both NFPA110 and NFPA 70B regulations require annual inspection and maintenance of automatic transfer switches. The inspection is intended to detect overheating contacts or connections that could be from overloads, wear in contact assemblies, or loose cable terminations. If these conditions remain uncorrected, the transfer switch can overheat and completely fail, resulting in total power loss to critical loads in a facility for extended periods of time. Replacement of the transfer switch is difficult when catastrophic failures occur because the transfer switch is always energized in the building's electrical system.

Clean and Inspect the Switch

Keeping the switch clean helps to prevent dangerous or damaging ground fault conditions. Disconnect power to the transfer switch from both the utility source and the generator source. The sources will be locked out and tagged for safety. Vacuum and clean the switch cabinet to remove all dirt and debris from the enclosure. Exterior surfaces of the switch can be cleaned as long as care is taken to prevent liquid from entering external switches or the interior of the cabinet.

It is necessary to the monitor transfer switch condition because they are operated under load many more times than other distribution circuit devices. Inspect the transfer switch for carbon tracking, cracks, corrosion, or any other type of deterioration. Remove covers over the contact mechanisms and contacts and inspect for abnormal wear or degradation. Some contact wear is normal. Make corrections and repairs when required.

Most transfer switches require no lubrication, but if required, lubricate according to the Service manual.

After the transfer switch is cleaned and reassembled, check all the power and control connections for deterioration. Re-torque lug connections ac-

cording to the Torque Table in the *Section 1* of the *Service Manual.* Particularly, check for wear on wires routed across doors, and wiring connected to moving parts.

Annual Testing

After cleaning and inspecting the switch, a full power failure test is recommended. In the monthly test, a power failure is typically simulated by manipulation of the control circuits in the transfer switch or controller. Each year, physically open the normal power supply to the facility. Verify all critical support equipment is connected to generator power, and that the generator starts and runs critical loads. The generator set and power transfer system must function exactly as if an actual power failure has occurred.

Thermography

A thermographic or infrared examination of transfer switches is a valuable resource to monitor transfer switch condition and loading. Thermal evaluations can detect overheating due to not only failure or deterioration of components, but also overloading or the effects of non-linear loads in the distribution system.

In general, thermographic evaluation is most useful when historical data is available for use in comparing current test data to samples of previous performance. Comparison of current performance to other contacts of identical or similar design, with similar load levels, or between contacts of a single device often identify contacts needing further inspection or repair.

If historical data is not available, then test data can be evaluated based on maximum allowable temperatures allowed by UL standards. On transfer switches rated 400 amps and lower, the contact and lug assembly should not exceed 50°C (122°F) over ambient with full load on the switch. On transfer switches 400 amps and over, the contact and lug assembly should not exceed 60°C (140°F) over ambient. The bus bar and connecting straps may operate at temperatures up to 60°C over ambient at full load.

Thermographic evaluation does not take the place of the required yearly inspection and maintenance, but can highlight problems between service intervals, or indicate the certain need for repairs such as contact replacement which are not commonly required. Advance notice of the need to repair these components can prevent wasted time and unnecessary down time.

Planned Maintenance Schedule

⚠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. Incorrect installation, service, or parts replacement can result in severe personal injury, death, and/or equipment damage. All corrective service procedures must be done only by trained and experienced personnel, according to procedures in the Service manual (150-1000 Amp Switches: 962-0518 and 1200-3000 Amp Switches: 962-0519).***

⚠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 set the genset 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. PLANNED MAINTENANCE

1. **Disconnect All Sources of AC Power:**

   A. 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.)

   B. ***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 the Service manual (for 150-1000 Amp switches: 962-0518 and for 1200-3000 Amp switches: 962-0519).

   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 (for 150-1000 Amp switches: 962-0518 and for 1200-3000 Amp switches: 962-0519). Retorque all cable lug connections. Lug torque requirements are listed in section 1 of the Service manual.

   B. Replace the batteries (3V lithium) in the Digital Module and the Network Module (if applicable) every two years. See Figures 2-6 and 2-16.

5. **Connect AC Power and Check Operation**

   A. Connect the genset 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. Verify proper operation of the battery charger.

   C. Test system operation as described in this section. Close and lock the cabinet door.