

# SYSTEMS DATA SHEET

Engine Division October 2000

## Manual Handles for Automatic Transfer Switches

### A. Background

For over 50 years, manufacturers of automatic transfer switches have provided manual operating handles. The reasons for providing a handle for an automatic transfer switch are:

1. *Installation:* For use during installation to manually place the switch in the proper position.
2. *Maintenance:* For periodic inspections and maintenance to verify the mechanical operation of the switch and for ease of contact inspection.
3. *Emergency Operation:* To switch from a dead source to a live source if the electrical operator has failed.

In the first two cases, the manual operator is used on dead sources. In the third case, it is used to switch from a dead source to a live source.

### B. UL

UL1008 permits an external operating handle or an internal operating handle. The internal handle is designed for maintenance purposes and must be so labeled. When an internal handle is used, contacts must be protected and both mechanical and electrical hazards must be considered. UL clearly states that power should be removed from the unit prior to servicing on all manufacturers internal operators. Caterpillar provides an internal removable operating handle that is listed by UL in accordance with UL1008 Standards for Safety.

### C. Specifications

Some specifications have been issued that add restrictive, unnecessary and dangerous requirements for manual handles.

The requirements issued state:

1. The manual handle shall provide the same contact-to-contact transfer speed as the electrical operator to prevent flashover.
2. The manual handle shall be externally operable.

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## D. Inherent Dangers Resulting from Manual Operation Under Load

1. It is possible to close a transfer switch into a generator which is attempting to crank, thereby forcing the emergency generator source to “bog down” as it attempts to assume full load prior to reaching proper voltage and speed.
2. Manually transferring fault currents in excess of switch rating would create a danger for anyone operating the manual handle of any transfer switch.
3. Manually operating the switch with overload currents present of six times switch rating unless the contacts are protected in enclosed arc chambers.
4. Manual operation by unauthorized personnel will possibly disconnect critical loads.
5. Manual operation of a switch that has malfunctioned without first determining the reason for that malfunction and whether manual operation is safe.
6. Manually operating the switch without disconnecting the electrical operator, causing the mechanism to drive back against the person operating the switch.
7. If the handle is external, additional dangers may exist:
  - a. Increased possibility of unauthorized persons operating the switch.
  - b. Possibility of a moving handle (during automatic operation) injuring someone standing or walking near the switch.
  - c. Complete disregard of the potential hazards, service difficulties and operational problems induced by manual operation.

## E. Caterpillar Safeguards

Recognizing the convenience of the manual handle, and also the problems, Caterpillar provides the following safeguards:

1. Fully enclosed arc chambers provide protection to the operator against arcing, and also prevent flashover.
2. The handle is long and well isolated from electrical or mechanical hazards.
3. Proper instructions and labels are provided on the switch to assure safe operation.
4. The handle is designed to operate the product within required UL guidelines.

## F. Summary

1. Specifications described in Section C are restrictive because they are design features centered around one manufacturer’s guide specifications. They are unnecessary for the proper and safe operation of an automatic transfer switch; and they are potentially dangerous because all safeguards are not considered.
2. The internal handle, with the proper instructions and safeguards as listed, provides a safe and dependable operating system.
3. It is recommended that specifications include “provide a manual handle for manual operation of the transfer switch during maintenance.”
4. It is strongly suggested that operating personnel be made familiar with proper procedures for manual transfer and that all factors be considered before this operation is performed.
5. The Automatic Transfer Switch (ATS) has been designed with operator safety and load protection in mind. External “load break” manual handles on automatic transfer switches ignore many aspects of those proven design principles.

