Service Manual

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Power Generation

Transfer Switch
1200–4000 Amperes

WOTPCE (Spec A)
WOTPCF (Spec A)
WOTPCG (Spec A)
WOTPCH (Spec A)
WOTPCJ (Spec A)

English – Original Instructions 3-2010 A030R452 (Issue 1)

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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.***

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

High voltage in transfer switch components presents serious shock hazards that can result in severe personal injury or death. Read and follow these suggestions.

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.

UTILITY-TO-GENSET OR GENSET-TO-GENSET APPLICATIONS

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 or sets (remove the ground [–] lead first).
3. Remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

UTILITY-TO-UTILITY APPLICATIONS

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.

GENERAL PRECAUTIONS

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 when working on the electrical equipment.

Wear safety glasses whenever servicing the transfer switch and do not smoke near the batteries.

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.

⚠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.

1. Introduction

ABOUT THIS MANUAL

This manual provides information necessary for operation of an WOTPC automatic transfer switch (ATS). This transfer switch and it is equipped with PowerCommand® Control (PC) and it is capable of executing Open Transition with Sync Check, Programmed Transition, and Closed Transition transfer modes.

An **Open Transition with Sync Check Transfer Mode** executes an open transition when both sources of power are within specified tolerances of frequency, voltage, and relative phase difference. If both sources meet the tolerances, a fast transfer occurs.

A **Programmed Transition Transfer Mode** executes an open transition by disconnecting the load from the source of power, pausing in the neutral position of the transfer switch (between switched positions) to allow transient currents from the load to diminish, and then the load is switched to the other source.

A **Closed Transition Transfer Mode** executes a load transfer by momentarily paralleling both sources (a maximum of 100ms) before switching sources.

Refer to the schematic and wiring diagram package that was shipped with the ATS for specific information about its configuration.

Use normal and necessary safety precautions before starting any service procedure. Identify all hazards by referring to the Safety Precautions section and observe all warnings and cautions within the manual. Whenever you are troubleshooting, remember that the generator set, ATS, and utility power source are all interdependent.

TRANSFER SWITCH APPLICATIONS

Transfer switches are an essential part of a building's standby or emergency power system. Power Source 1 (Normal), commonly the utility line, is backed up by Power Source 2 (Emergency), often a generator set. The transfer switch automatically switches the electrical load from one source to the other.

The load is connected to the common of the transfer switch (Figure 1-1). Under normal conditions, the load is supplied with power from Source 1 (illustrated as Normal). If Source 1 is interrupted, the load is transferred to Source 2 (Emergency). When Source 1 returns, the load is retransferred to Source 1. The transfer and retransfer of the load are the two most basic functions of the transfer switch.

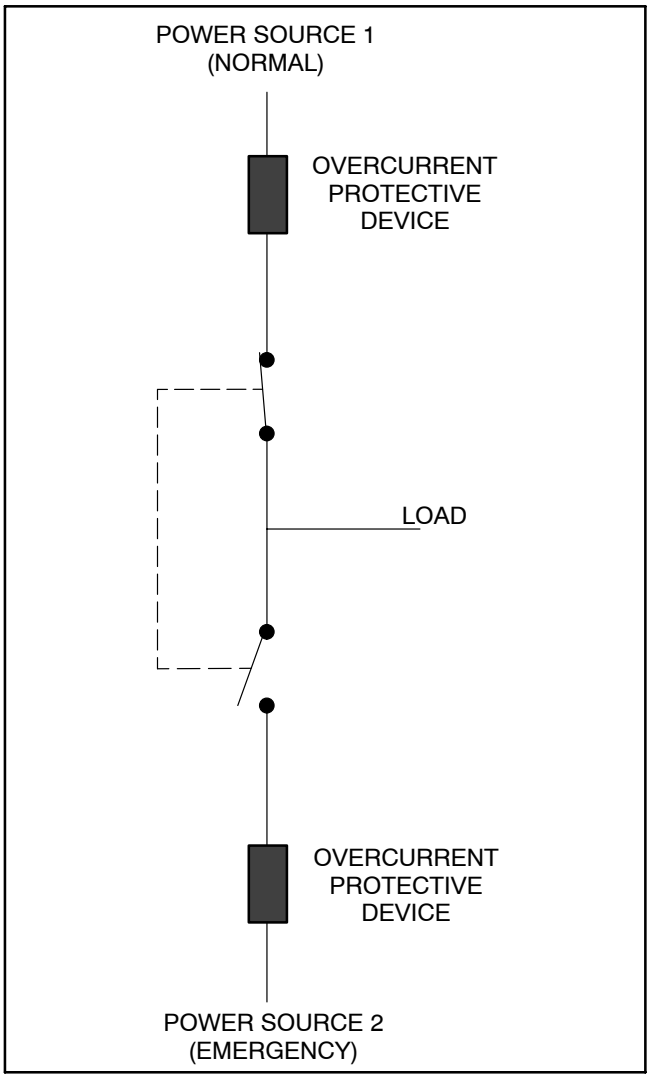

FIGURE 1-1. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

TRANSFER SWITCH FUNCTION

Automatic transfer switches, capable of automatic operation without operator intervention, perform the basic function of transferring the load to the available source. The controller monitors each source for allowable voltage and frequency range.

The WOTPC ATS supports utility-to-generator, utility-to-utility, and generator-to-generator applications.

UTILITY-TO-GENSET OPERATION

In utility-to-genset applications, the transfer switch performs the following functions:

1. Senses the interruption of the Source 1 power.
2. Sends a start signal to the generator set (Source 2).
3. Transfers the load to the Source 2.
4. Senses the return of Source 1.
5. Retransfers the load to Source 1.
6. Sends a stop signal to the generator set.

UTILITY-TO-UTILITY OPERATION

In utility-to-utility applications, the transfer switch performs the following functions:

1. Monitors the primary (Source 1) power.
2. Senses the interruption of the Source 1 power.
3. Transfers the load to the Source 2.
4. Senses the return of Source 1.
5. Retransfers the load to Source 1.

Level 2 controllers can control a two-utility configuration for prime power. One utility is designated the preferred source. The control automatically transfers the load between the two utilities and detects alarm conditions.

The operator can select either source as the preferred source (see Figure 1-2). The Preferred Source menu is included in the Test submenus (see Figure 4-13). The PC service tool can also be used to designate either source as the preferred source.

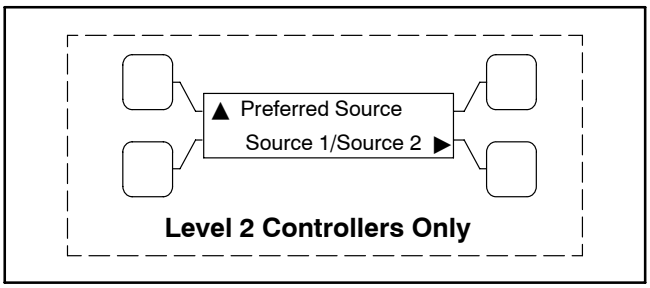

FIGURE 1-2. PREFERRED SOURCE SUBMENU

GENERATOR-TO-GENERATOR OPERATION

In genset-to-genset applications, there are two possible configurations, as shown in Figure 1-3.

- Prime Power – Two gensets provide all of the power (utility power is not available).
- Dual Standby – Two gensets are used to back up utility power.

In Prime Power genset-to-genset applications, the ATS performs the same as with utility-to-genset applications.

In Dual Standby gen-to-gen applications, the master and the slave ATSs perform the following functions.

1. The slave ATS begins connected to the preferred source (either genset A or B, but neither genest is operating yet) and monitors for the Stand-by Start signal from the master ATS (see Figure 1-3).
2. When the signal is received, the slave ATS starts the preferred genset.
3. If the preferred source voltage is acceptable, the slave ATS remains there and turns off the non-preferred genset. Otherwise, the slave ATS will transfer to the non-preferred source.
4. When the utility source returns on the master ATS, then it will transfer back to the utility and disables the Stand-by Start signal.
5. When the Stand-by Signal is disabled, the slave ATS turns off the operating genset (either genset A or B).

NOTE: The Test/Exercise function and Load Shed feature are not available in this configuration.

Prime Power (Plant to Plant) Operation

In prime power applications, utility power is not available. The system includes one transfer switch

and two gensets (see Figure 1-3). One genset is always running and supplying power to the load while the other genset is the backup genset. An external power supply is not needed in this application.

Preferred Source Selection

Under normal operation, one genset is designated as the preferred source and supplies power to the load. The second genset is the backup power source. If the preferred genset fails, the backup genset starts and the transfer switch transfers the load to the backup genset.

At any time, the PC service tool or the Test submenu (see Figure 1-2) can be used to designate either genset (Source 1 or Source 2) as the preferred genset. The Preferred Source menu is included in the Test submenus (see Figure 4-13).

If the user manually changes the preferred source setting so that the backup genset becomes the preferred genset, the transfer switch transfers the load to the new preferred genset when it becomes available. The unit that is carrying the load is always considered the preferred source. The control doesn't automatically select which source is considered preferred.

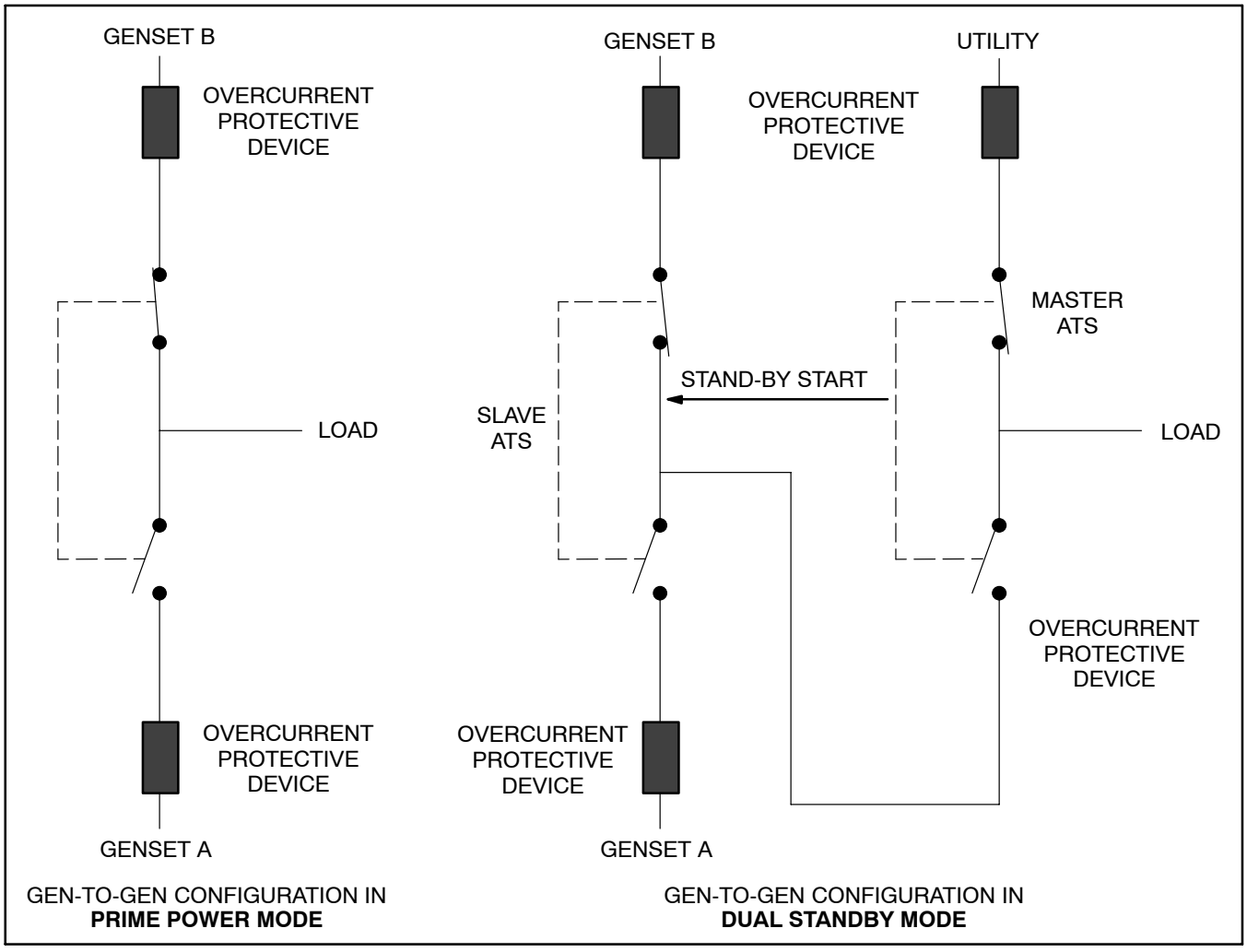

Figure 1-3. Generator-to-Generator Configuration in Prime Power and Dual Standby Modes

Automatic Changeover

The transfer switch can be set up to change the preferred source automatically by enabling the changeover timer. The Time Delay submenus under Setup (see Figure 4-12) or the PC service tool can be used to enable the changeover timer and specify a changeover delay time period (see Figure 1-4). The Changeover menus are included in the Time Delay submenus.

The automatic changeover timer automatically changes the preferred source and transfers the load to the new preferred genset after a TDEN time delay. After the transfer is complete, the control initiates a cool-down period (TDEC) on the old preferred genset before shutting it down. The old preferred genset is now the new backup genset. The changeover timer is now timing for the next changeover and the cycle continues as long as the changeover timer is enabled.

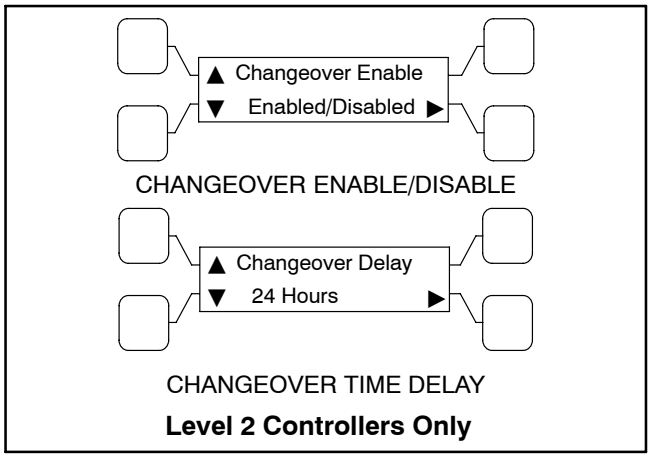

FIGURE 1-4. CHANGEOVER SUBMENUS

Prime Power Wiring

A permanent start jumper is installed in the transfer switch and is shipped from the factory in the prime power mode. Verify that the jumper (TB3-57 to TB3-59) is installed (see interconnect drawing 626−2108, sheet 3 in Section 9).

System Startup

To set up a system for prime power operation:

1. Place the motor disconnect switch in the Off position, and both generator selector switches into the OFF position.
2. Place the transfer switch in the Source 1 position.
3. Place the Off−Manual−Auto selector switch on the Source 1 genset control in the Auto position. The genset will start and supply power to the load (the load will be energized and TDEC may be timing).
4. Use the PC Service tool or the Test submenu to set this genset as the preferred source.
5. Wait for TDECa to finish timing.
6. Place the Off−Manual−Auto selector switch on the Source 2 genset control in the Auto position.
7. Place the motor disconnect switch in the Auto position.
8. If desired, use the Time Delay submenus under Setup or use the PC Service tool to enable the changeover timer and specify a changeover delay time period.

Testing the System by Turning Off the Preferred Source

1. With the preferred source genset running and supplying power to the load, place the genset control Off−Manual−Auto selector switch in the Off position. The backup genset should start and run.

   After the voltage and frequency are at acceptable levels, the transfer switch should transfer the load to the backup genset.

2. Place the genset control Off−Manual−Auto selector switch on the preferred genset back in the Auto position. The preferred genset should start and run.

   After the voltage and frequency levels are at acceptable levels, the transfer switch should transfer the load back to the preferred genset.

   After the transfer is complete, the control initiates a cool-down period (TDEC) on the backup genset and it should stop.

Testing the System by Changing the Designated Preferred Source

1. With the preferred source genset running and supplying power to the load, use the PC service tool or the Test submenu to change the preferred source. The new preferred source should start and run.

   After the voltage and frequency are at acceptable levels, the transfer switch should transfer the load to the new preferred source.

   After the transfer is complete, the control initiates a cool-down period (TDEC) on the old preferred source and it should stop.

2. Use the PC service tool or the Test submenu to change the preferred source back to the original genset. The original genset should start and run.

   After the voltage and frequency levels are at acceptable levels, the transfer switch should transfer the load back to the original genset.

   After the transfer is complete, the control initiates a cool-down period (TDEC) on the backup genset and it should stop.

Dual Stand-By Operation

In dual stand-by applications, utility power is available. The system includes two transfer switches (a Master ATS and a Slave ATS) and two gensets (see Figure 1-3). Utility power supplies power to the load and both gensets are backup gensets.

Under normal operation, the utility is supplying power to the load through the master transfer switch. The master transfer switch is a utility-to-genset switch. The two gensets are connected to the gen-to-gen slave ATS. The load side of this switch is connected to the genset side of the master transfer switch.

Upon loss of utility power to the master ATS, a Stand-by Start signal is sent to the gen-to-gen ATS to start the preferred genset. When the master transfer switch senses generator voltage, it transfers the load to that genset. If the preferred genset fails to start, a signal is sent to the backup genset to start. The PC service tool or the Test submenu on the gen-to-gen ATS can be used to set the preferred source.

If the Stand-By Start is inactive, upon initial power–up (or reset), or during software initialization, the transfer switch control will not start either genset. When a Stand-by Start command is received by the Slave ATS from a Master ATS (or other device), the preferred genset immediately starts. If the preferred genset does not start, a time delay engine start (TDES) is initiated and the control starts the backup genset. The load is connected to the genset when it becomes available.

If the preferred genset becomes available while the backup genset is active, a time delay retransfer (TDEN) period is initiated and the load is retransferred back to the preferred genset. A time delay cool-down (TDEC) period is initiated before turning off the backup genset. When the Stand-by Start signal becomes deactivated, a TDEC period is initiated and the active generator is turned off.

Preferred Source Selection

Under normal operation, one genset is designated as the preferred source and the second genset is designated as the backup power source. If both the utility power and the preferred genset fails, the backup genset starts and the gen-to-gen transfer switch transfers the load to the backup genset.

At any time, the PC service tool or the Test submenu (see Figure 4-13) on the gen-to-gen ATS can be used to designate either genset (Source 1 or Source 2) as the preferred genset. If the preferred genset is changed and the backup genset becomes the preferred genset, the ATS transfers the load to the new preferred genset if it is needed and when it becomes available.

Alternating Preferred Source

In an attempt to keep the running time equally distributed between both gensets, the control can be set to alternate between the gensets when utility power fails. The selected preferred genset starts with the first power outage. The second power outage starts the backup genset, which now becomes the preferred genset. Upon subsequent outages, the preferred genset alternates.

Utility outages, tests, or exercises initiated at the master transfer switch result in the gensets being alternated. The designated preferred genset will not change if it fails and the backup genset takes over the load. **This alternating preferred source can only be enabled with the PC service tool.** When enabled, a genset can be designated as the preferred source for a maximum of two weeks.