



DUAL SOURCE SYSTEM
(Level 3 Transfer Switch Option)
INFORMATION SUPPLEMENT



PM043 Rev 6 01/10/17

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1. PRODUCT REVISION HISTORY

The following information provides an historical summary of changes made to this product since the original release.

Rev 6 01/10/17	Minor text changes
Rev 5 00/09/25	Manual changed to DSS option Lev-3 Information Supplement.
Rev 4	Service entrance information for all models.
Rev 3	Warnings added with reference to multi-tap controller capability features and system voltage.
Rev 2	Added 200A model information c/w drawings.
Rev 1	Minor text changes
Rev 0	Original release.

Contact Thomson Technology Inc., to obtain applicable instruction manuals. Soft copy of most current version is available at www.thomsontechnology.com.

NOTE: All information contained in this manual is for reference only and is subject to change without notice.

2. INTRODUCTION

NOTE:

This information supplement is only to be used in conjunction with the standard Operation & Maintenance manuals as are supplied with the transfer switch, bypass switch or changeover switch. For other information, contact TTI to obtain applicable instruction manuals.

The term "transfer switch" used in this information supplement shall also refer to applications using a bypass switch or changeover switch.

The Dual Source System option (LEV-3) is available with TTI's line of Automatic Transfer Switches, Bypass Switches and Changeover Switches.

When LEV-3 option is ordered the following features are supplied in addition to the standard ATS features:

- Dual Source Selector Switch
- Overvoltage 3 phase Sensor (both sources)

- Under/Over Frequency Sensor (both sources)
- Second Engine Start Contact (Programmable Contact is utilized)

The Dual Source System option (LEV-3) allows operation of a standard automatic transfer switch or changeover switch in the following special applications:

- **DUAL UTILITY SOURCE:** When two utility supplies are connected to the transfer switch, the option allows either source to be selected as the “preferred” or “prime” source. When the “preferred” utility source fails, the transfer switch will automatically transfer to the alternate utility supply if available. The engine start contacts are not used in this application.
- **DUAL PRIME GENERATORS:** Dual prime operation is typically utilized for installations where no utility power is available thereby requiring two generator sources to supply a site load. This option allows either source to be selected as the “preferred” or “prime” source. The preferred selected generator would be operating on load, with the alternate “standby” generator stopped. When the “preferred” generator source fails, the transfer switch will automatically transfer to the alternate generator supply if available.
- **DUAL STANDBY GENERATORS:** Dual standby operation is typically utilized for installations where utility power is available and two non-paralleled generator sets are used for standby power. This system uses two automatic transfer switches. One is a standard automatic transfer switch and the other is a transfer switch with the option. The first “master” transfer switch is connected to the utility supply and is configured for standard automatic transfer switch operation. The second “slave” transfer switch with the option is connected to both standby generators supplies, with the common load connected to the generator supply of the first “master” transfer switch. The transfer switch with the option allows either generator source to be selected as the “preferred” or “prime” source when called to run as a result of a utility power failure. Under normal operation with utility power available, both generators would be stopped. If during a utility power failure, the “preferred” generator source fails, the transfer switch will automatically transfer to the alternate generator supply if available.

3. CAUTION!

Before opening the transfer switch enclosure to perform any service task, or to manually transfer the mechanism, it is imperative to **isolate the transfer switch from any possible source of power.**

Failure to do so may result in **serious personal injury or death** due to electrical shock.

Service procedures must be undertaken by **qualified personnel only!**

4. GENERAL SEQUENCE OF OPERATION

4.1. *DUAL UTILITY SOURCE*

This option provides the ability for an operator to select either source #1 or source #2 as “preferred”. The non-selected source will become the “standby” source. The “preferred” selected source will transfer on load provided it’s supply is within normal operating limits. Should the “preferred” source fail, the “standby” source will transfer on load provided its supply is within normal operating limits. If the “preferred” source returns to normal operating limits, the transfer switch will re-transfer to the “preferred” source.

For specific information regarding applicable time delay sequences or voltage/frequency setpoints, refer to the transfer switch controllers (TSC 800) programming data sheet and O&M manual for further information.

4.2. *DUAL PRIME GENERATORS*

Normal operation would require one generator continuously on load with the second generator operating as a standby unit.

Dual prime logic allows an operator to select which source is “preferred” (i.e. either source may be selected as preferred), therefore, the opposite source will act as the standby source.

A PREFERRED SOURCE selector switch is provided for an operator to manually select a “Preferred” operating source. The “Preferred” selected source will continuously operate on load with an engine start signal maintained. The non-selected unit (standby) will remain in the OFF condition. The standby unit will be signaled to automatically start the engine and transfer on load (following its engine start and warm-up delay period) should the “Preferred” operating unit fail. When the “Preferred” selected unit is returned to normal operating status, the load will automatically retransfer back to the “Preferred” selected source.

If the PREFERRED SOURCE selector switch is turned to the non-operating unit, the load will automatically transfer to this new “Preferred” source once the engine has started and warm-up period has expired. The originally selected prime unit will continue to operate for its cooldown period (optional), then stop.

Note: For automatic operation, both engine control panels must be set for the automatic mode of operation.

When the selected sources supply voltage drops below a preset nominal value (70 - 100% of rated adjustable) on any phase, an engine start delay circuit will be initiated to the opposite (standby) sources engine control and the transfer to the selected source signal will be removed (i.e. contact opening). Following expiry of the engine start delay period (0-60 sec. adjustable) an engine start signal (contact closure) will be given.

Once the opposite (or standby) engine starts, the transfer switch controller will monitor the generator's voltage and frequency levels. Once the generator voltage and frequency rises above preset values (70 - 100% nominal adjustable), the engine warm-up timer will be initiated. Once the warm-up timer expires (0-1800 sec. adjustable), the transfer signal (contact closure) will be given to the transfer switch mechanism. The load will then transfer from the prime selected source to the opposite (standby) source via motor driven mechanism.

The "standby" will continue to supply the load until the prime selected source has returned and the retransfer sequence is completed as follows: When the prime selected source voltage is restored to above the preset values (70 - 100% of rated adjustable) on all phases, then the load will retransfer from the standby source back to the prime source.

An engine cooldown timer circuit will be initiated once the load is transferred from the "standby" generator. Following expiry of the cooldown delay period (0-30 min. adjustable), the engine start signal will be removed (contact opening) to initiate stopping of the "standby" generator set.

4.3. DUAL STANDBY GENERATORS

One transfer switch is configured as the "Master" transfer switch which is connected to the utility supply and the other is configured as a "Slave" transfer switch which is connected to both generator sets. A "preferred source" selector switch is provided on the "Slave" transfer switch (with LEV-3 option) to select which generator set is to operate on load during a utility power failure.

Under normal operation the utility supply is available and the load is energized through the "master" transfer switch. The "Slave" transfer switch is de-energized and both generator sets are set for automatic operation.

When the “master” transfer switch detects a utility power failure, both standby generator sets will be signaled to start. The “preferred” selected generator will transfer on load through the “Slave” transfer switch once nominal voltage and frequency levels are attained. The non-selected unit will only transfer on load if the “preferred” generator is slow to start or fails to start. Once the “preferred” unit has successfully transferred on load, the non-selected unit will continue to operate unloaded for a cooldown period then stop. If the “preferred” unit fails on load, the non-selected unit will automatically start and transfer on load. When the utility supply returns, the “master” transfer switch will transfer the load back to the utility supply and the operating generator is signaled to stop following its cooldown period.

5. TSC 800 CONTROLLER

A transfer switch ordered from the TTI factory with the LEV-3 will have the TSC 800 pre-programmed for correct operation. The TSC 800 program is the same for all three types of LEV-3 applications (i.e. Dual Utility Source, Dual Prime Generator and Dual Standby Generator). The only changes between the different applications will be how the engine start contacts are utilized. The LEV-3 option setting in the TSC 800 controller is under programming menu item ATS CONTROL TYPE and must be programmed as “DUAL PRIME”.

Note: the naming conventions used between a “standard ATS” configuration and a “Dual Source” configuration change as follows:

Standard ATS	Dual Source
Utility Supply	Source #1
Generator Supply	Source #2

Refer to the TSC 800 controller for detailed information on programming and setpoints

6. TROUBLESHOOTING

Symptom

- The TSC 800 controller displays utility and generator naming conventions
- will not re-transfer to preferred source upon restoration
 - will not transfer to standby source upon failure of preferred source
 - transfer to standby source without a power failure in the preferred source
 - standby source does not start up or stop when it should
 - no time delay when there should be
 - power is not available at the load terminals but source 1 or source 2 breaker appears to be closed to a live source

Possible Causes

- TSC 800 controller has been programmed for standard ATS configuration. TSC 800 requires re-programming to DUAL PRIME mode.
- Transfer switch mechanism has failed (e.g. failed motor, limit switch etc.)
 - a test mode has been activated (check TSC 800 status LCD display)
 - preferred voltage or frequency is outside the pre-programmed limits (check source for adequate voltage & frequency)
 - a loose control connection
 - defective TSC 800 controller (verify output signals with circuit board mounted diagnostic LED's)
 - Transfer switch mechanism has failed (e.g. failed motor, limit switch etc.)
 - standby source not producing enough voltage/frequency or output circuit breaker open
 - Warm-up time delay function has not timed out yet (verify TSC 800 timer setting)
 - a loose control connection
 - defective TSC 800 controller (verify output signals with circuit board mounted diagnostic LED's)
 - a test mode has been activated (check TSC 800 status LCD display)
 - defective TSC 800 controller (verify output signals with circuit board mounted diagnostic LED's)
 - verify remote engine control panel is set for automatic mode
 - verify time delay function in the TSC 800 program setting as per programming sheets as supplied with the transfer switch
 - the breaker's trip unit (Type B style only) has tripped on a fault on the system. Correct the fault, and manually reset the breaker in the transfer switch by moving it off and then on again with the manual operating handle
 - limit switch incorrectly adjusted

7. NOTES