

INSTALLATION INSTRUCTIONS

Original Issue Date: **6/05**

Model: **TS 840, TS 870 Transfer Switches with TSC 80 Controllers**

Market: **ATS**

Subject: **Service Display Module (SDM) GM41218-KA1**

Introduction

The service display module (SDM) is a hand-held service tool that is designed for use on transfer switches with TSC 80 transfer controllers. The SDM provides an LCD screen to display detailed information on the operation and settings of the TSC 80 controller for simplified servicing/troubleshooting procedures.

The SDM module is for temporary use only while servicing procedures are undertaken and is not for permanent installation and use. The SDM module is designed only for use by trained service technicians. For detailed information on the TSC 80 transfer controller, refer to the operation/instruction manual.

The SDM module consists of a plastic enclosure that houses an LCD display, a faceplate with LED lights, and operation pushbuttons as shown in Figure 1. The SDM is interconnected to a TSC 80 transfer controller via two ribbon cables, which are permanently attached to the SDM module.

This equipment contains static-sensitive parts. Please observe the following antistatic precautions at all times when handling this equipment. Failure to observe these precautions may cause equipment failure and/or damage.

- Discharge body static charge before handling the equipment (contact a grounded surface and maintain contact while handling the equipment, and use a grounded wrist strap).
- Do not touch any components on the printed circuit board with your hands or any other conductive equipment.
- Do not place the equipment on or near materials such as Styrofoam, plastic and vinyl. Place the equipment on grounded surfaces and only use an antistatic bag for transporting the equipment.

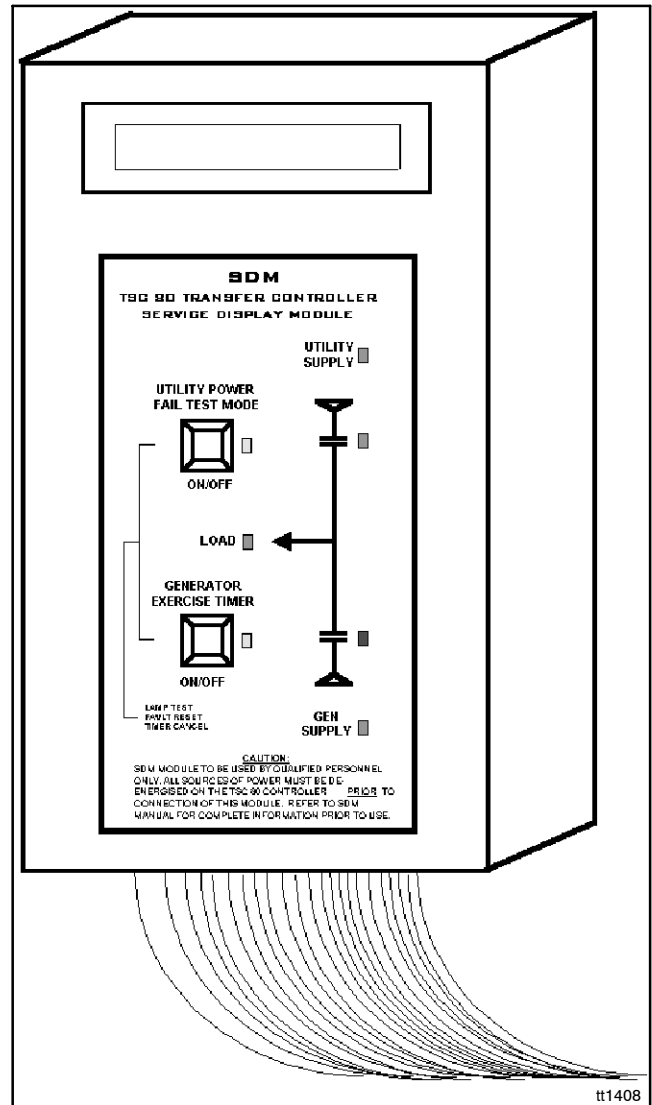
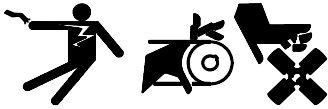


Figure 1 SDM Module

Safety Precautions

Observe the following safety precautions while installing the kit.

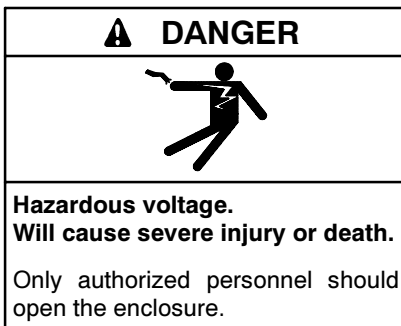
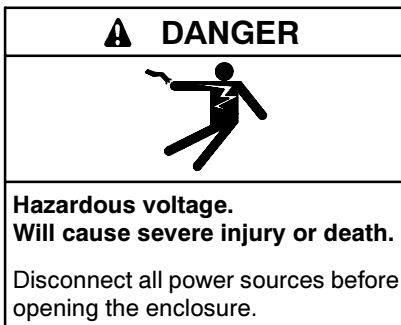
WARNING



Accidental starting. Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or connected equipment, disable the generator set as follows: (1) Move the generator set master switch to the OFF position. (2) Disconnect the power to the battery charger. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent starting of the generator set by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer.



Servicing the transfer switch. Hazardous voltage can cause severe injury or death. Deenergize all power sources before servicing. Open the main circuit breakers of all transfer switch power sources and disable all generator sets as follows: (1) Move all generator set master controller switches

to the OFF position. (2) Disconnect power to all battery chargers. (3) Disconnect all battery cables, negative (-) leads first. Reconnect negative (-) leads last when reconnecting the battery cables after servicing. Follow these precautions to prevent the starting of generator sets by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer. Before servicing any components inside the enclosure: (1) Remove all jewelry. (2) Stand on a dry, approved electrically insulated mat. (3) Test circuits with a voltmeter to verify that they are deenergized.

NOTICE

Electrostatic discharge damage. Electrostatic discharge (ESD) damages electronic circuit boards. Prevent electrostatic discharge damage by wearing an approved grounding wrist strap when handling electronic circuit boards or integrated circuits. An approved grounding wrist strap provides a high resistance (about 1 megohm), *not a direct short*, to ground.

SDM Installation and Removal

To temporarily install the SDM module to a transfer switch with TSC 80 transfer controller for servicing procedures, follow the procedure outlined below:

1. Place the generator set master switch in the OFF position.
2. Disconnect power to the battery charger, if equipped.
3. Disconnect the generator set engine starting battery(ies), negative (-) lead first.
4. Disconnect all sources of power to the automatic transfer switch.
5. Disconnect the transfer switch control circuit isolation plug inside the transfer switch.
6. Remove the TSC 80 rear cover to gain access to the printed circuit board.
7. Disconnect the faceplate interconnection cable to the TSC 80 controller (10-pin connector on JP3). Refer to Figure 2 for the location of JP3.
8. Connect the SDM module ribbon cables as follows:
 - a. Connect the 12-pin (small) SDM ribbon cable to TSC 80 connector JP3. Refer to Figure 2 for location of JP3 and correct orientation. The ribbon cable has a *pink* paint marking that must be on the left hand side of the connection pins when viewed from the front of the circuit board.
 - b. Connect the 16-pin (large) SDM ribbon cable to TSC 80 connector J2. Refer to Figure 2 for location of J2 and correct orientation. The ribbon cable has a *pink* paint marking that must

be on the left hand side of the connection pins when viewed from the front of the circuit board.

Note: For convenience, the SDM module may be attached to the door of the transfer switch using the magnetic strip on the rear of the module.

9. Reconnect the transfer switch control circuit isolation plug inside the transfer switch.
10. Once all ribbon cable connectors have been correctly installed and the transfer switch is safe to reenergize, restore normal power to the transfer switch.

To disconnect the SDM module, follow the procedure outlined below:

1. Deenergize all sources of power to the automatic transfer switch.
2. Disconnect the transfer switch control circuit isolation plug inside the transfer switch.
3. Disconnect the 12-pin (small) SDM ribbon cable from the TSC 80 connector JP3. Refer to Figure 2 for location of JP3.
4. Reconnect the faceplate interconnection cable to the TSC 80 controller (10-pin connector on JP3).
5. Disconnect the 16-pin (large) SDM ribbon cable from the TSC 80 connector J2. Refer to Figure 2 for location of J2.
6. Reinstall the TSC 80 rear cover on to the TSC 80 controller.
7. Reconnect the transfer switch control circuit isolation plug inside the transfer switch.

8. Once all ribbon cable connectors have been correctly removed, restore normal power to the transfer switch.

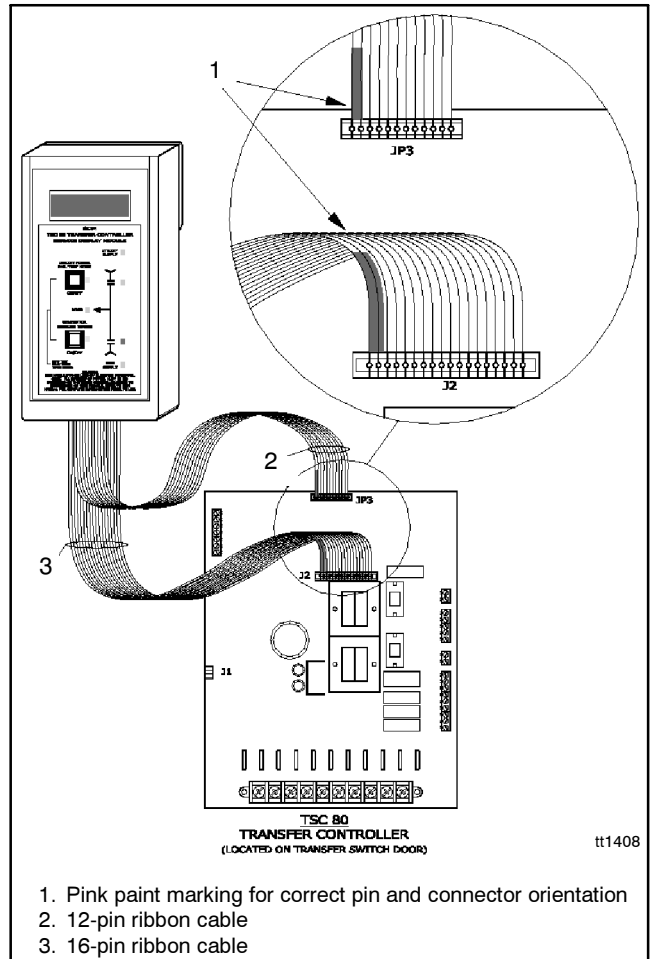


Figure 2 SDM/TSC 80 Interconnection Drawing

SDM Operation

The SDM module receives control power whenever the TSC 80 controller is energized. The SDM module faceplate LEDs will reflect the current status of the connected power to the transfer switch. The SDM module faceplate pushbuttons provide identical operation of the transfer switch as the standard TSC 80 faceplate. The SDM LCD will display 16 different operational status screens, which automatically scroll in a continuous loop.

When an automatic timing function occurs on the TSC 80 controller, the SDM LCD will automatically display the active timer and the count down of the timing sequence. When the time period expires the SDM will automatically return to displaying the normal status screens.

Note: The SDM module cannot be used to change any program settings in the TSC 80 transfer controller. Program settings may only be monitored. All program changes must be done on the TSC 80 controller using potentiometers and jumpers provided. See the controller operation manual.

LCD Display Screens

The following 16 SDM display screens are provided:

1. **Software Version.** The LCD screen shows the current version number of TSC 80 software loaded into the controller.
2. **TSC 80 Clock.** The LCD screen shows the day and time, which the TSC 80 controller was programmed. The timeclock function is not used in the operation of the transfer switch.
Note: The timeclock is not user-adjustable.
3. **Generator Voltage/Frequency.** The LCD screen shows the current generator voltage (3-phase or single-phase, line-to-line, or line-to-neutral voltages) and frequency.
4. **Utility Voltage/Frequency.** The LCD screen shows the current utility voltage (3-phase or single-phase, line-to-line, or line-to-neutral voltages) and frequency.
5. **System Configuration.** The LCD screen shows the current setting of the TSC 80 programming jumpers:

- System nominal voltage (120, 208, 240, 380, 480, 600 volt).
 - System nominal frequency (50, 60 Hz).
 - System phases (single- or 3-phase).
6. **Generator Undervoltage Setpoint.** The LCD screen shows the current generator voltage applied and the generator undervoltage sensor dropout percent setpoint as programmed in the TSC 80 controller. The SDM module can be used to monitor a change in setpoint while the undervoltage sensor is adjusted via the GEN UV potentiometer on the TSC 80 controller. For further information on the undervoltage setpoint, refer to the TSC 80 instruction manual.
 7. **Generator Underfrequency Setpoint.** The LCD screen shows the current generator frequency applied and generator underfrequency sensor dropout percent setpoint as programmed in the TSC 80 controller. The SDM module can be used to monitor a change in setpoint while the underfrequency sensor is adjusted via the GEN FREQ potentiometer on the TSC 80 controller. For further information on the underfrequency setpoint, refer to the TSC 80 instruction manual.
 8. **Engine Start Delay Setting.** The LCD screen shows the engine start delay timer setting as programmed in the TSC 80 controller. The SDM module can be used to monitor a change in setpoint while the engine start delay timer is adjusted via the GEN START potentiometer on the TSC 80 controller. For further information on the engine start delay timer, refer to the TSC 80 instruction manual.
 9. **Engine Warmup Delay Setting.** The LCD screen shows the engine warmup delay timer setting as programmed in the TSC 80 controller. The SDM module can be used to monitor a change in setpoint while the engine warmup delay timer is adjusted via the GEN WARM potentiometer on the TSC 80 controller. For further information on the Engine Warmup Delay timer, refer to the TSC 80 instruction manual.
 10. **Engine Cooldown Delay Setting.** The LCD screen shows the engine cooldown delay timer setting as programmed in the TSC 80 controller. The SDM module can be used to monitor a change in setpoint while the engine cooldown delay timer is adjusted via the GEN COOL potentiometer on the TSC 80 controller. For further information on

engine cooldown delay timer, refer to the TSC 80 instruction manual.

11. **Neutral Delay Setting.** The LCD screen shows the neutral delay timer setting as programmed in the TSC 80 controller. The SDM module can be used to monitor a change in setpoint while the neutral delay timer is adjusted via the NEUT DLY potentiometer on the TSC 80 controller. For further information on neutral delay timer, refer to the TSC 80 instruction manual.
12. **Utility Undervoltage Setting.** The LCD screen shows the current utility voltage applied and utility undervoltage sensor dropout percent setpoint as programmed in the TSC 80 controller. The SDM module can be used to monitor a change in setpoint while the undervoltage sensor is adjusted via the UTIL UV potentiometer on the TSC 80 controller. For further information on the undervoltage setpoint, refer to the TSC 80 instruction manual.
13. **Utility Return Delay Setting.** The LCD screen shows the utility return timer setting as programmed in the TSC 80 controller. The SDM module can be used to monitor a change in setpoint while the utility return timer is adjusted via the UTIL RTN potentiometer on the TSC 80 controller. For further information on neutral delay timer, refer to the TSC 80 instruction manual.
14. **Exercise Mode.** The LCD screen shows if the auto exercise mode is currently enabled or disabled. When it is enabled, the remaining time to test is displayed. For further information on exercise mode operation, refer to the TSC 80 instruction manual.
15. **Utility Fault Status.** The LCD screen shows the current status of the utility supply. The following different statuses will be displayed:
 - Normal
 - Utility Limit Switch Fail
 - Utility Switching Device FailedFor further information on the transfer failure modes, refer to the TSC 80 instruction manual.
16. **Generator Fault Status.** The LCD screen shows the current status of the Generator Supply. The following different statuses will be displayed:
 - Normal
 - Gen Limit Switch Fail
 - Gen Switching Device FailedFor further information on the transfer failure modes, refer to the TSC 80 instruction manual.

SDM Operation Pushbuttons

The faceplate contains two pushbuttons (i.e. UTILITY POWER FAIL TEST Mode and GENERATOR EXERCISE TIMER), which can be used for the following operational functions:

- **SDM LCD Display Auto Scroll Halt:** The automatic scrolling feature can be halted by pressing and holding the UTILITY POWER FAIL pushbutton for approximately 3 seconds. The display will remain for 255 seconds, and then return to the auto scroll mode.
- **Manual Advance and Lockon to Next LCD Display Screen:** To manually advance the LCD to the next screen, press and hold the UTILITY POWER FAIL pushbutton for approximately 1 second until the screen changes.
 - Note:** The LCD display will return to the automatic scrolling mode in 255 seconds if no other pushbuttons are used.
 - Note:** To quickly advance to the next display screen, momentarily press the UTILITY POWER FAIL pushbutton until the screen changes.
- **Manual Return and Lockon to Previous LCD Display Screen:** To manually return to the previous LCD screen, press and hold the GENERATOR EXERCISE pushbutton for approximately 1 second until the screen changes.
 - Note:** The LCD display will return to the automatic scrolling mode in 255 seconds if no other pushbuttons are used.
 - Note:** To quickly return to the previous display screen, momentarily press the GENERATOR EXERCISE pushbutton until the screen changes.
- **Timer Bypass:** Both faceplate pushbuttons must be held on for approximately 5 seconds until the displayed timer resets to zero.
- **Transfer Fail Reset:** Both faceplate pushbuttons must be held on until all LEDs on the faceplate illuminate in a flashing mode.
- **Lamp Test:** Both faceplate pushbuttons must be held on longer than 5 seconds until all LEDs on the faceplate illuminate in a flashing mode.
- **Initiate a Load Transfer to Generator (push and hold the UTILITY POWER FAIL TEST Mode for 5 seconds until the LED light changes state).**

- Initiate a Generator Exercise Mode (push and hold the GENERATOR EXERCISE TIMER Mode for 5 seconds until the LED light changes state).

Note: The SDM module pushbuttons cannot be used to change any program settings in the TSC 80 transfer controller. Program settings may only be monitored. All program changes must be done on the TSC 80 controller using the potentiometers and jumpers provided.

Troubleshooting

A number of problems can cause the SDM module not to function properly. Refer to the following list of typical problems.

Note: There are no user-serviceable components located on the TSC 80 printed circuit board or SDM module. If the TSC 80 controller or SDM module is deemed to be defective, return it to the factory for repair or replacement.

Symptom	Possible Causes
SDM will not display any information while the TSC 80 controller is energized.	LCD communication signal may need to be reinitialized. Remove jumper JP9 on the TSC 80 controller for 5 seconds and reinstall.
	A loose ribbon cable connection.
	Misalignment of TSC 80 pins and ribbon cable.
	Ribbon cable for 16-pin connector is backwards. Refer to Figure 2 for correct orientation.
SDM faceplate LEDs and/or pushbuttons are inoperative.	Defective TSC 80 controller (verify TSC 80 is energized and is operating correctly—check for flashing SYS OK green LED on the TSC 80 printed circuit board).
	A loose ribbon cable connection.
	Misalignment of TSC 80 pins and ribbon cable.
	Ribbon cable for 12-pin connector is backwards. Refer to Figure 2 for correct orientation.
	Defective TSC 80 controller (verify TSC 80 is energized and is operating correctly—check for flashing SYS OK green LED on the TSC 80 printed circuit board).