

### Variable Volume and Temperature (VVT) Slave Thermostat



## Troubleshooting Guide

Page

#### CONTENTS

GENERAL	. 1
GENERAL OPERATING PROBLEMS No Display Blinking Display	1,2 . 1 . 2
SLAVE COMMUNICATION PROBLEMS Common Communication Related Problems	. 2 . 2
Common Causes of System Communication Problems	. 2
SUPPLEMENTAL HEAT PROBLEMS     Heat Annunciator Not Displayed     Heat Annunciator Displayed     • LED NOT LIT     • LED IS LIT	2,3 . 2 . 3
HARDWARE FAILURE (HF) ERRORS Error Code Display Cannot Detect Open Damper Cannot Detect Closed Damper	4-7 . 4 . 4 . 5
Zone Temperature Sensor Out of Operating Range	. 5
Zone Damper Supply-Air Temperature     Sensor Out of Operating Range     Airflow Sensor Out of Operating Range     • VS OR ZVS-01 AIRFLOW SENSOR     • PS DESCUPE GENEROD	. 6 . 6
• PS PRESSURE SENSOR Micro-Electronic Component Failure	. 7
STORAGE FAILURE (SF) ERRORS Error Code Display Clearing an SF Error • EXAMPLE OF CLEARING AN SF ERROR	7,8 . 7 . 7
TRANSPARENT ERRORS     Comfort Trend (CT) Error     Clearing the Transparent Error Register     Meter Full (MF) Error	.9 .9 .9 .9
SLAVE THERMOSTAT WIRING	)-15 16

#### GENERAL

This manual contains information to assist in troubleshooting operating problems and errors associated with the slave thermostat (SSP-01E). The most common operating problems and types of errors associated with the slave thermostat are:

- Operating Problems. No display or flashing displays occur when the slave thermostat is not receiving rated power or has miswired connections.
- Slave Communication Problems. Not displaying correct time of day or does not follow associated System Controller program schedule. Device address not displayed during Communication Check.

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- Supplemental Heat Problems. The slave thermostat is not energizing supplemental or auxiliary heating equipment.
- Hardware Failure (HF) Errors. Occur when the slave thermostat detects a problem with one of its own components.
- Storage Failure (SF) Errors. Occur when the slave thermostat detects and replaces faulty data contained within memory with factory selected default values.
- Transparent Errors. Occur when the slave thermostat detects a zone operating problem or has a full usage meter. Operating problems other than those listed above maybe

related to the Carrier communication bus. NOTE: For complete details on the configuration of all affected options, refer to the Slave Thermostat Application book.

#### **GENERAL OPERATING PROBLEMS**

**No Display** — If the slave thermostat display remains blank after 24 VAC power has been applied to the damper actuator, it is an indication that power is not reaching the slave thermostat.

At the damper actuator, check that 24 VAC is being supplied from the power transformer. Acceptable voltage range is 22 to 30 VAC.

The VA requirements are:

- 20 VA for dampers only. (No relay packs or PS sensors.)
- 25 VA for dampers interfaced with a relay pack or a PS sensor.
- 30 VA for dampers interfaced to both a relay pack and a PS sensor.

Check the wiring between the 24 VAC transformer and the damper actuator or replace the transformer as necessary.

At the slave thermostat wiring connector board, with the slave thermostat connected, check for approximately 10 VDC (steady) across the red and white wires from the damper actuator.

Check the continuity of the 5-conductor wire running between the slave thermostat wiring connector board and the damper actuator.

Check that the slave thermostat ribbon cable is properly seated in the wiring connector board. Disconnect, then reconnect the ribbon cable from the connector board. If the slave thermostat display remains blank after the ribbon cable is reconnected, refer to slave thermostat wiring section on page 9 to check the slave thermostat wiring connector block and ribbon cable.

At the damper actuator, with the slave thermostat connected, check for approximately 10 VDC (steady) across the white and red wires to the slave thermostat. If faulty, replace the damper actuator.

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Form VVT-1T

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**Blinking Display** — If the slave thermostat display shows four zeros that either blink on and off, or that are constantly displayed, it is an indication the slave thermostat is continuously going through the power-up sequence and cannot enter normal operating mode.

Check for any of the following conditions that would cause the display to blink or constantly display four zeros:

- Low voltage from the 24 VAC transformer. Acceptable voltage range is 22 to 30 VAC.
- Unsteady 10 VDC across the red and white wires from the damper actuator.
- The yellow or blue wire from the damper actuator to the slave thermostat wiring connector board is broken or disconnected.
- The slave thermostat ribbon cable is improperly installed or defective.
- The slave thermostat wiring connector board is defective. Refer to Slave Thermostat Wiring section on page 9 for ribbon cable and wiring connector block troubleshooting information.
- The slave thermostat or damper actuator is defective.

#### SLAVE COMMUNICATION PROBLEMS

Most communication problems are associated with improper configuration of the system devices, faulty wiring, or failure of a single device wired to the communication bus.

#### **Common Communication Related Problems**

— The following are indications of communication related problems:

- A slave thermostat does not correctly indicate equipment fan operation, the current system mode, or time of day.
- During the communication check, the system controller associated with the slave thermostat fails to verify communications with the slave thermostat.
- The slave thermostat operates continuously in setback or comfort modes, even though setback program or local setback control functions are properly configured.

#### **Common Causes of System Communication**

**Problems** — The configuration of the communication bus is such that one item can cause multiple problems, or one error can cover up several problems. If a problem is found, correct it and check the communication bus for other communications problems that may appear.

1. Check the device address of the slave thermostat. A slave thermostat must have an address below the associated system controller and within the controller scanning range. See Table 1.

For additional information about addressing devices on the communication bus, refer to the Carrier Communication Bus Installation Instructions.

#### Table 1 – Controlling Device Scanning Range

CONTROLLING DEVICE	MAXIMUM SCANNING RANGE
MS(T)04ES	4 Device Addresses below its own
MS(T)16ES	16 Device Addresses below its own
MS(T)64ES	63 Device Addresses below its own
FBM(T)	31 Device Addresses below its own
VSC(T)	63 Device Addresses below its own

 Check the configuration of the communication related options of the system controller and each device in the problem system. Every device has one or more communication related options that could be configured incorrectly. NOTE: For all systems to communicate properly, the 2400 Baud Rate option for each device must be configured the same and the rotary switch for each device must be at position 0.

3. Check the slave thermostat mounting and cover plates for protruding screw heads or bent interior standoffs. This problem can be identified using the PC Command Center by flashing the red set point buttons on the slave thermostat display during a Device Inquiry.

Protruding screw heads on the rear mounting plate can cause a short between the rear pins of the set point buttons. The thermostat cannot communicate with the system controller when the set point buttons are depressed. Bent interior standoffs could constantly press the set point

buttons and block the device from communicating.

4. Check the slave thermostat wiring connector board for the correct communication bus wire connections.

The red, green, and black wires must be in their proper locations. The wiring connector block is labeled to indicate the correct wiring connections. Refer to Slave Thermostat Wiring section on page 9 to check for a faulty ribbon cable, wiring connector board, or failed Transient Voltage Arrestor (TVA).

If the communication related problem still exists, a device on the communication bus could be defective or the communication bus wiring may be faulty.

#### SUPPLEMENTAL HEAT PROBLEMS

When the slave thermostat is interfaced to supplemental/ auxiliary heating equipment, use the following section to troubleshoot problems related to the supplemental heat operation.

**Heat Annunciator Not Displayed** — The slave thermostat does not activate supplemental heat upon  $1.5^{\circ}$  F demand (no HEAT annunciator displayed).

If the slave thermostat zone has a heating demand of  $1.5^{\circ}$  F or more and the optional supplemental/auxiliary heat is not energized, check the following items:

- 1. Ensure the slave thermostat zone heating demand is equal to or greater than  $1.5^{\circ}$  F.
- 2. Ensure the slave thermostat Zone Supplemental Heat option (rotary switch position F4) is configured ON.
- Ensure the slave thermostat Supplemental Heat Time Guard has expired. Upon start-up, reset, or after the supplemental heat has been deenergized, the length of Time Guard is: (2.6 sec x slave thermostat device address) + 5 minutes.

The Supplemental Heat Time Guard Override option (rotary switch position F1) may be used to override the Time Guard to 30 seconds for one cycle. Activate the override by placing the slave thermostat rotary switch to position F1 and toggling the display to ON.

- 4. Ensure the slave thermostat is free of possible HF or SF Errors that can lockout its ability to energize supplemental heat. HF and SF Errors will be displayed by the slave thermostat if the Error Code Display function (rotary switch position F11) is configured ON.
- 5. Check the configuration of the system controller associated with the slave thermostat. The Monitor Thermostat (MSES), VAV System Coordinator (VSC), and Fan Box Monitor (FBM) all have one or more options that have the ability to lockout the slave thermostat supplemental/ auxiliary heat.

The Monitor Thermostat (MSES, MS(T)ES) Heating Lockout Temperature set point should be set correctly. For additional information see the Monitor Thermostat Reference Guide. The VAV System Coordinator (VSC, VSC(T)) Supplemental Heat Lockout Temperature Set Point, Setback Heat Source, and Warm-Up Heat Source options should be set correctly. For additional information see the VSC Reference Guide.

The Fan Box Monitor (FBM, FBM(T)) Supplemental Heat Lockout Temperature set point should be set correctly. For additional information see the FBM Reference Guide.

**Heat Annunciator Displayed** — The slave thermostat HEAT annunciator is ON, but the supplemental heat source is not energized.

Check the slave thermostat associated system controller system mode. If the system controller has selected a heating mode, the slave thermostat HEAT annunciator will be on, yet the supplemental heat may be OFF.

Check the LEDs on the slave thermostat HR-03 Relay Pack. Perform the correct procedure based on condition of LED.

LED NOT LIT — The slave thermostat HEAT annunciator is ON but the LED on the relay pack is not lit.

 At the damper actuator, unplug the relay pack and check the voltages between the damper output PIN 1 (common) and PIN 5 (H1). See Fig. 1. There should be approximately 7.5 to 9.5 VDC (steady). If the slave thermostat zone demand is equal or greater than 2.0° F, the voltage between PIN 1 (common) and both PIN 5 (H1) and PIN 6 (H2) should be the same. If not, replace the damper actuator circuit board.

2. At the damper actuator, with the relay pack plugged in, check the voltages across the relay pack input connector plug. Voltages should read approximately 4 to 6 VDC (steady) between the black wire and the appropriate relay pack input wire. If not, replace relay pack.

LED IS LIT — The slave thermostat HEAT annunciator is ON, the LED on the HR-03 relay pack is lit, but the corresponding equipment stage is not energized. See Fig. 2.

- 1. Check the AC voltage across the HR-03 relay board common (red) and any deenergized relay (H2 or H3/FAN in Fig. 2). The voltage should read 24 VAC. If not, check for wiring error.
- 2. Check the AC voltage across the HR-03 relay board common (red) and any suspect relay board output (H1 in Fig. 2). The voltage should read near zero (<1 VAC). If not, check for bad relay board.
- Check the AC voltage across a suspected contactor coil. The voltage should read 24 VAC. If not, check the contactor coil wiring.
- 4. Other possibilities are: bad contactor, defective equipment, or no unit power.





#### HARDWARE FAILURE (HF) ERRORS

A Hardware Failure (HF) error is a non-transparent error which occurs when the slave thermostat detects a failure of one of its components, or that of an associated component. There are 2 types of HF errors:

• <u>Non-Fatal HF Errors</u> — The slave thermostat continues to operate, but information from its zone is not used to determine the system mode.

• <u>Fatal HF Errors</u> — The slave thermostat cannot control the zone.

To clear a HF Error, the component responsible for initiating the HF Error must be adjusted, repaired, or replaced. See Table 2 for a description of HF errors.

HF ERROR	HARDWARE PROBLEMS	ERROR STATUS		
29	Can Not Detect Open Damper	Non-Fatal		
30	Can Not Detect Closed Damper	Non-Fatal		
31	Zone Temperature Sensor Out of Operating Range	Non-Fatal		
32	Zone Damper Supply-Air Temperature Sensor Out of Operating Range	Non-Fatal		
33	Airflow Sensor Out of Operating Range	Non-Fatal		
34	Does Not Apply to Slave Thermostat	Non-Fatal		
35	Micro-Electronic Component	Fatal		
36	Micro-Electronic Component	Fatal		

Table 2 – Hardware Failure Errors

**Error Code Display** — An error code representing the slave thermostat Storage Failure (SF) and HF diagnostic functions can be displayed to indicate which non-transparent error has been declared.

The 2 letters located in the upper left of the display of the slave thermostat represent the type of error. The 2 numbers located in the lower right of the display identify the specific error.

When the Error Code Display option of the slave thermostat is ON, an error code will be displayed when the associated error occurs. Any previous error codes that occurred when the Error Code Display was configured OFF will be displayed.

NOTE: When an error is cleared, any errors remaining in the thermostat will be displayed sequentially until all errors are cleared.

When the Error Code Display option is set to OFF, no error codes will be displayed by the slave thermostat.

To configure the Error Code Display option, turn the rotary switch of the slave thermostat to position F. Use the left set point buttons to toggle the display to 11. Use the right set point buttons to toggle the setting to ON or OFF. The option can also be configured from the PC Command Center.

**Cannot Detect Open Damper** — Each damper actuator is equipped with an electronic position sensor that signals when the damper is in the full-closed position. The position sensor is located on the back of the damper actuator printed circuit board. The position sensor receives a signal from a magnet on the damper traveler which, when aligned with the position sensor, indicates the damper is fully closed.

An HF29 error is registered when the slave thermostat attempts to position the damper open, but the position sensor indicates the damper is at the full-closed position.

To clear the HF29 error:

- 1. Check the damper for mechanical binding. An obstruction in the damper or a bent damper blade can prohibit the damper from modulating open. Remove the source of binding.
- 2. Check the damper actuator position to see if the traveler arm has moved past the position sensor. If the traveler arm is stuck at full open or full closed position, use the following steps to correct the problem:

- a. Disconnect the slave thermostat from the wiring connector board.
- b. At the damper, using a flat head screw driver, turn the traveler screw (located on the stepper motor) until the traveler arm is midway between the full closed and full open positions.
- c. Reconnect the slave thermostat.
- 3. Check for excessive inlet static pressure beyond the rated ability of the damper actuator.
  - ZD and RD zone dampers are rated for 18 in.-lb.
  - The MA-08 actuator is rated for 18 in.-lb.
  - The HTA-02 actuator is rated for 80 in.-lb.
  - The HTA-03 actuator is rated for 45 in.-lb.
- 4. For pressure independent systems, check the ZVS-01/VS airflow sensor or PS pressure sensor. Signals received from defective sensors can cause interference to be transmitted to the slave thermostat that results in an HF29 error.
- 5. Check the wiring between the damper actuator and slave thermostat. If the green wire between the damper actuator and the slave thermostat has lost continuity, the slave thermostat will constantly receive the indication that the damper is full closed.

To check the wiring, disconnect the slave thermostat and wiring connector board. Connect the slave thermostat and wiring connector board directly at the damper board. If the error disappears, the field wiring or the connections should be checked.

If the error is still present, the slave thermostat circuit board, the wiring connector board, or the damper actuator circuit board is bad. To isolate the defective component, replace components, one at a time, until the error disappears.

**Cannot Detect Closed Damper** — Each damper actuator is equipped with an electronic position sensor that signals when the damper is in the full-closed position. The position sensor is located on the back of the damper actuator printed circuit board. The position sensor receives a signal from a magnet on the damper traveler which, when aligned with the position sensor, indicates the damper is fully closed. During normal operation, the slave thermostat drives the damper blade closed until the position sensor indicates the fully closed position.

An HF30 error is registered when the slave thermostat attempts to position the damper closed, and the position sensor does not indicate the damper is at the full-closed position.

To clear the HF30 error:

- 1. Check the damper for mechanical binding. An obstruction in the damper or a bent damper blade can prohibit the damper from modulating open. Remove the source of binding.
- 2. Check the actuator-to-damper alignment. If the damper shaft is out of alignment with the actuator crankarm position, the damper may reach the fully closed position before the actuator.

Align the damper and the actuator so both fully closed positions coincide. Prior to alignment, the slave thermostat Ventilation and Minimum Damper Position setting should be configured to zero. This will ensure the actuator will be in the fully closed position when the slave thermostat demand is zero. See the Slave Thermostat Application Data book for more information.

- 3. Check the damper actuator position to see if the traveler arm has moved past the position sensor. If the traveler arm is stuck at full open or full closed position, use the following steps to correct the problem:
  - a. Disconnect the slave thermostat from the wiring connector board.

- b. At the damper, using a flat head screw driver, turn the traveler screw (located on the stepper motor) until the traveler arm is midway between the full closed and full open positions.
- c. Reconnect the slave thermostat.
- 4. Check for excessive inlet static pressure beyond the rated ability of the damper actuator.
  - ZD and RD zone dampers are rated for 18 in.-lb.
  - The MA-08 actuator is rated for 18 in.-lb.
  - The HTA-02 actuator is rated for 80 in.-lb.
  - The HTA-03 actuator is rated for 45 in.-lb.
- 5. Check the configuration of the slave thermostat Clockwise Open Damper Modulation option. For Carrier dampers, on which the damper blade modulates counterclockwise to open, the option should be configured to OFF. See the Slave Thermostat Application Data book for more information.
- 6. For pressure independent systems, check the ZVS-01/VS airflow sensor or PS pressure sensor. Signals received from defective sensors can cause interference to be transmitted to the slave thermostat that results in an HF30 error.
- 7. Check the wiring between the damper actuator and slave thermostat. If the green wire between the damper actuator and the slave thermostat has lost continuity, the slave thermostat will constantly receive the indication that the damper is fully closed.

To check the wiring, disconnect the slave thermostat and wiring connector board. Connect the slave thermostat and wiring connector board directly at the damper board. If the error disappears, the field wiring or the connections should be checked.

If the error is still present, the slave thermostat circuit board, the wiring connector board, or the damper actuator circuit board is bad. To isolate the defective component, replace components, one at a time, until the error disappears.

#### Zone Temperature Sensor Out of Operating

**Range** — The zone temperature sensor has an operating range of 30 to 180 F. When the zone temperature sensor reads a temperature outside the range, a HF31 error occurs.

To clear an HF31 error:

- 1. Check if the zone temperature sensor is physically intact on the slave thermostat printed circuit board. Ensure the sensor is not shorted against the slave thermostat printed circuit board.
- 2. If using a remote room temperature sensor, check for proper wiring connections. Ensure the slave thermostat zone temperature sensor has been removed. Check for other wiring running parallel to and less than 12 in. from the remote room sensor wiring. Avoid running AC, control, or communication bus near the remote room sensor wiring. Maintain a minimum separation of 12 in. or more between other wiring and remote room sensor wiring.
- 3. Check the zone temperature sensor calibration. Calibrate the sensor by using either of the following methods:
  - a. Manual calibration at the slave thermostat using the Zone Temperature Sensor Calibration function and an accurate thermometer. Measure the temperature at the slave thermostat zone temperature sensor location using the accurate thermometer. Wait for the reading to stabilize. Turn the slave thermostat rotary switch to position 6. Using the set point buttons, increase or decrease the temperature display to match the reading of the thermometer. Return the rotary switch to position 0.

b. Use the Device Calibration program and an accurate thermometer. Measure the temperature at the slave thermostat zone temperature sensor location using the accurate thermometer. Wait for the reading to stabilize. Using the Device Calibration software, establish communications with the slave thermostat. Use the Edit Sensor Readings command to adjust the zone temperature sensor reading. Use the Update Sensor Reading command to update the slave thermostat calibration. See the Device Calibration Operating Instructions for more information.

#### Zone Damper Supply-Air Temperature Sensor Out of Operating Range — The zone damper supplyair temperature sensor has an operating range of 30 to

air temperature sensor has an operating range of 30 to 180 F. When the zone damper supply-air temperature sensor reads a temperature outside the range, a HF32 error occurs.

To clear an HF32 error:

- 1. Check if the supply-air temperature sensor wiring and connections to the damper actuator circuit board are physically intact. Ensure the 5-conductor control wiring running between the damper actuator and the slave thermostat is not run near AC, control, or communication bus wiring. Maintain a minimum separation of 12 in. or more between other wiring and remote room sensor wiring.
- 2. Check the supply-air temperature sensor calibration. Calibrate the sensor by using either of the following methods:
  - a. Manual calibration at the slave thermostat using the Supply-Air Temperature Sensor Calibration function and an accurate thermometer. Measure the temperature at the slave thermostat supply-air temperature sensor location using the accurate thermometer. Wait for the reading to stabilize. Turn the slave thermostat rotary switch to position 7. Using the set point buttons, increase or decrease the temperature display to match the reading of the thermometer. Return the rotary switch to position 0.
  - b. Use the Device Calibration program and an accurate thermometer. Measure the temperature at the slave thermostat supply-air temperature sensor location using the accurate thermometer. Wait for the reading to stabilize. Using the Device Calibration software, establish communications with the slave thermostat. Use the Edit Sensor Readings command to adjust the supply-air temperature sensor reading. Use the Update Sensor Reading command to update the slave thermostat calibration. See the Device Calibration Operating Instructions for more information.

**Airflow Sensor Out of Operating Range** — The cause of an HF33 Airflow Sensor Out of Operating Range error can vary depending on the application.

VS OR ZVS-01 AIRFLOW SENSOR — For applications with a VS or ZVS-01 airflow sensor, the sensor is reading a pressure higher than the operating range of 2000 counts.

To clear the HF33 error:

1. Check the zone velocity sensor reading with the supplyair fan deenergized and without pressure in the duct system. The calibration of the sensor should read between 00 01 and 00 10 in still air. If the sensor is not reading within this range, calibrate the sensor by using the slave thermostat Airflow Sensor Error Correction function (rotary switch position 8), or the Device Calibration software. See the Device Calibration Operating Instructions for more information.

- 2. If the sensor cannot be calibrated, the field wiring or the VS or ZVS-01 sensor may be defective. To begin trouble-shooting, perform the following:
  - a. At the damper actuator, check the voltage between the white and red wires (the two outer pins on the actuator 10-pin male connector) running to the VS or ZVS-01 sensor. It should read 10 VDC. If not, the damper board is defective and should be replaced.
  - b. At the VS or ZVS-01 sensor, check the DC voltage between the white and red wires running to the damper actuator. It should read 10 VDC. If not, the field wiring is defective and should be rewired.
  - c. At the slave thermostat, access the Airflow Sensor Error Correction function by positioning the rotary switch to 8. Record the current reading.
  - d. At the VS or ZVS-01 sensor, disconnect the white wire between the sensor and damper actuator.
  - e. Check the slave thermostat Airflow Sensor Error Correction value. If the reading drops to zero, the sensor is defective and should be replaced. If the Airflow Sensor Error Correction value changes to a higher value (approximately 1650 to 1850 counts), the sensor and the wiring is good. If this occurs, the sensor should be relocated to an area of lower pressure.

#### **A** CAUTION

Do not attempt to take apart or try to repair the VS or ZVS-01 sensor probe.

PS PRESSURE SENSOR — To clear the HF33 error:

- 1. Check for excessive static pressure or excessive differential pressure at the PS sensor pressure pickup. The slave thermostat reads static or differential pressure dependent upon the setting of the CFM Calculation option (rotary switch position F7). The PS-01 is rated for a maximum of 0.5 in. wg. The PS-02 is rated for a maximum of 2.0 in. wg. When the PS pressure sensor is operating at or above the rated pressure, the sensor readings will be unstable, causing an HF33 error.
- 2. Check the connection of hoses running from the PSP pressure pickup and the PS pressure sensor. Incorrect or faulty connections with the PSP pressure pickup can result in an HF33 error.
- 3. Check to ensure the PS pressure sensor wiring connection to the damper actuator is complete and well connected. Ensure the connections labeled "O" on the PS pressure sensor wiring harness are not used or shorted to ground. For the SSP-01E, the two wires marked "O" on the PS pressure sensor wiring harness are not used and can be clipped to prevent possible connection to ground.
- 4. Check the wiring from the PS pressure sensor to the damper actuator printed circuit board. If improperly wired the SSP-01E will be unable to communicate with the PS pressure sensor. This will result in an HF33 error. To check the wiring:
  - a. Remove the PS pressure sensor from location and wire it directly to the factory supplied 6-wire harness. The harness should be connected to the damper actuator printed circuit board.
  - b. If the HF33 error disappears, then the field-wiring or connections should be checked.
  - c. If the HF33 error still appears, the damper circuit board or the PS pressure sensor may have failed.
  - d. To determine the defective component, replace the components one at a time until the problem is isolated.

**Micro-Electronic Component Failure** — An HF35 or HF36 error will occur during a micro-electronic component failure. The error normally occurs when the slave thermostat printed circuit board has failed.

Reset the slave thermostat by pressing any set point button. Try resetting the slave thermostat a few times. If the slave thermostat still displays an HF35 or HF36 error, replace the slave thermostat.

#### STORAGE FAILURE (SF) ERRORS

Storage Failure (SF) errors are non-transparent errors which occur when the slave thermostat replaces invalid data stored in memory with factory selected default values. SF errors are not fatal, and the slave thermostat will continue to control the zone. Information from the slave thermostat zone will not be used by the associated system controller to determine the system mode.

**Error Code Display** — If the slave thermostat Error Code Display function is configured to ON, the slave thermostat will display SF errors locally as SF## (where ## is the number of the SF error).

To configure the Error Code Display function, turn the slave thermostat rotary switch to position F. Use the left set point buttons to toggle the display to read 11. Use the right set point buttons to toggle the function ON or OFF.

If the slave thermostat Error Code Display function is configured OFF, the slave thermostat will continue to display current information during the SF error condition. In this situation, the SF error can only be accessed through communications using the ACS software.

**Clearing an SF Error** — Storage Failure errors can be cleared locally at the slave thermostat if the Rotary Switch Lock option (communication configured only) is set to OFF. SF errors can also be cleared through communications using the ACS software.

To clear a SF error, each of the affected functions must be reconfigured, even if the default value is the same as the correct configuration. After configuring all the affected functions for the particular SF error, the display will either return to normal or, if there are multiple SF errors, the next SF error code will be displayed. If the slave thermostat displays another SF error, reconfigure the affected options for that SF error code. See Table 3 for more information about SF error codes.

EXAMPLE OF CLEARING AN SF ERROR — The slave thermostat displays a SF10 error. Look up SF10 in Table 3. The affected configurations are PGC Setback, Rotating Display, and Minimum Ventilation Damper Position. The default values are OFF, OFF, and 0, respectively. The desired settings are OFF, ON, and 5.

To clear the SF error manually, turn the slave thermostat rotary switch to F. Use the left set point buttons to toggle the display until 27 is shown on the screen. Use the right set point buttons to toggle the PGC Setback option to OFF. Use the left set point buttons to toggle the display until 26 is shown on the screen. Use the right set point buttons to toggle the Rotating Display option to ON. Turn the rotary switch to C. Use the right set point buttons to set the Minimum Ventilation Damper Position to 5. Return the rotary switch to 0. The SF10 error should be cleared.

To clear the error using the PC Command Center, establish communications with the system. Initiate a Device Inquiry command on the slave thermostat. Use the Modify Device Information command to access the slave thermostat configurations. Configure the options to the correct settings. Use the Perform Update command to send the new configuration to the slave thermostat. The SF10 error should be cleared.

NOTE: If the slave thermostat SF error cannot be cleared, replace the slave thermostat.

#### Table 3 – Storage Failure (SF) Errors

SF ERROR	INFORMATION AFFECTED	DEFAULT VALUE(S)		
01	Device Address	63		
02	Comfort Set Points	74 (Cooling) 74 (Heating)		
03	Setback Set Points	85 (Cooling) 60 (Heating)		
04	Damper Maximum Open Position Damper Minimum Airflow Position	15 5		
05	Supplemental Heat Damper Position Damper Size	0 4r		
06	Comfort Set Point Limiting	66 (Cooling) 80 (Heating)		
07	Does Not Apply to Slave Thermostat	—		
08	System Options #1 Local Setback Control Alternate Information Zone Pressure Independent Operation CFM Calculation Celsius Temperature Display Zone Supplemental Heat Continuous Fan Operation	ON OFF OFF OFF OFF OFF OFF		
09	System Options #2 High Torque Actuator Clockwise Open Damper Modulation Error Code Display PS Valve Box (SSP-01E) Velocity Sensor Hydronic Heat Pre-Enhanced Compatibility Set Point Lockout Override	OFF OFF OFF OFF OFF OFF OFF OFF		
10	System Options #3 PGC Setback Rotating Display Minimum Ventilation Damper Position	OFF OFF 0		
11	System Options #4 Setback Programming Lock Local Setback Override Lock Meter Setback Override Meter HVAC Ventilation Mode Rotary Switch Lock	OFF OFF OFF OFF ON OFF		
12	Setback/Comfort Program	6 a.m. (ON, M-S) 6 a.m. (OFF, M-S)		
13	Zone Temperature Sensor Calibration	Mid-Range Value		
14	Supply-Air Temperature Sensor Calibration	Mid-Range Value		
15	Airflow Sensor Error Correction Pressure Sensor Communication (SSP-01E)	Mid-Range Value		
16	Airflow Set Point	0		
17	Setback Override Time Limit	60 minutes		
18	Comfort Trend Demand Set Point Comfort Trend Time Limit	0 0 minutes		
19	Does Not Apply to Slave Thermostat	_		
20	Does Not Apply to Slave Thermostat	_		
21	Does Not Apply to Slave Thermostat	_		
22	PS Temperature Sensor Calibration	Mid-Range Value		
23	Airflow Sensor Error Correction (SSP-01E)	Mid-Range Value		
24	Does Not Apply to Slave Thermostat			
25	Device Security Code	0		
26	Does Not Apply to Slave Thermostat			
27	2400 Baud Rate			
28	Zone Usage Meter	0		
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#### **TRANSPARENT ERRORS**

Transparent errors occur when the slave thermostat senses a zone operating problem. Transparent errors are not fatal, and the slave thermostat will continue controlling the zone.

The slave thermostat will not display transparent errors. Through communication with the slave thermostat, using the PC Command Center, transparent errors can be accessed and cleared.

**Comfort Trend (CT) Error** — A Comfort Trend (CT) error is a transparent error that provides information on the ability of the slave thermostat to maintain temperature conditions in its zone.

When the slave thermostat zone demand exceeds the Comfort Trend Demand Set Point, the slave thermostat begins tracking the Temperature Trend of the zone.

The slave thermostat declares a CT Error for the zone when the Temperature Trend is continuously zero (zone temperature conditions are not improving) or positive (zone temperature conditions are becoming worse) for the entire Comfort Trend Time Limit.

By indicating when zone heating or cooling set points cannot be satisfied, Comfort Trend Error helps identify zone comfort problems.

During system operation, Comfort Trend Errors can be continuously monitored for the servicing contractor by a local Tele-SAM to determine when system or equipment problems are affecting zone comfort.

To clear a CT Error:

- 1. Check the quantity of airflow into the slave thermostat zone.
  - a. For pressure dependent zones, check the configuration of the slave thermostat Damper Maximum Open Position setting (rotary switch position 5) and the position of any balancing dampers used by the zone. Dampers may need to be adjusted further open to allow additional airflow into the zone. The allowable range for the Damper Maximum Open Position setting is 15 to 8, with 15 being full open and 8 being approximately 50% open.
  - b. For pressure independent operation, check the configuration of the slave thermostat Airflow Set Point option. The airflow set point may need to be adjusted to a higher value to allow more airflow into the zone. For this type of zone operation, the slave thermostat Damper Maximum Open Position should be set to 15. In addition, zone airflow should not be reduced by balancing dampers. Calibration of the airflow or pressure sensor should be verified.
  - c. Check the ductwork running to the slave thermostat zone. Loose connections or poorly insulated duct can result in reduced air volume or temperatures causing the slave thermostat zone not to satisfy within the Comfort Trend Time Limit.
  - d. For VVT systems, check the bypass controller configuration. If the bypass controller is not configured correctly, it can keep the system static pressure too low to meet the design load airflow requirements.
  - e. After the previous steps have been completed, the performance of the supply-air fan should be checked. During full load situations, the fan must produce an adequate quantity of supply air at the necessary static pressure to meet the zone design requirements.
- 2. Check the temperature of airflow into the zone. If the temperature is above the zone design conditions during system cooling mode, or below design conditions during system heating mode, the operation of the equipment should be checked.

# **Clearing the Transparent Error Register** — For ACS systems, the report logging program automatically clears the slave thermostat error register when the system Tele-SAM calls the remote logging site.

The PC Command Center can be used to reset the slave thermostat transparent error message. Perform the following procedure:

- 1. Establish communications using the PC Command Center.
- 2. Initiate a Device Inquiry of the slave thermostat.
- 3. Perform the Modify Device Information command. The configurable options of the slave thermostat are changed from the Modify Device Information screen.
- 4. Activate the Clear Transparent Errors option by pressing the corresponding letter.
- 5. Press the SPACEBAR to switch the option to ON. Press ENTER.
- 6. Press F1 to Perform Update. Wait until the update has been acknowledged.
- 7. Press **ESC** to exit the configuration menu.
- 8. Check the error message on the PC Command Center display of the slave thermostat. The slave thermostat will only display one error at a time. If there were additional errors, the slave thermostat will display another error message. Be sure to clear the associated transparent error of the system controller.

**Meter Full (MF) Error** — A MF error is a transparent error that indicates when the zone meter is full.

NOTE: During a MF Error, the Zone Usage Meter stops recording and retains its maximum value until cleared.

To Clear a MF Error, the Usage Meter Inquiry software is used to read and clear the slave thermostat usage meter.

The PC Command Center can be used to reset the zone usage meter to zero. Perform the following procedure:

- 1. Establish communications using the PC Command Center.
- 2. Initiate a Device Inquiry for the slave thermostat.
- 3. Perform the Modify Device Information command. The configurable options of the slave thermostat are changed from the Modify Device Information screen.
- 4. Activate the Clear Usage Meter option by pressing the corresponding letter.
- 5. Press the SPACEBAR to switch the option to ON. Press ENTER.
- 6. Press F1 to perform update. Wait until the update has been acknowledged.
- 7. Press ESC to exit the configuration menu.
- 8. Exit the program.

#### **SLAVE THERMOSTAT WIRING**

Refer to Fig. 3-7 for wiring diagrams of possible slave thermostat configurations. Refer to Fig. 8 for a wiring diagram of the slave thermostat ribbon strip.



\*If laminar flow is not possible at 5 duct diameters past damper, place ZVS-01/VS in a sensor pocket as detailed in this illustration.

Fig. 3 — SSP-01E Slave Thermostat with Optional Supplemental Heat and ZVS-01/VS Airflow Sensor for Pressure Independent Operation

10



Fig. 4 — SSP-01E Slave Thermostat with Optional Supplemental Heat and ZVS-01/VS Airflow Sensor for Pressure Independent Operation

11











FBM<br/>FPMB<br/>PCB—Fan Box Monitor<br/>Fan Powered Mixing Box<br/>Printed Circuit Board

NOTE: To make the change to subzoning using a Fan Box Monitor, first remove the brown wire from the W2 terminal on Fan Powered Mixing Box and move to terminal W1. Next remove the white wire from terminal W1 and connect it to terminal W2 on the Fan Powered Mixing Box. Finally connect the green wire to terminal G (fan). For detailed information on the Fan Box Monitor please consult the Fan Box Monitor Reference Guide and the Fan Box Monitor Troubleshooting Guide.





#### LEGEND

**SBO** — Setback Override **TVA** — Transient Voltage Arrestor

NOTES:

 By checking continuity on ribbon strip pins, bad or intermittent problems with the "connector block" (i.e., bad or cracked solder joints or tracings) can be found.
Check continuity between the communication bus wiring connector block ter-minals (red and black) and the ribbon strip SBO- termination. If there is con-tinuity to the solution of the solutio tinuity, the TVA has failed.

Fig. 8 — Ribbon Strip, Wall Mounted Device

#### SLAVE THERMOSTAT CONFIGURATION TABLE

				DEVICE LOCATIONS					
ROTARY SWITCH		FACTORY							
0E11IIIO									
1	Device Address	1							
2	Setback Override Time Limit	60							
3	Setback Set Points (Rev. 2.9)	85/55							
3	Setback Set Points (Rev. 3.0-3.4)	85/50							
4	Comfort Set Point Limiting	80/66							
5	Damper Maximum Open Position	15							
5	Damper Vent./Min. Airflow Position (Rev. 2.9)	00							
5	Absolute Min. Position (Rev. 3.0-3.4)	05							
6	Zone Temperature Sensor Calibration	-	1						
7	Supply-Air Temperature Sensor Calibration	-							
8	Airflow Sensor Error Correction	-							
9	Airflow Set Point	0	1						
Α	Damper Size (Rev. 2.9)	6r							
Α	Damper Size (Rev. 3.0-3.4)	4r							
В	Supplemental Heat Damper Position	0							
С	Damper Vent. Position (Rev. 3.0-3.4)	5	1						
F1	Supplemental Heat Timeguard Override	OFF							
F2	Local Setback Control	ON							
F3	Alternate Information	OFF							
F4	Zone Supplemental Heat	OFF							
F5	Fan Powered Mixing Box	OFF							
F6	Zone Pressure Independent Operation	OFF							
F7	CFM Calculation	OFF							
F8	Celsius Temperature Display	OFF							
F9	High Torque Actuator	OFF							
F10	Clockwise Open Damper Modulation	OFF							
F11	Error Code Display	ON	1						
F12	Setback Programming Lock	OFF							
F13	Local Setback Override Lock	OFF							
F14	Meter Setback Override	OFF							
F15	Meter HVAC	OFF							
F16	Ventilation Mode	ON							
F17	2400 Baud Rate	ON							
F18	Pressure Sensor Valve Box	OFF							
F19	Pressure Sensor Auto Zero (Rev. 3.0-3.4)	OFF							
F20	Velocity Sensor (Rev. 3.0-3.4)	OFF							
F21	Supplemental Heat Lockout Override (Rev. 3.0-3.4)	OFF							
F22	Parallel Fan Box (Rev. 3.0-3.4)	OFF							
F23	Hydronic Heat (Rev. 3.4)	OFF							
F24	Pre-Enhanced Compatibility (Rev. 3.4)	OFF							
F25	Set Point Lock Override (Rev. 3.4)	OFF							
F26	Rotating Display (Rev. 3.4)	OFF							
F27	PGC Setback (Rev. 3.4)	OFF							
Com. Only	Comfort Trend Demand Set Point	0							
Com. Only	Comfort Trend Time Limit	0							
Com. Only	Device Security Code	0							
Com. Only	Rotary Switch Lock	OFF							
Com. Only	Zone Usage Meter	0							

NOTE: The Slave Thermostat Configuration Table is used to record the settings of each slave thermostat. Enter the configuration in order to provide a written record for troubleshooting and device reconfiguration.

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