



# Intelligent Controls System-II

## Troubleshooting Guide

### GENERAL INFORMATION:

1. The following voltages are used for the control circuitry: 120 volts AC, 24 volts AC, 5 volts DC, 15 volts DC and 24 volts DC.
2. The modulating / regulating valve and its associated circuitry is powered by a 0 - 28 volt DC signal.
3. Refer to air handler wiring diagram in conjunction with this Troubleshooting Guide.
4. If the air handler which you are troubleshooting does not incorporate a feature described in this Troubleshooting Guide, disregard the troubleshooting information provided for that feature
5. Terminal #2 (white wire) is the grounded side of the control circuitry. Check between terminal #2 (white wire), or ground and EACH of the 120V terminals mentioned in this guide.
6. When referencing terminal numbers, ports, pin numbers, etc. they are referenced to ICSII controls and not necessarily the ICSI controls.

### **ERROR CODE (-3) UNIT IS OFF LINE. COMMUNICATION NOT ALLOWED.**

There is no malfunction; someone has disabled network communications to the air handler by commanding it "OFF LINE".

1. Communication may be restored by commanding it back "ON LINE".

### **ERROR CODE (-2) UNABLE TO COMMUNICATE WITH THIS UNIT. UNIT NOT RESPONDING.**

Communication between the Controller and either the Network Computer or Remote Station has been interrupted. The red LED on the Controller will be lit when power is present and flashing when communication occurs. If multiple Controllers cannot communicate, the problem may be located between the last communicating Controller and the first non-communicating Controller. The problem location can be isolated by connecting a laptop PC at different locations on the network, both upstream and downstream of the suspected problem, then attempting communication in both directions on the network. Depending on where successful communications are achieved, the problem location will become apparent. Possible causes of the error are:

1. Electrical power has been removed from the Controller.

- a. Check for an open disconnect switch. Close the disconnect after verifying there are no safety concerns that would require keeping it open.
  - b. Fuse(s) blown on disconnect switch. Replace blown fuse(s).
  - c. Check for a bad fuse on the Controller. The fuse is at the left edge of the controller.
  - d. One of the wiring connections powering the Controller is loose or defective. Determine the point at which voltage fails to be present, find the wiring problem and repair it.
  - e. Check for a blown breaker. Determine cause of breaker trip, correct the problem and reset as appropriate.
  - f. Three-phase power monitor (optional) contact PM not closed. Check for phase loss, low service voltage, phase imbalance, phase rotation.
  - g. Control circuit transformer's primary fuse is blown. Replace the blown fuse(s).
  - h. Control circuit transformer's secondary fuse is blown. Replace the fuse.
  - i. Check for disruption of power from the local utility. Wait until power is restored.
2. The power supply for the RS232 - RS485 adapter is not plugged in or is defective.
    - a. Plug it in or substitute a proven power supply.
  3. There is a loose or improperly made network or Remote Station cable connection.
    - a. Confirm that the cable is installed per the cabling specification provided by RAPID. The cable installed must meet EIA RS-485 Standard.
    - b. Check for proper termination of all network and Remote Station conductors in the connectors.
    - c. Attempt communications from another location so as to isolate the problem to the last air handler on the network cable and attempt to communicate back through the network, etc....)
    - d. Test the solder connections at the 25 pin PC connector. Refer to the Cabling Specification for correct wiring. Correct as necessary.
  4. The Controller address is set incorrectly.
    - a. Set the address to the correct value, then reset (power down, power up) the Controller. Proper addressing methods may be found in the Service Technician Manual Booklet.
  5. The RS232 - RS485 adapter is defective.
    - a. Substitute a proven adapter.
  6. The communications chip on the Controller has been damaged.
    - a. Replace the chip. The chip is the only socketed chip found near the Network cable connector. RAPID can supply a new chip. CAUTION: This procedure should only be performed after investigating other causes for failure and then only by an experienced technician.
    - b. Replace the Controller.
  7. The Controller showing the error is served by a defective Repeater.
    - a. Replace the Repeater.
  8. Nearby equipment is generating excessive electrical interference on the AC power line or excessive auxiliary contact 'chatter' is causing the interference.
    - a. Contact RAPID regarding methods to isolate the Controller from the source of noise.

9. The network communication cable or RAPID remote station cable has been routed with high voltage conductors.
  - a. Re-route the communication cables.

**ERROR CODE (-1) UNIT CLOCK DOES NOT AGREE WITH SYSTEM CLOCK.**

The PC and Controller each have their own clock. If the PC clock's record of the time becomes significantly different from any of the Controllers' clocks (more than 5 minutes), this error occurs. Possible causes of the error are:

1. The Network Computer clock does not agree with the Controller's clock.
  - a. Use the Time/Date function to make the Controller's clock agree with the Network Computer.  
This message is NOT APPLICABLE to Remote Stations.

**ERROR CODE 1 SET POINTS ARE OUT OF RANGE AT START-UP.**

For ICSII applications, this is given as a warning and the Controller automatically replaces all setpoints with default values when this occurs.

**ERROR CODE 2 OUTSIDE AIR DAMPER FAILED TO OPEN OR RETURN AIR DAMPER FAILED TO CLOSE DURING START UP.**

See discussion for Error Code 3.

**ERROR CODE 3 OUTSIDE AIR DAMPER FAILED TO CLOSE OR RETURN AIR DAMPER FAILED TO OPEN DURING START UP.**

The outdoor air damper has a feedback potentiometer that indicates the damper position to the Controller. This error occurs when the Controller has not received a proper signal (less than 0.4 volts DC at closed position, greater than 4.4 volts DC at fully open position) from the damper feedback potentiometer within 120 seconds. This only occurs during the STARTUP mode. Possible causes of the error are:

1. One of the dampers is physically restricted and unable to open or close properly (e.g., blocked by ice, dirt, etc.).
  - a. Repair linkage, lubricate with silicone, remove obstruction
2. The damper is not connected or poorly connected to the analog input port(s) on the Controller.
  - a. Connect the cable to the proper port on the Controller.
  - b. Verify 5 VDC at pin 5 to pin 8 on P2 lower.
  - c. Verify that the DC voltage between pins 6 and 7 on P2 lower match values below.  
O.A. Damper full open = greater than 4.4 VDC  
O.A. Damper full closed = less than 0.4 VDC
3. The damper motor or the feedback potentiometer is defective.

- a. If the total voltage inputs of a damper feedback potentiometer is not less than 0.4 volts DC at closed position and greater than 4.4 volts DC at fully open position, replace the damper motor. (The potentiometer is not separately replaceable.)
4. The damper motor is not receiving power.
  - a. Check the 24 volt transformer for proper voltage to the dampers. Repair as necessary.
  - b. Check the wiring that feeds the dampers, isolate the problem and repair.
5. An output module (O-0, O-1) fuse is blown or an output module is defective.
  - a. Remove each fuse and check it for continuity. Replace as necessary with a spare from an unused output module space.
  - b. After verifying that the fuse is good, check for voltage on the output module terminals after the LED goes on. If the output contacts remain open, replace the module.
6. The Controller is damaged and cannot properly interpret the damper signal.
  - a. Replace the Controller.
7. The ribbon cable between the Controller and the I/O rack is damaged, defective or off.
  - a. Repair as necessary.
8. The I/O module rack is defective.
  - a. Replace the rack.

**ERROR CODE 4      DISCHARGE TEMPERATURE BELOW LOW TEMPERATURE LIMIT**

This error results when the discharge air temperature drops below the Low Temperature Shutdown setpoint for more than 5 minutes. Possible causes of the error are:

1. The error is a result of a burner failure. When the Controller detects problems with other areas of operation, it will not allow the burner to light. This, in turn, may allow the discharge air to fall below the low temperature setpoint for 5 minutes.
  - a. Check the error log to see if another code has preceded it by 5 minutes and follow that error code's explanation of possible trouble.
2. The manual gas valve is closed or there is a blockage in the gas line.
  - a. Open the valve or open the dirt leg cap and remove any blockage.
3. The discharge sensor, its cable or its connection to P1 on the Controller is off or defective.
  - a. Verify proper discharge sensor operation and cable connections and repair as necessary.
4. The connection from the P3 Controller port to the modulating valve is defective or off.
  - a. Plug the connector back in or repair the connector or cable as necessary.
5. Low limit setpoint is set too high. Factory recommended setpoint is 40°F. Adjust the low limit setpoint to an appropriate value.
6. The modulating gas valve does not open to allow high fire. The valve should modulate progressively more open as the voltage from P3 rises above approximately 5 volts DC until the voltage exceeds 15-19 volts DC.
  - a. Repair or replace the valve.

**ERROR CODE 5**          DIGITAL INPUTS NOT "OFF" AT START UP.

All of these inputs on the I/O rack should be off (open) before the air handler starts. If one or more is not off at STARTUP, a safety or operating control may be defective and STARTUP is aborted. During the STARTUP mode, the Controller waits 30 seconds for all inputs to the Controller to clear. If one or more of these inputs is present, the error is generated. Possible causes of the error are:

1.        The air handler disconnect switch has been turned off, then very quickly turned on again. (This can fool the Controller, since some of the inputs do not have time to de-energize.)
  - a.        Acknowledge and reset the error, then restart the air handler.
2.        One of the inputs is actually energized before fan startup.
  - a.        Observe the input rack in the air handler control panel to see which input's LED is "On." Repair, reset or replace the defective part.
3.        The input rack or its ribbon cable is defective or not seated properly
  - a.        Make sure the ribbon cable is seated properly or replace the defective component.

**ERROR CODE 6**          SUPPLY DAMPER LIMIT SWITCH FAILED TO OPEN WHEN THE SUPPLY DAMPER WAS DE-ENERGIZED.

Typically the controller energizes the supply damper immediately after energizing the fan contactor on AM's, VAV's, and AR's. The controller energizes the supply damper immediately after entering an occupied period or entering the Heating Mode in the unoccupied period. The one exception to this is when the controller is configured for DX or Chilled Water cooling. In this case the supply damper is energized only when there is a call for heat. Immediately prior to supply damper energization, the Controller checks the status of the supply damper limit switch. (It should be open.). If it is closed, for a duration of 10 seconds, an error is reported. If the supply damper limit switch opens, the error is reported, but operation continues. If the supply damper limit switch remains closed for 10 seconds, continues to operate, but an error is reported.. Possible causes of the error are:

1.        The damper is prevented from closing by some mechanical problem.
  - a.        Disconnect the linkage and manually operate the damper to determine the cause of binding. Clean, lubricate, adjust and repair as necessary.
2.        The air handler has been commanded OFF, then quickly commanded back on (either Auto Pressure or Manual Damper mode)
  - a.        There is no problem; just allow more time (about 1 minute) between stopping and starting.
3.        The wiring for the supply damper or the limit switch is loose or defective.
  - a.        Trace the voltage from the correct output module to the motor and back to the correct input module and repair the problem.
4.        The supply damper limit switch is defective or needs adjustment.
  - a.        Observe the limit switch response to successively energizing and de-energizing the damper motor. Adjust the limit switch so that it responds properly to the motor's operation. If the switch cannot be properly adjusted, replace the motor. Some motors are sealed and no adjustment can be made.

5. The supply damper output module (O-4) is defective, or the output module fuse is blown.
  - a. Remove fuse and check for continuity. Replace as necessary with a spare from unused output module space.
  - b. Check for voltage on the output module terminals after the LED goes off. If the output contacts remain closed, replace the module.
6. The limit switch input module is defective.
  - a. If, when voltage from the limit switch is removed from the input module, the LED remains lit, replace the input module.
7. The supply damper motor is defective.
  - a. If the motor fails to close when power is removed (and the damper is not somehow bound and prevented from moving) replace the motor.

**ERROR CODE 7**      SUPPLY DAMPER LIMIT SWITCH FAILED TO "MAKE" WHEN THE SUPPLY DAMPER WAS ENERGIZED.

The Controller gives the supply damper 220 seconds to open completely and close its limit switch. If the limit switch has not closed in this time, the error occurs. Possible causes of the error are:

1. The damper is prevented from opening by some mechanical problem.
  - a. Disconnect the linkage and manually operate the damper to determine the cause of binding. Clean, lubricate, adjust and repair as necessary.
2. The wiring for the supply damper or the limit switch is loose or defective.
  - a. Trace the voltage from the output module to the motor and back to the input module and repair the problem.
3. The supply damper limit switch is defective or needs adjustment.
  - a. Observe the limit switch response to successively energizing and de-energizing the damper motor. Adjust the limit switch so that it responds properly to the motor's operation. If the switch cannot be properly adjusted, replace the motor.
4. The supply damper output module (O-4) fuse is blown or the output module is defective.
  - a. Remove the fuse and check it for continuity. Replace as necessary with a spare from an unused output module space.
  - b. After verifying that the fuse is good, check for voltage on the output module terminals after the LED goes on. If the output contacts remain open, replace the module.
5. The limit switch input module fuse is blown.
  - a. Replace the fuse.
6. The supply damper motor is defective.
  - a. If the motor fails to open the damper when power is applied (and the damper is not somehow bound and prevented from moving) replace the motor.
7. An interlock such as a smoke detector, or access door limit switch is open and power to the control circuit has been interrupted.
  - a. Check appropriate interlock.

**ERROR CODE 8**      SUPPLY DAMPER LIMIT SWITCH OPENED AFTER IT CLOSED.

This error implies that, after the supply damper successfully opened and the limit switch proved it open by closing, the limit switch opened again. The error is reported if the condition exists for 5 seconds, and if it remains for 10 seconds, the air handler will be placed in the OFF mode. Place the air handler in the Auto Pressure or Manual Damper mode, and observe the supply damper limit switch LED on the input rack. The LED should remain steadily lit. Possible causes of the error are:

1. The supply damper limit switch is defective or needs adjustment.
  - a. Observe the limit switch response to successively energizing and de-energizing the damper motor. Adjust the limit switch so that it responds properly to the motor's operation. If the switch cannot be properly adjusted, replace the motor.
2. The damper is prevented from opening by some mechanical problem.
  - a. Disconnect the linkage and manually operate the damper to determine the cause of binding. Clean, adjust and repair as necessary.
3. The wiring for the supply damper or the limit switch is loose or defective.
  - a. Trace the voltage from the output module to the motor and back to the input module and repair the problem.
4. The supply damper output module (O-4) fuse is blown or the output module is defective.
  - a. Remove the fuse and check it for continuity. Replace as necessary with a spare from an unused output module space.
  - b. After verifying that the fuse is good, check for voltage on the output module terminals after the LED goes on. If the output contacts remain open, replace the module.
5. The limit switch input module fuse is blown or the input module is defective.
  - a. Remove the fuse and check it for continuity. Replace as necessary with a spare from an unused input module space.
  - b. If, when voltage from the limit switch is applied to the input module, the LED remains unlit, replace the module.
6. The supply damper motor is defective.
  - a. If the motor fails to stay closed when power is applied (and the damper is not somehow bound and prevented from moving) replace the motor.
7. An interlock such as a smoke detector, or access door limit switch is open and power to the control circuit has been interrupted.
  - a. Check appropriate interlock.

**ERROR CODE 9** FAN CONTACTOR NOT "OFF" BEFORE FAN TURN ON.

For this error to occur, the indicated contactor or switch has voltage through it (powering its associated input module) before the fan has been commanded ON. Since none of these should be powered before the fan is commanded ON, an error is reported. Possible causes of the error are:

1. The auxiliary contact to the starter is jumped and/or shorted.
  - a. Remove jumper or replace auxiliary contact on starter.
2. The air handler has been turned off, then quickly back on again
  - a. There is no problem, just allow more time (about 1 minute) between stopping and starting.
3. The output module, 0-5 has failed closed.
  - a. Replace output module.
4. The M-1 motor contactor has failed closed.
  - a. Replace contactor.

**ERROR CODE 10** AIR FLOW LIMIT SWITCH NOT "OFF" BEFORE FAN TURN ON.

The air flow switch is likely jumpered or shorted.

**ERROR CODE 14** BURNER LOCKOUT NOT "OFF" BEFORE FAN TURN ON.

If there is power to input I-19 or I-27 (24 or 32 pos. rack), but the flame relay is not powered i.e., O-2 is off, this error will occur. Possible causes of the error are:

1. The input module I-29 - 32 position, I-21 - 24 position is defective.
  - a. If, when there is no voltage applied to the input module, the LED remains lit, replace the module.
2. The flame relay is defective.
  - a. Replace the flame relay.

**ERROR CODE 17** PRIMARY AND BLOCK VALVE NOT "OFF" BEFORE FAN TURN ON.

Both of the gas valve limit switches are made before the fan turns on. Possible causes of the error are:

1. The limit switches are out of adjustment.
  - a. Adjust the limit switch.
2. A limit switch is defective.
  - a. Replace the switch.
3. A gas valve is defective.
  - a. Determine whether the actuator or the valve body is the problem and replace the defective part.

4. RAPID terminals 6 to 18 have been jumpered.
  - a. Remove the jumper.

**ERROR CODE 19** FAN MOTOR CONTACTOR NOT ENERGIZED DURING FAN TURN ON.

The auxiliary contact which powers the controls has not been proven at input module I-30., 32 position Rack or I-22, 24 position Rack. Possible causes of the error are:

1. The three overloads are tripped.
  - a. Reset the overloads. If on INITIAL START UP of a newly installed system, the overload keep tripping, check motor running amperage against motor name plate full load amperage. If greater than full load rating, determine cause of overamperage. (e.g., low service voltage, excessive voltage drop.)
2. The auxiliary contact is defective.
  - a. Replace the auxiliary contact.
3. The wiring between RAPID terminal 1 and 6 is loose or defective.
  - a. Determine the location of the problem and repair.
4. The input module (I-30, I-22) fuse is blown or the input module is defective.
  - a. Remove the fuse and check it for continuity. Replace as necessary with a spare from an unused input module space.
  - b. If, when voltage from the limit switch is applied to the input module, the LED remains unlit, replace the module.
5. Defective contactor (M1).
  - a. Check for voltage (120 volts) across the contactor. If there IS voltage, and the contactor does not pull in, the energizing coil is defective. If the contactor pulls in, but does not start the fan, the contacts are defective. Replace the contactor.
6. An interlock such as a smoke detector, or access door limit switch is open and power to the control circuit has been interrupted.
  - a. Check appropriate interlock.

**ERROR CODE 20** SAFETY CONTROLS SWITCH NOT CLOSED DURING HEATING MODE.

There are four safety controls in series. If any of them opens during a call for heat, this error occurs. All safety controls should remain closed continuously after the fan has been started and there is a call for heat. If, after a 5 second delay at STARTUP, the Controller accumulates more than 40 seconds of safety switch OFF time (10 seconds on air handlers with controller software Version 1.86 and older), this error results and the fan is placed in the OFF position. Possible causes of the error are:

Air Flow Switch Errors

1. The air flow switch tubing is plugged, preventing it from closing.
  - a. Clear the tubing.
2. The filters are clogged, preventing adequate air flow.
  - a. Replace the filters.

3. The fan rotation is reversed.
  - a. Turn off disconnect switch and reverse two (2) power wires, preferably at the line side of the disconnect. This is especially important for pony motor drives or two speed motors. The wires on the load side of the disconnect may be reversed for single speed, single motor air handlers.
4. The belts are too loose or have come off.
  - a. Tighten or replace the belts per RAPID and the belt manufacturer's recommendations.
5. The air flow switch has been set improperly.
  - a. Set the switch at forced high fire per the instructions in the Service Technician Manual.
6. The air flow switch is defective and has failed to close.
  - a. Replace the switch.
7. Supply or discharge damper is not open.
  - a. Check linkage and repair.
8. The (I-29 or I-21, 32 pos. or 24 pos. rack) input module fuse is blown or the input module is defective.
  - a. Remove the fuse and check it for continuity. Replace as necessary with a spare from an unused input module space.
  - b. If, when voltage is applied to the input module, the LED remains unlit, replace the module.
9. Access door is open (equipped with optional interlock switch).
  - a. Close the door.
10. Fan motor is not running.
  - a. Check for correct power on load side of motor overloads and at motor leads. Extreme care should be taken because of high voltage. Reset overloads or replace fuses or motor if defective.

#### Gas Pressure Switch Errors

1. The high gas pressure switch has tripped. FM manifolds are the manual reset type, IRI and "standard" manifolds are the automatic reset type.
  - a. The utility gas pressure exceeded 5psig, overpowering the modulating / regulating valve's pressure regulator. If this is a regular problem, install an additional pressure regulator to reduce the incoming pressure to below 5psig.
  - b. The modulating / regulating valve's pressure regulator has failed. Replace the regulator.
  - c. The High Gas Pressure Switch is set too low. Factory setting is 1.5" w.c. above the High Fire setting.
2. The low gas pressure switch has tripped. FM manifolds are the manual reset type, IRI and "standard" manifolds are the automatic reset type.
  - a. The manual gas valve is closed or the gas line is obstructed. Open the manual gas valve and clear any obstructions in the gas line.
  - b. The utility gas pressure dropped lower than 3" w.c.

3. There is a loose or defective wire upstream of the input module (I-29 or I-21, 32 pos. or 24 pos.)
  - a. Determine the location of the problem and correct it.
4. The switch is not set properly or is out of calibration.
  - a. Proper setting is 3" for the low gas pressure switch and (high fire differential pressure + 1.5") for the high gas pressure switch. Set to the correct value.
  - b. Check for proper calibration. Replace or adjust setpoint to compensate.
5. The limit switch input module (I-29, 32 pos, or I-21 24 pos.) fuse is blown or the input module is defective.
  - a. Remove the fuse and check it for continuity. Replace as necessary with a spare from an unused input module space.
  - b. If, when voltage is applied to the input module, the LED remains unlit, replace the module.

#### High Temperature Limit Switch Errors

1. The high temperature limit switch is tripped.
  - a. Determine the cause of the high temperature and correct the problem. Reset the switch.
2. There is a loose or defective wire upstream of the input module (I-29, 32 pos. or I-21, 24 pos.).
  - a. Determine the location of the problem and correct it.
3. The high temperature limit switch is set too low.
  - a. Set the switch for 150F.
4. The limit switch input module (I-29, 32 pos. or I-21, 24 pos.) fuse is blown or the input module is defective.
  - a. Remove the fuse and check it for continuity. Replace as necessary with a spare from an unused input module space.
  - b. If, when voltage from the limit switch is applied to the input module, the LED remains unlit, replace the module.
5. The high temperature limit switch is defective.
  - a. Replace the switch.

**ERROR CODE 24** BURNER LOCKOUT NOT "OFF" WITH THE FLAME RELAY DE-ENERGIZED.

This error can only occur with flame relay types used by RAPID prior to the Honeywell RM7895 (e.g., RM7795, RA890). This is very similar to Error #14, see the discussion for that Error code.

**ERROR CODE 27** PRIMARY OR BLOCK VALVE LIMIT SWITCHES NOT OPEN WITH FLAME RELAY DE-ENERGIZED.

After a brief time delay, the Controller checks these inputs prior to energizing the flame relay and before energizing the gas valves. If one of the limit switches is found closed, an error results. Possible causes of the error are:

1. The limit switches are defective or need adjustment.

- a. Attempt adjusting the switches. Replace if necessary.
- 2. The gas valves are defective.
  - a. Replace the valves.
- 3. The output module (O-2) is defective.
  - a. Check for voltage on the output module terminals before the LED goes on. If the output contacts are closed, replace the module.
- 4. Output module O-2 has been jumpered.
  - a. Remove the jumper.
- 5. The limit switches have been jumpered.
  - a. Remove the jumper.

**ERROR CODE 29** BURNER LOCKOUT.

This error can only occur with flame relay types used by RAPID prior to the Honeywell RM7895 (e.g., RM7795, RA890). The error results when the flame relay initiates a "hard" lockout and must be reset by pushing the Reset button on the flame relay. See discussion for Error Code 35, since diagnosis is similar.

**ERROR CODE 33** PRIMARY OR BLOCK VALVE LIMIT SWITCHES DID NOT CLOSE WITHIN THE REQUIRED TIME PERIOD.

The Controller expects the limit switches to prove that the valves have opened within 40 seconds of being energized. If this does not occur, an error is reported. Place the air handler in a condition where heat is called for and observe the appropriate gas valve. Possible causes of the error are:

- 1. One of the safety switches (air flow, high gas pressure, low gas pressure, high temperature limit) may be intermittently tripping.
  - a. Investigate each switch by measuring the voltage down stream of each switch while running. Commonly the **AIRFLOW** switch needs to be adjusted. See error code 20.
- 2. There is a loose or defective wire upstream of the input module (I-28, 32 pos. or I-20, 24 pos.).
  - a. Determine the location of the problem and repair.
- 3. A limit switch is misadjusted.
  - a. If there is NO voltage across the limit switch, look through the actuator observation window. If the valve is open, adjust the actuator auxiliary switch.
- 4. A limit switch is defective.
  - a. Replace the limit switch.
- 5. The gas valve took longer than 40 seconds to open.
  - a. Investigate the cause for the valve taking so long to open. Normal opening time should be about 13 seconds. Repair or replace as necessary.
- 6. The input module (I-28 or I-20) fuse is blown or the input module is defective.

- a. Remove the fuse and check it for continuity. Replace as necessary with a spare from an unused input module space.
  - b. If, when voltage from the limit switch is applied to the input module, the LED remains unlit, replace the module.
7. Plugged gas valve.
- a. Check for voltage (120 volts) between terminals L1 and L2 at the gas valve actuator. If there is voltage, look through the actuator observation window. If the valve plunger does not move or moves only slightly, turn off power to the valve actuator, remove the actuator from the valve, turn power back on to the actuator and look for plunger movement. If it now moves freely, then the valve is plugged. Clear the obstruction and check the valve seat. Replace the valve if the seat is damaged.
8. The output module (0-2) fuse is blown or the output module is bad.
- a. Remove the fuse and check it for continuity. Replace as necessary with spare from unused input or output module space.
  - b. If the fuse is good, check for voltage after the output module when the LED is lit. If no voltage present with LED on, replace module.

**ERROR CODE 35** FLAME RELAY LOCKOUT.

This error indicates a flame lockout condition with the burner control. (Honeywell RM7895A-1014). Possible causes are:

- 1. Ignition did not occur. Command the fan OFF. Disconnect the ignition cable from the transformer, then jumper the transformer so that it is powered. Using great care, hold the ignition cable close to its transformer connection with a insulated tool; there should be an arc from the transformer to the cable. If this test shows the transformer is OK, reconnect the cable and observe the spark plug. It should spark continuously.
  - a. The ignitor (spark plug) is defective, fouled or shorting against the burner end plate. Check that it is properly installed, has a clean (no carbon) gap of about 3/32" (2.5mm) and no cracks in the ceramic. Clean it with a wire brush if necessary.
  - b. The ignition transformer is not receiving power or putting out the proper (6000V) voltage. Determine the cause and repair.
  - c. If spark is present in the test above, air may be present in the gas line. Purging of air in a new line may be required. An LP system may need purging if the tank ran out of gas before refilling.
- 2. The flame verification signal (ultraviolet light) is not present. Possible causes include:
  - a. a dirty UV scanner. Clean the scanner with a soft cloth.
  - b. a plugged UV scanner sight tube. Remove the obstructions.
  - c. a UV scanner not secured firmly to the sight tube. Screw the scanner on firmly, but only finger tight.
  - d. a defective UV scanner. Replace the scanner.
  - e. loose or defective UV scanner wiring. Determine the location of the problem and repair.
  - f. a defective flame relay or UV amplifier. Replace the defective component.
- 3. Pilot manual valve is closed.
  - a. Open valve.
- 4. Pilot solenoid valve is defective.
  - a. Replace solenoid

5. Low pilot flame.
  - a. Increase pilot gas pressure by adjusting pilot regulator. The outlet pressure at the pilot regulator should be between 2.5" wc and 5" wc, about the size of a softball.
6. The Air Flow Switch setting is too low, causing frequent Flame Relay power cycling.
  - a. Set the switch properly per the Service Technician Manual.
7. The pilot pressure regulator is improper. When the air handler is ordered for a site gas pressure of less than 1psig, RAPID uses a Maxitrol standard regulator. If the pressure then exceeds 1psig, this regulator can "lock up" and takes several seconds to open, preventing pilot ignition before the Flame Relay's Flame Establishing Period and causing a lockout error. When the air handler is ordered for a site gas pressure of greater than 1psig, RAPID uses a Fisher "zero flow" regulator that does not "lock up".
  - a. Check the gas pressure and, if necessary, install the appropriate regulator.
  - b. As of January 2001, units have been shipped with Maxitrol R-400-5. This replaces the Fisher and Maxitrol R400S.
8. Wires on flame relay terminals are disconnected or loose
  - a. Remove the relay from its base and check.
9. Ignition wire is broken or grounded against unit.
  - a. Repair the wire or isolate from ground.
10. The primary, block or vent valve actuator is defective and, as a result, draws too much current, preventing proper flame relay operation.
  - a. Replace the faulty actuator.

NOTE: Honeywell 7895A flame relays are designed to allow remote resetting. RAPID accomplishes this using output module O-3, which is energized every time the air handler is placed in the OFF mode after a lockout condition occurs.

**ERROR CODE 39      GENERAL DISCHARGE DAMPER OR EXHAUST DAMPER OPERATION ERROR.**

During the exhaust mode, the Controller first opens the exhaust damper and waits for that damper's limit switch to signal that it is open fully. Then the discharge damper is closed and its limit switch signals that it closed fully. When the exhaust mode is de-activated, the reverse occurs. Both dampers are allowed 130 seconds to move from fully open to fully closed. This error indicates that the expected action did not occur. Possible causes of the error are:

1. The exhaust damper did not open or the discharge damper did not close fully within the allowed time period.
  - a. The damper motor or wiring is defective. Determine the location of the problem and repair.
  - b. The limit switch is defective. Replace the limit switch.

2. The open inputs are still present when the dampers should be fully stroked.
  - a. Check motors, limit switches, and I/O modules which are associated with the discharge and exhaust dampers. Determine the location of the problem and repair.
  
3. An input module fuse I-24 for the Discharge damper, I-23 for the Exhaust damper is blown or an input module is defective.
  - a. Remove the fuse and check it for continuity. Replace as necessary with a spare from an unused input module space.
  - b. If, when voltage from the limit switch is applied to the input module, the LED remains unlit, replace the module.
  
4. An output module (O-7,8 for the Discharge damper, O-9,10 for the Exhaust damper) fuse is blown or an output module is defective.
  - a. Remove the fuse and check it for continuity. Replace as necessary with a spare from an unused output module space.
  - b. After verifying that the fuse is good, check for voltage on the output module terminals after the LED goes on. If the output contacts remain open, replace the module.

**ERROR CODE 40** BUILDING UNDER PRESSURIZED.

has While in the OCCUPIED, AUTOMATIC PRESSURE and HEATING MODE, the air handler been unable to maintain a positive building pressure within .01" W.C. of the pressure setpoint for ten (10) consecutive minutes. As a result, the program has placed the outside air dampers in the minimum outside air position and the air handler in the UNOCCUPIED and SETBACK TEMPERATURE MODE. This mode will be maintained for thirty (30) minutes. The program will then return the air handler to the OCCUPIED, AUTOMATIC PRESSURE and HEATING MODE. The cycle will restart again in ten (10) minutes if the situation that caused the building pressure drop has not been corrected. This error occurs only if the Controller has been configured for the Energy Alert (under pressurization) option. Normally, there is an alarm horn that is energized when this error occurs. The alarm can be silenced at the Alarm Silence button on the alarm panel.

System is reporting the status of this function. There is no problem with the software or hardware.

<b>Additional Check items</b>
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## INPUT/OUTPUT RACK CHECKOUT

Verify that the LED come on when the device is activated and goes off when the device is de-activated. Be sure the module is tightened down, the ribbon cables are secure and connected properly, and there are no loose wires.

## INPUT MODULE

The LED should never light if the module or its fuse is bad. If voltage is present at the input terminals, but the LED is not on, check the fuse. If the fuse is bad, replace it. Otherwise, replace the module.

## OUTPUT MODULE

The LED can light if the module or its fuse is bad. If the fuse is bad, the LED may still operate properly, since it is responding to the Controller's commands, however, no voltage will be passed to the device connected to the module.

If the module's contacts fail closed, (and the fuse is good) voltage will be passed to the connected device at all times, regardless of the Controller's command.

If the module's amplifier is bad, the contacts will not respond properly to Controller commands.

If the fuse is bad, replace it. Otherwise, replace the module.

## TEMPERATURE SENSORS

The AD592 temperature sensors send a very small current to the Controller which varies proportionally to the temperature. The simplest way to check their performance is by using the chart shown in Appendix C of the RAPID Intelligent Control System Service Technician Manual. If the display indicates that a temperature sensor is "seeing" a very cold temperature that you know is much colder than the actual temperature:

1. The sensor wiring is damaged or connected improperly.
  - a. Inspect all cabling for the sensor and repair as necessary.
  - b. Inspect all terminations and plug connections; make sure that they are making good electrical contact.
2. The sensor is defective.
  - a. Replace the sensor.

If the display indicates that a temperature sensor is "seeing" a temperature that you know is much warmer than the actual temperature:

1. The sensor wires have (now or previously) been shorted, damaging the Controller.
  - a. Replace the Controller.

## FUSES / OVERLOADS TRIPPING

Frequent tripping of the electrical safety devices almost always indicates an electrical design problem. Investigate carefully to determine the underlying cause. Consult the National Electrical Code.

1. The voltage supplying the air handler is too low. Check transformer tap settings. Check wire size and length for excessive voltage drop.
2. The feeder, breaker or fuses are undersized. Correct the improper component.
3. Air handler CFM is too high, causing excessive current draw. Consult the Factory to determine the reason for the CFM being too high and correct.

## EXCESSIVE VIBRATION

Since all fans are factory balanced, the most common cause of vibration is that either the legs have not been properly anchored or attached or the cabinet section bolts are improperly tightened. Check all bolts for tightness and all legs for solid anchoring.

If everything is tight, consult the Factory. In rare cases, field balancing is called for.

## ODORS

90% or more of the time that odors are noticed, there is one of two causes.

- 1) There is a source of odor outside the building that is being drawn into the outdoor air intake. This odor could be roofing tar, sewer gas from a nearby sanitary vent, a nearby exhaust fan, etc.
  - a) The solution should be evident and may require raising or relocating the odor source.
  
- 2) The air velocity across the burner is too high and some aldehydes are being produced. RAPID selects fan speed to produce the specified CFM at the specified static pressure. If the specified static pressure turns out to be greater than the actual pressure, the fan will deliver more air than needed and the velocity across the burner will be too high, causing aldehyde odor. In addition, if there is substantially more pressure drop in the return duct than the outdoor air duct, the same result occurs.
  - a) If the actual pressure drop is less than the estimated (specified) drop, re-sheave the fan for the actual static pressure drop. Keep in mind that whatever is measured at the site will be higher than the actual value because the fan is spinning too fast, causing more flow, greater pressure drop, etc. Consult RAPID if there is any doubt regarding the correct fan speed.

## RAPID

- b) If the return side has substantially more pressure drop than the outdoor air side, add some pressure drop across the outdoor air inlet. Consult RAPID before doing this. NOTE: All of RAPID's Inlet Coil Sections have a baffle built into the burner air bypass section for just this purpose.

## RUN TIME ERRORS

### RUN TIME 5

Typically the result of a 300 remote station connected to a controller while that same controller is also connected to a network computer.

- a. Disconnect the 300 remote.

### RUN TIME 6

Communication problems or failure to export data files from the ICS-II software can cause this.

- a. Error#.Dat - This file is created automatically by the software whenever a controller reports an error. If an excessive amount of errors are present you may have a network cabling problem that is disrupting the software.. Delete the errors and trouble shoot the problem based on the information in this book under error code -2. Examples of the files are Error1.Dat & Error2.Dat etc...
- b. HLWxxxx.Dat - are files that contain data for a one-month period of time. These files can become very large over time. These files can be exported to another directory or deleted from the 4000 directory.

An example of one file is HLW1001. This file contains an hourly log of all the air handlers on the network for October 2001. Information about these files can be found in the user manuals and technicians guide.

#### RUN TIME 9

This is most commonly seen when the computer running the ICS-II software is also running other applications such as screen savers, and anti virus software or other windows application software programs.

- a. Disable screen savers and remove anti virus software from computer.

#### RUN TIME 340

This error usually accrues when there is a communication error while the software is bringing an air handler on line.

- a. Delete the SPSPLSCH.SYS file in the 4000 directory. The file will automatically be recreated the next time the air handler is brought on line.

In general all of the above Run Time errors are in some way created by a communication problem. The ICS-II software attempts to talk to each controller on a network about once every second. If it fails to communicate to a specific controller an error is generated. Using the wrong type of cable or poor connections most commonly causes these errors. Deleting any of the files above may resolve the problem temporarily, but until the cause of the problem is corrected (usually the cable) the run time error will reappear.

#### MISCELLANEOUS

When a problem persists in spite of your best efforts, disconnect all of the space temperature and network cables. Then plug in one at a time and see if the problem can be made to occur. This can aid in determining where the trouble's source is.

Also, "flaky", seemingly unrelated problems occur when one of the ribbon cables between the Controller and an I/O rack is not seated properly or the cable is defective.



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