

## Replacement Kit Instructions

Applies to: Model CAUA

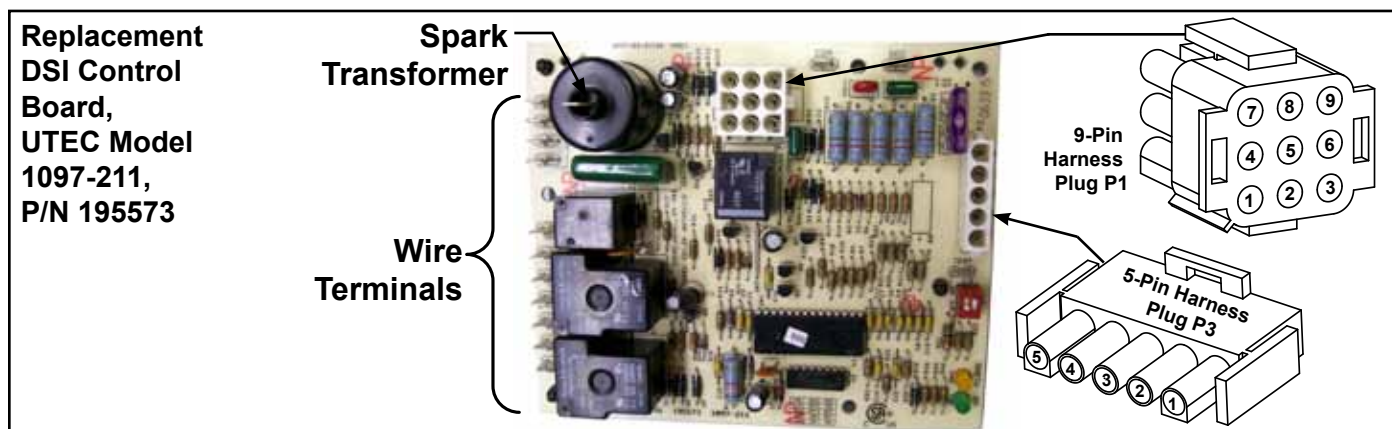
**Instructions for DSI Controller Replacement Kit, P/N 258251  
Convert from a RAM 3MC4-06 (Serial No. Code 76) or J/C G822KCC-5401D  
(Serial No. Code 77) Controller to UTEC 1097-211 (Serial No. Code 78)**

**WARNING**

**To ensure safe and proper operation, read and follow the installation instructions. Failure to do so could result in property damage, personal injury, and/or death.**

**Kit Components**

Kit P/N 258251, Ignition Conversion FROM DSI Controller RAM 3MC4-06 or J/C G822KCC-5401D TO DSI Controller UTEC 1097-211			
Qty	P/N	Description	
1	195573	DSI Control Board, Heat Only, UTEC 1097-211 (Labeled UTEC ID Code 417)	
1	257666	9-Pin Wire Harness Assembly (identified as P1 on the wiring diagram)	
1	257675	5-Pin Wire Harness Assembly (identified as P3 on the wiring diagram)	
1	257013	Drill Template	See Instructions, <b>STEP 3</b> .
1	257665	18" Ignition Cable	See Instructions, <b>STEP 4</b> .
7	142860	1/4" Quick Connect Terminal (Red)	Use as needed to make wire connections.
1	1350	Spade Terminal	
2	22573	Crimp Terminal	Used to connect flame rollout switch to high limit control - See Instructions, <b>STEP 5</b> , and Limit Switch operation.
1	129869	24" Red Wire Assembly with one Terminal	
6	20913	Cable Ties	Use as needed for excess wire length.
1	203058	Circuit Board Notice Label	See Instructions, <b>STEP 6</b> .
1	258250	Wiring and LED Code Label	

**Installation Instructions**

- Turn off gas supply and disconnect the electric power to the heater.**
- Remove the DSI control.** - Open the control compartment and locate the ignition control module. Disconnect the wiring including the spark ignitor lead from the DSI control. Remove the four screws and the controller.
- Attach the replacement DSI control.** - In the kit, locate the drill template (P/N 257013). Position the template with the painted side facing up and align it over the mounting holes. Justify the holes for the new DSI toward the bottom of the panel. Mark the new hole locations. Drill four 3/16" holes. Position the new DSI control so that the spark transformer is located nearest to the spark electrode on the burner. Snap the controller into the holes.
- Install the ignition wire.** - Locate the spark electrode (ignitor) on the burner. Remove the existing ignitor wire and replace it with the new one in the kit. Connect the other end to the spark transformer on the new DSI board.
- Connect the wires according to the new wiring diagram label.**
  - Connect the terminals from the 5-pin connector (identified as P3 on the diagram) to the appropriate terminals on the thermostat terminal strip.
  - Make connections from the 9-pin connector (identified as P1) according to the wiring diagram. As a wire is connected, it may be cut to a shorter length. Attach terminals as needed.
  - Connect existing wires to the new DSI board wire terminals as shown on the diagram. If the terminal on the line voltage wire is 3/16", cut the terminal off, strip the wire, and add one of the 1/4" quick connects from the kit. Connect to Terminal "L1". Use cable ties as needed for routing and excess length.

# Installation Instructions (cont'd)

Note there are five terminals with different terminology between the two boards; see cross reference:

Old Board	New Board
ACC	EAC/BLO
24 VAC HOT	SEC
Ground	COM
LINE VAC HOT	L1
CMB BLWR	IND

**d) Connect** the 24" red wire assembly to the rollout switch (located on the burner box top) and the high limit switch wire lead. Use one of the crimp nuts to make the connection to the limit control wire.

## 6. Apply new Labels. (See illustrations below.)

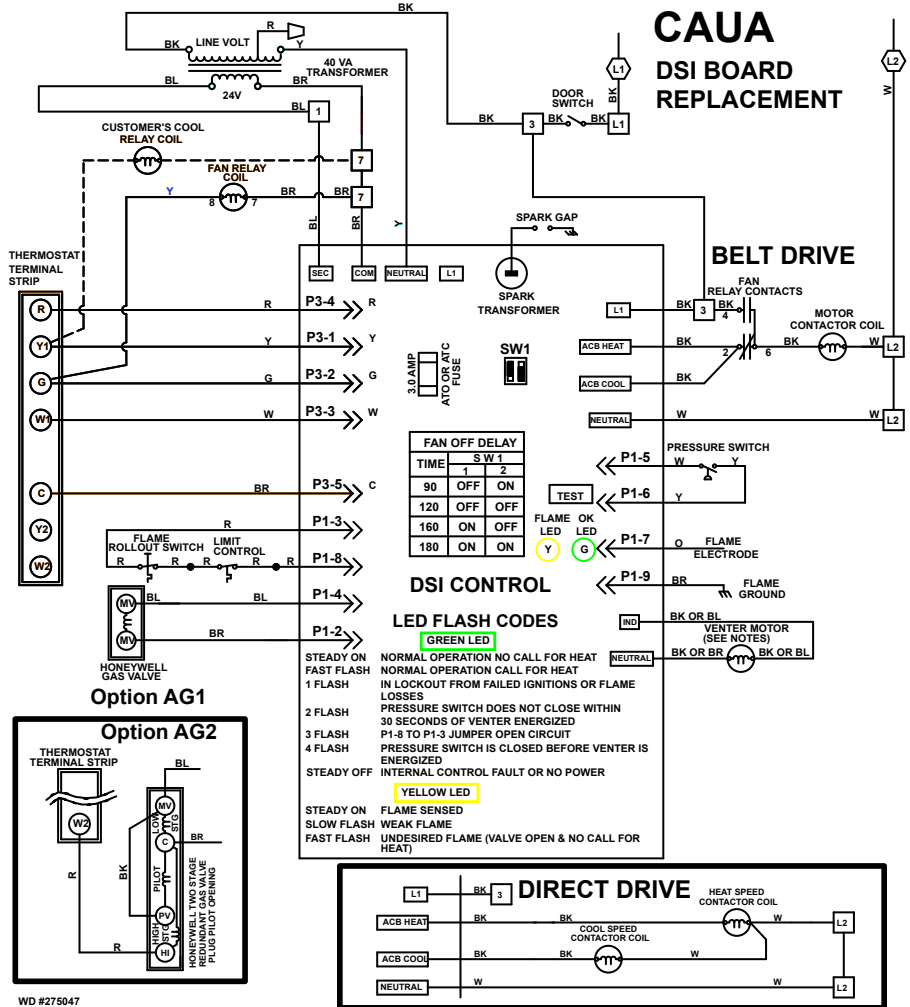
**Wiring Diagram** - On the left panel inside the burner compartment, adhere the wiring diagram label.

**Circuit Board Notice Label** - Apply below the new wiring diagram label.

## 7. Turn on the power and gas. Start the heater and check for proper operation.

### Wiring for CAUA - DSI Board Replacement (Label, P/N 258250)

**NOTE:** To cover all applications, connections are shown for single-stage (AG1) and two-stage (AG2) controls and for both direct and belt drive motors. Make the connections that apply to the options on the unit being serviced.



### Circuit Board Notice Label, P/N 203058

**NOTICE**

BEFORE REPLACING CIRCUIT BOARD:

- Check Fuse on Circuit Board
- Check 24VAC Supply
- Check LED Flash Codes

Replacing circuit board will not correct problems that are external to the board.

## Operating and Service Information for Replacement DSI Controller

### Normal Heat Cycle Operating Sequence

**1) Call for Heat** - The heating/cooling system controller calls for heat. The ignition system circuit board checks to see that the limit switch is closed and the pressure switch is open. If the limit switch is open, the circuit board responds as defined in the "Abnormal Heat Cycle, Limit Switch Operation". If the pressure switch is closed, the circuit board will do four flashes on the green LED and wait indefinitely for the pressure switch to open. If the pressure switch is open, the circuit board proceeds to prepurge.

**2) Prepurge** - The circuit board energizes the venter motor and waits for the pressure switch to close. If the pressure switch does not close within 30 seconds of the venter motor energizing, the circuit board will do two flashes on the green LED. The circuit board will leave the

venter motor energized indefinitely as long as the call for heat remains and the pressure switch is open.

When the pressure switch is proven closed, the circuit board begins the prepurge time. If flame is present any time while in prepurge, the prepurge time is restarted. If flame is present long enough to cause lockout, the circuit board responds as defined in "Fault Modes, Undesired Flame".

The ignition system circuit board runs the venter motor for a 20 second prepurge time, then proceeds to the ignition trial period.

**3) Ignition Trial Period** - The ignition system circuit board energizes the spark and main gas valve. The venter remains energized. If flame is sensed during the first 16 seconds, the spark

is de-energized. If flame has not been sensed during the first 16 seconds, the control de-energizes the spark output and keeps the gas valve energized for an additional one second flame proving period. If flame is not present after the flame proving period, the control de-energizes the gas valve and proceeds with ignition re-tries as specified in "Abnormal Heat Cycle, Ignition Retry". If flame is present, the circuit board proceeds to steady heat.

**4) Steady Heat** - Circuit board inputs are continuously monitored to ensure limit and pressure switches are closed, flame is established (sensor on both burner sections), and the system controller call for heat remains. When the call for heat is removed, the ignition system circuit board de-energizes the gas valve and begins postpurge timing.

**5) Post Purge** - The venter motor output remains on for a 45 second postpurge period after the system controller is satisfied.

## Abnormal Heat Cycle Functions

**Interrupted Call for Heat** - If the system controller call for heat is removed before the flame is recognized, the circuit board will run the venter motor for the post purge period and de-energize all outputs.

If the call for heat is removed after successful ignition, the circuit board will de-energize the gas valve and run the venter motor through post purge.

**Ignition Retry** - If flame is not established on the first trial for ignition period, the ignition system circuit board de-energizes the gas valve, and the venter motor remains energized for an inter-purge period of 10 seconds. The spark and gas valve are then re-energized, and the circuit board initiates another trial for ignition.

If flame is not established on the second trial for ignition, the circuit board de-energizes the gas valve and venter motor remains energized. The spark and gas valve are re-energized and the circuit board initiates another trial for ignition.

If flame is not established on the third trial for ignition period, the circuit board de-energizes the gas valve, and the venter motor remains energized for an inter-purge period of 10 seconds. The circuit board then re-energizes the gas valve and spark and initiates another trial for ignition.

If flame is not established on the fourth trial for ignition (initial try plus 3 re-tries), the circuit board de-energizes the gas valve and goes into lockout. The circuit board goes to one flash on the green LED to indicate ignition failure lockout.

**Limit Switch Operation** - The limit switch is ignored unless a call for heat is present (V energized). If the limit switch is open and a call

for heat is present, the control de-energizes the gas valve, runs the blower motor on heat speed, and runs the induced draft (venter) motor. The control will be in soft lockout and flashing fault code "3", before returning to normal operation.

When the limit switch re-closes or the call for heat is lost, the control runs the induced draft motor through post purge and runs the blower through the selected fan off delay.

**Pressure Switch** - If the pressure switch opens before the trial for ignition period, the venter motor will run through the pressure switch recognition delay (2 seconds), the gas valve will be de-energized, and the venter motor will run through the postpurge time. The ignition system circuit board will re-start the heat cycle at the pressure switch proving state if the call for heat still exists.

Pressure switch opening for less than 2 seconds during the trial for ignition period shall not interrupt the heat cycle. (Gas valve will de-energize while the pressure switch is open.)

If the pressure switch opens after a successful ignition, the circuit board will de-energize the gas valve. If flame is lost before the end of the 2 second pressure switch recognition delay, the circuit board will respond to the loss of flame. If the pressure switch remains open for 2 seconds and the flame remains, the circuit board de-energizes the gas valve and the venter motor runs through postpurge.

Power interruptions of less than 80mS shall not cause the circuit board to change operating states. Power interruptions greater than 80mS may cause the circuit board to interrupt the current operating cycle and re-start.

## Ignition System Fault Modes

**Undesired Flame** - If flame is sensed longer than 20 seconds while the gas valve is de-energized, the circuit board shall energize the venter motor. When flame is no longer sensed, the venter motor will run through postpurge. The circuit board will do a soft lockout, but will still respond to open limit and flame. The FLAME (yellow) LED shall flash rapidly when lockout is due to undesired flame.

**Gas Valve Relay Fault** - If the circuit board senses the gas valve as energized for more than one second when the circuit board is not attempting to energize the gas valve, or the gas valve is sensed as not energized when it is supposed to be energized, then the circuit board will lockout with the green LED off. The control assumes either the contacts of the relay driving the gas valve have welded shut,

or the sensing circuit has failed. The venter motor is forced off to open the pressure switch to stop gas flow unless flame is present.

If the gas valve was sensed as closed when it should be open, and has not de-energized after the venter motor was shutoff for 15 seconds, then the venter motor is re-energized to vent the unburned gas.

**Soft Lockout** - The circuit board shall not initiate a call for heat while in lockout. The circuit board will still respond to an open limit and undesired flame. Lockout shall automatically reset after one hour. Lockout may be manually reset by removing power from the circuit board for more than one second or removing the call for heat for more than one and less than 20 seconds.

# Operating and Service Information (cont'd)

## Ignition System Fault Modes (cont'd)

**Hard Lockout** - If the circuit board detects a fault on the board, the status LED will be de-energized, and the circuit board will lockout as long as the fault remains. A hard lockout will automatically reset if the hardware fault clears.

**Power Interruption** - During a momentary power interruption or at voltage levels below the minimum operating voltage (line voltage

or low voltage) the ignition system will self-recover without lockout when voltage returns to the operating range.

Power interruptions of less than 80mS shall not cause the circuit board to change operating states. Power interruptions greater than 80mS may cause the circuit board to interrupt the current operating cycle and re-start.

## Troubleshooting and Service



Lights

The direct spark integrated circuit board is polarity sensitive. If burners cycle on and off, try switching the power supply leads. The supply connection made to "L1" on the circuit board must be the "hot" wire.

The only replaceable component of the control module is the 3 amp Type ATC or ATO fuse. Do not attempt to repair the DSI integrated control module.

**Check the Ignition Control Module** - The integrated ignition control module monitors the operation of the heater and includes LED signals that indicate normal operation and various abnormal conditions. If the heater fails to operate properly, check this signal to determine the cause and/or to eliminate certain causes.

The integrated circuit board monitors the operation of the heater and includes two LED signal lights that indicate normal operation and various abnormal conditions. If the heater fails to operate properly, check this signal to determine the cause and/or to eliminate certain causes. Open the door panel to view the LED lights.

### Control Status - Green LED Codes

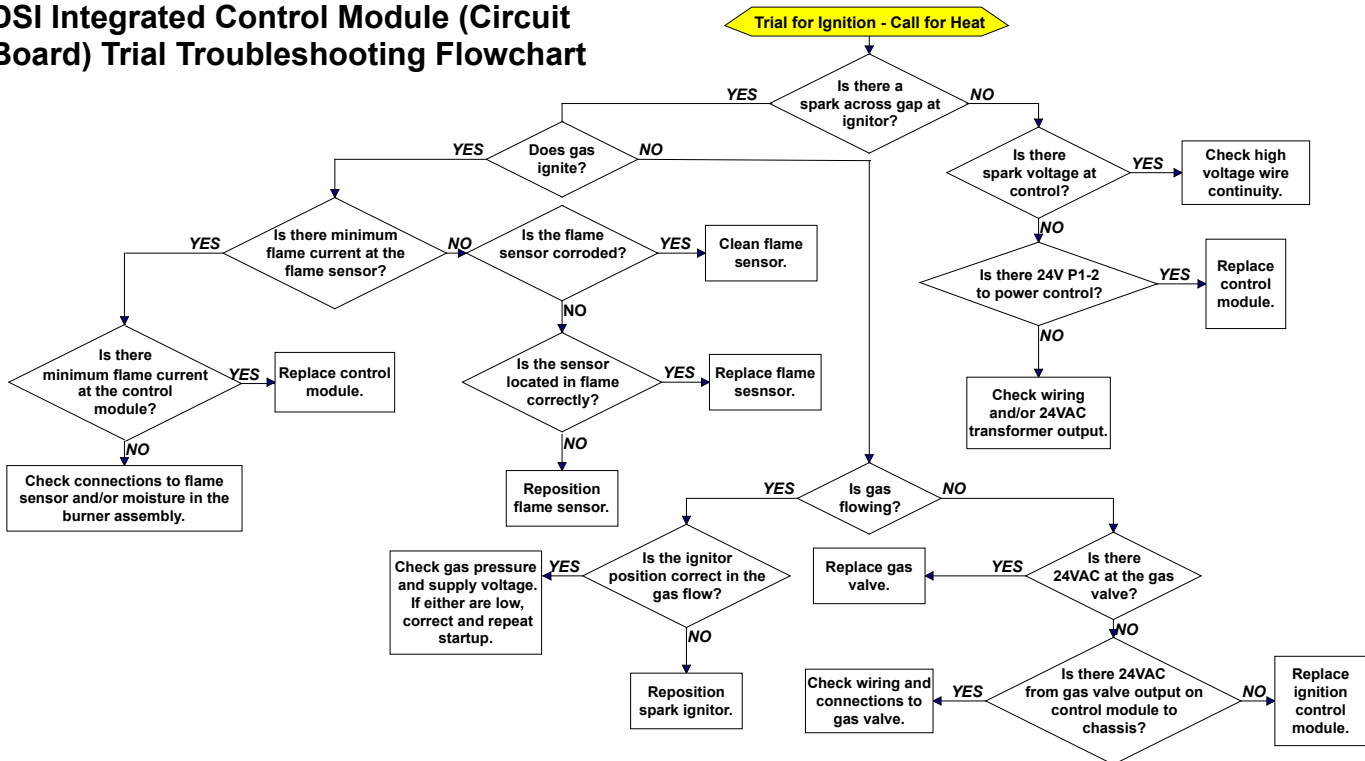
- Steady ON.....Normal Operation, No call for heat
- Fast Flash.....Normal Operation, Call for heat
- 1 Flash..... System Lockout, Failed to detect or sustain flame
- 2 Flashes..... Pressure Switch Did Not Close within 30 Seconds of Venter Motor
- 3 Flashes..... High Limit Switch Open
- 4 Flashes..... Pressure switch is closed before venter motor is energized
- Steady OFF .....Blown Fuse, No Power, or Defective Board

### Flame Status - Yellow LED Codes

- Steady ON.....Flame is sensed
- Slow Flash.....Weak flame (current below 1.0 microamps  $\pm 50\%$ )
- Fast Flash.....Undesired Flame (valve open and no call for heat)

**IMPORTANT:** When using a multimeter to troubleshoot the 24 volt circuit, place the meter's test leads into the 5 or 9 pin connectors located on the ignition control. Do not remove connectors or terminals from the electrical components. Doing so can result in misinterpreted readings due to the ignition control board's fault mode monitoring circuits.

## DSI Integrated Control Module (Circuit Board) Trial Troubleshooting Flowchart



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