PrecisionTemp
TwinTemp-2 / Junior
Service Pack

Please read the enclosed "PrecisionTemp Warranty Procedure Policy" and contact PrecisionTemp PRIOR to proceeding with service.

NOTE: This manual covers both TwinTemp models and drawings illustrate the two zone TwinTemp-2. These drawings also illustrate the Junior model with the exception of components related to zone 2.

PrecisionTemp™

Tankless Hot Water and Temperature Control Specialists

3428 Hauck Rd. Ste. G - Cincinnati, Ohio 45241
USA - 513-641-4446 - 800-934-9690 - Fax 513-641-0733
www.precisiontemp.com

NOTICE

Before proceeding with any repairs or parts replacements on the TwinTemp check the following:

- **Is the coolant level in the tank up to the bottom of the fill cap?**
- **Is the power turned on and have at least 11.5 VDC under load?**
- **Is the gas supply turned on?**
- **Is there any by-passes open, preventing proper circulation of coolant?**
- **Is the flue pipe blocked?**
- **Is there adequate combustion air in the TwinTemp Compartment?**
- **Are there any service codes?**
- **Are the thermostats turned on?**
- **Are there any loose wires or kinked pipes?**

If after checking the above, the problem still exists, it is advised to call PrecisionTemp to assist in troubleshooting. In any event, Precision Temp must be contacted prior to performing any warranty work.

See the "PrecisionTemp TwinTemp Warranty Procedure Policy" prior to performing work.

Call 800-934-9690 ext. 110
9:00 am to 5:00 pm Eastern Time weekdays

After hour's technical service is available by appointment only. To schedule, call our Service Department ext. 110

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PrecisionTemp TwinTemp Warranty Procedure Policy

The following procedure must be followed to implement the PrecisionTemp "Manufacturer's Limited Parts and Warranty". Please refer to the "Manufacturer's Limited Parts and Warranty" for full terms.

To Make a Warranty Claim

1) When possible, contact PrecisionTemp prior to service being performed. The technician must call PrecisionTemp at 513-641-4444 or 800-934-9690 ext. 110 prior to performing work. If voice mail picks up, dial "O" and have a service technician paged. NO work should be performed prior to calling PrecisionTemp. This work would be considered unbillable time and could void the warranty.

If it is known in advance that warranty work must be done on PrecisionTemp equipment outside of PrecisionTemp's normal business hours, (9:00 AM – 6:00 PM EST), call the above numbers in advance for a phone number of a PrecisionTemp technician to assist you after hours.

2) If it is known in advance that a part is needed for the service, the service call must not be made until part is on-site.

3) The equipment serial number MUST be on any and all paper work pertaining to the warranted product i.e.: Invoices, Work Orders, Tech Notes, and RGA's.

4) Any parts replaced under warranty must be returned to PrecisionTemp within 15 (fifteen) days of claim.

5) Any parts being returned to PrecisionTemp MUST have an RGA number. If an RGA number was not included with the warranty replacement part the service agency must call PrecisionTemp to obtain an RGA number before returning the part.

6) Hourly rate and travel expense must be approved in advance of work being performed. Under no circumstances will PrecisionTemp pay overtime fees.

7) All warranty invoices must be accompanied by copies of the technician's work sheets that details the service performed and hours worked.

PrecisionTemp will cover warranty work done only on products manufactured by PrecisionTemp for defects with the product, not problems related to the coach systems or installation or related equipment issues such as:

- **Improper water pressure.**
- **Improper installation including blocked access to heater access panel.**
- **Improper voltage to unit.**
- **Cold water bypass.**
- **Improper power hookup or power turned off.**
- **Undersized gas line or low gas pressure.**
- **Blocked air supply.**
- **Peripheral equipment such as water pumps, faucet, batteries, etc.**
- **Sludge buildup or blockage in hydronic plumbing.**

Warranty coverage is based on PrecisionTemp's warranty policy. PrecisionTemp may, at times, arrange service as a courtesy to the customer. This does not necessarily mean that PrecisionTemp is responsible for the charges. PrecisionTemp will not pay for additional time required to gain access to its equipment or the technician not being given access to equipment in a reasonable time-frame. PrecisionTemp reserves the right to accept or deny warranty claims based on the above policy.

IMPORTANT INFORMATION

- **2011 and prior TwinTemp systems use Rhogard Propylene Glycol boiler antifreeze, high temperature, non-toxic with "inhibitors for copper and aluminum" or 2012 and newer TwinTemps use any premium Propylene Glycol boiler antifreeze made for use with multiple metals, in a "50/50 mix with distilled water".**
- **Do not use Propylene Glycol antifreeze which is pre mixed, standard RV antifreeze or antifreeze without proper inhibitors.**
- **WARNING! DO NOT MIX "Propylene Glycol antifreeze" and "Ethylene Glycol antifreeze". They are incompatible and will create a thick sludge when mixed together.**
- **Contact PrecisionTemp with any questions.**

800-934-9690

TwinTemp Description of Operation and Sequence of Operation

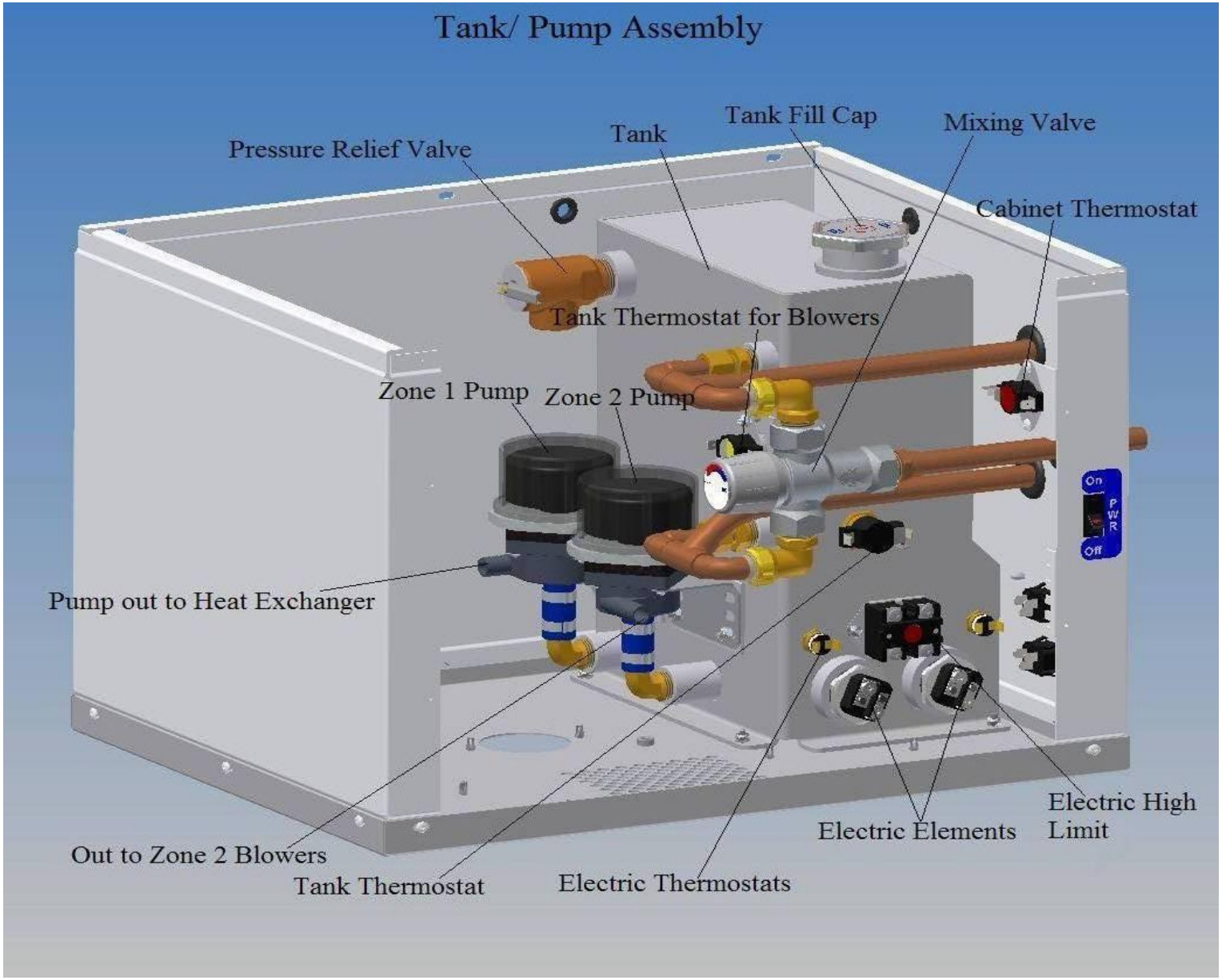
Technical Description of Operation-

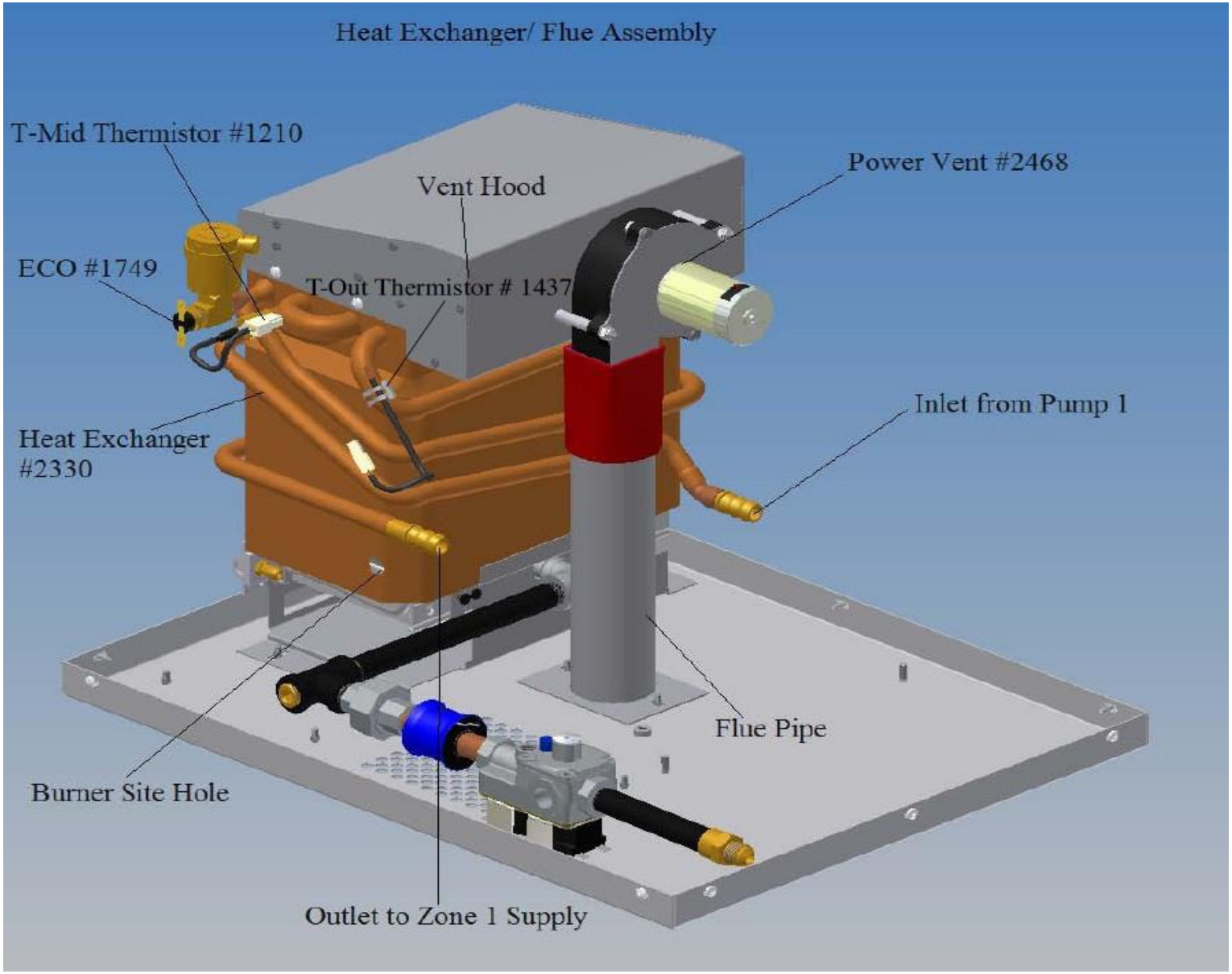
The *TwinTemp* systems provide quiet space heating utilizing liquid to air blowers or radiant devices, while producing a continuous supply of hot water. Its *Variflame* gas modulation enables it to use a very small tank and still maintain efficiency without rapid burner cycling. This greatly reduces startup time and standby heat loss. Unlike its diesel counterparts the *TwinTemp* has an instant on burner and modulates the gas flow on a 4-1 ratio.
A copper heat exchanger inside the tank of heated antifreeze in used to indirectly heat the potable water. This method is not only efficient, but will extend the life of the critical heat exchange elements, tank and circulating pumps.

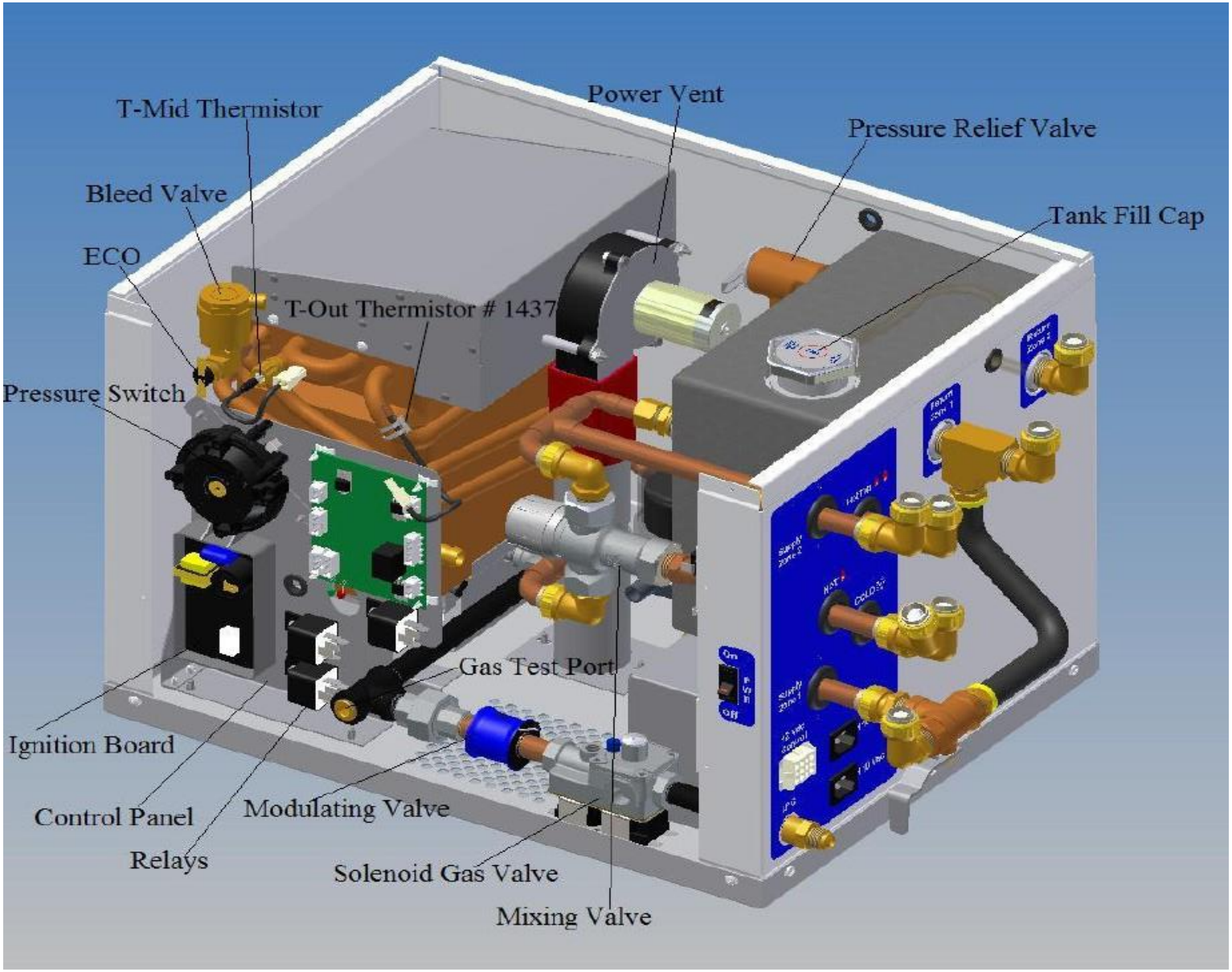
Sequence of Operation

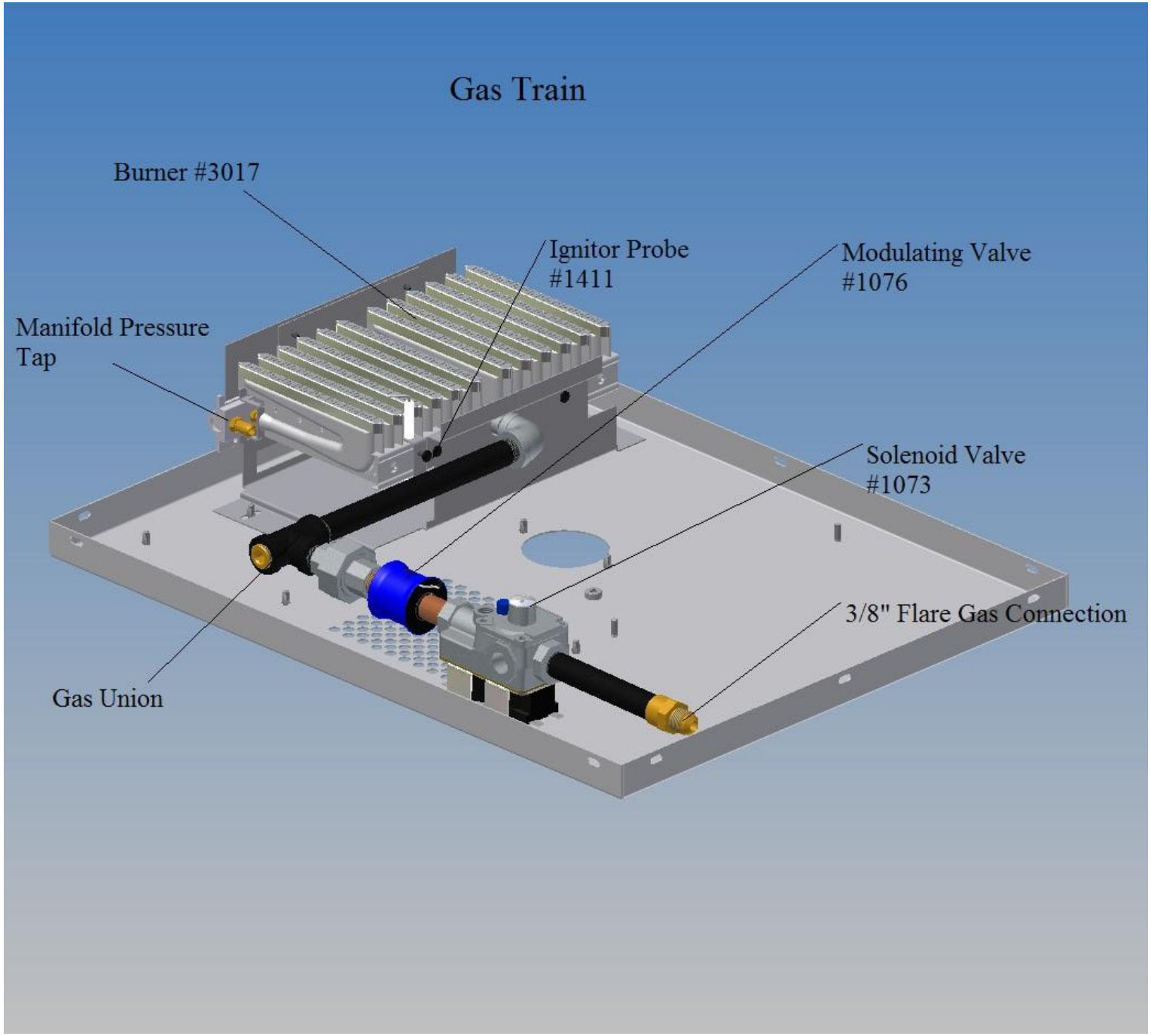
- **The power and propane are turned on to the *TwinTemp*. If the Tank thermostat senses low tank temperature (below 190° F), it will send 12 vdc power to the green control board and Pump 1 (rear) pump. Note: the Junior has one zone pump and the *TwinTemp-2* has 2 zone pumps.**
- **Anti-freeze starts to circulate from the bottom of the tank, through Pump 1, to the burner heat exchanger, out to Zone 1 blowers and back to tank.**
- **Simultaneously, the control board powers the power vent relay which activates the power vent and fluing is proofed by the pressure switch via the ¼" hose. The pressure switch sends 12 VDC to the ignition board (if flue is blocked, burner will not light).**
- **The solenoid gas valve is energized and a spark is effected to the igniter probe over burner via the heavy ignition wire. The flame is proofed via the same igniter element and yellow wire.**
- **Gas flow is adjusted by the gas modulating valve based on antifreeze temperature. Temperature readings are taken twice per second by the T-Mid Thermistor. As set temperature (about 190° F) is approached, the gas flow is reduced as much as 70% by reducing the voltage to the gas modulating valve until set temperature is achieved and the burner goes off.**

- **When a hot water tap is opened, cold water enters the copper tank heat exchanger imbedded in the tank and the heat transfer takes place. The hot water exits the tank coil through a tempering valve that can be set to any temperature between 100°-145°. As the tank cools, the burner cycle starts again when the tank thermostat senses the tank is getting cold.**
- **If the zone 1 room thermostat senses low room temperature, it sends power to the zone's relay that then powers pump 1, control board and the zone blowers.**
- **When the zone 2 (*TwinTemp-2* only) thermostat calls for heat the zone 2 relay sends power to the pump 2 and the blowers in zone 2 are activated. The burner will be activated by the tank thermostat as above if the antifreeze temperature falls below set temperature.**
- **The blower thermostat will turn off the Zone 1 blowers if tank temperature drops below 160° F.**
- **NOTE: The bold orange terms are identified and pictured in the following pages.**

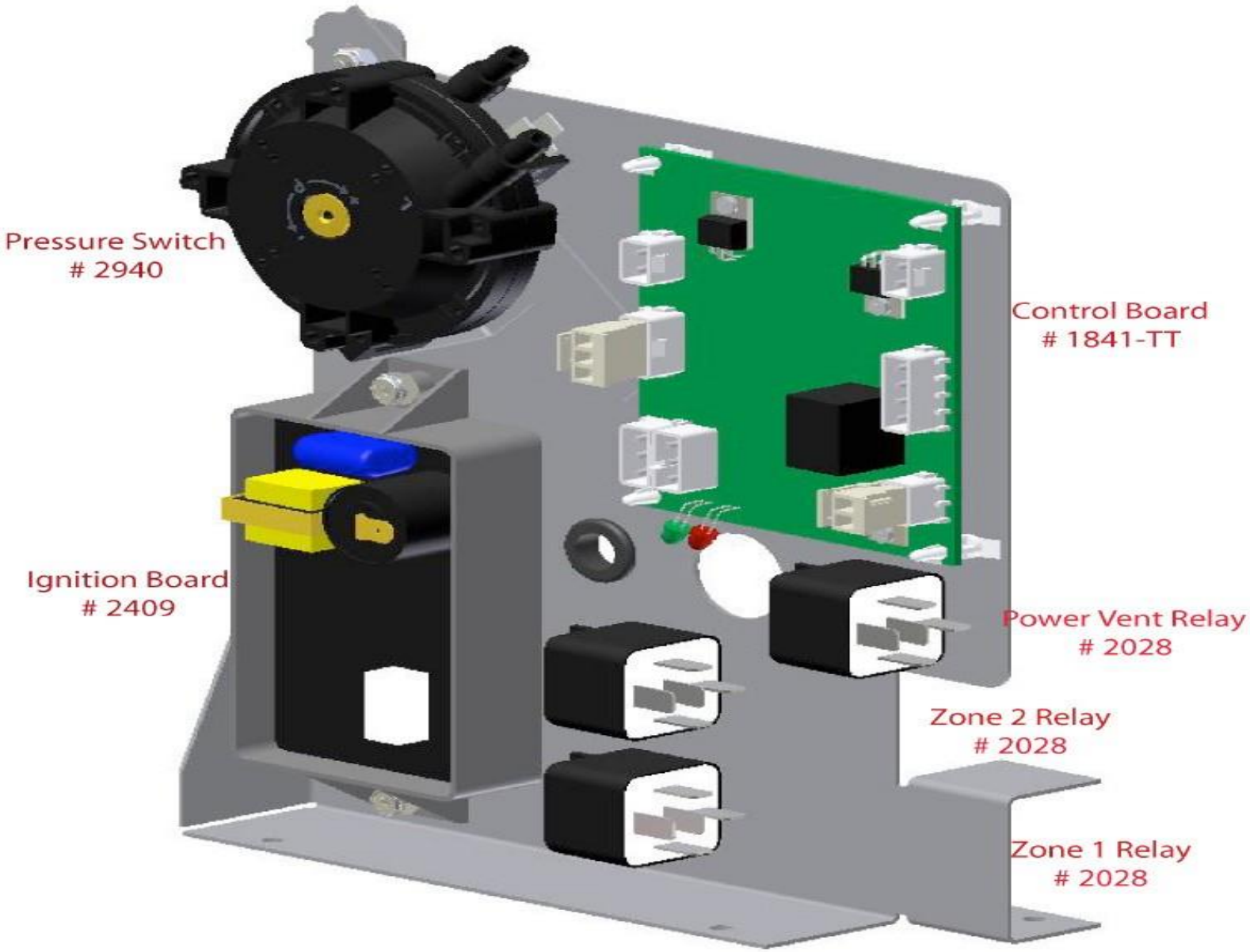

Tank/ Pump Assembly
Pressure Relief Valve
Tank
Tank Fill Cap
Mixing Valve
Cabinet Thermostat
Tank Thermostat for Blowers
Zone 1 Pump
Zone 2 Pump
Pump out to Heat Exchanger
On
PWR
Off
Out to Zone 2 Blowers
Tank Thermostat
Electric Thermostats
Electric Elements
Electric High Limit


Heat Exchanger/ Flue Assembly
T-Mid Thermistor #1210
Vent Hood
Power Vent #2468
ECO #1749
T-Out Thermistor # 1437
Inlet from Pump 1
Heat Exchanger
#2330
Flue Pipe
Burner Site Hole
Outlet to Zone 1 Supply

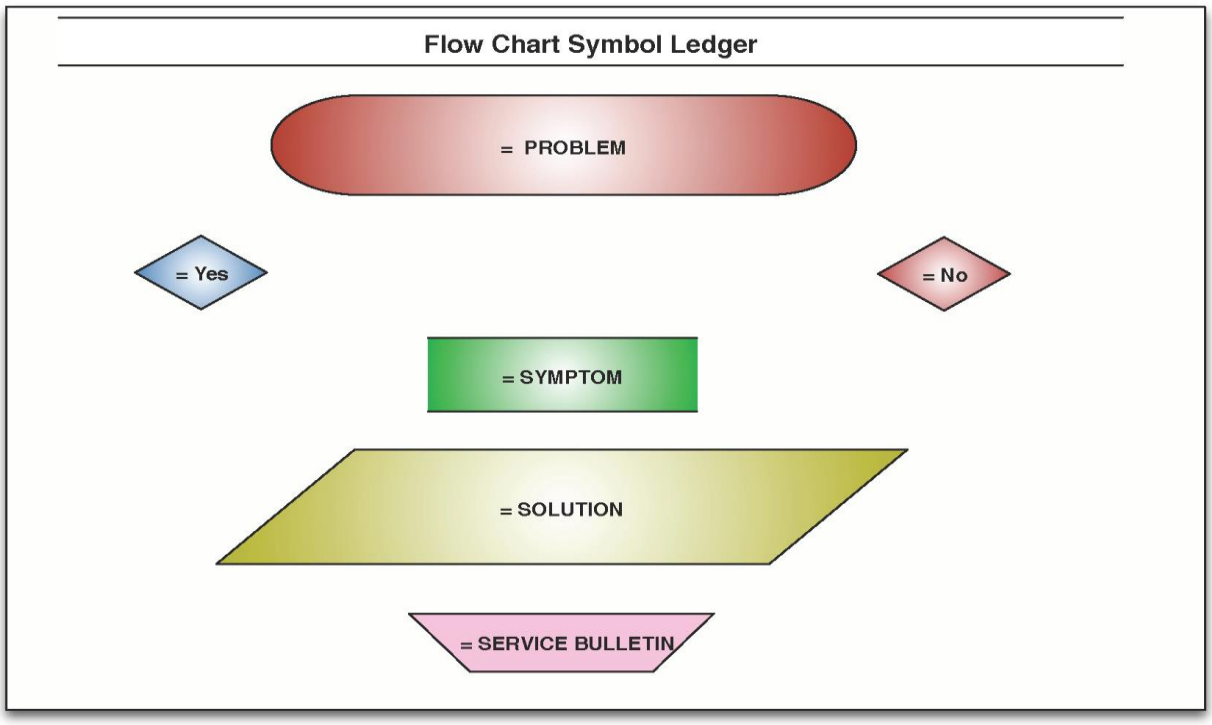

T-Mid Thermistor
Power Vent
Pressure Relief Valve
Bleed Valve
Tank Fill Cap
ECO
T-Out Thermistor # 1437
Pressure Switch
Gas Test Port
Ignition Board
Control Panel
Modulating Valve
Relays
Solenoid Gas Valve
Mixing Valve

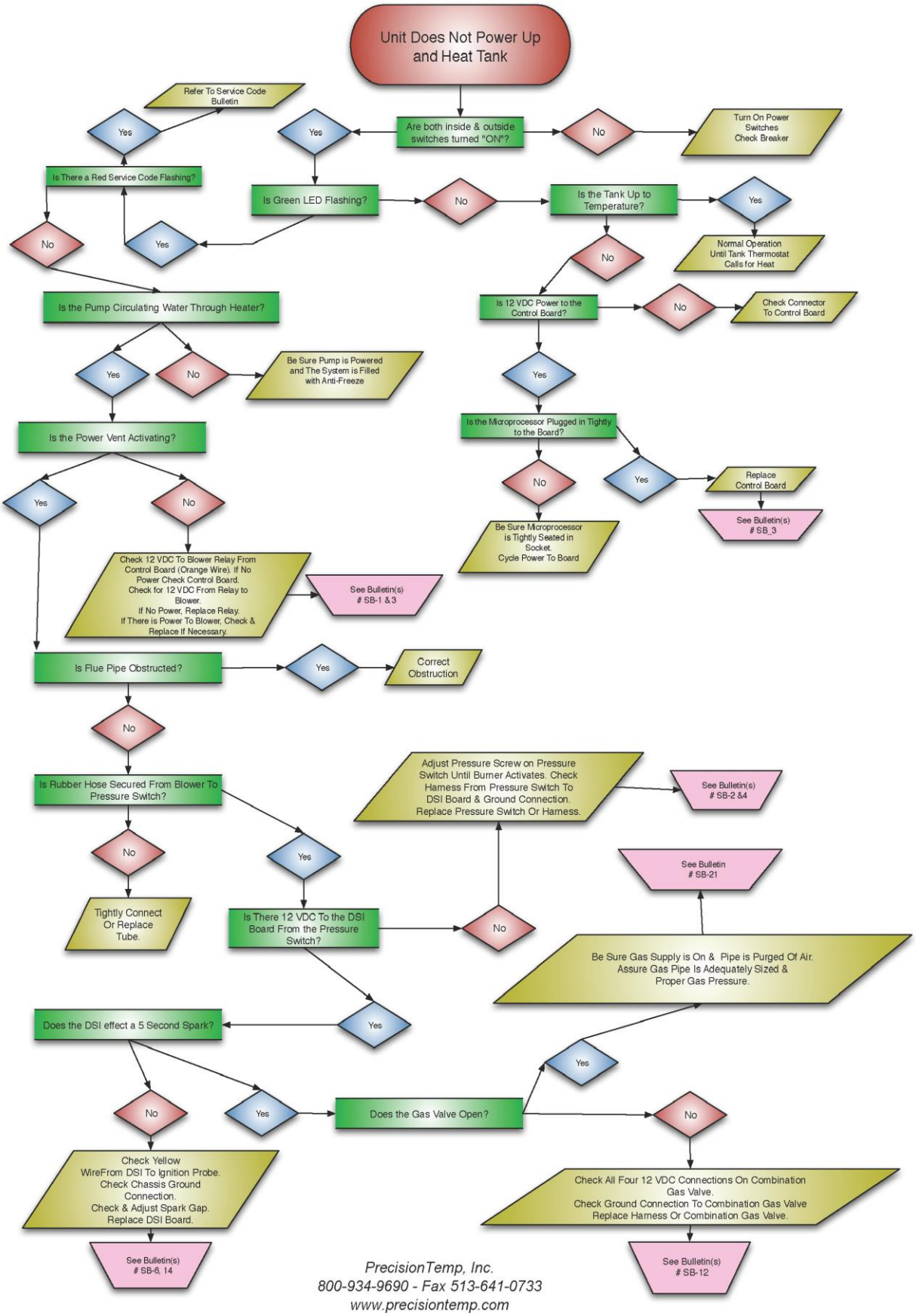

Gas Train
Burner #3017
Ignitor Probe
#1411
Modulating Valve
#1076
Manifold Pressure
Tap
Solenoid Valve
#1073
3/8" Flare Gas Connection
Gas Union

Control Panel



TwinTemp Junior Troubleshooting Guide - Chart 1





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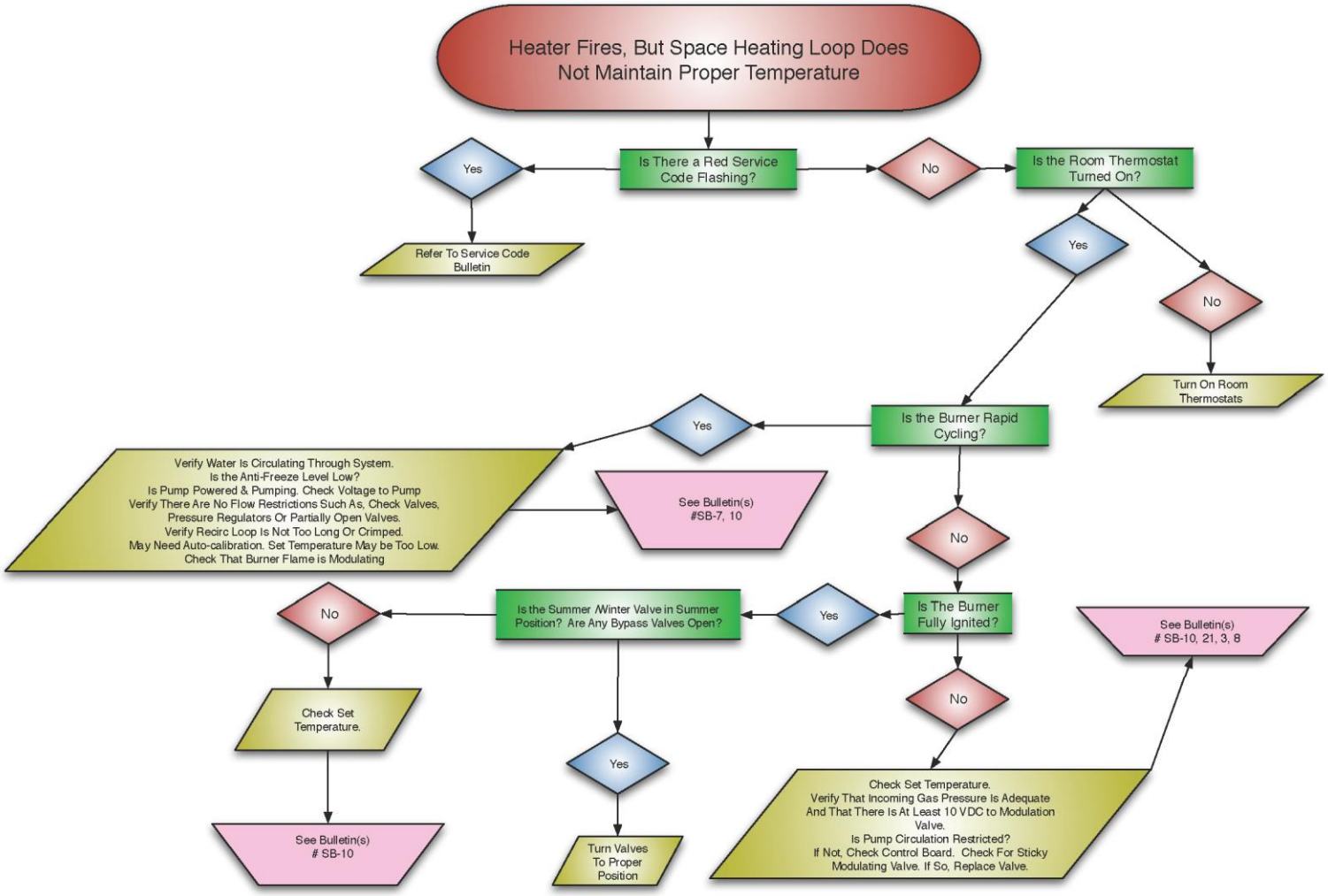
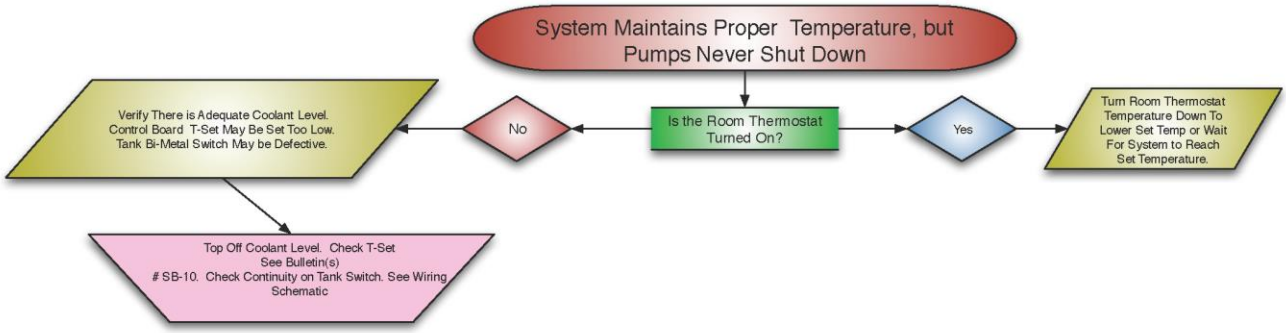
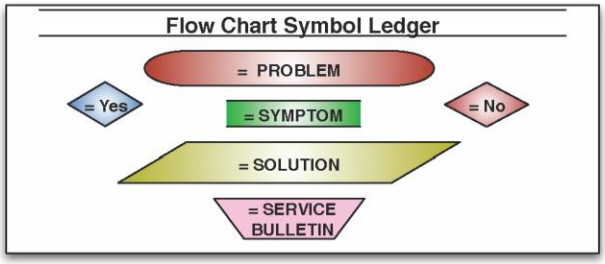
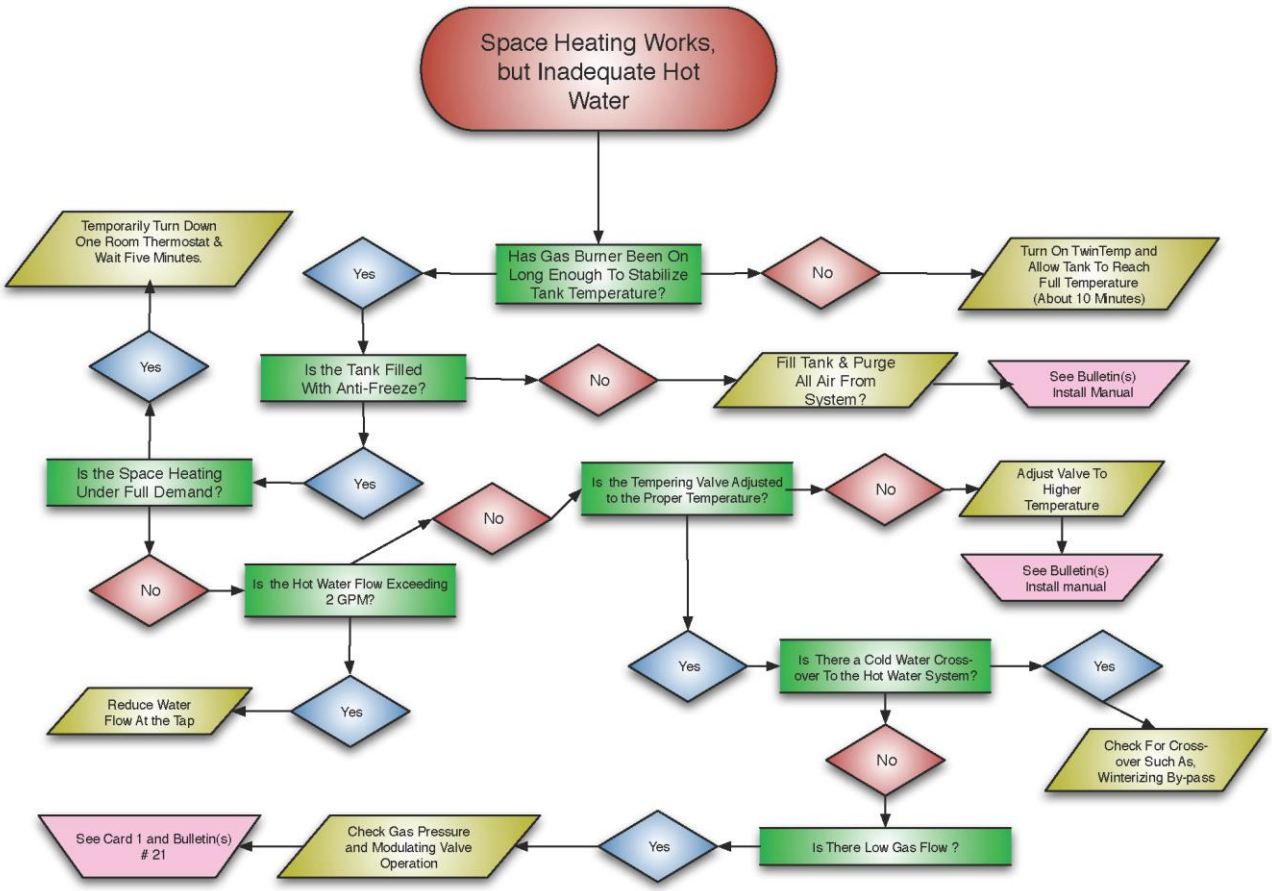
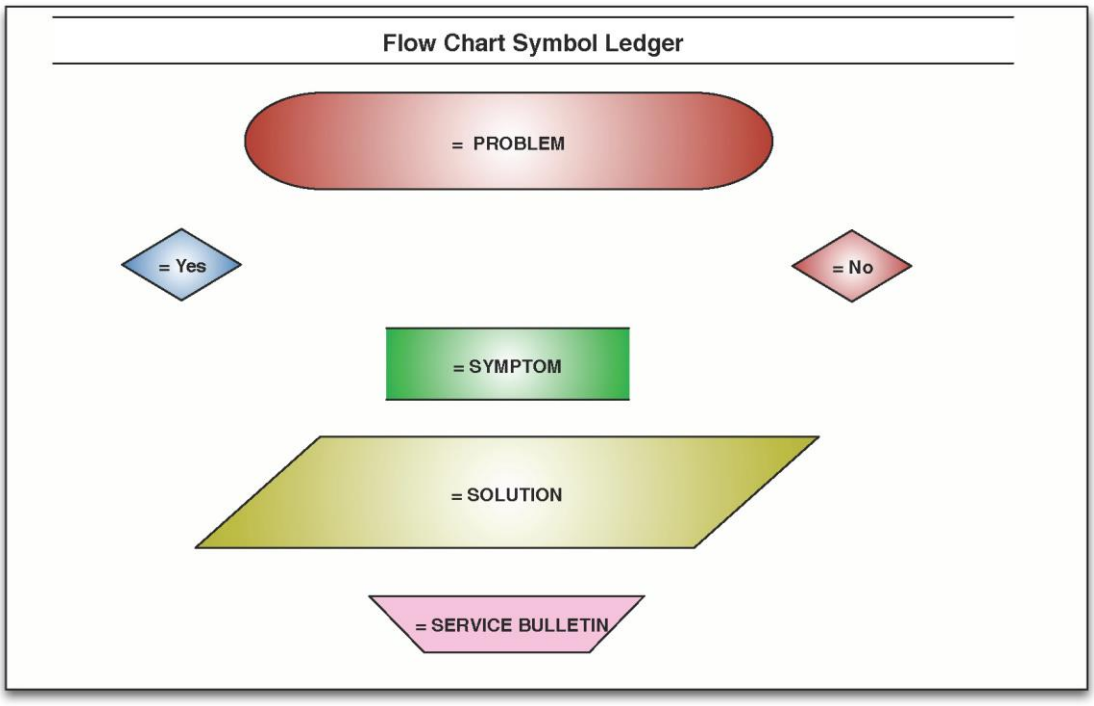

Heater Fires, But Space Heating Loop Does Not Maintain Proper Temperature
Is There a Red Service Code Flashing?
Yes
Refer To Service Code Bulletin
No
Is the Room Thermostat Turned On?
Yes
No
Turn On Room Thermostats
Is the Burner Rapid Cycling?
Yes
Verify Water Is Circulating Through System.
Is the Anti-Freeze Level Low?
Is Pump Powered & Pumping. Check Voltage to Pump
Verify There Are No Flow Restrictions Such As, Check Valves, Pressure Regulators Or Partially Open Valves.
Verify Recirc Loop Is Not Too Long Or Crimped.
May Need Auto-calibration. Set Temperature May be Too Low.
Check That Burner Flame is Modulating
See Bulletin(s) #SB-7, 10
No
Is The Burner Fully Ignited?
Yes
Is the Summer /Winter Valve in Summer Position? Are Any Bypass Valves Open?
No
Check Set Temperature.
See Bulletin(s) # SB-10
Yes
Turn Valves To Proper Position
See Bulletin(s) # SB-10, 21, 3, 8
No
Check Set Temperature.
Verify That Incoming Gas Pressure Is Adequate And That There Is At Least 10 VDC to Modulation Valve.
Is Pump Circulation Restricted?
If Not, Check Control Board. Check For Sticky Modulating Valve. If So, Replace Valve.


System Maintains Proper Temperature, but Pumps Never Shut Down
Is the Room Thermostat Turned On?
No
Verify There is Adequate Coolant Level.
Control Board T-Set May Be Set Too Low.
Tank Bi-Metal Switch May be Defective.
Top Off Coolant Level. Check T-Set
See Bulletin(s)
SB-10. Check Continuity on Tank Switch. See Wiring Schematic
Yes
Turn Room Thermostat Temperature Down To Lower Set Temp or Wait For System to Reach Set Temperature.

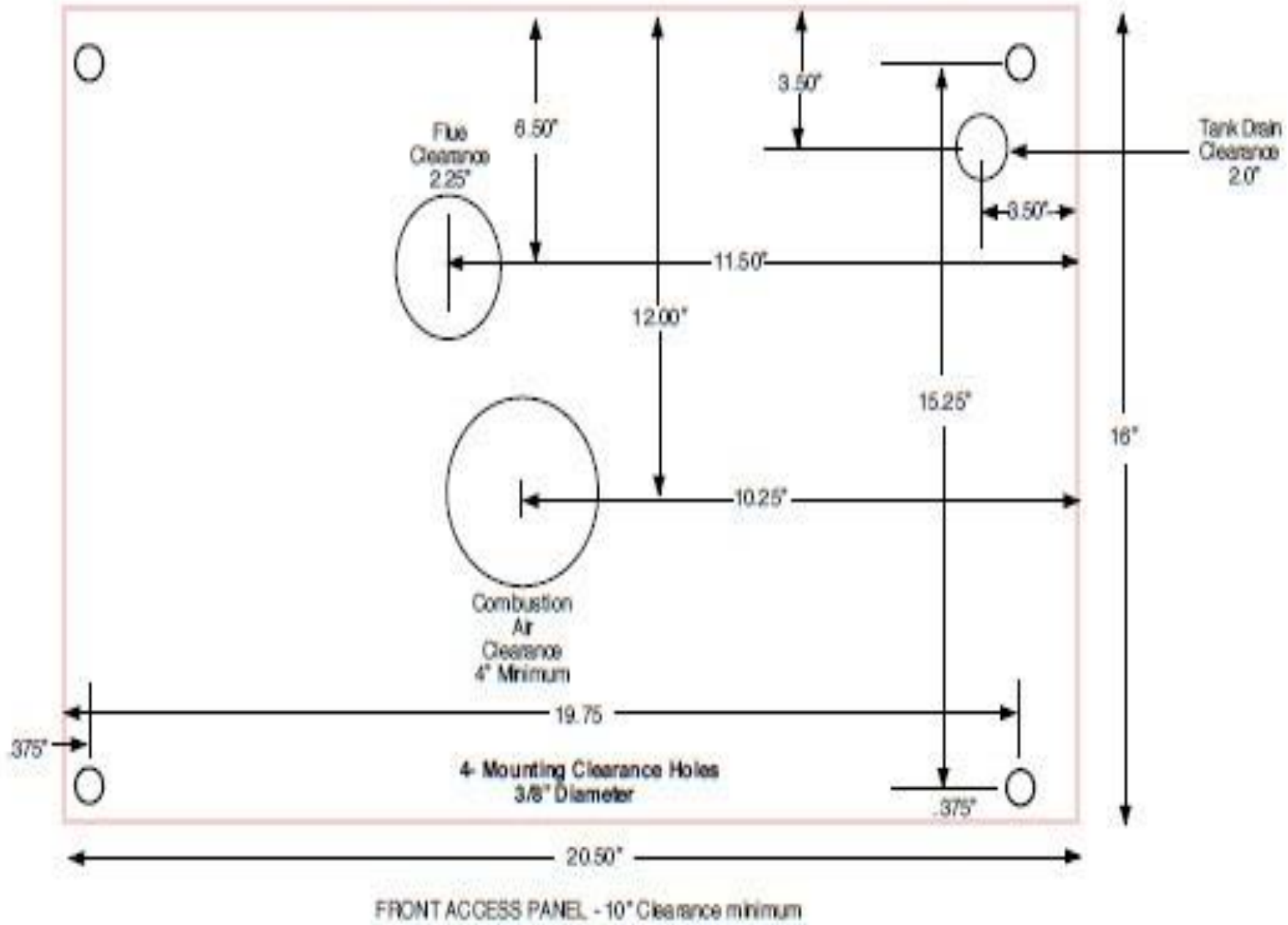

Flow Chart Symbol Ledger
= PROBLEM
= Yes
= SYMPTOM
= No
= SOLUTION
= SERVICE BULLETIN

TwinTemp Junior Troubleshooting Guide - Chart 3

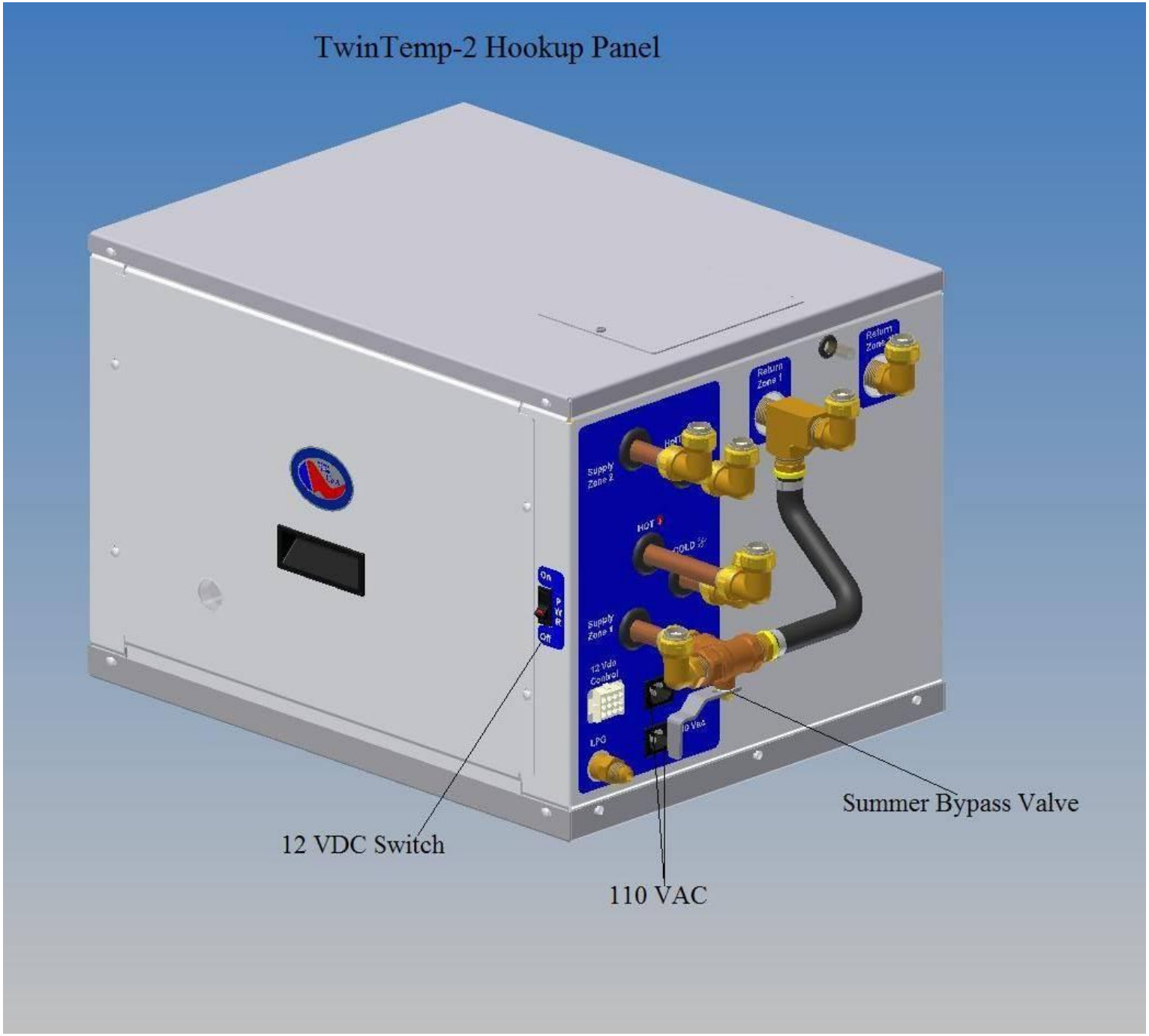


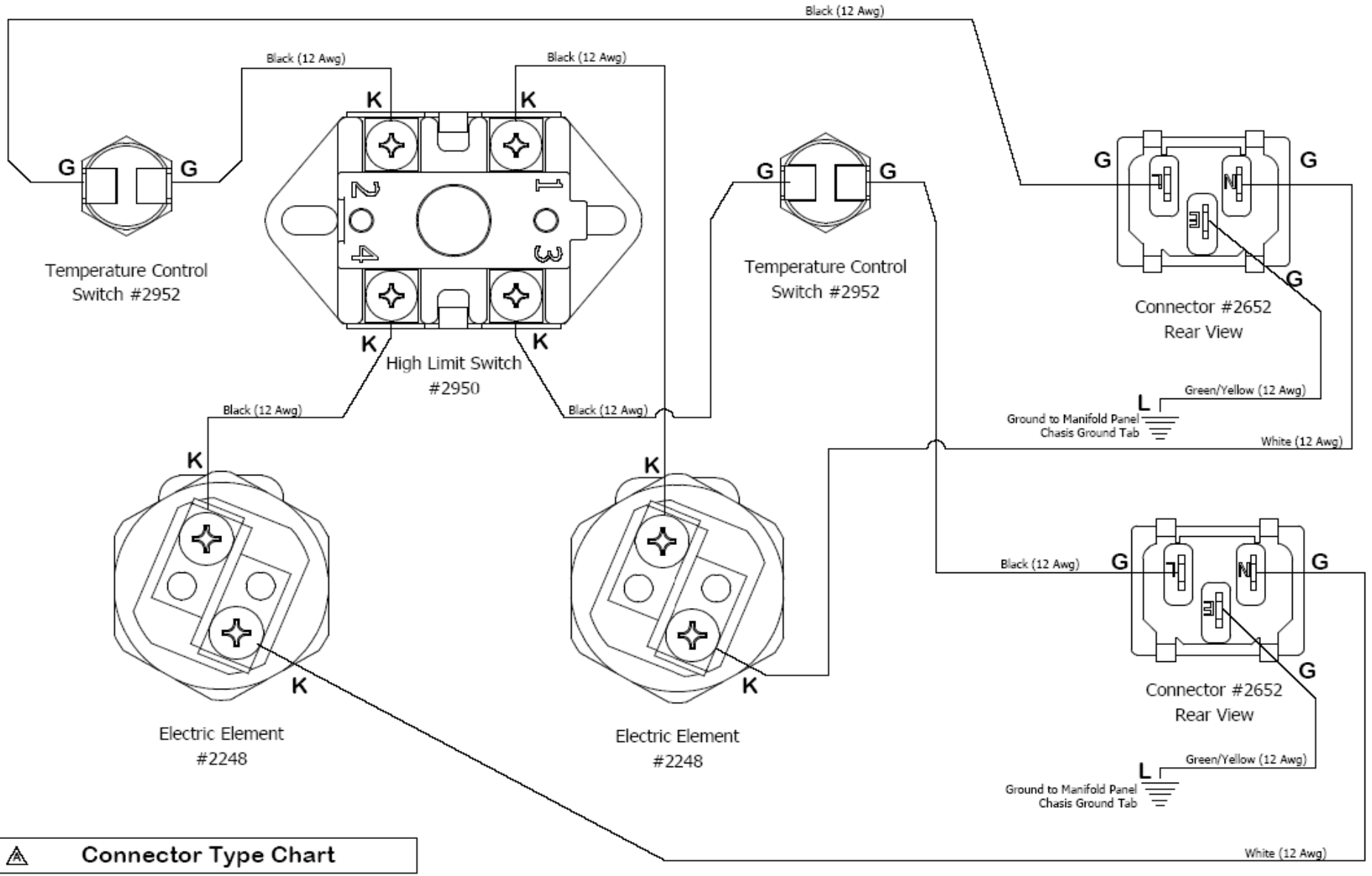


TwinTemp-2 / TwinTemp Junior Installation Template
Rev 6/09 for units with serial number 09X-06-468 or later



FRONT ACCESS PANEL - 10" Clearance minimum


TwinTemp-2 Hookup Panel
Return Zone 1
Supply Zone 2
HOT
Supply Zone 1
12 Vdc Control
LPG
On
Off
12 VDC Switch
110 VAC
Summer Bypass Valve



Connector Type Chart

Letter	View	Part No.	Letter
G		2780	Spade Connector, 1/4" Female for 10-12 Gauge Wire, Insulated
K		2349	Spade Connector, 1/4" Split Male for 10-12 Gauge Wire, Insulated
L		N / A	Ring Connector, 3/8" Dia. for 10-12 Gauge Wire, Insulated

Revisions: A Updated Conn Types 25Oct07 Chuck Haas

DRAWN BY: Chuck Haas 02Apr07
CHECKED BY: DATE:
APPROVED BY: DATE:

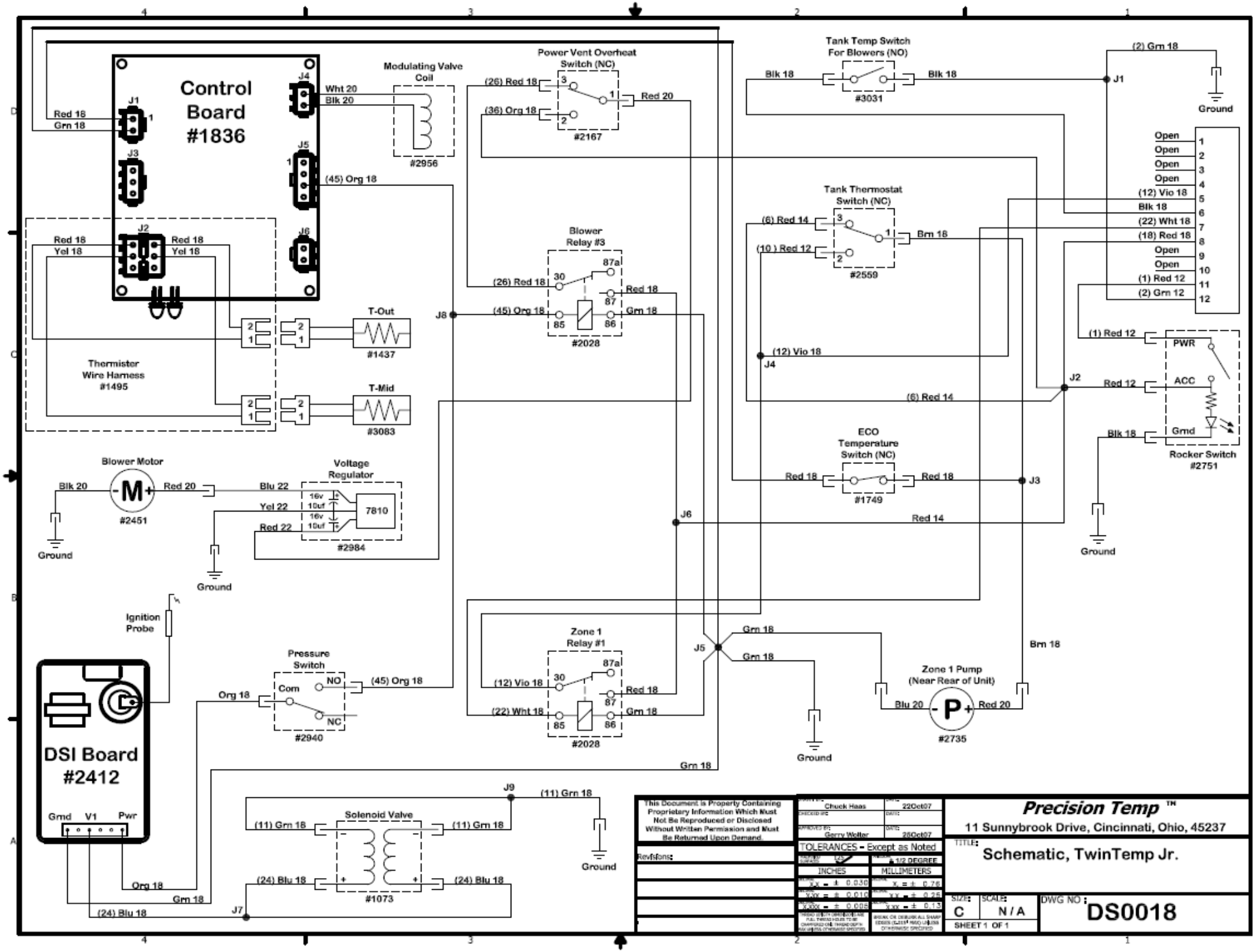
TOLERANCES - Except as Noted
INCHES: X.X = ± 0.030; X.XX = ± 0.010; X.XXX = ± 0.005
MILLIMETERS: X = ± 0,76; X.X = ± 0,25; X.XX = ± 0,13
ANGULAR: ± 1/2 DEGREE
BREAK OR DEBURR ALL SHARP EDGES (LEAST MAT'L UNLESS OTHERWISE SPECIFIED

PrecisionTemp™
11 Sunnybrook Drive, Cincinnati, Ohio 45237

TITLE: Wiring Diagram, Electric Elements TwinTemp 2

SIZE: C | SCALE: 2 = 1 | SHEET 1 OF 1

DWG NO : DS0013


Control Board #1836
J1
J2
J3
J4
J5
J6
Red 18
Grn 18
Red 18
Yel 18
Red 18
Yel 18
Wht 20
Blk 20
(45) Org 18
Modulating Valve Coil
#2956
Power Vent Overheat Switch (NC)
(26) Red 18
(36) Org 18
Red 20
#2167
Tank Temp Switch For Blowers (NO)
Blk 18
Blk 18
#3031
(2) Grn 18
Ground
Open
Open
Open
Open
(12) Vio 18
Blk 18
(22) Wht 18
(18) Red 18
Open
Open
(1) Red 12
(2) Grn 12
Tank Thermostat Switch (NC)
(6) Red 14
(10) Red 12
Brn 18
#2559
Blower Relay #3
(26) Red 18
(45) Org 18
87a
30
87
85
86
Red 18
Grn 18
#2028
J8
T-Out
#1437
T-Mid
#3083
Thermister Wire Harness #1495
(12) Vio 18
J4
(6) Red 14
J2
(1) Red 12
PWR
ACC
Gmd
Red 12
Blk 18
Rocker Switch #2751
Ground
ECO Temperature Switch (NC)
Red 18
Red 18
#1749
J3
J6
Red 14
Blower Motor
Blk 20
Red 20
#2451
Ground
Voltage Regulator
Blu 22
Yel 22
Red 22
16v
10uf
7810
#2984
Ground
Ignition Probe
DSI Board #2412
Gmd
V1
Pwr
Org 18
Grn 18
(24) Blu 18
J7
Pressure Switch
Com
NO
NC
Org 18
(45) Org 18
#2940
Zone 1 Relay #1
(12) Vio 18
(22) Wht 18
87a
30
87
85
86
Red 18
Grn 18
#2028
J5
Grn 18
Grn 18
Ground
Zone 1 Pump (Near Rear of Unit)
Blu 20
Red 20
#2735
Brn 18
Grn 18
J9
(11) Grn 18
Solenoid Valve
(11) Grn 18
(11) Grn 18
(24) Blu 18
(24) Blu 18
#1073
Ground
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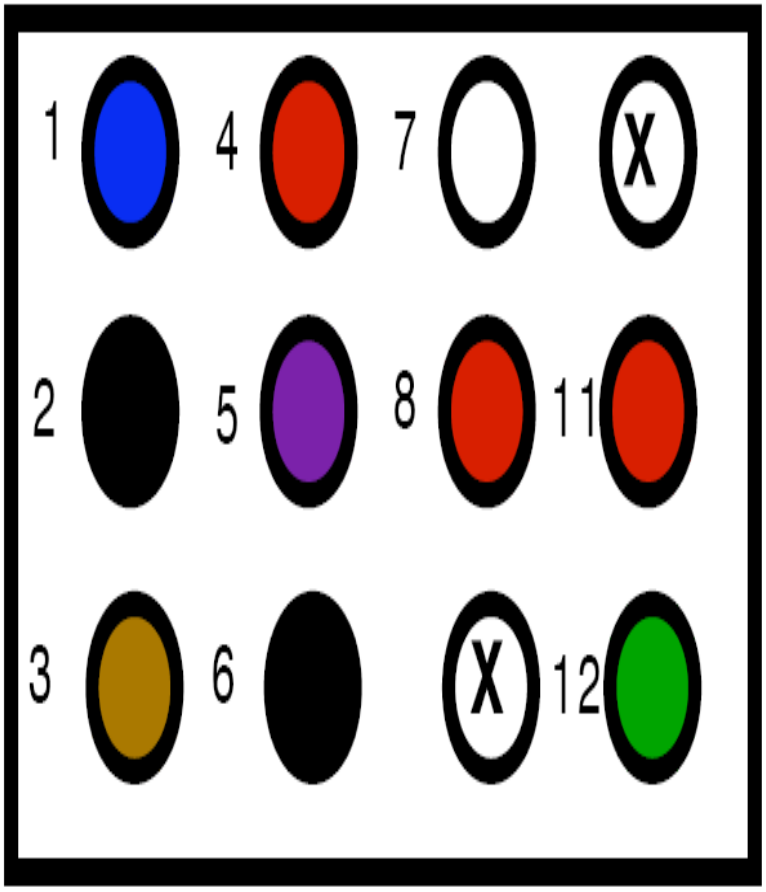
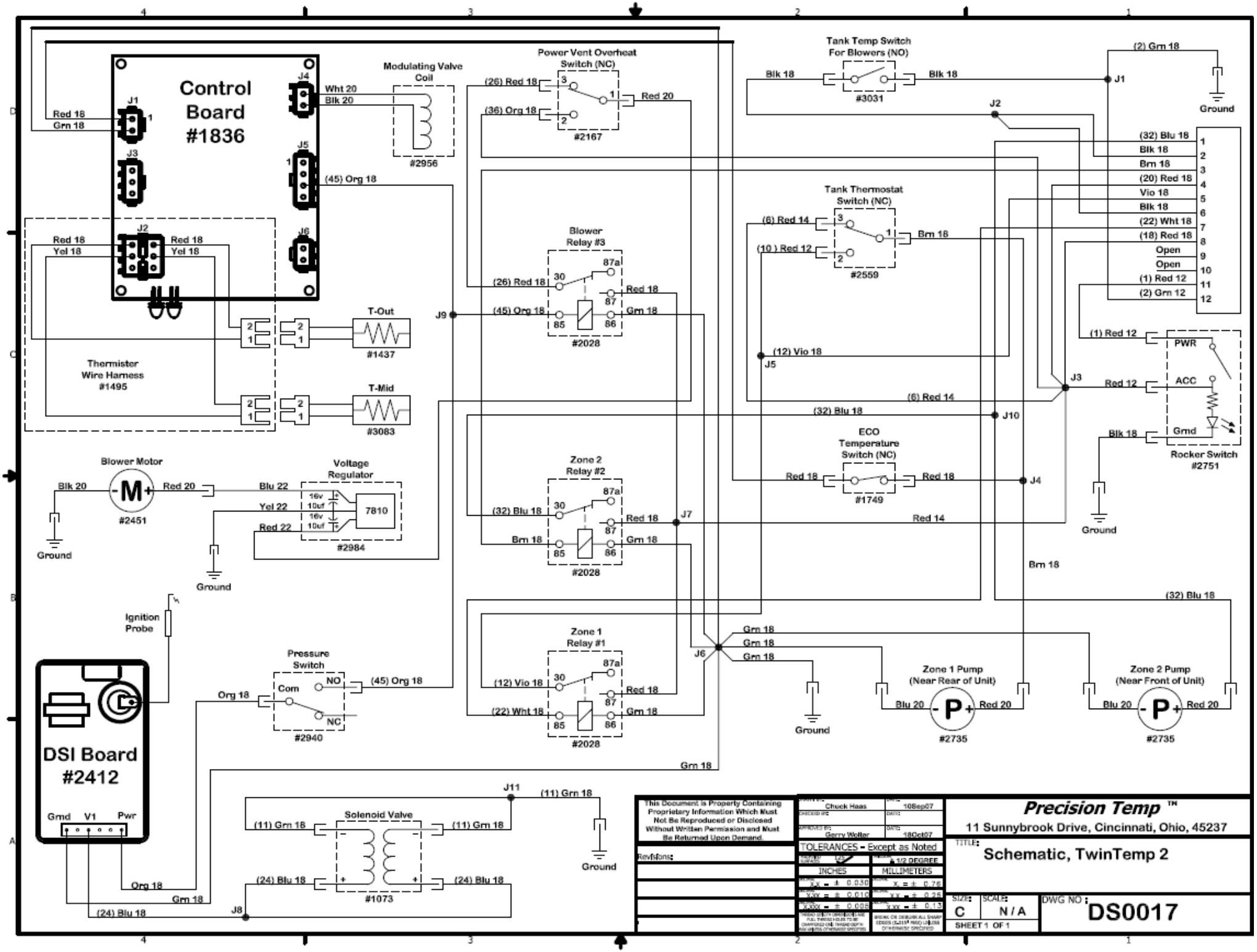
Revisions:
Chuck Haas
22Oct07
Gerry Wolter
26Oct07
TOLERANCES - Except as Noted
INCHES
MILLIMETERS
1/2 DEGREE
Precision Temp ™
11 Sunnybrook Drive, Cincinnati, Ohio, 45237
TITLE:
Schematic, TwinTemp Jr.
SIZE: C
SCALE: N/A
SHEET 1 OF 1
DWG NO: DS0018

12 Pin Connector Diagram (Viewed From Outside Case)



1. Blue Zone 2 Blower +
2. Black Zone 2 Blower -
3. Brown Zone 2 T-stat-
4. Red Zone 2 T-stat +
5. Purple Zone 1 Blower +
6. Black Zone 1 Blower -
7. White Zone 1 T-stat -
8. Red Zone 1 T-stat +
11. Red 12 VDC Supply +
12. Green 12 VDC Supply -


Control Board #1836
J1
J2
J3
J4
J5
J6
Red 18
Grn 18
Red 18
Yel 18
Red 18
Yel 18
Wht 20
Blk 20
(45) Org 18
Modulating Valve Coil
#2956
Thermister Wire Harness #1495
T-Out
#1437
T-Mid
#3083
Power Vent Overheat Switch (NC)
(26) Red 18
(36) Org 18
Red 20
#2167
Tank Temp Switch For Blowers (NO)
Blk 18
Blk 18
#3031
(2) Grn 18
Ground
J1
J2
(32) Blu 18
Blk 18
Brn 18
(20) Red 18
Vio 18
Blk 18
(22) Wht 18
(18) Red 18
Open
Open
(1) Red 12
(2) Grn 12
Tank Thermostat Switch (NC)
(6) Red 14
(10) Red 12
Brn 18
#2559
Blower Relay #3
(26) Red 18
(45) Org 18
J9
Red 18
Grn 18
#2028
(12) Vio 18
J5
J3
(6) Red 14
(32) Blu 18
J10
(1) Red 12
PWR
ACC
Gnd
Red 12
Blk 18
Rocker Switch #2751
ECO Temperature Switch (NC)
Red 18
Red 18
#1749
J4
Ground
Blower Motor
Blk 20
Red 20
#2451
Ground
Voltage Regulator
Blu 22
Yel 22
Red 22
16v
10uf
7810
#2984
Ground
Zone 2 Relay #2
(32) Blu 18
Brn 18
Red 18
Grn 18
J7
Red 14
#2028
Brn 18
(32) Blu 18
Ignition Probe
DSI Board #2412
Gnd
V1
Pwr
Org 18
Grn 18
(24) Blu 18
Pressure Switch
Com
NO
NC
Org 18
(45) Org 18
#2940
Zone 1 Relay #1
(12) Vio 18
(22) Wht 18
Red 18
Grn 18
J6
#2028
Grn 18
Grn 18
Grn 18
Ground
Zone 1 Pump (Near Rear of Unit)
Blu 20
Red 20
#2735
Zone 2 Pump (Near Front of Unit)
Blu 20
Red 20
#2735
J11
(11) Grn 18
Solenoid Valve
(11) Grn 18
(11) Grn 18
(24) Blu 18
(24) Blu 18
#1073
Ground
J8
(24) Blu 18
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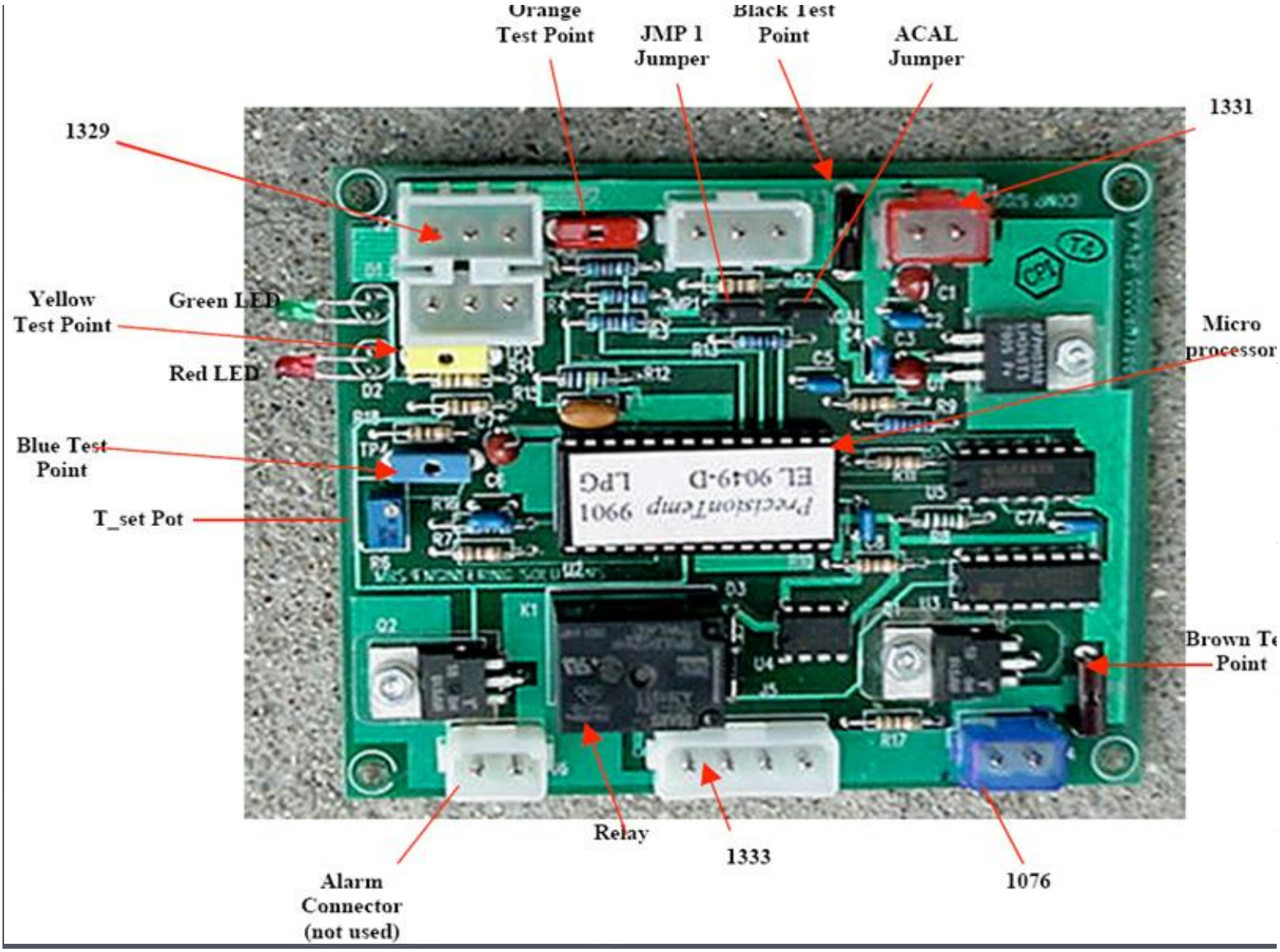
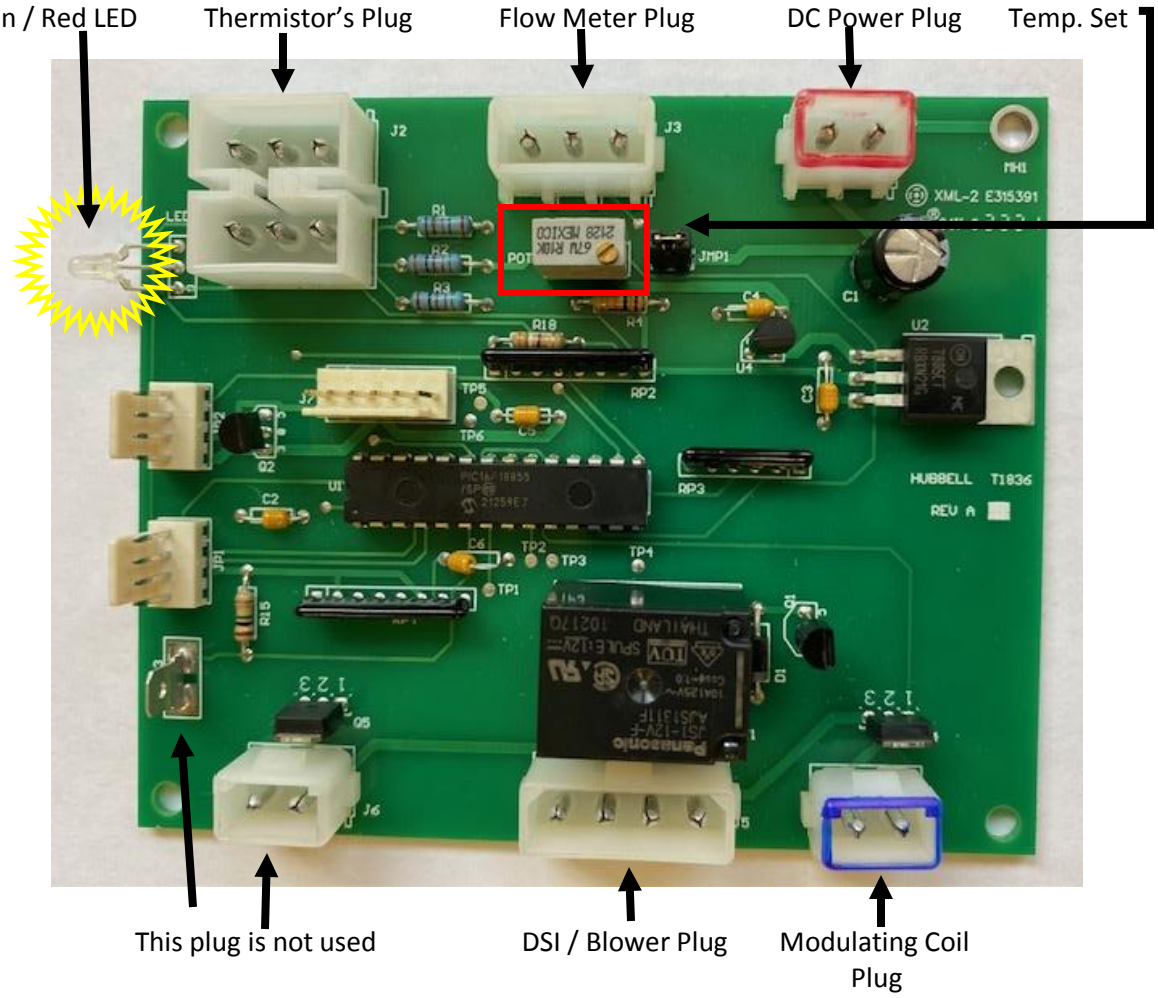
Revisions:
Chuck Haas
10Sep07
Gerry Wolter
18Oct07
TOLERANCES - Except as Noted
INCHES
MILLIMETERS
1/2 DEGREE
Precision Temp ™
11 Sunnybrook Drive, Cincinnati, Ohio, 45237
TITLE:
Schematic, TwinTemp 2
SIZE: C
SCALE: N/A
SHEET 1 OF 1
DWG NO: DS0017



1076- Modulating Gas Valve Connection
1329- Thermistor Wiring Harness Connection
1331- Power Supply Wiring Harness Connector
1333- DSI Wiring Harness Connector
Alarm- Alarm connector not used (in this application)
ACAL Jumper- Jumper for Auto-Cal
JMP 1 Jumper- Board Function Jumper (Do not change!)
Orange Test Point- Test point for T Out Thermistor
Yellow Test point- Test point for T Mid Thermistor
Blue Test Point- Test point for setting temperature
Brown Test Point- Test point for Modulating Valve
Black Test Point- Test point for ground (common)

#3743 Pre Programmed Control Board



The Vaugh Control Board can have up to 9 red error flash codes:
Red Error Flash codes 1 thru 6, refer to page 24
The Control Board input power can range from 10.5 DC Volts to 15 Volts DC
Maximum AC ripple voltage into the Control Board is 2 Volts AC

Standby mode: steady Green flash every 4 seconds with 12vdc power applied

****Water flow flash count:** 10 Green flashes between pauses = 1 gallon per minute
15 Green flashes between pauses = 1.5 gallons per minute

** Tankless heaters using flow meters

TwinTemp Service Codes

- **SB-7-RC- Lost autocal or not autocal displays alternating green and red flash**
- **SB-15, 17- T-Mid or T-Out failure displays steady red and flashing green LED**
- **Lock out after 10 ignition attempts displays red and green LED flashing together**

Note: The TwinTemp will reset or clear codes, with power applied to the control board, every 10 minutes. Hard faults or open circuits will not be erased.

TwinTemp Service Bulletin Index

Model: TwinTemp 2 & Jr.

- SB-01 Power Vent Blower Exchange Procedure
- SB-02 Pressure Switch Adjustment
- SB-03 Circuit Board Replacement
- SB-04 Pressure Switch Replacement
- SB-06 Direct Spark Ignition (DSI) Board Change
- SB-07 Auto-Calibration
- SB-08 Modulating Valve Change Procedure
- SB-09 Heat Exchanger/ Burner Change Out Procedure
- SB-10 Changing Set Temperature
- SB-11 Tempering Valve Adjustment and Replacement
- SB-12 Gas Solenoid Change Procedure
- SB-14 Igniter Cap Adjustment
- SB-15 T-mid Thermistor Change Procedure
- SB-16 T-out Thermistor Change Procedure
- SB-17 Re-Circulating Pump Change Procedure
- SB-18 Temperature Switches Replacement
- SB-19 110VAC Heating Element Replacement
- SB-20 Tank Replacement Procedure (CALL PRECISION TEMP)
- SB-21 Gas Valve Pressure Check and Adjustment
- SB-22 Thermistor Reading Procedure
- SB-23 Removing and Replacing TwinTemp Unit

Model: TwinTemp

SB-I Power Vent Blower Replacement

Other service documents required: SB-2 Pressure Switch Adjustment

- **Tools & Supplies Required-**
- 3/8” nut driver or socket
- 7/16” nut driver or socket
- Phillips Head Screw Driver
- Flat Blade Screwdriver

1. Turn off power.
2. Remove six screws from the front and top panel of unit using a Phillips screw driver.
3. Disconnect blower wire spade connectors from voltage regulator.
4. Remove hose from barb fitting.
5. Using a 3/8” socket, remove the two 10-32 lock nuts from the hood studs securing the blower.
6. Using a 7/16” socket, loosen clamps holding rubber collar on flue pipe below blower.
7. Remove the old blower and aluminum spacers. Rubber collar may have to be slipped down to remove blower.
8. Transfer barb fitting onto replacement blower housing
9. Install new blower by reversing the process. Install new aluminum spacers supplied with replacement blower.
10. Reinstall rubber collar over the blower outlet and tighten clamps.
11. Connect wiring.
12. Re-connect hose to blower barb.
13. Turn on power.
14. Test pressure switch operation using SB-2.

Model: TwinTemp

SB-2 Pressure Switch Adjustment

- **Tools & Supplies Required**:
- Phillips screw driver
- 5/32” Allen wrench

1. Remove six screws from the front and top panel of unit using Phillips screw driver.
2. Turn on the TwinTemp. Verify the burner is staying lit and not cycling on/off rapidly.
3. If burner is not staying on, use a 5/32” Allen wrench and turn the adjustment screw on the pressure switch counter-clockwise until the burner lights plus one half to one full turn.
4. Block flue. If burner stays lit with a blocked flue, turn the screw clockwise until burner goes off with flue blocked.
5. Block flue and verify burner goes out. If the burner stays lit turn screw clockwise until the flame goes out.
6. Unblock flue and verify burner ignites.
7. After adjusting the pressure switch perform several ignition attempts with the lid and front cover on case, verify proper adjustment by covering (flame goes out) and uncovering the flue pipe (flame ignites).
8. Secure access panels.

Ref: TwinTemp Component Illustration

Model: TwinTemp

SB-3 Circuit Board Replacement

Other service documents required: **SB-7** Auto-Calibration, **SB-10** Changing Set Temperature

- **Tools & Supplies Required:**
- Needle-nose pliers

1. Turn off power.
2. Disconnect all electrical connectors at the circuit board.
3. Remove the old circuit board by cutting or squeezing standoffs.
4. Install the new board with the LED's located on the lower left.
5. Reconnect all connectors to the board.
6. The set temperature should be preset to 4.45-4.60 VDC (195°F). Refer to manual if a further adjustment is needed. See SB-10.
7. Perform auto-calibration per SB-7.

Kit Parts List:
P/N 1841-56 control board and 9098-O Micro-controller chip (installed in board)

Model: TwinTemp

SB-4 Pressure Switch Replacement

- **Tools & Supplies Required:**
- Phillips screwdriver
- 11/32" socket

1. Remove access panel with Phillips screw driver.
2. Turn off gas and electric to unit.
3. Disconnect wires.
4. Disconnect rubber vacuum tube.
5. Remove lock nuts from studs using 11/32" socket or nut driver.
6. Install new switch, reversing above procedure.
7. Turn on power and propane to test switch. Verify proper adjustment of the pressure switch by covering (flame goes out) and uncovering the flue pipe (reignites). Adjust switch if necessary using service bulletin # SB-2.
8. After adjusting the pressure switch perform several ignitions with case cover on.

Ref: Pressure switch #3438, TwinTemp Component Illustration, Service bulletin SB-2

Model: TwinTemp

SB-6 Direct Spark Ignition (DSI) Board Change

- **Tools & Supplies Required:**
- 11/32” socket
- Phillips screwdriver

1. Turn off power
2. Remove front access panel.
3. Disconnect wire connector and ignition wire from DSI board.
4. Remove DSI board.
5. Install replacement.
6. Connect wire connector and ignition wire.
7. Turn on power.

Kit Parts List: #3756 Direct Spark Ignition board
Reference illustrations: Components Illustration

Model: TwinTemp

Software: 9098K and Later

SB-7 Auto Calibration Procedure

- **Tools & Supplies Required:**
- Needle nose pliers

1. Turn OFF power. Let system cool to 120° or lower before proceeding.
2. Remove access panel.
3. From the control board remove the 2-pin jumper from the terminal marked "ACAL" using pliers or fingers (see view of Control Board).
4. Turn power ON. The unit will ignite. Over the next 1 minute the computer calibrates itself. When calibration is complete the burner will automatically shut off.
5. When flame is extinguished turn OFF power.
6. Reinstall "ACAL" jumper on board.
7. Turn power ON, check for normal operation. Flashing green light.

Figures- 200-14 View of heater control board

Model: TwinTemp

SB-8 Modulating valve replacement

- **Tools required:**
- 13/16” open end wrench
- 12” adjustable wrench.

When performing the following repair, always back up mating plumbing fitting with a wrench to avoid damage to gas train. Do Not allow pipe dope to get into any gas train components. NEVER use pipe dope on a flare fitting.

1. Turn off power.
2. Turn gas supply off.
3. Disconnect the blue & white wires connected to the gas solenoid valve.
4. Unplug modulating valve wire connector from the control board.
5. Separate the gas union located between the burner and modulating gas valve.
6. Remove flare nut from gas line inlet fitting with 13/16” wrench.
7. Remove the gas valve assembly from cabinet.
8. Remove modulating valve from gas solenoid valve.
9. Install new modulating valve in reverse order using approved pipe sealant; insure sealant does not get into the modulating valve tube. Observe gas flow direction arrow when re-assembling.
10. Turn on gas supply. Inspect for leaks at all fittings disconnected during repair.
11. An auto-calibration must be performed after replacing the modulating valve. (See bulletin # SB-7)
12. Check all gas fittings and connections with a leak test solution. Disable ignition, turn on power and check for leaks. Repair if needed.

► **Note: It may take several attempts at ignition to purge air out of the refitted gas line.**

Figures- 200-14 Control Board illustration and Auto Calibration bulletin #SB-7

Model: TwinTemp
SB-9 Heat Exchanger/ Burner Assembly Replacement

► Contact PrecisionTemp Service Department
► 513-641-4446 or 800-934-9690

Model: TwinTemp

SB-10 Changing Set Temperature

- Tools & Supplies Required-
- Small flat blade screwdriver
- Digital Voltmeter

The temperature on the TwinTemp Junior has been factory set to approximately 185° antifreeze temperature. It is not recommended that you change this setting. Doing so could result in inadequate performance causing the pump to run continuously. If it is necessary to change the setting please follow the instructions below.

1. Open access door. Locate the Heater Control Board (see Heater Control Board illustration). The adjustment screw is located on a small blue block at the left side of the board.
2. A small bald screwdriver should be used. To decrease temperature, turn screw counterclockwise.
3. Use a voltmeter, placing the black lead into the black test point and the red leas into the blue test point. Adjust the screw to until voltage reads 4.40 VDC – 4.60 VDC at the blue test. Normal operating temperature.
4. Operate system in winter mode with coach interior thermostat off. There should be no sign of boiling. The pump should shut down when the tank thermostat switch reaches set temperature, 185 deg.

   See Control Board illustration

Model: TwinTemp

SB-11 Tempering Valve Adjustment and Replacement

- **Tools & Supplies Required-**
- Phillips screwdriver

The tempering valve is set to approximately 120° from PrecisionTemp. It is not advisable to set it to a higher temperature, since scalding may result. If adjustment is needed, proceed as followed.

1. Turn on TwinTemp Junior until tank is up to operating temperature.
2. Remove front cover & locate tempering valve (see TwinTemp Junior Components Illustration).
3. To increase hot water output temperature, turn gray knob counter-clockwise. Some models require a screw loosened in the handle. To decrease the temperature turn gray knob clockwise. Adjustments should be made in ¼ turn increments.
4. Turn on hot water and tap and let run for at least 45-90 seconds to test outlet temperature and re-adjust if necessary.

To replace the valve, proceed as follows. Newer models will have quick disconnect fittings replacing nuts and gaskets.

1. Remove front cover.
2. Turn off water pressure, depressurize system and let cool.
3. Using the Channel Locks completely loosen the three large nuts on the 3 ports of the tempering valve or release the quick disconnect fittings from the pipes. .
4. Slide old tempering valve off of the mating flanges.
5. Clean corrosion and old gaskets material from flanges.
6. Slide new valve into place, taking care to install in proper orientation (Hot inlet up).
7. Carefully slide new gaskets between the valve housing and mating flanges or push quick disconnect fittings onto copper tubes.
8. Tighten the nuts with the Channel Locks.
9. Turn on water pressure and check for leaks.
10. Adjust temperature as described above.

Kits Parts List & References- #3128- Tempering Valve with shark bite fittings 100°-145°F, TwinTemp Components Illustration

Model: TwinTemp

SB-12 Gas Valve Replacement

Tools Required: 13/16" open end wrench
12" adjustable wrench

When performing the following, always back up mating plumbing fitting with a wrench to avoid damage to the gas train. Be sure not to allow any pipe dope to get into any components of the gas train. Never use pipe dope on a flare fitting.

1. Turn power off to unit.
2. Disconnect the blue & white wires connected to the gas valve.
3. Turn the gas supply to the unit off.
4. Unplug the coil wire from the control board.
5. Remove the flare nut from the inlet pipe using the 13/16" wrench
6. Using two wrenches, separate the gas line union going to the gas valve assembly.
7. Remove gas valve assembly from the unit and remove the modulating valve from the gas valve.
8. Install the new valve in reverse order observing the gas direction arrow when reassembling. Use approved pipe sealant and avoid getting any in the modulating valve.
9. Turn on the gas.

Be sure to check all gas fittings with a leak test solution before energizing. After energizing, check for leaks at the union.

Note: It may take several attempts at ignition to purge all the air out of the refitted gas line

Model: TwinTemp
SB-14 Igniter Adjustment

- **Tools & Supplies Required:**
- Phillips screwdriver
- Small flashlight
- NOTE: Unless you're replacing the spark probe this procedure should not be necessary.

1. Remove access panel from TwinTemp
2. Turn power, water, and gas off.
3. Remove two 11/32" nuts at base of electronic panel. Lift panel to clear studs and reposition for access to spark probe.
4. Remove ignition cable from bottom of igniter probe. Pull on connector, not the wire.
5. Loosen screw on igniter clamp enough to allow the probe to be removed
6. Access through the viewing hole and remove by pulling the probe upward using needle nose pliers and out through the viewing hole.
7. Through the viewing hole inspect igniter probe position over burner.
8. Manually turn probe position so the rod tip is directly centered over second burner element allowing with a 1/8" gap from rod tip to burner. The notches in the porcelain body of the spark probe align with a "V" notched section of the burner assembly for proper adjustment.
9. Hold probe in set position to insure proper 1/8" gap and tighten screw, do not over tighten.
10. Reinstall Ignition Cable.
11. Secure electronic panel using two 11/32" nuts.
12. Turn on **power only**. When unit tries to ignite, inspect for spark through viewing hole. Verify gap and spark during ignition attempts. Readjust if needed.
13. Reinstall access panel, turn water and gas supply on.

Model: TwinTemp
SB-15 T-mid Thermistor Change Procedure

- **Tools & Supplies Required:**
- 9/16” open end wrench
- Adjustable wrench

1. Turn power off.
2. Remove old thermistor. CAUTION: Use two wrenches on the hex (9/16”) of the thermistor and another wrench on the hex located on the copper heat exchanger fitting. Failure to do so may seriously damage the heat exchanger.
3. Slide the nut and the new ferrule over end of the thermistor probe. The tapered end of the ferrule toward tip of probe or toward heat exchanger. .
4. Insert the thermistor tip into the heat exchanger until the heat shrink (black) on the thermistor is approximately ¼” from brass fitting and tighten the fitting finger-tight. . Make sure the probe is centered in the heat exchanger opening before tightening. The final tightening should be done using two wrenches as described in step 1.
5. Check the resistance across the thermistor leads. Under room temperature conditions the value should be between 700-1100 OHMS. A further check can be done by comparing the resistance to the other thermistor. If both thermistors have been exposed to the same temperature they should be within +/- 50 OHMS.
6. Secure thermistor wires to harness using supplied wire ties.
7. Turn power on.

Kits Parts List: #3207 T-mid thermistor including ferrule

Model: TwinTemp
SB-16 T-out Thermistor Change Procedure

- **Tools & Supplies Required:**
- Scissors (or other cutting tool)

1. Turn power off.
2. Remove the wire ties, metal tape, and old thermistor from copper tubing. Clean off the old heat sink compound and wiped clean.
3. Place a pea size amount of heat sink compound on the pipe where the thermistor will be located.
4. Place the thermistor into the heat sink with the wire leads pointing down along the tube.
5. Wrap metal tape around the tube and thermistor. Lightly compress tape to conform around thermistor
6. One wire tie goes around the wires as a strain relief approximately ½" from the thermistor tip. **Caution: Do not place the tie wrap over the thermistor tip. This will permanently damage thermistor.** Secure thermistor wires together with supplied wire ties.
7. Turn power on.

Kits Parts List: #1437 T-out thermistor

Model: TwinTemp

SB-17- Circulating Pumps

- **Tools & Supplies Required:**
- Phillips screwdriver
- Side cutters
- 3/8" socket
- Needle nose pliers

1. Turn power and gas off and let system cool below 100 deg.
2. Zone 2 pump must be removed to access Zone 1 pump. Zone 2 pump is located closest to the access opening.
3. Depressurize tank by carefully opening the radiator cap located on the top of the tank. Open tank drain plug to empty tank.
4. Remove front and top access panels.
5. Remove exhaust blower assembly from exhaust hood.
6. Disconnect pump wires from wiring harness.
7. Using the side cutters carefully cut banded clamps on the suction and discharge side of the pump.
8. Using a 3/8" socket remove the 2 nuts from pump bracket.
9. Carefully remove pump from unit.
10. Reverse procedure to re-install using new hose clamps.
11. **To remove Zone 1 pump the Zone 2 pump must be removed first.**
12. Using the same procedure used in removing the Zone 2 pump, disconnect and remove Zone 1 pump.
13. Reverse procedure to re-install.
14. Reinstall tank drain plug.
15. Top off or fill tank with fluid. The tank holds two gallons of 50/50 antifreeze distilled water mix. Additional fluid may be requires to completely fill the hydronic system.
16. Position Summer/Winter valve in the **Winter** position. Turn power and zone one/two thermostats on (**Do not turn on gas at this time)** to activate the pumps and purge air from the hydronic system plumbing. Run pumps for a minimum of 20-30 minutes.
17. Check for fluid leaks and top off fluid. Fill overflow reservoir to fill line.
18. Turn on gas, allow system to heat up and reach operating temperature.

Note: If a banging sound is heard during ignition an air pocket is trapped in the heat exchanger. Turn off gas and continue to purge air from the system for an additional 15-20 minutes.

Model: TwinTemp
SB-19 Electric Heating Element

- **Tools & Supplies Required:**
- 1 1/2” deep well socket
- 11/32” socket

1. Turn off propane.
2. Disconnect all power from TwinTemp, de-pressurize tank and drain anti-freeze.
3. Remove access covers from the TwinTemp unit.
4. Disconnect gas line from side of TwinTemp then remove Modulating gas valve/Maxitrol gas solenoid assembly.
5. Remove 11/32” nut from the heating element cover.
6. Slide cover to left.
7. Disconnect wires from heating element.
8. Using a 1 1/2” deep socket turn element counter-clockwise and remove.
9. Reverse procedure for installation being sure to install new gasket.
10. Top of fluid level in tank and purge all air from the system.
11. Run the TwinTemp-2/ Junior for 15-25 minutes in **Winter** position to bleed trapped air pockets from plumbing.
12. Turn on gas, allow system to heat up and reach operating temperature.

Note: If a banging sound is heard during ignition an air pocket is trapped in the heat exchanger. Turn off gas and continue to purge air from the system for an additional 15-20 minutes.

SB-20 Tank Replacement

Turn off AC & DC electric and propane tank. Turn off water pump and disconnect shore water line. Remove cabinet access door and top panel. Drain fluid from hydronic plumbing lines and tank. Disconnect all hydronic antifreeze and water lines from TwinTemp quick disconnect fittings. Disconnect 115vAC cord and unplug 12pin DC connector from TwinTemp. Disconnect propane line.

Remove exhaust pipe. Remove screws from the hold down brackets or remove nut from rubber mounting feet stud (4). Remove TwinTemp cabinet from coach.

Remove all fittings from plumbing manifold side of TwinTemp. Remove Mixing valve from cold and hot water copper pipe by releasing quick disconnects (copper pipes are permanently attached to tank). Remove hose from zone one supply connection. Remove Electrical element cover and unplug 110vAC wires from socket. Remove screws from cabinet base and lift off cabinet shroud. Disconnect hose from pump pickup on tank. Unplug tank switch connections. Remove the three nuts holding tank to cabinet base, lift and remove tank.

Reverse procedure to reassemble and refer to service manual for installation procedure.

NOTE: IF YOUR TWINTEMP WAS BUILT PRIOR TO JUNE 2009 MODIFICATIONS TO THE BASE OF THE CABINET FOR THE TANK DRAIN AND PRV LOCATION ARE NEEDED. REFER TO THE ATTACHED MOUNTING TEMPLATE DIAGRAM FOR TANK DRAIN HOLE AND CABINET PICTURE OF PRV LOCATION.

Model: TwinTemp
SB-21 Gas Pressure Check and Adjustment

- **Tools & Supplies Required:**
- Small flat blade screwdriver
- 3/16 Allen wrench, Manometer
- 1/8" NPT fitting from manometer hose
- **Dynamic gas supply pressure (to TwinTemp regulator) minimum of 11.0 WCI, Manifold gas pressure should between 1.0 – 9.5 WCI.**

1. Turn off power to TwinTemp unit.
2. To test manifold gas pressure, use a 5/16" allen wrench or 3/8" open end wrench to remove test port plug. Install tube from manometer using a 3/8" npt onto test port. Be sure it is a tight fit and doesn't leak.
3. Turn power on. The TwinTemp unit will start the ignition sequence and the burners will ignite.
4. Gas pressure should read between 1.0 WCI (at low burn) to 9.5 WCI (at max burn).
5. Placing a magnet between the mod valve coil and the combination gas valve will fully open the modulating valve. Maximum gas pressure should read 9 - 9.5 WCI.
6. When testing is completed turn off power and close valve at the test port.

- **To test dynamic gas pressure at the Maxi Control valve**:

1. Turn off power to TwinTemp unit
2. To test gas pressures at the Maxi Control gas valve remove the hex plug from the valve. Insert a 1/8" NPT fitting in place of the plug and connect hose from the manometer.
3. Turn on power to TwinTemp unit.
4. The TwinTemp unit will start the ignition sequence and the burners will ignite.
5. Gas pressure should read approximately 11 WCI with the burner on.
6. If an adjustment is needed to reach 11 WCI adjust the propane tank regulator or contact a certified technician or propane supplier.
7. When testing is complete turn off power and reinstall plug and screw in Maxi Control Valve.

Model: TwinTemp
SB-22 Thermistor Reading Procedure

The precise temperature of the coolant in the heat exchanger can be determined by reading thermistor DC voltages at the colored test points on the green control board (SEE ELECTRONIC CONTROL BOARD) with a multi-meter and refer to the "Thermistor Calibration" table.

The **black multi-meter probe** should go into the **black test point** and the red probe should go into the following test points:

- **Orange Test Point = Outlet temperature (T-out)**
- **Yellow Test Point = Mid-HX temperature (T-mid)**

Power must be on to the TwinTemp to take readings, but the burner does not necessarily have to be activated. Refer to the DC voltage reading in the "volts" column on the "Thermistor Calibration" chart. The corresponding temperature is the column to the left of the volt reading.

NOTE: Voltage on the T-Mid thermistor (Yellow test point), should be between **.65 – 70 VDC when burner goes off** and between **.71 - .85 VDC when burner re-ignites**.

If the voltage plunges much below the off reading when the burner goes off, check the anti- freeze level and the zone 1 pump performance for any obstruction in the zone 1 anti-freeze system. Possible cause is inadequate circulation through the burner heat exchanger.

If the re-ignite voltage is much higher that the above voltages, check that T-set voltage on the blue test point is between 4.40 - 4.55 volts.

Model: TwinTemp

SB-23 Removing & Replacing TwinTemp Junior Unit

1. Turn off water and gas supply.
2. Drain TwinTemp unit by removing tank drain plug or disconnect "zone one supply" plumbing connection and add a short length of pipe. Turn on 12 VDC power to pump anti-freeze from tank.
3. Once system is empty disconnect remaining gas, water and fluid lines.
4. Remove the exhaust pipe from under the coach.
5. Remove the 4 mounting nuts and washers or hold down brackets from the coach floor.
6. Carefully lift and remove the TwinTemp unit from the coach.
7. Reverse procedure to install TwinTemp Junior Unit. Refer to installation instructions.
8. Top off all fluids.
9. Run system to purge air from all lines and recheck fluid until tank is full.
10. Check anti-freeze level and top off if needed.
11. Start unit and test using the "Start-up and Testing" Document.

Part #	TwinTemp Part List 8/2009
1411	Spark Ignition Probe
1073	TwinTemp Gas Solenoid LPG
1076	3/8" LPG Modulating Gas Valve Assembly,
1103	Modulating Valve Coil
3309	Wire, Ignition Cable
1437	T-out Thermistor (red wires)
1495	Thermistor Wiring Harness
1749	Bimetal ECO 1/8" NPT @ 220°F +/- 7 auto reset at 170°F
1829	DSI Wiring Harness
2028	Relay, Omron
2123	Tempering valve w/flanges (all models prior to 3/2007)
2162	200 deg. Bimetal tank Thermostat (Electric Elements)
2248	Electric Heating Element
2451	Power Vent Blower Motor Assy. (obsolete)
2464	15 Amp Circuit Breaker
2558	Room Thermostat / wall mount
2559	190 deg. Bimetal tank Thermostat (used 2004 – 5/2009)
2582	Bleeder Valve (Obsolete)
2735	Magnetic Drive Pump Brushless 12 VDC
2737	Summer/Winter ball valve
2748	1/2 Heater Hose Elbow
2751	On/Off switch TT2 & Jr.
2838	Low profile secondary liquid to air heat exchangers w/fans
3499	Tank assembly for the TwinTemp-2 (SS tank)
3500	Tank assembly for the TwinTemp-2 w/engine assy. (SS tank)
3497	Tank Assembly, Twin Temp Jr. (SS tank)
3498	Tank Assembly, Twin Temp Jr. w/engine assist (SS tank)
2932	Heat Exchanger (Specify 'G', 'F' or 'C' model)
2940	Pressure Switch, .1 WCI Vacuum (normally open, 12v DC)
2942	Complete wire harness for TT-2
2950	220 deg. Switch, High Limit, Manual Reset (used w/Electric element)
2984	10vDC blower voltage regulator (Obsolete)
3012	Complete wire harness for TT-Junior
3017	Burner Assembly
3033	7 psi Radiator Cap
3121	Liquid to air heat exchanger with one fan
3122	Liquid to air heat exchanger with one fan and thermostat
3128	Tempering Valve (shark bite fittings)
3158	DSI Board
3207	Assembly T-Mid (Yellow wire)
3227	Pressure Relief Valve 3/4 npt set @ 30 psi
3333	Exhaust power vent blower assembly
3471	185 deg.ECO Tank Thermostat and electric element switch (6/2012)
3433	12 to18 DC voltage regulator for p/n 3333 exhaust blower
9098	Microprocessor software chip
1841-56	Control Board & Microprocessor for TwinTemp

The *TwinTemp* systems are certified as a power vented automatic instantaneous water heater/ furnace, designed to be installed in recreational vehicles or mobile homes. This appliance must be installed in accordance with local codes or in the absence of local codes the following applies:

- **Manufactured Home: Title 23 CFR, Part 3280**
- **Recreational Vehicle: ANSI A119.2/ NFPA 501-C-1987**

Every *TwinTemp* is inspected and tested before it leaves the factory. In order for this unit to operate safely and effectively, all installation instructions must be followed. Failure to comply with all installation and operating instructions will void the warranty. *PrecisionTemp, Inc.* will not be responsible for anything that is a result of non-compliance.

FOR YOUR SAFETY
WHAT TO DO IF YOU SMELL GAS

- Extinguish any open flame.
- Shut off the gas supply at the container or source.
- Do not touch any electrical switch or use any phone or radio in the vehicle.
- Do not start the vehicles engine or electrical generator.
- Contact the nearest gas supplies or qualified service technician for repairs.
- If you cannot reach a gas supplier or qualified service technician, contact the nearest fire department.
- Do no turn on the gas supply until the leak(s) has been repaired.

FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

WARNING!

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Refer to the installation instructions and/ or operating instructions provided with this appliance. A qualified installation service agency or the gas supplier must perform installation and service.

Keep this book with the *TwinTemp* at all times. It contains instructions regarding installation, operation and maintenance of your *TwinTemp*. If you need further information, contact *PrecisionTemp Inc*. 800-934-9690

Installation Instructions

Please read these instructions thoroughly before starting your installation

Note: These instructions apply to both models. The *TwinTemp-2* is a dual zone heating unit whereas the *Junior* is a single zone. Both also provide continuous hot water. Installation is identical except for the additional zone, optional engine assist and *HotTap* on the *TwinTemp-2*.

The *TwinTemp* is designed to be installed in a ventilated compartment of the vehicle such as a lower luggage compartment or "basement" and vented through the bottom of that compartment to the outside. The heater must not be mounted in the living area of the vehicle or in a way that receives its combustion air from the living are or flues into the living area of the vehicle. Doing so will void the warranty and cause the heater to malfunction and could cause damage, injury or death.

Please read these instructions before making any modification to the construction of your RV.

Installation Overview

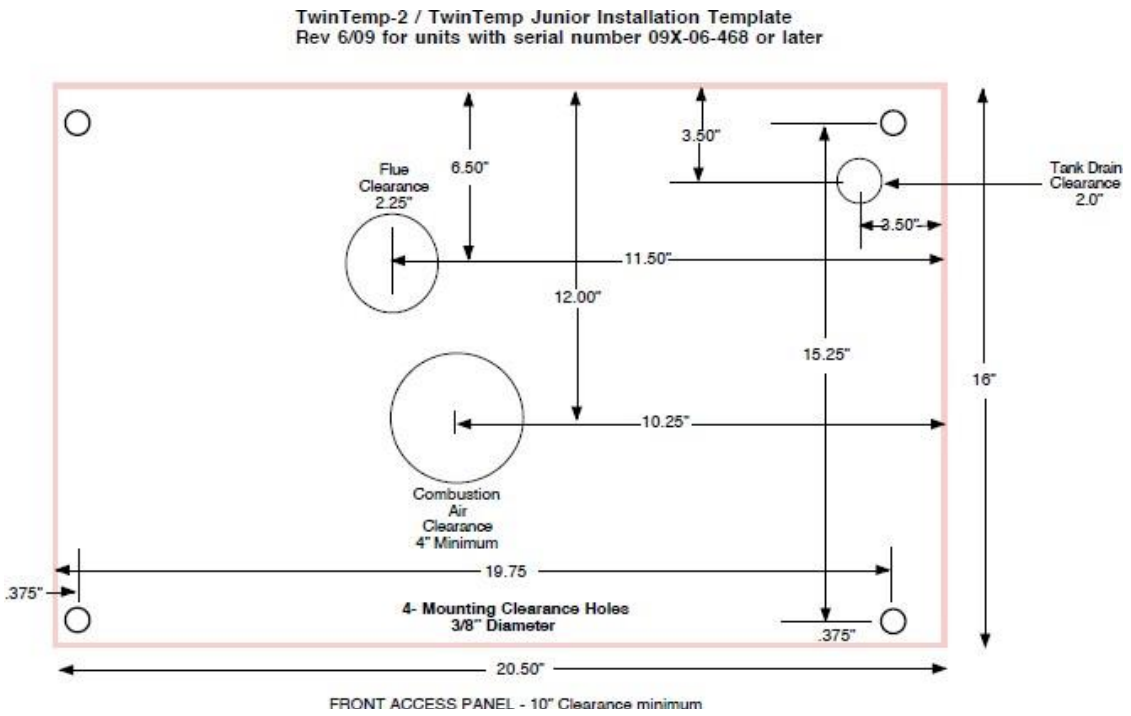
The installation of the *TwinTemp* is done in three steps:

- Installation of main heating unit and exhaust system
- Installation of blower heating units and thermostats
- Routing wiring and high temperature tubing from main heating unit to blowers

Installation of main heating unit and expansion tank

When selecting an installation location, please note the following installation requirements:

- Surface should be able to support at least 100 pounds
- The front panel of the heater should be accessible for inspections or servicing
- The vent must be able to be installed through the floor without interference with frame members or other equipment
- The compartment where the heater is installed must not be air tight from the outside. There should be at least 12 square inches of fresh air available from the outside, NOT FROM THE LVING AREA OF THE VEHICLE. **Caution:** the combustion air cannot be supplied from any compartment which may contain combustible gases (i.e. battery gases, gasoline fumes, propane fumes, etc.)
- Water, gas and electric line should be able to run to the installation.
- Installation must be done to allow at least 10" access to the front and at least 8" access above the unit. There must be access to all plumbing connections on the right side of the heater if they are not made prior to securing the installation into place.
- There should be at least 1" clearance in the back. At least 8" of top clearance in recommended to facilitate startup.
- It is recommended to install the heater as close to the gas supply as practical to minimize the length of the gas line.



Note the locations of the flue cut-out and mounting holes. Be sure they will not interfere with any framing members, wiring or equipment under the coach. Be sure to observe proper clearances around the unit. Drill the four 3/8th" mounting holes. Next cut the 2.25 minimum hole for the flue and the 4: minimum hole for the combustion air. Be sure they are located where they cannot be covered or blocked.

NOTE: If the *TwinTemp* cannot be mounted with sufficient access to the connection side of the unit to make connections after installation, the se connections must be made prior to mounting the unit. See sections regarding Plumbing Hook-ups, Wiring Hook-ups and Gas Line Hook-up.

Screw the short end of the supplied vibration absorbing mounting studs into the bottom of *TwinTemp*. These studs are used to secure the *TwinTemp* to a floor 1' thick or less. (Note: See below if the floor is more than 1" thick.) If the installation is located in a position which allows access to all hookups after installation, the *TwinTemp* can now be installed and secured. Lift the *TwinTemp* into position taking care not to damage the flue transition pipe, protruding from the bottom. Align the flue transition pipe with the flue cutout and all of the mounting studs with the 3/8" mounting holes. Drop the unit into place and secure from below with the flat washers and lock nuts. Following the instructions on the package, install the expansion tank in the same compartment. Attach and clamp the clear tube to the bottom barb on the tank and the barb fitting to the radiator cap.

If the floor is more than 1" thick the *TwinTemp* must be secured with the proper length ¼"-20 bolts, but the vibration absorbing pads must still be used under the unit.

- Using a hack saw, cut off the treaded studs from the vibration absorbing pads and place pads on the floor near the mount holes prior to placing the unit.
- Set the unit in place on the vibration absorbing pads, align with the mounting holes and run the bolts from underneath to secure into place.

Exhaust Pipe Installation:

- After the *TwinTemp* unit is secured into place, the exhaust (not supplied) is installed as follows:
- Fit a 2"od x 2"id aluminized steel elbow pipe onto the flue tailpiece of the *TwinTemp*.
  NOTE: A 2"od x 2"id aluminized transition pipe may be needed if the elbow doesn't reach the flue pipe.
- Locate a 2"od x 2"id aluminized pipe out from under the coach while positioning it so that it points about 30˚ to the rear of the coach.
- Allowing for about 2" to protrude from under the coach, mark the length, remove and cut to size.
- Screw the cut pipe to the elbow, re-position and install to the *TwinTemp* flue tailpiece.
- Screw the assembly into place using a proper exhaust bracket to support the pipe to the bottom of the coach.
  NOTE: The above procedure is a typical exhaust installation contact *PrecisionTemp* for questions concerning this installation. Exhaust pipes can be purchase at all major auto parts stores.

Interior Heat Exchanger (Blower) and Room Thermostat Mounting Locations

Up to four blowers per zone, or a total of eight blowers, can be installed in the *TwinTemp-2* system. Up to six blowers can be installed in the *TwinTemp Junior* system. In a two zone system, the living and kitchen areas are general put on one zone and the bedroom and bath area on the other zone. Each zone is controlled by its own room thermostat. The mounting locations for the thermostats should be selected carefully to ensure even heat distribution throughout each heating zone. Do not mount the thermostat where it can be affected by drafts, dead spots behind doors, radiant heat from the sun, appliances or unheated areas such as an outside wall behind thermostat.

Locate the heat exchangers so that even heat distribution will be felt throughout the interior. For slide outs, it is recommended to place blower(s) on the opposite side of the coach, pointing towards the slide out. Sufficient return air must be supplied to each interior blower. (See Illustration 2) Mounting blowers without sufficient ventilation will severely reduce their overall heating performance. In order to provide sufficient ventilation, the return air registers must be the same size or larger that the outlet registers. Return air must be supplied from the interior heating zones. Allow for access to all heat exchangers for tubing hook-up and for potential servicing and cleaning.

To mount the blowers once all permanent mounting locations have been selected, cut out the opening for each outlet air and return air register and screw down each heat exchanger permanently into place.

- Cut an opening for each heat exchanger and cold air return.
- Mount each heat exchanger permanently into place.
- Install the hot air outlet and cold air returns.

There must be complete access to the heat exchangers until the plumbing and electrical hook-ups have been made.

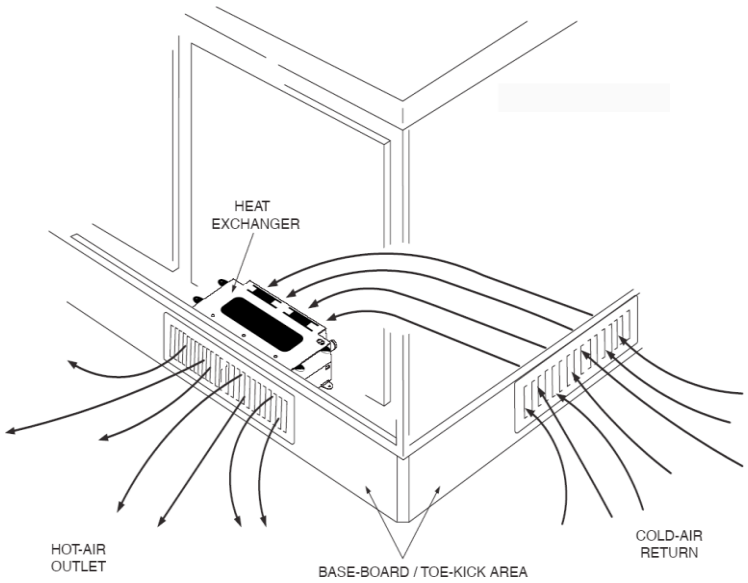


Illustration 2

Mounting locations for the water, gray and black tank heat exchanger

A tank blower should be strategically placed in the domestic water plumbing area to prevent freezing of the plumbing lines and storage tanks. Position the tank heater in the storage tank/ plumbing bay area so even heat distribution will be achieved. **NOTE:** The optional heat exchanger with the built-in thermostat should be used. This blower should be installed in zone one loop.

For best heating results, place the exchanger as close to the floor of the plumbing bay as possible (heat will naturally rise). Sufficient ventilation (cold air return) must be supplied. Return air should be supplied from the same compartment.

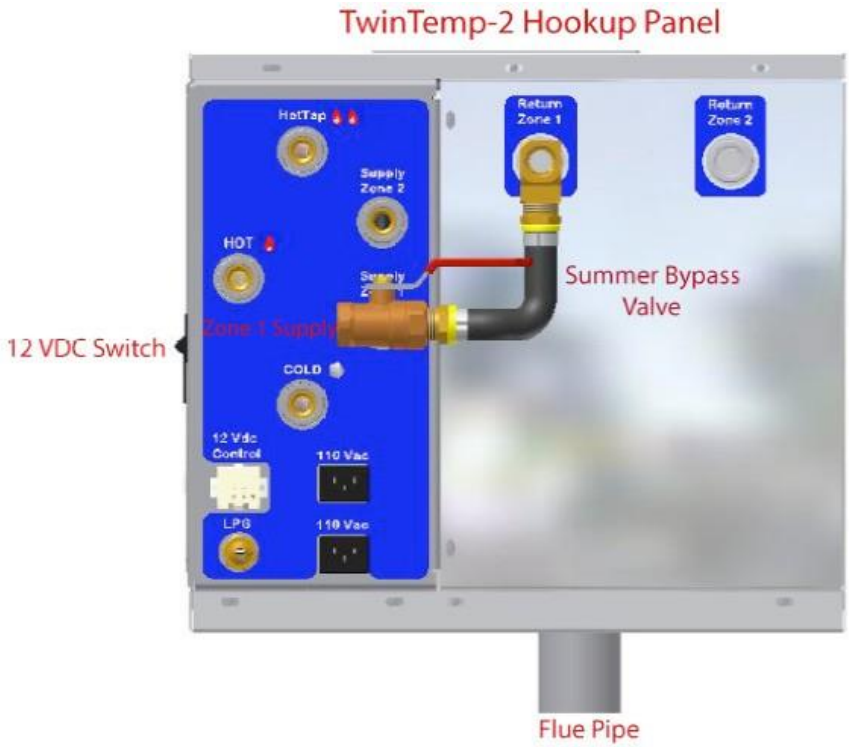
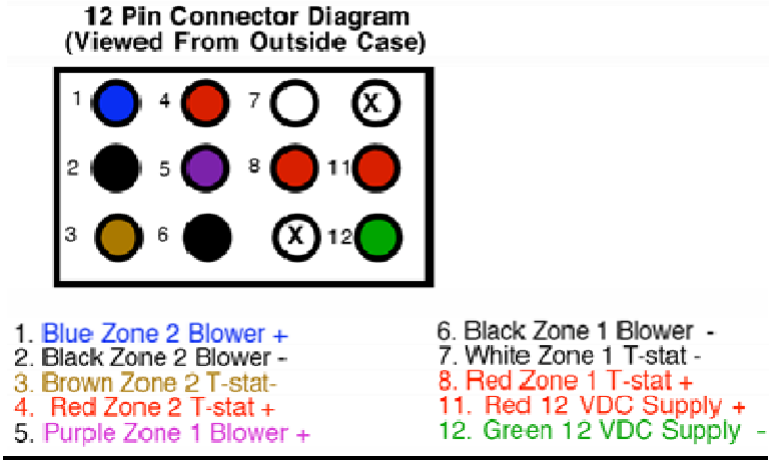


Illustration 3

<u>Connecting Gas Supply</u>

The gas line should be of approved type and size with a 3/8" female flare nut. If the gas line is very long or has numerous bends, it should not be less than 3/8" ID or performance of the *TwinTemp* will suffer. The maximum inlet gas pressure must not exceed 13 water column inches and no less than 10 WCI. This gas line should be one uninterrupted line from the LPG tank regulator with no tees or connections within the coach. Some standards may require a manual gas shut of valve in the gas line external to the *TwinTemp*. **<u>The TwinTemp must be isolated from the gas supply system during any pressure testing of</u> <u>that system at test pressures equal to it or in excess of ½ PSIG.</u>**

The flare nut on the gas line should be hand connected to the flare connection on the *TwinTemp* to assure it's not cross-threaded. **No pipe dope should be used on this flare connection.** Tighten with a wrench. This connection should be tested for leaks prior to start up, using soapy water or liquid leak test solution. **Do not use a flame to test for leaks.**



Wiring

The *TwinTemp* is pre-wired internally with a 12 pin connector for all of the 12 VDC hookups (see Illustration 4). A mating pig tail is supplied to make all field connections. Observe the illustration color codes, the wring sizes and procedure described below. The 12 VDC *TwinTemp* power switch should remain OFF during installation.

Note: Illustration 4 shows the *TwinTemp-2* connector. The Zone 2 terminals are not used for the *Junior*. **All connections should be secure and not in a wet location.**

12 Volt DC Power Hook-up

This is the main power harness that should be switched at a panel inside the coach on a 15 amp circuit. The wire must not be smaller than 12 gauge. Red is positive (+) and black (or green) is negative (-). Under-sizing this wire will result in the *TwinTemp* malfunctioning.

Zone 1 Thermostat and Blower Harness

Run 18 gauge wires to the Zone 1 room thermostat, observing the wire colors in the illustration to assure continuity of operation. 18 gauge minimum wires should be wired parallel to each blower in the Zone 1 circuit. The black wire is negative (-) and should be connected to the black wire on the blowers and the colored wire is positive and connected to the red wire on the blowers. Again, observe all wire colors in the illustration.

Zone 2 Thermostat and Blower Harness (*TwinTemp-2 only*)

As in Zone 1, run 18 gauge wires, observing wiring colors of the illustration and be sure both thermostats are turned to their lowest setting during installation. Observe polarity of thermostat.

110 Volt AC Electric Elements Cords (Single Element/ Circuit on Junior)

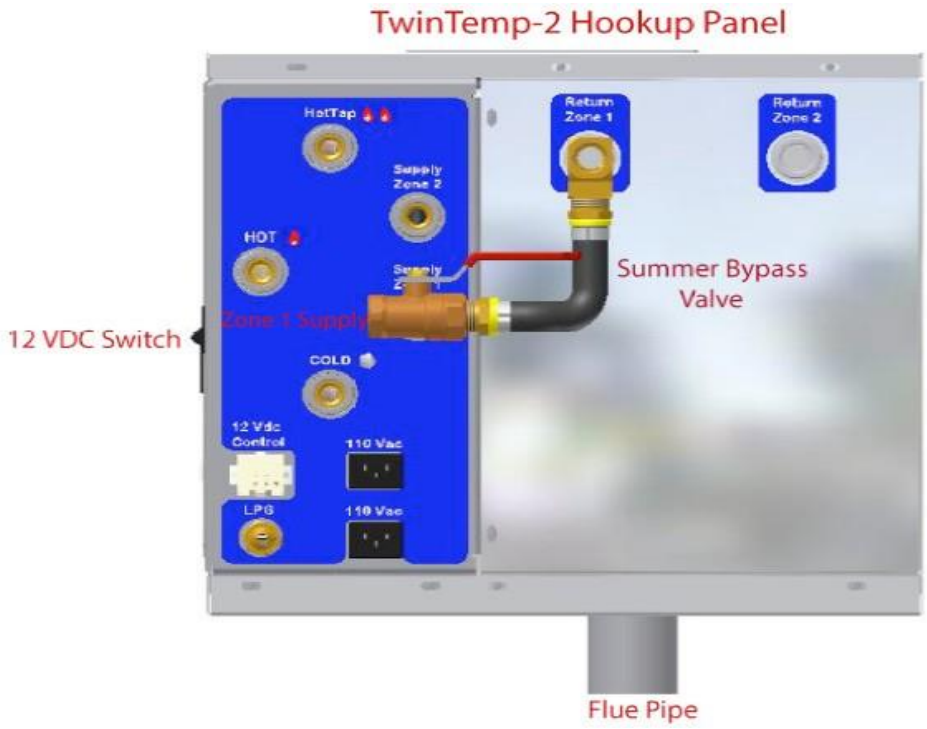
These wires are provided with a 15 am "SJO" plug that is to be plugged into a switched outlet "handy box". These should be dedicated 15 amp circuits that are switched at a panel inside the coach.
Keep Power off to this circuit at this time. If this circuit in energized prior to filling the system with antifreeze, severe damage will occur.

Plumbing

The plumbing installation involves three systems:

- Zone heating system blowers
- Domestic hot water system
- *HotTap* system (optional)

It is recommended to use 5/8" OD minimum PEX high temperature tubing and push fitting, similar to what *PrecisionTemp* can supply. Otherwise, an adapter will be required to make the connections.



Zone Heating System Blowers Piping Illustration 6

The heating system consists of two separately controlled zones with up to four blowers in each zone (*TwinTemp-2)*. The *Junior* can service up to six blowers. The *TwinTemp* has a supply line and a return line connection for each zone (see Illustration 6). It is suggested to use the red PEX line for Zone 1 and the blue PEX pipe for Zone 2 to avoid confusion during hookups.

Prior to running the PEX pipe, it is advisable to connect all PEX push fittings to the blowers and the *TwinTemp* water/ anti-freeze connections. Use a high quality Teflon tape on these fittings when making the connections. Take care not to let the Teflon tape get into the system.

The Zone 1 loop should be used for the longest loop with the most blowers in it, generally the living room/ kitchen loop. Install all PEX pipe and mark with labels at both ends. Arrows should indicate the supply and return lines.

Minimize extreme bends and any extreme rises in height should be avoided. Where possible use "flow bender" clamp rather than elbow fittings the reduce restriction. *PrecisionTemp* can supply the flow benders. Be sure the secure all PEX where necessary and apply protective shielding in areas where chafing may occur.

As shown in Illustration 6, the 3 way by-pass valve and tee fitting has been installed between the supply and return fittings in Zone 1. This is to prevent the heated anti-freeze from circulating to the blower units in warm weather, when space heat is not required

Connect to the Zone 1 supply line from the *TwinTemp* to the by-pass tee and then continue it to the closest blower unit. Be sure the end of the PEX is cut perfectly square and push it into the push fitting until it bottoms out. Then pull gently on the PEX tube to assure it is tight into the fitting to avoid leaks. Continue this process until all blowers in the Zone 1 loop have been plumbed (up to four blowers). From the top outlet fitting of the final blower in the Zone 1 loop, return the red PEX line to the 3 way by-pass valve and continue back to the *TwinTemp* "Zone 1 in" (return) fitting of the *TwinTemp*. As above, all PEX tubing should be tightly secured to all of the push fitting on the blowers and *TwinTemp*. *(The junior can accommodate up to six blowers on its single zone.)*

Repeat the above process for the Zone 2 loop using blue PEX piping.

Domestic Hot Water Piping

Although the *TwinTemp* is capable of delivering continuous hot water on demand, the plumbing system for the domestic hot water is plumbed exactly as it would be with basic recreational vehicle hot water systems. (see Illustration 6). The pressure cold water supply is connected to the "cold" fitting on the *TwinTemp* and the hot water line to the fixtures is connected to the "hot" fitting. As when running the heating system tubing, be sure to secure the push fitting to the *TwinTemp* using Teflon and cut the PEX tubing square and bottom it out into the push fittings.

If the coach is equipped with water pipes other than 5/8" OD PEX tubing, adapters should be used to make the connections to the ½" NPT connections on the *TwinTemp*. See Illustration 6 "Winterizing" drawing to incorporate the winterizing valve set into fresh water system **(what do I do here????)** this will assure a convenient way to drain the fresh water system and prevent freezing of the *TwinTemp* potable water circuit during freezing conditions. Severe damage can occur if this procedure if not followed.

***HotTap* Piping (*TwinTemp-2* Option)**

The *HotTap* is a dedicated high temperature hot water tap for food and drink preparation. It can dispense water as high as 190˚ F and **must not** be installed when or where there is a risk of scalding. The suggested location is on the kitchen sink countertop near the regular water tap. A clearly visible warning sticker (supplied with the *HotTap*) should be placed near the *HotTap*. To install the spigot, follow the instructions packed with your *HotTap*. The piping to the *HotTap* must be ¼" soft copper tubing. The tubing should be routed from the *TwinTemp* compartment to under the sink area where the *HotTap* is installed.

The copper tubing should be routed from the *HotTap* and the *TwinTemp* by the ¼" compression fittings supplied.

Filling Heating System with Anti-Freeze

Before turning on the power to the *TwinTemp* system, it must be completely filled with boiler anti-freeze/ water mixture and completely purged of all air. A 50/50 mixture of water and a high temperature boiler antifreeze **propylene glycol with inhibitors** must be used. **Never use automotive or other toxic / nontoxic anti-freeze.**

Fill system as follows:

- Remove the small access panel on the top of the *TwinTemp* using a Phillips screw driver.
- Remove the radiator tank fill cap from the top of the tank (see Illustration 8).
- Using a funnel, fill the tank with 50/50 anti-freeze/ water mix. This should be about 2-2.5 gallons.
- The Summer/Winter bypass valve should be in the "Winter" position as shown in Illustration 8
- Turn on zone one and two thermostats to call for heat.
- Turn on power to circulate and fill hydronic loop(s) with fluid. Once tank level stops dropping continue to allow pump to run for an additional 10-15 minutes.
- Top off tank fluid level, install radiator cap and fill overflow reservoir.
- Turn on propane supply and cycle the 12 volt power switch in 5 second intervals until the burner lights. This will purge the air from the gas line.
- Set the Zone 1 room thermostat to its highest setting. The Zone 1 pump will circulate the hot anti-freeze through the blower circuit and the anti-freeze level in the tank will drop. Note: Blowers will not come on until tank anti-freeze heats to 160˚F.
- Top off the overflow reservoir tank with anti-freeze solution until the level stops dropping.
- Turn on the Zone 2 thermostat (*TwinTemp-2* only) to activate the Zone 2 pump and continue to top off the over flow reservoir tank as the fluid level drops. After all blowers come on, fluid level may drop some more. Top off reservoir.
- Allow zone one and two pumps to run for about 15 additional minutes. Turn off and check the fluid level in the reservoir, top it off if necessary.
- Check all fittings in heating system and correct if necessary.

Note: As unit heats up the anti-freeze will expand into the expansion tank. After all expansion has taken place, be sure expansion tank is filled to full line. When the unit is shut off and cools down the fluid level in the expansion tank will lower. When cold, be sure to fill above the "Add" line. If expansion tank is ever empty, check the fluid level in the *TwinTemp* tank and top off if necessary.
NEVER remove the tank cap when it is hot.

Important Priming Notice

Proper priming procedures must be followed to avoid damage to the pump.

1. Summer / Winter valve must be in “Winter” position to fill tank. Turn off power and propane. (see manual)
2. Do not attach zone one and two supply lines until tank is filled with antifreeze. Fill tank to brim with a 50/50 water/antifreeze mix, approximately 2 gallons. Reconnect zone supply lines.
3. Turn on 12 volt power switch and for TT2 units, also turn on zone 2 thermostat.
   NOTE: If pump is making noise, it isn’t primed. Turn power off and on 5-10 times in 3 second cycles. When noise stops, pump is primed.
4. Turn on power and continue to fill tank to brim as the fluid level drops.
5. Run for 15-20 minutes checking fluid level. Top off tank as needed.
6. Install radiator cap once fluid level stops dropping.

Propane can be turned on and unit is ready for use. (refer to start up procedure)

TwlnTemp Start-up /Testing Procedure

Filling system with anti-freeze

* All power, water and gas should be off. Thermostat(s) set to lowest setting
* Remove access panel and radiator cap from top of TwinTemp
* Turn Summer/ Winter valve to Winter position. See illustration
* Open bleeder valve on top of copper heat exchanger. See illustration
* Using funnel, fill tank with about 3 gallons of 50/50 propylene glycol/water anti-freeze mix
* Turn on 12 volt power and switch on TwinTemp. (Do not turn on propane)
* Turn room thermostat to highest settings
* As anti-freeze level in tank drops, top off tank with anti-freeze mix
* Replace radiator cap assuring cap and seat are clean
* Fill expansion tank to about 1/3 full level with anti-freeze mix
* Turn off 12 volt power and turn on propane supply & check for leaks
* Turn 12 volt power back on and cycle power about 3 time to purge air from gas line
* Leave power on & burner should fire. Run system until burner shuts down.
  Note: If pump sounds as if it's cavitating, cycle power several time to dispel air
* When all air is out of system Close bleeder valve before system cools down

Start-up & Testing Space Heating System

* Turn off power & room thermostat(s) to the lowest settings
* Turn on propane 12 volt power
* Observe that flame is on and remains on. It should take about 1O minutes to bring system to temperature and burner goes out.
* Turn room thermostat(s) to highest setting and verify all blowers come on and deliver heat. Then turn thermostat off. NOTE: Tank temperature must be 160° before blowers will come on
* Turn thermostat(s) off and let system run until burner goes off.

Testing Water Heating System

* TwinTemp power should remain on and system up to temperature
* With water in the system, turn on the pressure pump or city water pressure
* Open hot water tap and purge out all air
* Water should be hot (about 120°) within about 30 seconds and temperature should stabilize. Let run for at least five minutes & verify burner on TwinTemp activates to maintain temperature. Turn off tap & check for leaks and correct if necessary

Testing Electric Heating Element(s)

* Be sure system is filled with anti-freeze and turn on 11O volt element(s) from a cold start
* Let heat up for at least 20 minutes.
* Check blower and hot water operation as described above.

NOTE: The 11O volt element is used for minimal needs since it has only 20% the capacity of the propane burner.

System MUST BE DRAINED OF ALL WATER OR WINTERIZED TO AVOID CATASTROPHIC FREEZINGIII
SEE •FREEZE PROTECTION PROCEDURE•


Bleeder Valve


Winter Setting

NOTE: These positions apply to TwinTemps with Serial #O?X-10-195 and late. On units with earlier numbers, the handle positions are opposite of those illustrated.


Summer Setting

Sequence of Operation

Before using the *TwinTemp* for the first time, it is important to know the proper sequence of operation to ensure understand of its operation. **Sequence of Operation is as follows:**

- The 12 VDC power switch on the *TwinTemp* is turned on.
- Tank thermostat inside turns on Pump 1 and the burner ignites automatically.
- Anti-freeze circulates from burner to Zone 1 blowers and back to the tank as it heats.
- Burner remains in high fire until set temperature is approached and gas is modulated to a low burn until set temperature is attained.
- Burner and pump shut down when set temperature is attained. This takes about 5-15 minutes depending on ambient temperature.
- *TwinTemp* is now in standby mode until a room thermostat is activated or hot water is called for.

If Room Heat is needed

Set Zone 1 or Zone 2 (*TwinTemp* only) thermostat to desired temperature. The corresponding pump and blowers will activate and within seconds heat is delivered from blowers. When tank temperature is below set point the burner will re-light and maintain proper tank temperature. When room reaches set temperature, the pump and blowers for that zone will go off. If thank temperature is below set temperature, pump 1 and the burner will stay on until tank reaches set temperature.

NOTE: the blower will not activate if the tank temperature is below or drops below 160˚ F. This assures that the how water function takes priority under heavy usage conditions. Blowers will resume operation when tank temperature goes over 160˚ F.

If Hot Water is needed

Once the tank reaches set temperature (5-15 minutes after system is turned on), continuous hot water is delivered when any tap is opened. Delivery temperature is determined by the setting of tempering valve (Adjustable 100˚ - 145˚ F). (See Illustration 8)
Warning: this valve is factory set at about 120˚ F. adjusting temperature any higher could result in severe injury due to scalding.
Tank thermostat turns pump 1 and burner on automatically when tank temperature starts to drop. Anti-freeze circulates from burner and back to tank as it heats. Burner remains in high fire and gas modulates burner to low burn until set temperature is attained. When set temperature is reached, burner and pump shit down and system returns to stand-by mode.

<u>To Operate the *TwinTemp*:</u>

Hot Water

- Pressurize the water system by turning on pump or city water pressure.
- Purge all air from system by turning on taps until there is a steady stream of water. Turn off taps. Check for leaks.
- Turn on the propane supply at tank and the manual gas valve if installed in system.
- Turn on the 12 VDC power supply and switch on *TwinTemp*. If this is the first the system has been used, power may have to cycle several times in 5 second intervals until air is purged from the gas line. Using sight hole, verify that burner is on.
- It will take about 5-15 minutes for the system to heat up.
- Turn on any hot water tap. Continuous hot water will be delivered in the time it takes to get from the *TwinTemp* to the tap. Hot water temperature can be changed by adjusting the mixing valve. (see Illustration 8)

HotTap (if equipped)

- Follow procedures 1-5 above.
- Depress lever on *HotTap* dispenser until hot water is dispensed. **WARNING: WATER IS EXTREMELY HOT AND CAN CAUSE SERIOUS INJURY!**
- Put container under dispenser, taking care to avoid splashing.

Space Heating

- Follow procedure 3-5 of "Hot Water" section above.
- Set the appropriate zone room thermostat to the desired temperature.
- Blowers in that zone will provide heat within seconds of being activated.
- When set temperature is attained, blowers will shut down.

NOTE: the blowers will not activate if the tank temperature is below 160˚ F. This assures that the hot water function takes priority under heavy usage conditions.

WARNING: Always turn off the 12-volt power supply to the heater during any fueling operations. Operating the *TwinTemp* or any other ignition source during fueling could cause a fire or explosion, which could result in serious injury or death.

NOTE: Should overheating occur or the gas supply fails to shut off, turn off gas valve at the supply tank. Immediately call a qualified service technician.

Do not use this appliance if any part has been under water. Immediately contact a qualified service technician to inspect the appliance and replace any part of the control system and any gas control which has been under water.

NOTE: When using an "on/off" button on a shower head or and outside was down box, always turn off the hot and cold water valves when finished. Not doing so will result in cold water bleeding into the hot water system and cold water or alternating warn and cold water will result.

The *TwinTemp* is designed to give a continuous flow of hot water as long as required and maintain the set temperature through all flow rates within the capacity of the heater (88˚ F temperature rise per GPM).

110 Volt Heating Element

The *TwinTemp-2* is equipped with two 110 VAC electric heating elements and the junior with one element. These provide limited amounts of hot water or space heating, such as washing hands or dishes. The electric element can be used with our without the propane burner, but for continuous hot water or space heat, the propane burner must be used. To operate, turn the 110 volt switch (es) on in the coach and be sure the power wire is plugged into the handy box (es) in the *TwinTemp* compartment.

For small amounts of hot water only, there is no need to turn the 12 volt power on to the *TwinTemp*. However, if space heat is required in very cold weather, the 12 volt switch should be turned on. If there is a higher demand for heat that the 110 volt element(s) can provide, the propane burner will activate automatically. For best operation, turn the 110 volt elements on about 30 minutes before turning 12 volt switch on. This allows the tank to come up to temperature utilizing the electric element before the burner can activate. This will help conserve propane.

NOTE: Be sure that the anti-freeze level is up to the "Fill" line on the expansion pack before turning the 110 volt element(s) on. Serious damage can occur to the system if the fluid level is low.

Changing Hot Water Temperature Setting

The temperature on you *TwinTemp* has been factory set to approximately 120˚ F. it is not recommended that you set the temperature any higher.
WARNING: Changing this setting could result in dangerously hot temperatures that could result in severe injury.

If it is necessary to change the setting it can be done as follows: Open access door on the front of the heater. Locate the tempering valve (see Illustration 8). Turn the adjustment knob **counterclockwise to increase temperature** or **clockwise to decrease temperature**. The setting range is between 100˚ F to 145˚F.

Summer Operation

When the space heating function of the *TwinTemp* is not needed, the heated anti-freeze should not be circulated to the blowers. To prevent this circulation, the Summer by-pass valve (see Illustration *) should be turned ¼ turn. The Summer position is opposite the position in Illustration 8 **(correct?)**. When heating is again needed, this level should best turned ¼ quarter turn from the Summer position to the same position as is shown in Illustration 8. This adjustment should only be needed twice a year for summer/ winter operation.

Routine Maintenance

All faucet aerators and showerhead screens in the coach should be cleaned regularly. It is recommended that the *TwinTemp* be inspected by a qualified service technician at least once a year. Particular attention should be paid to the following:

- Be sure that the air inlet openings and flue area are clear of any debris or obstructions (leaves, bugs, nests, spider webs etc.). Be sure nothing is stored against the unit that would block air or access.
- Make sure anti-freeze level in tank is full and up to the "Fill" line on the expansion tank. Top off if necessary with a 50/50 mix of specified boiler anti-freeze and water.
- Check that heater mounting is still secure to the coach. Tighten if necessary.
- Visually inspect wiring and hoses. Be sure there is no chafing of the insulation.
- Drain boiler antifreeze every two years and replace with new. (system holds approximately 6 gallons of a 50/50 boiler antifreeze/water mix)

NOTE: This winterizing procedure applies to all TwinTemp Models produced from January 2008 to present

TwinTemp Water System Draining / Winterizing Instructions

Note: Even though the heating circuit of the TwinTemp is filled with anti-freeze, the TwinTemp potable water heat exchanger MUST NOT be allowed to freeze. Freezing can cause severe damage to the unit and is not covered by warranty. When the coach is going to be on the road or laid up in freezing weather without the TwinTemp operating, the plumbing system must be drained or winterized as follows:

To drain the fresh water system in order to avoid freezing and damage:

- Turn off water pump or city water pressure
- Turn the black Hot & Cold Drain Valve handles to the opposite positions pictured
- Open the highest hot and cold water taps to permit water sytem to drain from the "Hot Winterizing Drain" and the "Cold Winterizing Drain".

After Water has drained:

- After water has drained, close Hot & Cold water taps
- Apply air pressure to the "Hot Winterizing Drain" outlet to force water from TwinTemp heat exchanger until air is heard coming from "Cold Winterizing Drain".

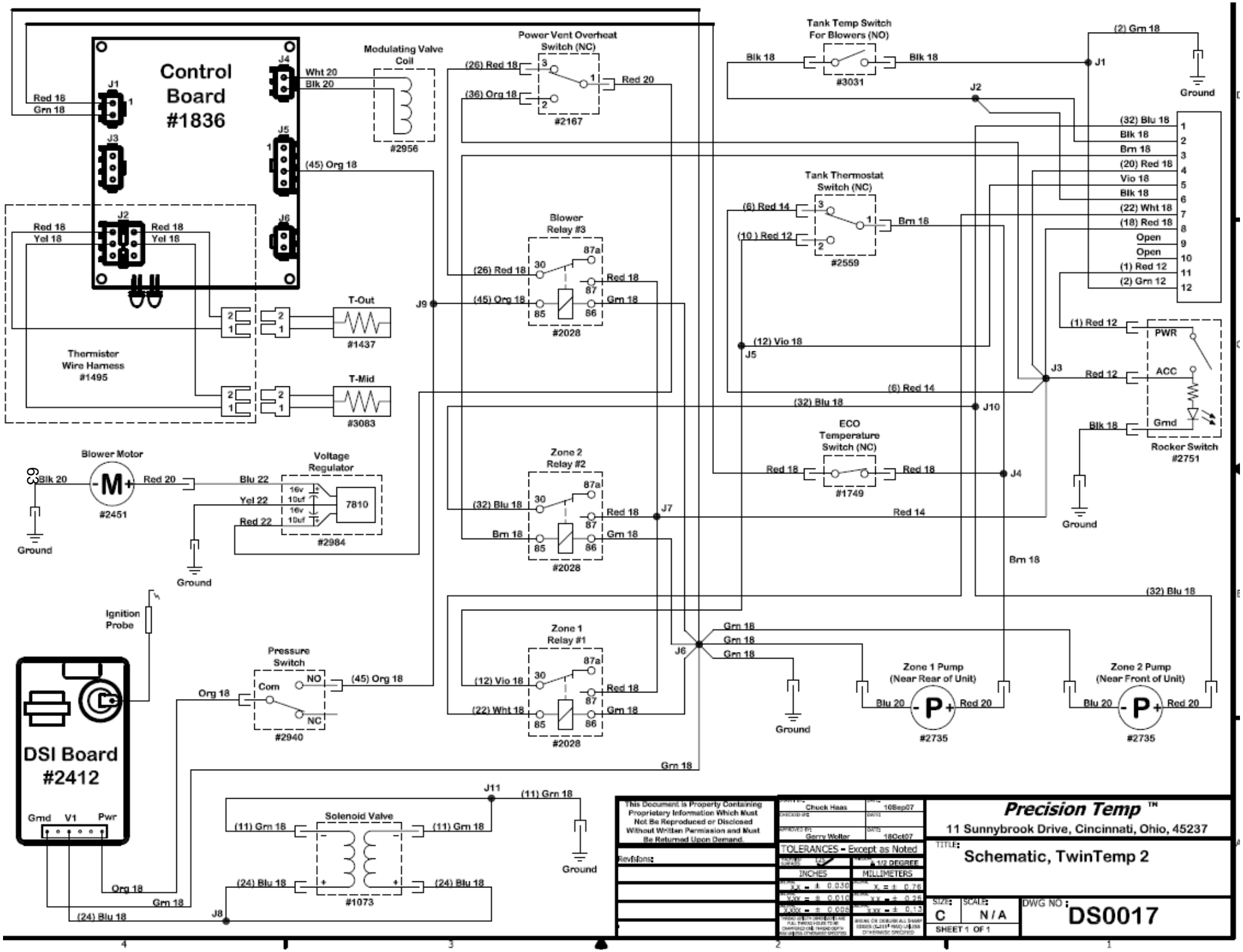
Leave valves in this position until you are ready to refill the system with water.

To use water system:

- Turn the Black Hot & Cold Drain Valve handles to the positions as pictured
- The system is ready for use

Valves shown in operating positions.


HOT
Hot Drain Valve
OLD
Hot Water OUT
Cold Water IN
Cold Drain Valve
Hot Winterizing Drain
Cold Winterizing Drain


Control Board #1836
J1
J2
J3
J4
J5
J6
Red 18
Grn 18
Red 18
Yel 18
Red 18
Yel 18
Wht 20
Blk 20
(45) Org 18
Modulating Valve Coil
#2956
Thermister Wire Harness #1495
T-Out
#1437
T-Mid
#3083
Power Vent Overheat Switch (NC)
(26) Red 18
(36) Org 18
Red 20
#2167
Tank Temp Switch For Blowers (NO)
Blk 18
Blk 18
#3031
(2) Grn 18
Ground
J1
J2
(32) Blu 18
Blk 18
Brn 18
(20) Red 18
Vio 18
Blk 18
(22) Wht 18
(18) Red 18
Open
Open
(1) Red 12
(2) Grn 12
Tank Thermostat Switch (NC)
(6) Red 14
(10) Red 12
Brn 18
#2559
Blower Relay #3
(26) Red 18
(45) Org 18
J9
87a
30
87
85
86
Red 18
Grn 18
#2028
(12) Vio 18
J5
(6) Red 14
(32) Blu 18
J10
J3
(1) Red 12
PWR
ACC
Red 12
Gmd
Blk 18
Rocker Switch #2751
ECO Temperature Switch (NC)
Red 18
Red 18
#1749
J4
Ground
Blower Motor
Blk 20
Red 20
#2451
Ground
Voltage Regulator
Blu 22
Yel 22
Red 22
16v
10uf
7810
#2984
Ground
Zone 2 Relay #2
(32) Blu 18
Brn 18
Red 18
Grn 18
J7
Red 14
Brn 18
#2028
Ignition Probe
DSI Board #2412
Gmd
V1
Pwr
Org 18
Grn 18
(24) Blu 18
Pressure Switch
Com
NO
NC
Org 18
(45) Org 18
#2940
Zone 1 Relay #1
(12) Vio 18
(22) Wht 18
Red 18
Grn 18
J6
#2028
Grn 18
Grn 18
Grn 18
Ground
Zone 1 Pump (Near Rear of Unit)
Blu 20
Red 20
#2735
Zone 2 Pump (Near Front of Unit)
Blu 20
Red 20
#2735
(32) Blu 18
J11
(11) Grn 18
Solenoid Valve
(11) Grn 18
(11) Grn 18
(24) Blu 18
(24) Blu 18
#1073
J8
Ground
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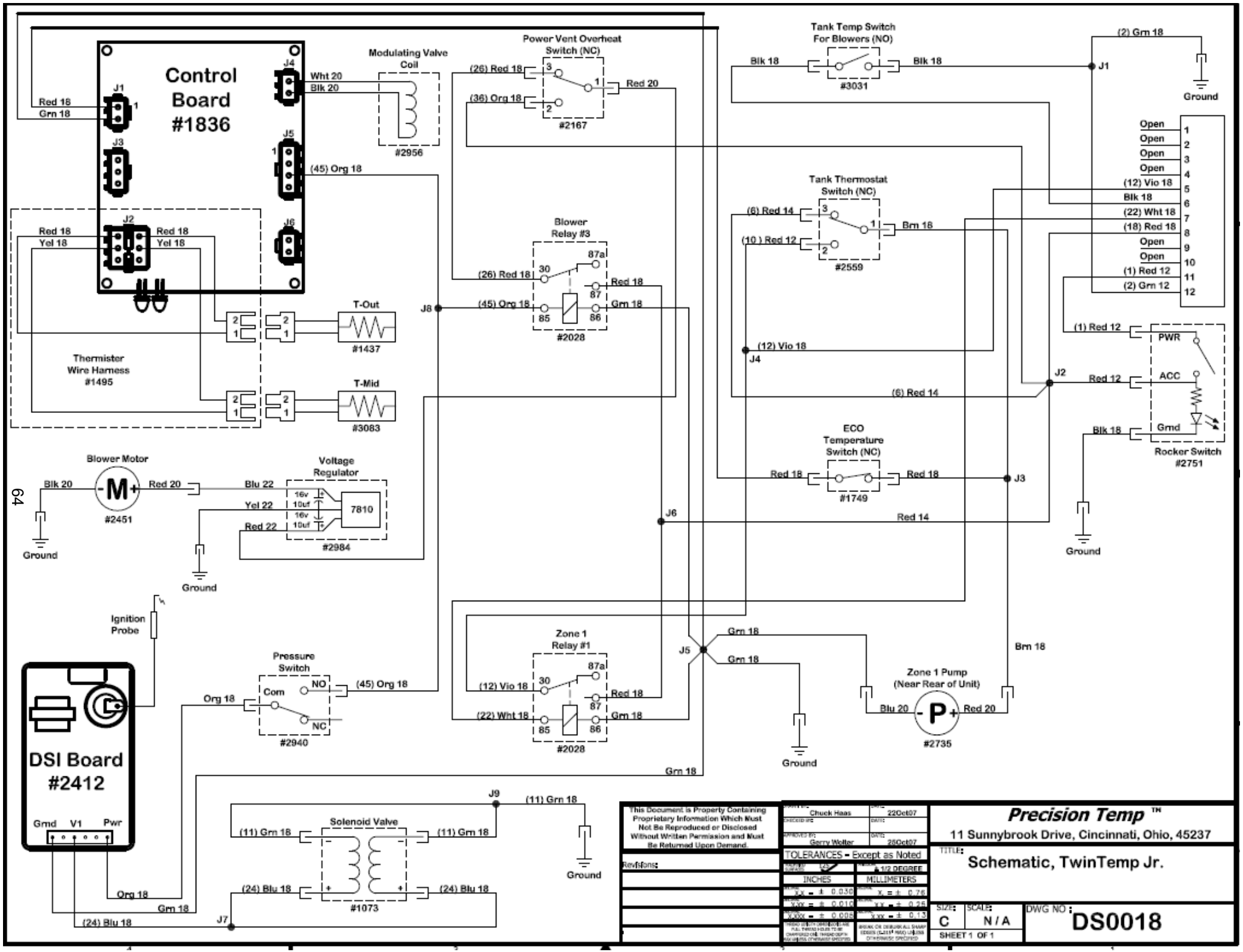
Revisions:
Chuck Haas
10Sep07
Gerry Wolter
18Oct07
TOLERANCES - Except as Noted
INCHES
MILLIMETERS
± 1/2 DEGREE
Precision Temp ™
11 Sunnybrook Drive, Cincinnati, Ohio, 45237
TITLE:
Schematic, TwinTemp 2
SIZE: C
SCALE: N/A
SHEET 1 OF 1
DWG NO: DS0017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J2
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J4
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J6
Red 18
Grn 18
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Yel 18
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Yel 18
Wht 20
Blk 20
Modulating Valve Coil
#2956
(45) Org 18
Power Vent Overheat Switch (NC)
(26) Red 18
(36) Org 18
Red 20
#2167
Tank Temp Switch For Blowers (NO)
Blk 18
Blk 18
#3031
(2) Grn 18
Ground
J1
Open
Open
Open
Open
(12) Vio 18
Blk 18
(22) Wht 18
(18) Red 18
Open
Open
(1) Red 12
(2) Grn 12
Tank Thermostat Switch (NC)
(6) Red 14
(10) Red 12
Brn 18
#2559
Blower Relay #3
(26) Red 18
(45) Org 18
87a
30
87
85
86
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Grn 18
#2028
J8
T-Out
#1437
Thermister Wire Harness #1495
T-Mid
#3083
(12) Vio 18
J4
(6) Red 14
J2
(1) Red 12
PWR
Red 12
ACC
Gmd
Rocker Switch #2751
Blk 18
Ground
ECO Temperature Switch (NC)
Red 18
Red 18
#1749
J3
J6
Red 14
Ground
Blower Motor
Blk 20
Red 20
#2451
Ground
Voltage Regulator
Blu 22
Yel 22
Red 22
16v 10uf
16v 10uf
7810
#2984
Ground
Ignition Probe
DSI Board #2412
Gmd
V1
Pwr
Pressure Switch
Com
NO
NC
Org 18
(45) Org 18
#2940
Zone 1 Relay #1
(12) Vio 18
(22) Wht 18
87a
30
87
85
86
Red 18
Grn 18
#2028
J5
Grn 18
Grn 18
Ground
Zone 1 Pump (Near Rear of Unit)
Blu 20
Red 20
#2735
Brn 18
Grn 18
J9
(11) Grn 18
Ground
Solenoid Valve
(11) Grn 18
(11) Grn 18
(24) Blu 18
(24) Blu 18
#1073
Org 18
Grn 18
(24) Blu 18
J7
64
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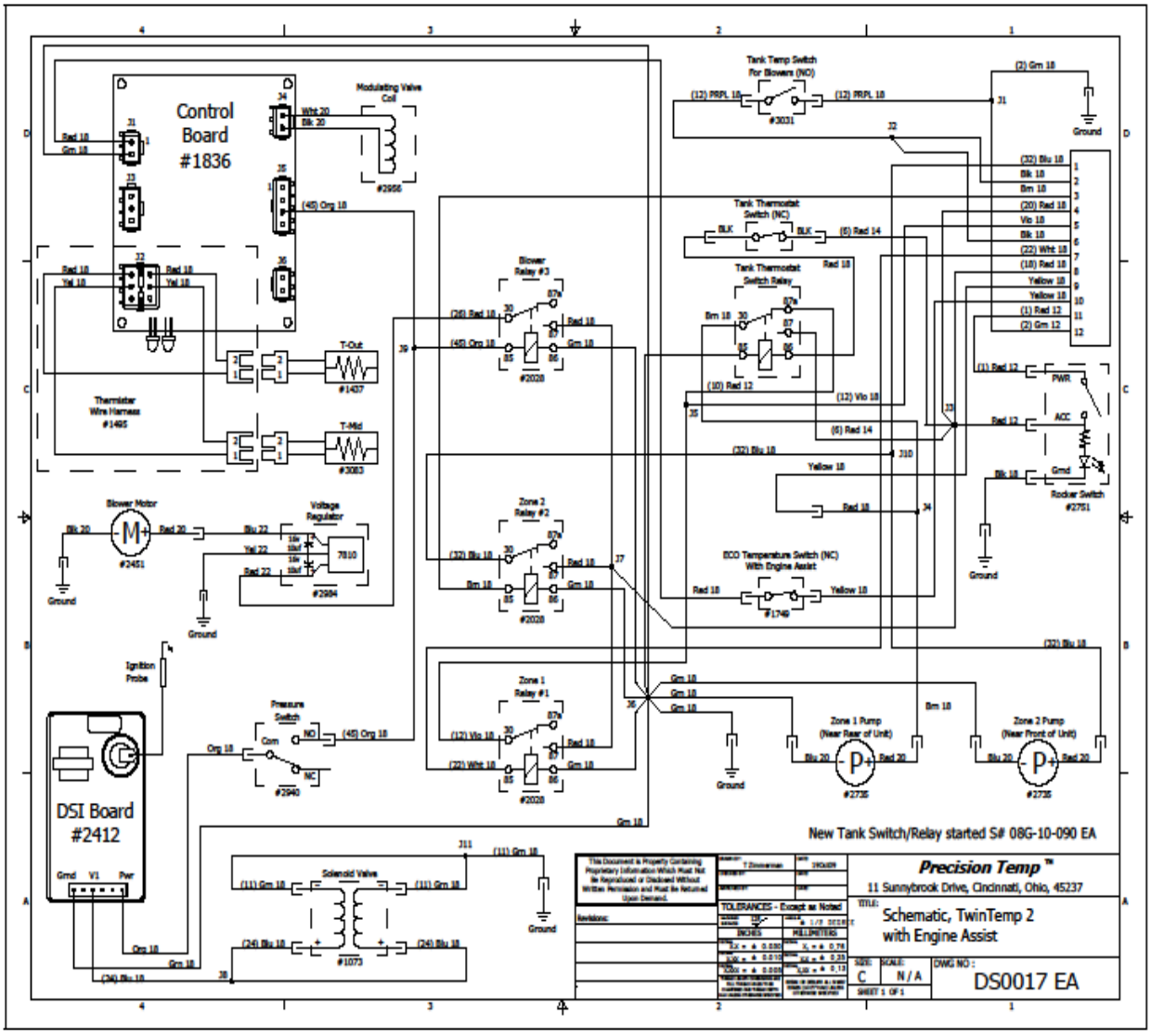
Revisions:
Chuck Haas
22Oct07
Gerry Wolter
26Oct07
TOLERANCES - Except as Noted
INCHES
MILLIMETERS
± 1/2 DEGREE
Precision Temp ™
11 Sunnybrook Drive, Cincinnati, Ohio, 45237
TITLE:
Schematic, TwinTemp Jr.
SIZE: C
SCALE: N/A
SHEET 1 OF 1
DWG NO: DS0018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Modulating Valve Coil
#2956
Tank Temp Switch For Blowers (NO)
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Tank Thermostat Switch (NC)
Tank Thermostat Switch Relay
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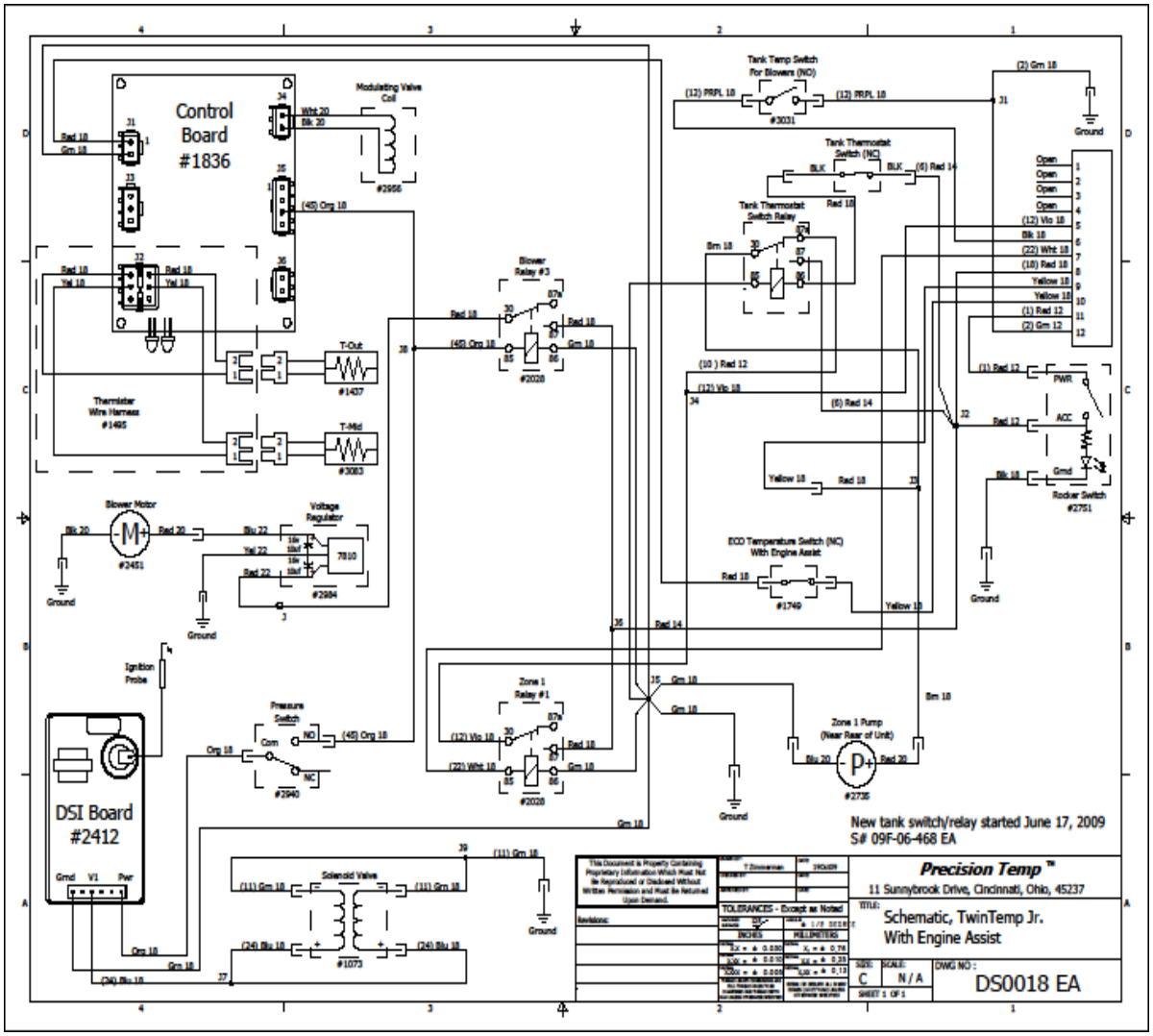
#2028
T-Out
#1437
T-Mid
#3083
Thermister Wire Harness #1495
Blower Motor
#2451
Voltage Regulator
7810
#2804
Zone 2 Relay #2
Zone 1 Relay #1
ECO Temperature Switch (NC) With Engine Assist
#1749
PWR
ACC
Rocker Switch
#2751
Ignition Probe
Pressure Switch
#2940
DSI Board #2412
Gnd V1 Pwr
Solenoid Valve
#1073
Zone 1 Pump (Near Rear of Unit)
Zone 2 Pump (Near Front of Unit)
#2735
Ground
New Tank Switch/Relay started S# 08G-10-090 EA
Precision Temp™
11 Sunnybrook Drive, Cincinnati, Ohio, 45237
Schematic, TwinTemp 2 with Engine Assist
DS0017 EA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Modulating Valve Coil
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Tank Temp Switch For Blowers (NO)
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Tank Thermostat Switch (NC)
Tank Thermostat Switch Relay
Blower Relay #3
#2028
T-Out
#1437
T-Mid
#3083
Thermister Wire Harness #1485
Blower Motor
#2451
Voltage Regulator
7810
#2984
ECO Temperature Switch (NC) With Engine Assist
#1749
PWR
ACC
Rocker Switch #2751
Ignition Probe
DSI Board #2412
Pressure Switch
#2940
Zone 1 Relay #1
Zone 1 Pump (Near Rear of Unit)
#2736
Solenoid Valve
#1073
Ground
New tank switch/relay started June 17, 2009
S# 09F-06-468 EA
Precision Temp ™
11 Sunnybrook Drive, Cincinnati, Ohio, 45237
Schematic, TwinTemp Jr.
With Engine Assist
DS0018 EA

TwinTemp **Hydronic Heating/ Water Heating Operating Instructions**

For maximum heat and hot water output, it is recommended to use the LPF mode of operation in addition to the 1220 volt electric element. Electric element operation should be used for minimal hot water demand such as washing hands or dishes. It is not necessary to have the water system filled to use the space heating system, but the heating system must be filled with anti-freeze.

To Start Up System:

- Turn on the propane supply.
- Turn on 12 volt power switch on the right side of the unit.
- Turn on 12 volt power switch on coach.
- Burner will start-up and system will be up to operating temperature is about 10 minutes.

For Space Heating:

Turn on main thermostat and set to desired temperature.
Blowers will turn on and heat is delivered within about two minutes.
System and blowers will cycle to maintain set temperature.

For Hot Water

Turn on water system pump power switch located near galley or be connected to city water system.
Turn on hot water tap.

Note: During heavy heat and hot water demand, the hot water system takes priority and the blowers may shut off briefly to maintain hot water supply. Hot water temperature is factory set. To change temperature, consult the operating manual or *PrecisionTemp*.

To Use With 110 Volt Power

Turn of 110 volt element switch located inside coach.
Let the unit heat up for approximately 30 minutes.
Follow the first 3 steps of "To Start Up System" above.

Note: In the 110 volt mode of operation the electric element supplies the heat until demand exceeds its capacity at which time gas burner automatically ignites.

TwinTemp Hydronic Heating/ Water Heating Operating Instructions

For maximum heat and hot water output, it is recommended to use the LPG mode of operation in addition to the 120 volt electric element. Electric element operation should be used for minimal hot water demand such as washing hands or dishes. It is not necessary to have the water system filled to use the space heating system, but the heating system must be filled with anti-freeze.

To Start Up System:

- Turn on the propane supply.
- Turn on 12 volt power switch on the right side of the TwinTemp cabinet.
- Turn on 12 volt power switch on coach, if applicable.
- Burner will start-up and system will be up to operating temperature in approximately 10-15 minutes depending on position of Summer/winter valve.

Summer Operation

Position Summer/Winter valve in Summer position.

When the space heating function for Zone one of the TwinTemp is not needed, the heated anti-freeze should not be circulated to the blowers. To prevent this circulation, the Summer/Winter by-pass valve should be turned ¼ turn. When heating is again needed, this valve handle should be turned ¼ quarter turn from the Summer position to the Winter position. This adjustment should only be needed twice a year for summer/ winter operation.

Summer

Winter

For Space Heating:

Position Summer/Winter valve in WINTER position.

Turn on main coach thermostat for Zone one or two and set to desired temperature.

When the system reaches set temperature the blowers will turn on and heat is delivered.

When room reaches set temperature, the pump and blowers for that zone will go off. If tank temperature is below set temperature the burner will stay on until tank reaches set temperature.

NOTE: the heat register blowers will not activate if the tank temperature is below 160˚ F. This assures that the hot water function takes priority under heavy usage conditions. Blowers will resume operation when tank returns to operating temperature.

For Hot Water

TwinTemp unit and water system pump must be turned on or connect to city water system.

Turn on hot water tap.

Note: During heavy heat and hot water demand, the hot water system takes priority and the heat register blowers may shut off briefly to maintain hot water supply. Hot water temperature is factory set at approximately 120 degrees. To change temperature, consult the operating manual.

Once the tank reaches set temperature (5-15 minutes after unit is turned on) continuous hot water is delivered when any tap is opened. Delivery temperature is determined by the setting of tempering valve **Warning: this valve is factory set at about 120˚ F. adjusting temperature any higher could result in severe injury due to scalding.**

Tank thermostat turns pump 1 and burner on automatically when tank temperature starts to drop. Anti-freeze circulates from burner and back to tank as it heats. Burner remains in high fire and gas modulates burner to low burn until set temperature is attained. When set temperature is reached, burner and pump shut down and system returns to stand-by mode.

Winter Mode Hot Water Production

During winter operation if the system has been dormant for more than 20 minutes turn on interior thermostat to call for heat. When the heat register blowers come on turn off thermostat and turn on hot water tap. Preheating the system is required in winter mode for hot water production due to 3 gallons of cold fluid in the hydronic loop suddenly being returned to the TwinTemp tank lowering the fluid (boiler antifreeze) temperature required for hot water production. Once fluid temperature reaches set temperature the system will make continuous hot water.

To Use With 110 Volt Heating Element

Turn on 110 volt element switch located inside coach.

Let the unit heat up for a minimum of 30-60 minutes.

Note: In the 110 volt mode of operation the electric element supplies the heat until demand exceeds its capacity at which time gas burner automatically ignites.

The *TwinTemp Jr.* is equipped with one 110 VAC electric heating element. The element provides limited amounts of hot water or space heating, such as washing hands or dishes. The electric element can be used with or without the propane burner, but for continuous hot water or space heat, the propane burner must be used. To operate, turn the 110 volt switch on in the coach.

For small amounts of hot water only, there is no need to turn the 12 volt power on to the *TwinTemp*. However, if space heat is required in very cold weather, the 12 volt switch should be turned on. If there is a higher demand for heat than the 110 volt element(s) can provide, the propane burner will activate automatically. For best operation, turn the 110 volt element on about 30 minutes before turning 12 volt switch on. This allows the tank to come up to temperature utilizing the electric element before the burner can activate. This will help conserve propane

Routine Maintenance

All faucet aerators and showerhead screens in the coach should be cleaned regularly. It is recommended that the *TwinTemp* be inspected by a qualified service technician at least once a year. Particular attention should be paid to the following:

- Be sure that the air inlet openings and flue area are clear of any debris or obstructions (leaves, bugs, nests, spider webs etc.). Be sure nothing is stored against the unit that would block air or access.
- Inspect boiler anti-freeze level in reservoir tank. Top off if necessary with a 50/50 mix of specified boiler anti-freeze and distilled water.
- Check that heater mounting is still secure to the coach. Tighten if necessary.
- Visually inspect wiring and hoses. Be sure there is no chafing of the insulation.
- Drain boiler antifreeze every 12-24 months for units with aluminum tanks and 24-36 months for units with stainless steel tanks and install new boiler antifreeze. (system holds approximately 4-6 gallons of a 50/50 boiler antifreeze/distilled water mix)
- Inspect for evidence of antifreeze leaks at internal and external plumbing connections and correct if needed. Test radiator cap and inspect the overflow reservoir hose connections.

clockwise direction to end stops each year.

IMPORTANT

COLD WEATHER PROTECTION INFORMATION

WARNING: **Do not** disconnect or turn off the electrical supply to include 12vDC and 120vAC electric element.

Do not turn off the propane supply when temperatures are near or below freezing.

The TwinTemp hot water heating system **will freeze** if the electrical power source or propane is disconnected.

WINTERIZING

1. **Turn off the power and gas supply to the TwinTemp.**
2. **Turn off main water supply.**
3. **Open all hot water taps. (Bathroom, kitchen, laundry, etc.)**
4. **Drain water from plumbing lines.**
5. **Follow the fresh water winterizing instructions attached to the TwinTemp winter drain valves on the plumbing manifold side of the cabinet.**

TwinTemp **Preventive Maintenance Schedule**

1. **Clean interior of *TwinTemp* cabinet including combustion air intake grill. ***
2. **Inspect all wiring connectors for corrosion and tighten or repair if needed. ***
3. **Performance test heating and hot water functions and rotate mixing valve temperature adjustment knob several times clockwise and counter clockwise direction. ***
4. **Check for fluid leaks at interior and exterior plumbing connections, radiator cap and overflow reservoir. ****
5. **Check propane connections for leaks. ****
6. **Check boiler antifreeze level in overflow tank.*****
7. **Drain and refill boiler antifreeze. *****
   (Use only Rhogard boiler antifreeze or equivalent with models having an aluminum tank. Use a boiler antifreeze made for multiple metals with a Stainless Steel tank)

* **Annual inspection**
** **Bi-Annual inspection**
*** **Every 12 - 24 months for units with aluminum tanks and 24-36 months with Stainless steel tanks.**
**** **Bi-Monthly**