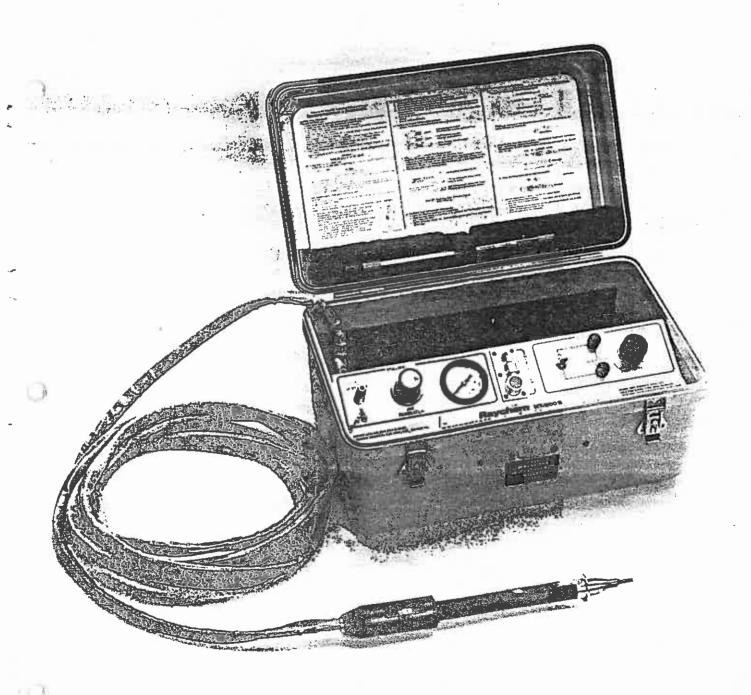
Raychem

HT-900A/-920A and HT-900B/-920B

Compressed Alr/Nitrogen Heating Tool Repair Manual



to Reorder This Manual From Raychem Specify Part Number 369275

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Note: This repair manual covers the following HT-900 healing tools.

Replacement Parts List

HT-900A

5.0

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HT-920A

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1.0 Description

1.1 General

The Raychem compressed Air/Nitrogen Heating Tool supplies a stream of heated air or nitrogen for the field installation of heat-shrinkable insulation and wire-termination products.

The heating tool consists of a heat gun and a control module built into a fiberglass case. Also included are hot air reflectors, spare heating element, thermocouple and built-in operating instructions. The heat gun

is permanently attached to the control module by a hose assembly which contains air hoses and electrical wires.

1.2 Functional

The Compressed Air/Nitrogen Heating Tool operates by passing a stream of air or nitrogen through an electrically heated element located in the body of the heat gun.

The compressed air or nitrogen at a pressure of 80-200 psig comes in through the compressed air fitting on the front panel and is fed to a relief valve and to the pressure regulator/filter. The relief valve prevents damage to the heating tool if the source pressure is too great. The filter screens out solid contaminants, and the pressure regulator permits the operator to adjust the pressure of the air/nitrogen passing through the heating element. The pressure gauge indicates the air/nitrogen pressure at the heat gun.

The regulated air/nltrogen is fed through a flexible hose to the heat gun. Part of this air/nitrogen passes through the lubular heating element, where it is heated to a temperature of 550°-920°F (290-495°c) by

the heating coils and controlled by the temperature controller setting, and flows out the center orifice of the nozzle. The rest of the air/nitrogen reaching the heat gun passes between the heating element and the walls of the handle body, keeping the handle body cool. This cooling air flows out through the four orifices on the sides of the heat gun housing.

The air/nitrogen pressure within the heat gun is monitored by a small pressure sensing hose which feeds the pressure back to a pressure switch in the control module. This pressure switch cuts off electrical power to the heating element whenever the sensed pressure falls below a set point. This safety feature protects the heat gun from overheating in the event that the supply hose is kinked or ruptured, or whenever the air/nitrogen pressure at the pressure gauge is below 5.0 psig.

The B models have an on-off switch in the handle of the heat gun which operates by interrupting the feedback air to the pressure switch, which in turn controls electrical power to the heating element.

The power switch in the control module controls the electrical power to the entire heating tool and also provides electrical overload protection.

The power on indicator light is illuminated whenever the heating tool is plugged in and the power switch is in the on position.

The heated air indicator light is illuminated whenever electrical power is being supplied to the heating element.

The temperature controller controls the output air temperature between 550°F and 920°F. The temperature is a function of the controller setting and it is based on a thermocouple feedback control system.

1.3 Model Information

Model	Nominal Operating Voltage	Case Color	Raychem Part Number	NSN
HT-900A	115 VAC	Yellow	938182	4940-00-132-4909
HT-900A	115 VAC	Olive drab	275023	4940-01-037-1413
HT-920A	230 VAC	Yellow	372850	4940-01-037-1412
HT-920A	230 VAC	Olive drab	· 609607	4940-01-037-1411
HT-900B	115 VAC	Yellow	910987	N/A
HT-900B	115 VAC	Olive drab	837097	5935-01-215-0985
HT-920B	230 VAC	Yellow	303754	N/A
HT-920B	230 VAC	Olive drab	712121	N/A

1.4 Specifications

Weight	20 pounds				
Electrical power	115 Volt AC, 50-400 Hz, 1¢, 7 amp (HT-900A or B) 230 Volt AC, 50-400 Hz, 1¢, 35 amp (HT-920A or B)				
Heat gun output termperature	550-920°F (290-495°C)				
Compressed air/nitrogen	80-200 psi, 4 SCFM (Dry and oil-free)				
Tool case dimensions	97" high by 17.3" wide by 11.5" deep				

2.0 Operating Instructions

2.1 Preparation for Use

Warning:

The attached standard universal power plug is not approved for use in hazardous locations as defined in NFPA 70-1984, Article 500. If this heating device must be used in a hazardous location as defined in NFPA 70-1984, Article 500, the universal power plug must be replaced with a plug designed for use in a hazardous location.

It is the responsibility of the user to provide appropriate connection to the power source. Failure to comply with these instructions may result in fire or explosion.

- a. Connect power cord to electrical power source:
 - 115 VAC, 7.0 amperes, 50-400 Hz for model HT-900A/B
 - 230 VAC, 3.5 amperes. 50-400 Hz for model HT-920A/B
- b. Move power switch to ON. Power lamp should illuminate.
- Press HEATED AIR indicator to test indicator lamp function. Proceed only if lamp functions.
- d. Move power switch to OFF position.
- e. Make sure that heat gun is removed from its case, and check air hose for kinks or pinching.
- Attach appropriate reflector to heat gun nozzle.

- Gonnect heating tool to clean, dry compressed air or nitrogen source of 80-200 psig.
- h. (B models only) Move the ON-OFF switch in the heat gun handle to the ON (forward) position.
- Pull AIR REGULATOR control, and adjust for 5-7 psig guage reading.
- Push AIR REGULATOR control to lock at desired setting.
- Move power switch to ON position. Heated air indicator lamp should illuminate.
- Allow 1 minute warm-up. After warm-up the air pressure gauge will indicate 10-15 psig. This is normal; do not readjust.
- Adjust TEMP CONTROL knob to the desired setting.

Warning: Nozzle and output air are hot-900°F

2.2 Performing Heating Operation

- The heat gun can be used while it is positioned in a holder, or it can be hand-held.
- Follow the application instructions for the particular product being installed.
- c. (B models only) Power to the heating element can be turned on and off during use by means of the ON-OFF switch in the heat gun handle.

2.3 Shutoff Procedure

Caution: Failure to cool the gun as directed below will shorten heating element life.

- Move POWER switch to OFF and cool the heat gun by allowing air/nitrogen to flow until cool (approximately 1 minute).
- Pull AIR REGULATOR control and adjust control for guage reading of 0 psig.
- c. (B models only) Move the ON-OFF switch in the heat gun handle to the OFF (rear) position.
- d. Disconnect heating tool from electrical power.
- Disconnect heating tool from compressed air/nitrogen source and replace cap on AIR INLET.
- Place air hose and power cord in storage compartment.

3.0 Troubleshooting Guide

Trouble		bable Cause	Corrective Action	
1.				
Unable to obtain operating pressure.				
	1.1	Inadequate pressure from air/nitrogen source	Check air/nitrogen source (80 psig minimum).	
	1.2	Filter dirty or clogged.	Clean or replace filter element (4.7).	
	1.3	Air/nitrogen supply lines are pinched, kinked or leaking.	Check supply lines for kinks, pinching, or leaking. Replace hose assembly if faulty (4.8)	
	1.4	Defective pressure relief valve.	Replace pressure relief valve (4.9, 4.10).	
	1.5	Air flow needle valve adjusted wrong.	Perform air flow adjustment (4.11).	
	1.6	Defective pressure gauge.	Replace pressure gauge (4.9, 4.10).	
<u>2</u>				
Power on indicator light does not il-	2.1	Breaker tripped.	Turn power switch off and on.	
luminale	2.2		Check power source.	
	2.3	Lamp burned out.	Press to test (4.3). Replace if faulty.	
3				
Heated air indicator light does not Illuminate and output air/nitrogen is		(B model only) Handle switch is in OFF position.	Move handle switch to on (forward) position.	
not heated.	3.2	Pressure sensing hose or (B model) handle switch disconnected or blocked.	Check pressure sensing hose and handle switch.	
4.			·	
Heated air indicator light does not illuminate but output air/nitrogen is hot.	4.1	Lamp burned out.	Press to test (4.3). Replace if faulty.	
<u>5</u>				
Output air/nitrogen is not hot, but heated	5.1	Heating element burned out.	Replace heating element (4.1).	
alr indicator light illuminates.	5.2	Faulty thermocouple.	Replace thermocouple (4.2).	
	5.3	Faulty controller.	Replace controller (4.9, 4.10).	
6				
Output air/nitrogen is not hot enough with	6.1	Defective thermocouple.	Replace thermocouple (4.2).	
gauge reading of 10-15 psig.	6.2	Airflow needle valve adjusted wrong.	Perform air flow adjustment (4.11).	
	6,3	Defective controller,	Replace controller (4.9, 4.10).	
7				
Output air/nitrogen is too hot with gauge	7.1	Defective thermocouple.	Replace thermocouple (4.2).	
reading at 10-15 psig.		Defective controller.	Replace controller (4.9, 4.10)	
ß				
Output air/nitrogen begins to heat at less	8.1	Pressure switch set too low. (A models).	Perform pressure switch adjustment (4.12	
	8.2	Defective pressure switch. (all models).	Replace pressure switch (4.9, 4.10).	
than 5 psig. 9.	8.2	Defective pressure switch. (all models).		
than 5 psig.	9,1	Pressure switch (all models). Pressure switch set too high. (A models). Defective pressure switch. (all models)	Replace pressure switch (4.9, 4.10). Perform pressure switch adjustment (4.12)	

Warning:
Important safety features may be affected by mishandling or improper service. Maintain only in accordance with the Maintenance Procedures outlined in this Manual. Other service or repairs and replacement of other parts should be performed only by authorized service facilities. Raychem will not be responsible for any tool not maintained properly in accordance with these procedures.

4.1 Heating Element Replacement (Figure 4-1)

Step 1

Disconnect the heating tool from electrical power and air/nitrogen sources.

Step 2

Remove the handle cover screw (5/64 hex socket head) and separate the two haives of the handle.

Step 3

Disconnect the two air hoses from the fittings on the breech plug. Do NOT remove air hose fittings.

Step 4

Disconnect the two heating element terminal screws.

Step 5

Remove the two breech plug screws (3/32 hex sockel head) and slide breech plug back carefully, clearing thermocouple wire and terminal leads.

Step 6

Slide out heating element.

Step 7

Remove rubber spacer from old heating element and install it on replacement element.

Step 8

Install the two o-rings over the end of the heating element near the lead wires.

Step 9

Apply silicone lubricant to the o-rings.

Step 10

Slide new heating element into position.

Step 11

Slide the heating element Into final position with the aid of the breech plug. Make certain that the breech plug o-ring is in its groove in the face of the breech plug.

Step 12

Install the two breech plug screws with the ground lead connected to one.

Step 13

Connect heating element terminal leads to screw terminals. These leads are not polarized; either lead may be attached to either terminal.

Step 14

Install air hoses over fittings. Use existing hose clamp on large air hose.

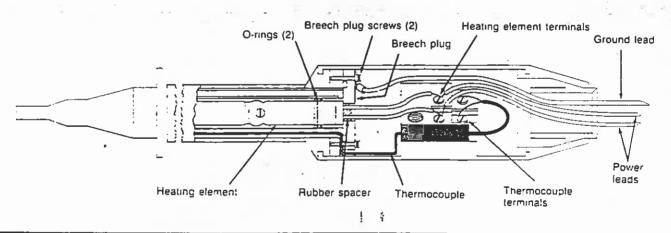
Step 15

Assemble the handle. The two halves and the handle end are keyed together and must be properly aligned.

Step 16

Test for proper operation per the operating instructions in the case lid.

Figure 4-1 Sectional View of Heat Gun (Air Hoses and ON-OFF switch not shown for clarity)



4.2 Thermocouple Replacement (Figure 4-1)

Step 1

Disconnect the heating tool from electrical power and air/nitrogen sources.

Step 2

Remove the handle cover screw (5/64 hex socket head) and separate the two halves of the handle.

Step 3

Disconnect the two air hoses from the fittings on the breech plug. Do NOT remove air hose fittings.

Step 4

Revove the two power lead screws

Step 5

Remove the two thermocouple terminal screws.

Step 6

Remove the two breech plug screws and slide breech plug back carefully.

Step 7

Slide out thermocouple.

Step 8

Insert new thermocouple.

Step 9

Install breech plug and breech plug screws. Make sure that the breech plug o-ring is in its groove in the face of the breech plug, and that the ground fead is connected to one of these screws.

Step 10

Terminate thermocouple terminal leads: red to red, yellow to yellow.

Step 11

Terminal power leads. Power leads are not polarized; either lead may be attached to either terminal.

Step 12

Install air hoses over fittings in breech plug. Use existing hose clamp on large air hose.

Step 13

Assemble the handle. Two halves and the handle end are keyed together and must be properly aligned.

Step 14

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Test for proper operations per the operating instructions in the case lid.

4.3 Indicator Lamp Replacement

Step 1

Remove indicator lamp housing (PRESS TO TEST button) from control panel by unscrewing it counterclockwise.

Step 2

Pull the indicator lamp straight out of the indicator lamp housing.

Step 3

Push the replacement indicator lamp fully into the indicator lamp housing.

Step 4

Screw the indicator lamp housing into its receptacle on the control panel.

4.4 Heat Gun Replacement (Figure 4-1)

Note: Only the B model heat gun is available for replacement. It is interchangeable with the A model heat gun.

Step 1

Disconnect the heating tool from electrical power and air/nitrogen sources.

Step 2

Remove the handle cover screw (5/64 hex socket head), and separate the two halves of the handle.

Step 3

Disconnect the two air hoses leading from the air hose assembly. DO NOT remove air hose filtings.

Step 4

Disconnect the power leads, ground lead, and thermocouple leads.

Step 5

Connect the power leads, ground lead, and thermocouple leads to the replacement heat gun. The green wire is ground. The black and white power leads are not polarized. The thermocouple leads are polarized: red to red, yellow to yellow.

Step 6

Install air hoses over fittings. Use existing hose clamp on larger air hose. The small hose attaches to the switch valve.

Step 7

Assemble the handle. The two halves and the handle end are keyed together and must be properly aligned.

4.5 Control Module and Cover Removal

Step 1

Disconnect the heating tool from its electrical power and air/nitrogen sources.

Step 2

Remove contents from storage compartment.

Step 3

Disengage the spring latch on the back of the control module.

Step 4

Swing the control module out of the case, reach underneath, and release the quick-disconnect hinge by squeezing the knurled pins together and upward.

Step 5

Remove the control module from the case.

Step 6

Remove the bottom cover from the control module by removing two screws and four hex nuts.

4.6 Control Module and Cover Installation

Step 1

Install the bottom cover on the control module and secure it in place with two screws and four hex nuts.

Step 2

Install the control module in the case. To engage the quick-disconnect hinge, move the knurled pins downward and let them snap into place.

Step 3

When the hinge is securely engaged, swing the control module into the case and engage the spring latch.

4.7 Air Filter Element Removal and Installation (Figure 4-2)

Step 1

Disconnect the heating tool from its electrical power and air/nitrogen sources.

Step 2

Remove the control module and cover (4.5).

Step 3

Remove regulator drain deflector screws (2). Rotate and remove deflector.

Stan A

Remove the filter bowl by turning it counterclockwise.

Step 5

Remove the filter element assembly, Use gloves or cloth to protect fingers.

Step 6

Clean or replace the filter element assembly.

Step 7

Install the filter element assembly Hand tighten using gloves or a piece of cloth.

Step 8

Coal the threads of the filter bowl with antiseize sealant and install the filter bowl. Hand tighten only.

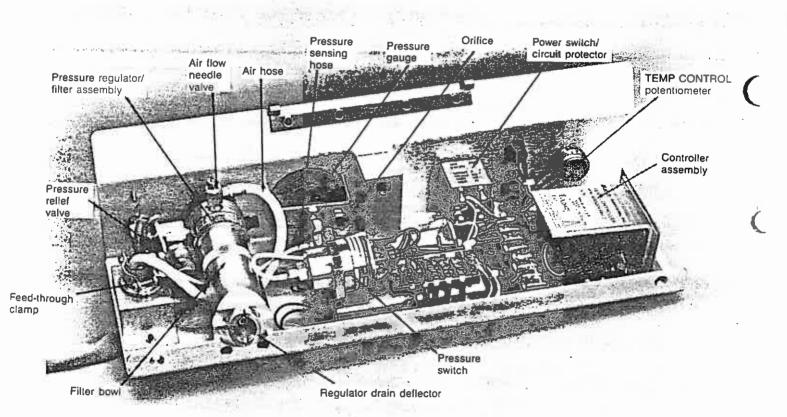
Step 9

Install regulator drain deflector.

Step 10

install control module and cover (4.6).

Figure 4-2 Control Module with Cover Removed. (Model HT-900B shown for reference.)



4.8 Hose Asembly Removal and Installation

Note: Use this procedure and para. 4.4 when replacing the hose assembly without replacing the heat gun.

Step 1

Disconnect the heating tool from its electrical power and air/nitrogen sources.

Step 2

Remove the control module and cover (45).

Step 3

Disconnect the hoses, power leads, and thermocouple leads.

Step 4

Loosen the feed-through clamp.

Step 5

Remove the clamp bushing from the feedthrough clamp and slide it off the hose assembly.

Step 6

Remove the hose assembly from the control module.

Step 7

Feed the replacement hose assembly through the rubber grommet.

Step 8

Slide the clamp bushing over the hoses and wires and inside the hose sheath.

Step 9

Position the end of the sheath and clamp bushing within the feed-through clamp, and tighten the clamp.

Step 10

Connect the hoses, power leads, and thermocouple leads to their respective locations (see pneumatic and wiring diagrams). Thermocouple leads are polarized: red to red, yellow to yellow.

Step 11

install control module and cover (4.6).

4.9 Control Module Disassembly

Note: Disassemble the control unit only to the extent necessary to replace any defective component.

Step 1

Disconnect the heating tool from its electrical power and air/nitrogen sources.

Step 2

Remove the control module and cover (4.5).

Step 3

Remove the item(s) to be replaced:

- a. Pressure switch Remove the rubber boot (A models only). Tag and remove wires. Remove pressure-sensing hose. Unscrew hose fitting and remove pressure switch from bracket (A models).
 Loosen bracket and remove pressure switch (B models).
- Pressure relief valve Unscrew counterclockwise from the fitting.
- c Pressure regulator/filter assembly -Remove the two drain deflector screws and the drain deflector. Disconnect the air hose from its fitting. Unscrew the panel mounting ring. Unscrew the air inle: quick-disconnect fitting from the front. Remove pressure regulator/filter assembly. Remove pressure relief valve and fittings as required.

- d. Pressure gauge Disconnect pressuresensing hoses. Remove two retaining nuts and clips. Remove pressure gauge.
- Power switch/circuit protector Tag and disconnect electrical leads. Remove nut from front. Remove switch.
- f. Controller assembly Tag and disconnect electrical leads, except wires to TEMP CONTROL potentiometer. Remove two screws holding controller assembly to front panel. Remove TEMP CONTROL knob. Remove TEMP CONTROL potentiometer nut from front. Remove potentiometer and controller assembly as a unit.

4.10 Control Module Assembly

Step 1

Install the item(s) as required:

- a. Pressure switch Install A model pressure switch through grommet in bracket. Install B model pressure switch in bracket. Attach hose fitting. Connect pressuresensing hose. Connect wires (Figure 4-4) (A models only) Perform pressure switch adjustment (4.12) and install the rubber boot.
- b. Pressure relief valve Apply thread sealant and screw clockwise into fitting
- c. Pressure regulator/filter assembly Install fittings and pressure relief valve as required, using thread sealant (Figure 4-2). Install pressure regulator/filter assembly in module panel. Install panel mounting ring. Install the air Inlet quick-disconnect fitting using thread sealant. Connect the air hose to the outlet fitting. Install the drain deflector and the two drain deflector screws
- d. Pressure gauge Install fittings on pressure gauge as required (Figure 4-2). Install pressure gauge in front panel and attach with two retaining clips and nuts. Connect both pressure-sensing hoses (Figure 4-3).
- Power switch/circuit protector Install switch and secure with panel nut. Solder electrical leads to the correct terminals (Figure 4-4).
- f. Controller assembly Install controller assembly and TEMP CONTROL potentiometer. Install both green ground leads over one mounting screw and attach with hex nut. Install TEMP CONTROL potentiometer panel nut. Install TEMP CONTROL knob so that the index mark will line up with the temperature marks at both extremes of rotation. Connect electrical leads to the correct terminals (Figure 4-4). Perform temperature calibration (4.13).

Step 2

Install the control module and cover (4.6).

Step 3

Test for proper operation per the operating instructions in the case lid.

4.11 Air Flow Adjustment

Note: This procedure requires an air flowmeter such as Dwyer Instruments Model VFB-90 or equivalent.

Step 1

Connect the heating tool to a clean, dry compressed air or nitrogen source of 80-200 psig. (Do not connect the tool to the electrical power.)

Step 2

Adjust the AIR REGULATOR for a 5 psig reading on the pressure gauge.

Step 3

Measure the air flow at the heat gun nozzle, using an air flowmeter. The air flow at 5 psig must be 1.6-1.9 sc/m.

Step 4

If air flow requires adjustment, remove the control module and cover (4.5). Do not connect power,

Step 5

Adjust the air flow needle valve (in and output fitting of pressure regulator) for 1.6-1.9 scfm airflow at heat gun nozzle when pressure regulator is set for 5 psig gauge reading.

Step 6

Disconnect air/nitrogen supply and reassemble control module (4.6).

4.12 Pressure Switch Adjustment (HT-900A and HT-920A only)

Note: This procedure requires an ohmmeter.

Step 1

Remove control module and cover (4.5).

Step 2

Connect the heating tool to a clean, dry compressed air or nitrogen source of 80-200 psig. (Do not connect the tool to electrical power.)

Step 3

Adjust the AIR REGULATOR for a 4.5 psig reading on the pressure gauge.

Step 4

Remove the rubber boot from the pressure switch.

Step 5

Connect an ohmmeter across the two terminals of the pressure switch.

Step 6

Turn the pressure switch adjustment screw (in one of the terminals) to the position where the ohmmeter reading changes.

Step 7

Verify that the pressure switch is closed (near zero resistance) when the gauge reading is below 4.5 psig, and open (infinite resistance) when the gauge reading is above 4.5 psig.

Step 8

Disconnect the ohmmeter and air/nitrogen supply, and reassemble control module (4.6).

4.13 Temperature Calibration

Note: This procedure requires a thermocouple and meter suitable for use in the 600° -1000°F temperature range.

Step 1

Fixture a thermocouple 1/32 inch from the end of the heat gun nozzle and centered in the air flow.

Step 2

Connect the heating tool to its electrical power and air/nitrogen sources.

Step 3

Adjust the AIR REGULATOR for 5-7 psig on pressure gauge.

Step 4

Move the POWER switch to the ON position. The POWER and HEATED AIR indicators should illuminate, and the output air should become hot.

Note: The handle switch on B models must be in the ON poistion.

Step 5

Turn the TEMP CONTROL to 900°.

Step 6

The temperature measured at the test thermocouple should be 900°±20°F. If adjustment is required, proceed through step 13. If not, proceed only through step 9.

Step

Turn off the POWER, and allow the heat gun to cool at least 1 minute.

Step 8

Adjust the AIR REGULATOR for 0 psig.

Step 9

Disconnect the heating tool from its power and air/nitrogen sources.

Step 10

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If the heating tool requires calibration, remove the control module and cover (3.5), repeat steps 1 through 5 above, and continue with step 11.

Warning: Electrical shock hazard exists when control module cover is removed.

Step 11

Adjust the trimmer potentiometer (labeled "HI" on the controller circuit board) for an output air temperature of 900°±20°F, with the TEMP CONTROL set at 900°.

Step 12

Shut off the heating tool as directed in steps 7 through 9.

Step 13.

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Reassemble control module (4.6).

Figure 4-4A Wiring Diagram for A Models

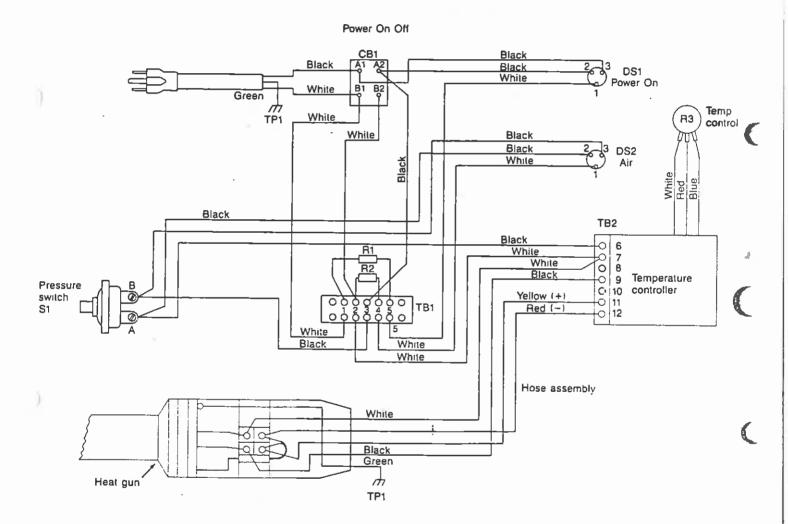


Figure 4-3 Pneumatic Diagram

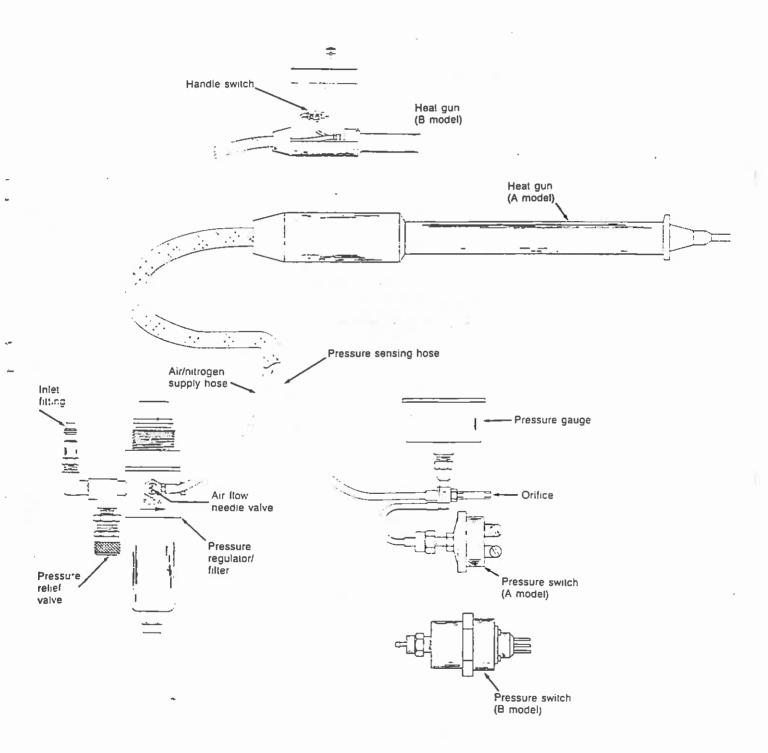
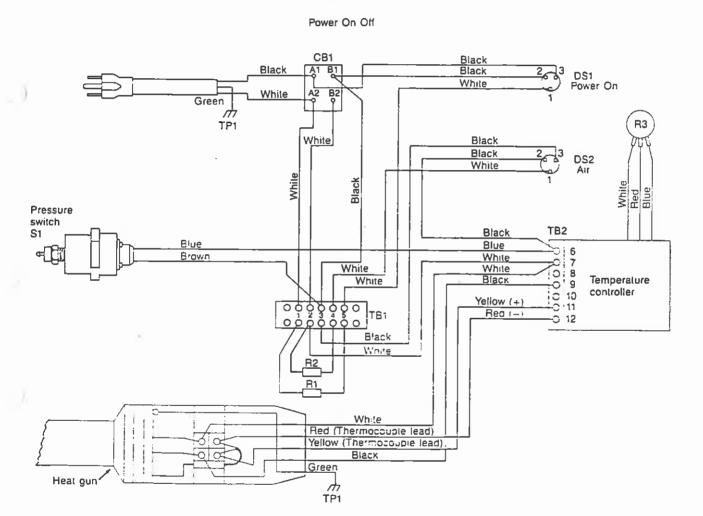


Figure 4-48 Wiring Diagram for B Models



Description	Raychem Part Number	National Stock Number
Needle Point Reflector	979647	4940-00-148-9847
Mini Termination Sleeve Reflector	979663	4940-01-043-7634
Boot and Tubing Reflector	979691	4940-00-148-9848
Termination sleeve Reflector	491878	4940-01-189-6023
Large Boot and Tubing Reflector	444100	4940-01-189-6021
Heating Element, 115V	508744	4940-01-185-4147
Heating Element, 230V	011349	4940-01-189-4146
Thermocouple	~ 7 29711 ~	4940-01-189-6022
Heat Gun/Handle Assy., 115V	980123	4940-01-189-6018
Includes thermocouple and heating element;		
does not include hose or end piece of handle		
Heat Gun/Handle Assy., 230V	975825	4940-01-189-6017
Includes thermocouple and heating element;		
does not include hose or end piece of handle		
Handle Assembly*	074594	4940-01-189-4148
Includes top and bottom halves, switch,		
and screw)		
Air Hose Assy, with Hardware	636183	4940-01-189-4149
Includes and piece of heat gun		
Power Cable	975411	6145-01-141-1994
Power Switch, Circuit Breaker	219449	
Resistors R1 and R2, 115V, 3000 Ω, 5W	994508	5905-01-142-1894
Resistors R1 and R2, 230V, 5000 €2, 11W	975429	5905-01-141-1995
Indicator Light DS1 and DS2 (MS25041-7)	975115	6240-01-143-8976
Indicator Lamp (MS25237-327)	975114	6240-01-142-1907
Air Filter Element	369118	
Pressure Regulator/Filter	643789	
Pressure Gauge	847630	
Pressure Relief Valve	156462	
Pressure Switch S1 (A models)	979636	
Pressure Switch S1 (B models)	646540	
Temperature Controller, 115V	192979	
Temperature Controller, 230V	363846	
Adapter Cable (Navy)	975378	
Adapter Cable (Air Force)	975379	
Maintenance Manual (A models)	450118	
Maintenance Manual (B models)	488076	
Repair Manual	369275	

^{*}B Model Handle Assembly is provided for all replacement applications.

Raychem Corporation

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