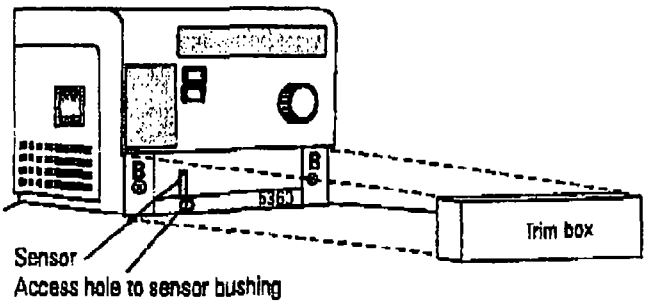
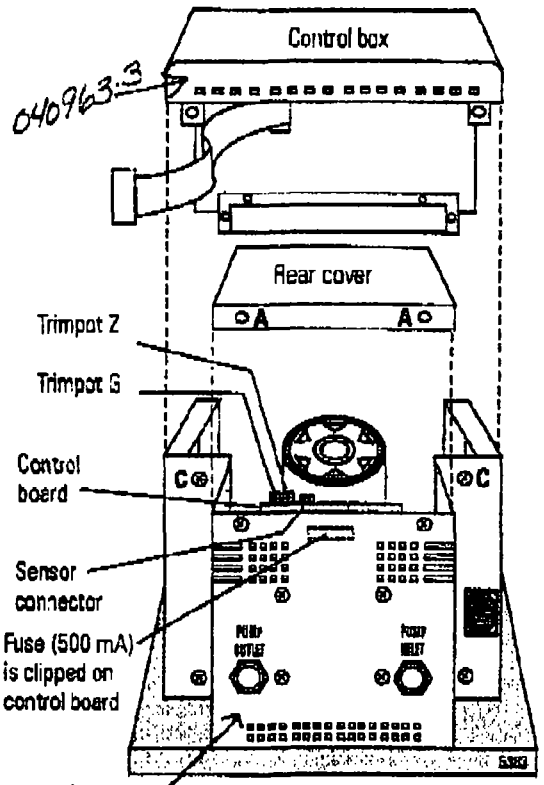
Special Bath '93 issue ! analog controller





Access

To access the control board, sensor connector, fuse, and calibration trimpots Z and G: Remove two screws (A) and remove the Rear Cover. The Control Box itself may remain in place.

To remove the Sensor, pop off the Trim Box. Insert an allen wrench through the Access Hole to engage the setscrew in the sensor bushing.

To completely remove the CONTROL BOX, remove two screws (B) and two screws (C).

Recalibration (analog)

NOTE: It is not necessary to remove any covers.

1. Place a reference thermometer in the bath.
2. Turn the bath on. Set the setpoint knob to the usual operating temperature. If that is unknown, use 40° C.
3. Allow time for the bath to stabilize. This has occured when the heater lamp is cycling at an even rate.
4. Compare the knob pointer to the reference thermometer. If they disagree, loosen the knob's setscrews and realign the knob on the shaft so the knob point at the correct temperature.
5. Calibration is complete.

If the board's settings are suspect (someone has been fooling with the trimpots), you can remove the rear cover and follow the procedure on the next page for the digital controller. This procedure will restore the original calibration. Just substitute "knob pointer" where the procedure calls for looking at the display. The trimpot names (Z and G) are identical. Refer to the illustration above for their locations.

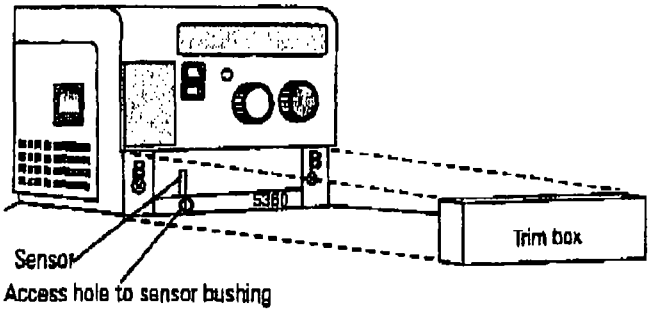
Fuse Info

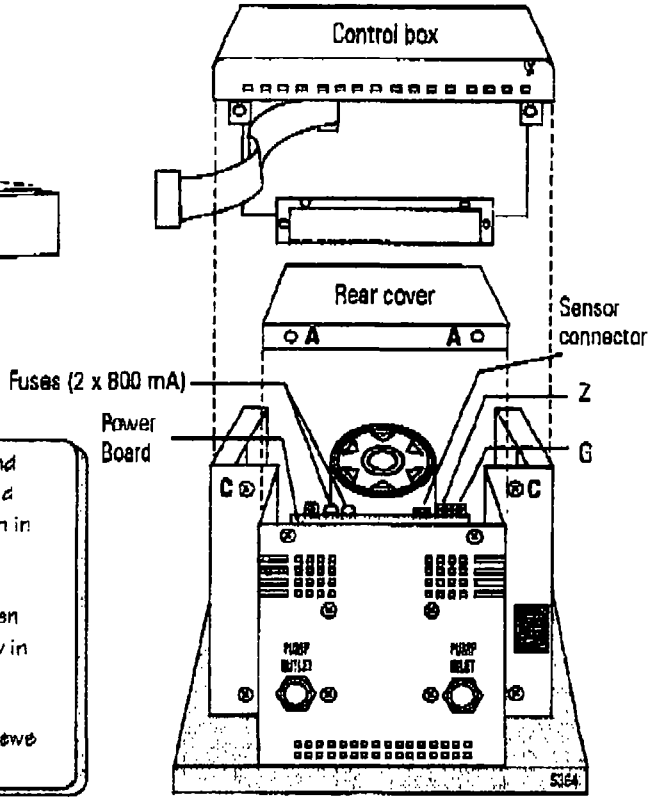
If the fuse is blown, the lamps on the control panel will not light, but the refrigeration will operate normally.
All fuses used in these baths are metric:
size 5mm x 20mm

This unit uses a single-diode temperature sensor. For detailed information on testing the sensor, refer to the April 1995 issue of The Evaporator. (reprints available from the editor)

Shipping Caps 14454(2)
Body 14455

Special Bath '93 issue ! digital controller





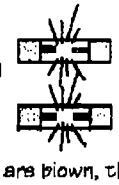
Access

To access the control board, sensor connector, fuses, and calibration trimpots Z and G: Remove two screws (A) and remove the Rear Cover. The Control Box itself may remain in place.

To remove the Sensor, pop off the Trim Box. Insert an allen wrench through the Access Hole to engage the setscrew in the sensor bushing.

To completely remove the CONTROL BOX, remove two screws (B) and two screws (C).

Fuse Info



If both fuses are blown, the display and lamps on the control panel will not light, but the refrigeration will operate normally.
If only one fuse is blown, the display will be dimmer than normal and the bath may not operate at all if low line voltage is present.
The fuses are metric, size 5mm x 20mm.

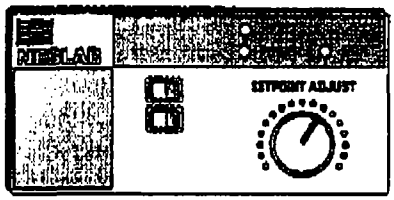
Recalibration (digital)

The complete recalibration calls for adjustments at 0° and 150° C. However, if you are using water as a fluid, these temperatures are inconvenient as water is a solid at one, and a gas at the other! If you are using water between 5°C and 90°C, the following procedure will be adequate. If you need the full range procedure, contact our Technical Service people.

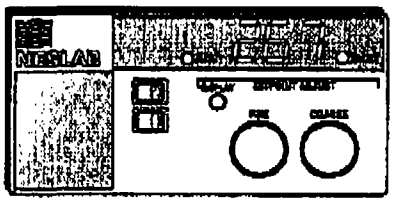
1. Remove the rear cover to expose the trimpots. Refer to the illustration above for trimpot locations.
2. Insert a reference thermometer in the bath.
3. Turn setpoint to 5°C and allow bath to stabilize there. (If you have an Exacal bath, you can substitute 40°C)
4. Compare the displayed temperature to the reference thermometer. If they disagree, adjust trimpot Z (Zero) until they agree.
5. Turn setpoint to 90°C and allow bath to stabilize there.
6. Compare the displayed temperature to the reference thermometer. If they disagree, adjust trimpot G (Gain) until they agree.
7. Go back to 5°C. Make sure they still agree. If they don't, repeat the procedure. The trimpots interact a bit, so you'll get a little closer each time.
8. Wet hair. Apply shampoo. Lather. Rinse. Repeat.

This unit uses an RTD type temperature sensor. For detailed information on testing the sensor, refer to the April 1995 issue of The Evaporator (reprints available from the editor)

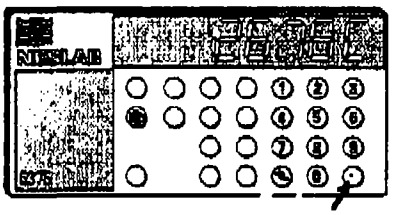
Special Bath '93 issue ! - Identification



The **ANALOG** controller is attached to the bath. Temperature is set using the analog dial, and monitored using a glass laboratory thermometer. The two rocker switches are optional and are installed on units with boost heaters or refrigeration respectively. There is no provision for computer control.



The **DIGITAL** controller is also attached to the bath. Temperature is set by pressing the DISPLAY button and turning the COARSE and FINE knobs while observing the displayed setpoint. Releasing the DISPLAY button switches the display back to actual temperature. The two switches are optional as above. A 15 pin accessory port is provided for optional interface.



The **MICROPROCESSOR** controller rests on the bath but may be removed for remote mounting. The temperature may be displayed in either °C or °F. An RS-232 port allows direct computer control.

QUICK TIP: Trying to tell them apart from the previous Modbath series? The Modbath has red display digits, The Bath 93 series has green digits.

How to decode the unit's part number (example - 134103200700) :

134	1	03	20	07	00
	CONDENSER	ELECTRICAL	PUMP	CONTROL	CATALOG
128 Ex111*	0 None	▶03 115v 60Hz	19 F-pump	01 Analog	▶00 Standard
129 Ex211*	▶1 Air cooled	06 220-240v 50Hz	▶20 Z-pump	▶07 Digital	01-99 Custom
130 Ex221*		11 100v 50-60Hz		11 Micro-processor	
131 Ex411*					
132 Ex511*					
▶134 Rte111					
135 Rte211					
136 Rte221					
137 Ex111					
138 Ex211					
139 Ex221					
140 Ex411					
141 Ex511					
167 Rte111*					
168 Rte211*					
169 Rte221*					

Ex = Exacal (non refrigerated)
Rte = Refrigerated
The numbers indicate the relative tank size (111 is smallest and so on)

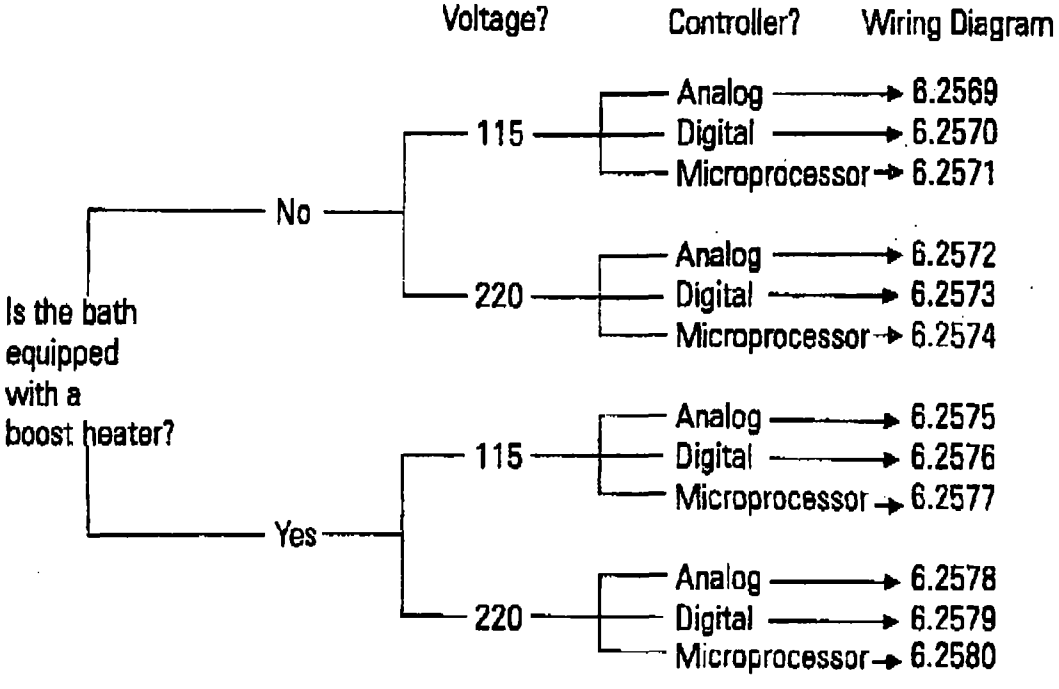
Post-it® Fax Note 7671 | Date 6/4 | # of pages ▶ 6
To Omar Clay | From Lisa Hamel
Co./Dept. SanDiego | Co. Neslab
Phone # | Phone #
Fax # 858 534 7697 | Fax #

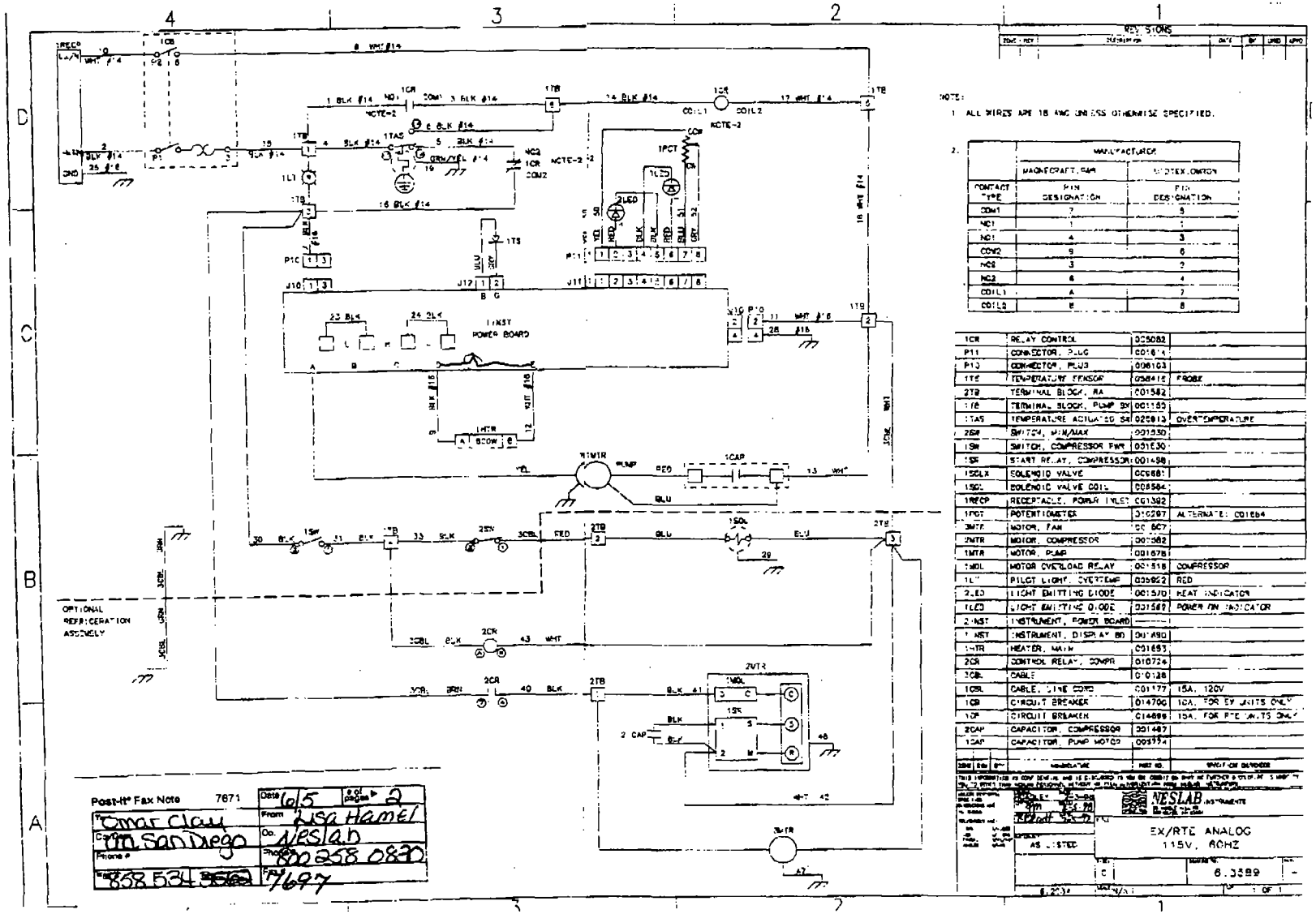
NESLAB
WORLD WIDE WEB
in the home page of
The American Chemical Society
http://pubs.acs.org

	analog	digital	microprocessor
control board	1890	1551	1550.4
power board	N/A	1892	1891
sensor	58416	1147	see page 1
fuse	1661 (500 mA)	1662 (800 mA x 2)	1663 (2 Amp)
pump motor 115v	1678	1678	1678
pump motor 220v	1679	1679	1679
pump motor 115v (EX511 only)	1683	1683	1683
pump motor 220v (EX511 only)	1682	1682	1682
keypad	N/A	N/A	NESLAB=484, Brookfield=587
keypad mounting plate	N/A	N/A	027436
operating manual, EX	259	259	261
operating manual, RTE	258	258	260

See next page for refrigeration parts

Use this chart to find a bath wiring diagram. This chart works for all size EX and RTE units. These diagrams will be distributed to LSI fields depots on microfiche.

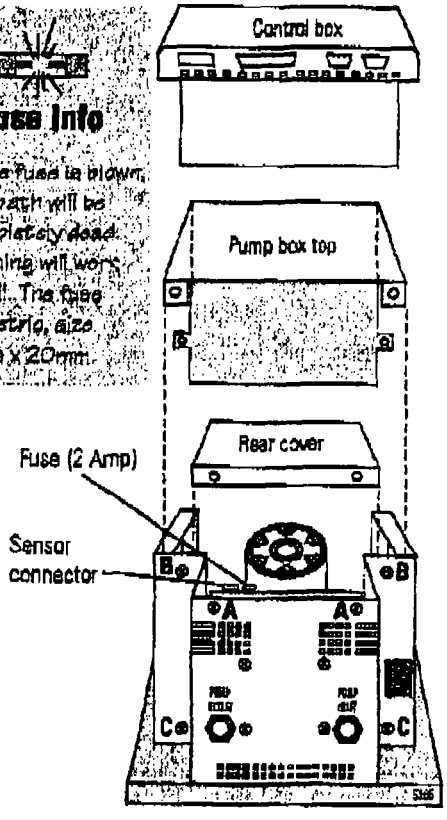



REVISIONS
NOTE:
1. ALL WIRES ARE 18 AWG UNLESS OTHERWISE SPECIFIED.
2.
MANUFACTURER
MAGNECRAFT, SAR
AMPHENOL
CONTACT TYPE
PIN DESIGNATION
COM1 7 9
NC1 1 1
NO1 4 3
COM2 9 6
NC2 3 2
NO2 6 4
COIL1 A 7
COIL2 B 8
1CR RELAY CONTROL 025082
P11 CONNECTOR, PLUG 006104
P10 CONNECTOR, PLUG 006103
1TS TEMPERATURE SENSOR 038416 PROBE
2TB TERMINAL BLOCK, RA 001582
1TB TERMINAL BLOCK, PUMP SK 001185
1TAS TEMPERATURE ACTUATED SW 025013 OVER-TEMPERATURE
2SW SWITCH, MIN/MAX 001530
1SW SWITCH, COMPRESSOR PWR 001530
1SR START RELAY, COMPRESSOR 001498
1SOLX SOLENOID VALVE 006681
1SOL SOLENOID VALVE COIL 008564
1RECP RECEPTACLE, POWER INLET 001302
1POT POTENTIOMETER 010297 ALTERNATE: 001684
1MTR MOTOR, FAN 006677
2MTR MOTOR, COMPRESSOR 001582
1MTR MOTOR, PUMP 001678
1MOL MOTOR OVERLOAD RELAY 001516 COMPRESSOR
1LT PILOT LIGHT, OVERTEMP 030922 RED
2LED LIGHT EMITTING DIODE 001570 HEAT INDICATION
1LED LIGHT EMITTING DIODE 001569 POWER ON INDICATOR
2INST INSTRUMENT, POWER BOARD
1INST INSTRUMENT, DISPLAY BD
1HTR HEATER, MAIN 001693
2CR CONTROL RELAY, COMPR 010724
3CBL CABLE 010128
1CBL CABLE, LINE CORD 001177 15A, 120V
1CB CIRCUIT BREAKER 014706 10A, FOR EX UNITS ONLY
1CB CIRCUIT BREAKER 014699 15A, FOR PIE UNITS ONLY
2CAP CAPACITOR, COMPRESSOR 001487
1CAP CAPACITOR, PUMP MOTOR 009994
NESLAB INSTRUMENTS
EX/RTE ANALOG
115V, 60HZ
AS LISTED
C
6.3389
1 OF 1
OPTIONAL REFRIGERATION ASSEMBLY
POWER BOARD
HTR
2VLV
Post-It Fax Note 7671
Date 6/5 # of pages 2
To Omar Clay
From Lisa Hamel
Co. UCSD
Co. NESLAB
Phone # 858 534 5562
Phone # 800 258 0830
Fax # 7697

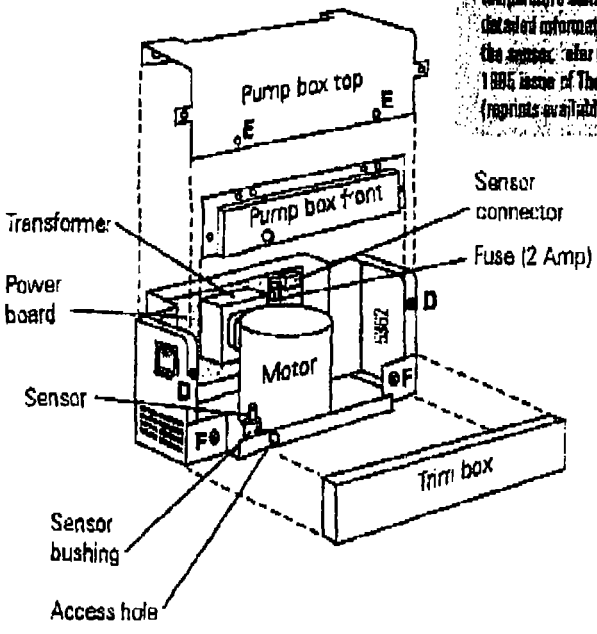
Special Bath '93 issue ! microprocessor controller

Fuse Info

If the fuse is blown, the bath will be completely dead. Nothing will work at all. The fuse is metric, size 5mm x 20mm.



This unit uses an RTD type temperature sensor. For detailed information on testing the sensor, refer to the April 1995 issue of The Evaporator. (reprints available from the editor)



Recalibration

The procedure is found in the operating manual. Get manual 000280 for RTE, or 000291 for Exacals.

Bruce Manchester's acclaimed reference document, titled, **"Microprocessor Troubleshooting"** is available on the NESLAB Online BBS. See page 2 for access details.

Access

1. Unplug unit.
2. Disconnect 25 pin cable from Control box.
3. Lift Control box off unit.
4. Remove 2 screws (A). The Rear cover may now be removed. The sensor connector and fuse are now accessible.

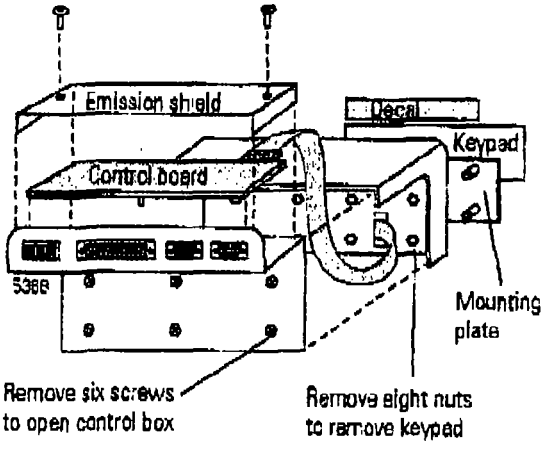
If further access is required:

5. Remove 2 screws (B).
6. Loosen (but do not remove) 2 screws (C).
7. Remove 2 screws (D).
8. Remove 2 screws (E).
9. Lift the Pump Box top off.

If sensor access is required:

10. Pop off the Trim box.
11. Remove 2 screws (F).
12. Lift Pump box front off.
13. Insert an Allen wrench through the Access hole to engage the setscrew in the sensor bushing.

Control Box



NOTE: The keypad is glued to the Mounting plate. Replacing keypad will require a new Mounting plate also.

RTD Temperature Vs. Resistance Table

For European Curve, Alpha = .00385

1° Celsius Increments

°C	Ohm	Diff.	°C	Ohm	Diff.	°C	Ohm	Diff.	°C	Ohm	Diff.	°C	Ohm	Diff.	°C	Ohm	Diff.
-200	18.49		-140	43.87	0.42	-80	68.33	0.41	-20	92.16	0.39	± 0	100.00	0.39	+ 60	123.24	0.38
199	18.93	0.44	139	44.28	0.41	79	68.73	0.40	19	92.55	0.39	+ 1	100.39	0.39	61	123.62	0.38
198	19.36	0.43	138	44.70	0.42	78	69.13	0.40	18	92.95	0.40	2	100.78	0.39	62	124.01	0.39
197	19.79	0.43	137	45.11	0.41	77	69.53	0.40	17	93.34	0.39	3	101.17	0.39	63	124.39	0.38
196	20.22	0.43	136	45.52	0.41	76	69.93	0.40	16	93.73	0.39	4	101.56	0.39	64	124.77	0.38
195	20.65	0.43	135	45.94	0.42	75	70.33	0.40	15	94.12	0.39	5	101.95	0.39	65	125.16	0.39
194	21.08	0.43	134	46.35	0.41	74	70.73	0.40	14	94.52	0.40	6	102.34	0.39	66	125.54	0.38
193	21.51	0.43	133	46.76	0.41	73	71.13	0.40	13	94.91	0.39	7	102.73	0.39	67	125.92	0.38
192	21.94	0.43	132	47.18	0.42	72	71.53	0.40	12	95.30	0.39	8	103.12	0.39	68	126.31	0.39
191	22.37	0.43	131	47.59	0.41	71	71.93	0.40	11	95.69	0.39	9	103.51	0.39	69	126.69	0.38
190	22.80	0.43	130	48.00	0.41	70	72.33	0.40	10	96.09	0.40	10	103.90	0.39	70	127.07	0.38
189	23.23	0.43	129	48.41	0.41	69	72.73	0.40	9	96.48	0.39	11	104.29	0.39	71	127.45	0.38
188	23.66	0.43	128	48.82	0.41	68	73.13	0.40	8	96.87	0.39	12	104.68	0.39	72	127.84	0.39
187	24.09	0.43	127	49.23	0.41	67	73.53	0.40	7	97.26	0.39	13	105.07	0.39	73	128.22	0.38
186	24.52	0.43	126	49.64	0.41	66	73.93	0.40	6	97.65	0.39	14	105.46	0.39	74	128.60	0.38
185	24.94	0.42	125	50.06	0.42	65	74.33	0.40	5	98.04	0.39	15	105.85	0.39	75	128.98	0.38
184	25.37	0.43	124	50.47	0.41	64	74.73	0.40	4	98.44	0.40	16	106.24	0.39	76	129.37	0.39
183	25.80	0.43	123	50.88	0.41	63	75.13	0.40	3	98.83	0.39	17	106.63	0.39	77	129.75	0.38
182	26.23	0.43	122	51.29	0.41	62	75.53	0.40	2	99.22	0.39	18	107.02	0.39	78	130.13	0.38
181	26.65	0.42	121	51.70	0.41	61	75.93	0.40	1	99.61	0.39	19	107.40	0.38	79	130.51	0.38
180	27.08	0.43	120	52.11	0.41	60	76.33	0.40				20	107.79	0.39	80	130.89	0.38
179	27.50	0.42	119	52.52	0.41	59	76.73	0.40				21	108.18	0.39	81	131.27	0.38
178	27.93	0.43	118	52.92	0.40	58	77.13	0.40				22	108.57	0.39	82	131.66	0.39
177	28.35	0.42	117	53.33	0.41	57	77.52	0.39				23	108.96	0.39	83	132.04	0.38
176	28.78	0.43	116	53.74	0.41	56	77.92	0.40				24	109.35	0.39	84	132.42	0.38
175	29.20	0.42	115	54.15	0.41	55	78.32	0.40				25	109.73	0.38	85	132.80	0.38
174	29.63	0.43	114	54.56	0.41	54	78.72	0.40				26	110.12	0.39	86	133.18	0.38
173	30.05	0.42	113	54.97	0.41	53	79.11	0.39				27	110.51	0.39	87	133.56	0.38
172	30.47	0.42	112	55.38	0.41	52	79.51	0.40				28	110.90	0.39	88	133.94	0.38
171	30.90	0.43	111	55.78	0.40	51	79.91	0.40				29	111.28	0.38	89	134.32	0.38
170	31.32	0.42	110	56.19	0.41	50	80.31	0.40				30	111.67	0.39	90	134.70	0.38
169	31.74	0.42	109	56.60	0.41	49	80.70	0.39				31	112.06	0.39	91	135.08	0.38
168	32.16	0.42	108	57.00	0.40	48	81.10	0.40				32	112.45	0.39	92	135.46	0.38
167	32.59	0.43	107	57.41	0.41	47	81.50	0.40				33	112.83	0.38	93	135.84	0.38
166	33.01	0.42	106	57.82	0.41	46	81.89	0.39				34	113.22	0.39	94	136.22	0.38
165	33.43	0.42	105	58.22	0.40	45	82.29	0.40				35	113.61	0.39	95	136.60	0.38
164	33.85	0.42	104	58.63	0.41	44	82.69	0.40				36	113.99	0.38	96	136.98	0.38
163	34.27	0.42	103	59.04	0.41	43	83.08	0.39				37	114.38	0.39	97	137.36	0.38
162	34.69	0.42	102	59.44	0.40	42	83.48	0.40				38	114.77	0.39	98	137.74	0.38
161	35.11	0.42	101	59.85	0.41	41	83.88	0.40				39	115.15	0.38	99	138.12	0.38
160	35.53	0.42	100	60.25	0.40	40	84.27	0.39				40	115.54	0.39	100	138.50	0.38
159	35.95	0.42	99	60.66	0.41	39	84.67	0.40				41	115.93	0.39	101	138.88	0.38
158	36.37	0.42	98	61.06	0.40	38	85.06	0.39				42	116.31	0.38	102	139.26	0.38
157	36.79	0.42	97	61.47	0.41	37	85.46	0.40				43	116.70	0.39	103	139.64	0.38
156	37.21	0.42	96	61.87	0.40	36	85.85	0.39				44	117.08	0.38	104	140.02	0.38
155	37.63	0.42	95	62.28	0.41	35	86.25	0.40				45	117.47	0.39	105	140.39	0.37
154	38.04	0.41	94	62.68	0.40	34	86.64	0.39				46	117.86	0.38	106	140.77	0.38
153	38.46	0.42	93	63.09	0.41	33	87.04	0.40				47	118.24	0.39	107	141.15	0.38
152	38.88	0.42	92	63.49	0.40	32	87.43	0.39				48	118.62	0.38	108	141.53	0.38
151	39.30	0.42	91	63.90	0.41	31	87.83	0.40				49	119.01	0.39	109	141.91	0.38
150	39.71	0.41	90	64.30	0.40	30	88.22	0.39				50	119.40	0.39	110	142.29	0.38
149	40.13	0.42	89	64.70	0.40	29	88.62	0.40				51	119.78	0.38	111	142.66	0.37
148	40.55	0.42	88	65.11	0.41	28	89.01	0.39				52	120.16	0.38	112	143.04	0.38
147	40.96	0.41	87	65.51	0.40	27	89.40	0.39				53	120.55	0.39	113	143.42	0.38
146	41.38	0.42	86	65.91	0.40	26	89.80	0.40				54	120.93	0.38	114	143.80	0.38
145	41.79	0.41	85	66.31	0.40	25	90.19	0.39				55	121.32	0.39	115	144.17	0.37
144	42.21	0.42	84	66.72	0.41	24	90.59	0.40				56	121.70	0.38	116	144.55	0.38
143	42.63	0.42	83	67.12	0.40	23	90.98	0.39				57	122.09	0.39	117	144.93	0.38
142	43.04	0.41	82	67.52	0.40	22	91.37	0.39				58	122.47	0.38	118	145.31	0.38
141	43.46	0.41	81	67.92	0.40	21	91.77	0.40				59	122.86	0.39	119	145.68	0.37

Note: At 100°C resistance is 138.50 ohms.

(DIN 43 760)

loop systems in the following manner. Connect the shortest possible section of flexible 3/8" tubing from the RTE-DD outlet to the inlet of external system (1). Run flexible tubing from system (1) outlet directly into the bath area. For external system (2) run a section of tubing from the bath area to the inlet of the system. Another section of tubing should run from the outlet of system (2) to the inlet of the RTE-DD.

The force section of the pump will push the bath fluid through system 1 while the suction section of the pump will pull the fluid through system 2.

2.3 ELECTRICAL REQUIREMENTS

LINE CORD COLOR CODE

115 volt	50/60 Hz	13 Amps	Black, White (Green Ground)
208/230 volt	60 Hz	6 Amps	Black, White (Green Ground)
220/240 volt	50 Hz	6 Amps	Blue, Brown (Green/Yellow Ground)

Actual voltage and amperage can be found on the serial number plate on the rear of the unit.

2.4 FILLING REQUIREMENTS

Fill the reservoir to within 3/4" of the top plate to insure contact of all refrigerant coils with the fluid. Do not allow the bath fluid level to fall below 2½" of the top. Heater burn out and aeration of the bath fluid will occur if the bath fluid level is too low.

DO NOT RUN BATH DRY !!!!!

NOTE: When pumping to an external system, be sure to have additional bath fluid on hand to compensate for the loss in volume to that system. Also, when the RTE-DD is used to maintain temperatures below 8°C, a non freezing fluid should be used. A 50/50 mixture of laboratory grade ethylene glycol and water is compatible with the entire temperature range of the RTE-DD units.

FIGURE 3 - Diagrams for front and rear panels of RTE-DD units.

2.5 TEMPERATURE ADJUSTMENT

During normal operation of the RTE-DD units all functions are controlled by the front panel controls (See Figure 3). When temperature control below +40°C is desired the lower tip switch should be in the -40°C position. When operating above +40°C the tip switch should be in the -40°C position thereby turning off the refrigeration compressor and allowing ambient to provide the cooling necessary to maintain temperature.

Turn the high temperature cutout dial on the rear panel of the RTE-DD unit to the full clockwise position and depress the reset button with a pencil eraser or other suitable object. Turn the main power switch to the "ON" position. The pump motor will start and the digital display will light.

To set the bath temperature depress and hold the black setpoint/bath temperature button above the LED display. Turn the coarse control dial until the desired temperature setpoint is shown on the LED display. The fine control dial can be used to aid in accurately setting the desired temperature. Once the operating temperature has been set, release the setpoint/bath temperature button. The LED will now display the actual bath temperature. As the bath temperature closely approaches the setpoint temperature the heater will cycle to maintain temperature.

Once the bath has come to stability the temperature reading in the setpoint and bath temperature positions should be the same. Very small adjustments to the fine control may be required to make the bath temperature and setpoint temperature agree. CAUTION: Inadvertent movement of the coarse or fine control dial, regardless of the position of the black setpoint button, will result in a change in the setpoint. This change will not be reflected on the digital display unless the setpoint button is depressed.

IMPORTANT (A) All RTE-DD units are capable of accepting the MTP-5 and ETP-3 Electronic Temperature Programmers or RS-1 Remote Sensor. Connection is made through the receptacle located on the rear of the control box. When the bath is used without a temperature programmer

accessory, the toggle switch next to the receptacle must be in the "OFF" position. (B) Never operate the refrigeration system when actual bath temperature is above +50°C. Allow bath to cool down to +50°C before starting the compressor.

2.6 HIGH TEMPERATURE/LOW LIQUID LEVEL SAFETY

All Neslab bath models are equipped with a High Temperature/Low Liquid Safety. The safety can be adjusted across the entire range of the circulator. Its primary purpose is to protect the bath against excess fluid temperature. A single sensing probe is used to control both functions. By attaching the sensing probe to the heater, low liquid level will be detected when the exposed surface of the heater becomes hot and shuts off the bath.

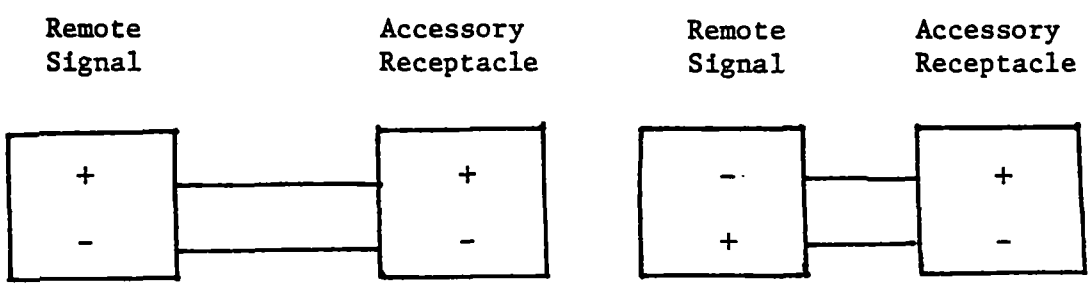
The High Temperature/Low Liquid Level Safety should be set according to the following procedure. Turn the adjustment dial fully clockwise and depress the Reset button. Start the bath and allow it to stabilize at the desired operating temperature. Turn the dial slowly counter clockwise until the bath shuts off. Note the position of the dial where the Reset button disengages and the bath stops. Turn the dial clockwise past the point where the bath stopped and depress the Reset button. (If the refrigeration system was on wait approximately 10 minutes before depressing the Reset button). Turn the dial counter clockwise to a point just above where the bath originally stopped (approximately 3/5 of one whole division).

If the High Temperature/Low Liquid Level Safety is activated, the problem must be corrected before the bath is restarted.

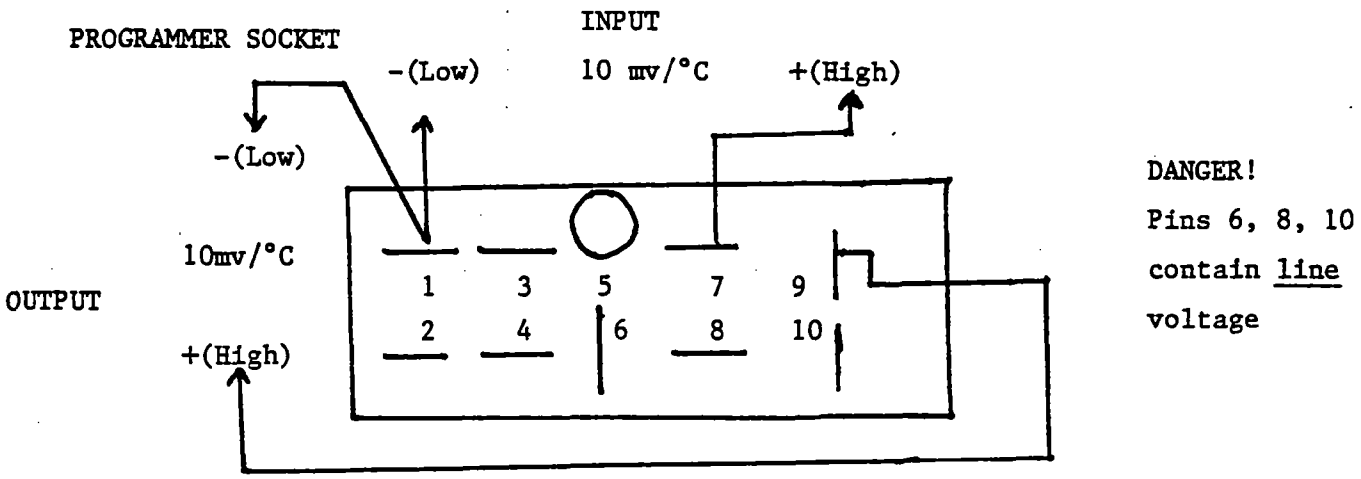
2.7 INTERFACE OF RTE-DD WITH REMOTE SIGNAL INPUT

Neslab's RTE-DD units are remote controllable through the accessory receptacle on the rear of the control box. An input signal into pins #1 and #7 of a known voltage alters the sensor circuit so that controller adjusts to a false temperature change. A suitable male plug, part number 10076, is available from Neslab Instruments.

An input signal of 0.00 mv DC corresponds to a setpoint of 0.00°C. An input signal of 10.00 mv corresponds to a setpoint of 1.00°C. The polarity of the signal will determine whether the setpoint is negative or positive.



To begin operation of the system, connect the remote signal output to the accessory receptacle of the RTE-DD. The accessory toggle switch on the rear of the RTE-DD control box should be "ON" at this point. Turn the bath "ON" and adjust the remote signal to the voltage which corresponds to the desired setpoint. Allow the system to stabilize. The bath temperature will increase or decrease, depending on the polarity, 1°C for every 10 mv supplied.



CAUTION: A minimum of 50 ma must be available at the input. The system cannot be driven outside of its normal operating range.

2.8 RECORDER OUTPUT

Using pins #1 and #9 of the accessory receptacle a 10mv/°C signal corresponding to the sensor temperature is available. (See figure #3).

SECTION III MAINTENANCE

3.1 CLEANING

It is recommended that the unit be drained and cleaned periodically. Wash out with a mild soapy solution and dry with a soft clean cloth. DO NOT USE STEEL WOOL. Its abrasiveness will lead to rusting.

A build up of dust or debris on the protective screen or heat exchange fins will interfere with the transfer of heat and prevent proper operation of the system. A periodic vacuuming of the front and rear panels will prevent a loss of cooling efficiency.

3.2 ALGAE

For protection against algae and bacteria build up, an algicide called Chloramin-T is available from EM Sciences, 480 Democrat Road, Gibbstown, NJ 08027. Used at a rate of 0.2 - 0.3 grams/liter (1 gram/gallon) this algicide is compatible with Neslab Circulators.

3.3 RUST

Contrary to common belief, stainless steel will rust if not properly used and maintained. Any physical damage to stainless steel such as scratching or pitting can cause rusting. The stainless steel parts exposed to bath fluids should be thoroughly cleaned periodically.

SECTION IV TROUBLE SHOOTING

4.1 IF RTE-DD WILL NOT START

(A) Check power source for correct voltage output.

(B) RTE-DD units with 220/240 volt, 50 Hz electrical requirements, check line cord plug wiring. (See section 2.3)

(C) Check the High Temperature/Low Liquid Level Safety located on the rear of the control box. (See section 2.6)

4.2 LOSS OF COOLING CAPACITY (SEE SECTION 1.4 & 1.5 FOR RTE COOLING CAPACITY SPECIFICATIONS)

A. To operate below 40°C the cooling switch must be in the - 40°C position. Be sure LED display is set for the desired low temperature when the setpoint/bath temperature button is depressed.

B. If recirculating to an external system, do not overcome the cooling capacity of the RTE-DD.

C. If the RTE-DD is shut off after the refrigeration compressor was operating wait ten minutes before restarting the unit. The refrigeration compressor will short cycle (clicking sound) if time is not allowed for equalization of refrigerant pressures.

D. The RTE-DD need proper ventilation for heat removal. Keep the front and rear ventilation panels open and cleared of dust. If ventilation is poor, the refrigeration compressor will shut down because of heat build up.

E. When operating below 8°C, a non freezing solution must be added to the bath fluid. A 50/50 solution of ethylene glycol and water is suitable for the entire range of the RTE-DD units.
Ice build up on the RTE-DD cooling coil will act as insulation and lower the cooling capacity of the unit. Raise the temperature of the bath to de-ice the cooling coil and increase the concentration of non-freezing solution.

F. When the circulating pump is not in use, plug the inlet connection on units equipped with the "Z" pump to prevent aeration of the bath and lowering of the units cooling capacity.

4.3 NO HEATING

A. Check temperature setting to be sure that it is at your desired temperature.
B. Cooling system must be off to reach temperatures above 40°C.

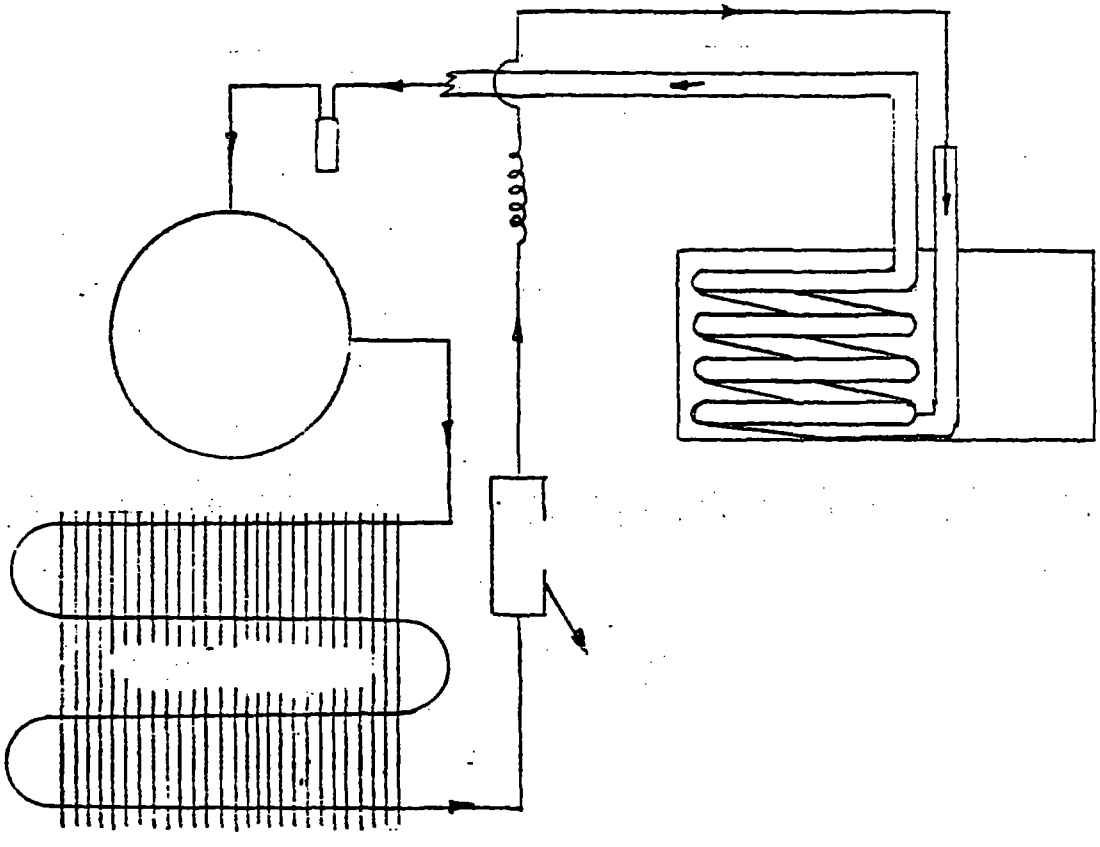
4.4 NO TEMPERATURE CONTROL

A. Below 40°C the cooling system must be on for proper temperature control.
B. Above 40°C the cooling system must be off for proper temperature control.
C. When using the RTE-DD units, the accessory toggle switch (located on the rear of the control box) must be in the "OFF" position when accessories are not in use.

4.5 NO EXTERNAL CIRCULATION

A. Make certain adjustable flow control is open (turn counter clockwise).
B. Check for plug in external systems line.
C. Recirculation will cease when pump head is exceeded. Review pump specifications stated previously (Section 1.4).

NOTE: If after following these trouble shooting steps, your unit fails to operate properly, contact our Instrument Service Department. When calling the Service Dept. please have the following information available: Part Number and Serial Number of unit which can be found on the rear of the control box, voltage of the unit, and application.



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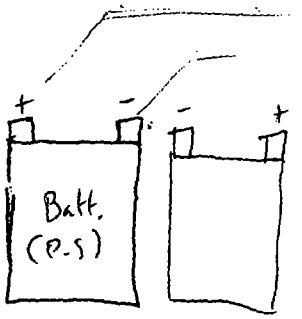
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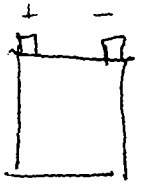
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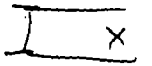
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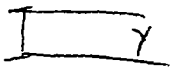
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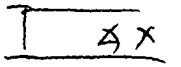
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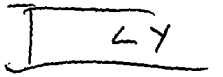
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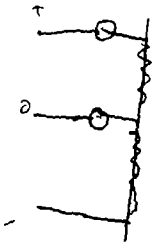

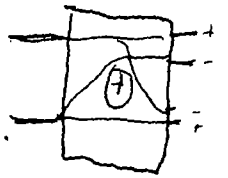

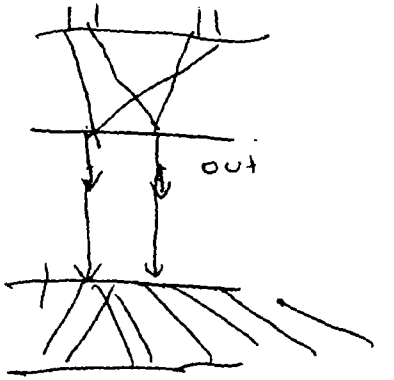
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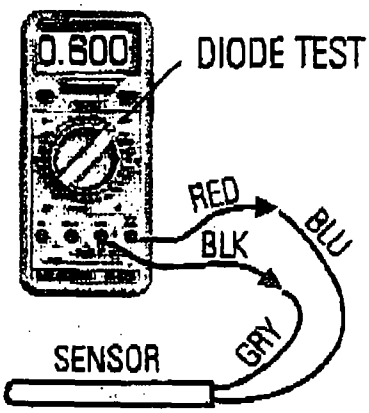
Mini Workshop #6

Testing Diode sensors

(B)

Diode sensors measure temperature by measuring the DC voltage drop across a diode. This drop decreases as temperature increases. Single-diode sensors are used in NESLAB baths, CFT, and HX units: generally units with analog controllers. Three-diode sensors are generally found on baths, CFT, and HX units with digital controllers.

1

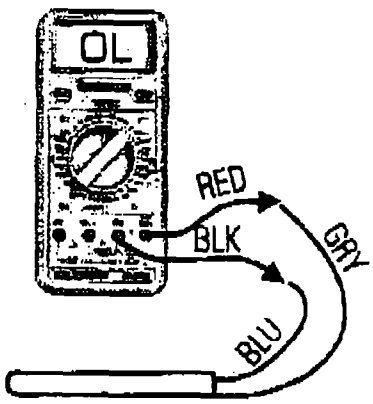


Turn unit off. Disconnect sensor from unit. Set meter to DIODE TEST range. Plug the red probe into the volt/ohm jack. Plug the black probe into the common jack.

Connect meter probes to sensor as shown. This will forward-bias the diode. Single-diode sensors will read around 0.600. Three-diode sensors will read around 1.800. This is the actual DC voltage drop across the diode.

Warm the sensor with your hand. The reading should decrease, assuming that your body temperature is above ambient. If you are a lawyer, you will need to find someone else to do this.

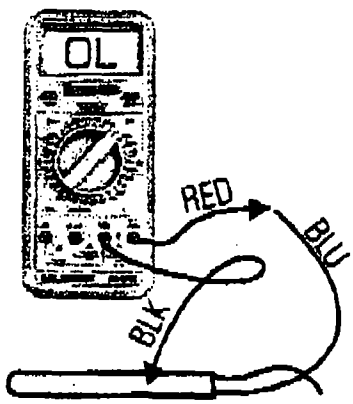
2



Now just reverse the meter leads. Now you are reverse-biasing the diode and therefore current will not pass.

The meter should display OL (overload) or some infinite reading, indicating an open circuit.

3



Connect the red probe to the blue wire. Touch the black probe to the sensor shell.

The meter should again display OL or infinite, indicating there is no path from the sensor diode to the shell itself.

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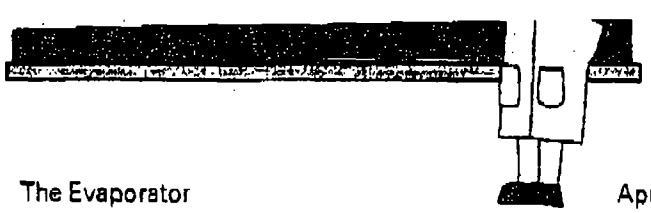


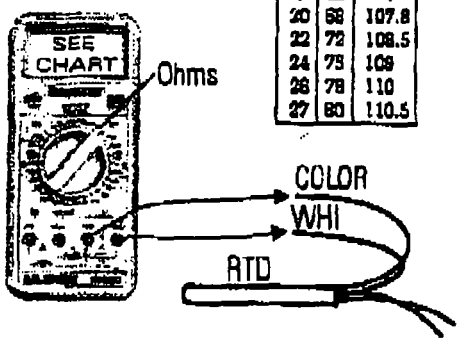
Mini Workshop #7

Testing ⑤ RTD sensors

RTD sensors are resistors wound from platinum wire. They will measure 100 Ohms when at 0°C. The resistance rises with temperature. They have 4 wires. One pair carries current to the resistor. The other pair measures voltage at the resistor. (The pairs are interchangable.) Two colored wires go to one end of the resistor. Two white wires go to the other end. This 4 wire system nulls out errors introduced by the resistance of the wires themselves. There are four steps to test an RTD.

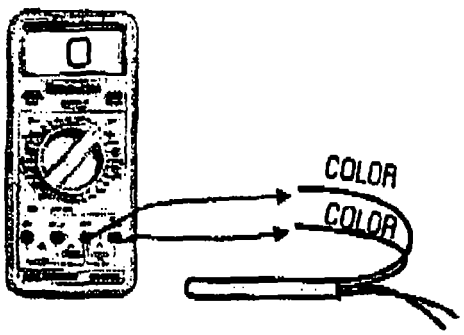
°C	°F	Ohms
0	32	100
20	68	107.8
22	72	108.5
24	75	109
26	78	110
27	80	110.5

①



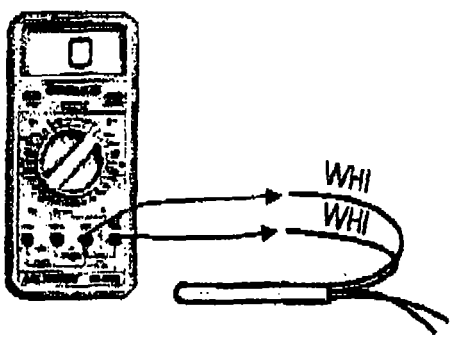
Turn unit off. Disconnect RTD. Set meter to Ohms range. Measure between either colored wire and either white wire. The display should indicate a resistance relative to the temperature of the RTD. See chart. Warm sensor by hand and observe resistance increase. This proves the RTD is responding.

②



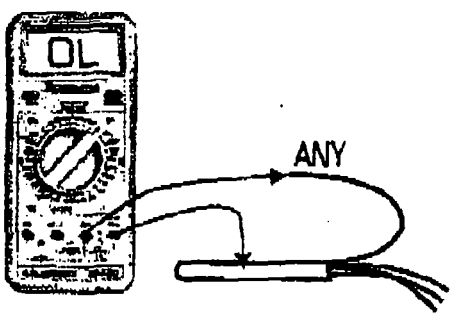
Now measure between the two colored wires. Observe zero or almost zero resistance. This proves both colored wires are intact.

③



Now measure between the two white wires. Observe zero or almost zero resistance. This proves both white wires are intact.

④



Finally test from any wire (we've already proven they are all good) to the shell. The meter should display OL (overload) or some infinite reading, indicating an open circuit.

RTD sensors are found where high precision is required. NESLAB uses them in various units, including DR2, ULT80, EX250, Exatrol, and microprocessor baths.

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