MODEL T-200
PLATINUM RESISTANCE
TEMPERATURE SENSOR

OPERATION MANUAL

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T-200-9800 OPERATION MANUAL

Technical Support

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1.0 SPECIFICATIONS

Resistance Element	Platinum
Nominal Resistance	$R_o = 100 \pm 0.1\Omega$
Sensitivity	$\alpha = 0.00385 \pm 0.00002\ \Omega/\Omega/°C$
Operating Range	-50°C to +100°C
Operating Environment	Atmospheric air temperature (sheltered from normal precipitation)
Time constant	Less than 10 seconds in well stirred water bath
Time Stability	Temperatures, as computed from the probe calibration data, must be within ±0.05°C over a one-year period from the time of calibration
Sensor Sheath	Type 300 series stainless steel
Lead Wires	

Number	Four
Gauge	# 22
Material	Standard Copper
Plating	Optional
Insulation	Teflon

Dimensions	See FIGURE 1

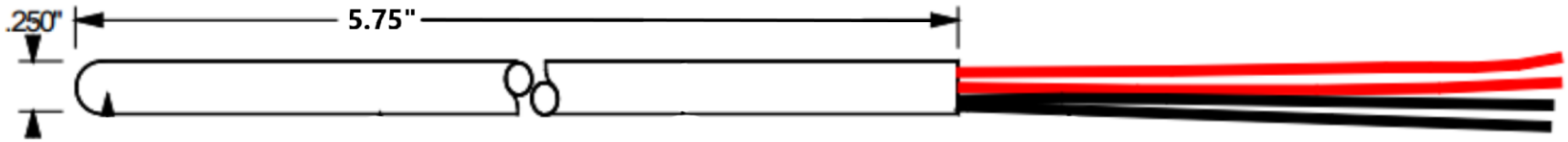


FIGURE 1
PLATINUM RESISTANCE TEMPERATURE SENSOR DIMENSIONS

2.0 INSTALLATION IN POWER ASPIRATED SHIELDS

2.1 To mount the sensor, assemble retaining bracket for selected sensor to mount on mounting butts located in the neck of shield assembly. The supplied clip assembly should only be used for sensors with a nominal cross-sectional diameter of 0.25 inch. Attach sensor and install in sensor cavity.

2.2 When used in the Model 327C Motor Aspirated Temperature Shield, a cable part number 1734 will be required to connect to the sensor, See FIGURE 3

CAUTION

Lower tip of sensor must not fall lower than 3 ¼ inches from under side of umbrella shield. If sensor tip falls below this point, remount. Failure to do so may result in temperature reading errors exceeding specifications during periods of maximum solar radiation.

2.3 Thread the sensor leads through the air duct assembly and out from the grommet located on the underside of the tube. Mount the triple shield assembly to the air duct assembly.

2.4 For additional information, see Manual 327C.

2.5 When used in the Power Aspirated Shield Model 076B, the 1734 cable is not required and the sensor is connected directly to the terminal block inside the internal junction box of the 076B Shield.

2.6 The temperature sensor is held in place by the two nylon ¼" sensor holders in the center tube of the removable lower section of the 076B Power Aspirated Shield. Insert the sensor down into the center section. The sensor should not touch the bottom of the shield but should be about 2 inch above the bottom plate in the shield center section.

2.7 For additional information, see Manual 076B

3.0 INSTALLATION IN WIND ASPIRATED SHIELD

3.1 The sensor units are precision instruments sturdily constructed for worst-case environmental abuse, but careful handling should be observed when unpacking and installing so as not to cause damage that may degrade their performance.

3.2 Using the adapter plate part number 10418, the T-200 Sensor can be used in both the Model 5980 and Model 073B Wind Aspirated Temperature Shields.

3.3 The temperature probe should first be inserted through the rubber seal in the cord grip fitting of the 10418 Adapter Plate. It should extend approximately 2" above the plate. Once set to the correct position, the collar of the cord grip fitting can be tightened to secure the probe in the collar.

3.4 For additional information, see Manuals 073B or 5980

4.0 SENSOR CONNECTIONS

4.1 Care must be exercised when installing the RTD and connecting it to the processor. Because of the low level signals (i.e. 4 μ V = 0.01°C) being processed, errors can be induced by noisy connectors, thermally induced junction voltages, and FRI generated voltages.

4.2 Low thermal solder should be used to make signal wire (two per RTD) connections if there is a possibility of the junctions being at different temperatures. Where pre-tinned wire is used, the wire should be stripped or scraped to the copper before using low thermal solder.

4.3 Proper signal polarity must be observed when connecting RTDs to the Met One Instruments 21.32 or 21.43 Processors. FIGURE 2 indicates polarity designations and gives pin assignments to be followed. FIGURE 3 gives the RTD schematics.

4.4 When connecting to data logger or other devices, this polarity should also be maintained to insure accurate measurement from the sensor.

4.5 The typical connections to be made are I+ and I- to drive the RTD, and E+ and E- to bring the signal back to the processor. I+ and E+ and I- and E- are normally tied together within the RTD probe as close to the actual platinum sensor as possible. No other connection between the two wires should be made.

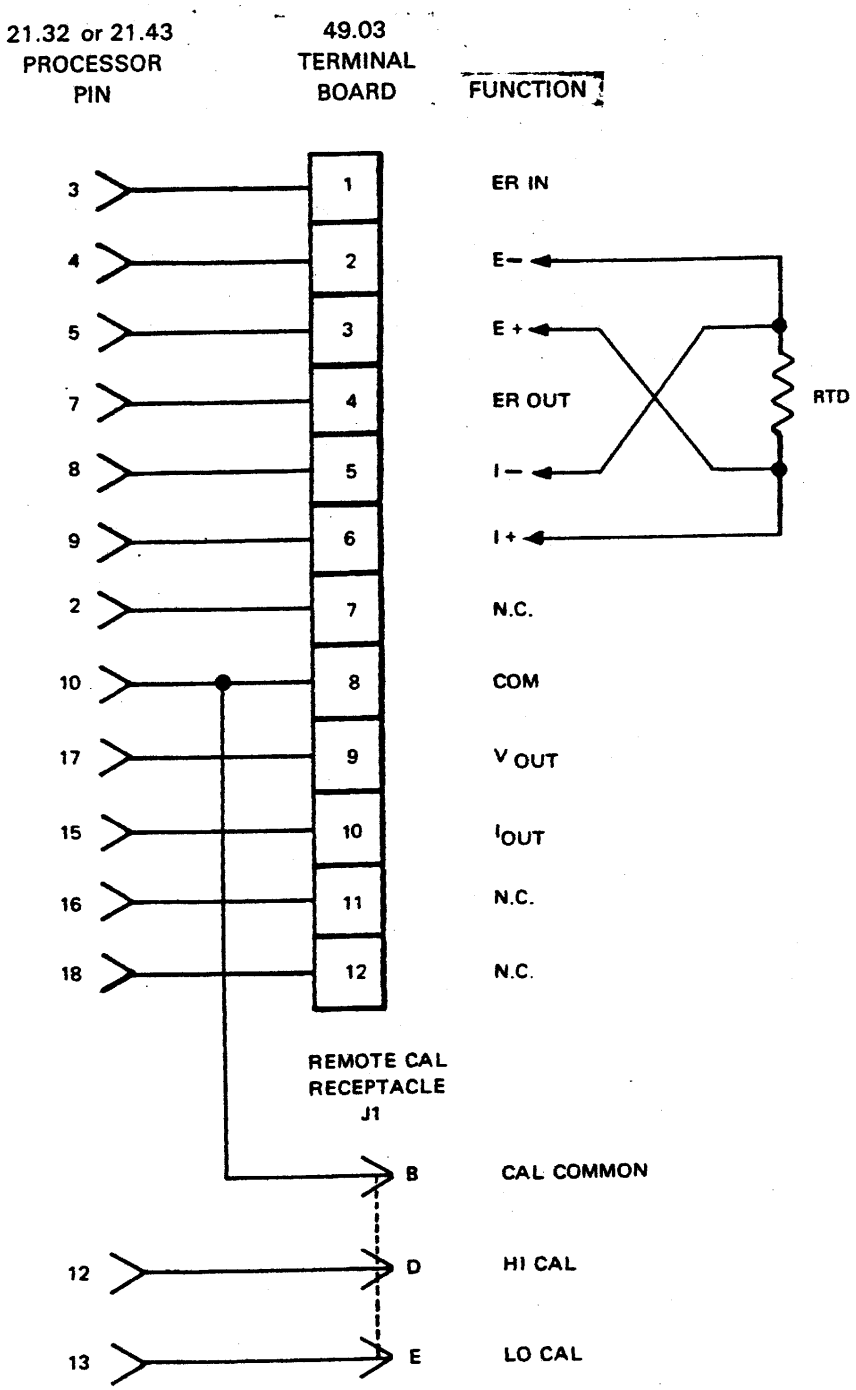
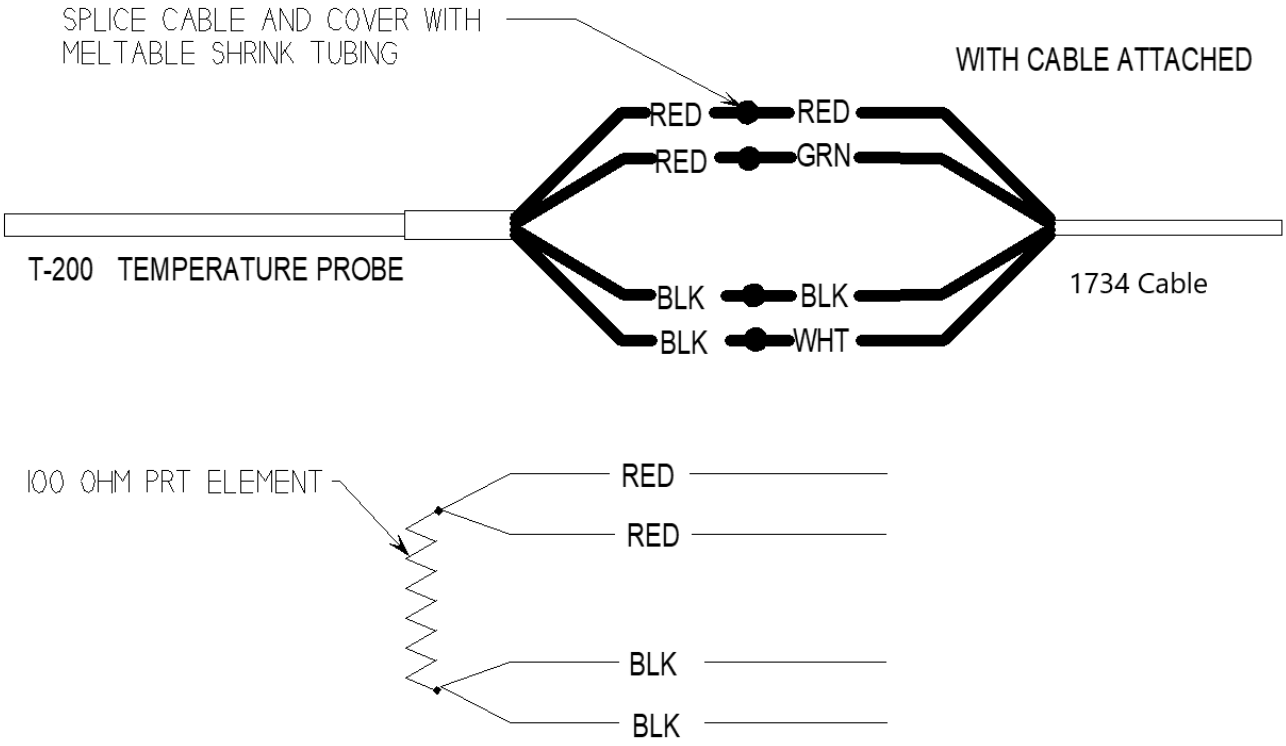


FIGURE 2
TERMINAL BOARD IDENTIFICATION FOR CONNECTION OF
RTD TO PROCESSOR MOUNTED IN 49.03 HOUSING



1. FIGURE 3

RTD SCHEMATICS

TABLE 1
TYPICAL SENSOR FORMULAS

$R_P = R_O * (1 + \alpha * T + K + L)$

$K = \alpha * \delta * (T/100) * (1 – T/100)$

$L = \alpha * \beta * (T/100) * (T/100) * (T/100) * (1 – T/100)$

R_P = Sensor Resistance at temperature T

T = Temperature in Celsius

R_O = Sensor resistance at 0° Celsius, 100

α = Nominal sensitivity, 0.00385

δ = Nonlinearity, $\alpha * \delta = 0.00580195$

β = Low temperature correction,

$\alpha * \beta = 0$, temperature above 0° Celsius

$\alpha * \beta = 0.00042735$, temperature below 0° Celsius

TABLE 2
TYPICAL COMPUTED VALUES, CELSIUS
PROGRAM IECRVST/BAS

RO = 100 ALPHA= 3.85 E-3
DELTA = 1.507 BETA = 0.111

Temperature Centigrade	Resistance Ohms	Temperature Centigrade	Resistance Ohms	Temperature Centigrade	Resistance Ohms
-50	80.307	0	100.000	50	119.395
-49	80.704	1	100.391	51	119.780
-48	81.101	2	100.781	52	120.165
-47	81.498	3	101.172	53	120.550
-46	81.894	4	101.562	54	120.934
-45	82.291	5	101.953	55	121.319
-44	82.687	6	102.343	56	121.703
-43	83.083	7	102.733	57	122.087
-42	83.479	8	103.123	58	122.471
-41	83.875	9	103.513	59	122.855
-40	84.271	10	103.902	60	123.239
-39	84.667	11	104.292	61	123.623
-38	85.063	12	104.681	62	124.007
-37	85.458	13	105.071	63	124.390
-36	85.853	14	105.460	64	124.774
-35	86.248	15	105.849	65	125.157
-34	86.643	16	106.238	66	125.540
-33	87.038	17	106.627	67	125.923
-32	87.433	18	107.016	68	126.306
-31	87.828	19	107.404	69	126.689
-30	88.222	20	107.793	70	127.072
-29	88.617	21	108.181	71	127.454
-28	89.011	22	108.570	72	127.837
-27	89.405	23	108.958	73	129.219
-26	89.799	24	109.346	74	128.602
-25	90.193	25	109.734	75	128.984
-24	90.587	26	110.122	76	129.366
-23	90.980	27	110.509	77	129.748
-22	91.374	28	110.897	78	130.130
-21	91.767	29	111.284	79	130.511
-20	92.160	30	111.672	80	130.893
-19	92.553	31	112.059	81	131.274
-18	92.946	32	112.446	82	131.656
-17	93.339	33	112.833	83	132.037
-16	93.732	34	113.220	84	132.418
-15	94.125	35	113.607	85	132.799
-14	94.517	36	113.994	86	133.180
-13	94.910	37	114.380	87	133.561
-12	95.302	38	114.767	88	133.941
-11	95.694	39	115.153	89	134.322
-10	96.086	40	115.539	90	134.702
-9	96.478	41	115.925	91	135.083
-8	96.870	42	116.311	92	135.463
-7	97.262	43	116.697	93	135.843
-6	97.653	44	117.083	94	136.223
-5	98.045	45	117.469	95	136.603
-4	98.436	46	117.854	96	136.982
-3	98.827	47	118.240	97	137.362
-2	99.218	48	118.625	98	137.741
-1	99.609	49	119.010	99	138.121
0	100.000	50	119.395	100	138.500

TABLE 3
TYPICAL COMPUTED VALUES, FAHRENHEIT
PROGRAM IECRVST/BAS

RO = 100 ALPHA= 3.85E-3
DELTA = 1.507 BETA = 0.111

Temperature Fahrenheit	Resistance Ohms	Temperature Fahrenheit	Resistance Ohms	Temperature Fahrenheit	Resistance Ohms
-70	77.656	30	99.566	130	121.105
-68	78.098	32	100.000	132	121.532
-66	78.540	34	100.434	134	121.959
-64	78.982	36	100.868	136	122.386
-62	79.424	38	101.302	138	122.813
-60	79.865	40	101.716	140	123.239
-58	80.307	42	102.169	142	123.666
-56	80.748	44	102.603	144	124.092
-54	81.189	46	103.036	146	124.518
-52	81.630	48	103.469	148	124.944
-50	82.071	50	103.902	150	125.370
-48	82.511	52	104.335	152	125.796
-46	82.951	54	104.768	154	126.221
-44	83.391	56	105.200	156	126.647
-42	83.831	58	105.633	158	127.072
-40	84.271	60	106.065	160	127.497
-38	84.711	62	106.497	162	127.922
-36	85.150	64	106.929	164	128.347
-34	85.590	66	107.361	166	128.771
-32	86.029	68	107.793	168	129.196
-30	86.468	70	108.224	170	129.620
-28	86.907	72	108.656	172	130.045
-26	87.345	74	109.087	174	130.469
-24	87.784	76	109.518	176	130.893
-22	88.222	78	109.949	178	131.317
-20	88.660	80	110.380	180	131.740
-18	89.098	82	110.811	182	132.164
-16	89.536	84	111.241	184	132.587
-14	89.974	86	111.672	186	133.011
-12	90.412	88	112.102	188	133.434
-10	90.849	90	112.532	190	133.857
-8	91.286	92	112.962	192	134.280
-6	91.723	94	113.392	194	134.702
-4	92.160	96	113.822	196	135.125
-2	92.597	98	114.251	198	135.547
0	93.034	100	114.681	200	135.969
2	93.470	102	115.110	202	136.392
4	93.907	104	115.539	204	136.814
6	94.343	106	115.968	206	137.235
8	94.779	108	116.397	208	137.657
10	95.215	110	116.826	210	138.079
12	95.651	112	117.254	212	138.500
14	96.086	114	117.683	214	138.921
16	96.522	116	118.111	216	139.342
18	96.957	118	118.539	218	139.763
20	97.392	120	118.967	220	140.184
22	97.827	122	119.395	222	140.605
24	98.262	124	119.823	224	141.025
26	98.697	126	120.250	226	141.446
28	99.131	128	120.678	228	141.866
30	99.566	130	121.105	230	142.286