OPERATIONS MANUAL

AIR TEMPERATURE SYSTEM

MOD. TA-1A

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INTRODUCTION

PURPOSE

The Model TA-1A air temperature system was developed by Oregon State University for the U. S. Coast Guard so that several of the 13th District stations will have standardized equipment to measure and report local air temperature to National Weather Service forecast centers for their use in making coastal weather forecasts. The Model TA-1A air temperature system is similar to the Model TW-1A sea temperature system, but differs in the temperature range.

TYPE

A thermistor probe senses air temperature; the change in thermistor resistance with temperature unbalances a D.C. bridge circuit in a converter box and results in a voltage output which is linear with temperature over the range 0-100^{o} F. The output voltage is read directly as temperature on an analog indicator meter at the station communications panel. The system requires 110v, 60 hz, single phase power at 0.1 amp. to the converter box only.

APPLICATION

The air temperature probe should be mounted in a location with good air circulation and out of direct sunlight.

EQUIPMENT

The thermistor probe, Fig. 1, consists of an epoxy encased bead with 50 feet of vinyl covered shielded two wire cable.

The converter box, Fig. 1, is a watertight aluminum box (with a neoprene gasket) that contains the printed circuit board, ON/OFF switch, fuse, and barrier strip. MS connectors are used for the input and output connections. Outside screw holes have been sealed with silicone grease. Conduit can also be used to feed the AC wires into the box.

The temperature is indicated on a 4-1/2 inch meter with scale markings from 0-100° F. A small board on the back of the meter contains a resistor and a 2.5 K potentiometer for calibration purposes. Press-on letters and numbers have been used for the meter dial scale markings. Figure 2 is the schematic diagram of the converter box.

Figure 1

Model TA-1A, Air Temperature System Components

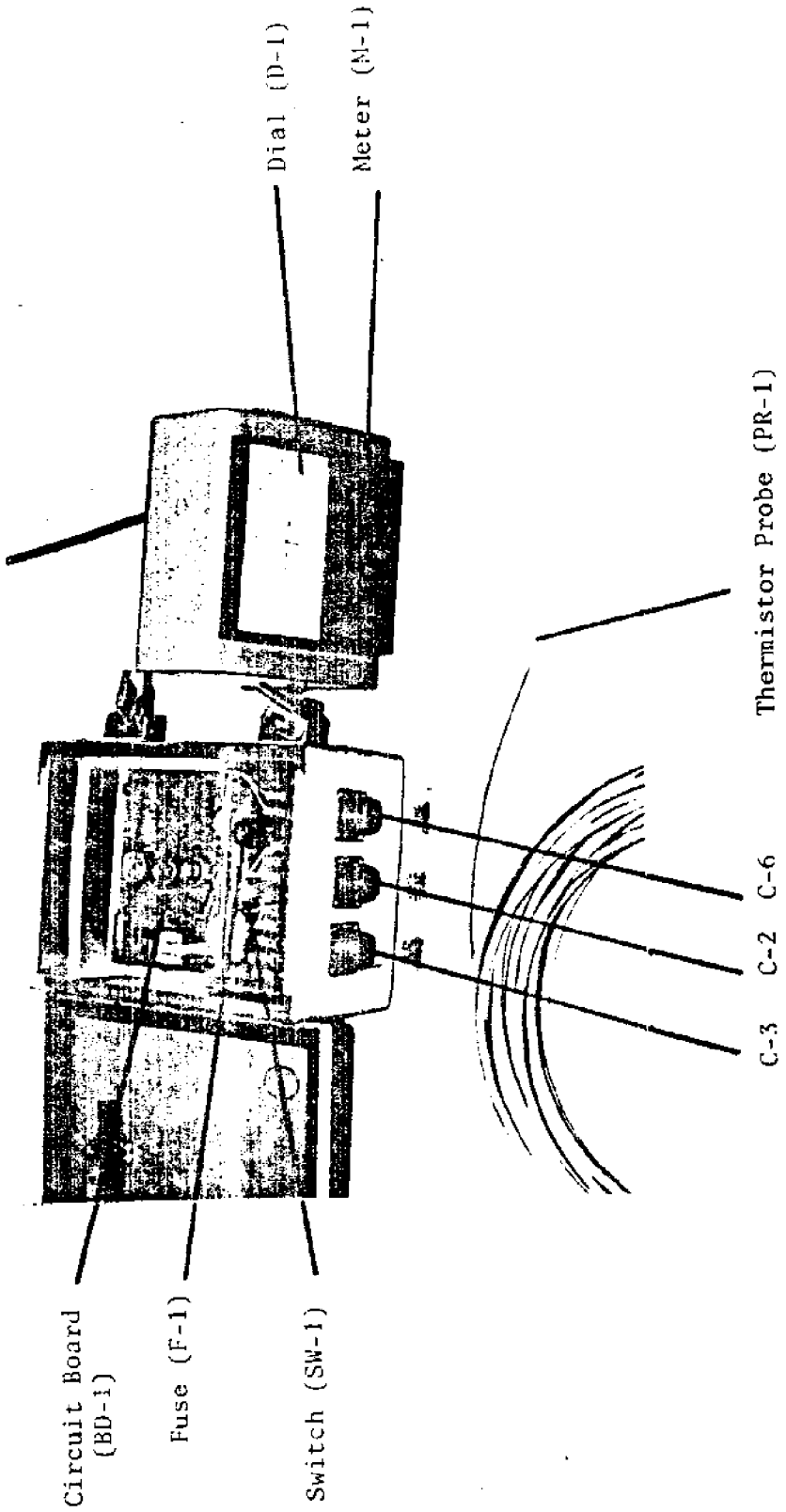
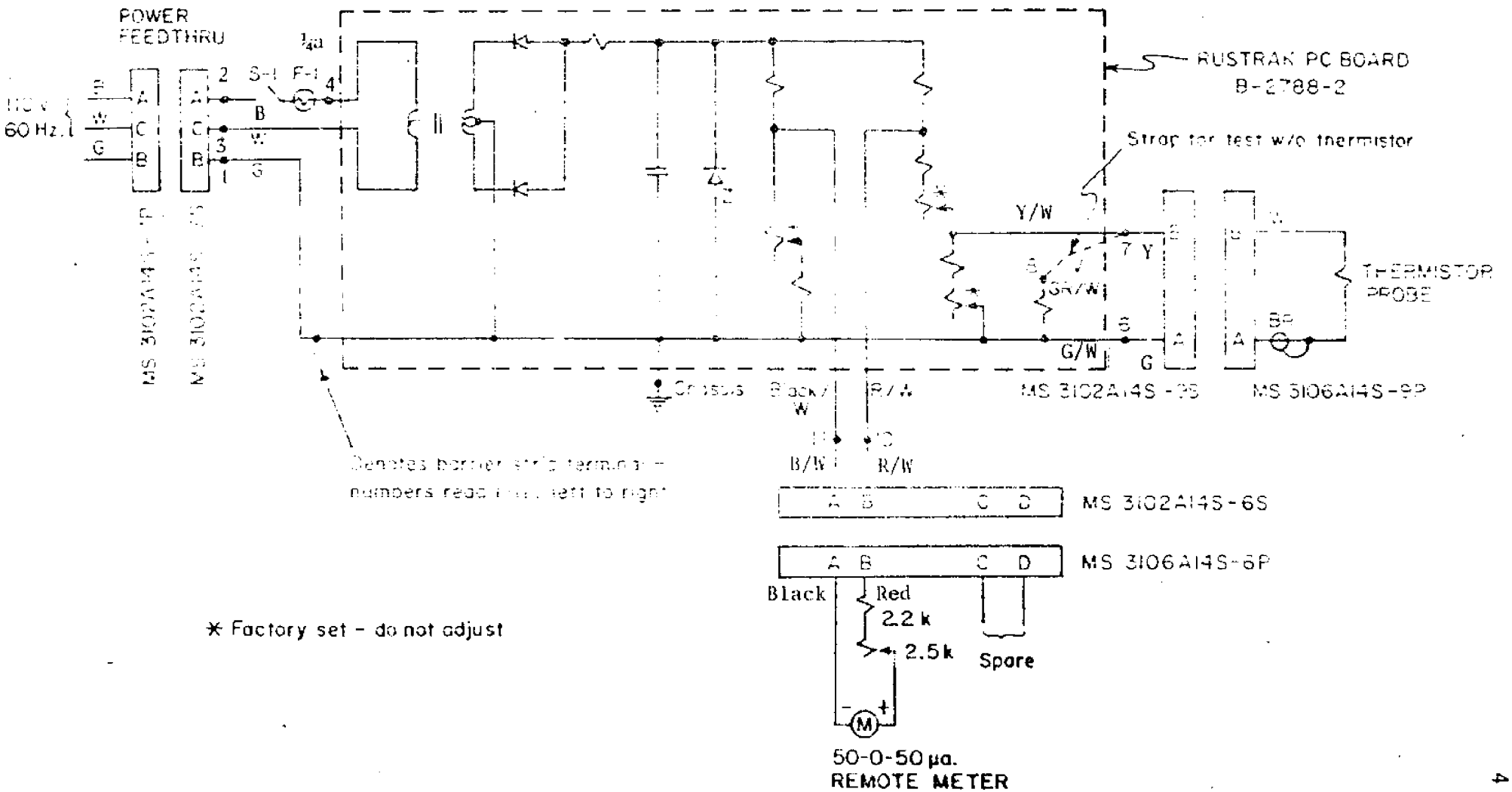


Figure 2

AIR TEMPERATURE

MODEL TA-1A CONVERTER
BOX SCHEMATIC

9 February 1979



INSTALLATION

PROBE

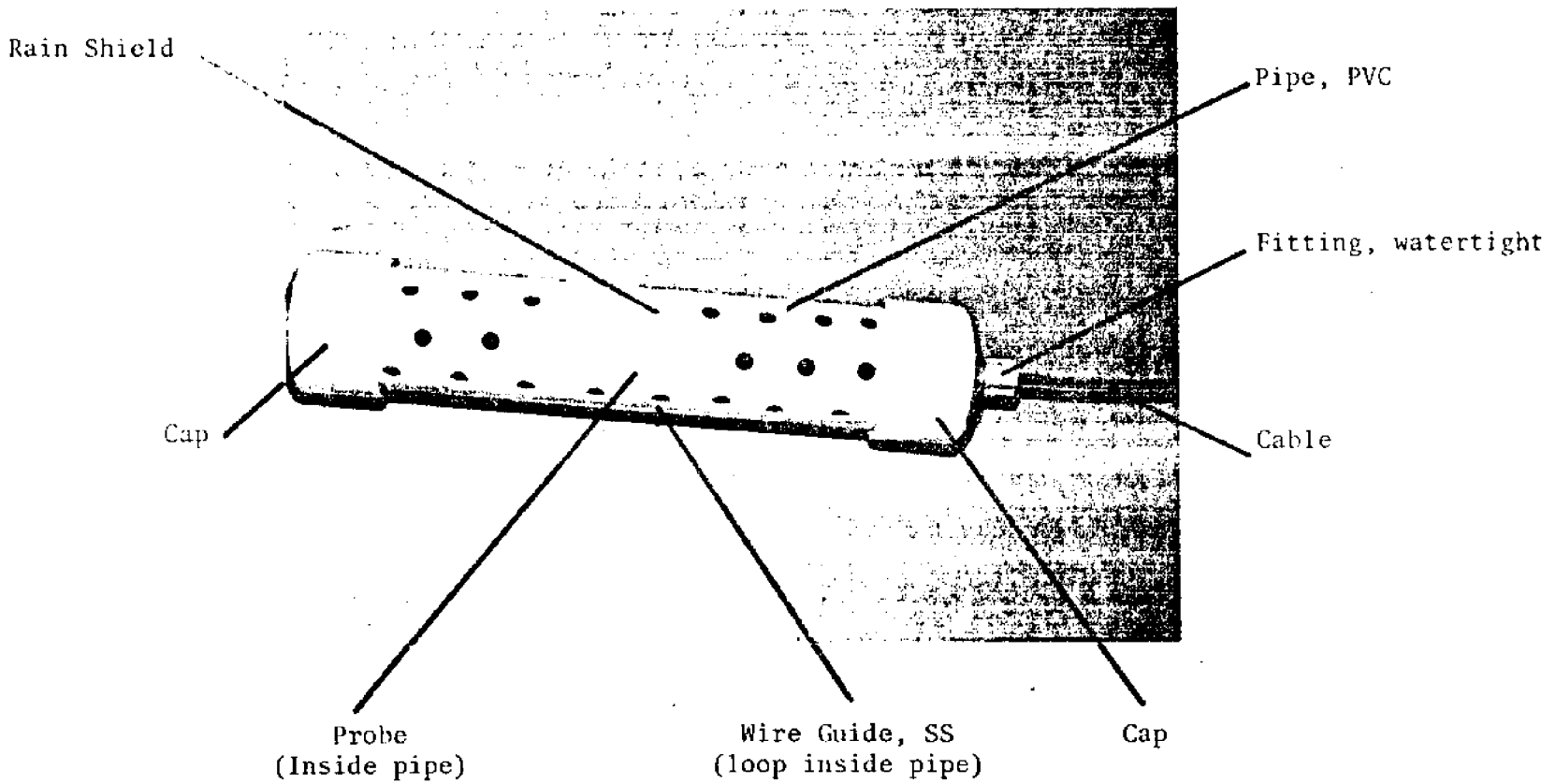
The probe and housing assembly should be mounted on the outside of the observation tower about six feet above the ground or near the opening to the covered moorage well above the water. It must be out of direct sunlight (use a north wall) and in a well ventilated location.

The probe housing assembly consists of a 2" white plastic pipe (PVC, schedule 40) about 12" long for protection as shown in Fig. 3. Drill several 5/16" holes in the pipe to increase air circulation. Leave an area about 3" long near the center of the pipe free of holes to act as a rain shield. Glue a plastic fitting into a hole in one cap. Insert the probe and cable through the fitting and about 6" into the pipe so that probe is under the rain shield. Glue the cap. String a stainless steel wire through the pipe near the tip of the probe to keep the probe centered in the pipe. Drill a hole in the other cap and attach to pipe (not necessary to glue).

Mount the pipe housing with rain shield up and cable end slightly lower to keep rainwater from collecting on probe tip. Securely attach to the side of the building using three 8" nylon cable ties with eyelets. Connect the cable to the converter box.

Figure 3

Probe Housing Assembly



CONVERTER BOX

The converter box should be mounted within 50 feet of the probe and reasonably close to AC power. Although the converter box is supposed to be water tight, it is best to mount it under cover. An electrical conduit containing three (3) wires is recommended for power input, but a neoprene cord and three (3) pin connectors (MS3106A14S-7P plug and MS3102A14S-7S socket) could also be used. Attach wires to terminals 1, 2 and 3 with spade lugs as shown in Fig. 2. Install a two (2) wire telephone cable from the output connector C-6 to the nearest telephone terminal block. Connect telephone wires into communications room.

METER

The meter may be mounted in the communications panel (3 inch hole) or in a separate meter enclosure. Connect a short piece of wire or coax from the rear of the meter to the nearest telephone terminal.

CALIBRATION

The bridge circuit on the printed circuit board has been pre-calibrated for a 50 foot probe at the factory for temperatures between 0 and 100° F. DO NOT UNDER ANY CIRCUMSTANCES ADJUST THE 3 POTENTIOMETERS ON THE CIRCUIT BOARD. These silver-colored pots are sealed with red glyptol upon factory adjustment.

A calibration field check can be made by turning power OFF, disconnecting lead 7 from the barrier strip (yellow wire) and shunting lead 8 (grey and white wire) to lead 7 (yellow and white wire) with the violet wire provided. Turn the power ON and adjust the 2.5K potentiometer on the back of the indicator meter to read 100° F. If it reads about 0° F., then the meter input leads are reversed. Reverse leads to meter, then adjust to 100° F. This adjustment compensates for the small added resistance due to the station telephone pair. After setting to 100° F., mark the position of the potentiometer with red glyptol or suitable sealant. Turn power OFF, disconnect shunt from terminal 7, tie down (violet wire) to lead 9 and reconnect lead 7 before turning power ON for operation.

OPERATION

After calibration, turn power ON, close cover and tighten two latch screws. The system should operate continuously without adjustment. The communication watch stander should read the dial to the nearest degree, record the temperature on NOAA form 72-5A in the appropriate column and report air temperature in his three hourly teletype weather reports. Refer to Table 2 if problems occur.

Table 1.

TA-1A Converter Box Replaceable Parts

Item	Description	Manufacturer
BD-1	Board Assembly, B-2788-2 Calibrated for 0-100°F.	Rustrak, Gulton Industries, Inc. East Greenwich, RI 02818
PR-1	Probe, thermistor, 1924-50 foot	Rustrak
F-1	Fuse, 1/4A	Littlefuse
C-2	Connector, 2 pin MS3102A14S-6S	Amphenol
C-3 (if used)	Connector, 3 pin MS3102A14S-7S	Amphenol
C-6	Connector, 6 pin MS3102A14S-9S	Amphenol
M-1	Meter, 50-0-50uA	API, LFE Corporation Waltham, MA 02154
D-1	Dial, meter, 100 divisions 448-1001-100A6	API

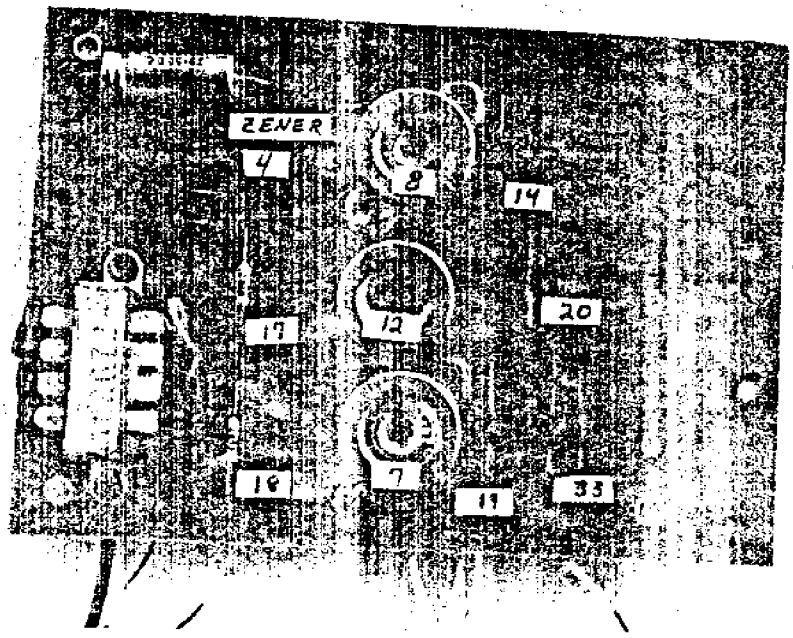
Table 2

Trouble-shooting Guide

Symptom	Probable Cause	Remedy
Meter needle on 50° F No movement over several hours	Actual temperature is 50° F	None
	110v AC power OFF	Flip station circuit breaker
	Power switch OFF	Turn ON (inside converter box)
	Bad fuse	Replace (inside converter box)
	Open BNC connector on meter enclosure	Resolder
	Open telephone pair	Repair
Meter needle on 100° F	Actual temperature 100° F	None
	Test shunt connected between terminals 7 & 8 on barrier strip	Remove and attach probe
Meter needle on 0° F with test shunt connected	Wrong polarity	Reverse input leads to meter
Meter needle off scale left	Input to converter box open	Connect thermistor
	Open connector	Resolder
	Open thermistor cable	Check continuity of thermistor cable, should be 1-10K ohms. If open, replace.

Figure 4

B-2788-2 PC Board Assembly



No.	Resistance
4	3.9 K 5%
14	6811 Ω
17	4991 Ω
18	4991 Ω
19	6811 Ω
20	4.3 K 5%
33	824 Ω (1401Ω and 2002Ω in parallel)

Table 2, continued

Symptom	Probable Cause	Remedy
Meter needle off scale right	Input to converter shorted	Check connector, repair
		Check resistance of thermistor cable, should be 1-10K ohms. If shorted, replace.
	Output shorted	Check connector, repair
		Check telephone pair, repair
		Check meter, replace
		Check potentiometer on back of meter, replace if shorted
Improper readings	Bad power supply	Check bridge voltage across zener diode. Should be 8 ± 0.2v., otherwise replace circuit board.
	Bad resistor on PC board	Check, replace as necessary (fig. 4)
	Potentiometers on circuit board out of adjustment	Send board to factory for recalibration. DO NOT ATTEMPT FIELD ADJUSTMENT.