

CAT. NO. DT0-69
REPAIR MANUAL
FOR
MODEL: DT-156
DIGITAL THERMOMETER



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PARTS LIST

MODEL: DT-156

<u>PART NO.</u>	<u>DESCRIPTION</u>
See 649980	Screw, #4-40 x 5/16 Lg. BHMS, Black
920442	Potentiometer, 10K Ω , $\pm 10\%$
920443	Potentiometer, 100K Ω , $\pm 10\%$
See 649980	"O" Ring
945428	Capacitor, .1 UFD, 100 VDC, Mylar
See 649980	Screw, #4 Self-Tap
946330	Battery Clip
See 649980	Speed Nut #4
See 649980	Rubber Bumper
646954	Battery Connector Assembly
949101	Front Panel
See 649980	Spacer (.785" Lg.)
949401	Liquid Crystal Display
949406	Quad X-Norgate, RCA CD 4077 1E
949411	Multi-Switch, 1B515B05106A
See 649981	Pushbutton, Black
See 649981	Pushbutton, Red
See 649981	Pushbutton, White
See 649981	Pushbutton, Blue
See 649981	Pushbutton, Gray
949419	Socket, 40 Pin Dual In-Line
949423	Resistor, 182K Ω , $\frac{1}{4}$ W, $\pm 1\%$, M.F.
949424	Resistor, 22.1K Ω , $\frac{1}{4}$ W, $\pm 1\%$, M.F.
949425	Resistor, 2M Ω , $\frac{1}{4}$ W, $\pm 1\%$, M.F.
949426	Socket Strip
949428	Resistor, 475K Ω , $\frac{1}{4}$ W, $\pm 1\%$, M.F.
949429	Resistor, 14.7K Ω , $\frac{1}{4}$ W, $\pm 1\%$, M.F.
949430	Resistor, 61.9K Ω , $\frac{1}{4}$ W, $\pm 1\%$, M.F.
949451	Analog Digital A/D
949650	Panel Label
949652	Lid Label
949603	Battery Cover Label
649901	Main Assembly
649950	P. C. Board Assembly

PARTS LIST

MODEL: DT-156

<u>PART NO.</u>	<u>DESCRIPTION</u>
649951	Bezel Assembly
649952	Front Panel Assembly
649953	Probe Lead Assembly (Black)
649955	Carrying Case Assembly
649956	Battery Cover Assembly
649957	Probe Lead Assembly (White)
649958	Probe Lead Assembly (Gray)
649980	Hardware Package, consists of 10 pcs. each P/N 913255 - Screw, P/N 946211 - Screw P/N 946351 - Speed Nut, P/N 146700 - Rubber Bumper P/N 953331 - Washer, P/N 986182 - Hex Nut & P/N 986330 - Lockwasher; 5 pcs. each of P/N 923700 - "O" Ring, P/N 919200 - Spacer P/N 986253 - Screw, P/N 986218 - Screw
649981	Pushbutton Package, consists of 4 pcs. each P/N 949413 - Black Button, P/N 949414 - Red Button P/N 949415 - White Button, P/N 949416 - Blue Button P/N 949417 - Gray Button, P/N 954351 - Cable Tie & P/N 981676 - Gasket
See 649980	Washer #4
See 649981	Cable Tie
954419	Silicon Diode, 75V.
954420	Capacitor, .22 UFD, 100V, $\pm 10\%$
954453	Resistor, 10K Ω , $\pm 1\%$, $\frac{1}{4}$ W, M.F.
981436	Resistor, 15K Ω , $\pm 1\%$, $\frac{1}{4}$ W, M.F.
981457	Capacitor, 47pF, 1 KVDC, C.D.
See 649981	Gasket
See 649980	Screw, #4-40 x $\frac{1}{2}$ Lg. BHMS
See 649980	Screw, #4-40 x .312 Lg., Nic. Pl.
See 649980	Nut, Hex #4-40
See 649980	Lockwasher #4, Split
986440	Zener Diode, 5.6V, $\pm 5\%$
981411	Capacitor, .15MFD, 100 VDC, $\pm 10\%$, M.P.

CALIBRATION PROCEDURE

MODEL: DT-156

PRELIMINARY

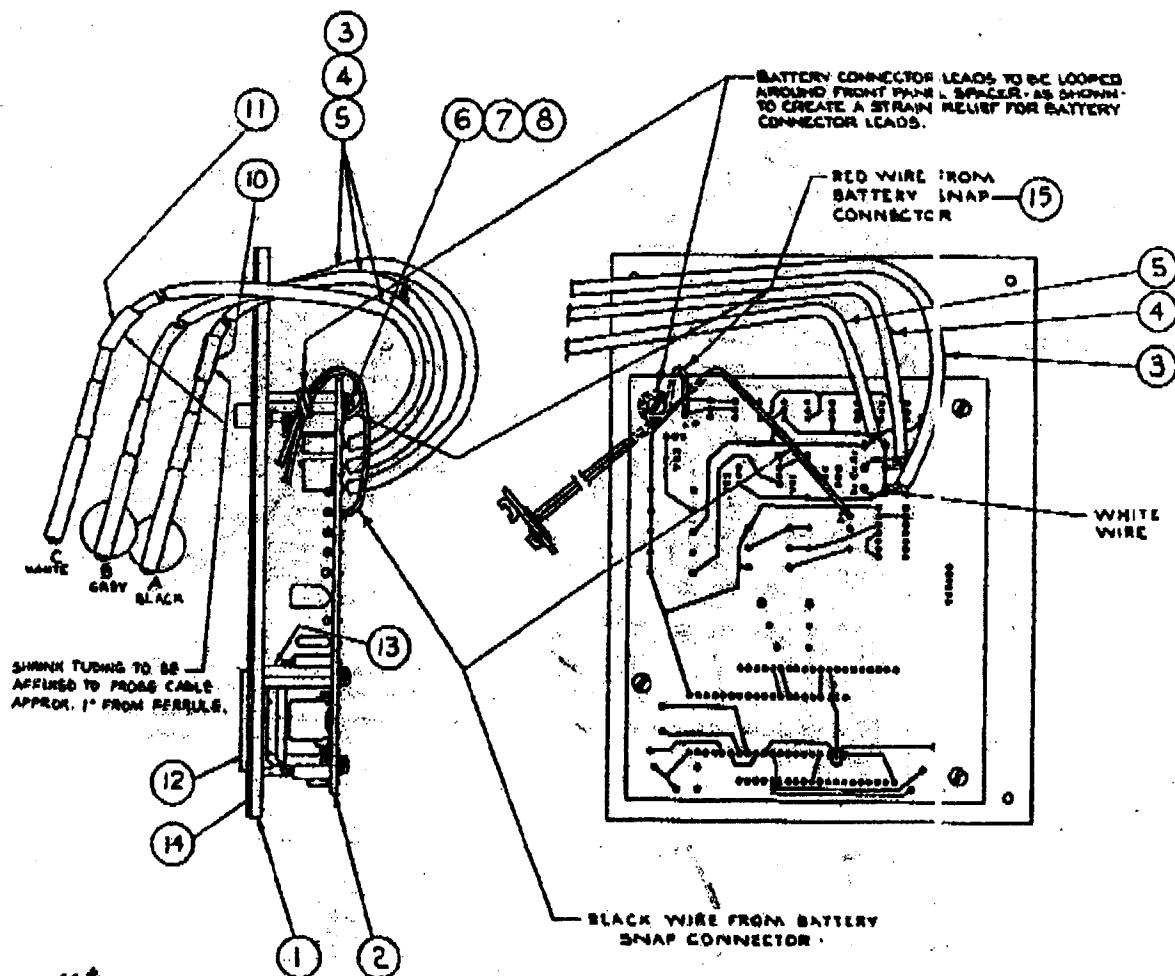
1. Set bath temperatures:
HOT = 170°F, COLD = -5°F
2. Connect a fresh 9V. battery to terminals.
3. Tie Probes "B" and "C" together with rubber band.
4. Tie Probe "A" and Temperature Standard Probe together.

PROCEDURE

1. Place all Probes in COLD BATH and allow time for Probes to stabilize.
2. Connect a 3½ digit Digital Voltmeter between "Common" (shield wire of probes) and center terminal of VR2. Adjust VR2 for a reading of 118.5 mVDC on Voltmeter.
3. For Probe "A", adjust VR1 until DT-156 displays same as Temperature Standard.
4. For Probe "B", adjust VR3 to display same reading as Probe "A". (When comparing, reading of "A" is changed when you adjust VR3).
5. For Probe "C", adjust VR4 to display same reading as Probe "A". (Readjust Probe "A" if required as in Step 4).
6. Insert Probe "A" and standard probe into HOT BATH and allow time for stabilizing.
7. For Probe "A" on DT-156, adjust VR2 to equalize reading on temperature standard.
8. Insert Probe "A" and standard probe into COLD BATH and allow for stabilization again.
9. Probe "A" of DT-156 should equal standard, if not adjust VR1.
10. Place all probes in HOT BATH and stabilize.
Select Probe "A" and adjust VR2 if not equal to standard. Select Probe "B" and adjust VR3 if not equal to standard. Select Probe "C" and adjust VR4 if not equal to standard.
11. Place all probes in COLD BATH, allow to stabilize.
12. Select Probe "A" and adjust VR1 if not equal to standard.
13. Select Probe "B" and Probe "C" in turn; each must be within $\pm 1^\circ\text{F}$ of standard. Adjust VR3 for Probe "B", and VR4 for Probe "C".
14. Probes "B" and "C" are balanced if readings are $\pm 0.5^\circ\text{F}$ at 170°F and at 0°F.

TROUBLESHOOTING CHART**FOR****MODEL: DT-156**

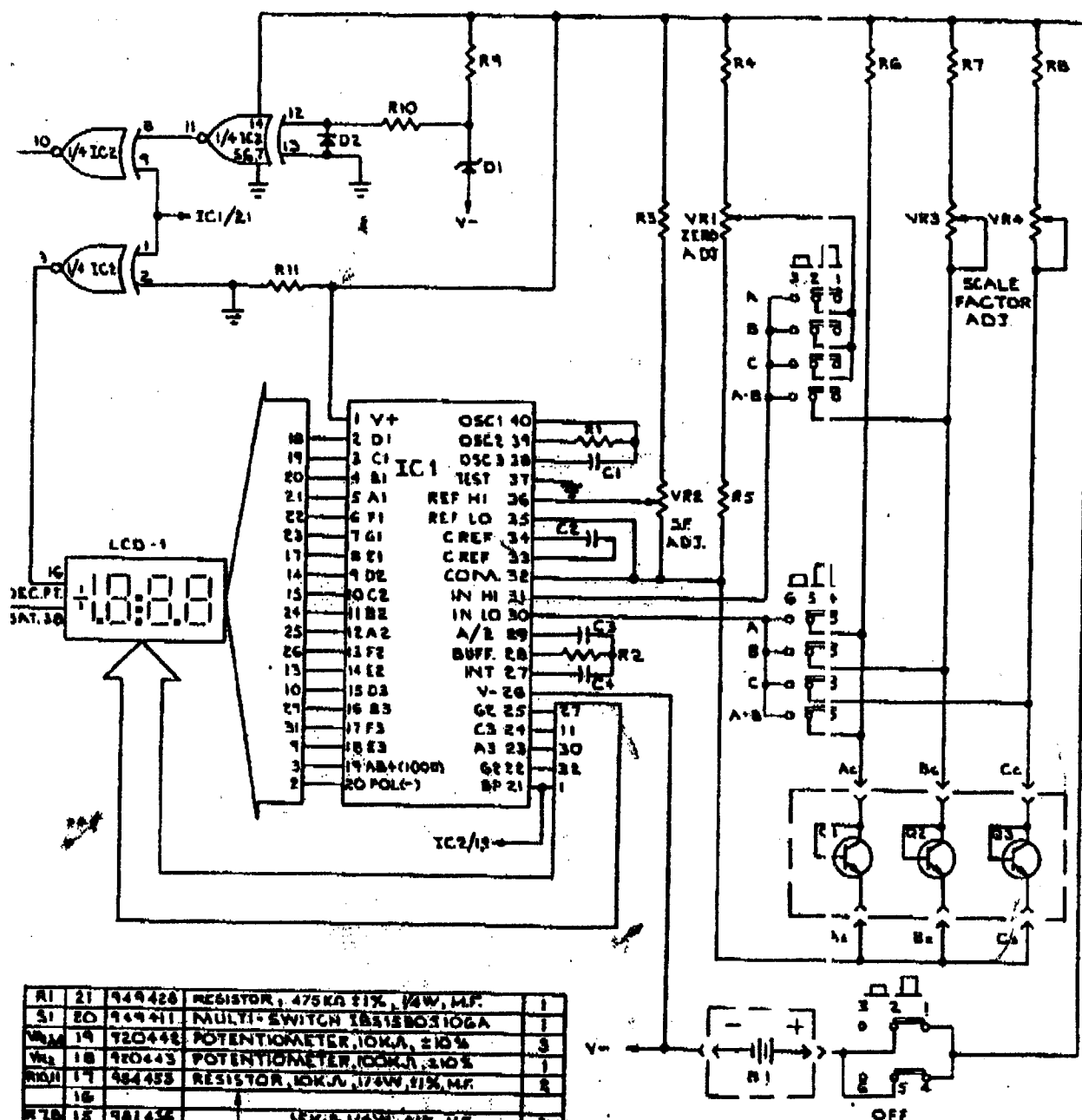
PROBLEM	POSSIBLE CAUSE	CORRECTIVE MEASURES
1. Incomplete read-out (Partial Display)	A. LCD non-functional. B. ICI non-functional. C. Open circuit between A/D converter and LCD.	A. Replace LCD with (PN 949401). B. Replace ICI with (PN 949451). C. Check connections on schematic with Ohmmeter. Add jumper wires if necessary.
2. Pushbuttons stick or will not lock in place.	A. Gasket too tight. B. Multiswitch non-functional. C. Front panel restricts operation of switch.	A. Eliminate gasket (981676) B. Replace multiswitch (PN 949411). C. File larger opening in front panel.
3. Battery indicator always on.	A. DI non-functional. B. LCD non-functional. C. ICI non-functional.	A. Give diode test, if necessary replace with (PN 986440). B. Replace LCD with (PN 949401). C. Replace ICI with (PN 949451).
4. Unit will not calibrate.	A. Probe A, B or C non-functional. B. VR1-3-4 non-functional. C. VR2 non-functional.	A. Unsolder probes from board, immerse in cold bath and give diode check. If probes not compatible, replace Probe A (PN 649953), Probe B (PN 649958) or Probe C (PN 649957). B. OHM - check if necessary, replace with (PN 920442). C. OHM - check if necessary, replace with (PN 920443).



15	646954	BATTERY CONNECTOR ASSEMBLY	1
14	949650	PANEL LABEL	1
13	949100	SPACER .705" LG.	4
12	649951	BEZEL ASSEMBLY	1
11	649604	SHRINK TUBING (C WHITE)	1
10	649610	SHRINK TUBING (A BLACK)	1
9	8888-001	SOLDER	A/R
8	986530	SPOT LOCK WASHER	4
7	933331	WASHER #4	4
6	986258	SCREW #4-40X.312 LG., BHMS	4
5	649957	PROBE LEAD ASSEMBLY (C WHITE)	1
4	649958	PROBE LEAD ASSEMBLY (B GREY)	1
3	649953	PROBE LEAD ASSEMBLY (A BLACK)	1
2	641750	PRINTED CIRCUIT BD. ASSEMBLY	1
1	649952	FRONT PANEL ASSEMBLY	1
ITEM	PART NO	DESCRIPTION	QTY

LIST OF MATERIAL

MAIN ASSEMBLY
P/N 649901



SCHEMATIC DIAGRAM
DT-156
DIGITAL THERMOMETER

ITEM	PART NO.	DESCRIPTION	QTY
R1	21	949428 RESISTOR, 475KΩ ±1%, 1/4W, M.F.	1
S1	20	949411 MULTI-SWITCH 18X18X0.3102A	1
VR1	19	720448 POTENTIOMETER, 10KΩ, ±10%	1
VR2	18	720443 POTENTIOMETER, 100KΩ, ±10%	1
R101	17	984453 RESISTOR, 10KΩ, 1/4W, ±1%, M.F.	1
R102	16		
R103	15	981436 15KΩ, 1/4W, ±1%, M.F.	1
R104	14	949428 22KΩ, 1/4W, ±1%, M.F.	1
R105	13	949429 1.75KΩ, 1/4W, ±1%, M.F.	1
R106	12	949430 4.0KΩ, 1/4W, ±1%, M.F.	1
R107	11	949424 2MA, 1/4W, ±1%, M.F.	1
R108	10	949433 RESISTOR, 182KΩ, 1/4W, ±1%, M.F.	1
IC1	9	749401 LIQUID CRYSTAL DISPLAY, 2-DIGIT	1
IC2	8	749406 QUAD 3-NONGATE 84C0178E	1
IC3	7	749431 A/D CONVERTER, TELEMETRY 75C7126 ADL	1
D1	6	754419 SILICON DIODE, 7.3V	1
D2	5	754440 ZENER DIODE, 5.6V, 15%	1
C1	4	981411 CAPACITOR, 15MFD, 100VDC, 310% M.F.	1
C2	3	954420 22MFD, 100VDC, 310% M.F.	1
C3	2	954421 10MFD, 100VDC, 310% M.F.	1
C4	1	981487 CAPACITOR, 1K VDC, 27PF, C.B.	1
B1		BATTERY, 9V, 100mAh	1

LIST OF MATERIAL

