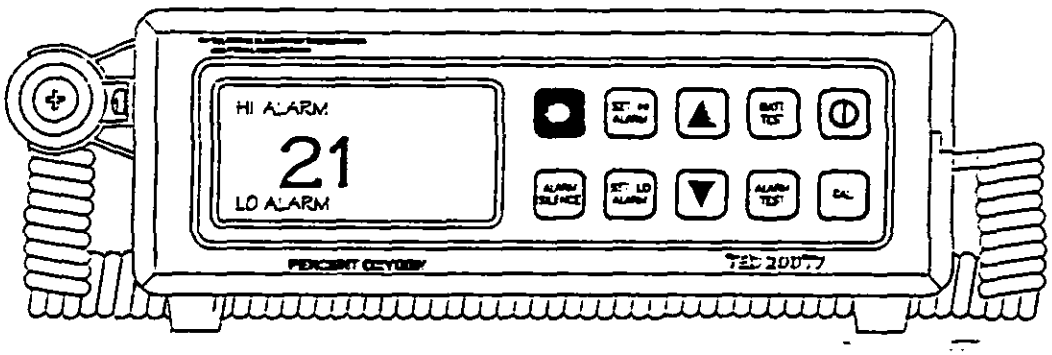
Model TED 200-T7

Oxygen Monitor

Service Manual



TYPE B EQUIPMENT: Equipment providing a particular degree of protection against electric shock, particularly regarding—

- allowable LEAKAGE CURRENT
- Reliability of the protective earth connection (if present).

Teledyne Analytical Instruments
16830 Chestnut Street
City of Industry, CA 91749

P/N SM70027
04/09/99
ECO#: 99-0159

Table of Contents

Caution: Federal (USA) law restricts this device to sale by or on the order of a physician.

This manual is intended to provide information to help qualified maintenance personnel service and repair the TED Model 200T7 oxygen monitor. The ability to read and follow schematics is assumed, as is basic electronic knowledge of the functions and characteristics of operational amplifiers.

The only equipment needed to service the monitor is a digital voltmeter; however, you may find that a means of simulating the sensor is useful in troubleshooting. A schematic for a simple cell simulator circuit is provided on page 6.

Description of the TED 200T7

The TED 200T7 uses a galvanic fuel cell sensor to detect the oxygen level in the gas immediately surrounding the tip of the sensor. The sensor signal is processed and displayed as a percentage.

Sensor

The T–7 Micro-Fuel Cell puts out a minute current in proportion to the partial pressure of the oxygen in the gas surrounding the sensor. The current is zero at zero oxygen pressure and is a maximum at 100% oxygen.

Alarms

The two alarms are set through the touch panel. The HI alarm can be set anywhere from 21 to 100, or OFF. The LO alarm can be set from 17 to 99. There is an alarm test option as well as an alarm silence key, which defeats the audible/visible alarm in increments of 30, 90, and 180 seconds.

Display and Touch Panel

The display is a digital liquid crystal display (LCD) showing oxygen level in percent.

All functions are microprocessor-controlled. Commands are input through the touch panel and processed in a ROM.

Circuit Description

The TED 200T7 is a high precision digital and analog circuit implemented in fine geometry, surface mount technology. Due to the highly integrated nature of this circuitry, Teledyne does not recommend that the circuitry or the board be troubleshot in the field.

Power Supply

The TED 200T7 uses 4 "AA" alkaline batteries which provide 6 volts and a ground. An integrated circuit chip regulates this voltage to 4.61 volts.

Repair/Replacement

Battery Replacement

1. Turn the instrument off.
2. Slide battery holder out.
3. Remove the battery holder and take out the old batteries (if any).
4. Install 4 "AA" alkaline batteries (other types of batteries will give erroneous battery test readings) into the holder, observing proper polarity.
5. Snap the battery holder back onto the leads and slide the holder back into the compartment.

T–7 Sensor Replacement

1. Turn off the instrument.
2. Unplug the coiled cable from the old sensor.

3. Remove the new sensor from its protective plastic bag.
4. Plug the coiled cable into the new sensor and calibrate.

Opening the Case

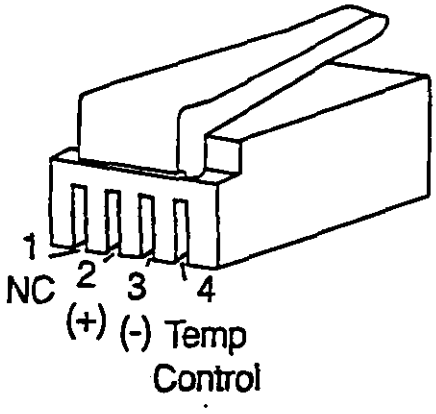
1. Turn the instrument off
2. On the bottom of the unit are four rubber bumper feet. Remove the screw in the center of each foot.
3. Carefully lift off the cover. If desired, turn the unit over, holding the two case halves together, and remove the top cover.

To close the instrument, reverse this procedure, being careful not to pinch any wires between the halves of the case.

Sensor Simulator

Occasionally, it is necessary to simulate a sensor for testing. The sensor connector and simulator are wired as shown below.

The sensor simulator shown will only give a general indication that the TED 200T7 electronic circuitry is operating normally. Actual calibrations should be in air with the sensor attached.



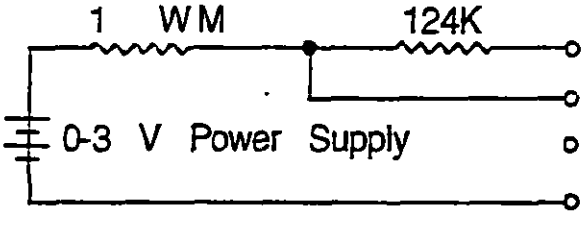


Figure 1a & 1b: the sensor simulator circuit.

1.0 INTRODUCTION

This functional test is performed as the final check of the TED 200 T7 Portable Oxygen Monitor prior to shipment.

2.0 APPLICABLE DOCUMENTS

2.1 Schematic D-68003 (1 of 2)
2.2 Schematic D-68003 (2 of 2)
2.4 Instruction Manual.

3.0 TEST OBJECTIVE

The objective of this test is to exercise all the functions of the monitor to ensure it performs to the specifications as outlined in the above referenced documents.

4.0 TEST EQUIPMENT

4.1 Power Requirements - As stated per the running sheet, otherwise, power shall be 6.3 Vdc.

4.2 Equipment Requirements - As follows:

5.2.1 AA Battery, 1.5 Vdc (4 ea.) or adjustable power supply.
5.2.2 Keithley Current Source
5.2.3 "Dummy" (sensor) cell.

5.0 TEST SETUP

Circuit oscillations may be generated when using the Keithley. If this happens, place a 10k or 20k ohm resistor in series with the input connector.

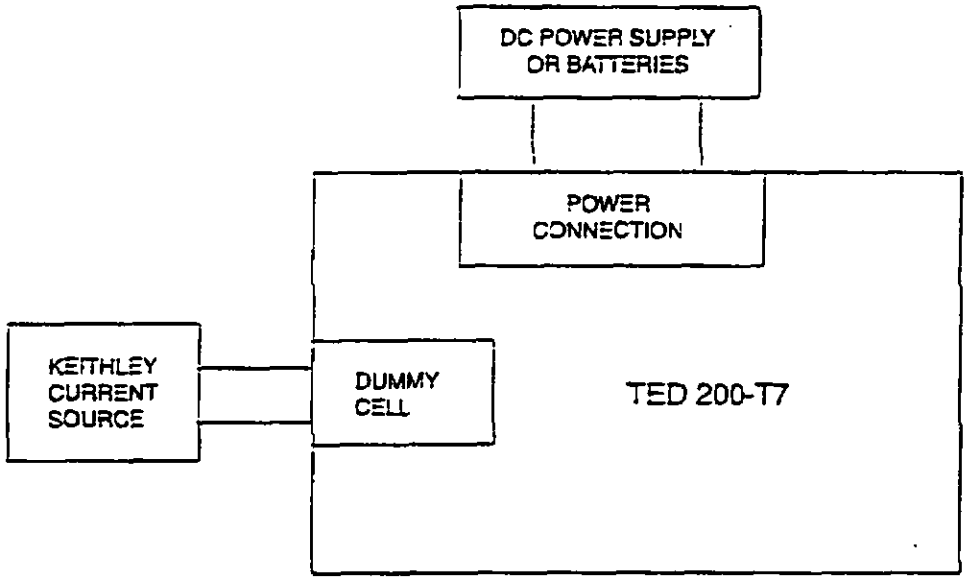


Figure 1. Test Setup
TED200-T7

STEP #	OPERATOR ACTION	EXP. RESULT	TOLERANCE
1	Install four AA 1.5 Vdc batteries or adjustable DC power supply.	N/A	
2	Press the ON/OFF key once.	Unit LCD displays "High Alarm 100" "Low Alarm 17" and flashing message "AIR CAL"	Exact
3	Install the dummy sensor cell, then connect the Keithley instrument to the dummy cell.	N/A	
4	Adjust Keithley to read zero µa.	N/A	
5	ZERO ADJUSTMENT: Connect DMM BLACK lead to TP2 and RED lead to TP3.	N/A	
6	Move a Shorting block JP4-1 and JP4-2 to JP4-2 and JP4-3	N/A	
7	Adjust R7 located on the analog input board so that the DMM read -5.5mv.	-5.5mv	±0.5mv
8	Return shorting block JP4-2 and JP4-3 to JP4-1 and JP4-2.	N/A	
9	Adjust the Keithley to 112µa.	N/A	
10	Remove DMM.	N/A	
11	Press the CAL key once	LCD display counts down from 10 to 0, then displays 21.	±1
		LCD displays message "CAL IN 100%".	Exact
12	Adjust the Keithley for 535.885µa.	LCD displays 100	±5%
13	Press the CAL key twice.	LCD displays message "CAL IN 100%" and counts down from 15 to 0, then displays 100.	±1%
		Alarm buzzer sounds and red LED flashes.	Exact

STEP #	OPERATOR ACTION	EXP. RESULT	TOLERANCE
14	Adjust the Keithley output to 267.9µa.	LCD displays 50	Exact
15	Press the SET HI ALARM key, then press the UP arrow key.	LCD displays "OFF for HI ALARM setting and flashing message "ALARM DEFEATED".	Exact
16	Using the DOWN arrow key, adjust the HI ALARM setting to a value less than 100, e.g., "88".	LCD displays value set.	Exact
17	Press the SET LO ALARM key, then press the UP arrow key until the LO ALARM setting reads "21".	LCD displays value set.	Exact
18	Adjust the Keithley to 112 micro amps.	LCD displays 21. Alarm buzzer sounds.	Exact
19	Press the ALARM SILENCE key once.	Red LED flashes. After 5 seconds, the LCD display counts down from "30" in the lower right hand corner. Alarm buzzer stops. Red LED continues flashing.	Exact
20	Press the SET LO ALARM key	N/A	
21	Using the DOWN arrow key, set the LO ALARM to "19".	Red LED goes off.	Exact
22	Press the ALARM SILENCE key	"30" is displayed in lower right hand corner of LCD display.	Exact
23	Press the ALARM SILENCE key a second time.	"90" is displayed in lower right hand corner of LCD display.	Exact
24	Press the ALARM SILENCE key a third time.	"180" is displayed in lower right hand corner of LCD display.	Exact

STEP #	OPERATOR ACTION	EXP. RESULT	TOLERANCE
25	Press the ALARM SILENCE key a fourth time.	"00" is displayed in lower right hand corner of LCD display.	Exact
26	Press the ALARM TESY key twice.	HI ALARM setting counts up from 19 to the value set in Step 9, e.g. "88".	Exact
		Alarm buzzer sounds twice.	Exact
		Red LED flashes twice. Then the setting counts back down to the LO ALARM setting of 19.	Exact
		The buzzer sounds twice again and the red LED flashes twice. The LCD then displays 21.	Exact ±1
27	Press the BATT TEST key.	LCD displays "BATTERY" HOURS LEFT999".	Exact
28	Press the ON/OFF key twice.	The unit shuts off.	Exact
29	Press the ON/OFF key once.	LCD displays 21.	±1
30	Adjust Keithley output to 0.000 µa. Allow meter to stabilize.	LCD displays 0	±1%
31	Adjust Keithley output to 535.885 µa.	LCD displays 100.	Exact
32	Veryfy the unit is in normal operating mode (e.g., displaying an O_2 concentration). The move the shorttting block from E1-1/E1-2 to E11-22/E11-3.	After 5 to 15 seconds, the unit's LCD goes blank the alarm buzzer sounds continuously, & the red LED stays on.	Exact
33	Return the shorting block from E1-2/E1-3 to E1-1/E1-2.	N/A	
34	Turn the unit under test POWER switch OFF. Disconnect all test leads and test equipment.	N/A	

Specifications

Range:	0-100% oxygen
Accuracy:	(after 2-point calibration) ±2% of full scale for 8 hours at constant temperature
Response Time:	90% in less than 8 seconds (typically 6–8 sec.) at 25°C.
Display Resolution:	Digital LCD with battery life indication.
Calibration Time:	@ 21%: 10 sec. @ 100%: 15 sec.
Battery Life:	Approximately 1,000 hrs. continuous use in non-alarm conditions using 4 "AA" alkaline batteries.
Humidity Range:	0–95% RH
Expected Sensor Life:	1 year in most applications
Sensor Type:	Class T-7 (Galvanic)
Dimensions:	7"W × 5"D × 2-1/2"H (178 mm × 127 mm × 63½ mm)
Weight:	Less than 2 lbs.
Cable Length:	Retracted: 2 ft. Extended: 10 ft.
Storage Temp.:	0-50°C (Recommended Temp. 10-30°C)
Operating Temp.:	0-40°C
Alarm Indicators:	Audible/Visible **Audio:** Pulsating .5-1 KHZ tone @ 70 to 90 DBA, 50% duty cycle. **Visual:** Red high-brightness LED.
Stability:	Less than 1% O_2 over an 8 hour period at constant pressure and temperature
O_2 level alarm ranges:	**Hi alarm:** 18 to 100 Percent **Low alarm:** 17 to 100 percent
O_2 level alarm accuracy:	Alarm thresholds digitally stored and alarm effectivity is digitally compared against the value calculated by the micro processor. Hence, the accuracy of the alarms is the same as the accuracy of the unit as specified above.
Warm up time:	Typically 20 minutes or less.
RFI Protected	

Drawing List

D-68003 Schematic Diagram, Surface Mount PCB
D-68004 PCB Assembly, Board Set
D-68987A TED 200T7 Final Assembly

Optional Accessories

1	B34102	Mounting Clamp
1	A51589	T-7 adapter cap, female (22 mm)
1	A51588	T-7 adapter cap, male (22 mm)
1	C53790	Calibration assembly
1	A284	Universal adapter set for pediatric circuits (15 mm)
1	A274	Tee adapter, autoclavable
1	A283	Tee adapter, metal

A minimum charge is applicable to spare parts orders.

IMPORTANT: Orders for replacement parts should include the model number, serial number, and range of the analyzer for which the parts are intended.

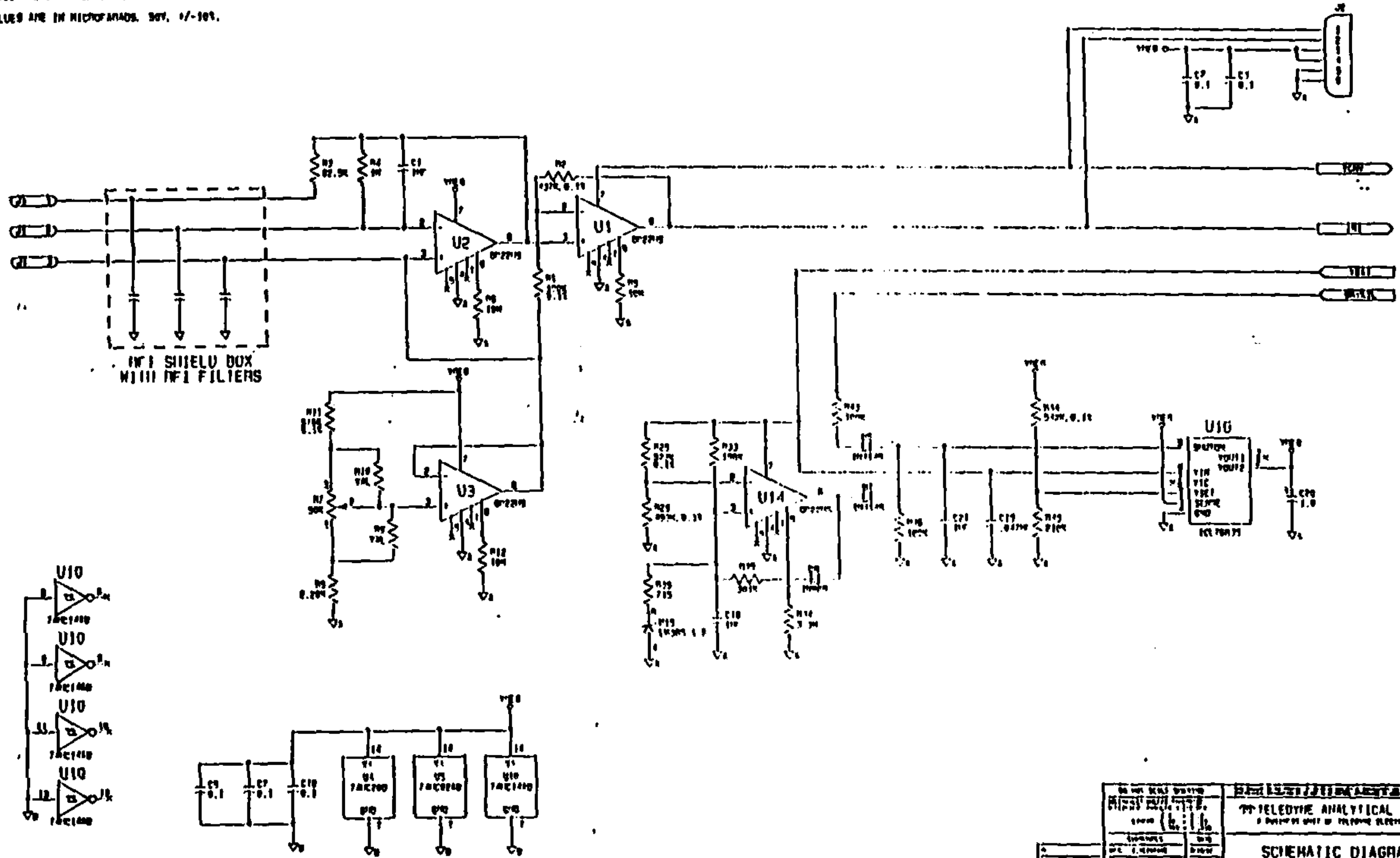
Orders should be sent to:
TELEDYNE ELECTRONIC TECHNOLOGIES
Analytical Instruments
16830 Chestnut Street
City of Industry, CA 91749-1580
Phone (626) 934-1500
FAX (626) 961-2538
TWX (910) 584-1887 TDYANLY COID
or your local representative

Parts List for TED 200T7

Qty.	P/N	Item Description
1	A51329	Micro-Fuel Cell T-7 w/Flow Diverter P/N A50057
4	B99	"AA" Size Alkaline Battery
1	B551	Battery Holder
1	B69934	Cable Assembly
1	A268	Tee Adapter (22mm)

NOTES: UNLESS OTHERWISE SPECIFIED

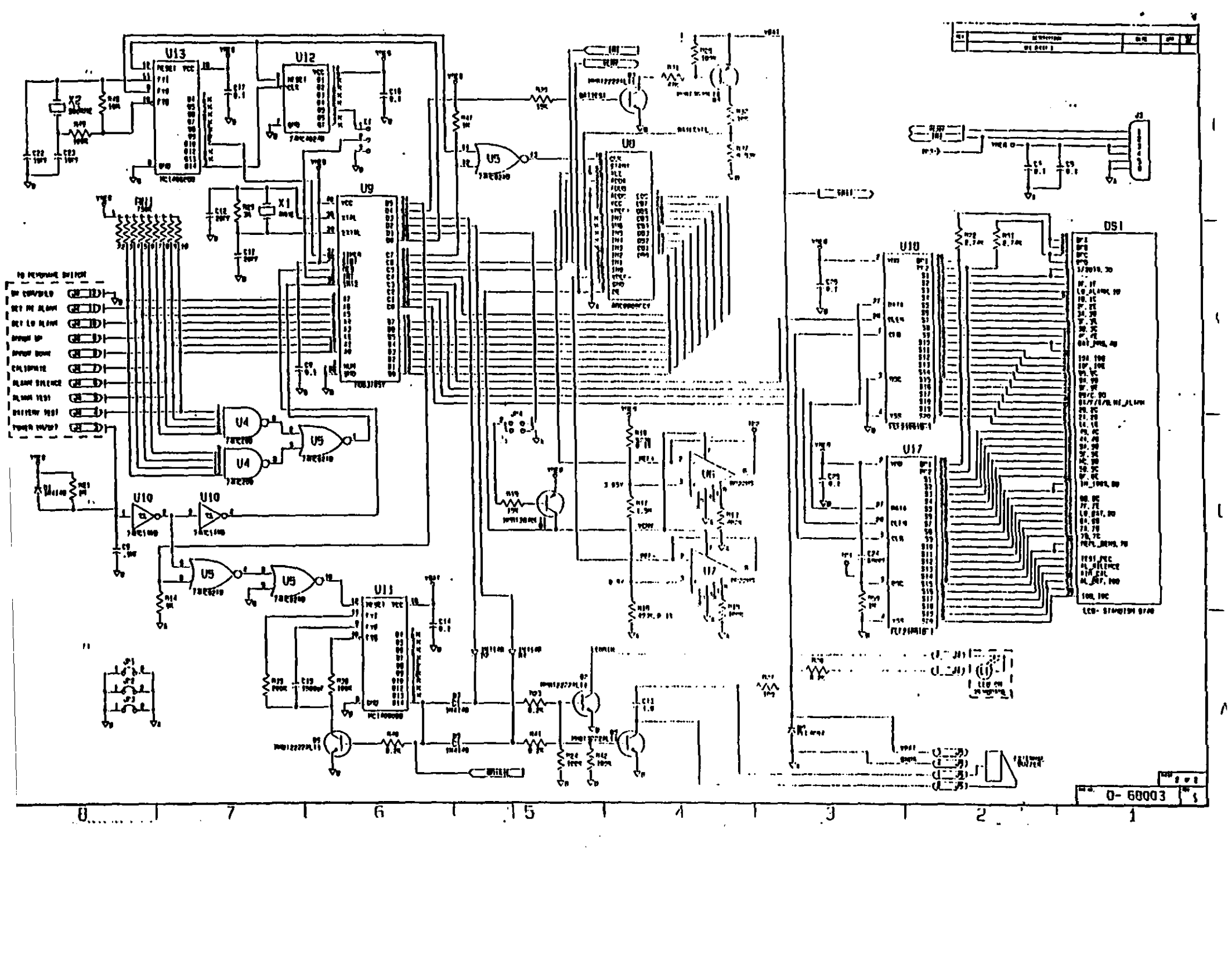
1. PREPARED IAW DOCUMENTS LISTED
   GRAPHIC SYMBOLS: ANSI Y32.2
   REFERENCE DESIGNATIONS: ANSI Y32.16
   DEFINITIONS OF ENGR DWGS: ANSI Y14.15
2. FOR ASSEMBLY SEE C00004.
3. RESISTANCE VALUES ARE IN OHMS, 1/8W, +/- 1%.
4. CAPACITANCE VALUES ARE IN MICROFARADS, 50V, +/-10%.



TELEDYNE ANALYTICAL INSTRUMENTS

SCHEMATIC DIAGRAM
TEU 20017 SHT PCB

D- 68003

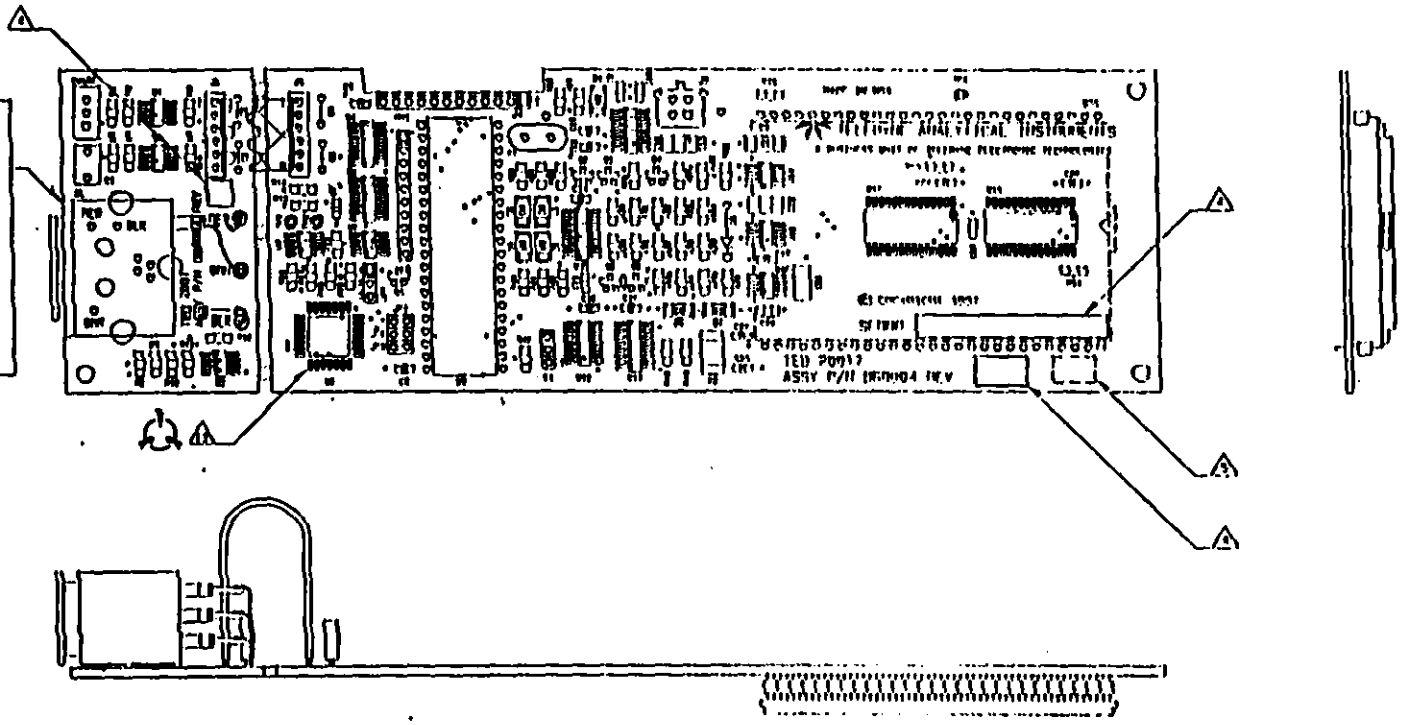

U13
U12
U9
U0
U3
U4
U5
U10
U11
U17
DS1
X1
X2
0- 68003

NOTES: UNLESS OTHERWISE SPECIFIED.

1. INTERPRET DIMENSIONS AND TOLERANCES PER ANSI Y14.5.
2. FOR SCHEMATIC DIAGRAM SEE [illegible].
3. SOLDER PER CONTRACT REQUIREMENTS.
4. (△) MARK REVISION AND SERIAL NUMBER PERMANENT AND LEGIBLE IN AREA INDICATED.
5. (△) MARK CONFIGURATION "A", "B" OR "C" PERMANENT AND LEGIBLE. A= ENGLISH VERSION, B= FRENCH VERSION OR C= GERMAN VERSION IN AREA INDICATED.

STEPS FOR INSTALLING J5 ASSEMBLY:

1. SOLDER J5 P/N [illegible] FIRMLY ONTO PCB WITH NO GAPS.
2. SOLDER WIRES FROM INSIDE OF BRASS SHIELDING BOX P/N [illegible] TO PCB WITHIN SILKSCREENED OUTLINE. USE IDENTIFIED COLOR SILKSCREEN FOR REF. RED WIRE TO PAD MARKED "RED" AND SO ON.
3. SOLDER BRASS SHIELDING BOX FIRMLY TO PCB WITH NO GAPS BETWEEN BOX AND PCB.
4. SOLDER COLORED WIRES ON OUTSIDE OF BRASS SHIELDING BOX TO CORRESPONDING PAD BELOW IT... RED WIRE SOLDERED TO PAD MARKED "RED" AND SO ON.



6. IF PRESENT, REMOVE LCD PROTECTIVE FILM BEFORE MOUNTING LCD ON BOARD. SAVE THE FILM TO REUSE AFTER THE LCD HAS BEEN INSTALLED ON THE PCB.
7. INSTALL SOCKETS FOR LCD ON SOLDER SIDE (BACK) OF PCB.
8. INSTALL LCD IN SOCKETS, WITH ORIENTATION AS SHOWN ON SOLDER SIDE OF PCB, AFTER ALL SOLDERING OF COMPONENTS IS COMPLETE.
9. REPLACE THE PROTECTIVE FILM OVER LCD FACE AFTER THE LCD IS INSTALLED ON THE PCB.
10. TRIM ALL COMPONENT LEADS TO .06 MAX AFTER SOLDERING.
11. INSTALL SHORT JUMPER ON E1 PINS 1 AND 2.
12. INSTALL SHUNT JUMPER ACROSS PINS 1 AND 2 OF JP3 FOR NORMAL OPERATION. JUMPER INSTALLATION ON JP3 PINS 2 AND 3 IS RESERVED FOR TEST USE ONLY.
13. (△) SOLDERING INSTRUCTIONS FOR U[illegible] P/N [illegible], LEAD TEMPERATURE:

VAPOR PHASE: 60 SECONDS 215°C

INFRARED: 15 SECONDS 220°C

WARNING: ANTISTATIC HANDLING PROCEDURES ARE REQUIRED IN ASSEMBLY OF THIS PCB. REF. A29573

TELEDYNE ANALYTICAL INSTRUMENTS

A BUSINESS UNIT OF TELEDYNE ELECTRONIC TECHNOLOGIES

PCB ASSEMBLY
TEU 20017
BOARD SET

SEE SEPARATE PARTS LIST

D- 68004

3

8	7	6	5	4	3	2	1

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PARTS LIST

DRAWING NO.	REVISION NO.	PAGE
D68004	3	1 OF 2

MODEL / SERIES: TED 200T7

DRAWING TITLE: TED 200T7 BOARD SET

A- ENGLISH VERSION

DATABASE FILENAME D68004.XLS

DATE: 04/20/99
A. A. 4/21/99
ECO NO.: 99-0167

ITEM NO	QUANTITY A	B	C	D	E	F	G	H	TET PART NUMBER	REF./PCB LOCATION	ITEM DESCRIPTION	REMARKS
1	1								R2191	R17	RES., 1.5M Ohms, 1/8W, 1%	(SMT 1206 PKG)
2	1								R2135	R27	RES., 100 Ohms, 1/8W, 1%	(SMT 1206 PKG)
3	9								R2129	R1,15,24,26,36,42,43,46,49	RES., 100K Ohms, 1/8W, 1%	(SMT 1206 PKG)
4	1								R2179	R32	RES., 10K Ohms, 1/8W, 0.1%	(SMT 1206 PKG)
5	4								R2272	R5, 6, 12, 48	RES., 10M Ohms, 1/8W, 1%	(SMT 1206 PKG)
6	2								R2273	R19, 30	RES., 15K Ohms, 1/8W, 1%	(SMT 1206 PKG)
7	1								R2274	R33	RES., 196K Ohms, 1/8W, 1%	(SMT 1206 PKG)
8	5								R2130	R4, 14, 21, 47, 50	RES., 1M Ohms, 1/8W, 5%	(SMT 1206 PKG)
9	1								R2275	R8	RES., 2.26M Ohms, 1/8W, 1%	(SMT 1206 PKG)
10	2								R2235	R22, 51	RES., 2.74K Ohms, 1/8W, 1%	(SMT 1206 PKG)
11	1								R2276	R35	RES., 200K Ohms, 1/8W, 1%	(SMT 1206 PKG)
12	1								R2277	R45	RES., 210K Ohms, 1/8W, 1%	(SMT 1206 PKG)
13	1								R2278	R34	RES., 3.32M Ohms, 1/8W, 1%	(SMT 1206 PKG)
14	1								R2279	R38	RES., 301K Ohms, 1/8W, 1%	(SMT 1206 PKG)
15	1								R2280	R25	RES., 3.01M Ohms, 1/8W, 1%	(SMT 1206 PKG)
16	1								R2281	R13	RES., 402K Ohms, 1/8W, 1%	(SMT 1206 PKG)
17	1								R2282	R2	RES., 437K Ohms, 1/8W, 0.25%	(SMT 1206 PKG) PFC-W1206R-02-4373-B
18	1								R2283	R31	RES., 47.5K Ohms, 1/8W, 1%	(SMT 1206 PKG)
19	2								R2284	R16, 29	RES., 493K Ohms, 1/8W, 0.1%	(SMT 1206 PKG) PFC-W1206R-02-4933-B
20	2								R2285	R18, 28	RES., 523K Ohms, 1/8W, 1%	(SMT 1206 PKG)
21	1								R2286	R44	RES., 542K Ohms, 1/8W, 0.1%	(SMT 1206 PKG) PFC-W1206R-02-5423-B
22	1								R2287	R11	RES., 576K Ohms, 1/8W, 1%	(SMT 1206 PKG)
23	1								R2288	R39	RES., 715 Ohms, 1/8W, 1%	(SMT 1206 PKG)
24	4								R2162	R20, 23, 40, 41	RES., 8.25K Ohms, 1/8W, 1%	(SMT 1206 PKG)
25	1								R2126	R3	RES., 82.5K Ohms, 1/8W, 1%	(SMT 1206 PKG)
26	1								R2289	R37	RES., 9.53K Ohms, 1/8W, 1%	(SMT 1206 PKG)
27	0								R2290	R9, R10	RES., XXXX Ohms, 1/8W, 1%	(SMT 1206 PKG)
28	1								P388	R7	POT., 50K, WW	(THRU HOLE)
29	2								T1232	Q1, Q4	XSTR., MMBT3640LT1	(SMT SOT-23)
30	4								T1191	Q2, 3, 5, 6	XSTR., MMBT2222ALT1	(SMT SOT-23)
31	7								D462	D1-D7	DIODE, FDLL4148.TR	(SMT MLL-34)
32	1								D475	D9	DIODE, MLL4001	(SMT MLL-34)
33	1								Z25	D8	DIODE, ZENER, 1N966, 130V	(THRU HOLE D07)
34	1								CP1916	C19	CAP., .047 uF, 50V, CERAMIC	(SMT 0805)
35	10								CP1753	C6-10, 14, 16, 17, 25, 26	CAP., 0.1 uF, 50V, CERAMIC	(SMT 0805)

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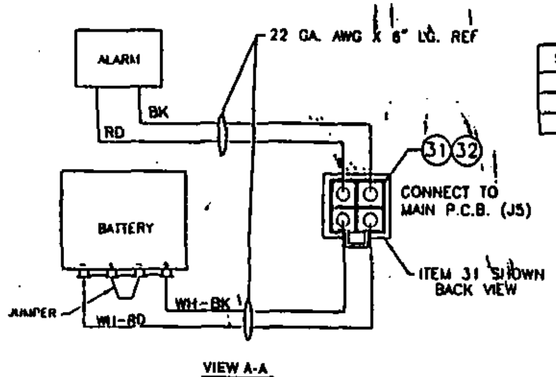
PARTS LIST

DRAWING NO.	REVISION NO.	PAGE
D68004	3	2 OF 2

ITEM NO	QUANTITY A	B	C	D	E	F	G	H	TEI PART NUMBER	REF./PCB LOCATION	ITEM DESCRIPTION	REMARKS
36	4								C731	C2, 3, 4, 5	CAP., 0.1 uF, 50V, CERAMIC	(CK06)
37	2								CP1793	C22, 23	CAP., 10 pF, 50V, CERAMIC	(SMT 0805)
38	1								CP1917	C15	CAP., 1500 pF, 50V, CERAMIC	(SMT 0805)
39	2								CP1918	C11, C12	CAP., 20 pF, 50V, CERAMIC	(SMT 0805)
40	1								CP1919	C24	CAP., 680 pF, 50V, CERAMIC	(SMT 0805)
41	3								CP1754	C13, 18, 21	CAP., 1.0 uF, 50V, CERAMIC	(SMT 1812)
42	1								C775	C1	CAP., 1.0 uF, 50V, POLYESTER	WIMA MKS2/1UF/10%/50V
43	1								CP1920	C20	CAP., 1.0 uF,	(SMT CC3216)
44	1								R1222	RN1	RES., NETWORK, 750K, 10 RES	(SIP)
45	1								L272	DS1	LCD, CUSTOM, TED200, ENGLISH	STANDISH 8470-313-420
46	0								L275	DS1	LCD, CUSTOM, TED200, FRENCH	
47	0								L276	DS1	LCD, CUSTOM, TED200, GERMAN	
48	1								S1114	FOR DS1	SOCKET, 27 POS., SINGLE ROW	
49	1								C1036	X1	XTAL., 4 MHZ	
50	1								CP1921	X2	XTAL., 500 KHZ, 0.5%	STATEK CX-1V-SM1-500 KHZ C/C
51	2								I468	U17, U18	IC, PCF21001D, LCD DRIVER	(SO-28 WIDE)
52	2								I493	U11, U13	IC, MC14060BD	(SO-16)
53	6								I470	U1-3, 6, 7, 14	IC, OP22HS	(SO-8)
54	1								I471	U8	IC, ADC0808CCV	(PLCC-28)
55	1								A52175	U9	IC, EPROM, PROGRAMED	
56	1								I472	U12	IC, MC74HC4024D	MOTOROLA
57	1								I473	U15	IC, LM385M-2.5V	MOTOROLA
58	1								I474	U4	IC, MC74HC20AD	MOTOROLA
59	1								I475	U5	IC, MC74HC02AD	MOTOROLA
60	1								I476	U10	IC, MC74HC14AD	MOTOROLA
61	1								I477	U16	IC, ICL7663ACSA	MAXIM
62	1								S642	FOR U9	SOCKET, 40 POS	
63	5								J32	FOR E1, JP1-JP3, JP4	SHUNT, JUMPER, 2 POS	
64	9								H220	E1, JP3, JP4	HEADER, SINGLE ROW, 0.1 X 3	
65	3								H220	TP1-TP3	HEADER, SINGLE ROW, 0.1 X 1	
66	6								H220	JP1-JP3	HEADER, SINGLE ROW, 0.1 X 2	
67	1								CP1724	J5	CONN., 4 POS., STRAIGHT, uFIT	
68	1								CP1922	FROM J2 TO J3	CABLE, FLEX, PC MNT., 6 POS	
69	1								J23	J1	JACK, TEL., MODULAR, 4 POS	AMP 520241111-2
70	1								A41900	FOR J1	SHIELD, BOX, BRASS, ASSY	
71	12								H220	J4	CONN., 12 POS., SGL., STR., 0.1 S	
72	1								D68005	N/A	PCB FABRICATION TED 2000	
73												
74												
75												

NOTES: UNLESS OTHERWISE SPECIFIED.

1. STICK A 4.0 X .75 X .13 THICK FOAM RUBBER PAD ON TOP OF COVER UNDER SURFACE AS SHOWN.
2. BREAK ITEM 3 INTO TWO PIECES, THEN TRIM BOTH EDGES, ON PERFORATED TABS. INSTALL ITEM 3 IN PLACE AS SHOWN.
3. LOCATE APPROX. AS SHOWN
4. OVERALL WEIGHT: WITH BATTERY 1 Pound 6 Ounces
   WITH-OUT BATTERY 1 Pound 4 Ounces
5. KIT WITH UNIT
6. APPLY E-100 TO ITEM 41 AS SHOWN.

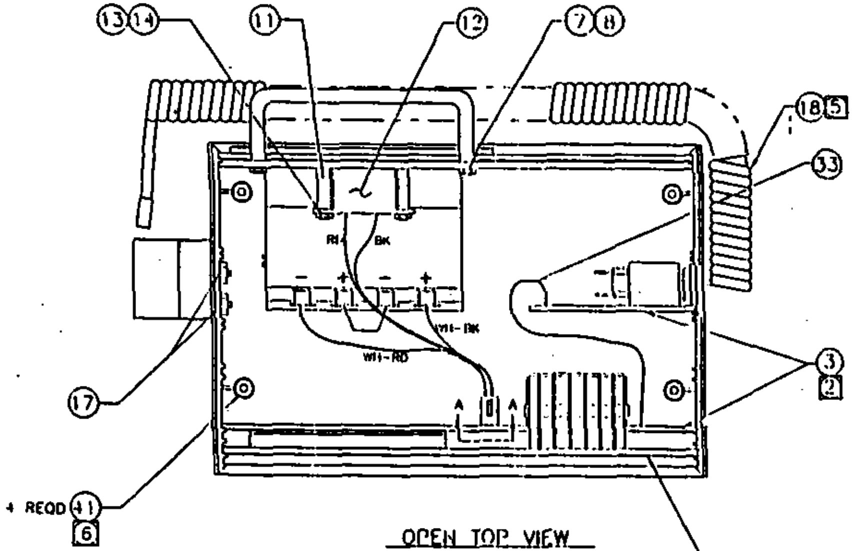


VIEW A-A

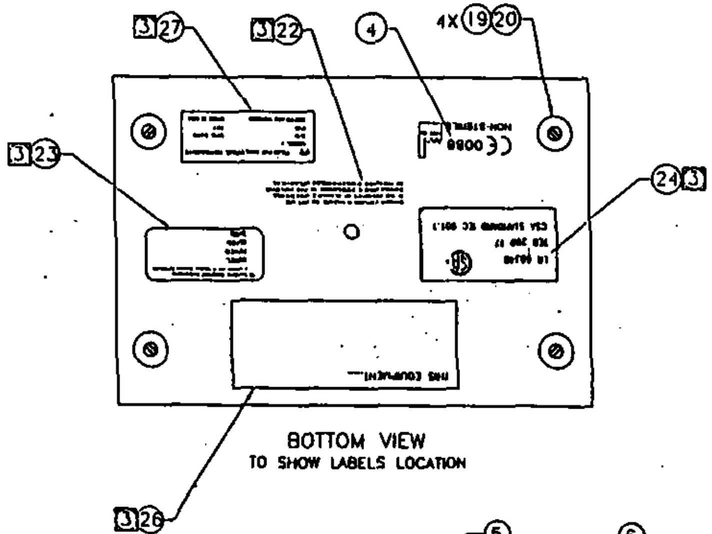
LEGEND

SYMBOL	DESCRIPTION
A	TED 200 T7
B	MDL. 650 (SECURIST)
C	OM-100 (NEWPORT)

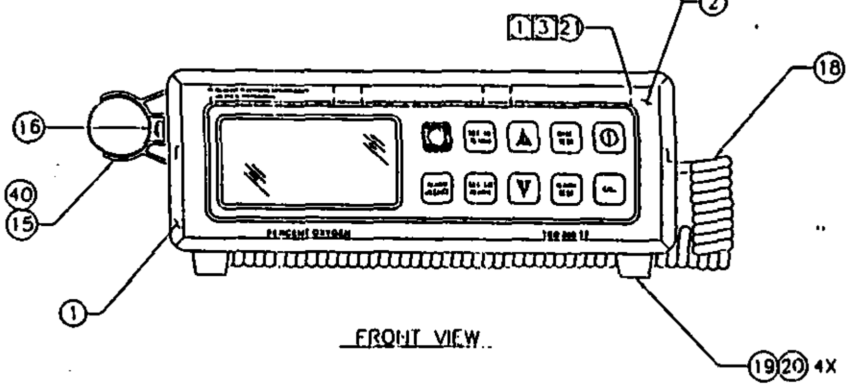
REV	DESCRIPTION	DATE	APP	
1	INC ECO 98-0207	11/17/98	R.H.	R.H.
2	INC ECO 99-0160	4/13/99	R.H.	VF



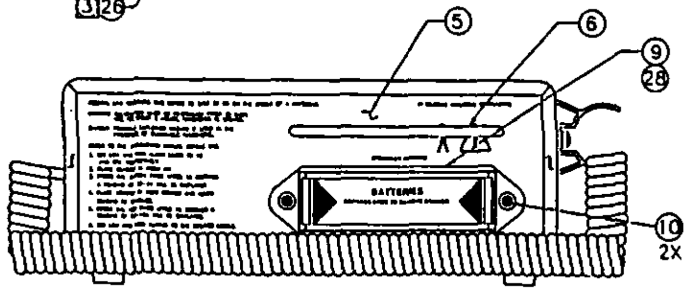
OPEN TOP VIEW



BOTTOM VIEW
TO SHOW LABELS LOCATION



FRONT VIEW



BACK VIEW

ITEM	QUANTITY A	QUANTITY B	QUANTITY C	PART NO.	DESCRIPTION
42	REF	—	—	D68987-RS	ROUTE SHEET
41	4	—	—	------	WASHER, FIBER #4 (.031 THK)
40	1	—	—	A51327	T7 SENSOR
39	1	—	—	B-69684	WARNING INFORMATION SHEET
38	1	—	—	A-70130	BOX, LABEL
37	—	—	—	A-57342	BOX, LABEL
36	—	—	—	A-57483	BOX, LABEL
35	REF	—	—	D-68003	SCHEMATIC DIAGRAM
34	—	—	—	M68987C	OPERATING MANUAL
	—	—	—	M68987B	OPERATING MANUAL
	REF	—	—	M68987A	OPERATING MANUAL
33	REF	—	—	CP1922	RIBBON CABLE 6-WIRES
32	4	—	—	CP1712	CRIMP, TERMINAL
31	1	—	—	CP1725	MINI-FIT CONNECTOR
30	1	—	—	A 788	T-ADAPTER, (NOT SHOWN, INCLUDED IN SHIPPING BOX)
29		—	—	/	/
28	4	—	—	B 99	"AA" BATTERY, (NOT SHOWN, INCLUDED IN SHIPPING BOX)
27	1	—	—	A-69403	LABEL, SERIAL NUMBER (TED 200 T7)
	—	—	—	A-57484	LABEL, SERIAL NUMBER (MDL. 650)
	—	—	—	A-69013	LABEL, SERIAL NUMBER (OM-100)
26	1	—	—	A-41151	LABEL, FCC
25	1	—	—	B8192	BOX, WITH FOAM
24	1	—	—	A-70091	LABEL, CSA
23	—	—	—	B65899-CV	LABEL, MODEL AND CLASS
	1	—	—	B65899-CW	LABEL, MODEL AND CLASS
22	1	—	—	A-45582	LABEL, WARNING
21	A/R	—	—	----	FOAM, RUBBER 4" X 3/4" X 1/8"
20	4	—	—	SS 272	SCREW, 4-40 X 1-3/8" LG BINDER HEAD
19	4	—	—	B 330	BUMPER
18	1	—	—	D-69934	COILED CABLE, ASSEMBLY
17	2	—	—	----	KEPS NUT, #8
16	2	—	—	----	SCREW, 6-32 X 3/8"
15	1	—	—	CP 1253	PROBE CLIP
14	2	—	—	----	SCREW, 2-56 X 1/4" LG BINDER HEAD
13	2	—	—	----	LOCKWASHER #2 EXTERNAL TOOTH
12	1	—	—	A 178	ALARM
11	2	—	—	S 823	SPACER, 3/16" O.D. 2-56 X 9/16" LG
10	2	—	—	----	SCREW, 8-32 X 3/8" FH UNDERCUT
9	1	—	—	B 551	4 CELL "AA" BATTERY HOLDER WITH DRAWER
8	2	—	—	LL 48	LOCKWASHER #4 EXTERNAL TOOTH
7	2	—	—	SS 78	SCREW, BINDER HEAD, 4-40 X 1/4"
6	1	—	—	H 240	HANDLE, VEMALINE PRODUCTS #SABA-8
5	1	—	—	A-67452	BACK PANEL SILKSCREEN DETAIL
	—	—	—	A-69822	BACK PANEL SILKSCREEN DETAIL
	—	—	—	A-69823	BACK PANEL SILKSCREEN DETAIL
4	1	—	—	A-69685	LABEL, LIDO
3	1	—	—	D-68004	P.C. ASSEMBLY, BOARD SET, TED 200T7
2	1	—	—	B-68990A	FRONT PANEL, ASSEMBLY
1	1	—	—	B-55014	CASE (PER C-55015 SHEET 1 AND 2)
	—	—	—	B-57566	CASE (PER C-55015 SHEET 1 AND 2)
	—	—	—	B-55014	CASE (PER C-55015 SHEET 1 AND 2)

BILL OF MATERIAL

TELEDYNE ELECTRONIC TECHNOLOGIES
Analytical Instruments

TED 200 T7 FINAL ASSEMBLY

SCALE: AS NOTED

DWG NO. D-68987

REV 2

SHEET 1 OF 1