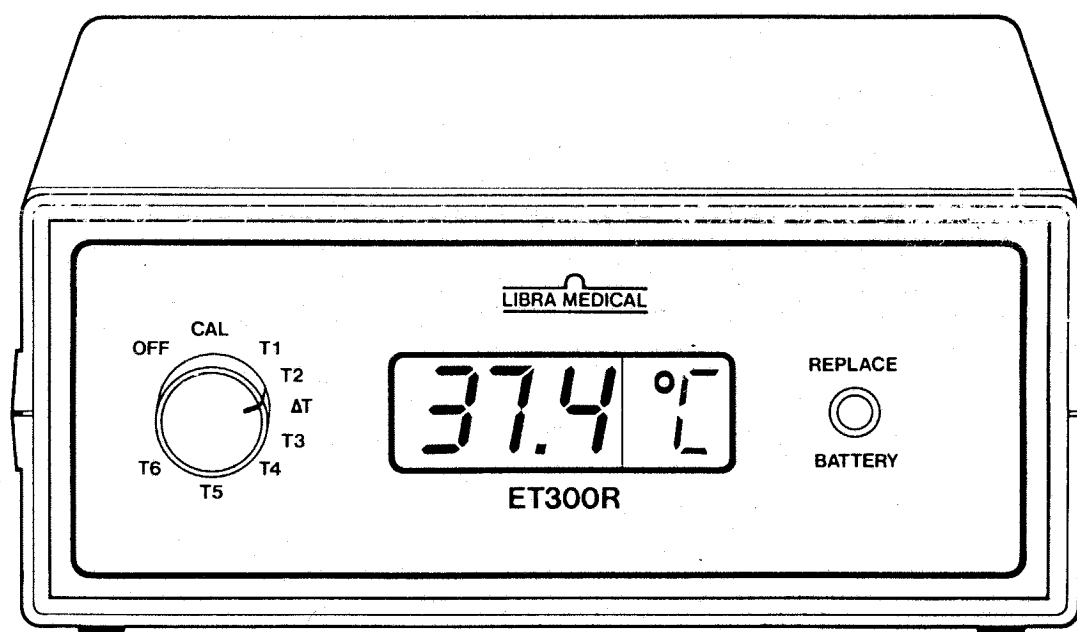


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**LIBRA MEDICAL**

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**ET 300R**  
**Electronic Temperature Monitor**



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**OPERATING AND SERVICE  
INFORMATION**

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# INTRODUCTION

The ET 300R is a portable, battery operated, six input temperature monitor. It has been designed to provide accurate and reliable long term monitoring and display in any critical patient care situation.

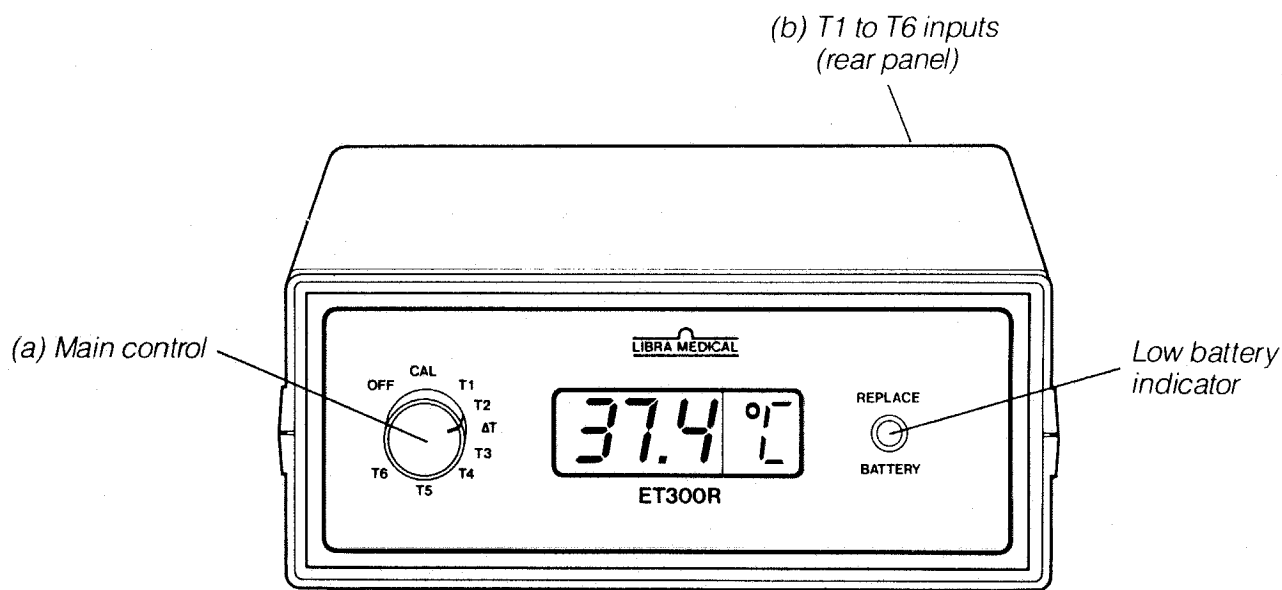
The unit uses the thermistor probes of Libra Medical or the Yellow Springs Instruments 400 series. An inbuilt calibration facility provides the operator with a simple performance assurance check.

# INSTALLATION

There are no special installation requirements.

The unit is delivered ready to use with the battery already installed.

# OPERATING INSTRUCTIONS



**1** Plug the temperature probes into the rear panel connectors (b). The normal practice when measuring both patient core and surface temperature is to connect the core probe to T1 and the surface probe to T2.

**2** Switch the main control (a) to CAL. Check the display reads  $40^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$ .

**3** To read the temperature measured by the probe connected to T1 switch the main control (a) to T1. Similarly for T2 to T6.

**4** To read the difference between T1 and T2, (T1 – T2), switch the main control (a) to ΔT.

# BATTERY REPLACEMENT

Access to the battery is gained by opening the cover of the battery holder on the rear panel. A low battery

is indicated by the front panel REPLACE BATTERY indicator flashing. Use a 9V PP3 or equivalent.

# ACCESSORIES

37104 General purpose, adult  
rectal/esophageal probe  
37204 Neonatal rectal/esophageal probe  
37804 Neonatal surface probe  
37904 General purpose, adult surface probe

PC 2500 Drip stand mounting bracket  
PP3 9V battery (supplied)

## APPLICATION CONSIDERATIONS

### INSTRUMENT CLEANING:

The ET 300R can be cleaned by wiping with a cloth moistened with warm water and a mild soap solution. Do not use any chemical cleaning agents

### PROBE CLEANING:

After use the probes should be cleaned with warm water and wiped clean and dry

### PROBE DISINFECTING:

After cleaning the probe, immerse the sensing end for one (1) minute minimum in a medically approved sterilization fluid\*. Do not immerse the connector

### PROBE STERILIZATION:

After cleaning the probe, immerse the sensing end for ten (10) hours minimum in a medically approved sterilization fluid\*. Do not immerse the connector

\*Avoid phenol based fluids as repeated use of these can cause the cable to stiffen.

NOTE: Directions for sterilization are described on the solution containers and these should be followed explicitly.

Ethylene oxide gas sterilization may also be used in accordance with standard safety recommendations.

Under no circumstances should the probes be boiled or autoclaved

## BASIC FAULT FINDING

1 Display blank:  
Check and replace the battery

2 Display reads 00.0:  
Probe not connected

3 Display reads below 10°C with probe connected:  
Probe open circuit, replace probe

4 Display does not read 40°C  $\pm$  0.1°C in CAL:  
Do not use, return unit for repair

## SPECIFICATION

*Input* Standard 1/4 inch jack socket.  
Suitable for Libra Medical  
thermistor probes and  
Yellow Springs Instruments  
400 series

*Range* 20°C to 50°C

*Accuracy*  $\pm$  0.1°C (excluding probe)

*Resolution* 0.1°C

*Calibration* 40°C  $\pm$  0.1°C

*Recorder output* 2.5mm jack socket  
50mV/°C

*Display* Liquid crystal 3 digit

*Battery* 9V PP3 or equivalent

*Battery Life* 2 to 3 months  
continuous use

*Dimensions* Height 65mm (2.5 ins)  
Width 155mm (6.1 ins)  
Depth 155mm (6.1 ins)

*Weight* 420 grms (15 oz)

# SERVICE INFORMATION

## Models ET250 & ET300R

### Theory of operation

Zener diode ZD1 provides a stable voltage for both the thermistor probes and preset PR1 which sets the accuracy at the upper limit of the monitors range. The low limit accuracy being set by preset PR3. As the circuits for T1 and T2 are identical only T1 will be described. With a thermistor probe plugged into socket JSK1 the voltage appearing at pin 15 will vary with the temperature at the point of measurement. This voltage is routed via switch SW1 to the input of the digital voltmeter chip IC3 which in turn directly drives the

liquid crystal display. Resistor R11 acts to linearise the output of the thermistor probe over the operating range of the monitor.

The output from both probes is taken to differential amplifier IC1 whose output provides the  $\Delta T$  value.

The battery voltage is compared to the zener diode reference ZD2. When the battery voltage drops below 7V the output of amplifier IC2 changes state turning on transistor TR1 and the low battery flashing i.e.d.

### Parts list

#### GENERAL:

It is the policy of Libra Medical to use components readily available from electronic component stockists

All parts including mechanical items are available from Libra Medical or the local Libra Medical distributor

### Electrical calibration procedure

The following should only be carried out by a qualified technician

#### EQUIPMENT REQUIRED:

Libra Medical calibrator TC 100

D.C. power supply, 0 to 10V

Digital voltmeter, 0.1V resolution

1 Plug the calibrator TC 100 into the T1 input. Switch the calibrator to 22°C and select T1 on the ET 250

2 Adjust SET LOW (PR3) for a reading of 22.0 on the display

3 Switch the calibrator to 20°C

4 Adjust SET HIGH (PR1) for a reading of 49.8 on the display

5 Repeat the PR3 and PR1 adjustments until satisfactory

6 Plug the calibrator into the T2 input. Switch the calibrator to 22°C and select T2 on the ET 250

7 Adjust SET T2 (PR4) for a reading of 22.0 on the display

8 Disconnect the calibrator and switch the ET 250 to CAL

9 Adjust CAL (PR2) for a reading of 40.0 on the display

10 Switch the ET 250 to T1

11 Adjust T1 0° (PR6) for a reading of 00.0 on the display

12 Switch the ET 250 to T2

13 Adjust T2 0° (PR7) for a reading of 00.0 on the display

14 Switch the ET 250 to  $\Delta T$

15 Adjust SET  $\Delta T$  (PR5) for a reading of 00.0 on the display

#### OTHER TESTS:

##### Low battery detector

1 Replace the battery with the d.c. power supply set to 9V

2 Switch the ET 250 to T1

3 Slowly reduce the power supply output until the REPLACE BATTERY indicator flashes. This should occur between 7.2V and 6.6V.

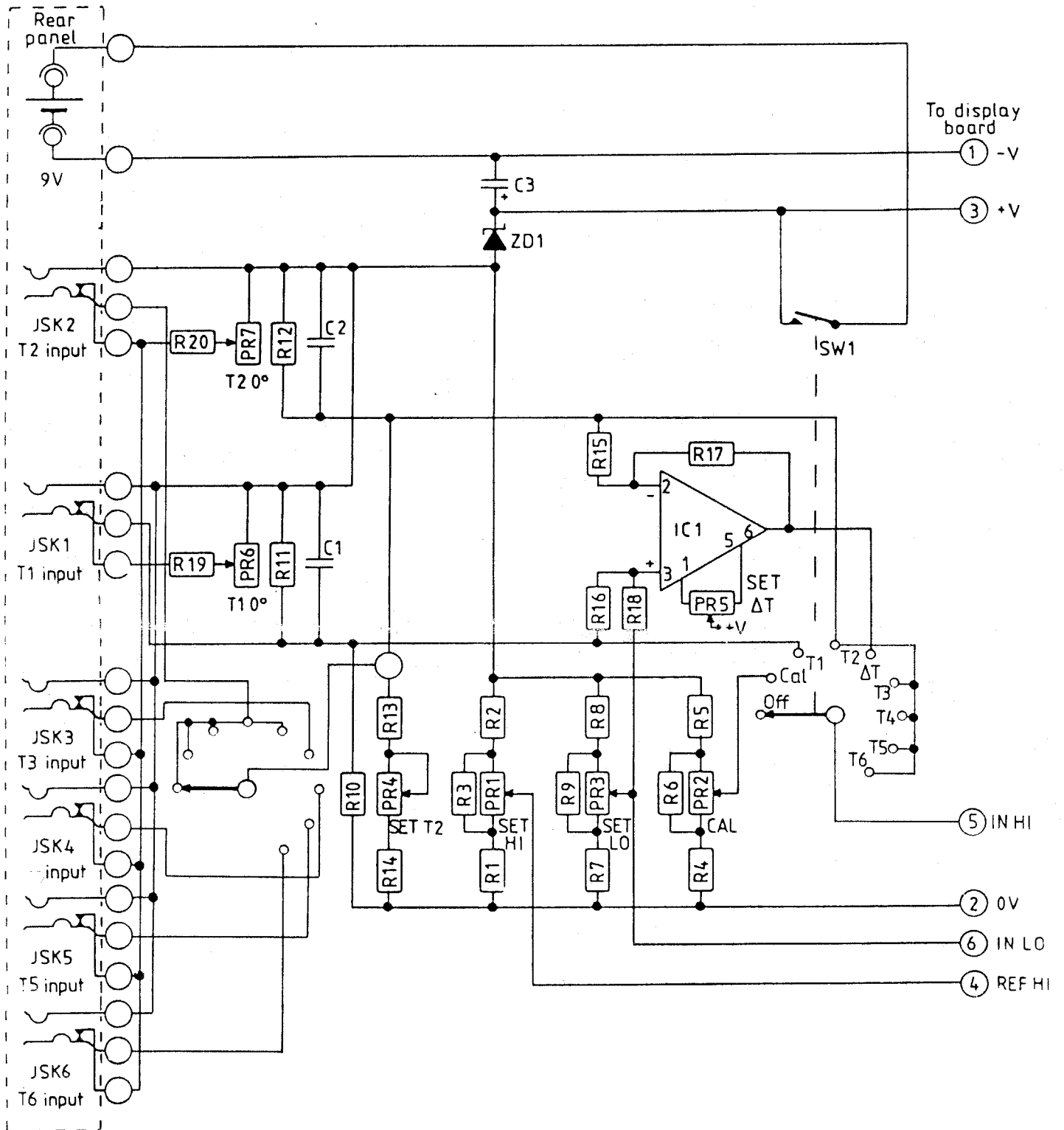


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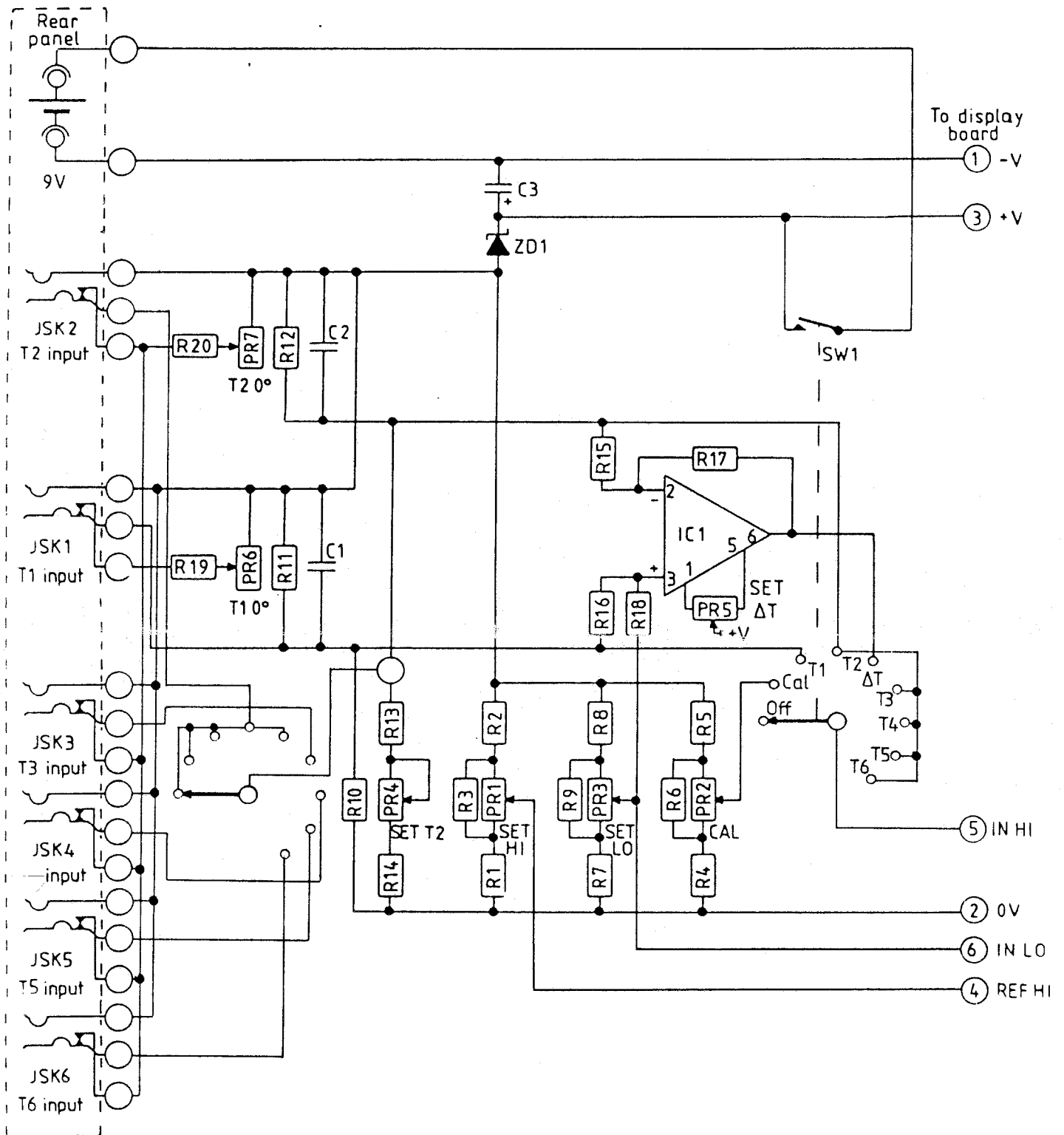
138 Overdown Road, Tilehurst, Reading, Berks. RG3 6NJ, England.  
Telephone 0734-25235

Cranbrook, London Road, Ascot, Berks. SL5 8DH, England.  
Telephone 0344-883875 Telex 848210

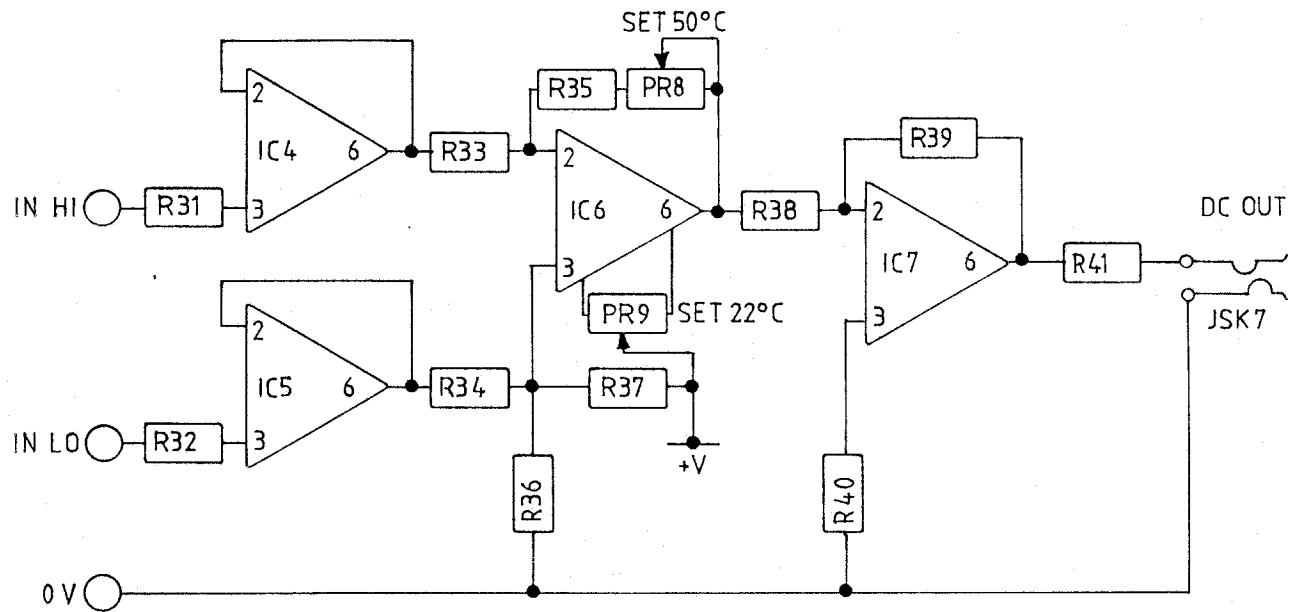
# INPUT AND PROBE SELECTION CIRCUIT



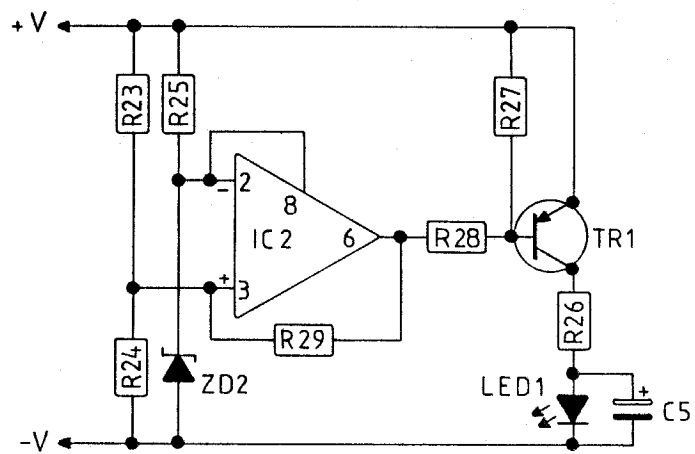
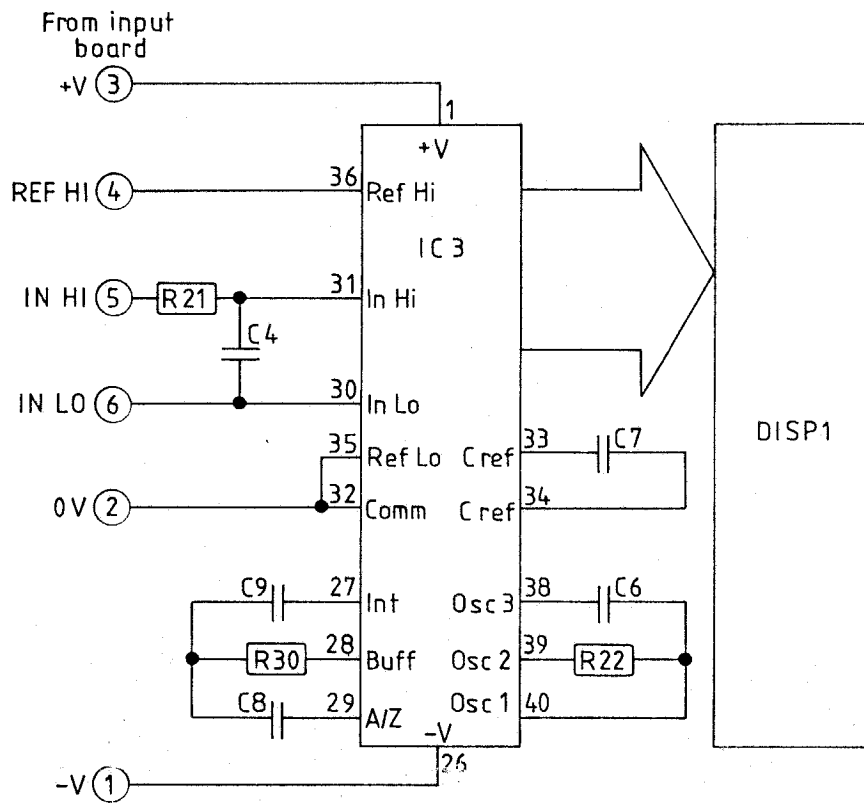
# INPUT AND PROBE SELECTION CIRCUIT



# RECORDER OUTPUT CIRCUIT



# DISPLAY AND LOW BATTERY CIRCUIT





PARTS LIST MODEL ET300R

Value	Descrt'n	Qty	Cct Ref
Resistors			
330	1% 0.25W MF	2	R9, 26
470	1% 0.25W MF	1	R6
1K	1% 0.25W MF	2	R3, 41
1K2	1% 0.25W MF	2	R11, 12
2K7	1% 0.25W MF	1	R14
3K3	1% 0.25W MF	1	R5
5K9	1% 0.25W MF	1	R8
6K34	1% 0.25W MF	1	R1
10K	1% 0.25W MF	2	R31, 32
11K3	1% 0.25W MF	2	R19, 20
15K	1% 0.25W MF	1	R13
18K	1% 0.25W MF	2	R10, 24
22K	1% 0.25W MF	2	R33, 34
47K	1% 0.25W MF	2	R28, 30
91K	1% 0.25W MF	1	R23
100K	1% 0.25W MF	5	R2, 4, 7 R25, 27
390K	1% 0.25W MF	1	R22
1M	1% 0.25W MF	9	R15, 16, 17 R18, 21, 36 R38, 39, 40
1M2	1% 0.25W MF	1	R35
10M	5% 0.25W MF	1	R29
Select	5% 0.25W MF	1	R37

Presets

1K	Carbon	6	PR1, 2, 3, 4 PR6, 7
20K	20 Turn	1	PR5
22K	Carbon	1	PR9
100K	20 Turn	1	PR8

Capacitors

47p	Ceramic	1	C6
0.1u	Met Poly	3	C1, 2, 4
0.22u	Met Poly	1	C9
0.47u	Met Poly	2	C7, 8
10u	Tant 25V	1	C3
220u	Elect 10V	2	C5

# Semiconductors

ICL8069	Band Gap	2	ZD1,2
7126	DPM	1	IC3
7611	Op Amp	6	IC1,2,4 IC5,6,7
BC 327	Transistor	1	TR1

# Switches

1P 12W	Wafer	2	P/O SW1
DP ST	On/Off	1	P/O SW1
Mech'ism	Miniature	1	P/O SW1

# PCB's

Display	1	PCB1
Input	1	PCB2

# Connectors

0.25"	Jack	6	JSK1 to 6
10 Way	Molex Plug	1	PL1
10 Way	Molex Skt	1	SK1
	Crimps	6	P/O SK1
20 Way	LCD	2	
2.5mm	Jack	1	JSK7

# Misc Elec

Cable	Rib'n 240mm	1	16 Way
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# Optoelec

LCD	3.5 Digit	1	Displ
LED	Red	1	LED1

# Misc Mech

Ty-Rap	2	
Sleeve Blk	2	
Thru Pins	2	
Screw No4	4	6.4mm max
Screw M3	2	M3x10mm CS
Nut M3	2	M3x0.5
Washer M3	2	
Spacer	4	Plastic
Spacer	4	Metal
Batt Holder	1	BH1
Knob Blk	1	KN1
Case assy	1	CA1
Front p'l	1	FP300R
Rear p'l	1	RP300R
Label	1	Serial No
Label	1	Calibrated