

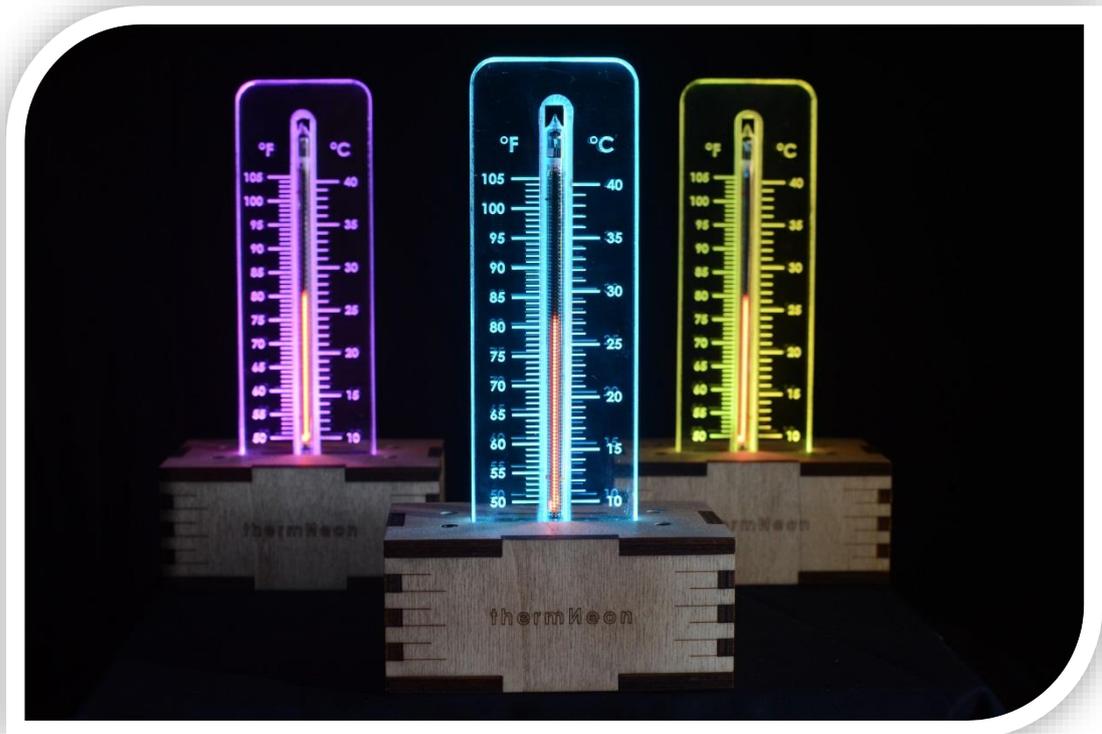
SALTechips

thermMeon

User Manual

Hardware version: v3

Software version: v2



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1. Introduction & History

Thank you and congratulations on your purchase of the *thermNeon* by SALTechips.

The *thermNeon* is not just a room thermometer, it is a piece of history of electronics right in your living room.

The IN-13 (IH-13 in Cyrillic) bargraph display tube used in your *thermNeon* is a member of a large family of cold-cathode indicator tubes called Nixie tubes. In the mid-1950's, when valve or vacuum tube technology was still widely used, there was already a need to display numerals and symbols in equipment ranging from railway control panels to desktop calculators.



Glass envelopes of tubes are flame-formed in Blackburn, UK. Circa 1954.

However, back then, the LED and LCD displays that we take for granted today had not been adequately developed, making Nixie tubes a popular choice for small display applications.

PATENT SPECIFICATION **1,012,229**
DRAWINGS ATTACHED.

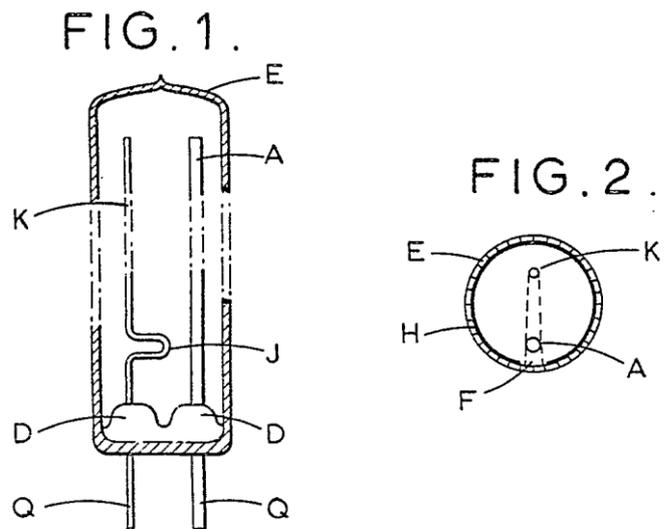
Inventors:—GEORGE FREDERICK WESTON and PIETER SCHAGEN.
Date of filing Complete Specification: June 27, 1963.
Application Date: Oct. 5, 1962. No. 37802/62.
Complete Specification Published: Dec. 8, 1965.
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COMPLETE SPECIFICATION.
Cold-Cathode Glow-Discharge Current-Indicator Tube.

We, MULLARD LIMITED, a British Company, of Abacus House, 33, Gutter Lane, London, E.C.2. do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a cold-cathode glow-discharge current-indicator tube of the type in which the electrode assembly comprises an anode and a cathode having longitudinally-extending parallel main discharge surfaces and wherein in operation the length

reference to the accompanying diagrammatic drawings in which:—
Figure 1 illustrates a first embodiment,
Figure 2 is an end view of the tube shown in Figure 1,
Figure 3 illustrates an external view of the tube,
Figure 4 also illustrates the first embodiment,
Figure 5 illustrates in cross-section a supporting arrangement and
Figures 6 and 7 illustrate a second embodiment.
Referring to Figure 1 a cold-cathode glow-



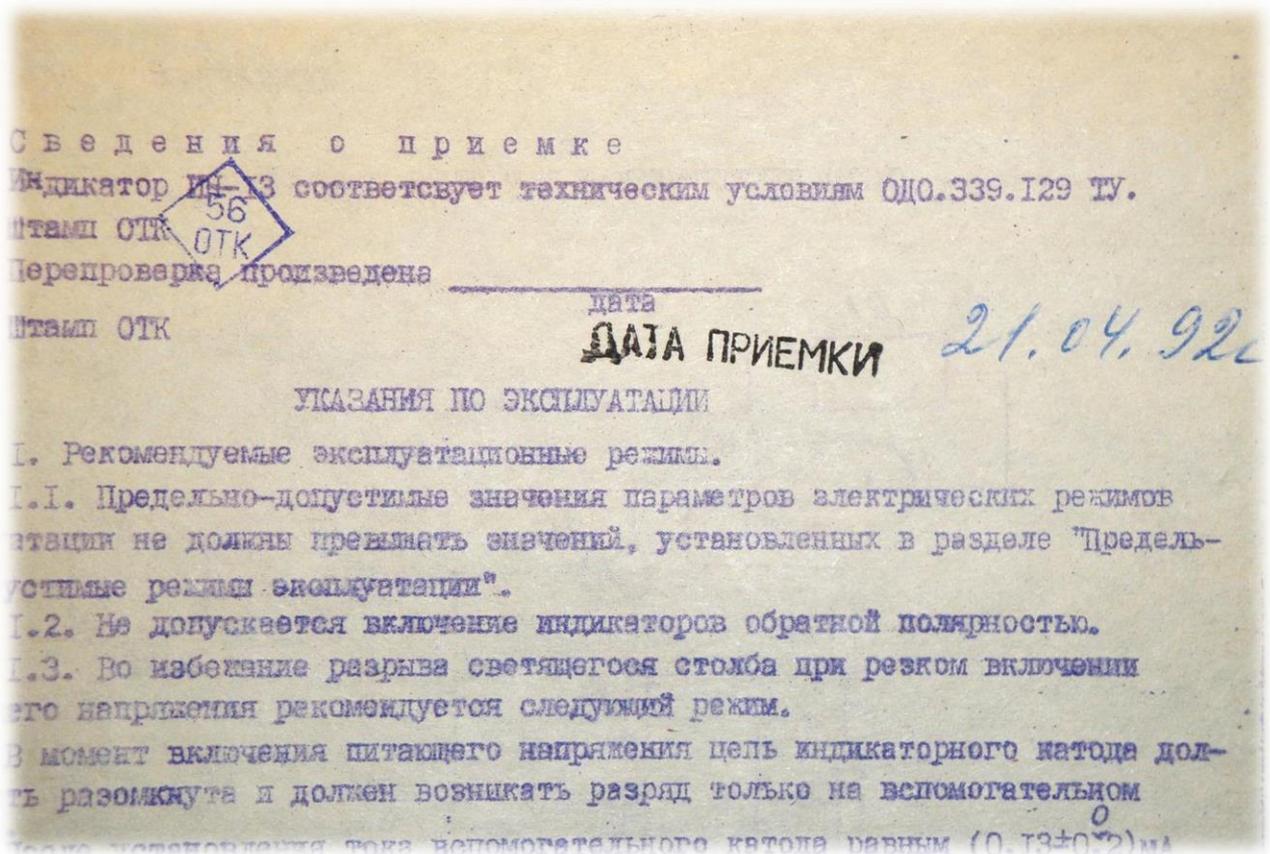
First patent application for a bargraph indicator tube. 1965 Mullard Ltd.

Although Nixie tubes were manufactured in several countries, the IN-13 tube in your thermNeon was manufactured by the Reflektor factory located in Saratov, Russia. At the time of manufacture, Saratov was part of the Former Soviet Union.



Markings at the back of an IN-13 tube.

The tube in your thermNeon is unused (besides us testing it!), but very old. You can find out how old by looking at the markings at the back of the tube. The year of manufacture is the first two digits of the number at the top and the week of manufacture is the second two digits. For example, 9207 means the tube was manufactured in the 7th week of 1992. When was yours made? Other markings on the tube are the factory logo (note the resemblance to a hammer and sickle), the tube model and the green OTK mark which indicates a quality inspection at the time of manufacture.



Final page of original datasheet for the IN-13 tube with handwritten date of manufacture.

With the thermNeon we tried to capture the warm neon glow emanating from the tube. We hope you enjoy your thermNeon it as much as we did developing it.

In the remainder of this user manual you will find information on how to operate your thermNeon. For additional product support or feedback please do not hesitate to contact SALTechips.



Warning Potentially hazardous voltages are generated within this unit. No liability is accepted for any damage, injury or death as a result of anyone dismantling this product.

2. Features

- Dual scale ranging from 10 to 40°C and 50 to 104°F with a 0.5°C resolution
- Transparent laser cut and engraved scale, illumination depending on temperature with 4096 colours palette
- Smooth temperature display and illumination effect
- User menu for configuration with build in settings memory
- Laser fabricated wooded base and scale
- Assembled by hand in our laboratories (for fully assembled *thermNeons*)
- Bespoke design

To ensure the thermometer remains accurate and the display bright, we have incorporated a maintenance routine which is performed automatically every 10,000 display cycles. If you are lucky enough to be viewing the display when this happens, you will see the display illuminate the full length of the tube for two minutes. The unit will then return to normal operation.

3. Specifications

Operating temperature range: 0-70 °C

Display temperature range: 10-40 °C

Resolution and absolute accuracy: 0.5 °C, ±1 °C / 0.9 °F, ±1.8 °F

Power supply: 5VDC @ 120mA (0.6W) over mini USB type B

Power input: Universal input 100-240 V AC, 50-60Hz

Base dimensions (w x h x d): 120mm x 54mm x 80mm (without feet)

Overall dimensions (w x h x d): 120mm x 224mm x 80mm (with scale and feet)

Weight: 0.3 kg without power supply, 0.4 kg with power supply

4. Items included

Included in the package are the following items:

- Fully assembled and calibrated *thermNeon*
- USB power cable (type A to mini-B)
- Universal wall adaptor power supply
- Printed user manual (this document)

*If you purchased the *thermNeon* as a kit, you will have received all of the above (except the assembled *thermNeon*!) and an assembly manual. Please refer to the assembly manual for a full parts list.

5. Powering the *thermNeon*

You can power the *thermNeon* in two different ways:

1. Using the included wall adaptor and USB cable
2. Or using the included USB power cable plugged into the USB port of a computer (laptop or desktop) capable of supplying at least 120mA.

When power is applied to the *thermNeon* it will start to display the temperature after approximately 2 seconds.

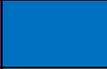
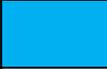
6. Controls

The *thermNeon* is controlled by two buttons located at the back of the unit. The buttons are marked '**UP**' and '**SET**'.

Pressing the UP button when the *thermNeon* is inactive will "wake up" the display and show the current temperature. Pressing the SET button will enter the user options menu.

During default operation, the temperature is read once and displayed for the duration depending on the frequency chosen in the options. However you may activate a "live" temperature update mode, where the display actively updates the temperature during its current display cycle for 30 seconds. You can enter this mode by holding down the UP button as the temperature begins being displayed or holding the UP button while the unit is inactive. You can release the UP button once the display has risen to the current temperature.

7. Menu Structure

Menu Option (flashing green)		Option Setting (flashing red)						
		10°C	15°C	20°C	25°C	30°C	35°C	40°C
10°C	Display Duration of temperature (s)	5	10	15	20	30	45	60
15°C	Display Frequency (min)	1	2	5	10	20	30	60
20°C	Cold set point	Press the "UP" button until you reach the desired temperature. #						
25°C	Hot set point							
30°C	Cold set point colour							White*
35°C	Hot set point colour							
40°C	Scale illumination brightness	OFF	1	2	3	4	5	MAX

The hot set point will be higher than the cold set point.

* Selecting white as the colour for either the cold or the hot temperature set point will display white for both set points.

Note: a copy of the table above is under the *thermNeon* for quick reference.

8. Changing the options

A unique menu system for the *thermNeon* has been created by utilising the scale values and illumination colours. When you enter the menu, the colour of the scale flashing and the displayed temperature value indicate the current menu option and the current setting respectively.

Pressing the SET button will cause the scale to flash green. The indicator tube will be at 10°C, Option 1. To enter Option 1, press the SET button. The scale will change to a flashing red colour and the indicator will show the current value for Option 1. Press the UP button to change the setting to the desired value. You can cycle through the values by pressing the UP button or by holding down the UP button. If you reach the top, pressing UP will start again from the bottom. Press the SET button to save and go back to the options menu, the scale will return to the flashing green colour.

From here you can press the UP button to move to Option 2. Follow the same procedure as above to change the desired options.

When you have finished changing the options (Option 7), pressing UP will return to the default operation of the *thermNeon*.

Options are stored in internal non-volatile memory when you exit the menu. Therefore, if you turn off your *thermNeon*, the settings will be as you left them when you turn it back on. It is not necessary to re-configure the options every time.

We have created a video showing how to change the options. You can view it on our web site at <http://www.saltechips.com/products/thermneon/manuals>

9. Option details

Value in **bold** is the factory default

Option 1 (10°C) – Display duration of temperature (seconds)

This option allows you to change the duration you would like the temperature to be displayed for. (5s, 10s, 15s, 20s, 30, 45s, **60s**)

Option 2 (15°C) – Display Frequency (minutes)

This option allows you to change the frequency between the temperature display. The off period. (**1m**, 2m, 5m, 10m, 20m, 30m, 60m)

Option 3 (20°C) – Cold set point

This option is used to set the temperature at which the scale will display the cold colour (see Option 5). For example, if the value is set to 15°C, the scale will display the colour set in Option 5 when the temperature is at or below 15°C. (**15°C**)

Option 4 (25°C) – Hot set point

This option is used to set the temperature at which the scale will display the hot colour (see Option 6). For example, if the value is set to 35°C, the scale will display the colour set in Option 6 when the temperature is at or above 35°C. (**35°C**)

Option 5 (30°C) – Cold set point colour

Choose a colour you would like to display when the value set in Option 3 is at or below the Cold Set Point. (Red, Purple, **Blue**, Aqua, Green, Yellow, White)

Option 6 (35°C) – Hot set point colour

Choose a colour you would like to display when the value set in Option 4 is at or above the Hot Set Point. (**Red**, Purple, Blue, Aqua, Green, Yellow, White)

Option 7 (40°C) – Scale illumination brightness

Choose the brightness of the scale illumination. (OFF, 1, 2, **3**, 4, 5, MAX)

When two different colours are selected in options 5 and 6 (except for white) and the temperature is measured in between the two set points (options 3 and 4) a mix of the two colours will be achieved. Eg with the default settings, when the temperature is 25°C (half way between the two set points) the scale will be illuminated with a purple colour. If the temperature rises, the purple will become closer to the hot set point colour, red in this instance until it reaches the hot set point (35°C) and the scale illumination will be red.

If any (or both) of the two colours selected in options 5 and 6 is white, the scale illumination will be white irrespective of the setting of the other colour.

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