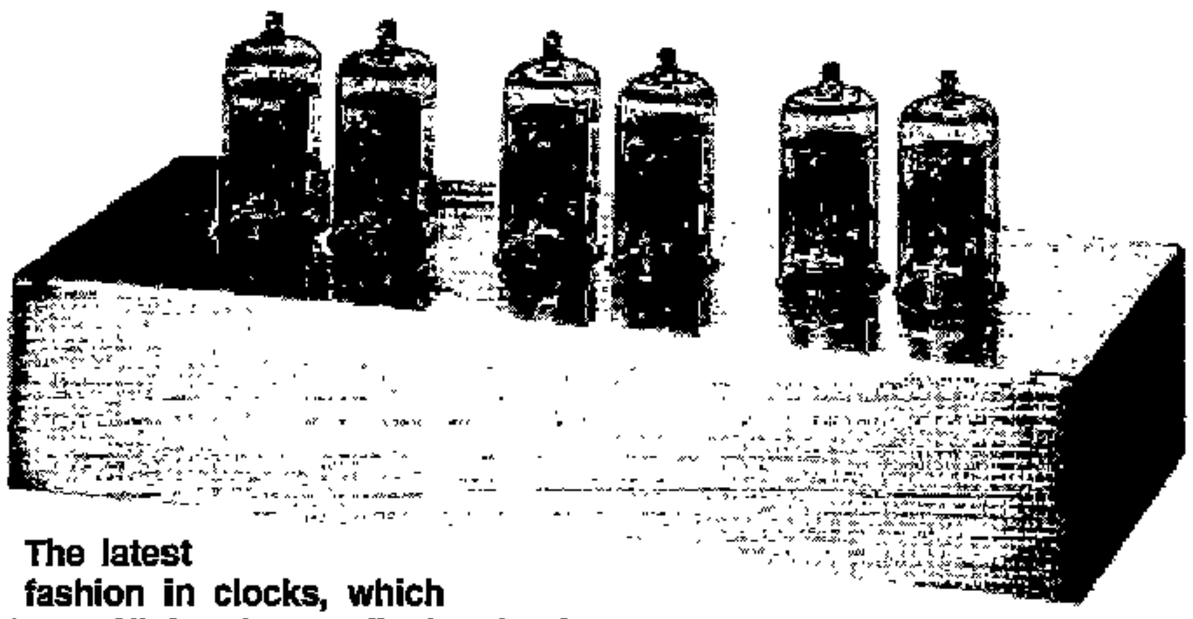
WHATEVER NEXT



The latest fashion in clocks, which uses Nixie tubes to display the time.

FASHIONABLE 'VALVES'

I REMEMBER the first frequency counter I ever saw. To the schoolboy I was at the time it truly was a thing of wonder, the numbers rippling back and forth inside the Nixie tubes (see panel below) that formed the display. I don't remember the make or model at all, but the year would have been in the early 1960s. I remember how, in the 1970s, the coming of LED displays, small as the original ones were, led to the earlier generation of equipment appearing on the surplus market in large quantities - indeed I remember seeing lots of it at rallies. By the 1980s, equipment with LED displays was being replaced wholesale by equipment with liquid crystal displays. It seems a long time ago indeed that anything employing a Nixie tube was built commercially, but what's this I see, a brand new digital clock (see photo left) with a Nixie tube display?

The clock in question is available from Ocean, a catalogue company which specialises in fashionable items, but when I researched it I also found it in other places on the Internet.

Designing such a clock, combining modern and not-so-modern components, would have been an interesting exercise, so it doesn't surprise me at all that someone has done it. What does surprise me is that it is possible to get hold of Nixie tubes in commercial quantities. Surely these things aren't still being made?

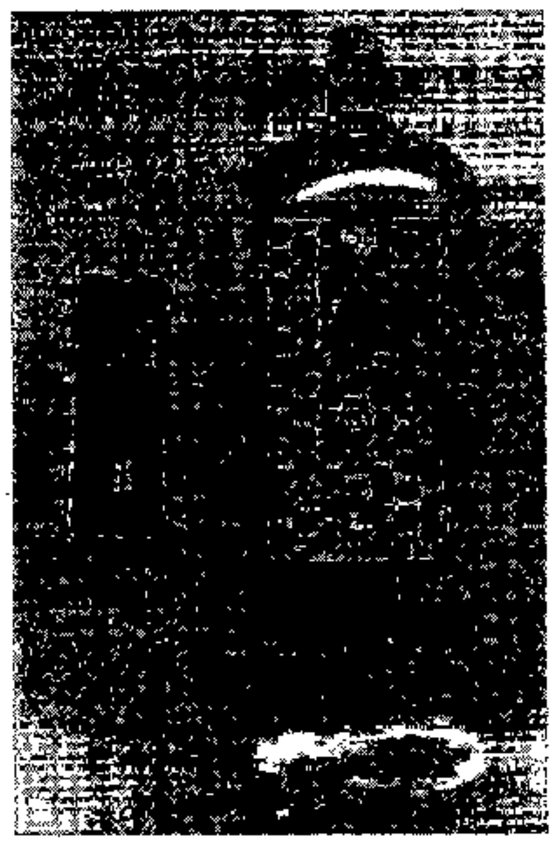
Nixie clock: http:// www.oceancatalogue.com

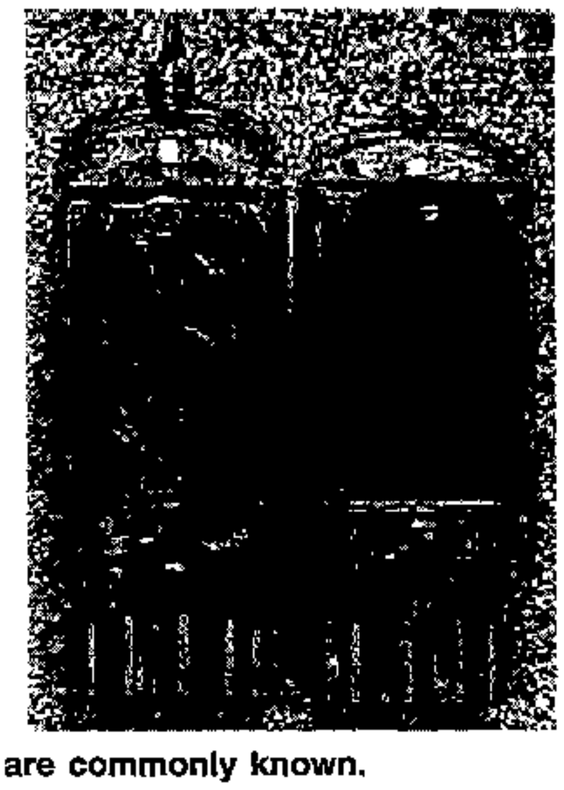
NIXIE TUBES - A BRIEF HISTORY LESSON

NIXIE TUBE displays first became available in the 1950s. They consist of a neon-filled glass envelope with a single anode made from a fine mesh, plus a number of wire cathodes, each cathode being bent into the shape of what is required to be displayed. Typically this means 11 cathodes, these being the numbers 0 - 9 plus a decimal point, but tubes were also made that could display letters and symbols. By placing a high voltage on the anode and earthing one of the cathodes, that cathode would glow orange in colour. Tubes were built in single- and multi-digit versions, end- and side-view versions, and in various sizes from miniature to enormous. The photos below show some examples.

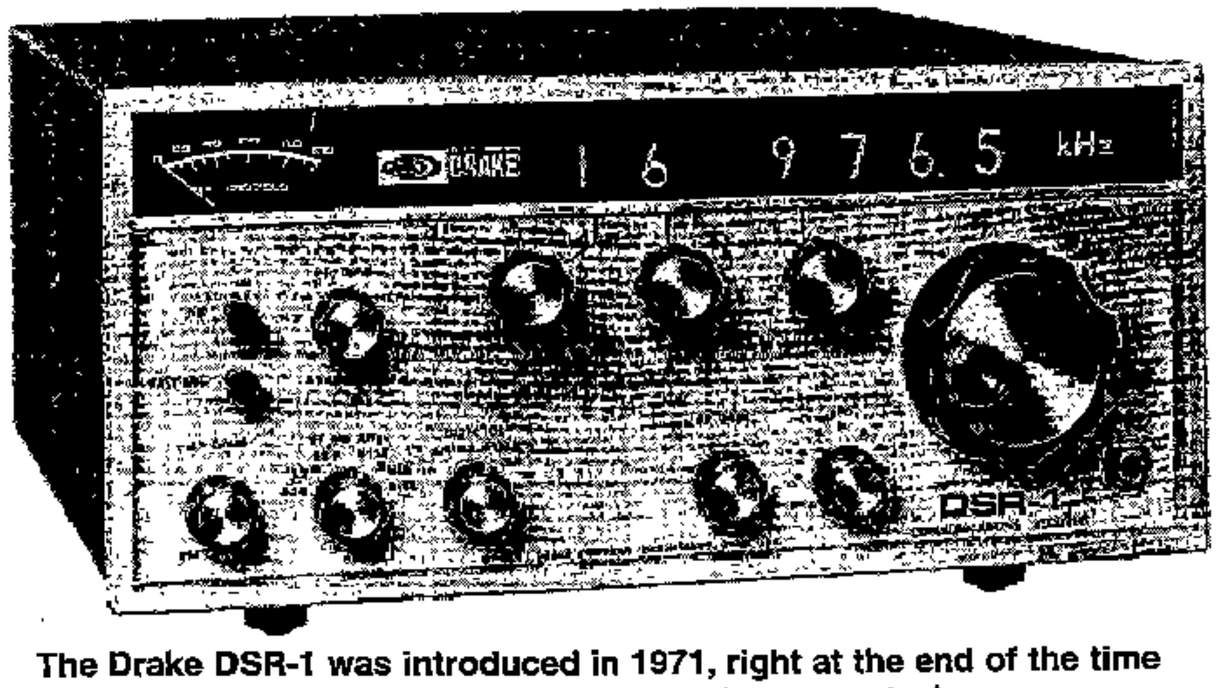
One item of radio equipment that I have been able to discover which used Nixie tube displays was the Drake DSR-1 (see photo below). This frequency-synthesised general coverage receiver was introduced in 1971. Being a commercial-grade product, I doubt it would have found its way into many shacks.

Although 'numeric neon displays' or 'gas-filled discharge devices', as they should really be called, are practically always termed 'Nixie tubes', the word Nixie is actually a trademark of the Burroughs Corporation. Finally, it is worth pointing out that although many Nixies look like 'valves' (in the English sense of the word), they aren't actually thermionic.

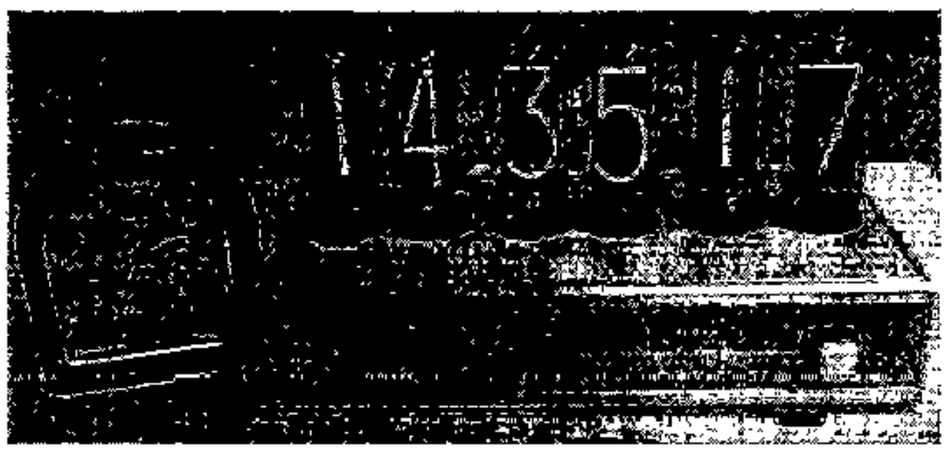




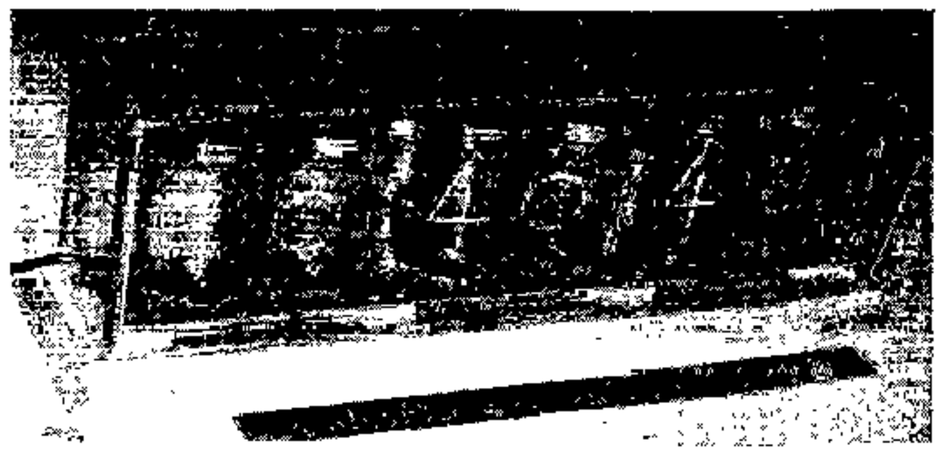
Examples of Nixie tubes, as they are commonly known.



The Drake DSR-1 was introduced in 1971, right at the end of the time that Nixie tubes were being incorporated into new designs.



G0HJC's Nixie clock, that uses 1.8in-high tubes that he bought new over the Internet from a supplier in Russia.



G0UPL's Nixie clock, using 4in-high Z568M tubes. They were obtained over the Internet from a German supplier.

needs to be exercised as most of the PCB is at mains potential. It uses direct mains - no transformer, and drops the voltage via resistors to several ICs and 28 transistors to drive the tubes. Hence, caution is needed when, for example, using a 'scope, in which case an isolating transformer is of course a must.

"It also has an interesting feature to set the time. It uses two reed switches (more glass!) on the PCB, which are set from outside the case by switching them on and off by use of a magnet. Neat, eh?" Yes, 'neat', and in view of the fact that there is no mains transformer a sensible precaution.

Gary Bleads, G0HJQ, wrote to say that he has built two Nixie clocks. "Both clocks use a PIC16F84 microprocessor", he says, "with the 200Volts @ 10mA for the Nixies being generated from a diode-capacitor multiplier from a low voltage (24-0-24V or 9-0-9V) transformer. Both clocks have an alarm and hourly chime (daytime only!) and dim automatically at night. I use the larger one as my main bedroom alarm clock, and it's worked perfectly since I built it five months ago. The smaller one is in my shack. I find the orange glow of the properly formed digits is very pleasant to look at and easier to read than LED displays." Gary agrees with my suspicion that Nixies are not being made any more, although there was apparently a factory in Russia making them until the mid 1990s. The larger of Gary's clocks, which uses IN18 displays, is pictured above left.

Even bigger are the digits of the Nixie clock built by Hans Summers, G0UPL (see photo above right). He sourced some "Giant East German Nixie tubes, which must have been intended for use in railway station clocks and such like. The tubes are some four inches high." Once again, he purchased them over the Internet.

Finally, on this subject at least, Enver H Chaudri, G3DCS, wrote to say that he had read the article on Nixie tubes "... with great interest, as I was in charge of the technicalities of Nixie tube production when I worked as Head of the Works Technical Department at Hivac Ltd in the early 1960s." He went on to add: "They were made for the Bell Punch Company at Uxbridge, who had developed the world's first electronic calculator just before the Japanese brought them out. The machine was the size of a typewriter. It used Hivac cold cathode tubes in the counter section and the 'number tubes' (or numicators) as we called them, as the readout.

"While at Hivac we introduced mercury to the interior of the tube. This covered the nickel cathodes with a replaceable surface, which was self-replenishing. It gave the tube a slightly blue / pink tinge when it was illuminated, instead of the bright orange of the neon gas with which it was filled. The addition of mercury greatly prevented sputtering of the cathode, hence considerably increasing the life of the tube. Later on, one potential customer wanted radioactive tritium gas added to the filling mixture, to aid priming and produce better tube striking characteristics. It is not generally known that without a priming source, cold cathode tubes will not readily work in the dark. Many a circuit has been developed in the daylight of a laboratory and has foxed the engineers because as soon as it was put into a black box it would refuse to work! I had to prepare a cylinder of neon gas to which was added tritium, for use on a 24-head automatic vacuum pump. Needless to say, a great deal of ventilation was required to ensure that the radioactive gas did not escape into the factory air. I do not recollect that we ever tried the experiment."

POSITIVE FEEDBACK

I WAS GENUINELY surprised at the level of feedback which the January item on Nixie clocks (*Fashionable 'Valves'*) generated. It seems that several readers have built themselves clocks that employ these elderly tubes to form the display.

David Taylor, G4EBT, brought to my notice the 'wacky website' www.electricstuff.co.uk, on which there are projects for several Nixie clocks, one of which he is currently building from a commercially-available PCB. Others also mentioned the same website.

David describes the project as "an interesting and compact design, with which caution

WWW.

Nixie clocks (and other things): www.electricstuff.co.uk
Near Space Balloon Group: www.kcnet.com/~n3kkm/nearspace.html
Anadyne Microelectronics AN10E40: www.anadigm.com/an10e40_data.pdf