

Signalite

APPLICATION NEWS

A General Instrument company



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Signalite Inc., 1933 Heck Avenue, Neptune, N J 07753

APPLICATION OF NEON GLOW-LAMPS IN ALPHA NUMERICAL DISPLAY

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Test Instruments Div ,
San Diego Operations

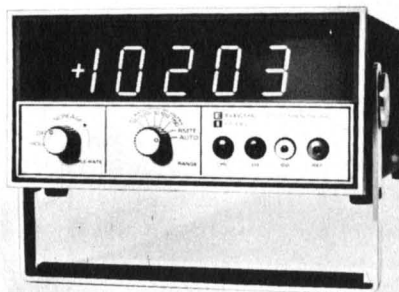
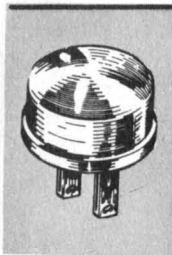


Figure 1

High visibility digital readout is featured in Honeywell's Digital Voltmeter

In the design and development of the Model 620 Series Digital Voltmeter (Fig. 1), Honeywell, Inc., Test Instruments Division (formerly Electro Instruments, Inc.), made an extensive search for a numerical display that would be best suited for this revolutionary new voltmeter



Yours free . . . for telling us how you use or would like to use neon glow lamps

You can get a free Signalite Owl Eye Nite Lite simply by sending us an application for neon glow lamps a problem or solution on their use. Each reader will receive the Nite Lite whether or not his letter is used in the Application News. In addition we welcome longer articles for feature treatment which we will also place in a leading technical magazine in your name.

with its exclusive AUTOJECT technique. Several design goals were established in the search for this numerical display, they were:

- a) *Compact size.* Due to the compact size of the basic voltmeter, the maximum size of the readout was limited to less than 6½" in length and 1½" in height.
- b) *Few parts.* A minimum number of parts to insure ease of assembly, while keeping cost at a minimum.
- c) *Long life bulbs.* Selection of low power long-life bulbs, to insure the lifetime of the display almost indefinitely, thus reducing maintenance costs.
- d) *Visibility.* Wide angle and distant viewing were two requirements that were desirous in the development of the numerical display
- e) *No glare.* Consistent brightness and color to avoid glare and eye fatigue.
- f) *Versatility.* Provisions for both alpha and numeric characters were among the design requirements.

Of all of the alternative design approaches considered only the neon lamp type numeric bar character display technique met all of these design goals.

This tube, the NE-2H is .244" in diameter and 3/4" long which meets our size requirement. It has a lifetime rating of 20,000 hours of *continuous* service which means that it would last 2½ years if it were on all of the time. Actually, the duty cycle for any given tube is but a small fraction of the time so that for all practical purposes we consider the tube's effective life essentially infinite.

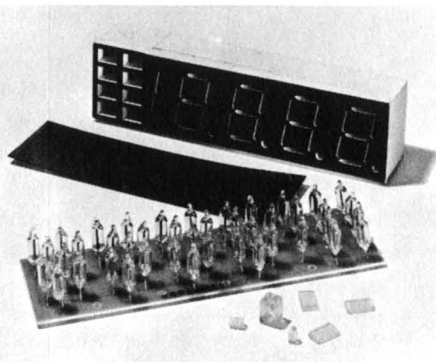


Figure 2

Readout assembly includes printed circuit board with neon lamps mounted which is inserted into rear of display panel. Each digit, except for the "one" uses eight neons, seven for the numeral and one for the decimal.

While the principles of using neons in readout displays is not new, Honeywell has achieved a particularly reliable and economic display through carefully chosen design, manufacturing and assembly methods.

The numerical display consists of two major parts, the main housing and the printed circuit board where the NE-2H neon light bulbs are mounted. The remaining parts are the bar-segmented inserts and the anti-reflection film, as shown in Figure 2. The main housing is made of white cyclocac and is injection molded in one shot. If symbols are required in the readout, another housing (also molded cyclocac) is cemented to the main housing. The face of the display is then silkscreened black.

The printed circuit board containing the neon light bulbs plugs into the rear of the readout housing. The bar segmented inserts are made of orange colored, clear-through cyclocac, and are pressed into the face

of the main housing, with the aid of a specially-designed insertion tool. The decimal points and rectangular shaped symbol block inserts are also made from orange colored cyclocac and are inserted in the same manner as the bar segmented inserts. All of the inserts are injection molded also. The special symbols that are required in the display are then silkscreened black on the face of the symbol block inserts. As shown in Figure 2, each display has a choice of eight symbols.

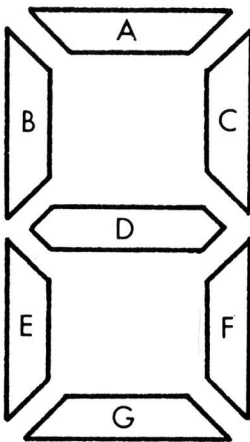


Figure 3
Arrangement of lamps in
seven-bar display of digits

Finally, the red colored plexiglass polarized light filter is placed in front of the display to guarantee maximum contrast of the red numerals against the solid black background for excellent definition even under extremely high ambient light conditions. Although neon lamps normally do not have a very high lumen rating, the NE-2H is a high brightness version which emits almost ten times as much light as the standard neon. This coupled with the contrasting color design described above, provides for excellent readability under even the highest indoor lighting conditions.

Figure 3 shows a single character made up from a number of individual bars which are illuminated by 7 neon lamps. These lamps are designated by the letters A through G. When all seven bars are illuminated, the numeral 8 is displayed; other numerals are formed by the switching of

various combinations of the neon lamps (see Table, Fig. 4).

LAMPS							NUMERALS
A	B	C	D	E	F	G	
ON	ON	ON	OFF	ON	ON	ON	0
OFF	OFF	ON	OFF	OFF	ON	OFF	1
ON	OFF	ON	ON	ON	OFF	ON	2
ON	OFF	ON	ON	OFF	ON	ON	3
OFF	ON	ON	ON	OFF	ON	OFF	4
ON	ON	OFF	ON	OFF	ON	ON	5
ON	ON	OFF	ON	ON	ON	ON	6
ON	OFF	ON	OFF	OFF	ON	OFF	7
ON	ON	ON	ON	ON	ON	ON	8
ON	ON	ON	ON	OFF	ON	ON	9

Figure 4

Table shows lamp states for illumination of each of ten numerals. Letters under lamps refers to arrangement shown in Figure 3

Each set of lamps is controlled by a diode matrix which includes one transistor; and the matrix is controlled by the decimal outputs of ten transistor switches. One element of each lamp is connected to a -60 volt supply, the other element is in series with a 47K resistor to a 100 volt supply (Fig. 5). When a decimal line is true, a ground is applied to the cathodes of the various diodes to remove the 100 volt from the required lamps extinguishing them.

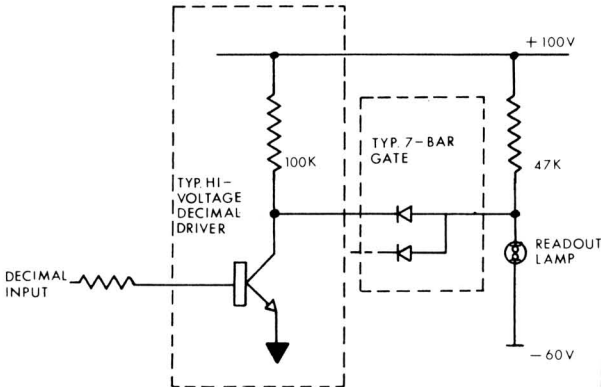


Figure 5

Typical driving circuit for each lamp in circuit

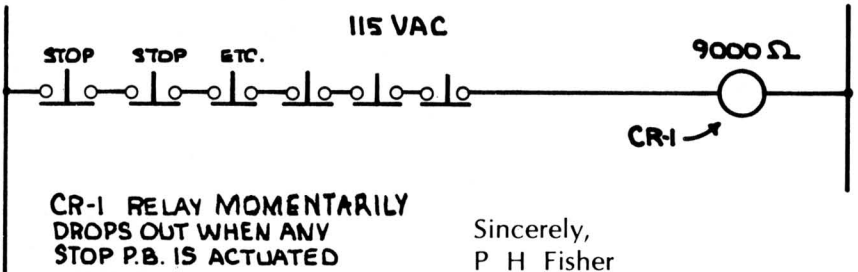


WHO STOPPED THE LINE?

Gentlemen:

I would like to submit an application problem which a neon lamp (memory type) might be able to solve.

Problem On a conveyor line with many stop stations, it would be desired to indicate at a remote operator's panel, which stop pushbutton was momentarily depressed. After this is indicated, corrective action would be taken and then the circuit would be reset.



Sincerely,
P H Fisher
Owens-Corning Fiberglass Corp.

ANSWER TO CAN YOU SOLVE THIS Vol. 5, No. 2

INTRUDER ALARM

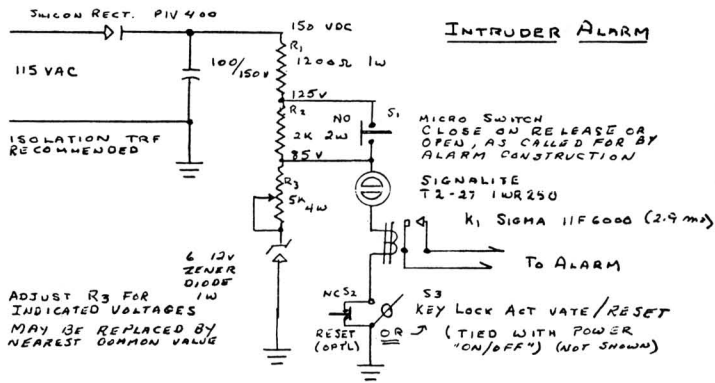
Gentlemen

Dear Mr Bauman

First, congratulations on the publication of your recent book. It is the authoritative text in the field.

(Ed. Note. Thank you for your kind words. If any of our readers still have not obtained their copy of "Applications of Neon Lamps and Gas Discharge Tubes" by Edward Bauman, it is available from Signalite Inc., 1933 Heck Avenue, Neptune, N J 07753. Price is \$2.95 plus 25 cents for handling and postage. For New Jersey residents, the 3% state sales tax must also be included.)

Regarding the Problem of Mr David Fiedler in Signalite Application News Vol 5, No. 2, we offer the (following) solution which the writer feels is the simplest, cheapest and most reliable application of neon devices for his Intruder Alarm problem



A stiff voltage divider, using a Zener diode as a current valve, provides sufficient current to allow direct operation of a relay to activate an alarm device through a Signalite T2-27-1WR250 upon closure of the microswitch contacts. Latching is accomplished by utilizing the difference between breakdown and minimum holding voltages. Reset or activation is simply a matter of grounding the neon-relay circuit. Though an ordinary voltage divider, carefully adjusted, could provide the same operation, utilization of a Zener diode (a 1 watt unit will pass a 30 ma divider with ease) allows for effective and reliable control with wide latitude for lamp variations. Though the stipulated lamp is recommended, other neon units could be used provided they (a) pass sufficient current for relay operation without degrading the lifetime of the lamp, and (b) have a differential between breakdown (ionization) voltage and holding (or extinguishing) voltage sufficient to permit non-critical design.

Sincerely,
B. E. Wrigley
Techron Laboratories

BUBBLE DETECTOR MK IV

Dear Ed:

Just for laughs, enclosed is a neon lamp application, although i am sure it does not represent a wide market!

Incidentally, this application is to be used in conjunction with the Home Winemaking Kits which are presently sold mail order and otherwise, which utilize a plastic jug which contains the fermenting mixture and allows the fermenting gas to pass through a plastic tube into a water container, the latter prevents outside air and wild yeast from contaminating the fermenting mixture.

Hope it gives you a chuckle!

Cordially,
R.C.P

We herewith present our first step in the automation of home winemaking: Bubble Detector Mark IV (The first three didn't work!)

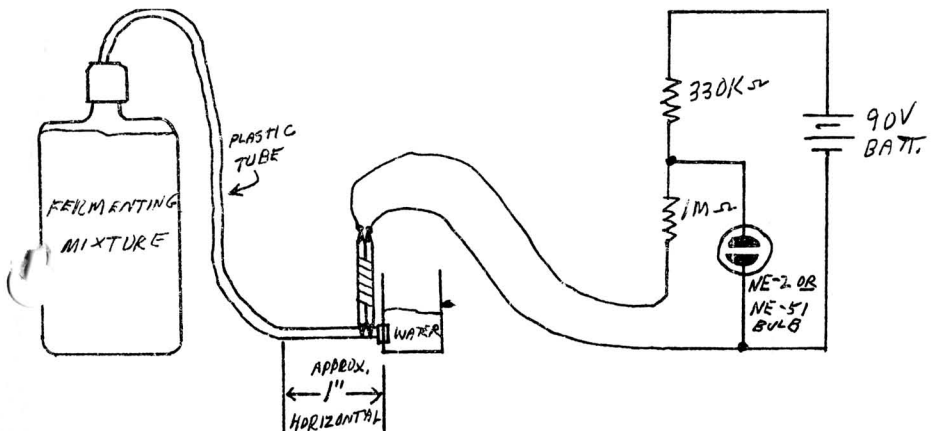
HISTORY It was soon learned that the BRR (Bubble Repetition Rate) was inversely proportional to the fermenting time: The longer the mixture fermented, the longer the period between bubbles. When the mixture was near the end of the fermenting cycle, it was sometimes necessary to wait a matter of minutes to determine if the bubbles had ceased. This being an intolerable situation, the R&D Department instituted a crash development program. Following are the results

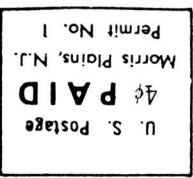
CONSTRUCTION Refer to the sketch below. Connect the tube toward the bottom of a water container (a grommet is suggested) with approximately one inch of the tube in the horizontal position. Tape two pencils (sharpened at both ends) together and pierce the tube near the water container. Connect the circuit shown to the other ends of the pencils.

OPERATION After the circuit is connected, disconnect one side of battery and bulb should go out. Reconnect battery and bulb should remain out if there is water in the horizontal portion of the tube. As a bubble passes the two pencil points in the tube the bulb should light and remain lit after the bubble has escaped and the horizontal portion of the tube is again filled. To reset circuit, momentarily disconnect one side of battery. In this manner it is possible to determine if a bubble has escaped since the last resetting of the circuit (this may be minutes, hours, or days).

CALIBRATION If bulb does not go off after resetting circuit (with water in horizontal portion of tube), increase 330K resistor. If lamp does not stay on after bubble escapes, decrease 330K resistor.

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Signalite Incorporated
Neptune, N.J. 07753

Drop Us A Line.

If you have an interesting application of neon glow lamps in your circuitry or a problem concerning the use of neon lamps, drop us a note telling about it. Interesting letters will be published in a future issue of the **Application News**—and we will send you an Owl Eye Nite Lite for your home.

Applications which in the opinion of Signalite have significant interest will also be brought to the attention of the editors of leading technical publications for consideration as articles and featurettes. If you would like help in preparing your material for publication, just send us the facts and data. We will put it in the correct form for publication. Your by-line and company credit will be given with your permission.

For immediate technical application or circuit design assistance, you may contact Signalite directly at:

TWX: 201-775-2255 TEL: 201-775-2490



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