Signalite APPLICATION NEWS

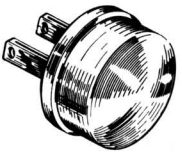
from the desk of Ed Bauman, Chief Engineer

VOL. 2, NO. 1

Send Us Your Glow Lamp Application

The use of the neon glow lamp as a reliable circuit component has dramatically increased the need for application information. We are asking that you:

1) Send application examples—both general and specific
2) Send application problems or solutions to problems that we publish



A Signalite Owl Eye Nite Lite for the home will be sent free to each person who sends us an application, a problem or a solution.

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Neon glow lamps have been finding increasing popularity in applications with solid state photosensitive elements. These applications include; substitutes for relays as described in this Edo story; photochoppers used in modulators, power supplies and voltmeters; in memory circuits; for high voltage overload protection; and many others.

E.B.

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PHOTOCONDUCTIVE SELECTOR CIRCUIT USES NEON GLOW LAMPS

by: Joseph LaFiandra, Senior Engineer
Edo Corporation
College Point, L.I., N.Y.

and: Howard Jennings, V.P., Engineering
Edo Commercial Corp.
White Plains, N.Y.

Mechanical relays have long been used as switching devices. Unfortunately, because they have parts that move, they are eventually subject to fatigue which can lead to failure of the relay. They also include contacts which are vulnerable to wear as a result of electrical discharge.

In their continuing search for techniques to improve the performance and reliability of their Airborne Loran A/C systems, engineers at the Edo Corporation, developed an intriguing circuit to replace mechanical relays. Using no moving parts, the circuit permits selection of any one of the number of outputs by means of a single wire control. The company has recently filed an application for a patent on this Photoconductive Selector Circuit as embodied in the Edo P-S Switch. A prototype model of the P-S Switch, which will be marketed by the Edo Commercial Corp., White Plains, N. Y. during the forthcoming year is shown in Figure 1.

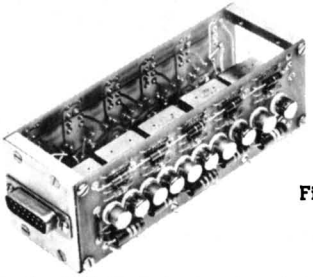

Figure 1

Prototype model of the P-S Switch developed by Edo. The unit has ten switching circuits based on photoconductive cells each composed of a neon glow lamp, produced by Signalite Inc., and a solid state photo-resistor. The Edo P-S Switch is an outgrowth of Edo's product improvement program on the Model 345A Airborne Loran A/C system.

The heart of the circuit is a photoconductive cell composed of a long life neon glow lamp and a solid state photo-resistor. Based on the property of glow lamps to ignite at the predetermined voltage, Edo engineers proceeded to develop a photoconductive cell which exhibited optimum characteristics for this application.

Commercially available lamps could not be used since the glow lamp striking voltages were too high, and they required additional biasing circuitry, a situation Edo wished to avoid. The answer was found in a lamp produced by Signalite Inc., type 7271, which has specially designed electrodes and a special gas mixture for extreme stability of operation. The lamp and photo-resistor are potted and encapsulated into a single unit so that the lamp always operates completely in the dark. The close tolerances required that an extremely low variation in operating characteristics be maintained.

The circuit developed by Edo may be shown functionally as in Figure 2. A simplified schematic is shown in Figure 3.

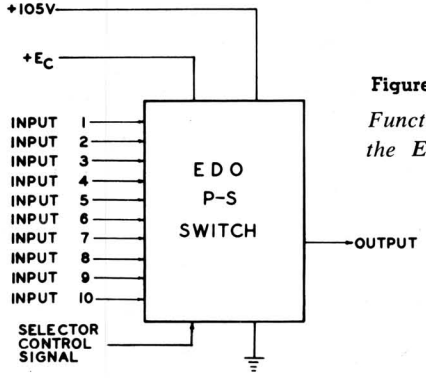

Figure 2

Functional representation of the Edo P-S Switch.

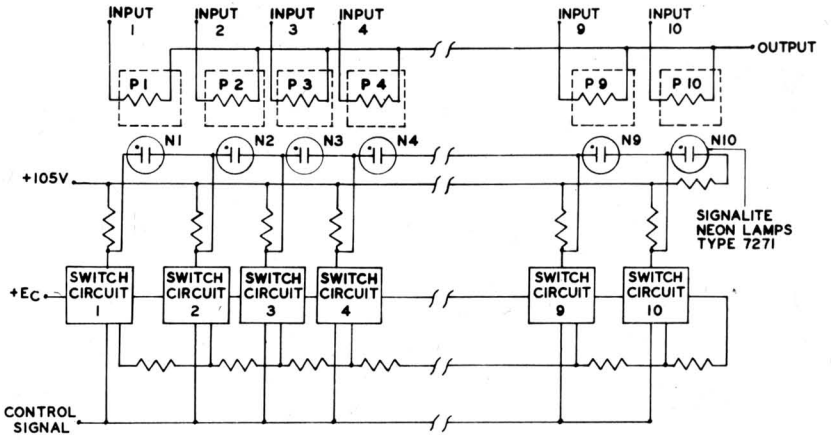

Figure 3

Control signal voltage activates a number of switch circuits as a function of the amplitude of the signal. The neon lamp string is grounded to the junction between the highest switch circuit activated and the one immediately below it in sequence. The neon lamp in the highest circuit then breaks down and ionizes, causing the corresponding photo-resistor to pass the input signal of this switch circuit to the output.

Basically, the Edo P-S Switch consists of a voltage divider, a number of switch circuits, the Signalite neon glow lamps, and photo-resistors. The amplitude of the control signal will determine the number of switch circuits to be activated, starting in sequence with circuit number 1.

Should, for example, the control voltage activate switch circuits numbered 1, 2 and 3, the Neon lamp string will be grounded to the junction of N2 and N3. Only neon lamp N3 will then have 105 volts dc across it. This lamp will light, causing photo-resistor P3 to decrease its resistance to allow input signal Number 3 to be present at the output.

The selecting function is achieved by causing the boundary condition to be shifted with each change in control signal. The boundary is the point below which all stages are on, and above which all stages are off. Variation of the control signal amplitude will cause different input signals to be passed.

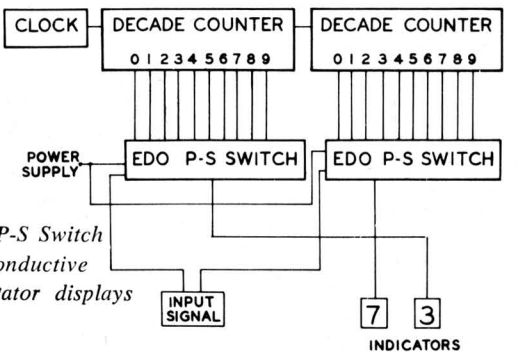

Figure 4

A typical application of the Edo P-S Switch utilizes the output of the photoconductive selector circuits to activate indicator displays for decade counters.

This Edo-developed circuit may also be used in configurations where there are N output terminals corresponding to the N input signals. In either case, the input and output terminals are effectively isolated from each other until switched, as well as from the control circuit.

A typical application of the Edo P-S Switch in shown in Figure 4.

PHOTO RELAY CUTAWAY DRAWING

NOTE: TWO (2) SIGNALITE NEON GLOW LAMPS AND TWO (2) PHOTO-SENSITIVE ELEMENTS PER ASSEMBLY.

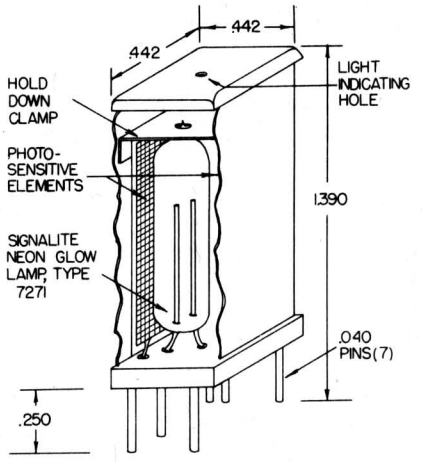

Figure 5

The Signalite Type 7271 neon glow lamp is encapsulated into housing with solid state photo-resistor. Specially designed electrodes and a special gas mixture provide extremely low variation in operating characteristics in this totally dark environment.

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CAN YOU SOLVE THIS?

NEED FREQUENCY DIVIDER

Dear Mr. Bauman:

We need a simple scale of eight (8) frequency divider and have been told that this can be done with neon lamps. We have a source of 400 cps and would like to produce a pulse once every eight cycles.

Laurence G. Cowles
Superior Oil Co.

Ed. Note: Two methods for achieving this come immediately to mind. One is the synchronized relaxation oscillator, and the other is a direct frequency counter. Since this is a forum of ideas, however, perhaps our readers would suggest specific circuits or other suggestions to help Mr. Cowles.

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New Glow Lamp Application Forum

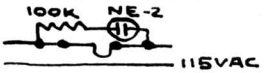
It is Signalite's policy to publish letters based on their intrinsic interest only. We do not necessarily agree with all comments and suggested uses and will upon occasion wait for your reaction before taking editorial space for ours.

TIME SAVING TROUBLE SHOOTER

Attn: Ed Bauman, Chief Engineer

I have an application for NE-2 Neon lamps that has been very helpful in locating blown fuses, especially when working with 3 phase power.

I place a 100K resistor in series with a NE-2 Neon bulb across each fuse. When the fuse blows the neon lights indicating which fuse is out. It saves many steps and test to get the equipment back in operation.



T. G. Frost, Field Engineer

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NEEDS HIGH BRIGHTNESS LAMP

Dear Sir:

In various portions of our plants we have three phase, Delta-connected 240 volt and 480 volt feeders to various types of outdoor electrical equipment, At the present time we are using NE-45's in series with an appropriate resistor, one per phase connected to ground, to enable us to catch and prevent potential short circuits through ground by observing the extinction of the ground lamp and locating and effecting repair of failures to ground as they occur.

The style and sprocket mounting of the NE-45's make them very convenient for use in watertight conduit boxes outdoors beneath a jewel cover. They have, however, the disadvantage of being very dim at best. We would appreciate your recommendation of a similarly based lamp for maximum brilliance complete with recommended values of voltage resistors or other appropriate circuitry.

H. J. Barton, Jr., Electrical Engineer
St. Louis County Water Co.

Ed. Note: A high brightness version of the NE-45 is our LNE-45. Appropriate resistors will still be required.

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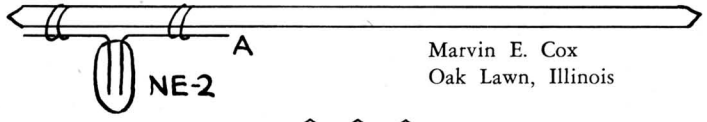
HIGH VOLTAGE DETECTOR

Dear Sir:

When repairing TV sets it is often needed to know when the flyback transformer is working without having to dig into the high voltage circuitry. An NE-2 taped to a plastic stick will do the trick very nicely.

When the business end of this tester is brought near to the working flyback transformer the neon bulb will light up. The flyback does not have to be contacted, neither do any of its terminals. Proximity is sufficient. Also note that a return lead is not required. Ionization of the air provides the necessary current return. The polarity of the high voltage lead to the picture tube can also be determined with this tester. The NE-2 element connected to the lead labeled "A" will glow when the end of the plastic stick is brought near the high voltage lead. If the wrong bulb element glows,

it indicates that the flyback is not connected properly.



Marvin E. Cox
Oak Lawn, Illinois

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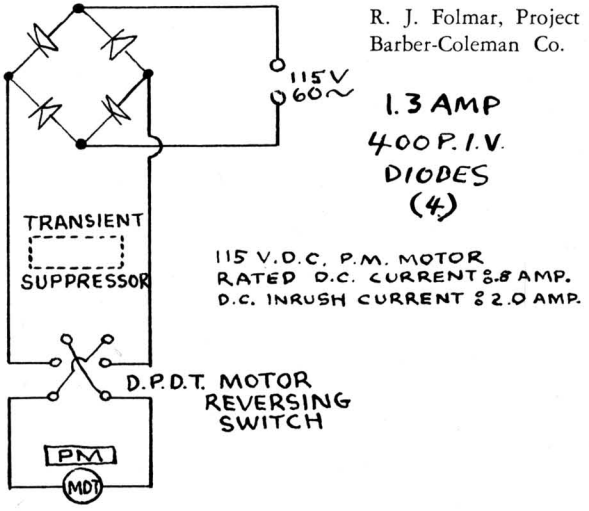
NEON TRANSIENT SUPPRESSOR

Gentlemen:

What would you recommend as a transient suppressor across a full wave bridge rectifier network, and how would it be connected? The bridge is used to operate a permanent magnet motor on 115 VAC, 60 cps. The max current capacity of the bridge is 1.3 amperes and the peak reverse voltage rating is 400 volts.



R. J. Folmar, Project Engineer
Barber-Coleman Co.

Ed. Note: Because of the high currents you are dealing with, we recommend the Signalite AO51, lamp specifically designed as a circuit component for use with current in this range.

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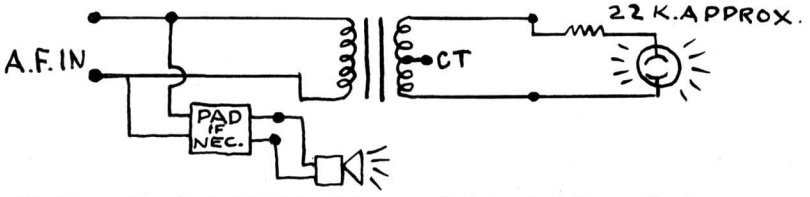
AUDIO INDICATOR

Sir:

Here is an idea we have used off and on for the last 11 years using glow lamps.

In communication systems where there are several speakers to be monitored at one time we place the following at each loudspeaker as an indication when there is audio there. The transformer is an inexpensive A.F. out-put transformer wired backwards.

Carl Wesser, Jr.
Wesser Marine & Mobile Radio



Ed. Note: Signalite's RT2-32-1A is a good choice for this application.

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MORE ON ARC SUPPRESSORS

Gentlemen:

I have a need for a spark suppression device on an item that I build. Silicon rectifiers have not been too successful — selenium rectifiers slightly better, and R-C networks seem to be the best that I have tried.

I have considered neon glow lites but they have heretofore been made to glow at voltages too low to permit their use on 120 to 130 volt AC rectified to DC. According to your Application News, yours are manufactured to resist glow below about 200 V DC. Do you think that they would serve my use.

Chrest B. Johnson
Houston, Texas

Ed. Note: As we mentioned previously in these pages (see Vol. 1, No. 2) in applications such as this, peak currents, average currents, pulse wave shape and pulse time duration should be considered when choosing a glow lamp as a spark suppression device. Glow lamps are available whose breakdown voltages are in the range you indicate. They can do the job you have in mind if the other parameters are compatible.

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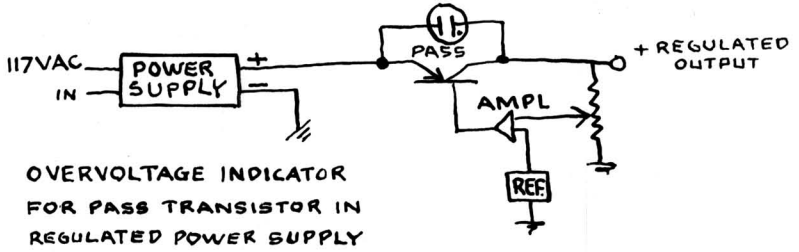
OVERVOLTAGE INDICATOR

Gentlemen:

The following is suggested for an overvoltage indicator for a pass transistor in a regulated power supply.

Les Toth
Project Engineer
Diamond Electronics



OVERVOLTAGE INDICATOR FOR PASS TRANSISTOR IN REGULATED POWER SUPPLY

Ed. Note: It should be noted here that gas discharge devices have a theoretical minimum breakdown voltage of 65VDC, which may be too high to prevent damage to the transistor before the lamp ignites.

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TESTING INSTALLED CABLES

Dear Ed:

In the course of supplying our standard products (strain gage transducers) we are called upon to also supply a great quantity of various interconnecting cables. These will have great differences in length, connector type, and circuit arrangement. To test these cables after assembly they are connected to the correct mating receptacles on a prewired test panel. Coded rotary selector switches connect each conductor into a series circuit containing a current limiting resistor and the "faithful" neon lamp. A switch position is provided for the connector shells also. The current limiting resistor is connected in the "hot" line of an ordinary 115V polarized power cord

ahead of the switch circuits to prevent operator shock should he handle the connector shells when switched into their test position.

The real versatility of the device makes use of the cable's distributed capacity. Of course, direct shorts and opens are readily noted. Observing the small but distinct changes in illumination when selecting connector shells and cable circuits one can determine any type of cable malfunction, including which end of the cable has an open circuit either of a conductor or the shield. This saves repair time since no dismantling and visual examination of both ends is necessary as would be when using a buzzer or ohmeter to check the cable. Both long and short cables can be adequately checked with no voltage or resistor adjustments. We must check that neither the shields or conductors are shorted to the connector shells to prevent ground loop noise injection into our low level circuits.

I have used this technique in several facilities. An ambient shield over the lamp might improve observations of the low capacity short cable checks.

F. B. Hardesty, Systems Dept. Supervisor
LeBow Associates, Inc.

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Congratulations to Mr. G. C. Wilson, President of G. C. Wilson & Co., for his story, A Comparison of Cold Cathode Tubes and Semiconductors as Control Elements (Signalite Application News, Vol. 1, No. 2). This story appeared in the December 6, 1963 issue of Electronic Design Magazine.

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If you have a circuit design problem involving the use of glow lamps, or have developed a circuit in which glow lamps are important for design and/or economic reasons, we would like to discuss your application in a future issue of this newsletter.

Applications which in the opinion of Signalite have significant interest will also be brought to the attention of the editors of the leading technical publications for consideration as articles and featurettes. Your by-line and company credit will be given with your permission.

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