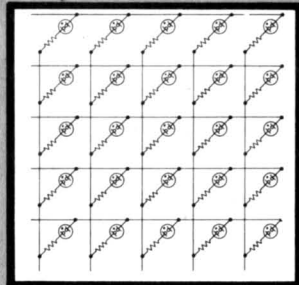


Signalite

APPLICATION NEWS

A General Instrument company

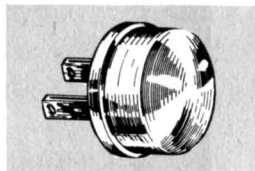


VOL. 3, NO. 1

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.

GLOW LAMP PREVENTS OPERATION BY TRANSIENT SIGNALS

By: Robert Pickett
Director Technical Marketing and
North Electric Company
Galion, Ohio

Edward Bauman
Chief Engineer
Signalite Inc.
Neptune, New Jersey

A spurious signal generated in the dialing of one telephone may activate the call signalling device in another extension or telephone, causing the undesirable sound known as "bell tapping" or "dial tapping". In the North Electric Ericofon® tone signaller this problem was solved by the addition of a single miniature neon glow lamp to the circuit of the transistorized electronic tone ringer.

To eliminate the conventional electromechanical bell signalling device used for years in telephones, North Electric engineers developed a miniaturized solid state signalling device which could be incorporated into the Ericofon standing handset. (Figure 2) The new electronic unit emits a pleasant and highly efficient tone with exceptional carrying quality, and without the nerve jangling stridency of the standard bell.

The circuit for creating the electronic tone is comprised basically of a power source and an oscillator circuit. (See Figure 3) The oscillator circuit produces sine wave output signals of variable amplitude which cause the diaphragm of the receiver to vibrate, generating a melodious tone call signal. The power source has three parallel branches with a diode in one branch,



Figure 1

Figure 1 -- The Ericofon standing handset developed and produced by North Electric Company, Galion, Ohio, incorporates a unique new electronic tone signalling device. The units shown here are complete within themselves and need no additional, externally installed equipment for signalling.

and a capacitor in the other branch. The capacitor is connected in series with the neon glow lamp.

In operation the ringing voltage across the telephone line is of sufficient value, when rectified and filtered to be greater than the firing voltage of the glow lamp. This causes the lamp to ignite and immediately settle to its sustaining voltage, allowing a voltage build up across the capacitor. This voltage is applied to the tone oscillator circuit. As the ringing voltage across the line decreases to a value less than the sustaining voltage of the lamp, the lamp goes out and the capacitor discharges through the tone oscillator. (See Figure 4).

To guard against spurious signals on the telephone line passing into the circuit and affecting the electronic tone signalling device, the device is connected so that transient pulses on the line are prevented from igniting the glow lamp. These transients are of two distinct types: the first type is a 48 volt peak of either polarity due to dialing, and the second is a sharp spike or series of short spikes due to the change of current through the inductance of the line relay. The first type is eliminated simply by extending

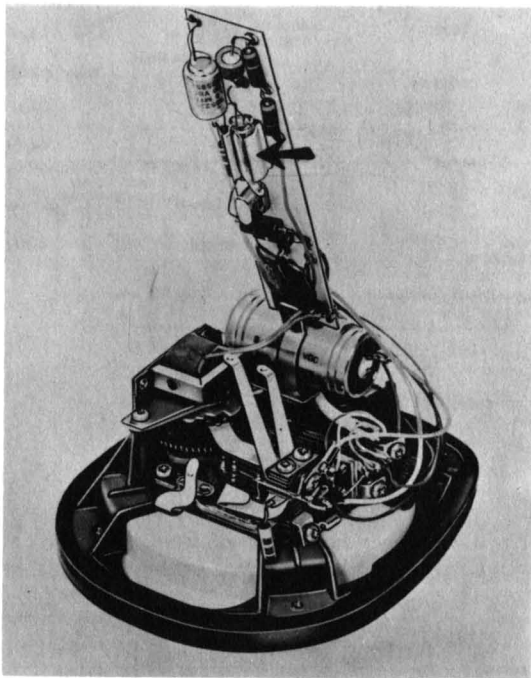
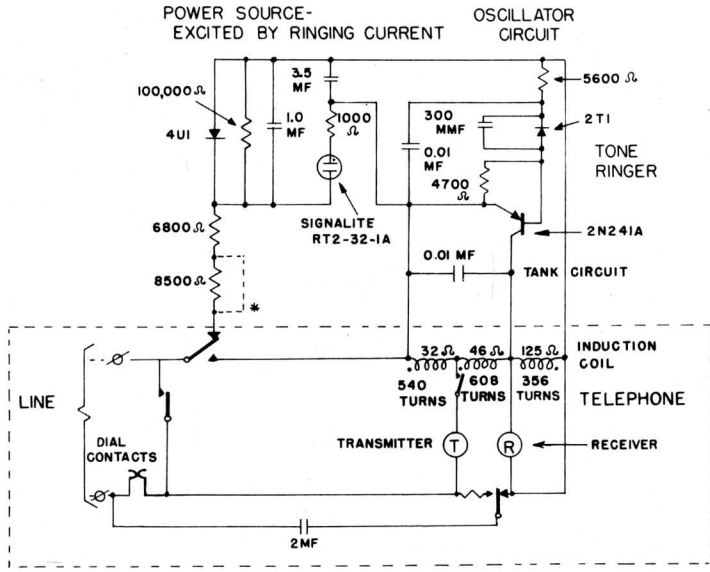


Figure 2

Figure 2 -- The new tone signalling device is a miniaturized solid state circuit which fits conveniently into the standing handset. The bulky, heavy mechanical bell ringer has been completely eliminated. The electronic tone generated by this telephone set is more pleasant to the ear than the familiar "bell", and is readily distinguishable from the tone emission of other audible signalling devices normally located in the vicinity of telephone substations.

the dialing pulses over the ringing circuit and power source. The 1.0 mf capacitor does not charge to a value sufficient to fire the neon glow lamp. With the second type the negative spikes of each cycle are shunted off through the diode.

To preclude operation of the signalling device by the positive short spikes, the capacitor 1 mf and resistor 6800 ohm are selected for a value that provides a time constant of such duration that the capacitor cannot charge to a value sufficient to fire the glow lamp. Thus, the lower frequency spikes of shorter duration are shunted through the diode, and the



* INSERT JUMPER TO DECREASE LEVEL

Figure 3

Figure 3 — The tone ringer is comprised basically of a power source, a transistor blocking oscillator circuit, and a tank circuit which together couple actuating signals to the telephone receiver. The 20 cycle ringing signals are coupled to the power source which in turn provides a pulsating dc output causing the oscillator to operate. The oscillator operates at the mechanical resonant frequency of the receiver. The power source includes series resistance connected between the terminals. A rectifier is placed in parallel with a resistor to provide uni-directional current flow in the direction indicated. A network including a first branch capacitor connected in parallel with a resistor, and a second branch including a series-connected capacitor resistor and Signalite Type RT2-32-1A glow lamp connected in parallel with a capacitor, provide the signal output for controlling the operation of the blocking oscillator circuit. The oscillator circuit includes a conventional P-N-P transistor. The tank circuit is connected to the collector circuit and includes two of the induction coil windings for positive feedback, a third being wound in the opposite direction.

higher value spikes of short duration are accumulated momentarily by the capacitor and then discharged through the 100 K resistor without operating the signalling device.

Breakdown voltage of the neon glow lamp is critical and must be held within narrow limits to prevent dial tapping throughout the life of the telephone. While in the off condition, the glow lamp creates, for practical purposes, an open circuit.

The electronic glow lamp, RT2-32-1A produced by Signalite Inc., Neptune, N.J. used in this application handles 18 milliamps, an unusually large amount of current for a lamp of this size. The lamp is 1-1/16" long by .244" diameter. It has been treated with a radioactive additive to stabilize its breakdown voltage in dark and light. Breakdown voltage for the lamp is held within 8%. The reliability and long life of the RT2-32-1A was proven at North Electric during a test program which produced the equivalent traffic of a busy telephone for 40 years of operation.

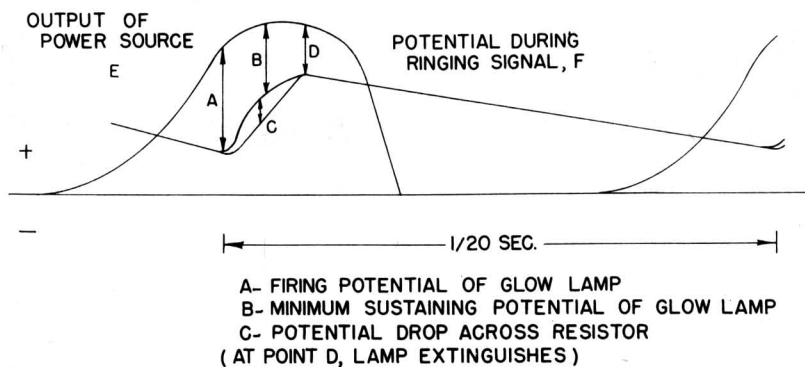


Figure 4

Figure 4 -- Operation of the ringing circuit is shown graphically in these curves. Curve F, indicated as Potential During Ringing Signal, represents the potential which appears across the capacitor connected in parallel with the glow lamp. Curve E, indicated as Output of Power Source, represents the voltage which appears across the capacitor (3.5 mf) connected in series with the glow lamp, and is the voltage applied to the oscillator circuit. During ringing, the incoming voltage is rectified and filtered by the power source. The dc voltage is stored in the 1 mf condenser. When this voltage reaches the firing potential of the neon glow lamp (A on the Curve), the lamp will ignite and begin to conduct to complete a charging circuit through to the 3.5 mf condenser. During this time the potential difference between the 1 mf and 3.5 capacitor consists of the maintaining potential of the lamp, which is a constant, and the potential drop across the 1000 ohm resistor, which is a variable represented by C on the curve. As the 3.5 mf capacitor becomes fully charged, the potential drop across the lamp and resistor de-

creases until it is below the maintaining potential of the glow lamp, which then extinguishes. The 3.5 mf capacitor supplies power to the oscillator circuit.

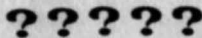
From curve E it can be seen that, if the capacitor (3.5 mf) is chosen so that it never becomes completely discharged between ringing frequency cycles, the potential will gradually drop between positive half cycles to a low value, and rise again to a maximum value during the next half-cycle in a continuous manner. This introduces variation in amplitude, or a "warble", into the tone, producing a melodious and pleasant sounding signal.

WRITE FOR SUPPLEMENT ONE

An Index for the first 100 pages of the Signalite Application News is now available. If you have not received your copy, or would like an additional copy, we will be pleased to send it to you on request.

Supplement One also contains complete specifications for 26 new Signalite tubes including our new Voltage Reference and Regulation tubes.

CAN YOU SOLVE THIS ?



Alpha-Numerical Readout Needed

Dear Sirs:

I am interested in the construction of an Alpha-numerical readout similar to those used on commercial scoreboards. This is to be on a much smaller scale and use NE-2 or their equivalent.

I would like information on possible set up and programming to get the desired letters. The blocks for the letters will contain approx. 36 bulbs. I wonder if you can help me or maybe one of your readers.

John Wyman
USAF



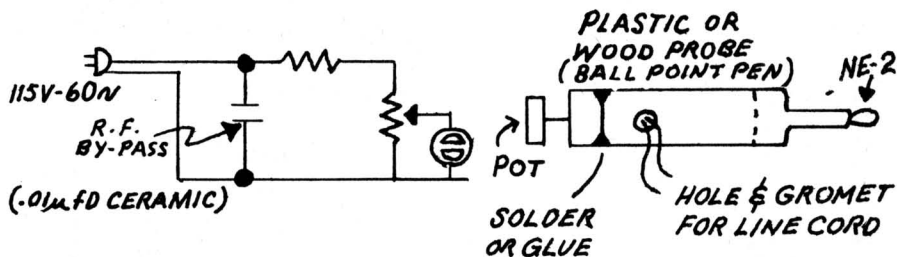
YOUR GLOW LAMP APPLICATION FORUM

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.

R. F. Probe Application

Gentlemen:

Use neon bulb as an R.F. sniffer. Increase its sensitivity by "biasing" with a pot:



To use - turn up pot until light just lights, then back off until it goes out. (If more sensitivity is needed, one can "cheat" by cranking back up a little.)

The intensity shows the presence and ball-park idea of magnitude of R.F. fields - "hot leads", etc.

Will Herzog
Cedar Rapids, Iowa

More On Soldering Iron Holders

Dear Sir:

A variation of Mr. W.D. Ameele's circuit on page 100 (Vol 2, NO. 6) would be to make the on-standby switch a micro switch on a soldering iron holder and then when the iron is removed from the holder, full power is applied to the iron. Also, for more sophistication, include a thermostat on the holder and the iron will heat faster on initial turn on.

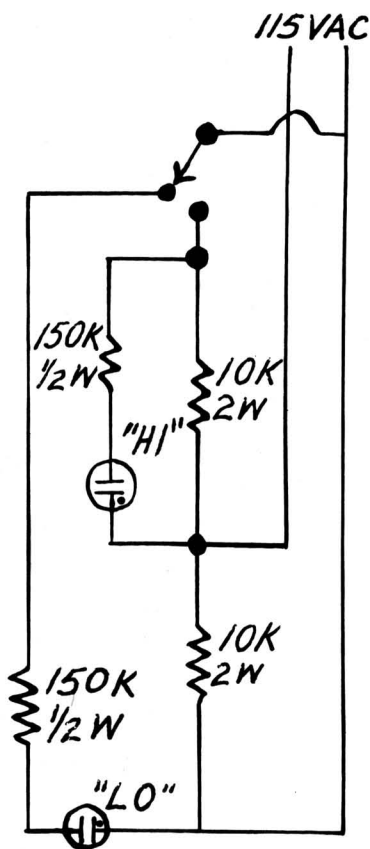
Paul A. Wrasman
General Electric Co.

Fish Story

Dear Sir:

The circuit shown below has been a good source of controlled warmth for small aquariums with convenient signal lights to show

Lo or Hi heat. The components were placed in the positions shown, slipped into a small test tube, and the wires sealed at the top with cork and wax. When the heat is on Lo, the lower neon lights and with double, or Hi heat, the upper neon lights and the lower goes out. It also adds a little color to the tank. The unit was never completely submerged. The cork and wax were a safety factor for splashes.



Stanley R. Jordan
Staco, Inc.

Ed Note:

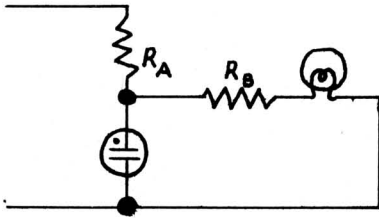
Similar devices are manufactured by some of our commercial customers. Lamps are Signalite T2-27-1. Changing lamps to our LT2-27-1 and using 150K and 30K resistors will increase light output 8 times.

Comments on Remote Indicator

Dear Mr. Bauman:

I have some observations which I believe are quite pertinent to Mr. A.H. Koenig's application, **Remote Indicator**, in Vol. 2, No. 6 of the *Signalite Application News*.

When the garage light is off, we have the following equivalent circuit:



The resistance of the light bulb is negligible compared to R_B , hence the voltage across the neon lamp is one-half of the source voltage.

1. For the neon lamp to extinguish, its maintaining potential must be greater than one-half of the source voltage.
2. Should the garage light burn out or be removed, the neon lamp will not extinguish. Hence, the observation that the neon lamp remains on regardless of switch position indicates a burned out garage light.
3. Due to the presence of the neon indicator, and its two resistors, the garage light socket is never de-energized. This may pose a shock hazard.
4. Although, the garage light does go off, there is always current passing through it.

Dennis Kirson
 American Electric Power
 Service Corporation

Ed Note:

Mr. Koenig's circuit indicates the condition of a remote light by having a neon indicator lamp on when the light is on. It should be noted with regard to point #1 above that our high brightness indicator lamp, LT2-27-1, with a 30K resistor has an ignition voltage between 70 and 95 VAC. If R_A and R_B are 30K resistors, then this lamp will not fire because the voltage applied will be 1/2 line voltage (57-62 VAC.) This lamp, incidentally, has an average life of 25,000 hours.

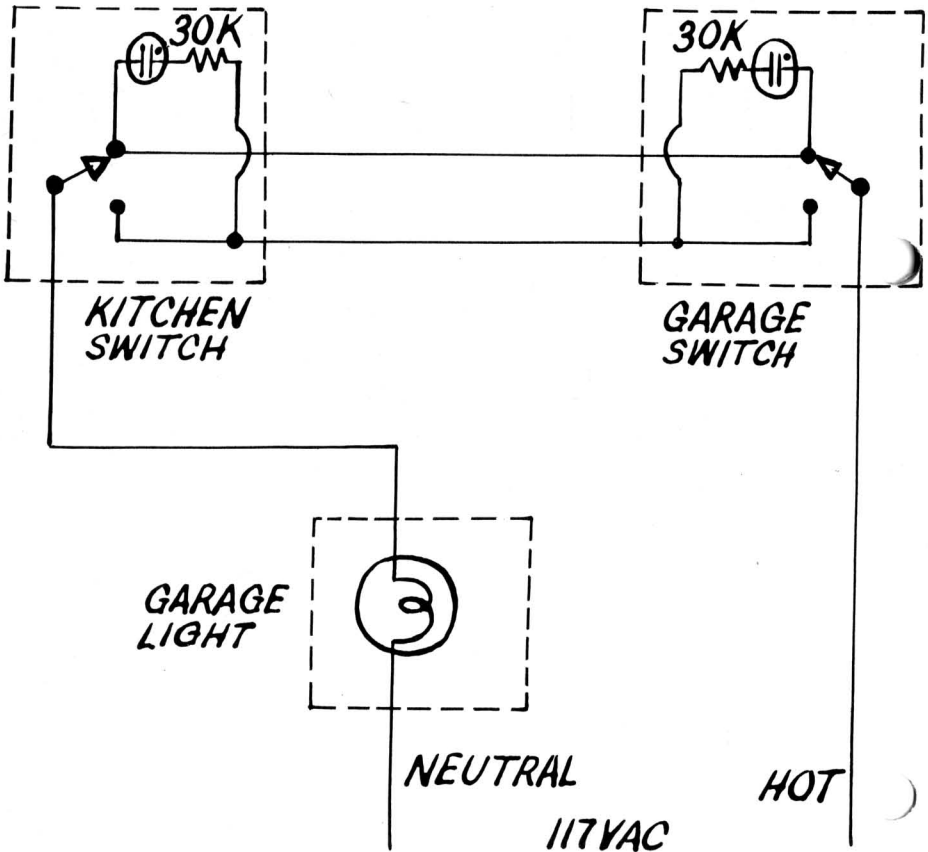
For those who want to indicate the opposite condition from Mr. Koenig's circuit (that is, that the neon lamp is on when the remote light is off), Mr. Lawson's circuit, below, is a practical approach, also using LT2-27-1 lamps.

Dear Mr. Bauman:

I have been using this . . . circuit for years in my house. Only one resistor is required for each neon light instead of two, and there is no need for a neutral wire in the switchbox for the neon light. The neon light in each switchbox will glow when the light is turned off, making it easy to locate the switch in the dark. If ivory plastic switchplates are used, bare neon lamps can be placed inside the switchbox and the glow will be easily seen through the plastic switchplate.

Erwin C. Lawson
Union Carbide Corp.

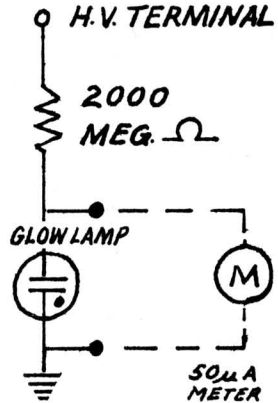
Ed Note: Neon lamps are Signalite LT2R-27-1 (30K)



Protection and Indication

Gentlemen:

Occasionally an Electrostatic Precipitator will be equipped with a D.C. voltmeter to indicate its operating potential – ca. 75 KV. The voltmeter will consist of a 50 μ Amp. meter movement and a series resistor of ca. 2000 megohms – the full scale would be 100 KV. In the interest of economy the resistor unit is designed to operate with one end grounded thru the meter. The resistor will be located in the high voltage cage and the meter may be mounted outside as it is at ground potential. To insure that the low end of the resistor can not be opencircuited – a condition which could cause insulation failure – the low end of the resistor is grounded thru a glow lamp. The normal voltage drop across the meter movement is too low to ionize the lamp and the lamp does not affect normal operation – but if the meter movement or its wiring should fail, the glow lamp will prevent the low end of the resistor from rising above ca. 75 volts which does not make an insulation problem – the visible indication of malfunction is a secondary benefit.

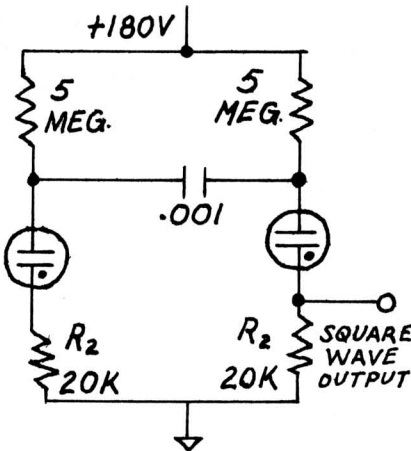


Howard Q. Duguid
Shell Chemical Company.

Dual Relaxation Oscillator

Dear Sir:

Shown below is a dual relaxation oscillator that operates as a multi-vibrator type oscillator. It can be used as a sequence flasher or as a source for square wave output. Output is obtained across resistor R_2 . The positive peak is slightly curved, but with a diode clipper across R_2 the output is near a perfect square wave.



With the components shown, the frequency is approximately 300 cycles, but this can be changed by altering either the resistance or the capacitance in the circuit.

Bill W. Napier
Fort Smith, Arkansas

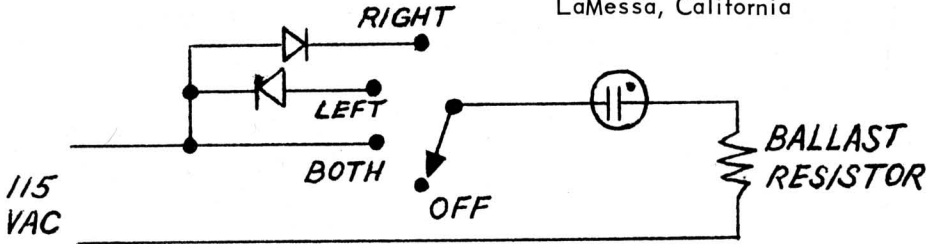
Status Indicator

Dear Sir:

I have a suggested circuit using a NE-2 or similar neon glow lamp where one single lamp can indicate four conditions.

Since with DC only one internal rod will glow, while with AC both rods seem to glow, three conditions can be signaled as well as off.

R.M. Whaling
LaMessa, California



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.

TWX 201-775-2255

Phone: 775-2490 (Area code: 201)

112

Printed in U.S.A.

Signalite Incorporated
Neptune, N. J.

