While the neon glow lamp has been around for many years, its widespread use in electronic circuits is relatively new. Neon lamps have found a variety of applications in electronic circuits, from simple indicator lamps to more complex devices like neon signs.

However, with the advent of lamps which consistently exhibit high close tolerance characteristics, there is now an ever-increasing need for neon lamps that match these new requirements. In recognition of this need, a new series of neon lamps has been developed. These lamps are designed to meet the more stringent requirements of high quality and reliability.

The circuits and applications that are described in this book are intended to illustrate the use of these lamps. We hope that you will find this information both useful and interesting.
CONTENTS

Chapter I. Forming and Applying Neon Close-

Chapter II. General Operating Characteristics: measurement of neon lamp items.

Chapter III. Frequency Dividers.
- Different configurations of dividers used to divide the electronic circuits.
- Definition of operational frequency.

Chapter IV. Frequency Dividers.
- Different configurations of dividers used to divide the electronic circuits.
- Definition of operational frequency.

Preface
success.

These results can be described as follows:

Currents in solution, like those in gases, exhibit a different behavior in the presence of an applied field. The flow of electric current in solution is represented by the electrical conductivity of the material. The conductivity can be expressed in terms of the electrical resistance, which is the inverse of the electrical conductivity. The electrical resistance is given by the formula:

\[ R = \frac{V}{I} \]

where \( V \) is the voltage and \( I \) is the current.

These results can be described as follows:

1. **Neon Flow Laws**
   - **Evaluating and Applying**
   - **Chapter I**
Operating in dark lamps and to have a higher breakdown voltage.

Another factor that may affect the performance of glow lamps is the presence of residual gas. Higher partial pressures of residual gas at room temperature can cause the lamps to be unstable and exhibit lower efficiency.

The most common type of glow lamp is the neon lamp, which is characterized by a low breakdown voltage. The breakdown voltage of a neon lamp is typically around 150 V.

Possible applications of neon lamps include:

1. **Signs and Displays**: Neon lamps are used in many signs and displays due to their vibrant colors and ability to create intricate designs.
2. **Vacuum Tubes**: Neon lamps are used as filaments in vacuum tubes for various electronic applications.
3. **Safety Devices**: Neon lamps are used in safety devices such as ionization detectors in fire alarms.
4. **Luminous signs**: Neon lamps are used in luminous signs and billboards.

The circuit for measuring glow lamp parameters is shown in the figure below:

![Circuit diagram for measuring glow lamp parameters](image)

**Scope**

Conduction time is usually measured on a high-speed oscilloscope.
It can meet critical specifications when designed to accommodate the expressed design requirements. The key points in developing and applying neuron link systems are well-known in the field of electronic design and implementation. The design must consider the neuron link's role in the context of a system's overall operation.

In more complex systems, neuron link systems can be quite intricate, and understanding their operation is crucial. The key points in developing and applying neuron link systems are well-known in the field of electronic design and implementation. The design must consider the neuron link's role in the context of a system's overall operation.

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proper design of selection of circuit components and components flow paths.

In most important of all, consult the application guide.

1. Know the importance of all components flow paths in the circuit. They do not affect when not operating.

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9. Know the importance of all components flow paths in the circuit. They do not affect when not operating.

10. Know the importance of all components flow paths in the circuit. They do not affect when not operating.
CALCULATION

CHAPTER II

Oscillations
In circuits where the frequency is more critical, a number of factors must be taken into consideration.

In determining the low-frequency capability of the circuit, the frequency response of the band-pass section is a critical factor. The bandwidth of the band-pass section is determined by the frequency response of the amplifier, which is defined by the characteristic impedance of the amplifier.

The basic circuit for a relaxation oscillator is shown in Fig. 3-1.

![Basic Circuit for Relaxation Oscillator](image)

---

Theory of Operation

A basic circuit for a relaxation oscillator is shown. When the switch is closed, a capacitor is charged through a resistor, and then discharged through the inductor. This process is repeated indefinitely, resulting in a periodic oscillation.

When the switch is open, the capacitor is completely discharged, and the circuit is in a quiescent state. When the switch is closed again, the capacitor begins to charge, creating a voltage across the inductor, which then oscillates through the circuit until a new cycle begins.
Correction Factors for Higher Frequencies

Where

\[ f = \frac{1}{T} \]

\[ T = \frac{C}{R} \]

Expression: Then the value of the RC time constant is determined from the graph of the flow lamp. Where E = Supply voltage of the flow lamp

\[ V_m = \frac{V_m}{E} = \frac{V_m}{\sqrt{2}} \]

\[ V_m = \frac{E}{\pi} \]

Where E = Supply voltage of the flow lamp

\[ V_m = \frac{E}{\pi} \]

Factors to be considered with the flow lamp becoming potentiometer and determination times of the flow lamp, becoming potentiometer, the resistor is the added in addition to the frequency of the flow lamp. It can normally be ignored. A higher (2000 ppm) the frequency of the flow lamp (below 50 ppm) when the frequency is equal to the flow change. T' and dis-

In oscillations, the sum of the flow approximately 2000 ppm.

2.4 RC Theorem
and C = I outmaged
R = I megahm

selective filter in this low frequency the resistors and capacitors have their usual values such that
we can then determine the form of the noncausal, Figure 2

RC = 1

I

K

= RC

I

70 - 90

90 - 120

X

R - W

since this is less than 0.63 we have

K = 0.9 - 0.95

K = 0.9 - 0.95

X

4

Example:

the required voltage of the particular given
level from the calculated form of the
shown in the oscillogram, operating at a somewhat higher voltage
resulting from the introduction of the deflection tubes of the emf.
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resulting from the introduction of the deflection tubes of the emf.
26. Circuit for smoothed triangular waveform

\[ V(t) = I_C \cdot R \cdot \sin(2\pi f t) \]

This equation represents the voltage for the smoothed triangular waveform. The circuit is designed to produce a smooth triangular waveform with moderate ripple in frequency, as shown in the block diagram.

Additional Considerations

For operation at high frequencies, the output capacitor should be chosen to give the desired ripple. For applications requiring high voltages, the output voltage should be limited to a safe level. The circuit should be tested under various conditions to ensure proper operation.

Frequency Correction Factor

\[ F_c = \frac{1}{1 + 2\pi f R C} \]

The correction factor, \( F_c \), is used to calculate the actual frequency at which the circuit operates. It is given by the above expression for determining the correction factor.

Example

By applying the correction factor, the circuit's actual frequency can be calculated for different values of the correction factor. The graph shows the relationship between the actual frequency and the correction factor, with the correction factor being the x-axis and the actual frequency being the y-axis.
2.8 shows a simple and inexpensive tone generator which could be used in some instances to electric organs. The schematic in Figure 2.10 is that of the coil-wound reed. A similar arrangement has been widely used in some amplifiers.

Another useful reed is shown in Figure 2.10. It can be used as a reed in a number of different oscillators, which operate as a simple tone generator.

2.9 shows a simple and inexpensive tone generator which could be used in some instances to electric organs. The schematic in Figure 2.10 is that of the coil-wound reed. A similar arrangement has been widely used in some amplifiers.

For very low frequencies in the range of 1-10 cps, the circuit shown in Figure 2.9 can be used.

2.7 shows a simple and inexpensive tone generator which could be used in some instances to electric organs. The schematic in Figure 2.10 is that of the coil-wound reed. A similar arrangement has been widely used in some amplifiers.

Many variations on this circuit are possible and most of the circuits shown in this chapter could be built for under $10. Any one of the circuits shown in Figure 2.9 can be used as a tone generator. The component values, the frequency range is from about 5 cps to over 1,000 cps, which is well suited for tone generators.
2.13 Dual antenna oscillator

The circuit in Figure 2.13 is an interesting variation on the 2-TZ Dual antenna oscillator. It may be substituted to obtain a very wide range of frequency, which is limited mainly by the reactance of the capacitor. The reactance of the capacitor increases as its value decreases, and with a 100 µF capacitor, the circuit oscillates at 500 Hz, using a grid-leak resistance of 20,000 ohms.

Another approach to generating a triangular waveform is to use a 2-TZ-211 mixer oscillator, which produces a differential output.

2.14 Dual relaxation oscillator

The circuit in Figure 2.14 is a relaxation oscillator, which produces a square wave. The two-tone voltage of 2000 volts, produced by a circuit using a 2-TZ-211 mixer oscillator, is applied to the grid of tube T2-211. The voltage across C2 is approximately 0.005 V, producing an output of 0.5 volts, providing an upper frequency limit of approximately 50,000 Hz.

The relaxation oscillator is provided with a dual neon steady oscillator as shown in Figure 2.4. Waveform with a dual neon steady oscillator as shown in Figure 2.4.
3.2. Oscillator circuit and waveform

3.3. Bridge characteristics of glow lamps

3.4. Flow lamps as frequency dividers

Chapter III
Series with a neon lamp (actually two lamps in sequence) between
two collector driver circuits (16 and 17 in figure).

A potential divider is one producing output 5 (or 5000 volts C
2. When a square wave input is applied to a square wave output, the output voltage is proportional to the input voltage. The square wave output is a series of equal and opposite voltage steps, each equal to the amplitude of the input signal. The transition between the high and low states of the output waveform occurs at the same time as the transition in the input waveform. The output waveform is essentially a periodic square wave with a frequency determined by the input frequency, and the amplitude of the output waveform is proportional to the amplitude of the input waveform.
This type of 'wave is that of a digital logic circuit. The number of steps required to produce the desired output is determined by the input voltage. The output voltage will be zero if the input voltage is below a certain threshold. The output voltage will increase as the input voltage increases.

The circuit diagram shown in Figure 2-5 illustrates the basic concept of a digital logic circuit. The output of the circuit is connected to a set of logic gates, which in turn control the output of the circuit. The circuit is designed to provide a high output voltage when the input voltage is above a certain threshold, and a low output voltage when the input voltage is below the threshold.

The output of the circuit is also connected to a set of logic gates, which in turn control the output of the circuit. The circuit is designed to provide a high output voltage when the input voltage is above a certain threshold, and a low output voltage when the input voltage is below the threshold.
If there was a large difference between breakdown and minimum voltage, the lamp characteristic should meet the following specifications:

In order to ensure proper operation of the circuit, the lamp should be properly designed to handle the required voltage at the specified current levels. The lamp should be designed to handle the required power levels and have a minimum life expectancy. The lamp should be selected to operate within the specified voltage and current ranges.

When the lamp discharges, the voltage across it is due to the current flow through it, as indicated in the order of 1 volt (peak).
When used in electronic organs, the oscilloscope is a valuable tool for observing waveforms. The oscilloscope can be used to display a variety of waveforms, including those produced by electronic circuits and systems. The oscilloscope is particularly useful for analyzing the behavior of electronic circuits, as it allows the user to visualize the waveforms and their interactions in real-time.

The oscilloscope is comprised of a cathode-ray tube (CRT) that produces a bright spot on the screen. The spot is moved across the screen by an electron beam, which can be controlled by the oscilloscope's input signals. As the beam moves across the screen, it creates a visual representation of the input waveform.

The oscilloscope is used to display waveforms by applying the input signals to the oscilloscope's input channels. The input signals are then amplified and displayed on the CRT screen. The oscilloscope allows the user to manipulate the input signals by adjusting various settings, such as the gain, offset, and triggering level. These adjustments allow the user to display the input signals accurately and clearly.

The oscilloscope is a powerful tool for analyzing electronic circuits and systems. It is used in a variety of applications, including education, research, and development. The oscilloscope is an essential tool for anyone working with electronic circuits and systems.
The circuit was intended for use as an electronic option tone
and would not affect the clarity of the speaker. Simply to prove
that without modification to utilize 12 YS T-1200, the circuit would
be suitable for tone.
The very high voltages occurring at the battery terminals and their duration and capability to deliver large currents can be very short, limited by the design of the circuit. To ensure adequate power output, the voltage source must be capable of delivering large amounts of power during short duration bursts. The power converter, located between the battery and the load, is designed to convert the high voltage to a lower, usable voltage for the load.

**Chapter 17**

**Timing Applications**
In order to determine the capacitors and the circuit components of the neutral lamp, the calculation of the parallel combination of the lamp must be done. The equivalent resistance of the parallel combination can be calculated using the formula:

\[ R_{eq} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}} \]

where \( R_1 \) and \( R_2 \) are the resistances of the individual lamps.

The equivalent time delay network is shown in the figure below.
Figure 4-7. This circuit is essentially the same as the one shown in Figure 4-6. The transformer is used to isolate the circuit from the power source. A circuit in which a silicon controlled rectifier is operated to pull in the relay is shown in Figure 4-8. The transformer is used to raise the applied voltage above the relay's threshold, thus enabling the relay to operate.

4-5. Use of neon-lamp makes the relay function as a simple switch. When the lamp is illuminated, the relay is turned on. When the lamp is not illuminated, the relay is turned off.

4-6. Use of neon-lamp makes the relay operate as a simple switch. When the lamp is illuminated, the relay is turned on. When the lamp is not illuminated, the relay is turned off.

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4-11. Use of neon-lamp makes the relay function as a simple switch. When the lamp is illuminated, the relay is turned on. When the lamp is not illuminated, the relay is turned off.

4-12. Use of neon-lamp makes the relay function as a simple switch. When the lamp is illuminated, the relay is turned on. When the lamp is not illuminated, the relay is turned off.

4-13. Use of neon-lamp makes the relay function as a simple switch. When the lamp is illuminated, the relay is turned on. When the lamp is not illuminated, the relay is turned off.

4-14. Use of neon-lamp makes the relay function as a simple switch. When the lamp is illuminated, the relay is turned on. When the lamp is not illuminated, the relay is turned off.
Use of neon-lamp to operate SCR

4.7 Use of neon-lamp to operate SCR

4.8 Use of neon-lamp to operate SCR

4.9 Use of neon-lamp to operate SCR
Memory switch will be opened on any input.

\[ V \text{ (neural voltage) = } \frac{V_1 - V_0}{R_1 + R_2} \]

The lamp is used in the normalizing voltage range of the lamp.

Memory switches are used in the normalizing voltage range of the lamp.

Chapter A
The mode to cathode columns usually require the mode to cathode columns for the operation of the memory. When compared to standard two-element mean jumps, the mode to cathode columns produces a higher than normal height profile. To achieve this, a higher than normal height profile is achieved. However, this mode is more difficult to achieve due to the nature of the memory. A practical circuit using a three-element integrator with a trigger circuit is shown in Figure 5. The diagram is shown in Figure 6. The circuit is designed for the memory. This circuit is designed for the memory. The circuit is designed for the memory. The circuit is designed for the memory.
A current switch as shown in Figure 2.7 may be used. The current switch is an important component in the operation of the memory switch.

**Operation of 2-terminal lamp memory switch by light**

For the two-terminal lamp memory switch, the light intensity determines the state of the lamp. When the light intensity is high, the lamp is on; when the light intensity is low, the lamp is off.

**Operation of 2-terminal lamp memory switch by voltage**

The voltage applied across the switch in the circuit is critical. A low voltage applied across the switch will not trigger the lamp to turn on. To turn on the lamp, a sufficient voltage must be applied across the switch. The voltage across the switch is determined by the combination of resistors in the circuit.

- **Procedure**: Operation of 2-terminal lamp memory switch by light. When the light intensity is high, the lamp is on; when the light intensity is low, the lamp is off. To turn on the lamp, a sufficient voltage must be applied across the switch.
The circuit shown in the diagram is designed to provide proportional output with the change in input. The circuit consists of a voltage divider and a phase inverter. The output voltage is proportional to the input voltage. The circuit is shown in the figure, and the equations for the output voltage are given as follows:

\[ V_{out} = V_{in} \times \frac{R_2}{R_1} \]

where \( V_{out} \) is the output voltage, \( V_{in} \) is the input voltage, \( R_1 \) is the resistor in the divider, and \( R_2 \) is the feedback resistor.

The circuit is designed to be used in applications where a linear output is required for a given input range. The circuit can be adjusted by changing the values of \( R_1 \) and \( R_2 \) to achieve the desired performance.
Using two-element tubes, the three-element tube matrix would allow the use of X-Y matrices. In Figure 5-26, the matrix is shown.

**Figure 5-15. Scanning Amplifiers.**

![Diagram of Scanning Amplifiers](image)

**Figure 5-14. Coupling Element in Amplifiers.**

![Diagram of Coupling Element in Amplifiers](image)

In Figure 5-21, the coupling elements in the amplifiers are shown in a schematic diagram.

**Figure 5-13. Driver Plate Multiplier.**

![Diagram of Driver Plate Multiplier](image)

The tuning multiplier of a tuning null-diode circuit, a voltage is applied to the diode, and the circuit is adjusted to a null condition. When the null condition is obtained, the voltage across the diode is zero. Thus, in this circuit, the null condition is obtained when the voltage across the diode is zero.
The voltage on the X line to the lamp and on the X line is the voltage across the lamp, which is lower than the breakdown voltage. However, raising the X line to a voltage comparable to the breakdown voltage on the X line to the lamp should be increased to a given voltage. The advantage of the kneeing characteristics of the addition.
Chapter VI

VOLTAGE REGULATION AND REFERENCE
The variation in the supply voltage of the power supply is the photo.

One of the more common devices that is particularly sen-

sitive to changes in the supply voltage is a transistor.

This indicates the necessity of providing a well-regulated

voltage supply for each of the stages of the circuit. The

Figure 6.2

For this particular circuit shown in Figure 6.2, the voltage regulator

provides a fixed DC output voltage that is independent of the

supply voltage. However, this can cause the transistor to drift in

the desired output voltage, which can result in a change in the

equation of the output. This is why it is necessary to provide a

protection against excess currents. These are

provided by the protection circuitry in the output stage.

Although the protection circuit is relatively simple,

it can provide a significant amount of protection.

For the protection of the load, a power supply output voltage

must be developed in the output of the circuit to supply the

load. The protection circuit is designed to limit the current to

a safe level, which is typically a few milliamps.

The protection circuit also includes a fuse or a circuit breaker

that will trip if the current exceeds a certain level. This

provides additional protection in case of short circuits or

overcurrent conditions.

The protection circuit is essential for maintaining the

integrity of the power supply and ensuring its safe operation.

Many circuits in today’s electronic equipment require this

protection.
The circuit diagram on the right illustrates the relationship between the applied voltage and the resulting current in a diode. The graph shows a curve that indicates the behavior of the diode as the voltage is increased. At low voltages, the current is negligible, but as the voltage increases, the current also increases. This is characteristic of a diode, where it allows current to flow in one direction (forward bias) but blocks it in the other direction (reverse bias). The curve is important in understanding the operation of diodes in various electronic circuits.
In some applications these problems have been solved by using

6-5. Reservoir-type voltage divider for photomultiplier.

Page 64
This circuit may be used with a voltmeter or oscilloscope.

Note: The output voltage should be as specified.

1. Adjust R to the required reference voltage.

2. Adjust R so that the oscilloscope reads exactly 5 volts across the voltmeter.

I. Connect a galvanometer of suitable sensitivity to the circuit shown. The voltmeter is used to calibrate the voltmeter.

The following procedure is used to calibrate the voltmeter:

(a) Place the voltmeter on an extremely high input impedance.

(b) Place the voltmeter on an extremely low input impedance.

(c) Place the voltmeter on an oscillator circuit.

(d) Place the voltmeter on an oscillator circuit with a high input impedance.

(e) Place the voltmeter on an oscillator circuit with a low input impedance.

(f) Place the voltmeter on an oscillator circuit with a medium input impedance.

(g) Place the voltmeter on an oscillator circuit with a very high input impedance.

(h) Place the voltmeter on an oscillator circuit with a very low input impedance.

(i) Place the voltmeter on an oscillator circuit with a very high input impedance.

(j) Place the voltmeter on an oscillator circuit with a very low input impedance.

(k) Place the voltmeter on an oscillator circuit with a medium input impedance.

(l) Place the voltmeter on an oscillator circuit with a very high input impedance.

(m) Place the voltmeter on an oscillator circuit with a very low input impedance.

(n) Place the voltmeter on an oscillator circuit with a medium input impedance.

(o) Place the voltmeter on an oscillator circuit with a very high input impedance.

(p) Place the voltmeter on an oscillator circuit with a very low input impedance.

(q) Place the voltmeter on an oscillator circuit with a medium input impedance.

(r) Place the voltmeter on an oscillator circuit with a very high input impedance.

(s) Place the voltmeter on an oscillator circuit with a very low input impedance.

(t) Place the voltmeter on an oscillator circuit with a medium input impedance.

(u) Place the voltmeter on an oscillator circuit with a very high input impedance.

(v) Place the voltmeter on an oscillator circuit with a very low input impedance.

(w) Place the voltmeter on an oscillator circuit with a medium input impedance.

(x) Place the voltmeter on an oscillator circuit with a very high input impedance.

(y) Place the voltmeter on an oscillator circuit with a very low input impedance.

(z) Place the voltmeter on an oscillator circuit with a medium input impedance.

These new and old cathode voltage regulators can provide reliable

Voltages and Currents versus input voltage.

<table>
<thead>
<tr>
<th>VOLTAGE (V)</th>
<th>CURRENT (mA)</th>
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<tbody>
<tr>
<td>1000</td>
<td>25</td>
</tr>
<tr>
<td>1500</td>
<td>30</td>
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<tr>
<td>2000</td>
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<td>4000</td>
<td>55</td>
</tr>
<tr>
<td>4500</td>
<td>60</td>
</tr>
<tr>
<td>5000</td>
<td>65</td>
</tr>
</tbody>
</table>

These data are taken at different points in time and at different current levels. A typical

Load regulation for a feedback and phase-shift correction.
Another example of a regulated power supply is shown in Figure 6-11. The circuit is shown in detail in Figure 6-11. While the example indicates a simple voltage divider source for comparison purposes, it is typically the need for accurate voltage regulation that is a primary reason for employing a regulated power supply.

The power supply is connected as follows:

1. The power supply is connected to the circuit as shown in Figure 6-11.

2. The regulated output voltage is connected to the circuit as shown in Figure 6-11.

3. The output voltage is measured using a voltmeter as shown in Figure 6-11.

4. The output voltage is regulated using a precision Zener diode voltage regulator as shown in Figure 6-11.

5. The regulated output voltage is connected to the circuit as shown in Figure 6-11.

6. The output voltage is measured using a voltmeter as shown in Figure 6-11.

A simple method for regulating the voltage of low-power circuits uses a precision Zener diode voltage regulator as shown in Figure 6-11.
7.14: Voltage Buffer Circuit

6.12: Electronically regulated power supply

The output voltage was set to 100 volts. This is shown in Figure 6.12.

The resistance ladder is adjusted to operate within

...
The model 1242 electronic voltmeter produced by the Non-Linear Co. is used to measure voltages in the range of 0 to 100 volts. The meter is connected in series with the circuit under test, and the voltage across the terminals is read directly on the meter face. The sensitivity can be varied by adjusting the sensitivity control located on the front panel of the meter. The meter is operated by a 6 volt battery, and the sensitivity of the meter can be increased by using a higher voltage battery.

When the lamp is illuminated, the voltage is measured at a fixed point on the scale. The sensitivity of the meter is decreased by turning the sensitivity control counterclockwise, and increased by turning it clockwise.

The meter is powered by a 6 volt battery, and the sensitivity can be adjusted by turning the control on the front panel.

**Diagram:**

```
  +----------------+  +----------------+
  |                |  |                |
  |  CONTROL LINE  |  |  CONTROL LINE  |
  +----------------+  +----------------+
        |                      |
        |                      |
        |                      |
        |  LAMP                |
        |                      |
        |                      |
        +-------------------+---
```

When the lamp is illuminated, the voltage is measured at a fixed point on the scale.
High voltage

The second application for neon glow lamps in the voltmeter circuit is shown in Figure 7.4. The neon lamps are used to indicate the high-voltage range. When the neon lamps are lit, the meter needle indicates a high-voltage range. The neon lamps are connected in parallel with the voltmeter and are used to provide a visual indication of the voltage level. When the neon lamps are off, the meter needle indicates a low-voltage range. The neon lamps are turned on or off by a control switch, which is typically a neon lamp switch. The neon lamps are connected in series with the voltmeter and are used to provide a visual indication of the voltage level. When the neon lamps are lit, the meter needle indicates a high-voltage range. The neon lamps are turned on or off by a control switch, which is typically a neon lamp switch. The neon lamps are connected in parallel with the voltmeter and are used to provide a visual indication of the voltage level.
direction

In order to provide a correct operation of the blocking oscillator circuit, the collector current and voltage of the blocking oscillator must be properly controlled. The feedback circuit is connected to the collector circuit and provides two of the necessary feedback paths. The feedback path is connected to the modulation input, and the feedback path is connected to the output of the detector. The feedback path is connected to the input of the detector, and the feedback path is connected to the output of the detector. This completes the circuit diagram.

---

Please refer to the following pages for more information:
- Page 72: [Diagram]
- Page 96: [Text]

---

The operation of the blocking oscillator circuit requires the proper control of the collector current and voltage. The feedback circuit is connected to the collector circuit and provides two of the necessary feedback paths. The feedback path is connected to the modulation input, and the feedback path is connected to the output of the detector. The feedback path is connected to the input of the detector, and the feedback path is connected to the output of the detector. This completes the circuit diagram.

---

Please refer to the following pages for more information:
- Page 72: [Diagram]
- Page 96: [Text]
The device is connected so that the transformer's primary winding is connected to the AC source, and the secondary winding is connected to the load. This configuration allows the transformer to step up or step down the voltage as needed.

In the transistor circuit, the transistor is used as a switch to control the flow of current. The transistor is biased in the active region, allowing it to amplify the input signal. The output of the transistor is connected to the load, which is then amplified by the following operational amplifier (Op Amp) circuit.

The circuit can be used as a buffer, a current amplifier, or a voltage follower. The output voltage is proportional to the input voltage, with a gain of approximately 1.

The circuit diagram shows the components and their connections. The transformer is connected to the AC source, and the transistor is connected to the load. The output of the transistor is connected to the input of the Op Amp, which provides additional gain and buffering.
The diagram illustrates a typical transmission system. It shows the flow of electrical current through various components such as transformers and cables. The text explains the operation of the equipment and the principles behind its function. The diagram is essential for understanding how the transmission system works.
is expected to limit the power source, a reasonable number of operations, and prevent overheating if the relay is used for long periods. However, it must be removed from the circuit by severe application for both relay and motor lamps. Once activated, depending on the magnitude of over-voltage, this can be a correct connection.

To protect voltages and transformers under test, a relay is used in this circuit. A well as dc circuits, it can be used to indicate the presence of over-voltage. The relay provides an indication that over-voltage is present. The relay will open the power source to stop the test and visible flow of the voltage. This can be used in dc circuits as well as ac circuits. The relay will turn off when the voltage exceeds the sum of the breakdown voltages.
using neon with photodetectors

chapter vili

primary requirements for performance of the glow lamps were
from a practical standpoint working closely with streetlighting devices
which are designed to be used as a single component or part
among the photodetectors developed and produced by ray
the photodetectors since the glow lamps are capable of faster reaction times than
the speed of the photodetector is limited to that of the photodetector
devices the speed of response is limited to that of the photodetector
and their internal response to the lamp-photodetector
the input current to the high source
the input current to the lamp source
a signal voltage and the photodetector can be changed by adjusting
as a result the photodetector is a fixed resistor in series with
a sudden change in the photodetector and changes its resistance.
with variation of the input current to the lamp source the input
two devices a diode and photocell
for use with the photodetector
for many applications the low power photodetector and special
photodetectors such as calcium carbonate or carbon suboxide
lamps is compatible with photodetector photocell system.
the special distribution high output of certain neon glow
the use in electronic circuits as a switch or a variable resistor
more use in electronic circuits this type of unit is known
influence and low noise this type of unit is used in
because of the high efficiency of economy, low noise. Low
due to the characteristic of a higher right angle with a photodetector
for electron-optical components which consists of a neon glow
In B-3.4, the phase relationships between modulator and demodulator shown here and the modulator is controlled by the commutator. The demodulator can be used for both the modulator and the modulator itself. The phase shift of the reference voltage and the phase shift in the desired phase are maintained within a few degrees under normal operation. The procedure may be repeated for the same frequency, as shown in Fig. 8-2, to provide a more symmetrical phase shift.

For the ultimate in low distortion, an all-analog method is used. Although, theoretically, it is possible to design an all-digital system, the use of digital switching is not practical for most applications. The use of digital switching, however, is not necessary, and in some cases, it can be advantageous. The use of digital switching reduces the complexity of the system and allows for easier implementation of the desired functionality.

Choppers are sometimes used in conjunction with photoconducting cells and other devices. They are not suitable for use in power electronics, as the voltage and current ratings are not high enough to support the necessary power levels. However, they can be used in applications where low-voltage, high-current switching is required. The chopper is an effective way to control the power flow between the source and the load, and it can be used in a variety of applications, including power conversion, motor control, and energy management.

The chopper is characterized by rapid switching between two states, one of which is conducting and the other is non-conducting. The switching between the two states is controlled by a control signal, which can be generated by a trigger or a timer. The chopper is often used in conjunction with other devices, such as inverters or converters, to control the power flow between the source and the load.
Low noise switch

where output voltages to very close voltage.

chooses of ac amplifier gain and ac amplifier gain; this can see
in a drop of the output. It can be seen that the inductive
amplifier, a drop decoupling it to control bias.

Another example of using the rectifier as a photodetector

Polar Supplies

and demodulator

ac electric voltmeter with neon photomultiplier

ac amplifier
The advantages of the new protocol controller were

![Diagram of a circuit]

Overload Protection

- A two-protocol sequential switch directs use to one or another.
The output signal is the function of the amplitude of the signal. The control signal voltage affects a number of switch outputs.

---

In Figure 8-8, a simplified circuit is shown in Figure 8-7. The circuit developed by Edo may be shown in this manner. The characteristics of the lamp are shown in Figure 8-9. The lamp and control characteristics are shown in Figure 8-10. The circuit is developed by Edo to a simplified form. The lamp and control characteristics are shown in Figure 8-9. The circuit is developed by Edo to a simplified form. The lamp and control characteristics are shown in Figure 8-10. The circuit is developed by Edo to a simplified form. The lamp and control characteristics are shown in Figure 8-9. The circuit is developed by Edo to a simplified form. The lamp and control characteristics are shown in Figure 8-10. The circuit is developed by Edo to a simplified form. The lamp and control characteristics are shown in Figure 8-9. The circuit is developed by Edo to a simplified form. The lamp and control characteristics are shown in Figure 8-10. The circuit is developed by Edo to a simplified form. The lamp and control characteristics are shown in Figure 8-9.
Figure 8-13

A typical application of the EDC-2 switch is shown in

The circuit diagram shows how the EDC-2 switch is connected to

The diagram shows the connections and components of the circuit.

The following text describes the operation of the circuit:

- Figure 8-12
  - Application of photomultiplier switch
  - The switch circuit is illustrated with the corresponding switch diagram.

The text describes the function of the switch and how it is used in the circuit.

The circuit includes a photo multiplier and several switches, indicating its use in a specific application.
...
5500 and 7600 Anode.

These neon glow tubes fall primarily in the spectrum between 5500 and 7600 Angstroms. The high intensity peaks are between 5500 and 7600 Angstroms. The high pressure mercury discharge produces a total of these neon glow tubes. Some are used in the photoelectric properties of neon lamps. Neon lamps are a high pressure mercury and have also been used in applications which utilize neon discharge properties to perform a variety of tasks. They have been used as lamp displays, and also in electronic devices.

The neon tube is but one of many interesting devices.

---

8.15 The-Water Circuit

---

Output from each protocol is taken through the circuit.

---

The power source is 110 to 125 volts.
 Chapter IX

USING NIXIES WITH SILICON CONTROLLED RECTIFIERS

HEATING CHEMICALS.
Applying full power to the load when it is closed at the end of the clock-wise rotation of the potentiometer to the load is referred to as the power factor of the potentiometer. It can only be made to apply full load if the power factor is less than one.

Since the SCR is only capable of conduction in one direction, the applied voltage to the gate of the SCR must be in the correct direction for conduction to occur. The gate of the SCR is usually connected to a voltage source. When the voltage across the gate exceeds the breakover voltage, the SCR will fire. The current through the load then increases due to the impedance of the load resistance. The SCR gate then loses its control over the SCR, and the SCR conducts current in the direction of the load, which is often referred to as the forward conduction mode.

The typical gate current in Figure 4.2 shows the current waveform and its effect on the load. The waveform is shown in Figure 4.2, which illustrates the forward current and voltage waveform as a function of time. The load current is shown as a function of time, and the voltage waveform is shown as a function of current. The waveform shows that the load current is a sinusoidal waveform, and the voltage waveform is a rectangular waveform.

![Waveform Diagram](image-url)
Direct coupled full wave power control

In the AO stage, the output of C1 is the high level output. This is due to saturation of the AO stage. When this occurs, a small amount of negative feedback occurs in the AO stage, which reduces the output level. When D is open, the AO stage is unloaded and an increase occurs in the output level. When D is closed, the AO stage is loaded and a decrease occurs in the output level.

The simplified full wave circuit shown in Figure 9-6 uses

9-6

Inherent full wave proportional control

The inherent full wave proportional control


does not change the power levels and the split logic switch all other conditions.

Figure 9-5: The inherent full wave control is shown in Figure 9-5. A very simple way to modify the inherent full wave control is shown in Figure 9-5.

9-3

Percent RMS power in 1/2 cycle vs SCW conduct.

The percent RMS power in 1/2 cycle vs SCW conduct.

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

\( \text{RMS POWER IN ONE-HALF CYCLE} \)
Feedforward control circuit. However, in circuits of this type, the

\[ \text{Diagram} \]

The sequence of events in the system is as follows: TRANSISTOR, which

\[ \text{Diagram} \]

The +9 V is applied to the base of the transistor, and the collector

\[ \text{Diagram} \]

The collector voltage is then applied to the output circuit, which

\[ \text{Diagram} \]

The +9 V is applied to the base of the transistor, and the collector

\[ \text{Diagram} \]

The collector voltage is then applied to the output circuit, which
Using Neons with Transistors

Chapter X
of a signal

When no signal is applied, the transistor is biased normally, and the base of the transistor is at a positive voltage with respect to the collector. When a signal is applied, the base voltage changes, and the collector voltage follows the base voltage. The output voltage is then the voltage across the load resistor.

10-3. Noon lamp controlled using simply a transistor

In Figure 10-4, the noon lamp circuit is shown. The noon lamp is controlled by the output of the transistor. The noon lamp is turned on when the output voltage is positive.

Transistor -- noon memory circuit

The noon memory circuit uses a transistor to control the noon lamp. The input voltage is applied to the base of the transistor, and the collector voltage is the output. The transistor is biased normally, and the base voltage changes when a signal is applied. The collector voltage follows the base voltage, and the noon lamp is turned on or off as needed.
A counting decade consists of four binary circuits of the kind shown in Figure 11.2, together with appropriate interconnections of the type shown in Figure 11.1. The two rows of lamps shown on the photograph, one positive and the other negative, can be provided for any combination of the circuits shown in Figure 11.1. These combinations are numbered 0 to 9 and are shown in Figure 11.2, along with the lamps and associated circuitry. Each lamp is connected to a circuit that is designed to provide a current of approximately 100 milliamperes. The lamps are illuminated by a constant voltage of 2.5 volts, which is supplied by a transformer. The currents are then limited by a series resistance of 500 ohms. The resulting light intensity is approximately 50 lumens.

The circuits of Figure 11.2 are designed to operate on a 120-volt alternating current supply. The lamp current is limited to 100 milliamperes by the series resistance. The resulting light intensity is approximately 50 lumens. The lamps are illuminated by a constant voltage of 2.5 volts, which is supplied by a transformer. The currents are then limited by a series resistance of 500 ohms. The resulting light intensity is approximately 50 lumens.

The circuits of Figure 11.2 are designed to operate on a 120-volt alternating current supply. The lamp current is limited to 100 milliamperes by the series resistance. The resulting light intensity is approximately 50 lumens. The lamps are illuminated by a constant voltage of 2.5 volts, which is supplied by a transformer. The currents are then limited by a series resistance of 500 ohms. The resulting light intensity is approximately 50 lumens.

The circuits of Figure 11.2 are designed to operate on a 120-volt alternating current supply. The lamp current is limited to 100 milliamperes by the series resistance. The resulting light intensity is approximately 50 lumens. The lamps are illuminated by a constant voltage of 2.5 volts, which is supplied by a transformer. The currents are then limited by a series resistance of 500 ohms. The resulting light intensity is approximately 50 lumens.
The speed of switching in this circuit is a function of the

Lamp control in several modes

Diagram and schematic for the circuit, showing the lamp control system.

If possible, use a neon glow lamp in circuits which

Lamp control in several modes

Diagram and schematic for the circuit, showing the lamp control system.

If possible, use a neon glow lamp in circuits which
Some interesting applications

Chapter XII

The decimal sector in this example is essentially a two-digit display.
The decimal selector in this example is essentially a two-pole, two-way rotary switch. This was selected for its simplicity and because of the limitation of the switch available at the time.
SOME INTERESTING INDICATOR APPLICATIONS

CHAPTER XI
Sequence of Operation Indicator

When it closes, the line having that switch in will be turned on by the fourth switch. If the line having that switch in is already turned on and has the third lamp associated with it, the third switch will be able to turn on of its lamps in the circuit, and the third switch to close will turn on of its lamps in the circuit. The second switch to close will turn on of its lamps in the circuit, and the second switch to close will turn on of its lamps in the circuit. The first switch to close will turn on of its lamps in the circuit.

A similar application of the lamp is to indicate the presence of operation of various electrical devices. Such an application of operation indicator is on the following page.
The insulated probe through a 0004 ft. 400 volt capacitor. The lead is attached to the housing and the other is connected to open ground. Which the high voltage can be seen. One or opening through which the high voltage can be applied in the case is provided to a metal housing with a window and in this case is exposed to the air. The 110 volt is available, the probe can be used to determine when 110 or 220 volts is available. The 110 volt probe is the primary of the high voltage transformer will show voltage 220 volts on the secondary of the high voltage transformer. Both probes are connected to the insulated probe of the housing and connected to the insulated probe of the housing. In Figure 12-13, the lamp is placed in a tube and sealed with two terminal probes which can be used to test the house.
In the representation of power supply equipment associated with this
short Ri, in trouble shooting equipment, due to failure of the breaker -
charge, shown in block C, due to failure of the breaker -
Figure 12-17. A flowing current indicates the presence of a
shorted capacitor C, due to failure of the breaker.

In the representation of power supply equipment, shown in

12-16 Condition Indicator

12-15 Signal of Faulty Indicator

In the condition, in the condition, the faulted condition may be activated, as well as relay
fuses, or both reconnectors may be activated, as well as relays.
By switching S as indicated after right electrode, let E-
Figure 12-16 to indicate poor condition since only 600W will be connected to the
electrode with proper indication. The electrode is connected to the
left electrode of every lamp that when operated one
characteristic of every lamp that when operated one
noted, is connected to 600W.

K and X, FRX lamp (c) lamp number 2, should be
noted. The characteristic of every lamp that when operated one
characteristic of every lamp that when operated one
noted, is connected to 600W.

When S, switches K, lamp number 1, shorts, and
When S, switches K, lamp number 1, shorts, and
When S, switches K, lamp number 1, shorts, and
When S, switches K, lamp number 1, shorts, and

In Figure 12-14, the neon lamp is used to provide positive

Noon.
is a high productivity component in the circuit. It is used to increase the volume of the lamp. The lamp is connected in series and the resulting current will be used to power the neon lamp. Many times a neon glow indicator is used to check for leaks or other faults in the circuit.

12-19 Indicating for Simultaneous Phases

If switch S is in the on position, the phase will cause the ac to change from -60 to +60 volts. When the phase changes, the neon lamp will light when the phase changes from -60 to +60 volts. There are many different types of neon lamps that can be used in the circuit. An example of a neon lamp is shown in Figure 12-19. It is assembled to help identify the correct phases of the circuit.

12-18 Capacitor Release Rectifier

Depending on the location of the capacitor, the neon lamp is lit in the circuit. The resultant voltage in the circuit is controlled by the capacitor. The general voltage is controlled by the capacitor's location. The resultant voltage is shown in Figure 12-18. This is assembled to help identify the correct phases of the circuit.
should be used for all light applications, high brightness momentary and
most satisfactory performance. High brightness momentary and
momentary applications require for maximum visibility and

In addition to the references cited in each chapter, the

CREDITS

manner and characteristics are located on the
two common lamps on each

a modification of this circuit using two neon lamps on each

12A. 25 Dual oscillating neon heater

1.7 TO 17

L1 17

20 K

180 V

IN

OUT

250 K

17 K

17 K

17 K
DIMENSIONS
NEON GLOW LAMPS DISCUSSED IN THIS BOOK
APENDIX

CHAPTER XI
A. Wieland, Haiden Hegeles, M.J. R. Banko. Throok
### Neon Lamps

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Breakdown Voltage (VDC)</th>
<th>Maintaining Voltage (VDC)</th>
<th>Design Current (Average) (mA)</th>
<th>Datiating Voltage (VDC)</th>
<th>Average Life (Hrs)</th>
<th>Oper. Temp. (Deg. C)</th>
<th>Rem.</th>
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<tr>
<td>AC 74</td>
<td>28 (max)</td>
<td>50-60</td>
<td>0.3</td>
<td>40</td>
<td>18,000</td>
<td>A</td>
<td></td>
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<tr>
<td>AC 73</td>
<td>105 (max)</td>
<td>60-70</td>
<td>2.0</td>
<td>50</td>
<td>18,000</td>
<td>A</td>
<td></td>
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<td>TT-27-12200</td>
<td>66-112</td>
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<td>0.5</td>
<td>40</td>
<td>18,000</td>
<td>A</td>
<td></td>
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<td>TT-27-129250</td>
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<td>55 (min)</td>
<td>5,000</td>
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<td>TT-27-120250</td>
<td>110-160</td>
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<td>2.5</td>
<td>55 (min)</td>
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<td>60-70</td>
<td>3.0</td>
<td>55 (min)</td>
<td>5,000</td>
<td>A</td>
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<tr>
<td>TT-27-127200</td>
<td>170-200</td>
<td>60-70</td>
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<td>AO 59-2</td>
<td>65-75</td>
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<td>53-63</td>
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<td>53-63</td>
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<td>65-75</td>
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<td>AO 576</td>
<td>65 (max)</td>
<td>60 (max)</td>
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<tr>
<td>ST 2-18-1</td>
<td>70 (max)</td>
<td>60-85</td>
<td>6.0</td>
<td>50</td>
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<td>AO 79</td>
<td>70 (max)</td>
<td>58</td>
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<td>47</td>
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<td>58</td>
<td>0.3</td>
<td>47</td>
<td>7,500</td>
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<tr>
<td>AO 79</td>
<td>70 (max)</td>
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<td>0.3</td>
<td>47</td>
<td>7,500</td>
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<td>0.3</td>
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<tr>
<td>AO 79</td>
<td>70 (max)</td>
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<td>0.3</td>
<td>47</td>
<td>7,500</td>
<td>B</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
2. Glass Tolerance Lamps designed and manufactured specifically for use in Electronic Circuits.
4. Designed for operation in total darkness.
5. Glass maintaining voltage values - use in simple voltage regulator applications or use maintaining voltage must be held to within 2-3 volts.
6. SCR Trigger.
7. High Current Glue Lamp.
8. Textile Applications.
9. For lighting circuit applications, resistance in 5000 megohms max.
10. Arc suppression of DSNAC circuits.
11. For memory circuits.

### Voltage Regulator and Reference Tubes

<table>
<thead>
<tr>
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**Notes:**
1. Limits for less than one volt variation.
2. Maximum continuous current without permanent damage to tube.
### THREE-ELEMENT TRIGGER TUBES

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<tr>
<th>Type Number</th>
<th>Anode to Cathode</th>
<th>Trigger to Cathode</th>
<th>Trigger to Anode</th>
<th>Life</th>
<th>Dimensions</th>
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Notes:
1. Anode Positive, Cathode Negative, Trigger Floating.
2. Anode Floating, Cathode Negative, Trigger Positive.
3. Anode Positive, Cathode Floating, Trigger Negative.
4. Electrically interchangeable with KJ-77.