

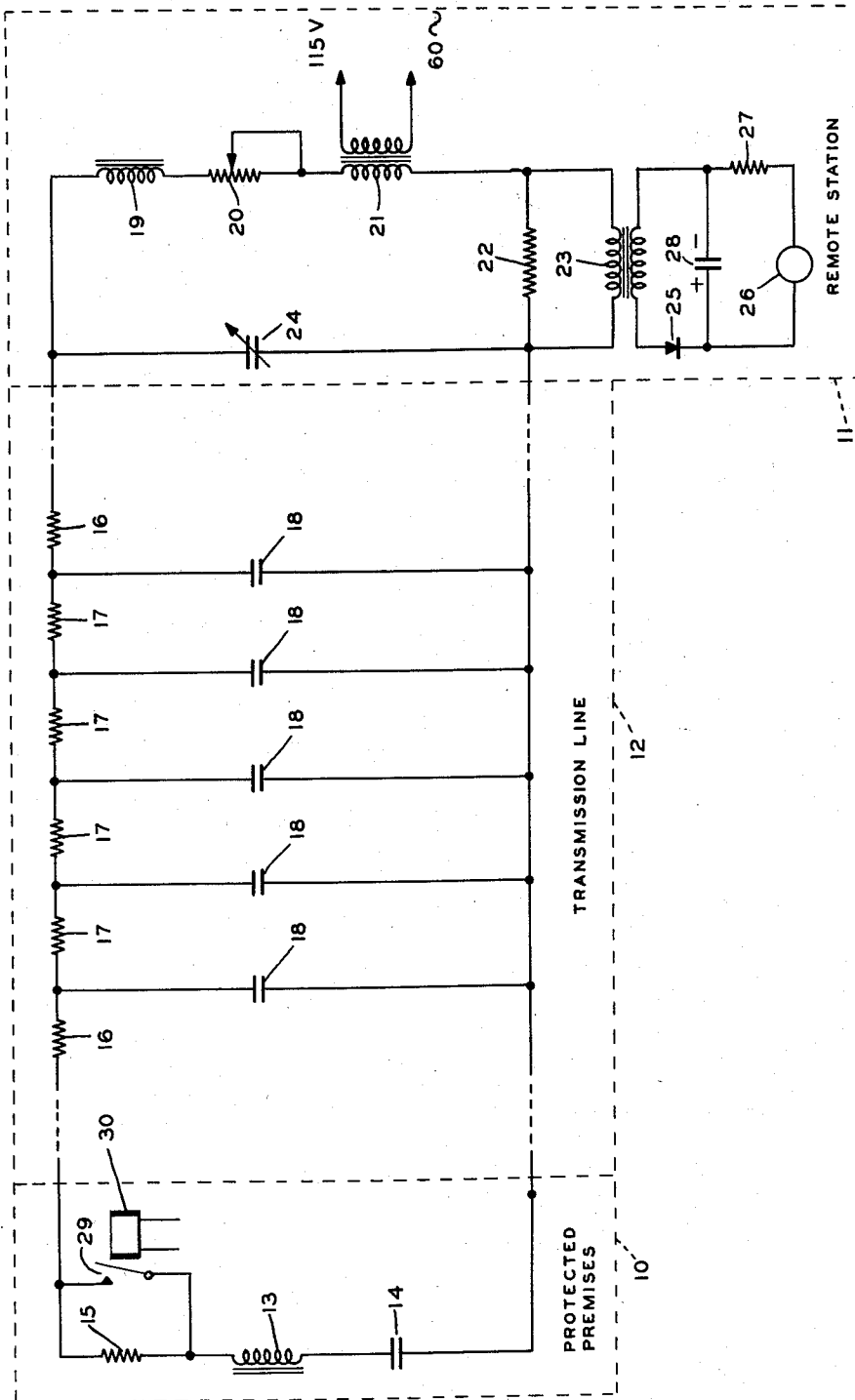
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TUNED INTRUDER ALARM SYSTEM

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TUNED INTRUDER ALARM SYSTEM

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The present invention relates to intruder alarm systems and more particularly to such systems which are intended to provide an alarm indication at a remote point.

In a direct current intruder alarm system where alarm signals are transmitted from protected premises to a remote station through a transmission line (usually a telephone line), it is sometimes possible to defeat the protection by substituting, at an intermediate point along the transmission line, a circuit which is the equivalent of that provided at the protected premises. Such defeat is most often feasible where the remote station is a police headquarters or the like rather than a central station since the equipment and personnel usually available at a police headquarters are not as prepared to cope with such a situation as are the equipment and personnel at a central station.

A principal object of the invention has been the provision of a novel and improved circuit for interconnecting protected premises and a remote station.

More particularly, it has been an object of the invention to provide a novel and improved circuit of the above type which will provide an alarm indication upon any effort to compromise the integrity of the system.

A feature of the invention has been the provision of a circuit in which current variations are different at the protected premises and at the reporting station, and in which substitution of equipment at the protected premises cannot be effected with full knowledge of circuit conditions without access to both ends of the system.

The invention will now be described in greater detail with reference to the appended drawing in which there is illustrated one embodiment of the system in accordance with the invention.

Referring now to the drawing, there is shown a protected premises 10 and a remote station 11 connected by a transmission line 12. At the subscriber's premises there is provided a complex impedance network formed by a choke coil 13, a capacitor 14 and a resistor 15. The transmission line has distributed constants which may be represented by the resistors 16 and 17 and the capacitors 18. At the remote station there is provided a complex impedance network formed by a choke coil 19, a resistor 20, a transformer 21, a resistor 22 in parallel with a transformer 23, all connected in series, the combination being in parallel with a variable capacitor 24. The transformer 21 is preferably of the voltage stabilizing type.

The primary winding of transformer 21 is connected to a source of A.C. power, such as a 115 volt, 60 cycle supply. The secondary winding of transformer 23 is connected to a D.C. signalling circuit formed by a rectifier 25, an alarm indicating device 26 and a resistor 27. A capacitor 28 is provided to suppress alarms which may be caused by momentary power failures.

The A.C. voltage supplied to the transformer 21, which will usually be commercial 60 cycle voltage, produces supervisory current flow in the loop consisting of the reactance network at the protected premises, the transmis-

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sion line and the reactance network at the remote station. The loop is brought to resonance, i.e., a unity power factor by tuning the remote station reactance against the reactance of the protected premises and the transmission line distributed constants. Tuning may most conveniently be effected by adjustment of the capacitor 24.

A portion of the A.C. current flowing in the loop is used to operate the D.C. signalling network. This current, which is delivered to the signalling network by the secondary winding of transformer 23, is rectified by rectifier 25 and flows through alarm indicating device 26 and resistor 27. The device 26 may be of any suitable type but preferably is basically a galvanometer type relay which can give indications of both increases and decreases in current. Such indications may be used to illuminate lights, ring bells or in any convenient way attract appropriate attention when the current flow goes up or down. Momentary surges are suppressed by the capacitor 28.

A normal alarm is initiated at the protected premises by shorting resistor 15. This causes an increase in A.C. current flow in the loop. An increase in A.C. current is reflected by an increase in D.C. current flow through the device 26, producing an alarm signal. Shorting of the resistor 15 may be effected in any convenient way as by closing of normally open contacts 29 of a relay 30 upon deenergization of relay 30. Relay 30 in turn will be deenergized upon operation of any of the protective circuits at the protected premises, for example, rupturing of a window foil upon an intruder's breaking a window. A break in the transmission line at any point will result in decreased current flow, which causes the device 26 to respond by giving a trouble signal.

An attempt to compromise the reactance network at the protected premises with a resistance network, and by coupling such a network to the transmission line, detunes the loop from unity power factor thereby initiating an alarm or trouble signal at the remote station depending upon whether the loop current increases or decreases. The coils 13 and 19 may be chosen so that shorting of the transmission line at or near the protected premises will cause the supervisory current at the remote station to decrease (giving a trouble signal) while the current at the protected premises would remain constant or increase slightly. Such a construction gives an added advantage since anyone attempting to defeat the system through substitution of the protected premises reactance network will not, at any time, have complete knowledge of actual circuit current variations. For this purpose, the inductor 19 should be operated in a region of its hysteresis curve so that it is, in effect, a swinging choke, i.e., one in which the induction increases and decreases with increases and decreases, respectively, in current.

Use of the transformer 23 isolates the D.C. network from the A.C. loop, thereby eliminating the possibility of circuit compromise through D.C. voltage substitution.

While the invention has been described in a specific embodiment thereof and in a specific use, various modifications thereof will occur to those skilled in the art without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. An intruder alarm system for providing protection to protected premises from a remote station coupled thereto by a transmission line, comprising a first reactance network at the protected premises, a second reactance network at the remote station, said reactance networks being intercoupled by said transmission line to form a loop, a source of alternating current for said loop, and means at said remote station responsive to increases and decreases in the current flow in said loop to provide an alarm indication, said reactance networks being adjusted to provide unity power factor in said loop.

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2. An intruder alarm system for providing protection to protected premises from a remote station coupled thereto by a transmission line, comprising a first reactance network at the protected premises, a second reactance network at the remote station, said reactance networks being intercoupled by said transmission line to form a loop, a source of alternating current for said loop, means at said remote station responsive to increases and decreases in the current flow in said loop to provide alarm and trouble indications upon increase or decrease in the loop current, said reactance networks being adjusted to provide unity power factor in said loop, and means at said protected premises to increase the current flow in said loop upon detection of an intrusion.

3. An intruder alarm system for providing protection to protected premises from a remote station coupled thereto by a transmission line, comprising a first reactance network at the protected premises, a second reactance network at the remote station, said reactance networks being intercoupled by said transmission line to form a loop, a source of alternating current for said loop, including a rectifier and a device responsive to increases and decreases in current flow at said remote station to provide an alarm indication transformer for coupling said last mentioned means to said loop, said reactance networks being adjusted to provide unity power factor in said loop, at the frequency of said alternating current, and means at said protected premises to increase the current flow in said loop upon detection of an intrusion.

4. An intruder alarm system for providing protection to protected premises from a remote central station coupled thereto by a transmission line, comprising a first impedance network coupled across said transmission line at the protected premises end thereof and including, in series connection, a capacitor, an inductor and a resistor, a second impedance network coupled across said transmission line at the remote station end thereof and com-

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prising a second inductor and a second resistor in series across said line and a second capacitor in parallel therewith across said line, said impedance networks and said transmission line forming a loop, a first transformer having a secondary winding included in said loop to supply alternating current thereto, a second transformer having a primary winding included in said loop at said remote station, a rectifier and a current sensitive indicating device coupled to the secondary winding of said second transformer to provide a local D.C. signalling circuit, and means responsive to detection of an intrusion into said protected premises to change the value of said first resistor, the reactance of said second impedance network being adjusted, at the frequency of said alternating current, so as to be in resonance with the reactance of said first impedance network and said line whereby said loop is normally at unity power factor.

5. An intruder alarm system as set forth in claim 4 in which said first and second inductors are adjusted so that a short on said line adjacent said protected premises will decrease the current in said loop at said remote station.

6. An intruder alarm system as set forth in claim 4 in which said current sensitive indicating device provides different indications for increases and decreases in loop current.

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