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(54) **Telephone alarm transmitter**

(57) The present invention relates to apparatus for transmitting an alarm condition, following the occurrence of a state of alarm, by automatically dialling prestored telephone numbers and by the automatic transmission of an alarm message upon receipt of a response to said dialling.

The transmitter is used in conjunction with telephones, the numbers of which are pre-stored for dialling, which have a teleprinter connected to them *via* a MODEM. The transmitted message, coded to meet requirements of the telephone network being used, is such that a readily intelligible message is printed on a teleprinter connected to a responding telephone.

The transmitter may be so constructed that the stored telephone numbers as well as other information relating to the content of the message and/or the specific operating procedures of the transmitter may be modified *via* a MODEM connected to one of the telephones which can be dialled by the transmitter.

GB 2 049 359 A
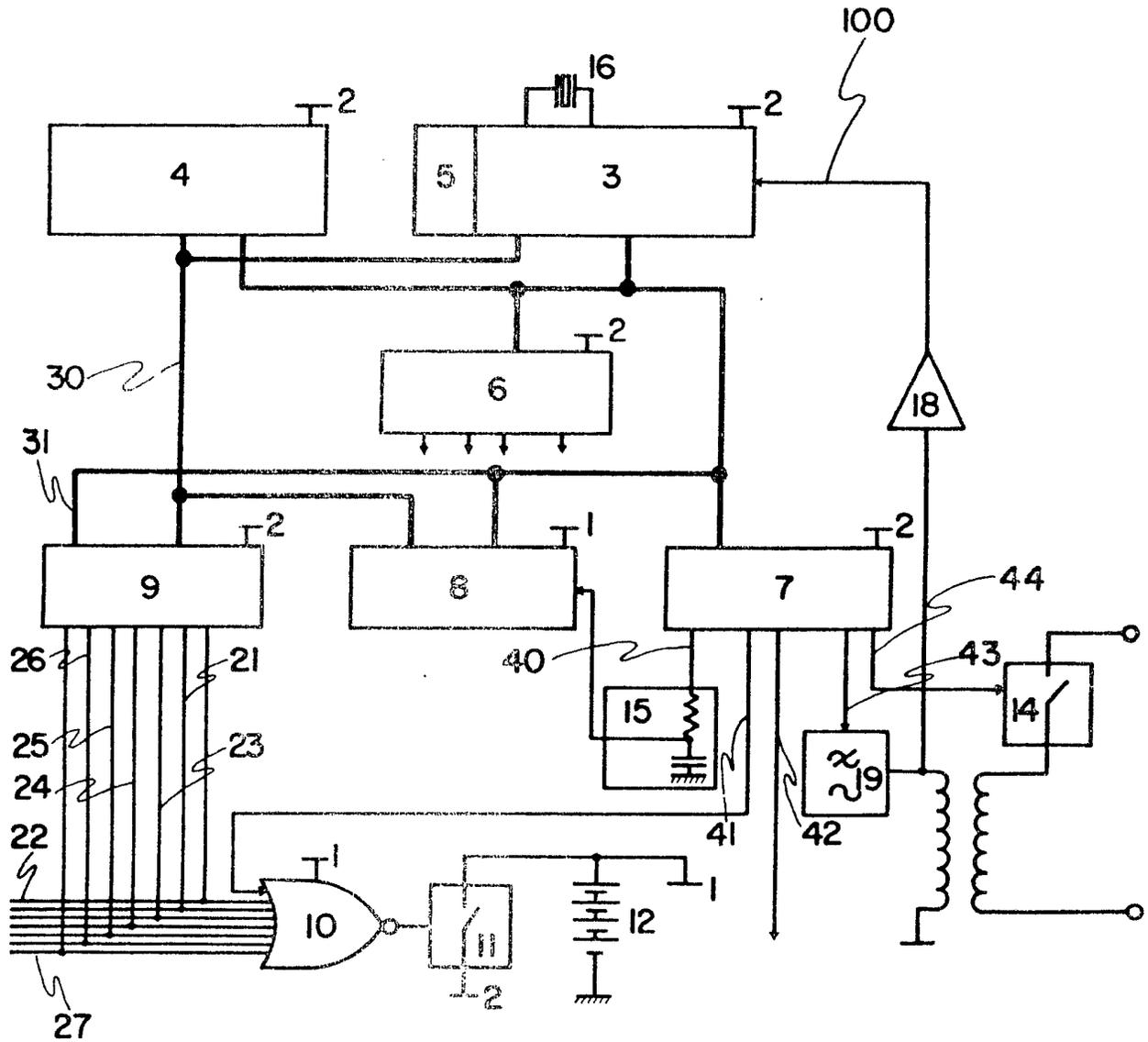
SPECIFICATION

Telephone alarm transmitter

5 The present invention relates to apparatus for trans-
mitting an alarm condition by automatically dialling
telephone numbers and by the automatic transmis-
sion of messages over the network connected
between the monitored site at which the transmitter
10 is located and the subscriber called automatically by
the transmitter.
　　In known apparatus of this type, the messages
transmitted during a state of alarm are recorded on a
magnetic tape in speech. Such apparatus has the
15 drawback of requiring mechanical devices for driv-
ing the tape which may jam and require consider-
able expenditure if a high degree of reliability is
desired. With apparatus of this type there is no
written record of the state of the alarm, unless the
20 operator called by the transmitter makes a manual
transcription.
　　Transmitters are also known in which the message
is coded in the form of pulse sequences at vocal
frequencies requiring the subscriber called to be in
25 possession of specific, complicated and costly de-
coding equipment.
　　In the case of known automatic transmitters, the
first programming or storage of the modification of
the telephone numbers to be called requires the
30 programming of a read-only memory, by means of a
magnetic or optical support device, or by bootstrap
or hard wired coding; the programming operation is
therefore difficult, costly and requires specific prog-
ramming equipment.
35 　　With a view to mitigating the above mentioned
drawbacks the present invention provides a tele-
phone alarm transmitter for automatically dialling
pre-stored telephone numbers following the occurr-
ance of a state of alarm, each telephone, the number
40 of which is pre-stored, being connected to a teleprin-
ter *via* a MODEM, comprising means for transmitting
messages, coded to the modulator standards of the
telephone network to which the means are con-
nected, such that a readily intelligible alarm mes-
45 sage is automatically printed on the teleprinter
connected to a telephone which responds to said
dialling.
　　Preferably, the message transmitted in case of
alarm is recorded in a readily intelligible form at the
50 receiving end by a standard teleprinter connected to
the telephone *via* a standard modulator/demodula-
tor (MODEM). The message transmitted may contain
not only the call origin but also other data of interest
to the monitor called: information concerning the
55 sensor which has triggered the alarm, the time lapse
since the triggering of the alarm etc.
　　The programming of the parameters of each
transmitter (for example, telephone numbers to be
called, call origin, time lapse before triggering of a
60 local alarm) may be carried out by remote control *via*
the connected telephone network and by means of
the keyboard teleprinter installed at the monitor's
site. Consequently with the same equipment
(keyboard teleprinter, MODEM), the monitor may
65 both receive the alarm message and programme

further transmitters, or modify, if necessary, para-
meters of the installed transmitters. This feature of
the invention simplifies the programming operation
and reduces its cost.
70 　　Preferably, the transmitter of the invention may
operate in accordance with two different cycles. The
algorithms of the 2 cycles are stored in a monolithic
read-only memory and are executed by a monolithic
microprocessor. The first cycle is in the alarm cycle;
75 it is triggered on the physical occurence of a state of
alarm (for example, the breakage of a loop through
which a current passes). The transmitter performs a
control function, if its non-volatile memory, in which
its operating parameters are stored, is in a suitably
80 programmed state; this control is carried out by
means of redundant words written in the memory at
the end of a programming cycle (see below). If the
non-volatile memory is not correctly signed (the
case of a virgin transmitter), it will trigger a local
85 alarm if the monitored site is equipped with one. In
these circumstances the transmitter does not, in
effect, have available the telephone numbers to be
called. If the volatile memory is correctly signed, the
transmitter will call the subscribers whose telephone
90 numbers are recorded in a list in the non-volatile
memory. As soon as the subscriber called has lifted
the receiver, the transmitter, identifying the carrier
frequency of the MODEM at the other end of the line,
transmits its message modulated in accordance with
95 the MODEM protocols. It will then wait for a
conformation signal corresponding to the operation
of keys on the keyboard of the subscriber called;
when the conformation signal is received, the trans-
mitter has terminated its alarm cycle. If the subscri-
100 bers do not reply, or if the transmitter does not
obtain a conformation signal for its messages, it
calls the other subscribers from the list of numbers
programmed in its non-volatile memory going
through the list in a circular manner.
105 　　If the transmitter has still not received a reply or a
confirmation signal within the time programmed
during a programming cycle, see below, it triggers a
local alarm if the monitored site is equipped with
one, and continues to call the programmed subscri-
110 bers in rotation until it obtains a confirmation signal,
or until the termination of a total action time which is
also programmed during a programming cycle.
　　The second cycle in which the transmitter of the
invention may preferably operate is the program-
115 ming cycle.
　　This cycle is triggered following a manual action
on a key of the transmitter, informing the transmitter
that programming is required. It then engages the
telephone line and holds a dialogue with the subscri-
120 ber at the other end of the line by means of the
keyboard teleprinter and the MODEM; the dialogue
is in the form of questions set by the transmitter and
displayed on the operator's teleprinter, and re-
sponses typed by the operator on his keyboard
125 which are analyzed and stored by the transmitter in
its non-volatile memory. If the operator types a
syntactical or sematic error, the transmitter repeats
its questions until it receives a correct reply.
　　The programming cycle is terminated when the
130 transmitter has received all the parameters correctly

and it is waiting for a particular command type by
the operator signifying that the transmitter should
terminate the call. It will then add redundant words
to its non-volatile memory so that during an alarm
5 cycle (see above) it will be able to ascertain that its
memory is correctly programmed, and then it ter-
minates its cycle. If should be noted that the
programming cycles may be repeated indefinitely
each time it is necessary to modify all or part of the
10 parameters of the transmitter.

The present invention will now be described by
way of example and with reference to the accom-
panying single figure of drawing which shows one
embodiment of the transmitter of the present inven-
15 tion. The processor 3 is of the MOTOROLA 6802 type
which includes 128 live memory octets or eight bit
bytes 5. The programme carried out by the proces-
sor is recorded in the read-only memory 4 which is
of the INTEL 2716 type, the capacity of which is 2048
20 octets. The decoder 6 which is of the 74LS 138 type,
receives the most significant address weights from
the processor and generates mutually exclusive
selection signals to the circuits 4, 7, 8 and 9. The
multiplexor 9 which is of the 4512 type, enables one
25 of the input signals 21 to 27 selected by three of the
bits of the address bus 31 to be multiplexed to the
most significant bit of the data bus 30. The output
register 7, which is of the 74 LS 259 type, is
constituted by eight registers of one bit each which
30 may be individually addressed; as the charged or
signed bit is of a low address weight, it is loaded in
the given address by three other bits of the address
bus 31. The non-volatile memory 8, which is of the
5101 type, is of CMOS technology and its selection is
35 influenced not only by the decoder 6 but also by the
output regiater 40 *via* the integrator network 15. The
memory 8 is controlled so as not to become volatile
with respect to the storage of operating parameters
of each application. In the rest position, the potential
40 line 2 floats in such a way that only the non-volatile
memory 8 and the junction gate 10, which is of the
4078 type, are supplied with voltage which is fed by
the battery 12. In this case, the power consumption
of the transmitter is negligible.
45   As soon as one of the input lines 21 to 27 passes
into the active condition, the relay 11 actuated by the
gate 10 is triggered (ie closed) and feeds all the
components by bringing the potential 2 to the
potential 1 of the battery. The processor 3 then
50 carries out its initialization sequence under voltage,
programmed in the read-only memory 4, and acts on
the output register 7 *via* output line 41 which has the
result of connecting the supply of all the compo-
nents to the battery 12.
55   The processor 3 uses the output register 7 *via*
output line 44 to open, dial the numbers and close
the telephone line by means of the relay 14. The
output register 7 *via* output line 43 enables the
processor to transmit the modulation directly by
60 frequency changes in accordance with specified
standards, for example P.T.T. (French Post Office);
the filter 19 is a low pass active filter whose role is to
suppress the high frequency component contained
in the rectangular signal present in the output line
65 43. The output reset line 42 enables the processor 3

to actuate a local alarm if a device of this type is
connected to the output reset line 42. The speech
signal carrying the information relating on the one
hand to the different telephone tones, and, on the
70 other hand, the modulation generated by the MOD-
EM at the other end of the telephone line is amplified
to saturation by the operational amplifier 18, which
is of the 2 M 324 type, and is then applied to the
breaker input 100 of the processor 3. This arrange-
75 ment enables the programmed frequency to be
measured with simple logical filtering. The input line
21, read *via* the multiplexor 9 informs the processor
3 when the line is active that the required cycle is a
programming and not an alarm cycle. If, on the other
80 hand, one of the lines 22 to 27 is active, the
processor 3 carries out an alarm cycle and, in
accordance with the active line 22 to 27, it emits a
corresponding message (for example, FIRE on line
22, THEFT on line 23 etc.)
85   The processor computes the time lapse by refer-
ence to the programme which it is carrying out and
to the duration of the machine cycle given by its
quartz clock 16.

At the end of the programming or alarm cycle, the
90 processor 3 itself switches the voltage off from the
system by opening the relay 11 by means of an
action on the register 41. An adequate period before
this action on the output line 41, the processor
disconnects the non-volatile memory 8 by acting on
95 the output line 40 so as to protect the non-volatile
memory 8 against false entries which might be
accidentally produced during release from voltage ie
voltage transients.

The integrator network 15 ensures the disconnec-
100 tion of the memory 8 during the jumps which the line
40 may undergo during the application and the
release from voltage (voltage transients).

It goes without saying that in accordance with the
state of integration techniques, all or part of the
105 components constituting the construction described
above may be integrated in a monocircuit without
constituting a basic modification of the present
invention.

Preferably, the rate of transmission of the alarm
110 message by the transmitter is either 110 bits per
second or 300 bits per second.

Preferably, the telephone alarm transmitted in-
cludes means for detecting the frequency of the
space state generated by a modulator as a sign off to
115 a transmitted message. Preferably, this detection is
ensured by a logic unit in a read-only memory.

The automatic telephone transmitter of the inven-
tion may be used in all cases in which it is desired to
call subscriber(s) during the occurrence of a state of
120 emergency at the site at which the transmitter is
located.

The transmitter is particularly useful in all applica-
tions in which the same type of telephone transmit-
ter is desired to be adapted to the particular
125 conditions of different sites to be monitored, or if it is
desired to modify the operating parameters of a
transmitter which has already been installed with a
maximum ease of adaptation and a minimal adapta-
tion cost (in practice the cost of a telephone call).
130

CLAIMS

1. A telephone alarm transmitter for automatical-
ly dialling pre-stored telephone numbers following
5 the occurance of a state of alarm, each telephone,
the number of which is pre-stored, being connected
to a teleprinter *via* a MODEM, comprising means for
transmitting messages, coded to the modular stan-
dards of the telephone network to which the means
10 are connected, such that a readily intelligible alarm
message is automatically printed on the teleprinter
connected to a telephone which responds to said
dialling.

2. A transmitter as claimed in claim 1, wherein
15 the required modulation function is programmed in
a monolithic memory having at least one processor
which the performs the encoding.

3. A transmitter as claimed in claim 1 or 2,
wherein the speed of transmission of the message
20 by the transmitter may be either 110 bits/sec, or 300
bits/sec.

4. A transmitter as claimed in claim 1, compris-
ing a means for detecting the frequency of the space
state generated by a modular as a sign-off to a
25 transmitted message.

5. A transmitter as claimed in claim 4, wherein
the detection of the space state frequency generated
by a modulator is ensured by a logic unit in a
read-only memory.

30 6. A transmitter as claimed in claim 1, compris-
ing a monolithic memory of CMOS technology,
controlled so as not to become volatile with respect
to the storage of the operating parameters of each
application.

35 7. A transmitter as claimed in claim 6, compris-
ing a means for programming the non-volatile
memory by telephone by demodulating the signal
emitted by a MODEM at the other end of the
telephone line.

40 8. A transmitter as claimed in claim 7, wherein a
demodulation function is stored in the read-only
memory and the demodulation is carried out by a
processor.

9. A transmitter as claimed in claim 1, wherein
45 the transmitter detects the different tones required
for the dialling of telephone numbers and the setting
up of a telephone call, by means of the read-only
memory and a processor.

10. A transmitter as claimed in claim 1, compris-
50 ing means for altering the pre-stored telephone
numbers by demodulating signals transmitted by a
MODEM.

11. A telephone alarm transmitter substantially
as herein before described with reference to and as
55 illustrated in the accompanying figure of drawings.