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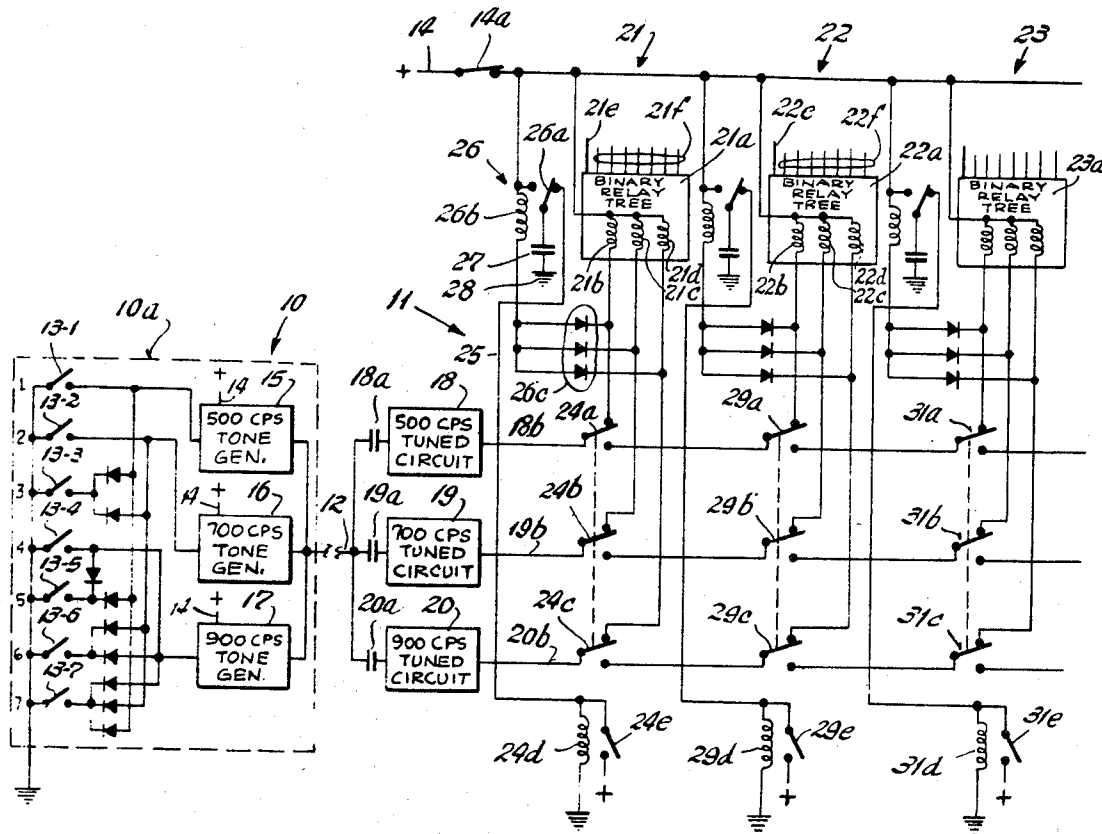
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[54] **CHOSEN SELECTION TRANSMITTAL SYSTEM**
4 Claims, 4 Drawing Figs.

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166

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ABSTRACT: A system for selecting at a remote station any one of a plurality of outputs at a central station in which the selection is accomplished by initially translating the selection into a binary code of tones, passing the tones over a wire interconnecting the remote and central stations and then translating the code of tones into the output selected by use of a binary coded relay means.



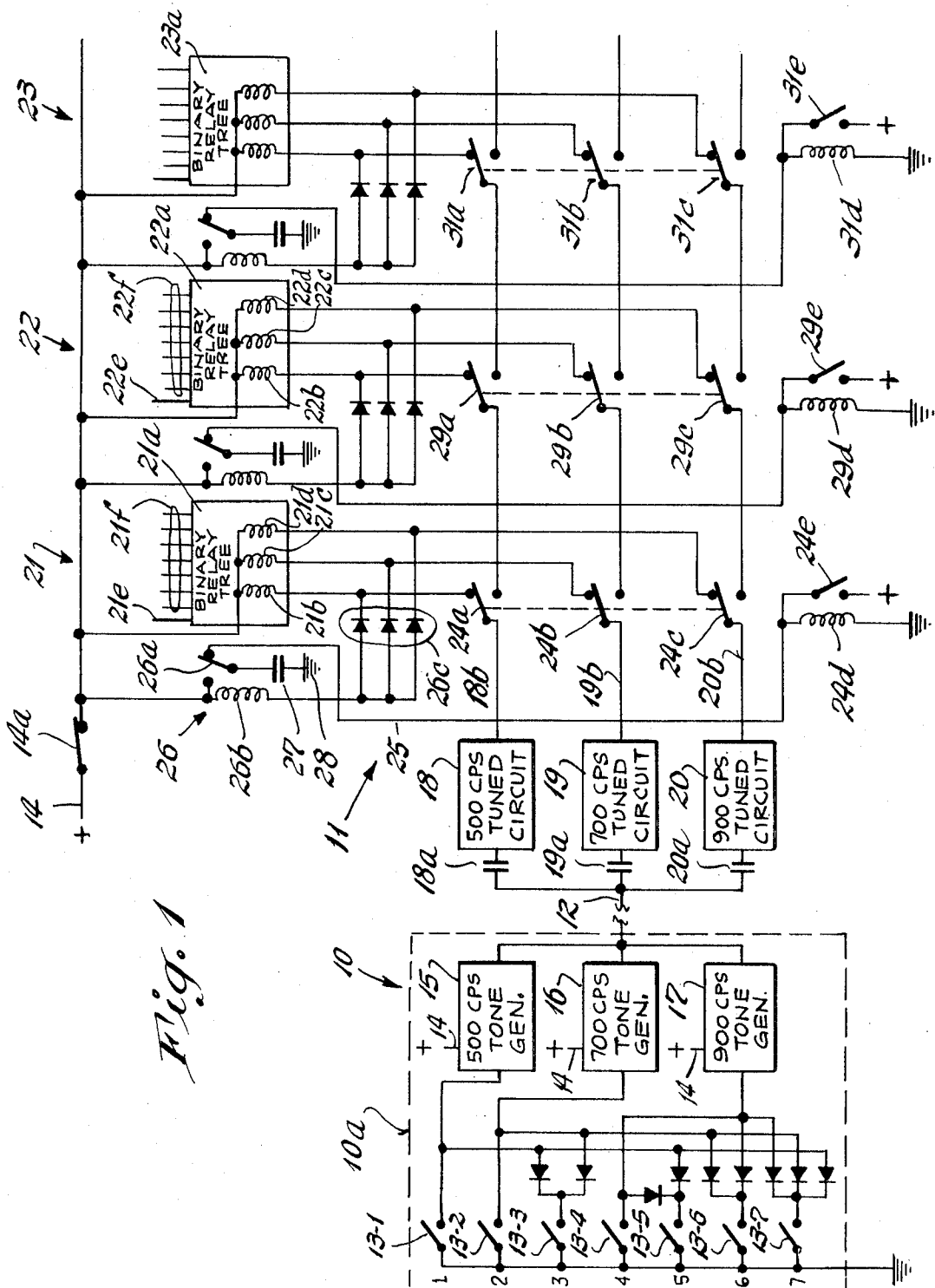
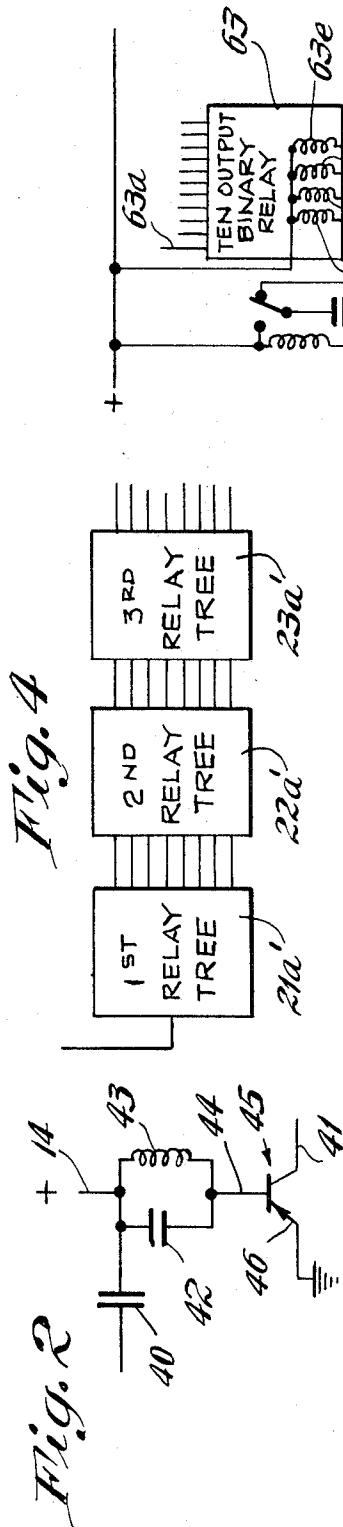
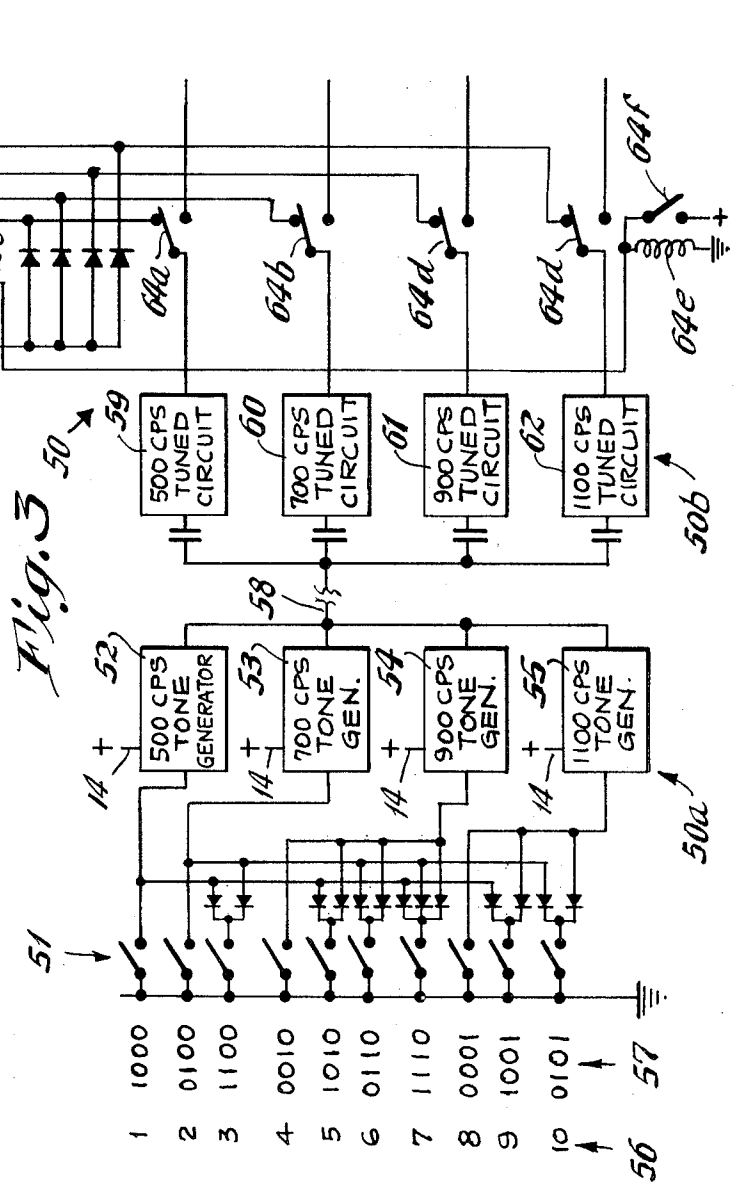


Fig. 1

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CHOSEN SELECTION TRANSMITTAL SYSTEM

In U.S. Pat. No. 3,423,732, granted Jan. 21, 1969 and also entitled "Chosen Selection Transmittal System" of which the present Applicant is also an inventor, there is disclosed a remote selection system for enabling the selection, at a remote station, of any one of a plurality of outputs at a central station. The selection is accomplished by converting the selected output into an electrical signal on a plurality of wires that interconnect the two stations with each selection having a different signal. The signals are coded according to a binary representation and for each selection different wires have one potential or another and thus a binary condition.

While such a system has been found satisfactory it requires that the number of wires that are connected between the remote station and the central station be directly related to the number of selections available. Specifically the relationship is a geometric progression with a ratio of 2. Thus for 8 selections, 3 wires are required; for 16 selections, 4 wires; for 32 selections, 5 wires, etc. Thus while the system functions extremely satisfactorily, the number of wires and/or the lengths of the wires may render the system somewhat unacceptable or unsatisfactory for certain installations.

It is accordingly an object of the present invention to provide a chosen selection transmittal system which even though providing for a large number of selections only requires a single signal carrying wire connected between each remote station and the central station.

Another object of the present invention is to achieve the above object with a chosen selection system that is relatively simple in construction, yet reliable and durable in use.

A further object of the present invention is to provide a system which has a plurality of different tones, each selection has a combination of tones unique to it and the tones are transmitted to and translated at the central station into the output that uniquely corresponds to the combination of tones.

Another object of the present invention is to enable the system to make a selection having a plurality of identifying characters, such as a plural digit number, and to enable each character to be sequentially identified at the central station.

In carrying out the present invention, the chosen selection transmittal system has at least one remote station which includes a plurality of individually operable switches with the switches being uniquely identified, as for example by a decimal number of one or more digits. The switches are interconnected to a plurality of tone generators, as for example 3, in such a manner that actuation of a switch causes one or more tone generators to become energized. A different combination of generators are energized by operation of each switch and thus for each selection a different combination of tones is produced.

The output of the generators is connected to a single wire which in turn provides the connection between the remote station and a central station. At the central station the wire is connected in parallel to a plurality of tuned circuits with there being one circuit for each tone generator and the circuit is tuned only to the tone of its tone generator. The tones in the wire activate their respective tuned circuits and cause the same to produce electrical signals, when activated, corresponding to the tones. These signals are employed to actuate a relay means which selects the output that corresponds to the unique combination of tones for the selection made.

If the selection is identified by a plurality of characters, the central station has a plurality of outputs. Each character of the selection is selected at the remote station, its corresponding output made at the central station and then the next character is selected with the central station storing the selected number and then being conditioned to store the next character sequentially on the next output.

Specifically, in the embodiment described herein the tones are related to the identification of each selection by a binary code. If the identification of each selection is by a decimal number, it is translated into a binary number and for each digit of the binary number there is a tone generator with the generator being actuated if the digit of the binary number is a

1. Thus if there are 7 possible selections, 3 tone generators are required each with a different tone and they will be actuated according to a binary representation of the decimal number selected. Thus for the number 1, only the first tone generator will be actuated; for the number 2 only the second; for the number 3, the first and second; for the number 4, only the third, etc. The combination of tones that is passed over the wire that interconnects the remote and central stations may thus be any one of the 3 tones or any combination thereof up to and including all three tones. At the central station the tones are decoded to operate a binary relay tree. Naturally if more selections are desired, more tone generators are needed.

Other features and advantages will hereinafter appear.

In the drawing:

FIG. 1 is a schematic and block diagram of the chosen selection transmittal system of the present invention.

FIG. 2 is a schematic diagram of a tuned circuit.

FIG. 3 is another embodiment of the chosen selection transmittal system.

FIG. 4 is a block diagram indicating a different interconnection of the outputs in the central station.

Referring to the drawing, FIG. 1, the remote station is generally indicated by the reference numeral 10 and is enclosed within a dotted line 10a. The central station, generally indicated by the reference numeral 11, is connected to the remote station by a wire 12, it being understood that both are grounded to a common ground in any convenient manner to complete the circuit.

The remote station has a plurality of individually operable, normally open, switches 13-1 through 13-7 that have their contact arms connected in parallel to a ground. The wire 12 is connected to be in parallel with the outputs of a first tone generator 15, a second tone generator 16 and a third tone generator 17. The particular frequency of the tone generators is selected so that they will not interfere as by harmonics with each other and thus the first tone generator may be a 500 cycle per second signal producer, the second, 700 c.p.s. and the third, 900 c.p.s., as indicated in the drawing. The tone generators 15-17 are normally inoperative to produce a tone but will do so upon energization thereof from a positive source 14.

The output contacts of the switches 13-1 through 13-7 are interconnected in the manner shown with the tone generators so as to actuate the tone generators according to a binary representation of the switch actuated. Thus, for actuation of the first switch 13-1, tone generator 15 only is actuated; for actuation of the fifth switch 13-5, tone generators 15 and 17 are actuated and for the seventh switch 13-7, all three tone generators are actuated.

The output of the actuated tone generators are combined for transmittal over the wire 12 to the central station 11 which has 3 tuned circuits 18, 19 and 20. Condensers 18a, 19a and 20a are connected in parallel to the wire 12 so that each tuned circuit will receive the transmitted signal. The tuned circuits 18-20 each functions to eliminate on their output leads 18b-20b a positive voltage, when they are actuated by the reception of the tone which corresponds to their tuning. Thus the tuned circuit 18 is set to be actuated just by the tone of the tone generator 15; the tuned circuit 19 just the tone of the tone generator 16 and the tuned circuit 20 just the tone of the tone generator 17 and as indicated may be 500, 700 and 900 c.p.s. respectively.

The central station in the embodiment shown in FIG. 1 is set to provide an individual output for each selection made and to provide them as they are sequentially made. Thus there is provided a first selection output generally indicated by the reference numeral 21, a second selection output 22, a third selection output 23, etc. Each of the selection outputs includes a binary relay tree 21a having three relays 21b, 21c and 21d that have their coils connected through relay switches 24a, 24b and 24c to the outputs 18b-20b of the tuned circuits in the unenergized position of the relay coil 24d which controls the position of the three switches. With the relay coil 24d

deenergized, whenever a lack of positive voltage appears on the output 18b, the first coil 21b of the relay tree is energized; whenever a lack of voltage appears on the output 19b the relay coil 21c is energized; and whenever a low or ground voltage appears on the output 21b the relay coil 21d is energized.

A binary relay tree is specifically shown and described in the above-noted copending application. It will be however understood that a relay tree input 21e will be connected to the one of the plurality of outputs 21f of the tree which corresponds to the combination of energizations of the relays 21b—21 which in turn is determined by the selection made through operation of one of the switches 13—1 through 13—7.

Upon release of the actuated selecting switch, the present circuit provides for the next selection to appear in the second selected output 22. This is achieved by energizing the relay coil 24d through a wire 25 which engages a contact arm 26a of a relay 26 having a coil 26b. The contact arm 26 is connected through a condenser 27 to the ground 28. Upon the selector switch being initially pressed, the relay coil 26b is energized through any one of the diodes 26c, connecting the condenser 27 to the positive source 14 to charge it. With release of the selection switch, the switch arm 26a assumes its solid line position and the condenser 27 discharges through the wire 25 to the relay coil 24d to energize same and it is maintained energized through a latching contact 24e. The switches 24a—24b are now disconnected from the first selected output 21 and connected to the relay tree 22a of the second selected output 22 through relay switches 29a, 29b and 29c. These switches are operated by a relay coil 29d having a latching circuit 29e.

The selection switch that is next actuated will cause the relay tree 22a to have its appropriate coils 22b, 22c and/or 22d to be energized to connect its input 22e to one of its plurality of outputs 22f. Similarly, the relay 30 will effect charging of a condenser 31 so that upon release of the selection switch the charged condenser 31 will energize the relay coil 29d with the contact arm 29a maintaining it energized.

The next selection will be transferred to the selector output 23 having a binary relay tree 23a through contacts 31a, 31b and 31c of a relay 31d having a latching contact 31e. It will be seen that the selector 23 will function as the other selector outputs 21 and 22.

While only three selector outputs have been shown, each is identical and they may be multiplied as desired to accommodate each character of a plural character selection.

The provision of a separate output for each selected character is achieved by the connecting in parallel of the selector groups. If desired, the selector outputs may be connected in series, such as diagrammatically shown in FIG. 4, wherein the output of the first relay tree 21a' becomes the input of the second relay tree 22a' and the latter output becomes the input of the third relay tree 23a' though it will be understood that each sequential tree will have a larger number of outputs. One example of serially connected relay trees is shown in my U.S. Pat. No. 3,328,533.

After utilization of the outputs, the central station may be restored to receive the next selection as by momentary operation of a switch 14a in the power source in any desired manner. This will effect deenergization of the relay coils 24d, 29d and 31d and also a latching contact (not shown) for each of the relay coils 21b, 21c, 21d, 22b, etc. of the relay trees.

Shown in FIG. 2 is a schematic diagram of a tuned circuit in which there is a condenser 40 corresponding to one of the condensers 18a through 20a and an output 41 corresponding to one of the outputs 18b through 20b. The positive source 14 is connected to a resonate or tuned circuit consisting of a condenser 42 and an inductance 43 that are connected to the base 44 of a transistor 45. The transistor's emitter 46 is grounded as at 28 and the output 41 is connected to the collector thereof. Normally the components 42 and 43 are selected to have a low resistance at one frequency and without the frequency have sufficient resistance between the positive source 14 and the base to prevent conduction of the transistor. However, upon the frequency passing through the condenser 40 which is

that to which the circuit is tuned, its impedance will decrease, effecting conduction of the transistor and the effective grounding of the output 41.

The embodiment shown in FIG. 1 only permits seven selections per generator. If desired, as shown in FIG. 3 there may be ten or up to sixteen selections per generator by the use of four tone generators and corresponding four tuned circuits. Thus in this embodiment, generally indicated by the reference numeral 50, there are 10 individually operable switches 51 connected to four tone generators 52, 53 54 and 55 in a manner which actuates the tone generators according to a binary representation of the numerical number of the switch. A decimal number is set forth in the column 56 aligned with its appropriate switch as is also the binary representation column 57. Thus for the selection number 8, only the tone generator 55 will be actuated; for the selection number 9, tone generators 52 and 55 will be actuated etc.

The wire 58 is the only connection between the remote station 50a and the central station 50b. The central station has four condensers connected in parallel to the wire 58 and to four tuned circuits 59, 60, 61 and 62 with each being only receptive to the frequency corresponding to the tone generator set forth opposite thereto as indicated by the cycle per second frequency in each of the tone generator and tune circuit block diagrams.

The central station includes a 10 output binary relay tree 63 having an input 63a and relay coils 63b, 63c, 63d and 63e. Each of the coils is connected by relay switches 64a, 64b, 64c and 64d respectively to the outputs of the tuned circuits 59—62 so as to enable the relay corresponding to the tuned circuit to be energized upon actuation of the circuit. Upon release of the selection switch the relay coil 64e is actuated and latched as by contact 64f to enable the tune circuits to be connected to the next digit selector. While only one selector output has been shown, it will be clear that any number may be utilized, depending on the number of characters in the selection.

It will accordingly be understood that there has been disclosed a chosen selection transmittal system which enables a selection to be chosen at a remote station and to have an output that corresponds to the chosen selection be actuated. The transmittal of the selection is over only one wire and consists of one or more tones with each selection having a tone or combination of tones unique to it. The tones have different, noninterfering frequencies and are translated at the central station into corresponding voltage potentials on control leads which in turn serve to actuate a relay tree that connects the output which is made by the selection. The system also enables selections to be made having a plurality of characters with each character being initially selected, its output chosen at the central station and then the next character be selected and its output chosen. Thus the output of the central station may consist of an output for each character in the chosen selection.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. A chosen selection transmittal system for transmitting a chosen selection from a plurality of selections made at a remote station to a central station for utilization comprising a remote station having a plurality of individually operable switches with there being one for each selection, a wire extending from said remote station to said central station, a plurality of tone generators with each generator producing a different frequency electrical tone upon actuation, means connecting the tone generators to the wire, means in the remote station for connecting the tone generators to the switches to have one or more tone generators actuated to produce a different combination of tones for each selection with each selection having a different combination unique to it, and choosing means in the central station connected to the wire to receive the tones and having a plurality of individual outputs with there being one output for each selection, said choosing

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means being responsive to the received tones to choose the output which corresponds to the combination of transmitted tones, in which the number of tone generators is related to the number of selections by a geometric series having a ratio of two, and in which the tone generators are connected to the selecting switches to have the tone generators actuated according to a binary representation of the selection switches with there being a tone generator for each digit of the binary representation.

2. The invention as defined in claim 1 in which the choosing means includes a plurality of tuned circuits, one for each generator, in which each tuned circuit is responsive to a frequency tone of only one of the tone generators to produce an electrical signal upon the appearance of its tone, and in which the choosing means includes a selector output means which includes a relay tree means having a plurality of relays and in which each relay is connected to only be responsive to

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the electrical signal from one tuned circuit.

3. The invention as defined in claim 2 in which there are a plurality of sequential chosen selections, in which the choosing means includes a plurality of selector output means with there being one selector output means for each sequential chosen selection, means for connecting the electrical signals from the tuned circuits to the selector output means with only one selector output means being connected at a time and in which each selector output means includes shifting means for disconnecting itself to receive the electrical signals upon cessation of the signals caused by a chosen selection.

4. The invention as defined in claim 3 in which each selector output means includes a relay tree means having a plurality of relays and in which each of said trees has an output for each of the switches at the remote station.

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