Nov. 3, 1970 A. M. MIDIS ET AL 3,538,263

REPERTORY DIALER

Filed Feb. 7, 1967 6 Sheets-Sheet 1

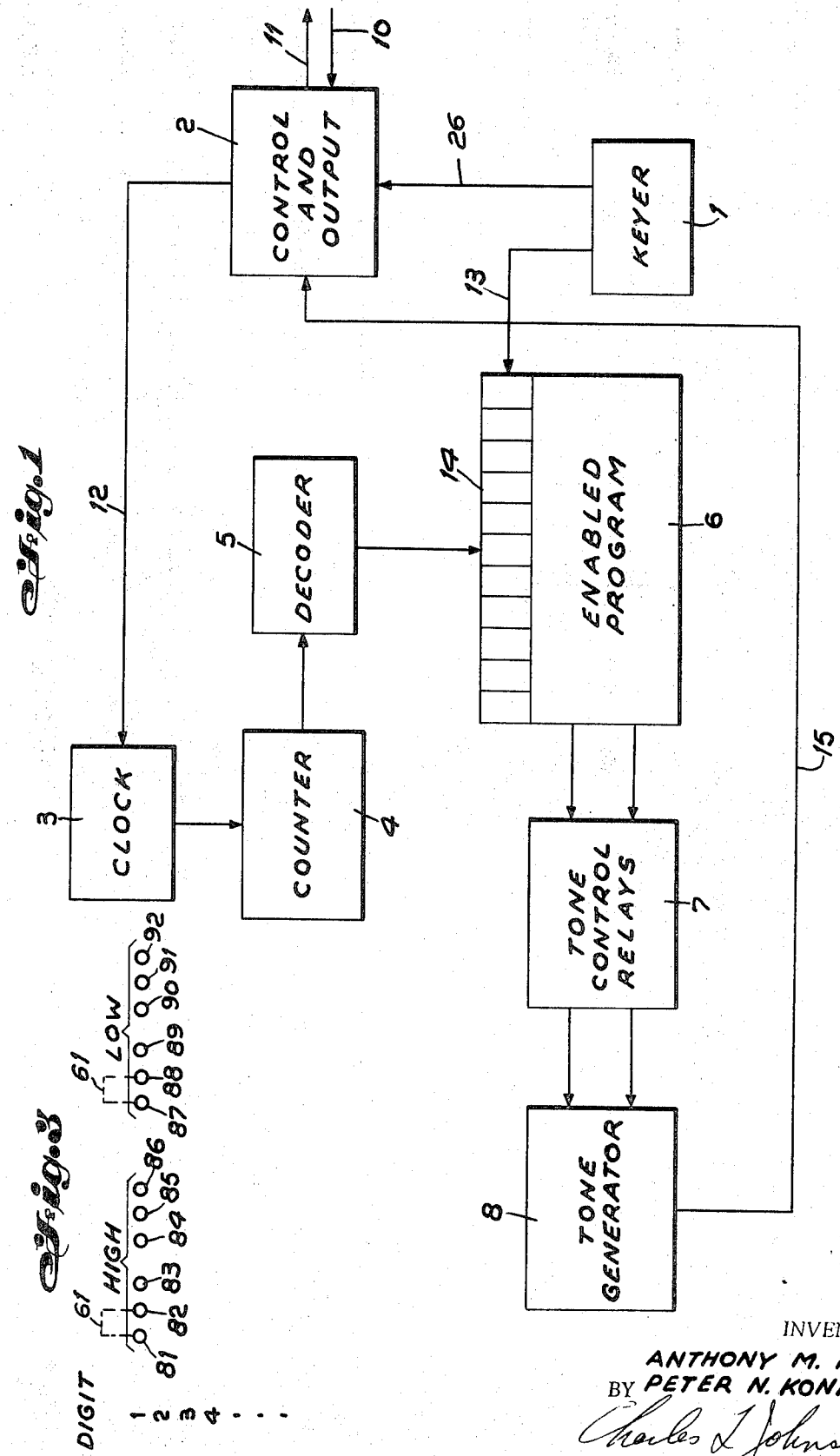

Fig. 1

Fig. 3

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REPERTORY DIALER

Filed Feb. 7, 1967 6 Sheets-Sheet 2

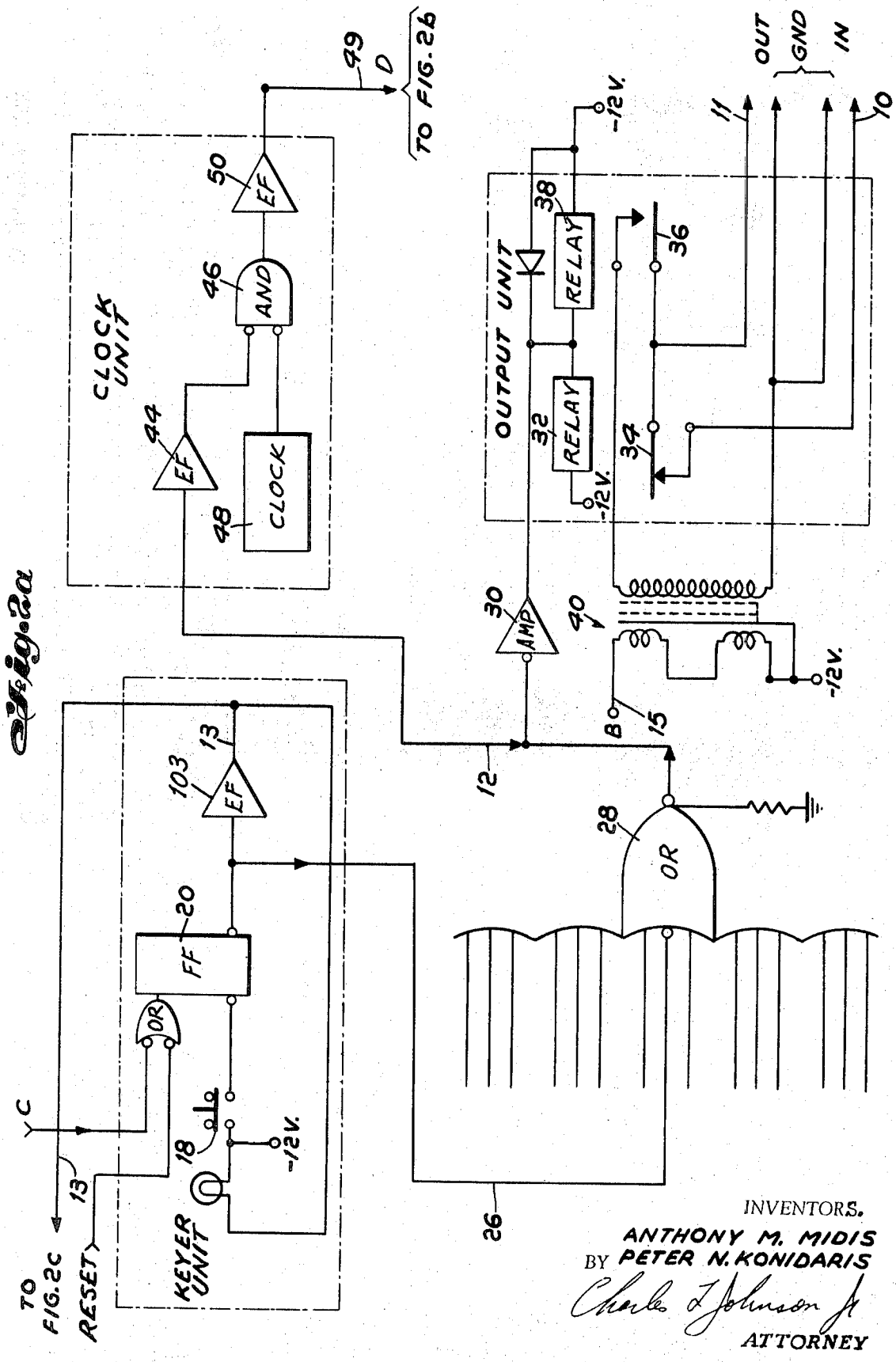

Fig. 2a

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REPERTORY DIALER

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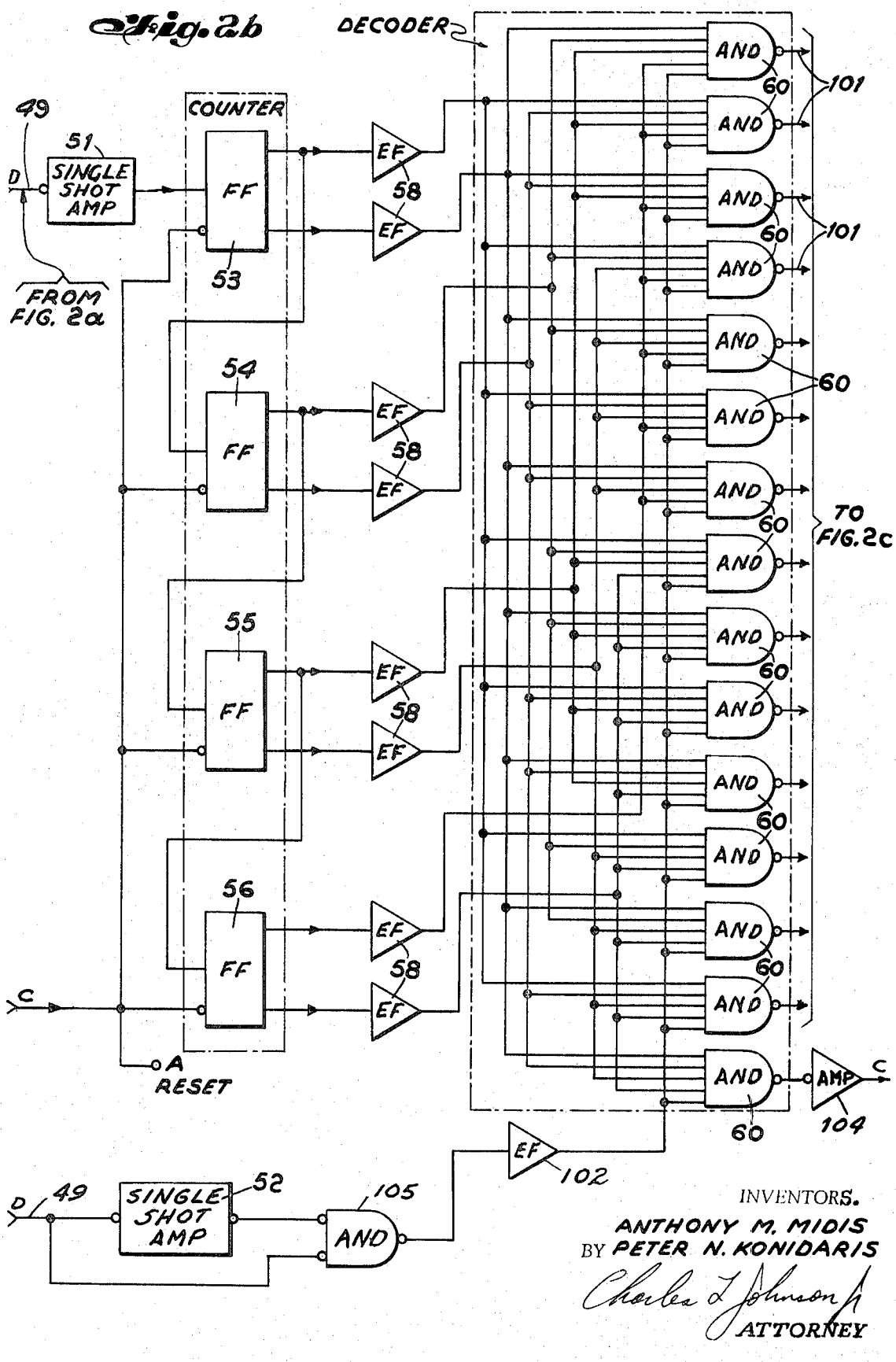
Fig. 2b



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REPERTORY DIALER

Filed Feb. 7, 1967 6 Sheets-Sheet 4

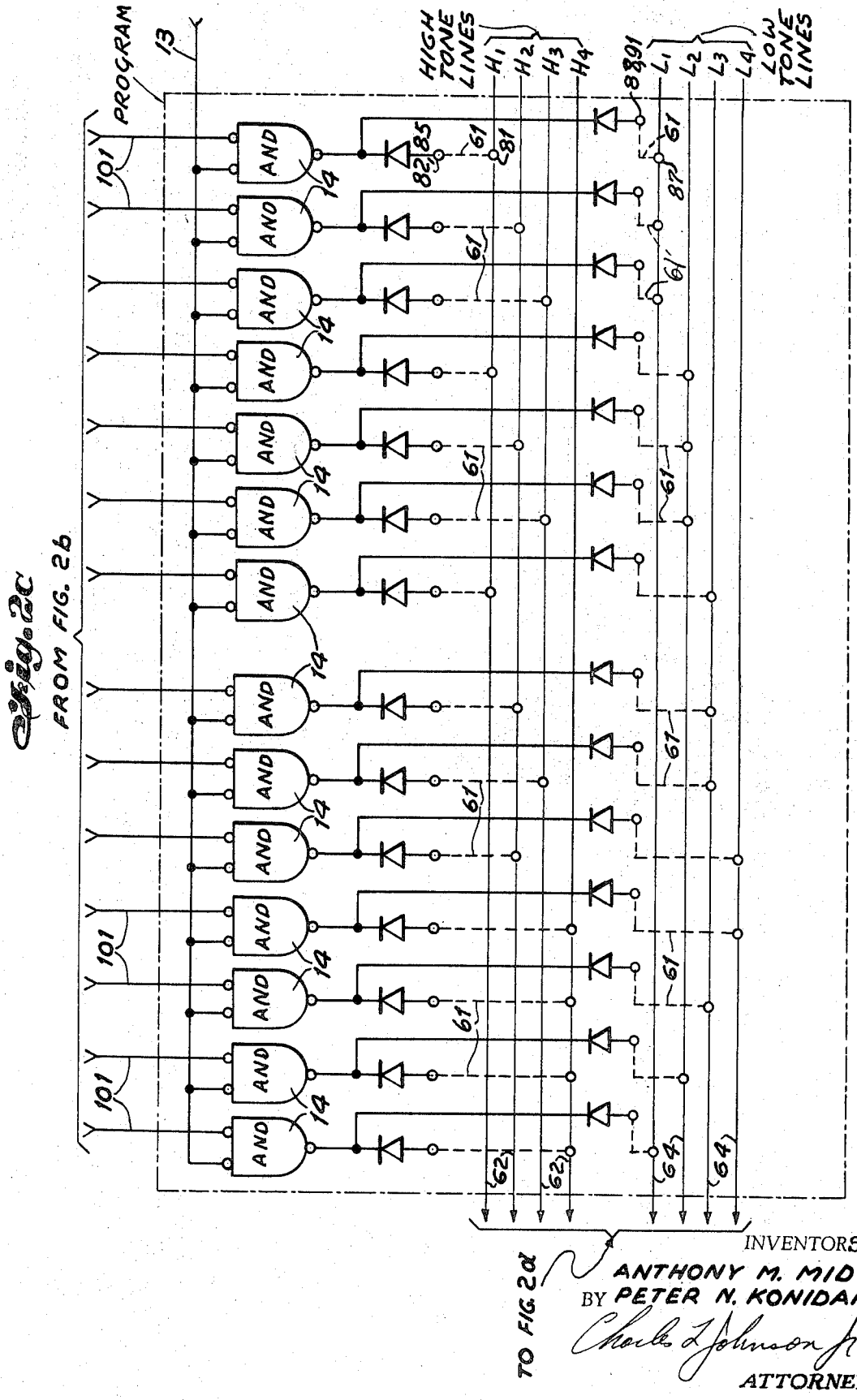

Fig. 2c

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REPERTORY DIALER

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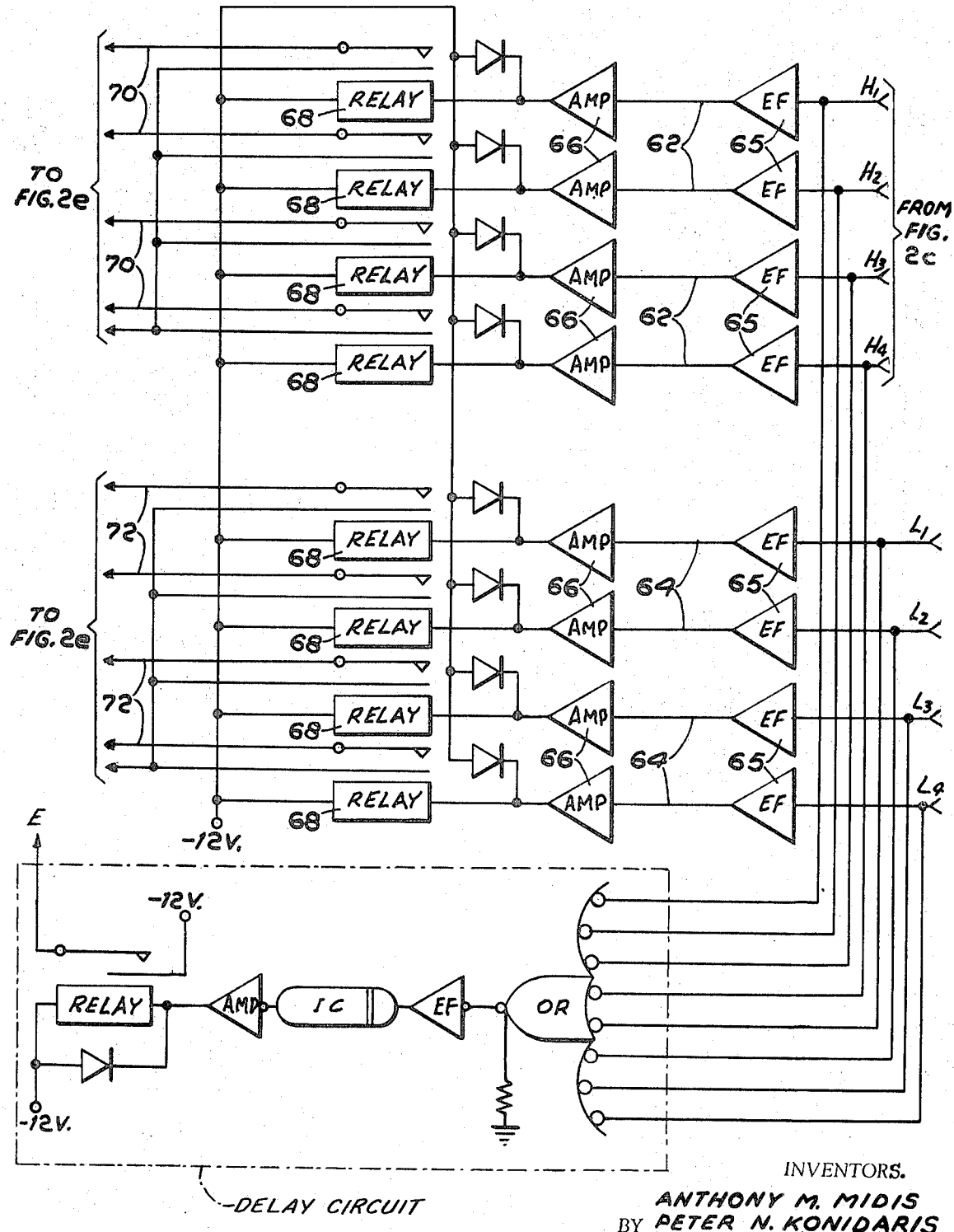
Fig. 2d



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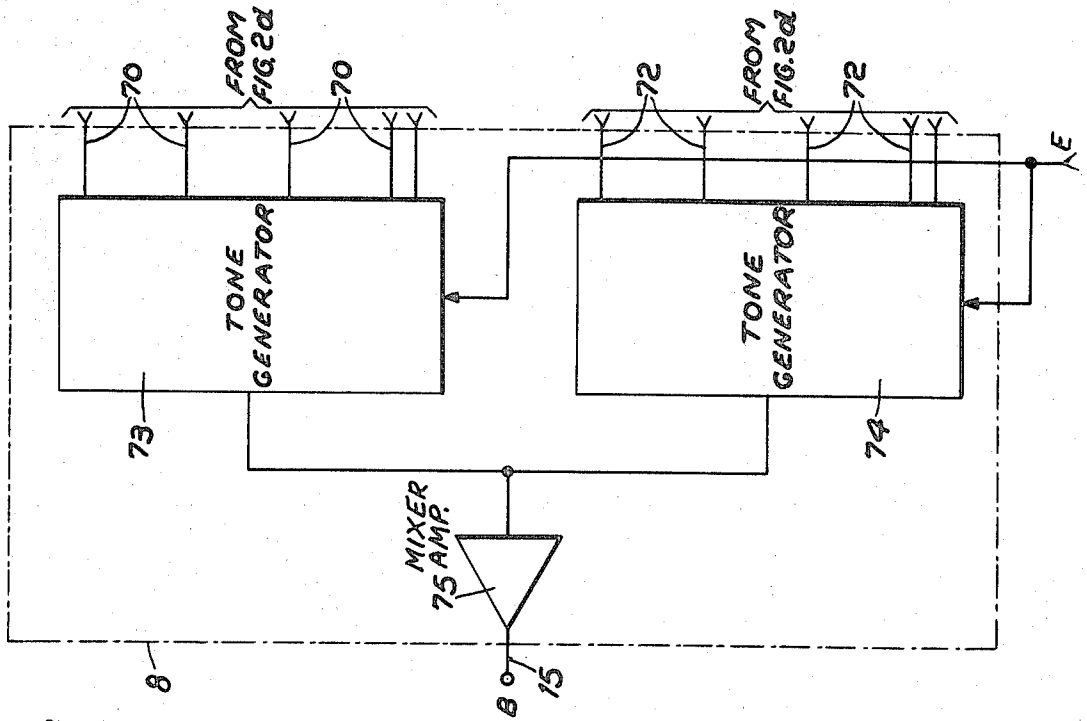

Fig. 2e

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United States Patent Office

3,538,263
Patented Nov. 3, 1970

3,538,263

REPERTORY DIALER

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Filed Feb. 7, 1967, Ser. No. 614,511
Int. Cl. H04m 1/45
U.S. Cl. 179—90 9 Claims

ABSTRACT OF THE DISCLOSURE

An automatic dialer of a plurality of multidigit addresses in which the activation of one key automatically dials a multidigit address by generating sequential pulses which are fed to a plurality matrix each of which in turn control a pair of tone generators for transmitting a sequence of address tones to a communication line.

BACKGROUND OF THE INVENTION

In communication systems, especially those having a large number of lines to be serviced, the number of address digits is often greater than the standard seven digit address used by the conventional telephone. With a large number of digits to be dialed, accuracy and speed may both be gained by an automatic system which can dial a multidigit address upon the depression of a single key or button.

SUMMARY OF THE INVENTION

This invention provides an automatic dialer of multidigit addresses by providing a plurality of programmed matrices each of which is so arranged that upon sequential application of electrical pulses a plurality of pairs of telephone tones are generated from the initial activation of a single key. This is accomplished by controlling pulses from a pulse generator so as to apply them sequentially to gates of the program matrix which in turn sequentially activates pairs of relays for generating a high tone and a low tone for each digit of the communication address.

DESCRIPTION OF THE DRAWINGS

The above-mentioned and other features of the invention will become more apparent and the invention itself will be better understood by reference to the following detailed description thereof taken in conjunction with the accompanying drawings in which:

FIG. 1 illustrates in block diagram form a repertory dialer according to the invention;

FIGS. 2*a*–2*e* are schematic representations of the various stages in the block diagram of FIG. 1; and

FIG. 3 is a diagrammatical illustration of a program board according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1 a keyer **1** is illustrative of one of several keyers each of which represents a single multidigit address. Activation of a key in the keyer **1** operates on the control and output circuitry **2** via conductor **26** to disconnect the telephone input line **10** from the telephone output line **11** and to enable the clock **3** by means of the control **12**. The clock **3** in turn activates the counter **4** for counting the pulses from the clock **3** which the counter **4** then transmits to the decoder **5**, the outputs of which are fed to the program **6**. The keyer **1** by means of conductor **13** also primes the program gates **14**, permitting thereby the program stage **6** to receive the decoded pulses from decoder **5**. The enabled program stage **6** in turn activates two tone control relays **7** for each pulse received from decoder **5**, which in turn activate two oscillators within the tone generator stage **8** so that a pair of tones are transmitted from the tone generator **8** over conductor **15** to the control and output stage **2** which in turn transmits the sequential pairs of tones representative of the address digits out on line **11**.

Referring now to FIGS. 2*a*–2*e* it may be seen that switch **18** of the keyer in FIG. 2*a* when activated will apply the −12 volt logic potential through flip-flop **20** and emitter follower **103** over conductor **13** to AND gate **14** of the program (FIG. 2*c*), priming same, and at the same time over conductor **26** to OR gate **28** of the control unit portion of FIG. 2*a*. The OR gate **28** in this case is shown to have **15** inputs representative of the inputs from fifteen different keyers (only one of which is shown in FIG. 2*a* for clarity), each of which represents a multidigit address upon the activation of its corresponding key. The potential applied to the OR gate **28** is conducted through current amplifier **30** to activate relay **32** so as to open the normally closed contact **34**, disconnecting thereby the telephone input line **10** from the output line **11** so as to disconnect the telephone operator from the circuit. At the same time the normally open contact **36** is closed by the activated relay **38** so as to apply the output from the line transformer **40** to the output line **11**. Also upon activation of a key such as **18** the resultant output potential from OR gate **28** is applied by means of conductor **12** through the emitter follower **44** to the gate **46** which gates the output of clock **48**, a free-running multivibrator, to the emitter follower **50** which, by means of conductor **49**, applies the clock output to the single shot amplifiers **51** and **52** for controlling the decoding of the counter of FIG. 2*b*. Single shot **51** is activated with each clock pulse received over conductor **49**, causing thereby the counter to be advanced, one step per clock pulse. Single shot **52** on the other hand, along with AND gate **105** and emitter follower **102**, are included to inhibit the decoder, upon an input pulse over conductor **49**, from generating any output for a time sufficient to allow the counter to complete its switching to the next step in response to a clock input. In this manner this manner this generation of spurious or otherwise undesirable and untimely pulses is prevented while the counter is switching. The flip-flops **53** through **56** of the counter of FIG. 2*b* feed the emitter followers **58** whose outputs are fed to the AND gates **60** of the decoder of FIG. 2*b* which in turn enable the AND gates **14** of the program of FIG. 2*c* which by way of conductors **101**. The AND gates **14** as mentioned previously are primed by means of conductor **13** from the keyer of FIG. 2*a*. Both the flip-flop **20** of FIG. 2*a* and the counter of FIG. 2*b* are reset when there occurs an output at C from amplifier **104** and associated decoder AND gate **60**. The program of FIG. 2*c* in the preferred embodiment comprises a matrix of diodes arranged to allow conduction of electronic pulses to the control relays in accordance with the desired digits. This is accomplished by having each diode in the matrix shorted to a particular high tone conductor **62** or a low tone conductor **64** via a U-short or shorting strap in accordance with the required program for the particular phone number desired. FIG. 2*c* illustrates via dotted line connections **61** one arrangement of the diode-to-tone line shorting connections according to the program belonging to that particular phone number and corresponding keyer unit. Thus, for example, diode output **82**, **85** might be, as shown, shorted to a high tone line H_1. Each AND gate **14** of the program of FIG. 2*c* is as a result arranged to activate one of the high tone conductors **62** and one of the low tone conductors **64** in FIG. 2*d* through the emitter followers **65**. The voltages appearing on the conductors **62**

and 64 are applied to the current amplifier 66 which drive the reed relays 68 which are of well known construction. In this manner one of the high tone conductors 70 and one of the low tone conductors 72 is activated so that the tone generator stage 8, illustrated in FIG. 2*e*, will respond by generating one of four high tones and one of four low tones in the tone generators 73 and 74 respectively the outputs of which are fed by way of mixer amplifier 75 over conductor 15 to the line transformer 40 of FIG. 2*a* for transmission to the output line 11. At the bottom of FIG. 2*d* is a delay circuit whose purpose, by way of output E, is to prevent the occurrence of an output from the two tone generators for a time sufficient to allow the potential output level therefrom to build up to an acceptable standard.

FIG. 3 illustrates one embodiment of the program means wherein a common type program element, such as a shorting strap or shorting pin (U-short) may be applied between apertures in a plugboard to short the proper conductors so as to facilitate the generation of the high and low signals.

The plugboard may be arranged, as in FIG. 3 whereby the various digits may be identified by the vertical numerals and there is associated with each digit a horizontal row of twelve apertures such as 81–92 of diigt 1, wherein there may be effected by means of two shorting straps, the connection to two of eight possible tone positions. Points 82 and 85 represent a common position, in that both are connected to one of the diode outputs of the first digit AND gate 14 of FIG. 2*c*. Similarly, points 88 and 91 are commonly connected to the other first digit AND gate diode output. Points 81, 83, 84 and 86 represent the four high frequency tone positions (H_1, H_2, H_3, and H_4 respectively) and points 87, 89, 90 and 92 represent four low frequency tone positions (L_1, L_2, L_3, and L_4). By placing one shorting device between either 82 or 85 and one of the points 81, 83, 84 or 86, the generation of one high frequency tone will be enabled while the placement of one strap between either 88 or 91 and one of the points 87, 89, 90 or 92 will enable the generation of one low frequency tone. Illustrated in FIG. 2*c* and FIG. 3, via lines 61, are the connections between the first digit diode outputs (82, 85, and 88, 91) and the H_1 and L_1 (81 and 87 respectively) tone lines, thus giving an H_1L_1 tone combination for the first digit of the phone number arranged by the program as shown in FIG. 2*c*. Thus by the use of two shorting straps the well known two-tone dialing for each digit may be accomplished.

It is thus seen that the apparatus provides means for generating a sequence of address digits upon the activation of a single key. Inasmuch as there belongs to each number that one wishes to have available in the dialer a separate key and corresponding program, it is apparent that many such numbers can be made available simply by arranging the shorting straps on each of the program boards contained in the apparatus according to the digit tones required.

It should be understood that the arrangement can be expanded or condensed for handling more or fewer lines and for generating more or a smaller number of digits.

It should also be understood that variations of the arrangement may be made without departing from the spirit of the invention which is described in the following claims.

What we claim is:

1. A repertory dialer for automatically dialing a desired subscriber's number upon the activation of a single key comprising:

(a) a keyer unit having a key for each subscriber's number contained in the repertoire;

(b) a plurality of readily alterable program matrices having input and output leads, each program matrix being associated with an individual one of said keys, said program matrix including patchboard means for storing semipermanently the connections between said input and output lines as appropriate to the subscriber's number;

(c) a key-actuated source of clock pulses;

(d) an arrangement of gates common to all of said keys and responsive to said clock pulses for distributing sequentially output pulses to said program matrix input lines; and

(e) tone generator means coupled to said program matrix output lines for generating predetermined signals in response to corresponding pulses from said gates.

2. Apparatus according to claim 1 wherein said program matrices further include program gating means coupled to said arrangement of gates, said program gating means providing a separate gated output for each digit of a subscriber's number.

3. Apparatus according to claim 2 wherein said program matrix output lines include a set of high tone lines and a set of low tone lines.

4. Apparatus according to claim 3 wherein each of said separate gated outputs is divided, one division thereof being associated with said high tone lines and the other with said low tone lines.

5. Apparatus according to claim 4 wherein said patchboard means include removable shorting connectors which by their arrangement determine the program digits.

6. Apparatus according to claim 5 wherein said shorting connectors are positioned on said patchboard means in pairs, each pair representing one digit and by their respective positions, connect a particular gated output to a high tone line and a low tone line.

7. Apparatus according to claim 1 further including control and output means, responsive to said keys and coupled to said tone generating means and to said source of clock pulses for starting said clock and for disconnecting a previously connected communication line upon the activation of a key, whereby interference from the operator for example is avoided while the subscriber's multidigit number is being dialed.

8. Apparatus according to claim 1 wherein said arrangement of gates comprises a decoder, and wherein said apparatus further includes a counter coupled to said source of clock pulses and to said decoder.

9. Apparatus according to claim 8 further including a plurality of tone control relays, coupled between said program matrix output lines and said tone generator means, each of said relays being associated with a particular one of said program matrix output lines and responsive to output pulses from said program matrices.

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