United States Patent [19]

Seaton

[11] **3,889,290**

[45] **June 10, 1975**

[54] **PROCESS OF PREPARING AND DELIVERING PLURALITY OF AUDIBLE MESSAGES AND APPARATUSES THEREFOR**

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[73] Assignee: **George B. Cree, Jr.,** Pampa, Tex.

[22] Filed: **Aug. 27, 1973**

[21] Appl. No.: **392,056**

[52] **U.S. Cl.** ..... **360/12;** 179/100.1 C

[51] **Int. Cl.** **G11b 15/02;** G11b 15/06

[58] **Field of Search** ..... 360/12, 72, 74; 179/100.1 C, 100.1 PS

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Primary Examiner—Terrell W. Fears
Assistant Examiner—Stewart Levy
Attorney, Agent, or Firm—Ely Silverman

[57] **ABSTRACT**

Audio recording and playback systems provide for automatically starting and stopping playback of sequences of different taped audio messages of variable duration in sequential combination with periods of playing of background music during periods when such audible messages are not desired to be played. The systems include a unique monitoring unit with an input responsive to yet not interfering with the audio input to the system which provides output signals which, in cooperation with counter and logic units, control mechanical and other operations of the system.

5 Claims, 17 Drawing Figures

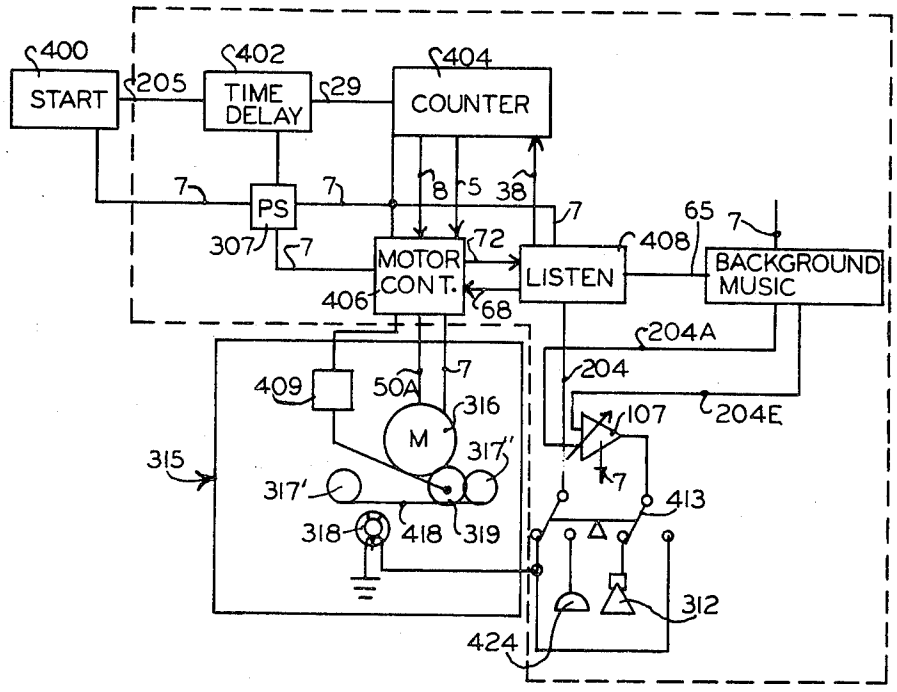
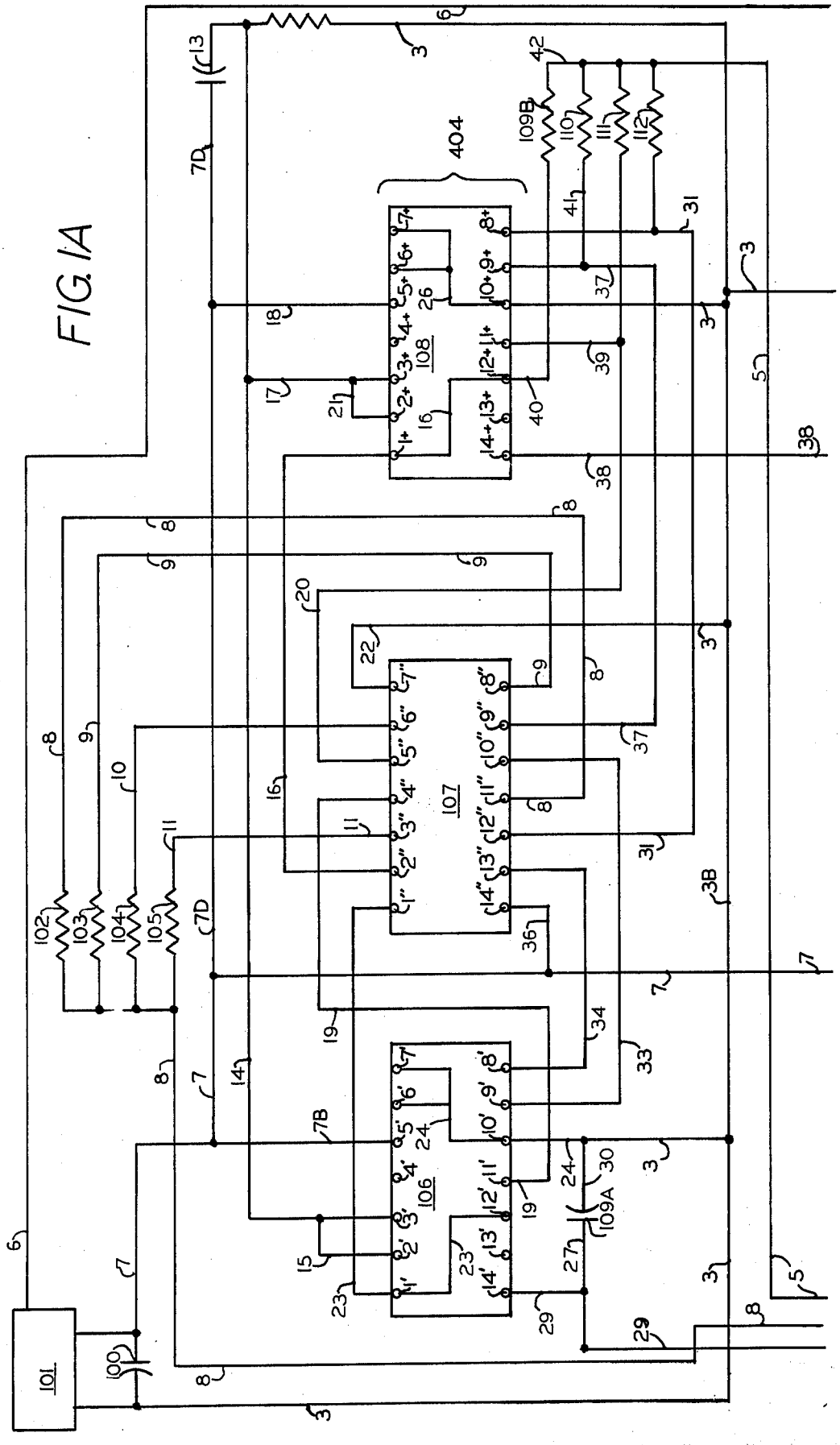


FIG. 1A



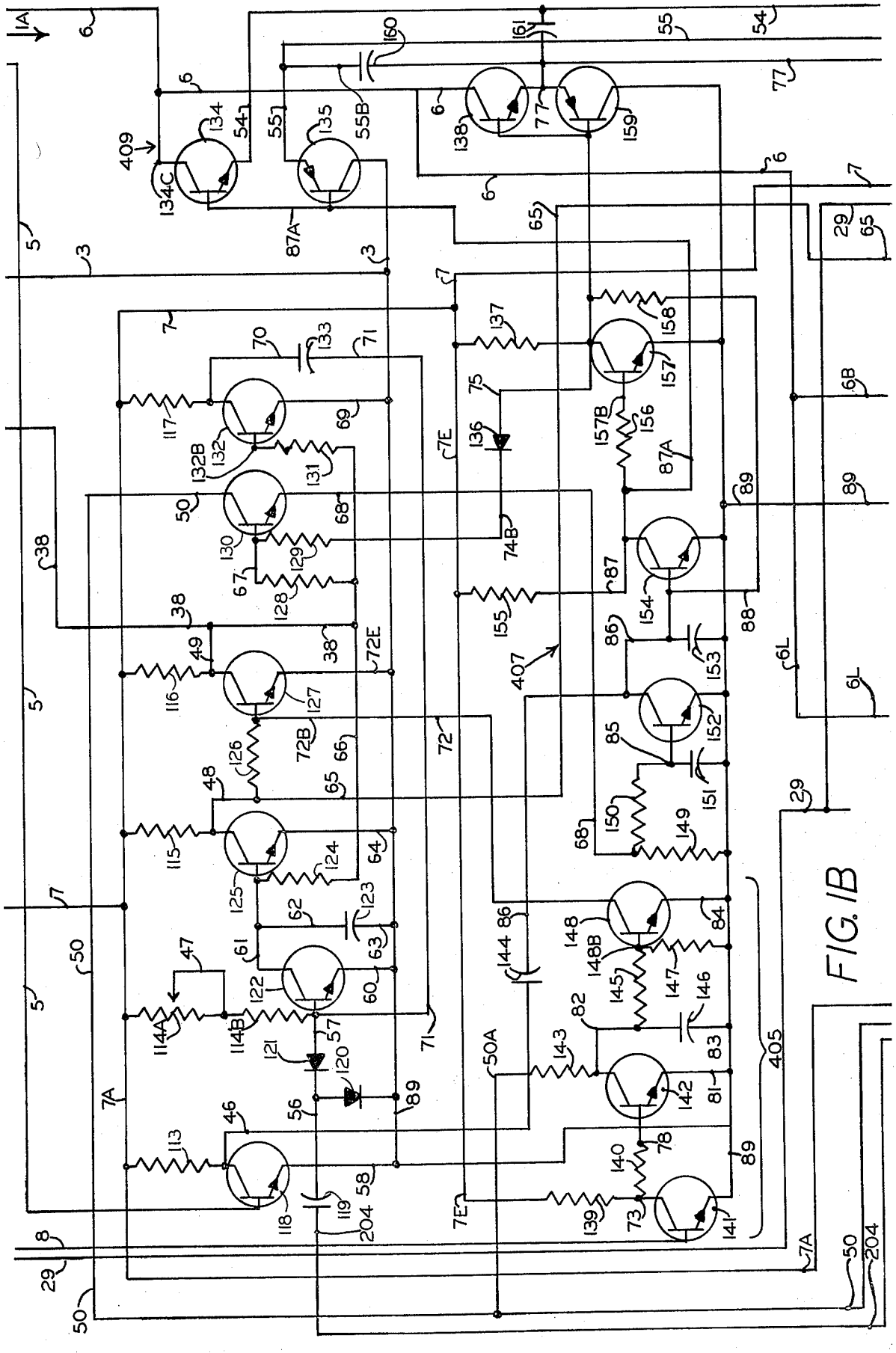
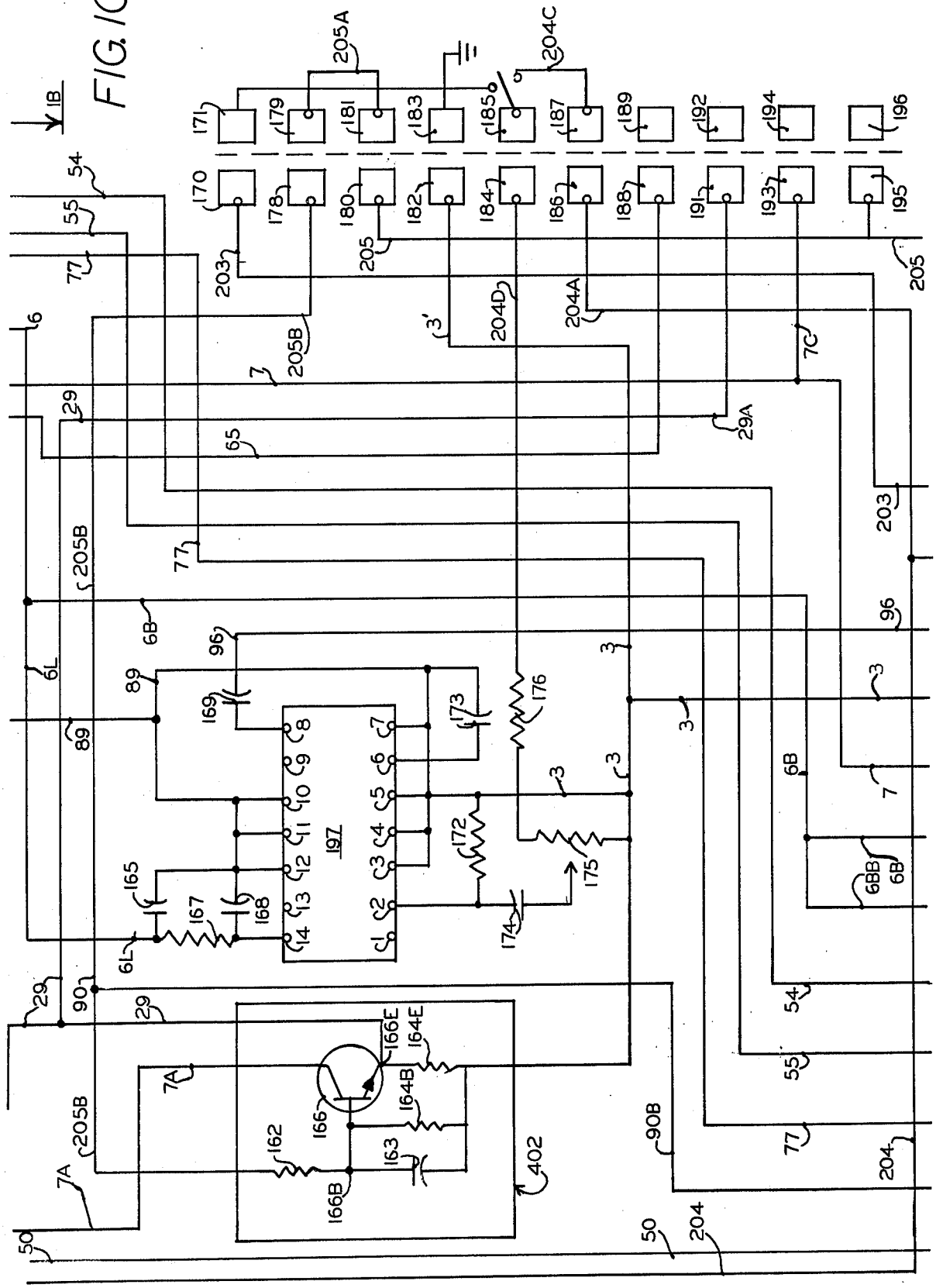


FIG. 1B

FIG. IC


1B
205A
204C
171
179
181
183
185
187
189
192
194
196
170
178
180
182
184
186
188
191
193
195
54
55
77
203
205
205B
204D
204A
3'
7C
6
7
29
29A
65
6B
6L
89
96
169
173
176
197
165
167
168
172
175
174
3
6BB
7
90
90B
7A
166E
164E
164B
166
162
163
166B
402
204
50

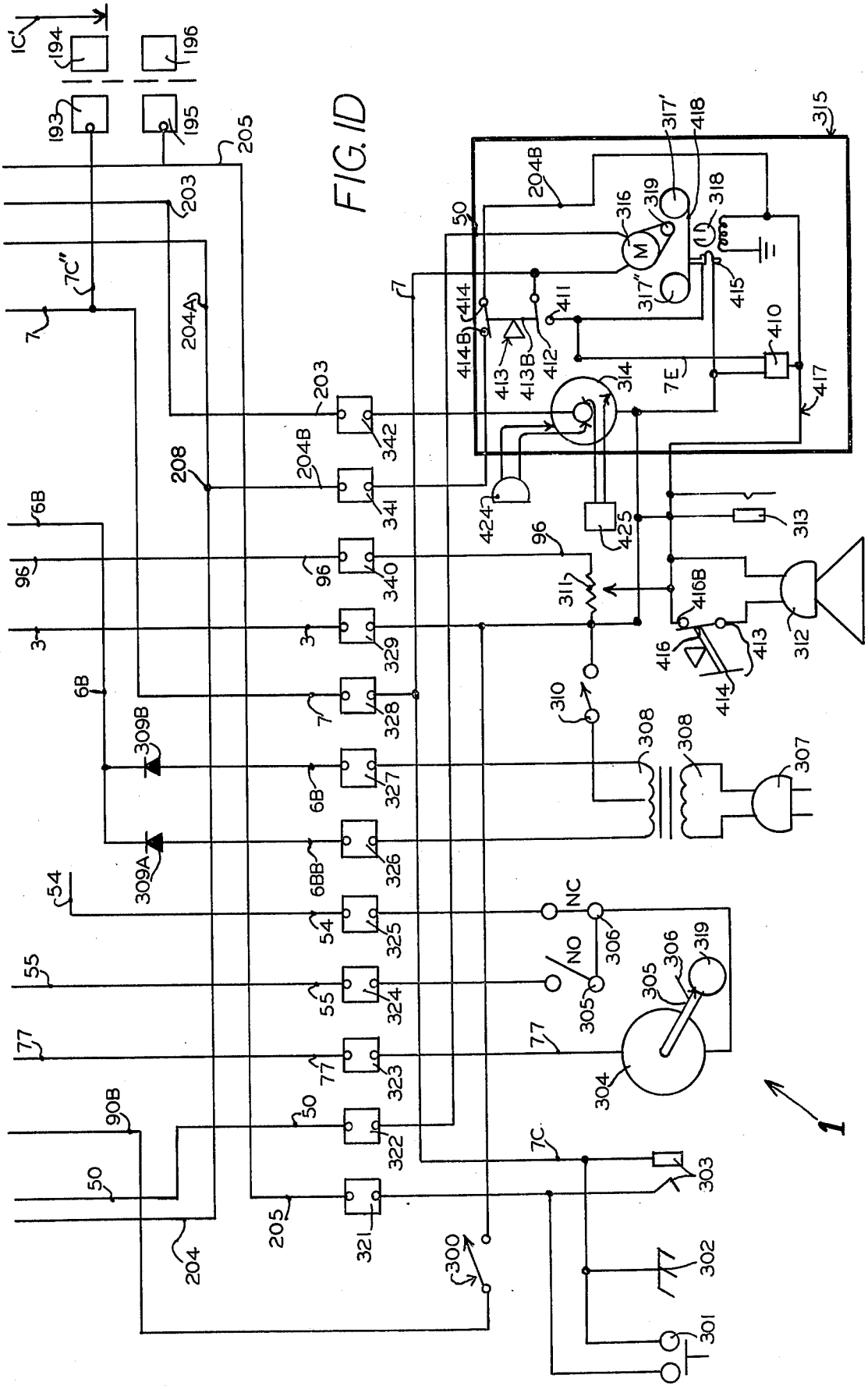

1C'
194
196
193
195
205
203
7C"
7
204A
208
204B
6B
96
3
6B
309B
309A
54
55
77
90B
50
204
205
321
322
323
324
325
326
327
328
329
340
341
342
300
7C
303
302
301
NC
NO
306
305
304
319
77
50
7
414
414B
413
413B
412
411
204B
316
M
317'
317"
418
315
318
415
410
417
7E
314
424
425
96
311
313
312
416B
416
413
414
310
308
307
1

FIG. 1D

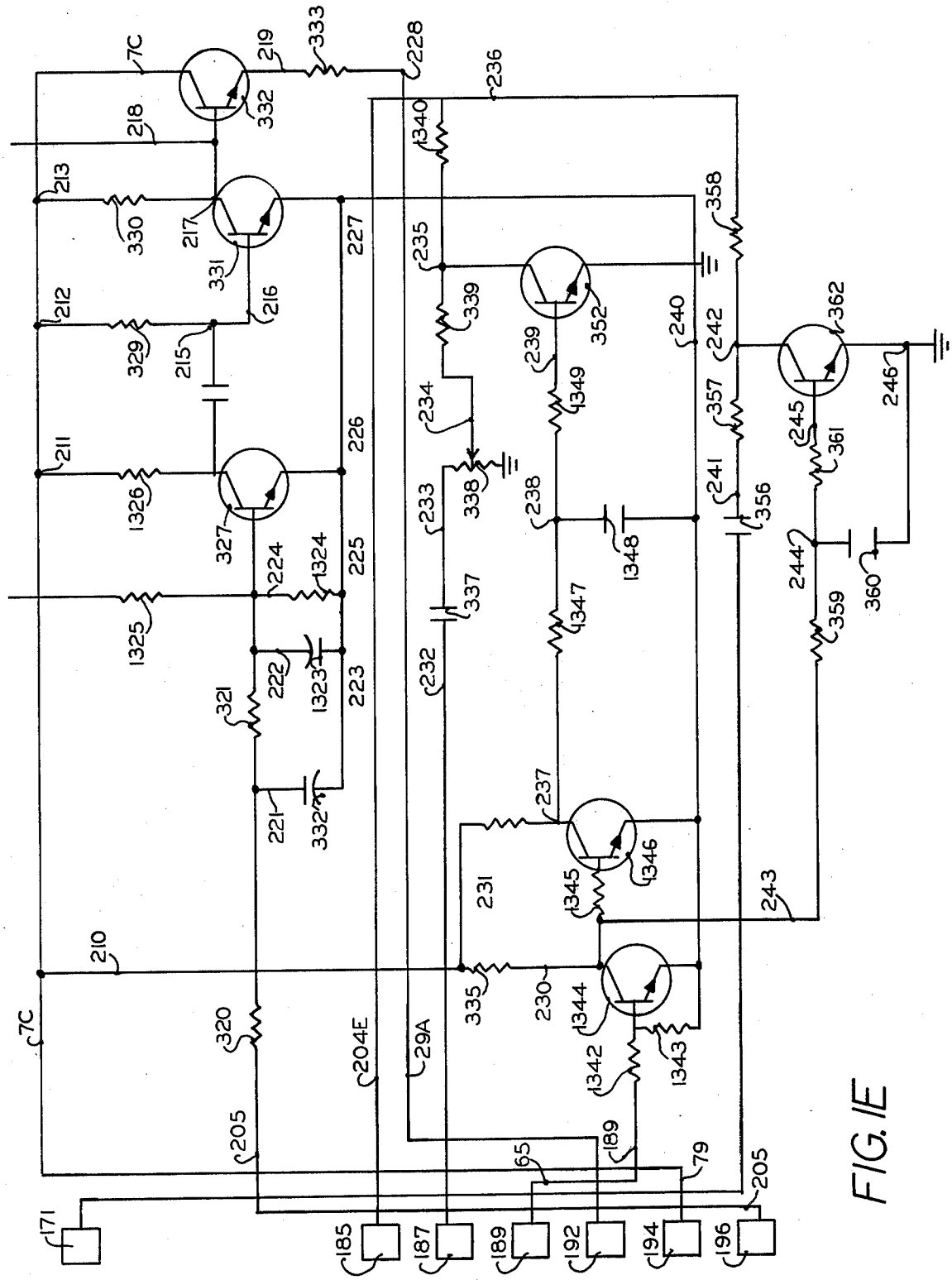

7C
219
333
228
236
218
332
340
213
358
330
217
227
235
331
339
212
216
352
240
242
362
329
215
239
234
349
357
246
211
226
245
361
1326
327
233
338
238
241
356
224
1324
225
1348
244
1325
337
1347
360
222
1323
223
359
321
232
237
221
332
1346
231
1345
243
210
335
230
1344
320
204E
29A
1342
1343
205
189
65
79
205
171
185
187
189
192
194
196

FIG. IE

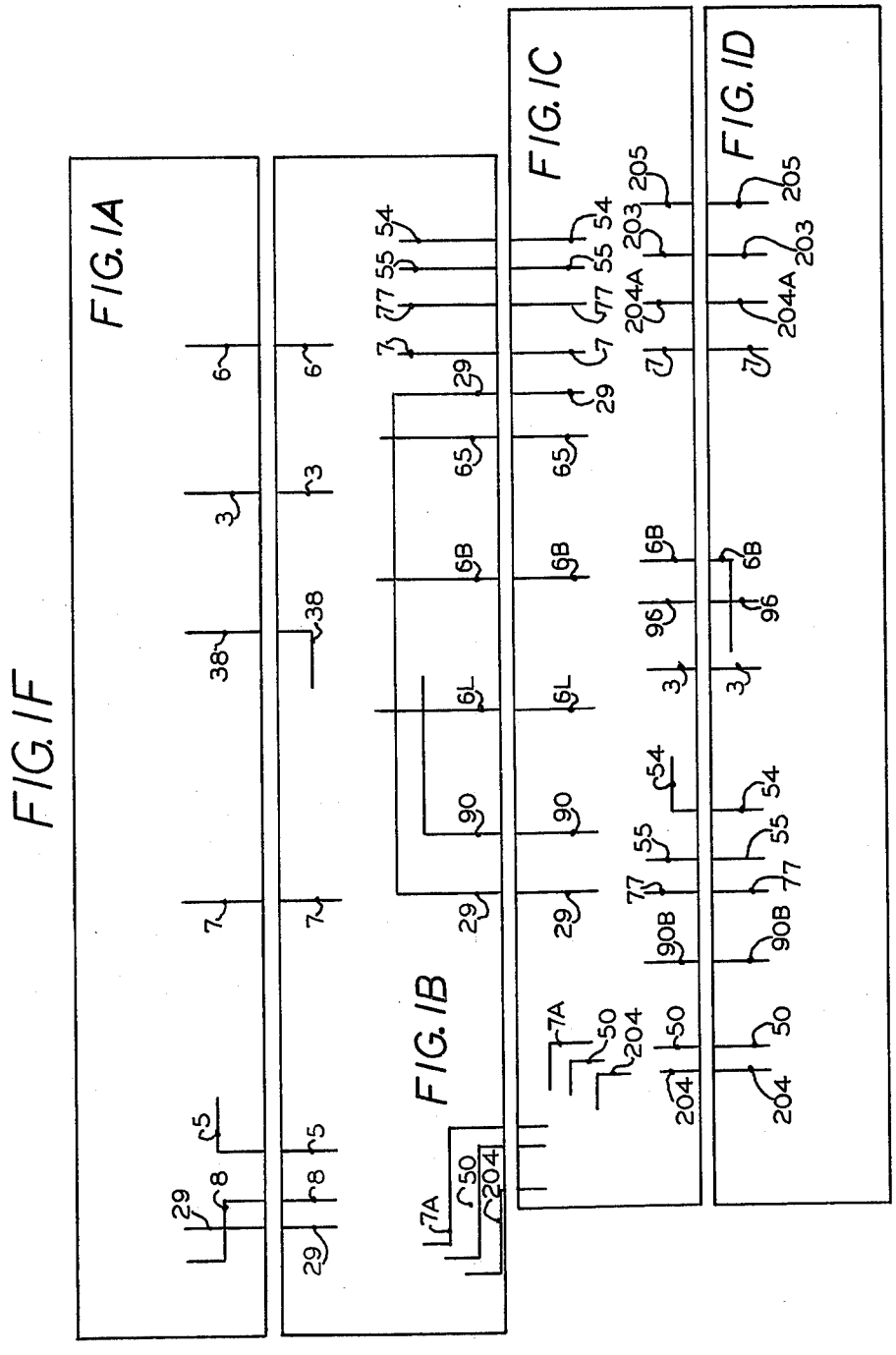


FIG. IA
FIG. IB
FIG. IC
FIG. ID
FIG. IF

FIG. 2

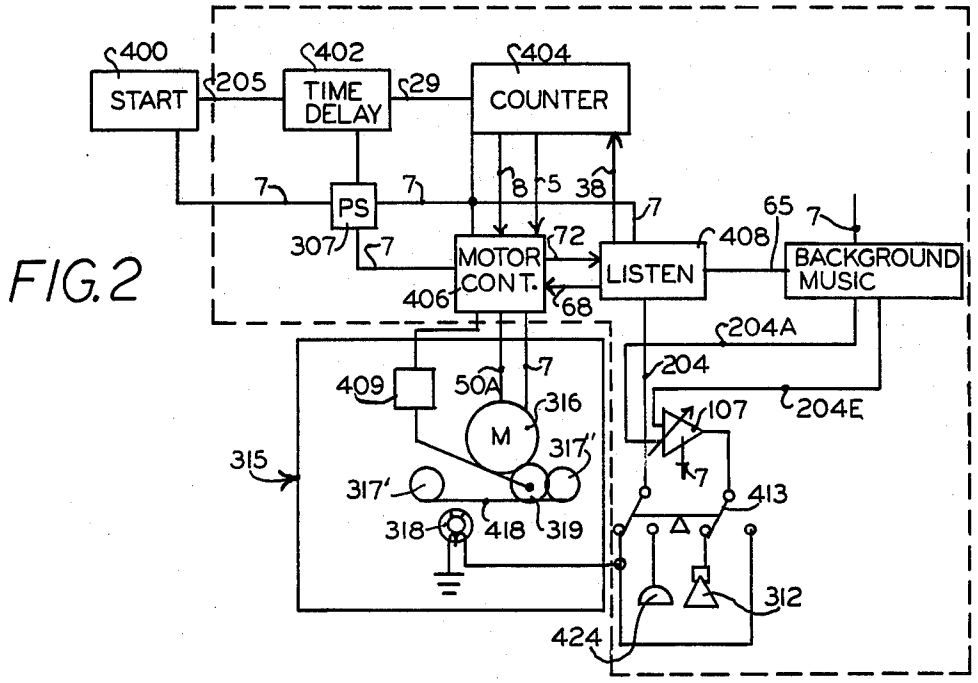


FIG. 9

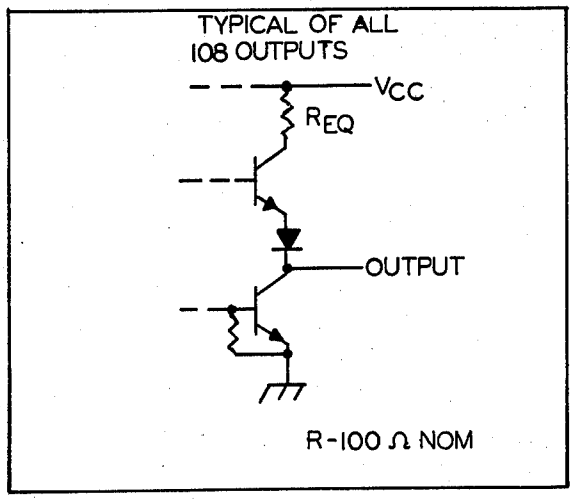


FIG. 10

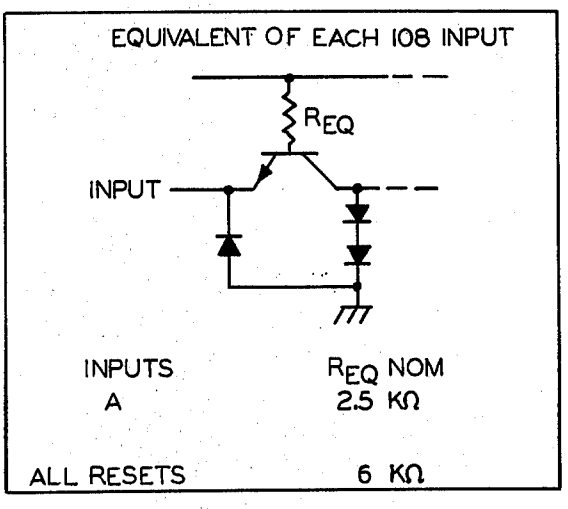


FIG. 3

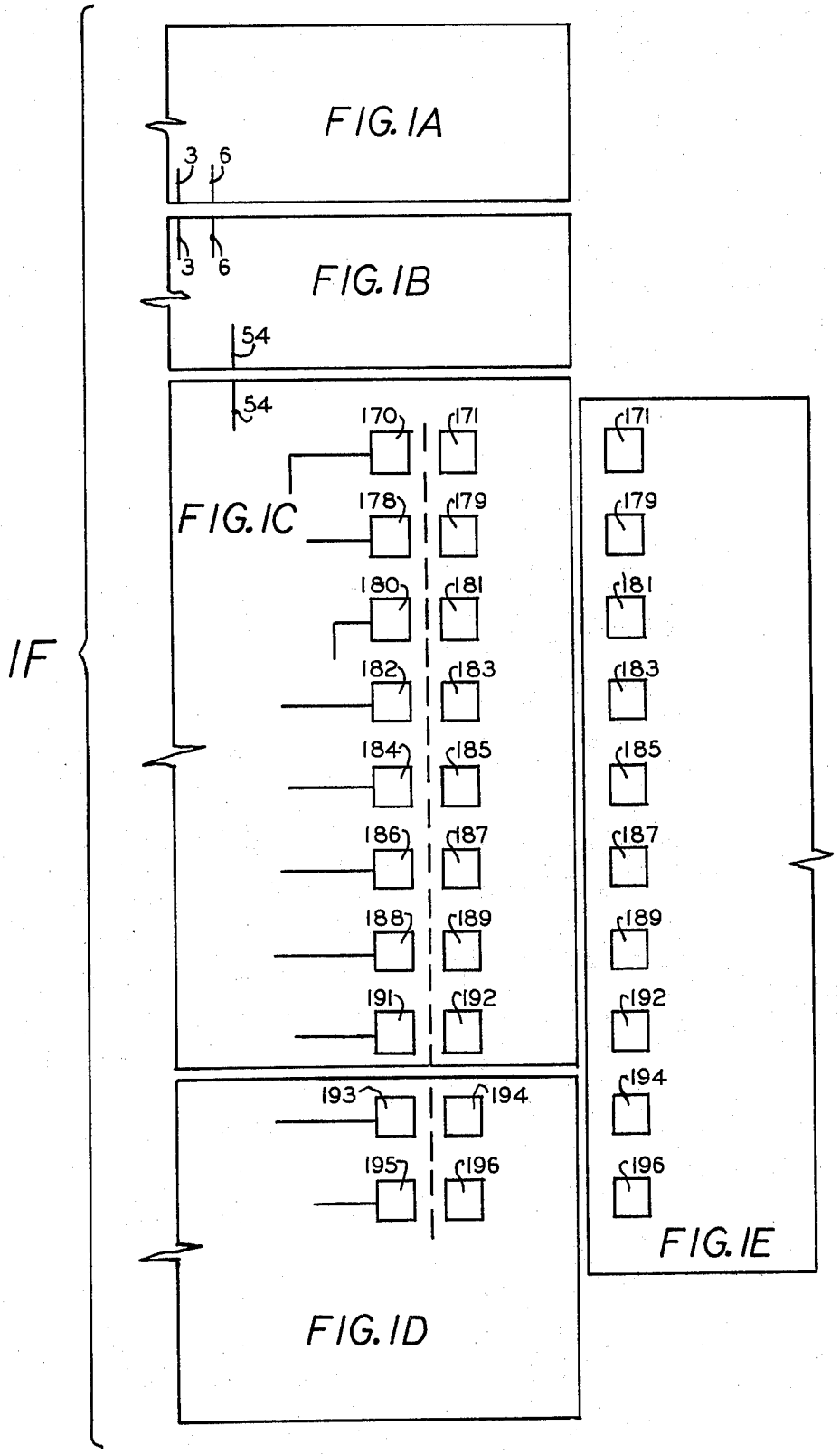


FIG. IA
3
6
FIG. IB
3
6
54
54
FIG. IC
170
171
178
179
180
181
182
183
184
185
186
187
188
189
191
192
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195
196
IF
171
179
181
183
185
187
189
192
194
196
FIG. IE
FIG. ID

FIG. 4

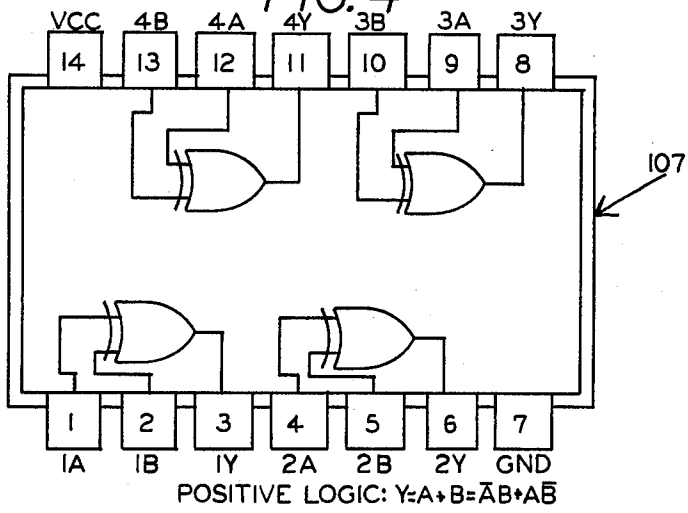


FIG. 5
EQUIVALENT OF EACH INPUT OF 107

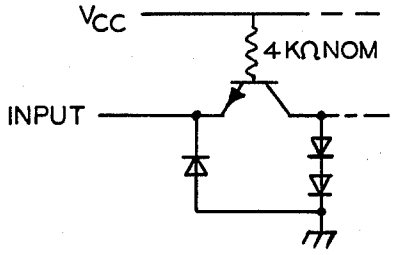


FIG. 6
TYPICAL OF ALL OUTPUTS OF 107

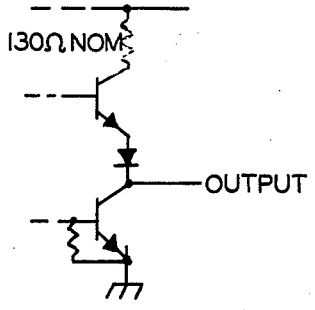


FIG. 7

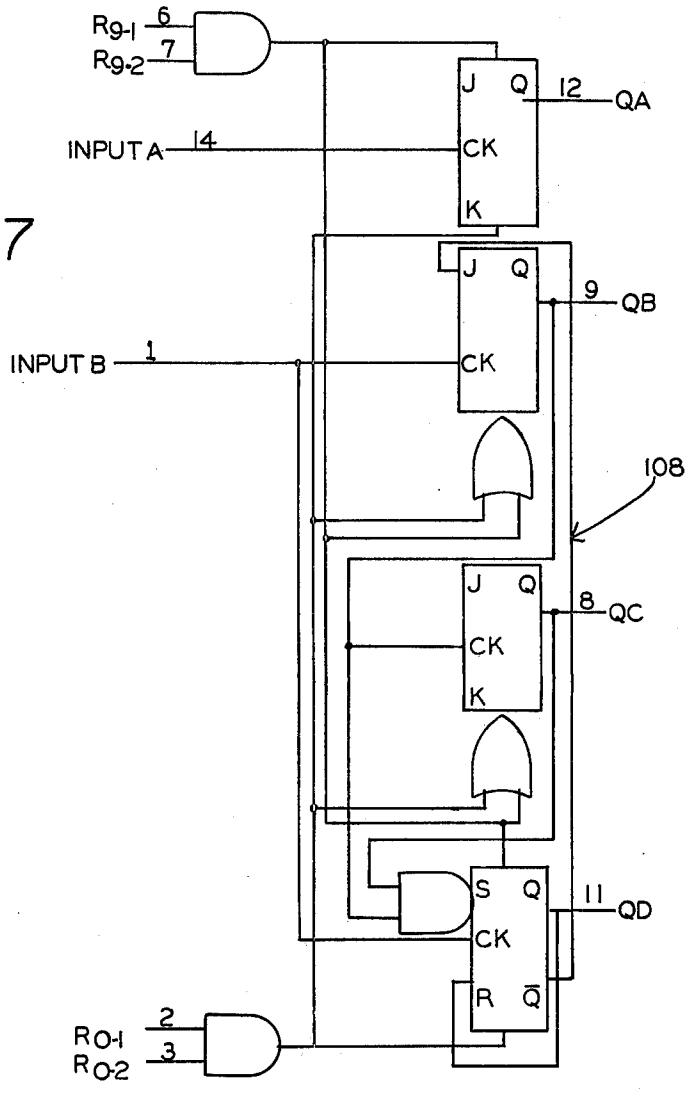
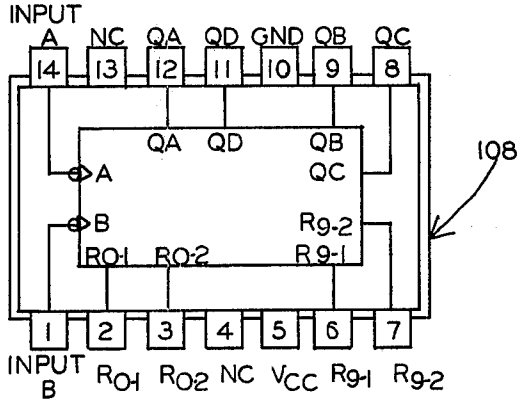

R9-1
6
R9-2
7
INPUT A
14
INPUT B
1
J
Q
CK
K
12
QA
9
QB
8
QC
11
QD
S
R
Q̄
108
R0-1
2
R0-2
3

FIG. 8


INPUT
A
NC
QA
QD
GND
QB
QC
14
13
12
11
10
9
8
QA
QD
QB
QC
A
B
R9-2
R9-1
R0-1
R0-2
108
1
2
3
4
5
6
7
INPUT
B
R0-1
R0-2
NC
VCC
R9-1
R9-2

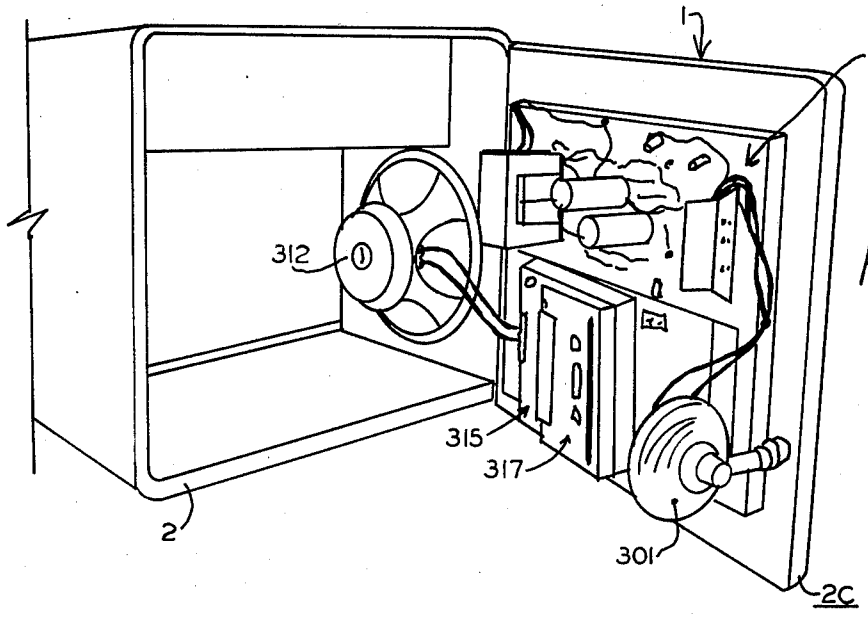


FIG.11

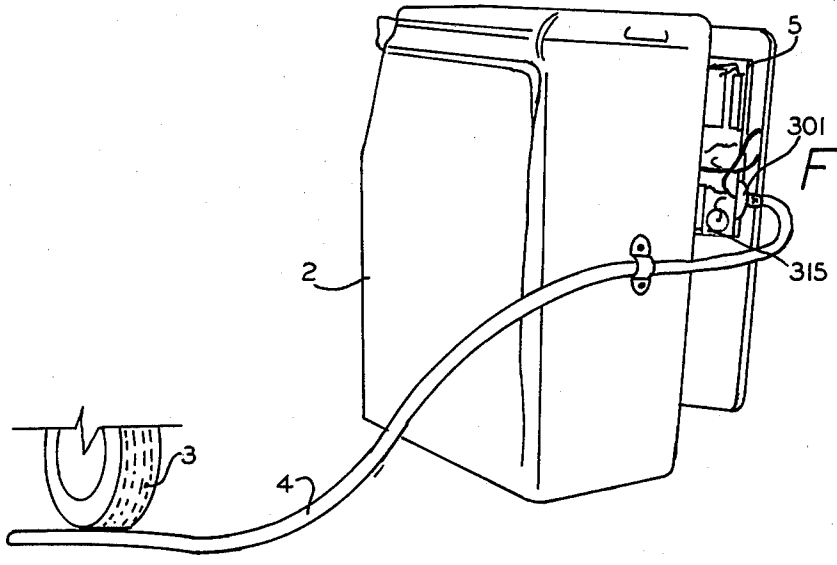


FIG.12

PROCESS OF PREPARING AND DELIVERING PLURALITY OF AUDIBLE MESSAGES AND APPARATUSES THEREFOR

BACKGROUND OF THE INVENTION

1. The Field of the Invention

The fields of the art to which this invention pertains are tape recording and switch controlled phonographs.

2. The Prior Art

The prior art has provided background music and, separately, audible messages at point of sale, e.g. U.S. Pat. Nos. 2,866,646; 3,244,541 and 3,309,776 but has no provision for readily and automatically changing the sequence of operation of recording and initiation of repeatedly playing sequences of audible messages of varied lengths in combination with automatic interspersion of periods of playing non-repetitive attractive background music.

SUMMARY OF THE INVENTION

A magnetic tape player and recorder in its play mode is used in combination with automatic starter mechanism, a counter, and a monitoring circuit controlled by the audio input signal. The sales message play periods are started on command and continue automatically until the messages are completed. After each audio output period, and a predetermined safety period, other steps automatically follow including rewind. The apparatus in its recording mode provides for making records of sales messages of various lengths with automatic cutoff shortly after cessation of the audio input onto the magnetic tape. The system includes components to play background music when sales messages are not being produced. The convenient and ready variation of time and content of message permitted by this system provides a flexible operation readily responsive to varied commercial needs because it is readily changed in short periods of times. The automatic control of the varied combination of playback is effected using standard magnetic tape cassettes. The automatic switching on of background music between presentation invites the attention of the listener prior to presentation of the various and varied audio sales messages.

This system accommodates the replay of sales messages of varying lengths even in view of varying volume of their audio output of such messages from a playback head on a tape deck. The apparatus includes a reliable switching circuit whereby to operate reliably notwithstanding the variations in volume and the presence of stray capacities due to the closely connected circuit elements where the elements are closely packed together and there are temperature variations due to temperature changes in the area in which the apparatus is used.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A, 1B, 1C and 1D form portions of one schematic diagram, the overall relations of which are shown in FIG. 1F;

FIG. 1E is a wiring diagram of components controlling background music;

FIG. 1F shows connecting wires between the components shown in FIG. 1A, 1B, 1C and 1D, which combination is shown in FIGS. 2 and 3;

FIG. 2 is an overall block diagram of the particular components and units of FIGS. 1A–1E arrayed as in FIG. 1F and including components of FIG. 1E;

FIG. 3 is a representation of the connecting components shown in FIGS. 1A, 1B, 1C and 1D (combined as in FIG. 1F) with the additional background music components of FIG. 1E operatively combined therewith;

FIG. 4 is a logic and terminal diagram of the integrated circuit **107**;

FIG. 5 shows the equivalent of each input thereof; FIG. 6 shows the equivalent of each output thereof;

FIG. 7 is a logic diagram of like units **108** and **106** while FIG. 8 is a terminal diagram thereof (**108** is shown);

FIGS. 9 and 10 are separate equivalent electronic diagrams of each of the output and inputs of unit **108** and **106**;

FIG. 11 is a perspective view of the interior of the overall assembly 1 while FIG. 12 is a view of the same apparatus 1 in the operative position of apparatus and partially closed position of the cover of the casing. DESCRIPTION OF THE PREFERRED EMBODIMENT

1. Overall Assembly

The apparatus **1** according to one embodiment of this invention comprises cooperative and synergistic combination of, as shown in FIGS. 1F and 2, an electronic unit start assembly **400**, a time delay assembly **402**, a counter control assembly **404**, a power source assembly **307**, a motor and servo control assembly **406**, a listening control unit **408**, an amplifier unit **197** (with speaker) and a tape recorder and playback unit **315**. The components of these electronic units and assemblies (**400, 402, 404, 307** and **406, 408, 197**) are firmly and rigidly attached to and supported on a rigid insulating base **5** together with unit **315**. Base **5** is firmly fixed to a pivotally movable cover (2C) of the casing **2**. A standard 2½ inch × 4 inches × ⅜ inch tape cassette **317** is removably located on tape spindles of the unit **315**. FIGS. **11** and **12** are drawn to scale to show the overall size of the apparatus and its 12 inch × 12 inch × 6 inch casing. The wheel, **3**, of a vehicle operating on a hose **4** connected to a pneumatic switch **301** of start unit **400** is shown in FIG. **12**.

The functions and sequences of operation effected by the apparatus **1** are described herebelow. The electrical characteristics of the separate components of the apparatus units of the apparatus **1** are listed in Table I; the components of these units referred to in the below textual description of operation are connected as shown in FIGS. 1A, 1B, 1C and 1D and 1E: Electrical conditions of operation of the transistor and integrated circuit components and other critical points are measured at the terminals of those components in the apparatus **1** and are quantitatively set out in Table IIA and Table IIB. Different steps and conditions of operation of apparatus **1** are set out in Table IIIA and IIIB. The operating mode of the transistors of apparatus **1** in those different steps and conditions of operation of the apparatus **1** are qualitatively set out in Table IIIC.

While the following description of operation refers principally to the playback mode of apparatus **1** in the array shown in FIG. 2, a description of operation on the recording mode is provided in the section entitled "Recording Mode" herebelow.

The listening circuit **408** includes transistors (Q3) **122**, (Q4) **125**, (Q5) **127** and (Q6) **130** and (Q7) **132**; resistors directly connected thereto with **114A, 114B, 124, 115, 126, 116, 128, 129, 131** and **117** and capacitors **119, 123** and **133** and diodes **120** and **121** and con-

nections therebetween operatively connected as shown in FIGS. 1B and 1F.

The motor and servo control assembly **406** comprises, in cooperative combination, a motor start control circuit **405** and a motor stop and servo control assembly **407** and a servo power assembly **409.** These circuits are operatively tied together and to the listening circuit components cooperatively and synergistically but are grouped as herein described for purpose of reference.

The motor start control circuit **405** includes transistors **141, 142** and **148,** capacitator **146** and resistors **139, 140, 143, 145, 147** and **126** directly connected thereto and the connections therebetween, as shown in FIGS. 1B, 1A and 1F, and also transistors **125** and **127** and resistors **116** and **115.**

The motor stop and servo control assembly **407** includes transistors (Q2) **118,** (Q13) **152,** (Q14) **154,** (Q15) **157,** (Q6) **130** and resistors **113, 155, 137, 149,** 150, 156, 158 and **129,** capacitators **144, 151** and **153,** diode **136,** motor **316** and the counter assembly **404** and the connections therebetween connected as shown in FIG. 1F.

The servo control circuit **409** is a part of the motor control assembly **406** and includes transistors **134** (Q8), **135** (Q9), **138** (Q16), **157** (Q15) and **154** (Q14) and **159** (Q17), diode **136,** resistor **129, 137** and **155,** 156 and **158** and servo motor **304** and play switch **306** and rewind switch **305** and the connections therebetween, as shown in FIGS. 1F and 1B.

Power Lines

In operation, the a.c. power from plug (P1) **307** passes through the transformer line **308** to the terminal **310.** The switch **310** is connected by ground line **3** (which is shown in FIG. 1C) to brnach line **3'** to the terminal **182** and thence to ground.

The output of the transformer output **308** is connected by lines **6BB** and **6B** through rectifiers **309A** and **309B** to the high voltage line **6B.** The line **6B,** at one branch, **6L,** passes high voltage through the integrated circuit **197,** which is an audio amplifier, while the main line **6** passes high voltage (about 9 volts) to the integrated circuit **101,** which is a 5 volt voltage regulator with an output regulated voltage line **7** and a ground line **3.**

The line **7** provides rectified D.C. power to the amplifier **197** and components of start unit **400,** of time delay unit **402,** of counter assembly **404,** of motor control assembly **406** and its subassemblies **405, 407, 409,** of motor **316,** of listening unit **408** and (as line **7C**) to background music assembly, as shown for line **7C** in FIG. **1E** and as lines **7** and **7A–7E** in FIG. **1F.**

Starting Assembly Operation

The unit starting assembly **400** is composed of a pneumatic switch **301** or an external switch **303** and a timer switch **300.** In the circuit shown in FIGS. **1A–1D** and **1F,** these provide, when actuated by a car wheel as shown in FIG. **12,** for closing a signal circuit and thereby passing a signal through the signal line **205** through the shorting plug **205A** between terminals **180** and **178** into the resistor **162** of the time delay unit **402.** In the array shown in FIG. **3,** wherein additional circuit components are provided, the time delay unit of **402** is bypassed or short circuited by line **29A** which connects to plugs **191** and **192** to line **205** via plug **196** and provides for an instantaneous provision of power through the plug **192** and thence to the output line **29** of tube **166** (Q1) to directly activate the counter circuit unit **106.**

Time Delay Unit

Time delay unit **402** is composed of an NPN transistor **166,** a base connected stabilizing resistor **164B,** base connected capacitator **163** and emitter connected resistor **164E** and biasing base connected resistor **162.** The input or activating signal from the start unit **400** enters the transistor through the base bias resistor **162** from point or terminal **321** via line **205** and terminals **180, 181,** shorting line **205A,** and terminals **179** and **178** and line **205B** from the switches **301** or **303** or **300** which transmit power from the regulated power supply line **7.** Voltage bleed-off occurs through the capacitator **163;** according to the preferred embodiment of this invention, there is a 5 second delay following signal application to resistor **162,** following which tube **166** conducts from the regulated voltage line **7** to its output line **29,** from the transistor **166,** and thereby to input **14'** of the counting unit integrated circuit unit **106.**

Tape Deck and Motorboard

The tape recorder deck **315** comprises a standard tape transport mechanism or motorboard; it supports a motor **316** which carries standard magnetic recording ⅛ inch wide tape **418** from reels **317'** and **317''** within a cassette **317** past a recorder-playback head **318** wound with wire coils which provide an electrical signal to a preamplifier stage. The deck thus comprises a standard motorboard with tape drive and magnetic playback head and a reversing mechanism **319** to reverse the direction of drive of motion of the reels **317'** and **317''** from forward play to rewind. The reversing mechanism is driven by the servo motor **304** as hereinbelow described.

A regulated power line **7** feeds into the motor **316** and a motor output line **50** passes out therefrom; the circuit for motor **316** is completed in transistors **130** and **142** in motor control unit **406.**

An audio output line or wire **204B** passes from the playback head **318** and carries the audio signal to a junction **208.**

The audio signal line **204A** passes from the junction **208** to plug **186,** shorting plugs **185** and **187** (as shown in FIG. **1F**) to the resistor **176** and the adjustable volume potentiometer **175** and thence into the amplifier integrated circuit unit **197.** The output of the amplifier circuit **197,** line **96,** passes to connector **340** and, in the playback array shown in FIG. **1F,** that output passes to one terminal of an adjustable potentiometer **311** and thence to speaker **312.** The other terminal of resistor **311** is connected to ground through connector **329.** The junction **208** is also operatively connected to the listening branch **204.** That branch is connected to the input capacitator **119** of the "listening" or sound signal sensing unit **408.**

Starting of Motor 316

The impulse from line **29** to the integrated circuit **7490,** item **106** on FIG. **1A,** provides a low voltage inhibiting control signal via line **8** to transistor **141** (Q10) which permits (Q11) transistor **142** to "fire" or "conduct." Accordingly, with passage of such signal through transistor **142,** the circuit to the motor **316** of

the tape deck **315** is completed through the return line **50** and resistor **143** although no signal yet passed through capacitator **119.** When **106** and **108** provide equal signals, then the output of **107** is a low voltage cut-off signal and transistor **142** (Q11) remains conductive; however, if **106** and **108** are not in balance, then a high signal comes out to transistor **141.**

Sound Control of Operation

The basic circuitry involved in the listening unit **408** is an NPN transistor **132** (Q7) with its collector tied through a resistor **117** (R22) to the regulated power source line 7A and a capacitator **133** (C7) connected to that collector. Another NPN transistor **122** (Q3) has its collector tied to a power source through resistors **124** and **116** whereby to effect a substantial amplification of signals passed to its base. Resistors **114A** and **114B**, one of which is adjustable, are connected to the base of the transistor **122** (Q3) and the base of that transistor **57** is tied to the negative side of a capacitator **133** attached to the collector of transistor **132** (Q7). A diode series **121** and **120,** at their intermediate point **56** (P of **120** and N of **121**) is connected to one plate of the capacitator **119.** The other plate of capacitator **119** is connected to and is actuated by the audio line from the audio circuit **204,** which line (**204**) is fed by the tape deck output line **204B** to the junction **208.**

The listening circuit, accordingly, comprises a capacitator lead **56,** which is connected between the output of one diode **121** and the input P of another diode **120,** with the positive end of the diode **121** connected to the base of a first NPN transistor **122** and through an adjustable resistor **114B** and **114A** to a regulated voltage line with the transistor base also connected to one end of capacitator **133,** the other end of which capacitator is tied to a collector of an NPN transistor **132** which collector end of the NPN transistor is connected through a resistor **117** through a regulated voltage in line 7A (same as line 7). The emitter of the transistor **122** (Q3) is tied to ground **3** while the collector of NPN transistor **122** is connected through two resistors **124** and **116** to a regulated positive voltage and to an input line **38** to the counter circuit **108.** The base of the transistor **132** (Q7) is connected by a resistor **131** to the same resistor **116** to which the base connected resistor **124** of the transistor **125** is connected.

The transistor **125** (Q4) has its collector connected to a resistor **115** and therethrough to the regulated voltage line 7A while the collector of that transistor **125** is also connected through another resistor **126** to the base of a transistor **127** (Q5). The collector of that transistor **127** is connected by resistor **116** to the 5V. regulated voltage and that transistor collector is also connected, by line **38,** to the input (14^+ terminal) of the counter circuit **108.**

A motor control transistor **130** (Q6) has its base connected to a resistor **128,** the other end of which resistor **128** is also connected to the resistor **116** and collector of the transistor **127.**

In operation, this relationship of the capacitator **133** to the transistor **132** maintains the line **71** at a negative voltage value, which actually falls to a value of minus 4 volts when audio signal is applied to **119.** The 30 micro farad capacitator **119** (C5) being fed by the audio input line **204** provides a continual although pulsating negative voltage at the line **56** so long as there is an audio input coming from along line **204** (from junction **208**) toward the ground line **89** (which is the portion of ground line **3** adjacent to **120**) to which the diode **120** is connected.

Accordingly, so long as audio signal is being transferred from the tape deck to the capacitator **119,** the base of the transistor **122** is maintained at a negative value and no conduction occurs through transistor **122.** When, however, at the end of each message, sound ceases to be produced from tape **418** on reels **317** and **317''** moved by motor **316** past the tape head **318,** the pumping action of the capacitator **119** and the diode network **120** and **121** ceases passing negative pulses to the base of transistor **122** and the capacitator **133** bleeds off through the resistors **114A** and **114B** until (after 20 seconds in the particular adjustment and embodiment shown), the voltage at the base of transistor **122** is sufficiently high (high relative to the voltage between line **3** and the regulated voltage through line 7A) so that the transistor **122** will conduct.

Each time there is such a cessation of sound and a concurrent cessation of electrical signal input at capacitator **119** with the transistor **122** in conducting mode, it changes the bias at the base of transistor **125** and causes a signal through resistor **126** which is reflected through resistor **116** to the line **38** and provides, through line **38,** to the input of the counter unit **108,** a signal which is an indication or count of the number of messages played by the tape **418.**

More particularly, when transistor **122** (Q3) conducts or fires bias control transistor **125** and motor control transistor **127** are put in their non-conducting cutoff mode; on cut-off of transistor **125,** the voltage drop of resistors **115** and **126** decreases and transistor **127** (Q5) fires; when transistor **127** fires (or conducts), it cuts off and sends an impulse through the line **38.** Such actuation of unit **108** also effects the motor control transistor **142** (Q11) as below described. This circuit, accordingly, translates the oscillatory output of the audio sound to a triggering impulse by use of the oscillatory capacity of the capacitance **C5** (**119**) to provide a triggering action and flip-flop operation, with circuits **106–108** resetting the apparatus for its next message play.

When transistor **122** fires, motor transistor **130** is cut off and also the counting of play via line **38** at the end of each audio message provides a signal to the counter at **108** and it sends a high voltage signal (if the counter is not at the end of its count) to transistor **141** (Q10) base which fires Q10 and cuts off motor transistor **142** until another impulse comes in at **29.** After the desired number of messages is played, a high voltage signal is sent to base of **118** and the servo is thereby actuated to provide for reversing tape wind direction.

The base voltage applied to transistor **141** (Q10) is raised (to 0.65 volt) by the circuits **106–108** when each signal indicating one message has been completed (i.e., sound is cut off) and passed from collector of transistor **127** (Q5) by line **38** to integrated circuit unit **108**: this count signal input provides an output signal along line **8** that makes transistor **141** (Q10) conductive. Thereby, connection of power to motor **316** through transistor **142** (Q11) is cut off (in combination with cut off of power through transistor **130** when audio signal was cut off). Thus, no power is passed to motor **316** and movement of the tape **418** stops on "firing" of transistor **122,** which occurs at end of each audio message.

Movement of tape **418** and another tape message audio signal series to **119** resume when the tape is not at end of its count or the tape is not at its end following the next actuation of start unit **400**, as by a tire, as **3**, actuating switch **301**, and delay circuit **402** to pass a signal by line **29** to integrated circuit unit **106** and thereby begin again the cycle of operation of audio controlled movement of tape **418** on deck **316** by the next audio message on tape **418**.

Transistor **148** (Q12) is saturated when transistor **141** (Q10) is actuated (made conductive) and transistor **142** (Q11) is then cut off and keeps Q5 (transistor **127**) from firing: although transistor **122** (Q3) be saturated, and so avoid counting of plays until after motor **30** is running. Transistor **148** (Q12) releases transistor **127** (Q5) after transistor **142** (Q11) is saturated by "firing" of transistor **141** (Q10) on signal thereto from unit **107**.

Changes and Steps at End of Tape and Following End of Count

The servo **304** is an electromagnetic switch that moves a normally open play switch **305** to close and open a normally closed rewind switch **306** and moves gears **319** on the tape deck to provide for change from play or rewind mode of operation to the other. The servo is actuated by end of tape or end of count action effected by the circuitry of FIG. **1F**.

The counter circuit output line **5** issues from the integrated circuit **108**, on completion of the final message for which the circuit **108** is set, feeds a signal voltage to the base of transistor **118** (Q2) which, with 5 volt collector-emitter voltage applied thereto, renders conductive (or trips) that transistor and, via capacitator **144**, similarly, trips and fires cut-off transistors **152** (Q13) and **157** (Q15) and this actuates the servo but cuts off voltage theretofore sent to base of transistor **130** (Q6): this end of tape action also disconnects power to the motor **316** on the tape deck **315**.

In a similar mode of using transistors **152** (Q13), **154** (Q14) and **157** (Q15) when the tape **419** on one reel is at its end, the motor **316** pulls or draws more current. This increase in current causes an increase in the voltage drop across resistor **149** and the resultant potential change at base of transistor **152** (Q13) causes a change of mode of transistors **154** (Q14) and **157** (Q15), **152** and **157** to saturation from cut-off and **154** to cut-off from saturation as for the end; thus, the end of tape provides a condition where the voltage drop across and resistance **149** increases and, as at end of count operation, provides a triggering action that flips the servo motor sufficiently for it to move from one position of tape movement to the other. When the tape reaches the end of its travel in the other direction, the same condition of current through the resistor **149** will cause the tape to again cause an increase in current through the resistor **149** and move the servo to its play position or mode from rewind position or mode following servo mode change and resulting impulse to counter circuit. A signal to transistor **141** (Q10) base, by line **8**, from the counter circuit connects power to transistor **141** (Q11) and drives motor **316** and rewinds the tape **418** until end of tape action —increased current and increased voltage drop— at resistor **149** causes servo (via Q12, **13**, **14** and **15**) to again change its mode (to play mode from rewind mode): the second end of tape signal to the counter causes a shut-off signal to be sent to Q10 (**141**) and all components of apparatus **1** come to their rest mode.

Subsequent actuation of the start assembly **400**, as by pressure on pressure sensitive line **4** and closing switch **301** by a tire as **3** of a vehicle in a service station entry or by the weight of the foot of a customer or other means of sensing such a person near to a self-service counter or like point of potential sale to a customer for goods or services of the proprietor of the establishment at the location of such point of sensing the presence of the customer, actuates another cycle of operation of the components shown in FIGS. **1–12** as hereinabove described.

Record Mode

As in the wiring diagram shown, deck **315** supports a triple pole switch **413**. The switch **413** comprises points **416B**, **414B** and **411**, switch arms **412**, **414** and **416** and control arm **413B**. As shown in FIG. **1D**, arm **416** connects speaker **312** at point **416B** to potentiometer **311** and the switch arm **414** connects the head **318** to the line **204B** through one switch point **414B** and arm **416B** so that when music is played, the audio signal from head **318** derived from tape **418** goes from **204B** to junction **208** and to the amplifier **197** and speaker **312**, as above described. When the double pole switch **413** is put in the position to close switch **412** (on point **411**) and open the junctions between contacts **414B** and **414** and arm **416** and point **416B**, the apparatus **1** with microphone **424** connected to jack **314**, serves as an audio input controlled recorder.

When the switch **413** is moved by its handle **413B** to close the contact from line **7** to point **411**, it closes a circuit through the erase head **415**; the power from line **7** also goes through switch arm **412** to feed into the standard a.c. bias unit **410** to provide such signal to the head **318** and place power from the amplifier output line **96** into the recording head **318** with a.c. bias.

The sound signal under these circumstances, is provided by a microphone **424**. The signal is then put into the external audio plug **314**, passes by line **203** to the connector **171**, which is, in turn, connected to the plug **185** and also thereby to plug **187**. Thereby, one portion of the input audio signal passes to the line **204A**, at junction **208**, and the listening circuit **408**, and another to the amplifier **197** through plugs **185** and **184** and resistor **176** and line **96** and, via the potentiometer **311** and the recording line **417**, through the a.c. bias apparatus **410** to the recording head **318** and thence on to the adjacent tape **419**.

The listening assembly **408** and the counter assembly **404**, as well as the motor control **406**, operate in the same manner as hereinabove described to provide power to motor **316** while sound is on in the recording circuit; the input **424** and assembly **408** operate similarly to stop movement of the tape at end of each message. The operator starts the tape moving by closing a switch as **303** and, after one message and automatic cut-off of tape movement thereafter, adds as many messages of differing lengths as desired (after closing a switch as **301** to initiate movement of the tape) to the tape **419**.

Background Music Interposition

The components arranged in circuit of FIG. **1E** used in combination with the apparatus of FIGS. **1A–1B**, **1C** and **1D**, as shown in FIG. **3**, including the taped mes-

sage tape **419** and deck **315** provide for automatic interposition of background music when the taped message audio signal ceases. Line **65**, which is attached to the collector of transistor **125** and at the low voltage end (**48**) of resistor **115** (in FIG. 1B) in the listening circuit **408**, controls the operation and output of the background music assembly.

With arms **414** and **416** of switch **413** in their closed position, as in FIG. 1D, an external speaker is plugged into the external audio plug **314** as shown for external sound source tape deck **425**. This background music sound signal passes by the line **203** to plug or connectors **170** and **171**: background music is thereby passed into the audio system through plug **171** and out through plug or connector **185** and therefrom into the amplifier **197** and the speaker **312** continuously unless or until a message audio signal from tape **418** is passed into the circuit of FIG. 1B from the tape deck **315** which activates the listening circuit and thereby changes the mode of transistor **125**, as above described. Such activation of the transistor **125** creates a signal in line **65** which passes to plug **189** and through the transistors **1344, 1346** and **352**. The passage of such current, accordingly, provides that, when the listening assembly **408** is activated by an audio signal through capacitator **119** and the line **65** is activated, that the circuit of FIG. 1E operates to activate point **187** so that the message sound output from the tape **418** deck **315** is passed into plug **185** and resistor **176** (as well as activating point **204** and the listening circuit **408**). When the line **65** is not pulsed, then the audio input from the external source **425** will be connected to the plug or terminal **185** and thence to the amplifier **197** and speaker **312**.

The signal through line **65** operates the transistors **1344, 1346** or **352** to either cut-off the usual audio signal coming from the tape deck or to cut off the background music signal. When a low voltage signal current passes through line **65** and to circuit of FIG. 1E, it provides a low, cut off, voltage to its transistors **1344** and **352**, hence does not interfere with passage of signal along line **232** from line **204A** to terminal **186** and **187** to line **204D** by terminals **185** and **184** (See FIGS. 1E and 3). However, the low voltage signal to transistor **1344** leaves it (**1344**) in cut-off mode and causes transistor **362** to conduct and thereby shorts out or cuts out the signal from the background music line (at the junction point **242** between resistors **357** and **358**).

Accordingly, the apparatus of FIG. **3** provides that there is a continuous emission of sound from the loud speaker **312**, either by the background music system or by the tape recorder system that is provided in FIG. **1F**. Further, the system of FIG. **3** permits that the audio input **424** be used to produce automatic interspersion of periods of background music between recorded sales messages when (with audio input **424**) switch **413** is connected as described above for the record mode.

Common components of tape recorders and terminology hereinabove referred to and as known to those skilled in the art are set out in *Encyclopedia Brittanica*, Volume 21, 1969 Edition, Library of Congress Card No. 69-10039, pages 682–284, and *Tape Recorders*, Second Edition, Seventh Printing, by Charles G. Westcott and Richard F. Dubbe, Copyright 1964, published by Howard W. Sams & Co., Inc., Library of Congress Card No. 64-24251.

Descriptive data on components above-described and shown in FIGS. **1–12** are provided in TABLES I–VI appended hereto as Insert A and attached hereto.

TABLE I

ELECTRICAL CHARACTERISTICS OF THE SEPARATE COMPONENTS OF APPARATUS 1

No.	Condenser	[FIG]	Resistor	[FIG]	Transistor	[FIG]	Rectifier	[FIG]	Other	[FIG]
100	C1 33μf	A								
101	1C Lμ309K	A								
102			R1 10.K	A						
103			R2 10.K	A						
104			R3 10.K	A						
105			R4 10K							
106	1CA SN7490	A								
107	1CC SN7486	A								
108	1CB SN7490	A								
109A	C4 0.1μf	A								
109B			R9 10.K	A						
110			R10 10.K	A						
111			R11 10.K	A						
112			R12 10.K	A						
113			R13 1.0K	A						
114A			R19 1 Megohm	B						
114B			R15 20K	B						
115			R16 330 ohms	B						
116			R19 330 ohms	B						
117			R22 1.0Kohms	B						
118					Q2 2N5172	B				
119	C5 30μf6V	B					CR2 IN914	B		
120							CR1 IN914	B		
121					Q3 SN5172	B				
122										
123	C6 1.0μf6v	B								
124			R17 10.0K	B						
125					Q4 2N5172	B				
126			R18 22K	B						
127					Q5 2N5172	B				
128			R20 820 ohms	B						
129			R21 220 ohms	B						
130					Q6 2N3415	B				
131			R23 22.0K	B						
132					Q7 2N5172	B				
133	C7 47μf tant	B								
134					Q8 2N3415	B				
135					Q9 2N5355	B				
136							CR3 IN914	B		
137			R33 100.0ohms	B						
138					Q16 2N3415					

TABLE I—Continued

ELECTRICAL CHARACTERISTICS OF THE SEPARATE COMPONENTS OF APPARATUS 1

No.	Condenser	[FIG]	Resistor	[FIG]	Transistor	[FIG]	Rectifier	[FIG]	Other	[FIG]
139			R24 1.0K	B						
140			R25 22K	B						
141					Q10 2N5172	B				
142					Q11 2N5172	B				
143			R26 22K	B						
144	C8 1μf6v	B								
145			R27 22K	B						
146	C9 100μf6v	B								
147			R28 33K	B						
148					Q12 2N5172	B				
149			R29 2.2ohms	B						
150			R30 22K	B						
151	C10 100μf6v	B								
152					Q13 2N3415	B				
153	C11 1μf	B								
154					Q14 2N3415	B				
155			R31 100 ohms	B						
156			R32 20 ohms	B						
157					Q15 2N3415	B				
158			R39 5.1Kohms	B						
159					Q17 2N5355	B				
160	C12 01.μf	B								
161	C13 0.1μf	B								
162			R6 22 ohms	C						
163	C3 100μf	C								
164B			R7 56K	C						
164E			R 270 ohms	C						
165	C14 2200μf	C								
166					Q1 2N3415	C				
167			R34 10 ohms	C						
168	C15 2200μf	C								
169	C16 100μf	C								
170									Plug	C
171									Plug	C
172			R35 100K	C						
173	C18 33μf	C								
174	C17 10μf	C								
175			R37 10K	C						
176			R36 56K	C						
177	N/R									
178									Plug	C
179									Plug	C
180–199									Plug	C
200–299	N/R									
300									Timer	D
301									Pneumatic Switch	D
302									Chassis	D
303									External Trigger Jack	D
304									Servo Motor 11 ohm	D
305									N.O. Switch SW3	D
306									N.C. Switch SW2	D
307									Plug 110 volts a.c.	D
308									Transformer Input	D
309									Transformer output	D
310									Switch, N.O.	D
311			R38 10 ohms (pot)	D						
312									Speaker 3.2-8 ohms	D
313									External Jack	D
314									External Audio IVRMS	D
315									TPQ200 Tape Deck	D
316	N/R									
317	N/R									
318	N/R									
319	N/R									
320–329									Plug Connectors	D
1320	N/R									
1321	N/R									
1322	N/R									
1323	C 10μf	E								
1324			R 5.1K	E						
1325			R18 10K	E						
1326			R19 1K	E						
1327					Q 2N5172	E				
1328	N/R									
1329			R20 33K	E						
1330			R21 1K	E						
1331					Q 2N5172	E				
1332					Q 2N5172	E				
1333			R22 100 ohms	E						
1334	C 220μf	E								
1335			R3 1K	E						
1336									Short plug from 184–186	C
1337	C3 100μf									
1338			R8 10K Pot	E						
1339			R9 5.1K	E						
1340–1349									Plug Connectors	D
1340			R10 5.1K	E						
1341	N/R									
1342			R1 3.3K	E						
1343			R2 1K	E						

TABLE I—Continued

ELECTRICAL CHARACTERISTICS OF THE SEPARATE COMPONENTS OF APPARATUS 1

No.	Condenser	[FIG]	Resistor	[FIG]	Transistor	[FIG]	Rectifier	[FIG]	Other	[FIG]
1344					Q 2N5172	E				
1345			R4 22K	E						
1346					Q 2N5172	E				
1347			R11 5.1K	E						
1348	C 33μf	E								
1349			R12 5.1K	E						
350	N/R									
351	N/R									
352					Q 2N5172	E				
353	N/R									
354	N/R									
355	N/R									
356	C1 100μf	E								
357			R13 5.1K	E						
358			R14 5.1K	E						
359			R6 5.1K	E						
360	C 33μf	E								
361			R7 5.1K	E						
362					Q 2N5172	E				

TABLE IIA

NO.	VOLTAGE TESTS DURING OPERATION LOCATION	OPERATIONAL DATA
1.	7 (13+)	Initial Preset Charge=5V.
2.	166B	Start I.C. 106 at 1.2; Activated at A5.0 or initial charge, R=0
3.	166E	R=.45 A=4.3
4.	118C	A=.16
5.	5 (118B)	Unit Reset at Rest .1 Shut off signal from ICC .6SV
6.	58 (118E)	A0; Servo on .02
7.	47	Set for 20 Sec. Discharge Time
8.	61 (122C)	A=.7 R=.04
9.	57 (122B)	Momentary On = −4V R=.52
10.	48 (125C)	A=.38 R=4.9
11.	61 (125B)	A=.7 R=.04
12.	64 (125E)	A=0 R=0
13.	49 (127C)	A=3.8 R=.42
14.	72B (127B)	Momentary On =0 R=.68 A=.38
15.	72E (127E)	A=0 R=0
16.	50 (130C)	A=.46 R=5
17.	67 (130B)	A=1.1 R=.4
18.	68 (130E)	R=0 Momentary On .6 (A=.34 Varies with Motor)
19.	70 (132C)	A=.05 R=5
20.	132B	A=.67 R=.4
21.	69 (132E)	A=0 R=0
22.	51 (134B, 135B)	R=4.4 Servo Rewind=.1 Play=4.4
23.	6 (134C)	R=9.4
24.	54 (134E)	Servo Direction, Rewind=.3 R=9.4 Play=3.7
25.	55 (135E)	Servo Direction, Rewind=.8 Play=3.8
26.	135E	R=0 Servo Action=.01
27.	(141C) 73	A=.16
28.	8 (141B)	Unit Reset at Rest .1 Signal from 108=.65
29.	80 (141E)	A=0 Servo On=.02
30.	82 (142C)	R=.02 Momentary on (Motor Surge)=.95 A=.32
31.	78 (142B)	A=.16 R=.59
32.	72 (148C)	Momentary On=0 A=.38 R=.68
33.	148B	Momentary On=.5 A=.2 R=.001
34.	86 (152C) (154B)	A=.04 R=.04
35.	85 (152B)	A=.34 R=0 Servo Rewind=.6
36.	87 (154C)	A=4.4 R=4.4 Servo Rewind=.02
37.	88 (154B)	Servo Rewind=.7 Play=.04
38.	75 (157C) (138B, 159B)	Servo On=4.8 R=.02
39.	157B	A=.1 R=.73
40.	3 (157E)	A=0 R=0
41.	74B	Servo On=4 A=1.1 R=.4

TABLE IIA-Continued

NO.	VOLTAGE TESTS DURING OPERATION LOCATION	OPERATIONAL DATA
42.	53 (159E, 138E)	R=.42 Servo Rewind=4.0 Servo Play=.75

LEGEND:
C = at collector (e.g. 118C = collector of 118)
B = at base (e.g. 118B = Base of 118)

TABLE IIB

TERMINAL CONDITIONS OF OPERATION OF INTEGRATED CIRCUIT UNITS 106, 107 and 108

Terminal	Integrated Circuit Units 106 1′– 14′	108 1″ – 14″	107 1⁺ – 14⁺
1	.12	R.12	R.12
2	.24	R.24	R.14
3	nc	R.24	R.8
4	.1	R.0	R.1
5	5.0	5.0	R.1
6	.0	.0	R.8
7	.0	.0	R.0
8	A3.9, R.1	R.1	R.8
9	A3.8, R.1	R.1	R.12
10	.0	.0	R.12
11	R.1	R.1	R.8
12	A3.8, R.12	R.12	R.1
13	.1	NC—O	R.1
14	A4.3, R.45	R.42, A3.8	R5.1

LEGEND:
A = Activated
R = Rest

TABLE IIIA

DESCRIPTION OF CONDITIONS OF OPERATION OF APPARATUS 1

Number	
1.	Apparatus turned on, no audio signal yet at 107 input or at 162.
2.	Start signal applied from 301 (no delay).
3.	Delayed signal applied to input 29 of 106.
4.	Output of 107 applied to Q10 (141), tape runs and provides audio input at C-2 (119)
5.	One audio message stops, but tape still remains to be run counter not at end.
6.	Message starts again.

TABLE IIIA-Continued

DESCRIPTION OF CONDITIONS OF OPERATION OF APPARATUS 1

7. Message stops, and counter at end of count (after play as at 6 above).
8. End of tape (after operating on "play" mode as at 6 above).
9. End of tape after servo in rewind mode.
10. Tape motor on, rewinding (prior to 9). These conditions are tabulated in TABLE IIIB and are the operating conditions referred to in TABLE IIIC.

TABLE IV—Continued

TRANSISTOR CHARACTERISTICS

Transistor Type No.	Note	2N3415	2N5172	2N5355
Description	1	NS 45	NS 45	PS 45
JEDEC		98	98	98
(TO)	1			
Manufacturers		GEC,SPR,SES,HUG	GEC,SPR	GEC,SPR
ABSOLUTE MAXIMUMS:				
I_{CBO} at V_{CB}	4	100NA 25	100NA 25	100NA 25
Gain h_{FE} at I_C (A)	3	360	224 .010	175 .050

TABLE IIIB

TABULATION OF OPERATION FACTORS DURING DIFFERENT OPERATING CONDITIONS

No.	Power On	Signal at 301	Signal at 106 (Input via 29)	Tape Running	Audio Message On	Counter at End of Count	End of Tape	Servo Position
1	+	O	O	O	O	O	O	P
2	+	+	O	O	O	O	O	P
3	+	+	+	+	O	O	O	P
4	+	+	+	+	+	O	O	P
5	+	+	+	O	O	O	O	P
6	+	+	+	+	+	O	O	P
7	+	+	+	+	O	+	O	R
8	+	+	+	+	O	O	+	R
9	+	O	O	+	O	O	+	P
10	+	O	O	+	O	O	O	R

LEGEND: O = Off + = On P = Play R = Rewind

TABLE IIIC

TRANSISTOR MODE DURING DIFFERENT OPERATING CONDITIONS

Ref. No.	Q	Conditions 1	2	3	4	5	6	7	8	9	10
166	1	C	C	S	S	S	S	C	C	C	C
118	2	C	C	C	C	C	C	S	C	C	C
122	3	S	S	S	C	S	C	S	S	S	S
125	4	C	C	C	S	C	S	C	C	C	C
127	5	S	S	S	C	S	C	S	S	S	S
130	6	C	C	C	S	C	S	C	C	C	C
132	7	S	S	S	C	S	C	S	S	S	S
134	8	S	S	S	S	S	S	C	C	S	C
135	9	C	C	C	C	C	C	S	S	C	S
141	10	S	S	C	C	S	C	S	C	C	C
142	11	C	C	S	S	C	S	C	S	S	S
148	12	S	S	C	C	S	C	S	C	C	C
152	13	C	C	C	C	C	C	C	S	S	C
154	14	S	S	S	S	S	S	C	C	C	S
157	15	C	C	C	C	C	C	S	S	S	C
138	16	C	C	C	S	C	S	S	S	S	S
159	17	C	C	C	S	C	S	S	S	S	S

LEGEND:
C = Cut off
S = Saturation

TABLE IV

TRANSISTOR CHARACTERISTICS

Transistor Type No.	Note	2N3415	2N5172	2N5355
Description	1	NS 45	NS 45	PS 45
JEDEC		98	98	98
(TO)	1			
Manufacturers		GEC,SPR,SES,HUG	GEC,SPR	GEC,SPR
ABSOLUTE MAXIMUMS:				
V_{CB}	2	25	25	25
V_{CE}	2	25	25	25
V_{EB}	2	5.0	5.0	4.0
Collector Current (A)	8	.500	.100	.300
Power (W)	7	.360 A	.200 A	.360 A
Temp. (°C)	6	150J	100J	125J
Frequency Response (MH_z) Cutoff	5	MS SW	120.000G	250.000G

LEGEND:
1:
N=NPN P=PNP
G=Germanium
S=Silicon
TO numbers refer to *Registered Transistor Outlines*, Page 98 of TRANSISTOR SPECIFICATIONS MANUAL 5th Edition (*Joint Electronic Device Engineering Council*)
Key to Manufacturers, Page 160 of TRANSISTOR SPECIFICATIONS MANUAL 5th Edition
2:
Maximum voltages that cannot be exceeded without permanent damage to the transistor.
V_{CB} = Collector-to-base voltage with emitter open.
V_{CE} = Collector-to-emitter voltage (base open, if no subscript indicated).
R = Resistor between emitter and base.
S = Short between emitter and base.
X = B-E junction forward biased.
V_{EB} = Emitter-to-base reverse voltage with collector open.
3:
Typical value of current gain for common emitter configuration at current shown.
4:
Current between collector and base with the emitter open, at voltage shown.
MA = Milliamperes
UA = Microamperes
NA = Nanoamperes
5:
Frequency in megahertz. Transistor will operate at this frequency or higher.
Conditions:
MS = medium speed
G = f_t (gain-bandwidth product)
6:
Maximum operating temperature (°C) Conditions:
A = Ambient
C = Case
J = Junction
7:
Maximum power that can be dissipated at 25°C ambient for low-power types (A) 25° case temperature for high-power types (C), or at elevated case temperature (H).
8:
Maximum continuous collector current.

TABLE V

SN7490A RESET/COUNT FUNCTION TABLE

Reset Inputs $R_{0(1)}$	$R_{0(2)}$	$R_{g(1)}$	$R_{g(2)}$	Output Q_D	Q_C	Q_B	Q_A
H	H	L	X	L	L	L	L
H	H	X	L	L	L	L	L
X	X	H	H	H	L	L	H
X	L	X	L	COUNT			

TABLE V—Continued

SN7490A
RESET/COUNT FUNCTION TABLE

Reset Inputs				Output			
$R_{0(1)}$	$R_{0(2)}$	$R_{9(1)}$	$R_{9(2)}$	Q_D	Q_C	Q_B	Q_A
L	X	L	X		COUNT		
L	X	X	L		COUNT		
X	L	L	X		COUNT		

LEGEND:
H = high level
L = low level
X = irrelevant

TABLE VI

SN7486
FUNCTION TABLE

INPUTS		OUTPUT
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

LEGEND:
H = high level
L = low level

I claim:

1. A message and background music sound producing apparatus comprising, in operative combination, a tape recorder deck, an audience sensing means, electric power voltage source, motor control circuit, a listening circuit, a background music source, a switching circuit, an amplifier and a loudspeaker in operative combination;

a. said tape recorder deck comprising a motorboard supporting an electromagnetic tape head, a tape reel support and an electric motor, said motor having an input terminal and an output terminal and said motor operatively connected to said tape reel support in driving relation therewith; said motor control circuit connecting said motor to electric power means therefor, an electrical output means on said electromagnetic tape head operatively connected to a first signal input means of said switching circuit and, in parallel therewith, to an input of said listening circuit, said first signal input means of said switching circuit operatively connected to an output terminal of said switching circuit through a transistor switching unit when the switching circuit is in tape broadcast mode and disconnected from said output terminal when the switching circuit is in background music broadcast mode; a trigger signal input terminal in said switching circuit operatively connected to said transistor switching unit in said switching circuit whereby to change the mode of said switching circuit from broadcast music mode to tape broadcast mode;

b. said background music source having an electrical output signal terminal operatively connected in series with a second signal input of said switching circuit and through said transistorized switching unit in said switching circuit to the signal output of said switching circuit when said switching circuit is in its background music mode; said switching circuit output operatively connected to the signal input of said amplifier, said amplifier having a signal output means operatively connected to the signal input of said loudspeaker;

c. audience sensing means operatively connected to switch means completing circuit connection to ground from said motor on said tape deck to said voltage source;

d. said listening circuit comprising

1. An input conductor connected to the output of said tape head on said motorboard a plate of one polarity of a capacitator directly connected to said input, the plate of opposite polarity of said capacitator being connected to the negative terminal of a first diode and the positive terminal of a second diode, the negative terminal of which second diode is grounded;

2. A first NPN transistor to the base of which are attached the positive terminal of the first diode and one end of a first bleeding resistor, the other end of which first bleeding resistor is attached to a positive voltage and the emitter of which first transistor is grounded;

3. A second NPN transistor, the emitter of which is grounded and the collector of which connects to said positive voltage through a second load resistor and which collector is also attached to one plate of one polarity of a second capacitator, another plate of opposite polarity of which capacitator is connected to the base of said first transistor, and

4. the collector of said first transistor is connected to

i. base of a third NPN transistor the emitter of which is grounded and the collector of which is connected through a load resistor to said positive voltage and said collector of said third transistor is connected to a trigger signal line which is operatively connected to the trigger signal input terminal of said first switching circuit whereby to cut off the background music signal between said first input of the switching circuit and the output thereof on cessation of audio signal to the input of said listening circuit and a time lapse controlled by said second capacitator and said bleeding resistor, and also

ii. the collector of the first transistor also is connected to the base of said second transistor, and

iii. the collector of the first transistor is connected to said positive voltage through a first transistor load resistor and the emitter of said first transistor is grounded.

2. Apparatus as in claim **1** wherein the collector of the first transistor is connected to a low voltage end of a first transistor load resistor, another higher voltage portion of which load resistor is below said positive voltage and is connected to

a. the base of a fourth transistor through the collector and emitter of which a circuit is completed for said motor on said motorboard, and to

b. the base of said second transistor and through a resistor, and

c. a low voltage end of a second load resistor for said first transistor and a high voltage end of which second load resistor is connected to said positive voltage;

d. the collector of a fifth transistor, the base of which is connected to the collector of said third transistor and the emitter of which fifth transistor is connected to ground whereby to cut off conduction

through said fourth transistor on cessation of audio signal to said input to said listening circuit;

e. the base of said fifth transistor being connected to a conduction inhibiting signal source conductor from said motor circuit.

3. Apparatus as in claim **2** including

a. a servo control resistor means sensitive to increased current through the motor circuit as at the end of tape condition thereof;

b. a servo motor operatively connected to said tape reel support;

c. a servo triggering means operatively connected to a electrical power source therefor and having an output operatively connected to said servo motor and an input operatively connected to said servo control resistor;

d. a reversing mechanism operatively connected to said servo motor and said tape reels;

e. said means sensitive to increased current through the motor circuit operatively connected to the said input of said servo motor triggering means the output of which is operatively connected to said servo motor whereby to automatically reverse the direction of said reels at end of tape.

4. Process of playing a series of audio sales messages alternatively with background audio messages comprising steps of

a. Repetitively and automatically sensing at a fixed location the presence of an movable audience in the vicinity of a loudspeaker at said location and automatically responsive to each such sensing, immediately

b. i. initiating passage of a first magnetic tape past a playback head in one, play, direction,

ii. developing and picking up electrical audio signals from sequential portions of said first magnetic tape and passing said signals to an audio amplifier and to said loudspeaker and to a signal sensing assembly,

iii. moving the first tape past the said playback head continuously responsive to the presence of said oscillatory electrical audio signal on said tape for varying lengths of time and for a predetermined time thereafter in each play period,

iv. at the termination of each such period, terminating the passage of said tape past said head and passing a signal of such terminating to a counter and automatically initiating play of a second audio input through said loudspeaker and wherein a second audio signal from said second audio input is passed to the audio amplifier and loudspeaker during intervals between the termination of one period of picking up signals from said first tape and beginning of another period of picking up audio signals from another portion of said first tape.

5. Process as in claim **4** wherein

a. said period of play of said second audio input is automatically and immediately interrupted by another sensing of an audience in the vicinity of said loudspeaker at said location, and

b. automatically responsive to such another sensing, immediately

b. i. initiating passage of said first magnetic tape past said playback head in said, play, direction,

ii. developing and picking up electrical audio signals from sequential portions of said first magnetic tape and passing said signals to said audio amplifier and to said loudspeaker and to a signal sensing assembly,

iii. moving the first tape past the said playback head continuously responsive to the presence of said osciallatory electrical audio signal on said tape for varying lengths of time and for a predetermined time thereafter in each play period,

iv. at the termination of each such period, terminating the passage of said tape past said head and passing a signal of such terminating to a counter and automatically initiating play of a second audio input through said loudspeaker and wherein said second audio signal from said second audio input is passed to the audio amplifier and loudspeaker during intervals between the termination of one period of picking up signals from said first tape and beginning of another period of picking up signals from another portion of said first tape.

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