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[56]

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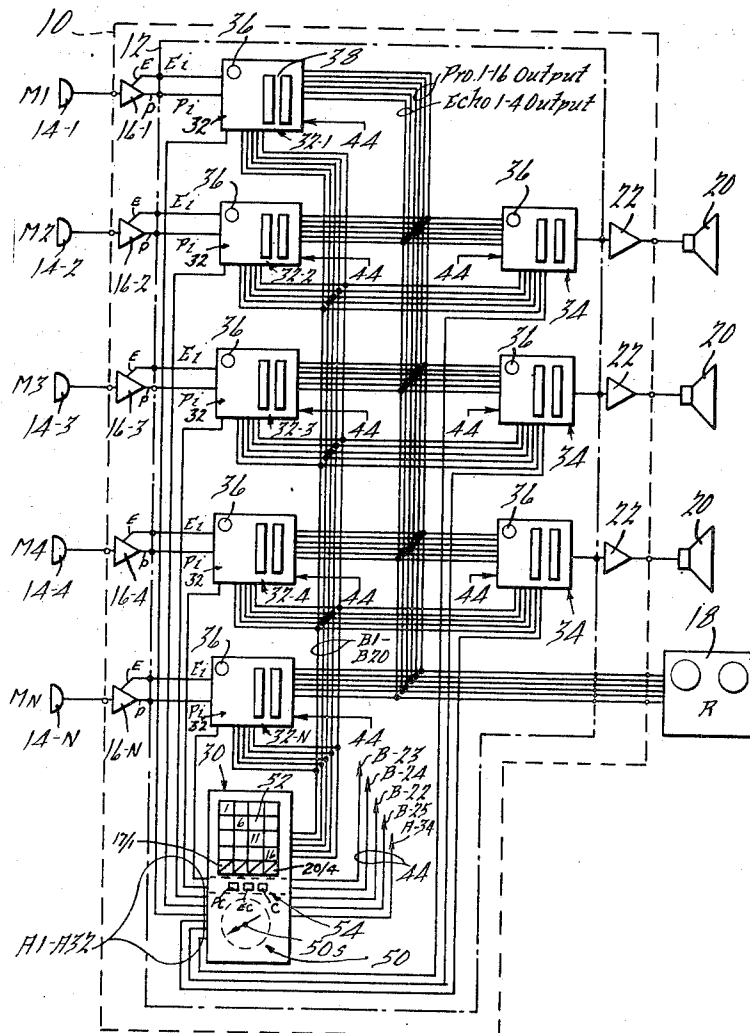
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[54] ACCESSING CONTROLLER FOR MULTIPLE- INPUT PLURAL OUTPUT SIGNAL CONTROL CONSOLE DEVICE

24 Claims, 5 Drawing Figs.

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[51] Int. Cl.	G09b 5/04
[50] Field of Search	179/1 B, 1
	AT; 307/115

ABSTRACT: An accessing controller for a signal control console device having a multiplicity of signal input channels selectively and variously connectable through said controller to a plurality of signal output channels of the console device and featuring both channel interlocked or cancellation type and channel accumulating or cumulative-type switching units selectively activated from a single keyboard switching unit selector also affording a selection of the activated signal channel or channels of a switching unit selected thereby as well as a selection of any one or more of a plurality of clearing function controls exercised by the controller over the several switching units.



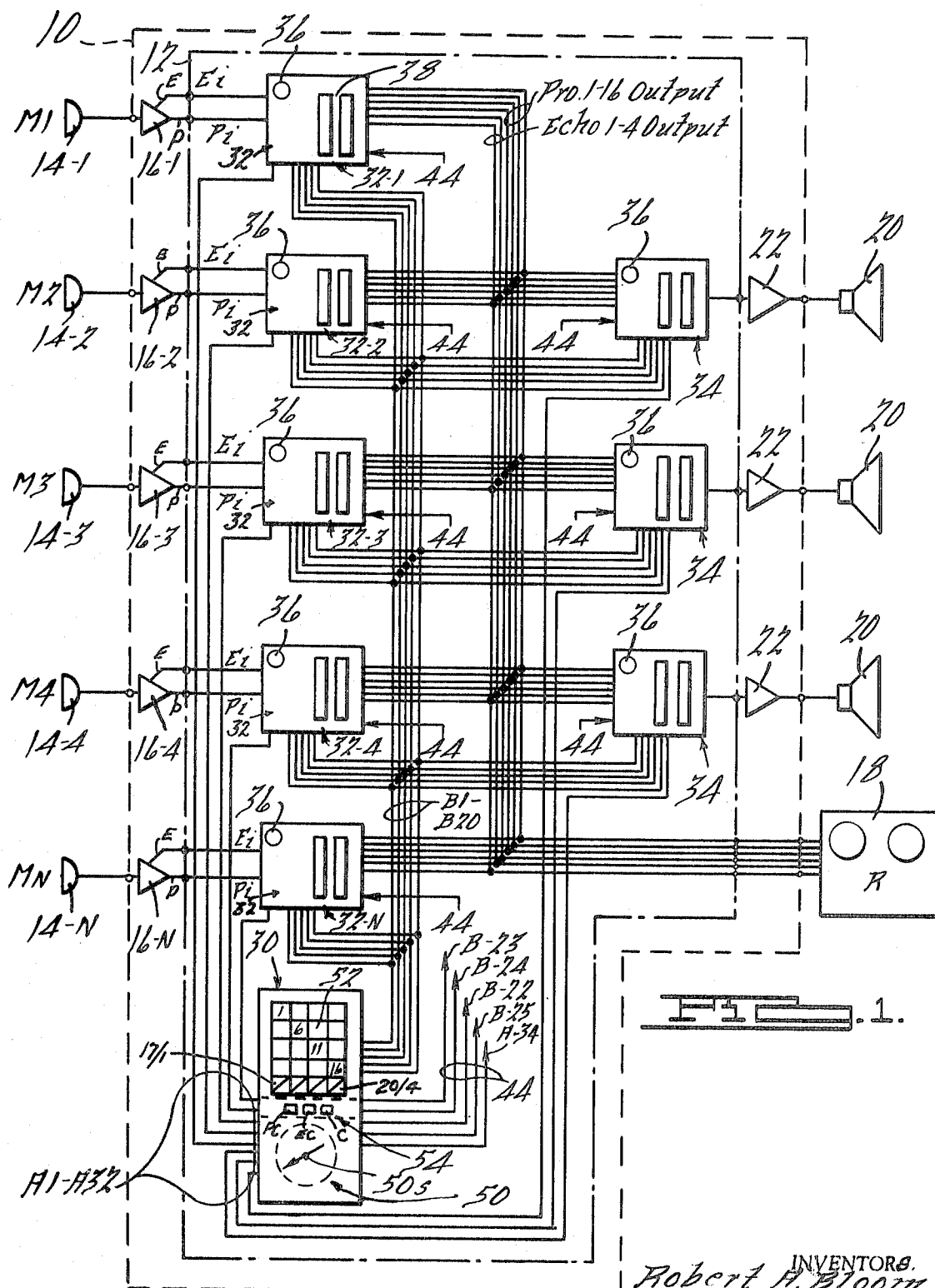


FIG. 1.

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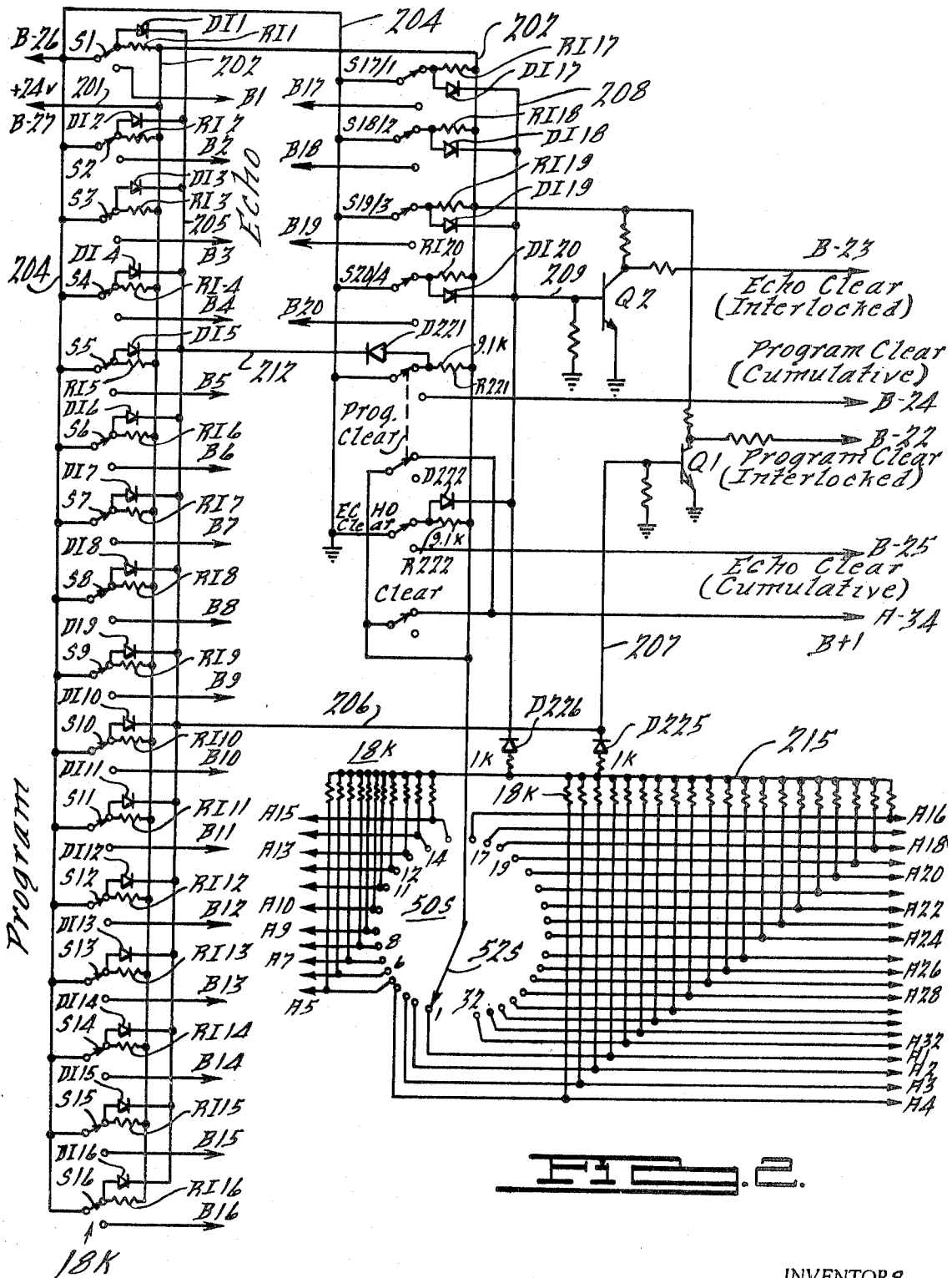
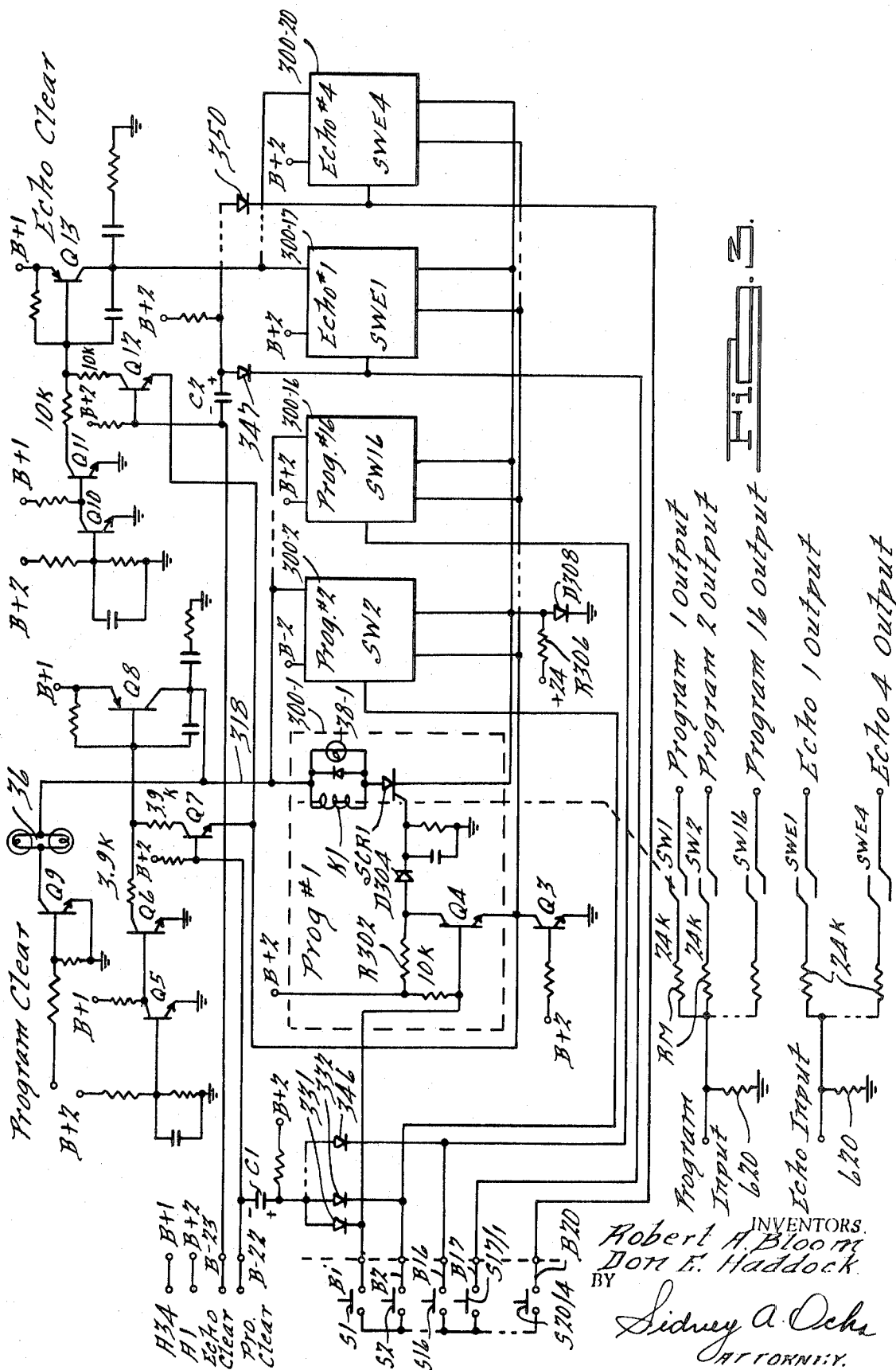
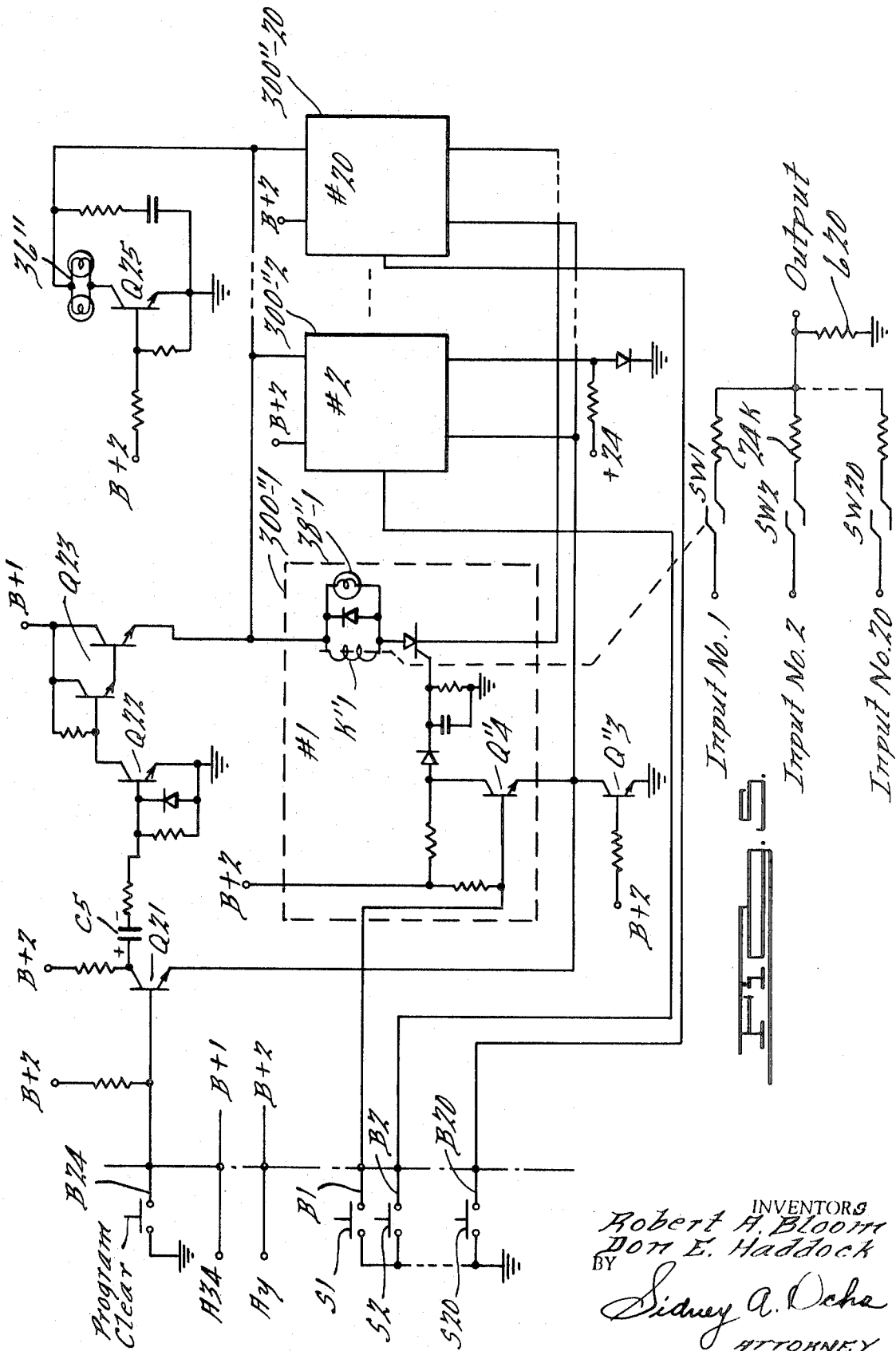


FIG. 2.

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ACCESSING CONTROLLER FOR MULTIPLE-INPUT PLURAL OUTPUT SIGNAL CONTROL CONSOLE DEVICE

BACKGROUND

This invention relates to signal control console equipment such as is employed in sound recording and broadcasting studios, for example. More particularly, the invention relates to a selectively operable accessing controller for such equipment for selectively and variously accessing or connecting a multiplicity of signal input channels, such as a plurality of microphone inputs, to a plurality of signal output channels supplied from the console device to a multichannel signal utilization display, recording and/or monitoring device.

The invention has among its objects to provide improvements in such equipment from the standpoint of simplifying the construction and operation and improving the performance thereof. Other objects are to provide improved control console equipment possessed of maximum distribution capacity or capability effected from a minimum number of accessing or distribution and function controls.

The above and other objects together with the structure and operation of the invention will appear and be understood from consideration of the detailed description of the preferred embodiment of the invention made with reference to and following the accompanying description of drawings:

wherein,

FIG. 1 is a functional block diagrammatic representation of the organization of a control console device incorporating an accessing controller in accordance with the present invention;

FIG. 2 is an electrical schematic circuit diagram of a keyboard control section of the accessing controller of the present invention;

FIG. 3 is an electrical schematic circuit diagram of a channel interlocked or cancellation type of controlled channel switching unit of the accessing controller of the present invention;

FIG. 4 is an electrical schematic circuit diagram of a channel accumulating type of controlled channel switching unit of the accessing controller of the present invention; and

FIG. 5 is another form of channel accumulating type of controlled channel switching unit of the accessing controller of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With respect to the block diagrammatic representation of FIG. 1, the numeral 10 represents a console device which, in addition to the various amplifiers, mixers and attenuators customarily provided in such equipment, includes the subject accessing controller 12 of the present invention. The controller 12 has a multiplicity of signal input channels and a plurality of signal output channels of which the signal output channels do not necessarily correspond in number to the number of signal input channels. The signal input channels are supplied from a plurality of external, electrical signal sources, as microphones 14-1 through 14-N, each of which is connected over a separate signal channel to a different one of the inputs of the console 10.

Each microphone input channel is supplied to the controller 12 through a different amplifier 16-1 through 16-N contained in the console and having a program channel output P and an echo channel output E in customary fashion. The program and echo channel outputs of each of the microphone amplifiers and thus of the microphone input channels are supplied to the accessing controller 12 through which controller the microphone signal input channels may (as program signal and echo signal input channels) be individually selected and variously connected (as program output and echo output channels) to any one or plurality of signal output channels of the console device. The signal output channels are supplied from the console device to a multichannel signal utilization or monitoring device, such as a studio-type tape recorder 18 and/or one or more amplified audio reproducers shown as

loud speakers 20 of which the amplifiers 22 for the loud speaker channels are shown contained in the console.

The accessing controller 12 comprises a keyboard switcher or control means illustrated as a unit 30 affording a selection of input and output channels as well as a clearing function control over a plurality of selectively operable channel distributor-type switching means illustrated as functional units or groups 32 and channel combining type switching means illustrated as functional units or groups 34, each unit or group comprising a plurality of normally disabled switching means such as the 300 numbered switching means of FIGS. 3-5 through which the signal channel connections are effected. These units or groups may, as hereafter noted, comprise sub units or sub groups where both program and echo signal channels are involved.

The distributor switching units or groups 32 are of two different forms, either or both of which may be employed in the subject controller system, and will be referred to as a type I or type II distributor switching unit herein. These are schematically illustrated in FIGS. 3 and 4. Both types I and II have a program signal input channel P_i and an echo signal input channel E_i connected thereto and a plurality of signal output channels, which are allocated between a first group of 16 program output channels labeled Program 1-16 Output and a second group of four echo output channels labeled Echo 1-4 Output which may be considered subunits or sub groups of the composite unit or group 32. In addition, each switching unit 32 or 34 includes a pair of indicating or display sections 36 and 38 of which the section 36 indicates that that particular switching unit has been selected for operation and the section 38 provides a visual display indicating the activated output channel or channels that are being supplied from the output of the switching unit to the signal utilization device. The principal difference between the type I and II distributor switching units is that the type I unit is a channel interlocked unit equipped with a self-cancellation feature which permits only one program and/or echo output channel to be effective at any one time therefrom. No cancellation is provided in the type II unit, which is a cumulative or accumulating type device in which the selection of a different output channel thereof also connects that channel as well as the previously selected output channel thereof to the output channel of the console device. The unit 34, which may be referred to as a type III distributor switching unit is similar functionally to the type II unit but operates in relation to a plurality of program input channels and a single program output channel as hereinafter described in connection with FIG. 5.

The keyboard switcher or control unit 30 includes a switching unit or group selector or control section 50, a specific channel or switching means selector section 52 and a function control selection section 54. Section 50 is connected over a plurality of switching unit selector control lines labeled A1-A32, each of which is connected to a respectively different one of the distributor and combining switching units 32 and 34. The channel selector section 52 is connected over a plurality of channel selector control lines labeled B1-B20, which are bussed in parallel to corresponding output channel or switching means selector sections of each of the distributor type switching units or groups 32 and to corresponding input channel or switching means selector sections of each of the combining type switching units or groups 34. The function control selector section 54 provides for clearing of the switching units and is connected over a group of function control lines labeled B22-25 and A34 bussed in parallel over cable 44 connected to each of the distributor and the combining-type switching units 32 and 34.

The keyboard switcher or control unit 30 is shown in electrical schematic circuit form in FIG. 2 as including (1) a 32 position rotary selector switch 50S through which any one of up to 32 different distributor and combining type switching units may be selected for operation in the console; (2) 20 momentarily actuable key-operated SPDT switches arranged in a first group of sixteen selector switches labeled S1 through S16

and in a second group of four additional selector switches labeled S17/1, S18/2, S19/3 and S20/4, the first group controlling the 16 program output channels of the units or groups 32 and the second group the four echo output channels of the units 32 and both groups of switches controlling the input channels connecting the output channel of the units or groups 34; and (3) three additional momentary key-operated switches constituting the function selector section 54 of the keyboard, including a DPDT switch labeled PROGRAM CLEAR and two additional SPDT switches labeled ECHO CLEAR and CLEAR, respectively.

The rotary selector switch 50S, which is of the make-before-break-type construction for reasons later explained, serves to make +24 v. operating supply voltage available from terminal B-27 and over conductor 201 and bus 202 to the input or rotor arm 52S of the selector switch 50S. The rotor arm of the selector switch is adapted to be selectively manually positioned on any one of the 32 output contacts thereof, each of which contacts is shown connected to a different one of a group of 32 output lines, labeled A1 through A32.

The switch blade or pole of each of the channel selector switches S1-S20 is connected to electrical ground reference applied to ground bus conductor 204 from the terminal labeled B-26. Assuming for purposes of illustration that the switches S1-S20 are to serve as output channel selector switches it will be seen that upon depression of the corresponding key button actuator assigned to a particular output channel selector switch, the switch blade thereof is displaced from its illustrated position in engagement with the back or upper contact of the switch to its front or lower contact to which is connected a corresponding one of a plurality of output control lines labeled B1-B20.

The back contact of each channel selector switch S1-S20 is connected to one side of an 18K interlock resistor RI and to the anode of an interlock diode DI, a different one of each of which resistors and diodes is provided for each output channel selector switch S1 through S20. The other side of each interlock resistor RI is connected to the B+bus conductor 202, while the other side or cathode of each of the diodes DI associated with the grouping of 16 output program selector switches S1 through S16 is connected to the common bus conductor 205. The latter bus conductor is shown connected over conductors 206 and 207 to the base electrode or control element of a transistor Q1 preferably contained within the keyboard switcher unit provided for these 16 switches which control the 16 output channels of a type I or II distributor switching unit or group 32 or the 16 input channels of a combining type switching unit or group 34. The cathodes of the diodes associated with the output channel selector switches S17 through S20 are connected over bus 208 and conductor 209 to the base electrode of a similar transistor switch Q2 provided for these four switches, which control the four Echo Output channels of a type I or II distributor switching unit 32 or input channels 17 through 20 of a combining type switching unit 34.

When transistor Q1 and/or Q2 is turned on, ground potential is applied to the line labeled B-22, Program Clear (Interlocked) and/or line B-23 Echo Clear (Interlocked) in order to clear a selected Program and/or Echo Output channel of a type I distributor switching unit. One or the other or both of the transistors Q1 and Q2 are turned on upon activation respectively of the Program Clear switch and/or the Echo Clear switch. Q1 and Q2 are also turned on upon the movement of the rotary selector switch 50S from one contact to another while an output channel selector button is depressed. These transistors are also turned on, from a double key depression of a pair of output channel selector switches in the program grouping or in the echo grouping respectively, of the output channel selector switches in a type I distributor switching unit.

In addition to the function control lines B-22 and B-23, the keyboard control unit is shown as having three additional function control lines labeled B-24 Program Clear (Cumulative),

B-25 Echo Clear (Cumulative) and A-34. B+1 lines B-24 and B-25 are normally employed to execute clearing functions in a cumulative type switching unit and are shown as being connected respectively to the front contact of one section of the Program Clear switch and to the front contact of the Echo Clear switch of FIG. 2. Line A-34 supplies 24 v. operating potential to the B+1 terminal points of all of the switching units 32 and 34 and is interrupted upon the simultaneous depression of the Program Clear switch and the Clear switch.

FIG. 3 illustrates the schematic electrical circuit diagram of a Type I distributor switching unit 32 shown as having (1) a pair of signal inputs labeled Program Input and Echo Input at the lower portion of the drawing; (2) 20 signal output channels which are allocated in two groups comprising a first group of 16 signal output channels labeled Program 1 Output through Program 16 Output and a second group of four signal output channels labeled Echo 1 Output through Echo 4 Output; (3) 20 output channel selector control terminals which are connected to respective ones of the output channel selector control lines B1-B20 of the output channel selector push button switches S1-S20 of FIG. 2; (4) a Program Clear function control line labeled Program Clear, which is connected to line B-22 of FIG. 2; (5) an Echo Clear function control line labeled Echo Clear connected to line B-23 of FIG. 2, and (6) two operating voltage supply busses labeled B+1 and B+2 of which the bus B+1 is connected to line A34 of FIG. 2 and the bus B+2 is connected to the particular one of the output contacts A1-A32 of the rotary distributor switch 50S that is connected to that distributor unit.

Internally the distributor unit 32 comprises as shown a group of 20 reed relay type distributor switching means stations or sections 300-1 through 300-20 each corresponding to and controlling a different one of the signal output channels of the distributor unit; a Program Clear circuit control section labeled Program Clear; and an Echo Clear circuit control section labeled Echo Clear.

The Program signal input channel and Echo signal input channel are supplied to each distributor switching unit or group from its respectively corresponding or associated microphone and input amplifier 16, as mentioned in connection with FIG. 1, and are shown as being connected internally of a distributor unit 32 to one side of each of a plurality of 24K mixing resistors RM. The other side of each mixing resistor is connected through a corresponding one of a plurality of normally open switch contacts labeled SW1 through SW16 and SWE1 through SWE4 of the 20 reed relays provided in each switching unit 32. The actuating coil K1 of the reed contact relay associated with Program 1 signal Output channel is shown schematically in the control circuit section or station 300-1 labeled PROG. No. 1 in FIG. 3, it being understood that a similar control circuit is included in each of the other output channel selector stations functionally depicted herein and labeled PROG. No. 2 - PROG. No. 16 and ECHO No. 1 - ECHO No. 4. Energization of a relay coil is controlled from an SCR (silicon-controlled rectifier) device one of which is provided for each of the 20 reed relay coils contained in each type 32 or 34 switching unit. Each relay coil also has an indicating lamp as 38-1 connected thereacross for signalling that its associated output channel has been activated.

In addition to the reed relay K, SCR and an indicating lamp 38, each of the 20 output channel control circuit sections 300 includes an NPN-transistor Q4 therein, whose emitter is connected to the collector of another PNP-transistor Q3, only one of which is provided in each type 32 or 34 switching unit. In addition to the transistor Q3 and 20 95 transistors Q4, the distributor switching unit of FIG. 3 also includes the transistors Q5-Q13 of which the transistors Q5-Q8 are associated with the Program Clear circuit thereof and the transistors Q10-Q8 are associated with the Program Clear circuit thereof and the transistors Q10-Q13 with the Echo Clear circuit. Transistor Q9 is associated with two lamps 36 which provide a visible indication that the switching unit group in which they are contained has been activated.

Assuming that the distributor unit of FIG. 3 represents the distributor unit corresponding to and associated with the signal inputs to the console supplied from microphone M1 or 14-1 and that the rotary selector switch 50S of the keyboard switcher unit is positioned on its output contact 1, distributor switching unit 1 will be selected and will be the only distributor unit having +24 v. operating voltage supplied to all of the points labeled B+2 thereon. It will be noted also that the emitter electrode of transistor Q8 is connected to the B+1 bus supplied from terminal A34 of FIG. 2, and its base electrode is branched through a pair of 3.9K resistors to the collectors of transistors Q6 and Q7 of which transistor Q6 supplies an inversion of transistor Q5 connected anteriorly thereof. Transistor Q5 will be turned on whereby transistor Q6 will be off. With Q7 on, transistor Q8 will conduct base current through transistor Q7 and will be turned on. With transistor Q8 on, the +24 v. supplied to the emitter thereof from terminal B+1 over line A34 will be available on buss conductor 318 connected to one side of the reed relay operating coils in switching sections 300-1 to 300-16 and to one side of the distributor unit indicating lamps 36. Transistor Q9 receives base current drive from terminal B+2, whereby the collector of transistor Q9 will be essentially at ground and the indicating lamps 36 will be turned on.

With +24 v. supplied to the B+2 terminals of the selected distributor unit, transistor Q3 of FIG. 3 is turned on to ground the emitters of the 20 transistors Q4 provided in each of the control circuit sections or stations 300 in FIG. 3. The transistors Q4 are thus switched on preparatory to the selection of a desired output signal channel by actuation of an output channel push button. Since the base of each transistor Q4 of each distributor unit is connected in parallel and if the emitter in each of Q4 in each distributor unit were grounded thereby connecting them in parallel also the transistor Q4 with the lowest effective emitter-base junction voltage will clamp all base-emitter voltages at this value. Since all transistors do not have the same effective emitter-base junction voltage all transistors Q4 cannot be expected to be in the on-state reliably. Otherwise stated if the bases of all Q4 transistors were connected in parallel and if the emitters of all Q4 transistors were parallel, the Q4 with the lowest Vbe will clamp all base-emitter voltages to the lowest value and prevent the Q4 transistors with the highest Vbc from being turned on. This condition is prevented by Q3 which grounds only one Q4 emitter in the selected distributor unit thereby preventing any of the other corresponding Q4 transistors in the other non-selected distributor units from clamping this voltage.

Actuation of an output channel selector push button, say push button No. 1 for effecting connection of the selected PROGRAM 1 OUTPUT signal channel of the activated distributor unit to the program input labeled Program Input 620 of the console, grounds the base electrode of the transistor Q4 in the PROG. No. 1 output channel control circuit section or station 300-1 to open transistor Q4 of this section. Turning off Q4 in PROG. No. 1 station raises its collector from a potential previously at or near ground to permit sufficient current to flow from B+2 through 10K collector resistor R302 and diode D304 to the gate electrode of SCR1 to turn it on. The reed relay coil K1 for the selected output channel will thus be energized and will close its switch contacts SW1 to connect the Program Input channel to the thus selected Program 1 Output channel. With the energization of the relay coil K1, signal lamp 38-1 connected in parallel with the energized one of the reed relays K1 will also be energized to indicate the selected output channel of the distributor unit that is active.

The selection of an Echo Output channel in a type I distributor is accomplished in a similar manner through depression of one of the Echo channel key actuated selector switches labeled S17/1-S20/4 in FIG. 3. B+ potential is supplied to the reed relay coils of the respective Echo Output switching sections 300-17 through 300-20 through transistor Q13 of the Echo Clear circuit, which is associated with the Echo channels of this unit and is similar in circuit by its energization of the selected relay coil K1 for the selected echo output channel

will close its switch contacts SWE1-SWE4, as the case may be to connect the selected echo input channel to the echo output channel thus selected. Structure and operation to the above described Program Clear circuit. Since the Program and the Echo channel selection and clearing circuits of the described distributor switching unit are independent of each other, it will be apparent that a Program output channel and an Echo output channel can be selected and be simultaneously effective from a type I distributor switching unit.

As previously mentioned, the type I distributor switching unit is of the self cancelling variety where the selection of a different output channel cancels or disconnects the previously connected output channel from the microphone input and connects the newly selected channel thereto unless the previously selected output channel is a Program channel and the newly selected output channel is an Echo channel. In such case, no cancellation is effected, and both the previously selected Program channel and the newly selected Echo channel of that distributor unit will be activated. Also, two output channel indicator lamps 38 will be illuminated, one lamp in the program channel grouping of 16 indicator lamps and the other lamp in the echo channel grouping of four indicator lamps.

The aforementioned cancellation is effected electrically internally of the type I distributor switching unit through capacitor C1 and its associated bank of 16 isolation diodes 331-346 in FIG. 3 which effect the turn off of transistors Q7 and Q8 in the Program Clear circuit when a different Program output channel is selected for connection to the microphone input connected to that distributor. With Program 1 Output channel selected, SCR1, reed relay K1 and indicating lamp 38-1 will be activated, and capacitor C1 will have a very slight charge thereon with the polarity indicated.

Upon the selection of another program output channel, say Program No. 2 by depression of push button No. 2 on the keyboard switcher unit 30, ground potential will be supplied through output channel selector switch S2 to lower the positive side of the capacitor C1. The potential on the other or negative side of C1 will likewise be reduced momentarily, thereby forming a negative going pulse to lower the potential of the base of transistor Q7 sufficiently with respect to its emitter to open Q7 and shut off Q8, whereby SCR1 drops out. SCR2 in Prog. No. 2 section 300-2 turns on in a manner previously described in connection with the activation of SCR1 in Prog. No. 1 station switching circuit.

If the previously connected active output channel of a selected type I distributor switching unit is an Echo output channel instead of a Program output channel, its cancellation upon the selection of another echo output channel is effected through the pulse forming cancellation circuit comprised of the capacitor C2 and bank of four diodes D347-350 which are associated with the Echo Clear control circuit and the four Echo channel selector control circuits or stations of FIG. 3.

The Program channels and Echo channels can also be cleared independently of the selection of another Program or Echo output channel by actuating the Program Clear switch and the Clear switch or by actuating the Program Clear switch alone or the Echo Clear switch alone, depending upon whether the output channel to be cancelled or cleared is a Program channel or an Echo channel. Actuating the Program Clear button displaces the D.P.D.T. Program Clear switch of FIG. 2 and removes ground potential from the back or upper contact of the upper pole or switch section thereof to permit this point to rise in potential toward +24 v. supplied over a circuit traced from bus 202, 9.1K resistor R221, diode D221, conductor 212, bus 205, conductor 206 and conductor 207 to the base of transistor Q1. The series circuit 9.1K resistor supplies sufficient base current drive to transistor Q1 to turn it on and lower the potential of output control line B-22 to substantially zero or ground level. Accordingly, Q7 in the Program Clear circuit of FIG. 3 will be turned off as long as the Program Clear actuator key button in the keyboard switcher or control unit 30 is held depressed. Therefore, transistor Q8 will

drop out and interrupt the cathode current to the energized SCR in the distributor switching unit, deenergizing the reed relay connected thereto and clear the previously connected program output channel therefrom.

Depressing the Echo Clear switch actuator of the keyboard switcher or control unit 30 displaces the SPDT Echo Clear switch in FIG. 2 from its position shown to its opposite or front contact position and supplies +24 v. through 9.1K resistor R222 and diode D222 to bus 208 and conductor 209 to the base of transistor Q2. This effects the turn on of transistor Q2 and grounds function control output line B-23, which is connected to the base of transistor Q12 in the Echo Clear circuit of FIG. 3. Transistor Q12 corresponds to transistor Q7 in the Program Clear circuit and likewise effects the turn off of transistor Q12 and Q13 to drop out the active SCR in the Echo output channel selector portion of the active distributor switching unit.

The simultaneous depression of both the Program Clear switch and the Clear switch of the keyboard switcher or control unit 30 of FIG. 2 removes the +24 v. potential on output line A34 therefrom which is connected to the B+1 terminal points of all of the distributor switching units 32 and combining type switching units 34 thereby clearing out all of the channels of an active switching unit, irrespective of whether the active channel is a Program or Echo channel.

It will be seen also that the Program Clear and Echo Clear lines B-22 and B-23 of FIG. 2 are also conditioned to execute a clearing function on the active Program and/or Echo output channels of a selected distributor switching unit whenever the rotary selector switch 50S of the keyboard switcher or control unit 30 is moved from one output contact position to another to select or activate a different distributor or combining switching unit 32 or 34 and a channel selector button is held depressed. Each of the output contacts 1-32 of the rotary selector switch has one end of an 18K resistor connected thereto, the other end of each of which resistors is connected to bus 215 and then over separate 1K resistors and diodes D225 and D226 to conductors 207 and 208 to the base electrodes of transistors Q1 and Q2 respectively. The rotary selector switch 50S is of the make-before-break-type construction, as previously mentioned so that, as the switch arm 52S is moved from one contact to an adjacent contact, current will be supplied through a pair of 18K resistors in parallel to the base electrodes of Q1 and Q2. This current is insufficient to turn on the transistor Q1 or Q2. But, with the additional current supplied through one of the interlock resistor R11-20 and diode D11-20 associated with a depressed one of the channel selector switches, the total current now supplied to Q1 or Q2 will turn on the transistor associated with the depressed Program channel or Echo channel selector switch, as the rotary switch arm 52S is rotated from one contact position to another.

The transistors Q1 or Q2 are also activated to cancel the effect of an inadvertent double key depression of a pair of output channel selector switches in the group of 16 program output channel selector switches or in the group of four echo output channel selector switches of a distributor type switching unit 32. With transistors Q1 and Q2 off, actuation of any one of the Program output channel or Echo output channel selector switches displaces the selected switch arm from and removes ground potential from the front contact thereof enabling +24 v. to be supplied from terminal B-27 and through the 18K resistor R1 and diode D1 associated with the selected switch to the base of transistor Q1 or Q2. This current is insufficient to turn on the transistors Q1 or Q2. However, when two such switches in a Program channel grouping or an Echo channel grouping of these switches are simultaneously actuated by an inadvertent double key depression, the additional effect of the current through an additional 18K interlock resistor and diode will be supplied in parallel to supply sufficient base current drive to the associated transistor to turn it on, thereby grounding the line B-22 or B-23 from the keyboard switcher unit.

FIG. 4 represents the electrical schematic circuit diagram of a type II distributor type switching unit 32, which will be seen to be similar to a type I distributor unit except for the omission from FIG. 4 of the cancellation circuits of FIG. 3 comprised of the capacitor C1 and bank of 16 diodes D331-346 and the capacitor C2 and bank of four diodes D347-350. Accordingly, the Program Clear control circuit and the Echo Clear control circuit of FIG. 4 will also be somewhat simpler. As shown, these circuits are respectively comprised of the transistors Q14, Q15 and Darlington Q16 for the Program Clear circuit and of the transistors Q17, Q18 and Darlington pair Q19 for the Echo Clear circuit. Transistor Q20 effects the ground switching function to turn on the indicating lamps 36 of FIG. 4.

In view of the omission of the cancellation effecting circuitry, the type II distributor switching unit provides an accumulation of Program and Echo output channels therefrom as successively different Program output channels and Echo output channels are selected in an active type II distributor switching unit. In the Program Clear circuit of FIG. 4, Q14 will be turned on when a type II distributor unit is selected and activated by the rotary selector switch of the keyboard switcher or control unit 30. Transistor Q15 will thus be off and Q16 will be on to supply current to any activated one of the SCR devices in the Program or Echo stations and to the indicating lamp 36'. Actuation of the Program Clear switch grounds the base of Q14 to supply a positive going pulse through C3 to turn on Q15 which momentarily turns off Q16 to drop out any activated one of the SCR devices. The Echo Clear circuit operates similarly on the Echo output channels. Depression of the Program Clear and Echo Clear switch actuators simultaneously clears all of the previously activated program and/or echo output channels of a selected distributor switching unit.

Otherwise the operation of the type II distributor switching unit is similar to that already described for the type I distributor switching unit of FIG. 3.

FIG. 5 illustrates the schematic of a twenty input single output accumulative type switching unit or group. This is also referred to above as a type III distributor. The operation of the individual switching stations 300'-1 to 20, each composed of Q''4, SCR'', reed relay K'' and lamp 38'', and the effect of transistor Q''3 are the same as previously described with respect to FIG. 3. Since there is but a single output channel associated with all of the 20 input channels, it is only necessary to provide a single clearing circuit. This clearing circuit is identical to the Program Clear circuit of FIG. 4, the lighting circuit of which will also be seen to be identical to the lighting circuit for the lamp 36' of FIG. 5.

From the foregoing description of the invention it will be evident that a novel accessing controller for multiple input plural output signal control console devices has been provided including many significant features which will be apparent to those skilled in the art. Although the invention has been described in connection with console equipment for sound recording and broadcasting studios, other applications such as for video and the like will readily suggest themselves as will various other changes and modifications of the described structures, all without departing from the spirit and intent of the invention.

We claim:

1. An accessing controller for a signal control console device having a multiplicity of signal input channels variously and selectively connectable through said accessing controller to a plurality of signal output channels of the console device, said controller comprising, in combination,

a normally disabled distributor switching unit for each signal input channel, at least one unit having a plurality of selectively enabled output channels therefrom connected to corresponding output channels of said console device, distributor unit selector means connected to said distributor switching units enabling a selected one of said units for operation from the signal input channel for that unit and

a plurality of output channel selector means each connected to select a corresponding output channel in each of the distributor switching units.

2. An accessing controller in accordance with claim 1 wherein the switching units comprise units of different character including a switching unit having a single output channel and a plurality of signal input channels.

3. An accessing controller in accordance with claim 1 including means whereby the selection of the output channel of a selected distributor switching unit by the different output channel selector means cancels and disconnects the previously selected output channel of a selected distributor switching unit from the signal input channel of that unit and connects the said different output channel thereto.

4. An accessing controller in accordance with claim 3 wherein the cancellation of the previously selected output channel is effected electrically within the distributor switching unit.

5. An accessing controller in accordance with claim 3 including clearing means for clearing a selected output channel of a selected distributor switching unit independently of the selection of a different output channel thereof.

6. An accessing controller in accordance with claim 5 further including clearing means clearing all of the output channels of a distributor switching unit independently of the selection of a different output channel thereof.

7. An accessing controller in accordance with claim 5 further including clearing means simultaneously clearing all of the output channels from a selected distributor switching unit independently of the selection of a different output channel thereof.

8. An accessing controller in accordance with claim 4 wherein the cancellation is effected through a pulse forming capacitor charging network for disabling the energization of the switching relays.

9. An accessing controller in accordance with claim 1 wherein said output channel selector means includes a plurality of momentary contact push button activated switches.

10. An accessing controller in accordance with claim 1 wherein said distributor unit selector means includes a multiple position rotary selector switch.

11. An accessing controller for a signal control console device having a multiplicity of signal input channels variously and selectively connectable through said accessing controller to a plurality of signal output channels of the console device, said controller comprising, in combination,

a normally disabled distributor switching unit for each signal input channel, at least one unit having a plurality of selectively enabled output channels therefrom connected to corresponding output channels of said console device, distributor unit selector means connected to said distributor switching units enabling a selected one of said units for operation from the signal input channel for that unit and output channel selector means connected to select a predetermined signal output channel of the selected distributor unit for connection with the signal input channel of that unit.

12. An accessing controller in accordance with claim 11 wherein the selection of a different output channel of a selected distributor switching unit from the output channel then in effect by the output channel selector means connects the input channel of the selected switching unit to the additionally selected output channel of the selected switching unit as well as output channel in effect.

13. An accessing controller in accordance with claim 11 wherein some of the distributor switching units are of the character described in claim 3 and others of the distributor switching units are of the character described in claim 5.

14. An accessing controller in accordance with claim 11 wherein said distributor switching units are comprised of relay switches controlled from said output channel selector means and controlling the connection to a selected output channel of a signal input channel of a selected distributor switching unit.

15. An accessing controller in accordance with claim 14 wherein said distributor switching units are comprised of reed type switching relays.

16. An accessing controller in accordance with claim 11 wherein each distributor switching unit comprises a program signal input channel and an echo signal input channel and a plurality of program signal output channels and a plurality of echo signal output channels of which at least one program signal output channel and echo signal output channel are effective from an activated distributor switching unit at a time.

17. An accessing controller in accordance with claim 16 wherein said accessing controller is interlocked against the simultaneous selection of a pair of program channels and a pair of echo channels.

18. An accessing controller in accordance with claim 11 wherein each distributor switching unit also includes visual indicator means indicating that the selected distributor switching unit has been activated and the selected output channel connected to the signal input channel thereof.

19. An accessing controller in accordance with claim 11 wherein each of said distributor switching units includes a separate mixing resistor in each of its plurality of output channels connected to the signal input thereto.

20. An accessing controller in accordance with claim 11 wherein signal input to each distributor switching unit is supplied thereto from a microphone a different one of which is provided for each distributor switching unit and wherein a plurality of output channels of said console device are supplied to a multichannel signal utilization device.

21. An accessing controller for a signal channel control console device having a multiplicity of signal input channels variously and selectively connectable through said accessing controller to a plurality of signal output channels of the console device, said controller comprising, in combination,

a plurality of units of normally disabled distributor switching means, each unit comprising a plurality of such switching means each having an input side and an output side, one side connectable to a signal input channel and the other side to a signal output channel of the console device, all of one kind of said sides of said switching means of at least one of said units being connected with at least one signal channel of one kind selected from the signal input and signal output channels of the console device and a plurality of the other kind of said sides of said switching means of this one unit being connected respectively to separate signal channels different in an input and output kind from that selected for connection with said one kind of sides of the switching means of this one unit,

unit control means connectable with said units of distributor switching means, operable to condition for operation a predetermined units of said units of distributor switching means, and

switching means selector means connected with said units of distributor switching means operable to select for operation a predetermined distributor switching means of the unit conditioned by said unit control means and effect operation of this predetermined switching means to connect the signal input and output channels of the console device with which this predetermined switching means is connected.

22. An accessing controller in accordance with claim 21 wherein said units each comprise plurality of channel switching sections each section including a first transistor having a collector and an emitter, an SCR device having an anode and a gate, a diode connected between the collector of said transistor and the gate of the SCR device, a relay coil connected to the anode of the SCR device, a source of energizing potential, and a resistor connected between the power source and the collector of said transistor.

23. The invention in accordance with claim 19, further including a second transistor of similar conductivity type to said first-mentioned transistor, said second transistor having its

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collector connected to the emitter of said first mentioned transistor and its own emitter connected to reference potential.

24. An accessing controller for a signal channel control console device having a multiplicity of signal input channels variously and selectively connectable through said accessing controller to a plurality of signal output channels of the console device, said controller comprising in combination,

plurality of units of normally disabled distributor switching means, each unit connected with at least one of said signal input channels of the console device, each unit having a plurality of selectively enabled signal output channels, one connected with each of said switching means of its unit, the said signal output channels being connectable with at least one signal output channel of the console device and each said switching means of a unit being operable to connect a signal input channel associated with its unit and the signal output channel connected with

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this switching means of the same unit,
unit control means connected with said units of distributor switching means operable to condition for operation a predetermined unit of said units of distributor switching means, and

switching means selector means connected with said units of distributor switching means operable to select for operation a predetermined distributor switching means of the unit conditioned for operation by said unit control means and effect operation of this predetermined switching means to connect the signal output channel with which it is connected and thereby a signal output channel of the console device with which this signal output channel is connected with a signal input channel of the console device, with which the conditioned unit of distributor switching means is connected.

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