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(54) A System for the Transmission of Speech and Music to a Plurality of Seats

(57) A system for the transmission of speech and music to the seats of a bus or coach has, for each seat (2), a programme selector switch (4), an amplifier (5) with a volume control, and a pair of stereo loudspeakers (3). The system also includes similar components at the driver's seat (1), as well as a radio receiver (13), a tape and/or cassette recorder (16), and a microphone or microphones (32, 37, 39).

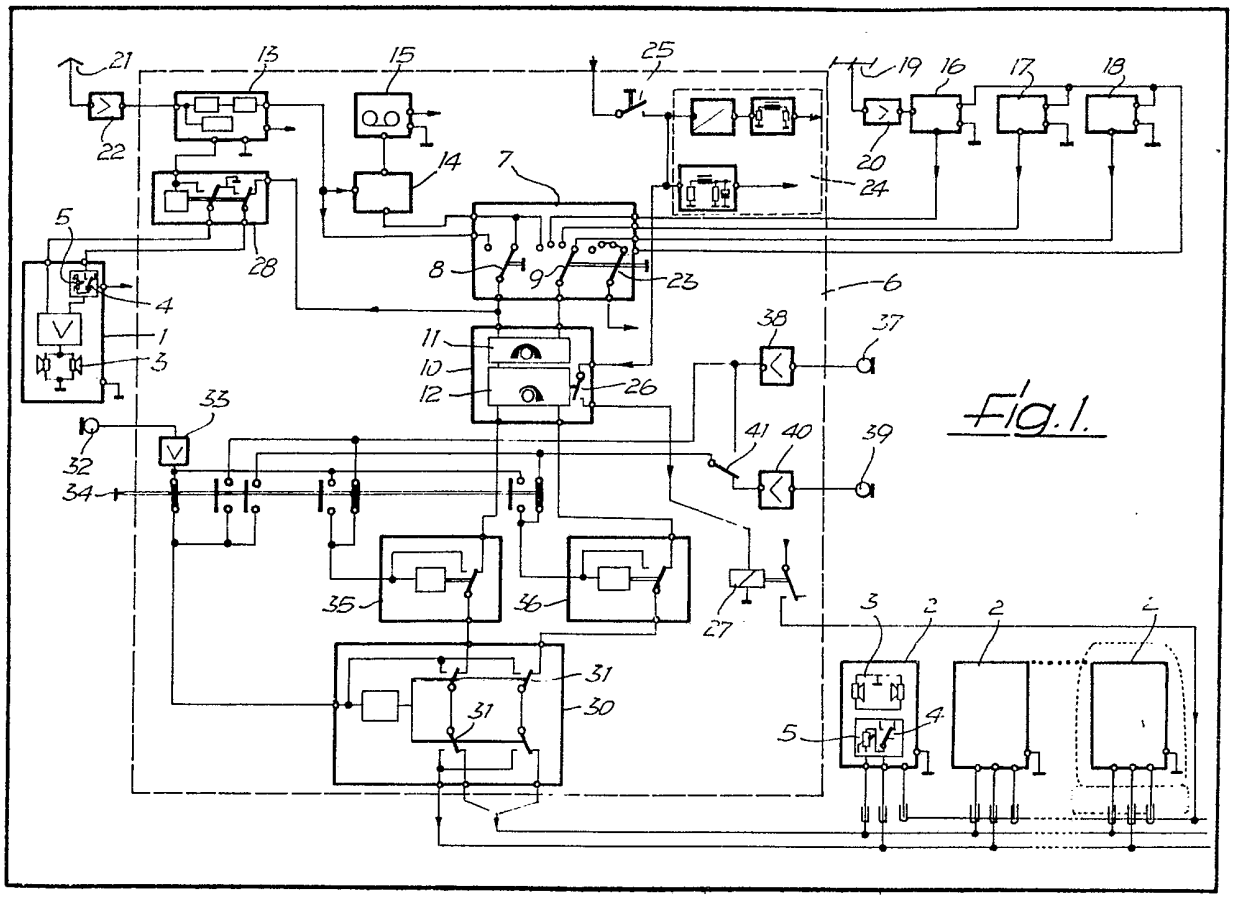

Fig. 1.

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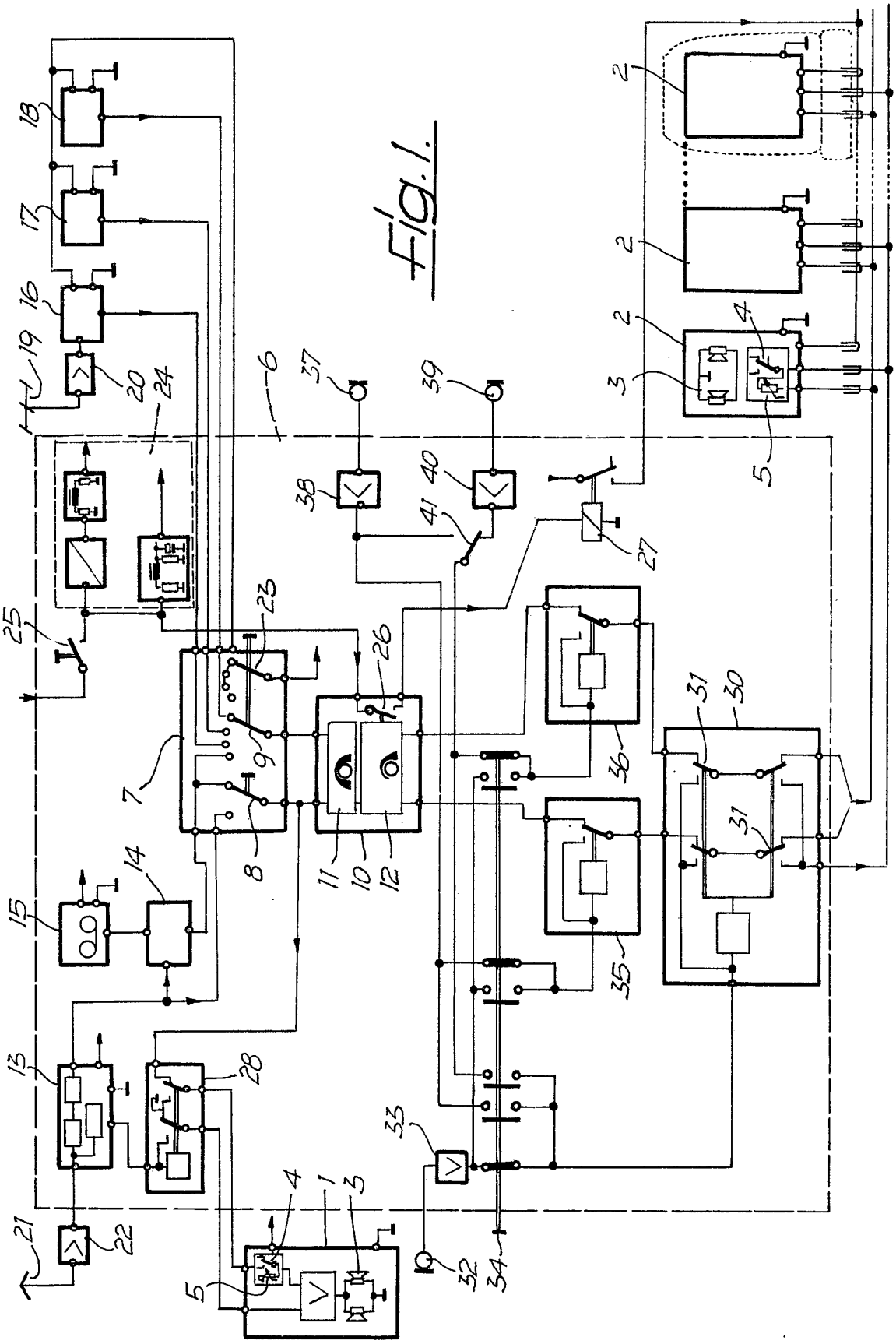

Fig. 1.

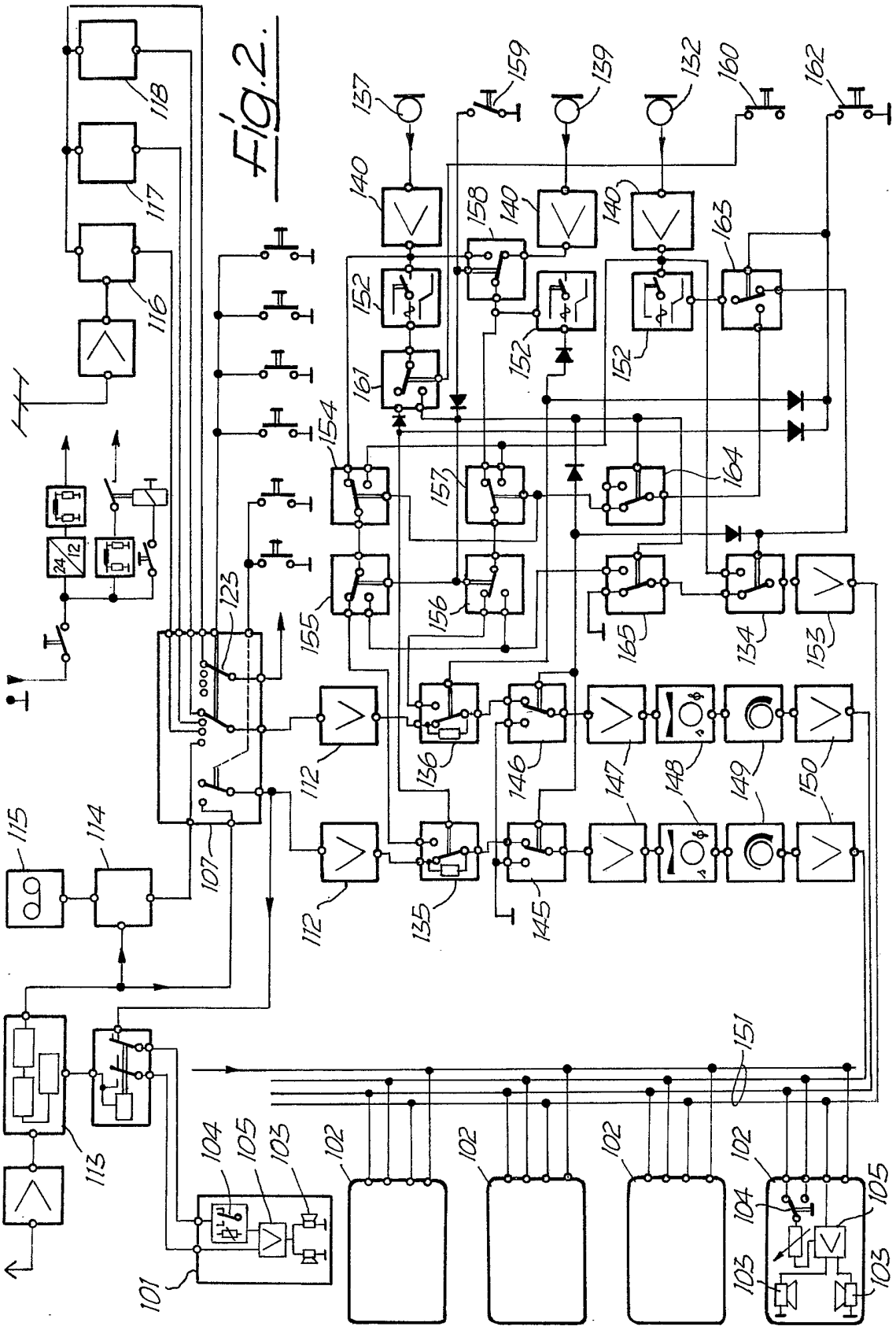

Fig.2.

SPECIFICATION

A System for the Transmission of Speech and Music to a Plurality of Seats

This invention relates to a system for the transmission of speech and music to a plurality of seats, for example in a coach or bus.

Known systems are installed in buses and have several loudspeakers fixed above the seats, to the side wall or roof of the bus. All the loudspeakers are connected to a common amplifier situated near the driver's seat so that he can adjust the volume and make other adjustments necessary. For transmission of information by microphone, the driver can fade his microphone announcements into the continuous programme.

These known systems have various disadvantages. The transmission of sound via the loudspeakers cannot be adapted to the individual requirements of the seat occupants either as regards programme or as regards volume. It is therefore not possible to transmit sound only to individual seats nor is it possible to transmit several programmes simultaneously. Furthermore, the sound quality, particularly of music, reaching each passenger is not satisfactory since there must be considerable interference at least at some of the seats due to the distance between the loudspeaker and the passenger. Another disadvantage is that the central amplifier to which all the loudspeakers are connected is expensive owing to its necessarily high power and any extension of the system, such as the provision of additional loudspeakers, generally cannot be carried out or only after replacement of the amplifier by a more powerful one, because the amplifier must be adapted to the loudspeaker to avoid unnecessary expense. Lastly, the cost of installing the equipment is considerable and servicing and repair is a skilled operation.

It is an object of the invention to provide a system which will meet the requirements of the passengers but still be advantageous in cost.

According to the invention there is provided a system for the transmission of speech and music to a plurality of seats, for example in a coach, comprising for each seat a programme selector switch, an amplifier, a volume control, and at least one loudspeaker.

By connecting a loudspeaker or pair of loudspeakers with each seat, the sound is virtually limited to the particular seat and this limitation of sound is further assisted by the relatively small distance between the loudspeaker and the head of the listener, who can now limit the maximum volume to a relatively low value. The small distance between the loudspeaker and the head of the listener is also an advantage from the point of view of fading out noise interference from outside, so that with suitable equipment, the installation can be used for transmitting music with high quality sound, without the listener having to wear headphones, which are uncomfortable if worn for a long time.

A programme selector switch enables each passenger to select a programme without overhearing other programmes. The volume control of the amplifier enables him to adjust the volume individually or to switch off the loudspeaker when he no longer wishes to listen in.

Other important advantages arise from the fact that an amplifier is provided for each seat. It eliminates the use of a central high power amplifier. This, in conjunction with the individual loudspeakers or pairs of loudspeakers and individual programme selector switches, enables the installation to be easily increased or decreased in size because all that is necessary to make such a change is to connect the amplifiers for additional seats to the low frequency transmission leads which are common to all the seats and to connect or disconnect the current supply. The apparatus is also simple to instal since the individual seat systems need only be connected to one cable harness.

The construction of the system of the invention as a modular system also facilitates servicing and repair. If, as is preferable, the electronic system associated with each seat is constructed as a plug-in circuit board, then a break-down can be dealt with by simply replacing the board with a new one, which requires no specialized skill. Correction of a break-down can therefore be carried out by the driver of a coach, for example, but even when a fault in the electronic system of one of the seats cannot be eliminated so easily, the system of the invention is still preferable to known systems because the other seats are not affected by the fault.

The loudspeaker or the pair of stereo loudspeakers, may be installed in the vehicle above the seat but it may also be installed in the seat itself and preferably in the head-rest. The programme selector switch and the pre-amplifier with volume control may also be installed in the vehicle in a position close to the associated seat or in the seat itself, for example in an arm rest.

If, as is preferred, each seat is also equipped with a tone control and balance control, every passenger has the same possibilities of adjustment available as in a domestic stereo system.

In a preferred embodiment, plug-in connections are provided between the components of the system mounted in the seats and the supply leads, in order to make assembly simpler and more fool-proof.

All the stereo amplifiers may be connected not only to a common low frequency transmission lead but to a common current supply lead. This simplifies assembly and in particular enables the electronic system of a seat to be easily switched off when the seat is not in use, so reducing current consumption. This is particularly important in a large bus.

It is generally not necessary for a passenger to be able to select from all available programmes such as radio programmes, one or more tape recordings, the sound of a television programme,

or the sound of a narrow width ciné film. The system may therefore be simplified by providing a programme selector equipped with a mechanical or electronic selector switch for at least one of the programmes which can be selected by means of the programme selector switch, so that by adjusting the mechanical or electronic switch to its various settings, different inputs which can be connected to the various sound sources are connected to the output leading to the amplifiers. Such a programme selector can therefore be used to select and restrict the number of programmes which can be chosen by the passenger.

To ensure that the maximum volume which can be adjusted at the seat will not exceed a permissible noise level, which may vary and may, for example, be adjusted to a lower level for a night journey than for a day journey, a preferred embodiment provides that all the amplifiers be connected to a preamplifier with a volume control, which fixes the maximum volume adjusted at the seats. This pre-amplifier is preferably combined with a tone control if the individual seats do not have separate tone controls.

The microphone of a system, which is generally controlled by the driver in a coach or bus, is preferably equipped with a switch connecting it in one of its settings with all the amplifiers associated with the seats. In this way, the microphone sound can be faded in at all the seats, preferably at a suitable volume for listening, regardless of the programme selected and the volume adjusted at a seat. This microphone can be used for making announcements to all passengers, even those not listening to a programme.

According to a preferred embodiment, the microphone is connected in the other setting of the change-over switch to speech fade-in devices of which there is one in each of the programme leads connected to the amplifiers of the seats and which fade the microphone sound into those seats which have the volume control adjusted to an audible volume, while the volume of the selected programme is at the same time reduced. The microphone may thereby be used for making announcements which will reach only those passengers who are tuned into a programme.

It is advantageous to provide at least two additional microphones, each of which is connected with one of the speech fade-in devices when the changeover switch is in one of its settings. In this way, various anouncements can be fed simultaneously into the various programmes; for example the micrphones can be used to transmit explanations simultaneously in different languages, for example in a sightseeing coach. In a preferred embodiment, at least one of the additional microphones can be connected to all the loudspeakers when the changeover switch is in its other setting, so that this microphone can be used to reach all those passengers who are not tuned into any programme or who have adjusted the volume control to an inaudible level.

It is preferable to provide an additional seat which, like the other seats, is equipped with a loudspeaker or a pair of stereo loudspeakers, a programme selector switch, a control amplifier, and a volume control, but which is also connected with a radio programme fade-in device which in the event of a radio transmission characterised by an identifying signal will fade in that radio transmission at a suitably audible volume regardless of the programme selected by the programme selector switch and the volume selected by the volume control. Radio traffic messages can thus be faded into the programme selected at the driver's seat without the traffic message being transmitted to the passenger seats.

To eliminate interferences as far as possible and keep installation cost low, the switches or changeover switches may be electronic signal switches. The programme selector switch may also be an electronic switch for the same reasons. Moreover, the keys of such a switch are easier to operate.

It is also advantageous to connect each microphone with an electronic speech switch, i.e. an electronic switch which can be connected by the signals produced by the microphone. This dispenses with the need for a hand-operated switch for switching the microphone on and off.

Two embodiments of the invention will now be described by way of example, with reference to the drawings, in which:—

Figure 1 is a block circuit diagram of the first embodiment; and

Figure 2 is a block circuit diagram of the second embodiment.

Referring to the drawings, a system for transmission of speech and music to the driver's seat 1 and the passenger seats 2 of a coach or bus has a pair of stereo loudspeakers 3 for each seat. The two loudspeakers of each pair are fixed to the left and right edges of a head-rest at the top of the seat back-rest, so as to be directed to the left and right ears of the occupant of the seat. The loudspeakers fulfil the requirements for transmission of music of so-called "hi-fi" quality. Each pair of loudspeakers is connected to a programme selector switch 4 and a stereo amplifier with a volume control 5, constructed as a plug-in modular circuit card and arranged in a beading at one side edge of the seat or of an arm rest, so that the card is easily replaceable.

A programmable or signal source selector 7, constructed on a modular basis and having two manually operated selector switches 8 and 9 and several inputs connected to the outputs of various sound signal sources, is arranged in an instrument housing 6 which is placed on or near the dashboard of the vehicle in such a position that its front panel is easily accessible to the driver. The selector switch 8 is shown associated with the first of the two programmes which can be selected by the programme selector switch 4, and in its first position it connects one input of a control device 10, which is connected to it in

series and contains a tone control 11 and a preamplifier 12 with a volume control, to the low frequency output of a radio receiver 13 for stereo reception. In its second position the switch 8 connects the said input to a radio fade-in device 14 whose two inputs are connected to the outputs of the receiver 13 or of a stereo cassette recorder 15. The selector switch 9 selectively connects the second input of the control device 10 to the output of the radio fade-in device 14 and, by way of this device 14, to the recorder 15, to the low frequency output of a television set 16, to a universal input 17 to which, for example, a second tape recorder may be connected, and to the sound track of a narrow width film projector 18. The television set 16 is connected to an omni-directional Kfz television serial 19 with a pre-amplifier 20, and the receiver 13 is connected to a Kfz radio serial 21 with a pre-amplifier 22.

A switch 23 is mechanically ganged with the selector switch 9. To save energy, when the selector switch 9 is in that position in which the recorder 15 is connected, the switch 23 disconnects the television set 16, the universal input 17 and the film projector 18 from a current supply unit 24 which can be connected to the vehicle electrical supply through a main switch 25, and has outputs for 12 volt and 24 volt DC. It is only in the other positions of the selector switch 9 that the other instruments are connected to the supply unit 24.

The volume control of the pre-amplifier 12 is coupled to a control switch 26 which is open when the volume control is in its off position and closed when a volume has been selected. The control switch 26 is connected in the energizing circuit of a relay 27, so that the passenger seat amplifiers 5, which are connected to a common current supply line, can be connected to the current supply unit 24 when the control switch 26 is closed. The passenger seat sets are disconnected from the supply unit 24 when the control switch is open, to save energy.

A line leads from the output of the selector switch 8 to a switching device 28 for traffic announcements, which is also connected to a traffic announcement decoder of the radio receiver 13. The radio fade-in device 14 co-operates with the switching device 28 so that when the selector switch 9 has selected the cassette recorder 15 as the sound signal source, traffic announcements can be faded into the driver's seat set at audible volume regardless of the volume selected there. At the same time, the traffic announcements are not transmitted to the passenger seat sets.

By means of the volume control of the pre-amplifier 12, the driver determines the maximum volume to which the passenger seat sets can be adjusted. It is thus possible to adapt the maximum volume to external conditions. The volume setting at the seat 1 is unaffected by the adjustment of the volume control 12.

The passenger seat sets are connected by plug-in connections to a cable harness which in addition to the current supply leads contains low frequency transmission leads from two outputs for a first and second programme, respectively, and a third output for a so-called pilot sound of a speech control device 30 which, like the programme selector 7, the control device 10, the radio fade-in device 14 and the switching device 28, is accommodated as a modular unit in the instrument housing 6. The speech control device 30 contains change-over switches 31 which normally connect the output for the first programme with the input for this programme and the output for the second programme with the input for that programme. Only when a gooseneck microphone 32, connected to a third input of the speech control device 30 by way of an amplifier 33 and a normally open contact of a push-button switch 34, is used at the driver's seat 1 are the changeover switches 31 automatically moved into their other setting in which they switch the microphone 32 to the pilot sound output. Messages given over the microphone 32 are transmitted at a suitable volume to all the passenger seats 2 by the loudspeakers 3 by way of the aforesaid output and a lead connecting it to the seats 2, regardless of the programme and volume adjusted at any of those seats. This enables the driver to notify all the passengers of important meassages.

A first speech fade-in device 35 is connected between the output of the pre-amplifier 12 for the first programme and the corresponding input of the speech control device 30. A like second speech fade-in device 36 is also a modular unit arranged in the instrument housing 6 and is connected between the output of the pre-amplifier for the second programme and the corresponding input of the speech control device 30. A first additional microphone 37 with an amplifier 38 connected in series is connected to a second input of the first speech fade-in device 35, by a normally open contact of the push-button switch 34. Any message transmitted through the microphone 37 reduces the volume at which the first programme is transmitted to the passengers and fades the message into the first programme. A second additional microphone 39 with an amplifier 40 connected in series is connected by another normally open contact of the switch 34 to the second input of the second speech fade-in device 36, which fades a message into the second programme by way of the microphone 39 while reducing the volume of the second programme. The volume at which the first and second programmes can be heard during fading in of a microphone-transmitted message can be adjusted at the two speech fade-in devices 35 and 36. The second additional microphone 39 can be switched off and the first additional microphone 37 connected to the second speech fade-in device 36 by means of a switch 41, in order to fade a microphone message into both programmes.

If the push button of the switch 34 is pushed down two normally closed contacts of the switch

contact the additional microphones 37 and 39 instead of the gooseneck microphone 32 to the third input of the speech control device 30. The microphone 32 is at the same time connected to the second input of the two speech fade-in devices 35 and 36. When the push button switch 34 is in this position, messages are therefore transmitted at an appropriate volume over the additional microphones 37 and 39 to all the passenger seats 2 regardless of the volume to which the passenger seat loudspeakers have been adjusted and of the selected programme. Messages given over the gooseneck microphone 32, on the other hand, are faded into the first and second programme and the volume of these programmes is at the same time reduced.

Referring to Figure 2, the second embodiment is also a system for transmission of speech and music to the driver's and passengers' seats of a coach or bus. It is in principle of the same construction as the first embodiment and corresponding components are indicated by the Figure 1 reference numerals increased by 100.

The driver's seat 101 and the passenger seats 102 are each equipped with a pair of stereo loudspeakers 103. The two loudspeakers of each pair may be arranged on or in the headrest of the seat, but they may also be mounted in the vehicle in a position above the seat. Each pair of loudspeakers 103 is connected to a manually operated programme selector switch 104 and a stereo amplifier with a volume control 105. These components, in the form of a plug-in modular printed circuit, are arranged in the seat, for example in an armrest of the seat, or they may be fitted to the vehicle in a position above the seat.

A programme selector 107 is easily accessible to the driver and in contrast to the first embodiment, this selector 107 is an electronic switch with push buttons equipped with an electronic lock. Switch TCA 1029 manufactured by Valvo, for example, is suitable. The various sound signal sources can be selected with the programme selector 107 as in the first embodiment.

Connected in series with each of the two outputs of the selector 107 for two different programmes is a stereo pre-amplifier 112. Each pre-amplifier 112 has an electronic speech fade-in device 135, 136, respectively, connected to its output, by means of which fade-in device a microphone message can be faded into any programme being transmitted. The volume of the programme is automatically reduced during the microphone message. One programme output of the selector 107 may be selectively connected to the low frequency output of a stereo radio receiver 113 and a radio fade-in device 114 whose two inputs are connected to the outputs of the receiver 113 and stereo cassette recorder 115. The other programme output can be selectively connected to the output of the radio fade-in device 114 and through this device to the recorder 115, the low frequency output of a television set 116, the output of a tape recorder 117, and the sound output of a narrow width film projector 118.

As in the first embodiment, the programme selector has a switch 123 by which the sound signal sources which have not been selected are automatically switched from the current supply to save energy.

Each electronic speech fade-in device 135, 136 has an electronic signal changeover switch 145 or 146, respectively, connected in series with it. This changeover switch may be, for example, a Valvo TCA 1028 switch. In the switching position shown in Figure 2, they connect the loudspeakers 103 to one of the programme outputs of the selector 107. In the other switching position, they connect the subsequent units to earth, thus switching off these two programme channels.

As shown in Figure 2, each of the two electronic signal changeover switches 145, 146 is connected in series with a pre-amplifier with volume adjustment 147, a tone control 148, an overall volume control 149 and a low frequency end stage amplifier 150, in that order. A ring circuit 151 leading to all the passenger loudspeakers is supplied from the two low frequency end stage amplifiers 150.

As in the first embodiment, a microphone, preferably a gooseneck microphone 132, is arranged at the driver's seat. First and second additional microphone 137, 139 are also provided. These microphones may be used by the driver or his neighbour, for example a courier, to make announcements. In order that the user of the microphones 132, 137, 139 does not have to switch the microphone on by hand every time an announcement is to be made, each microphone is connected to an electronic speech switch 152 containing an amplifier and an electronic signal changeover switch. The latter may be like the signal changeover switch 145 or 146. If the signals at the input of the speech switch 152 are below a certain level, the switch 152 functions as an open switch, but for signals above that level it functions as a closed switch.

The passenger loudspeaker 103 are not only connected to the outputs of the two end stage amplifiers 150 by way of the programme selector switch 104, but are directly connected through a third channel to the output of a third low frequency end stage amplifier 153 which, when none of the microphones is in use, has its input connected to ear h by a changeover switch 134 and an electronic signal changeover switch 165 connected in series with the switch 134. The changeover switch 134 is also an electronic signal changeover switch which, like the other changeover switches, may be a Valvo TCA 1028 switch. Any message given over the gooseneck microphone 132 shifts the changeover switch 135 into its other position, whereby the microphone 132 is switched to the input of the low frequency end stage amplifier 153. A message over the microphone 132 reaches all the passenger loudspeakers, regardless of whether a

passenger has selected a programme and to what volume it is adjusted.

When the first additional microphone 137 is used, a signal from this microphone reaches the second input of the speech fade-in device 135 of the first channel by way of two electronic signal changeover switches 154 and 155. At the same time, this speech fade-in device is automatically switched over so that the announcement made over the microphone is transmitted at an appropriate volume while the volume of the programme is reduced. The announcement reaches all those loudspeakers which are adjusted to this programme. When the second additional microphone 139 is used, an announcement is in the same way faded into the other programme at the correct volume while the sound level of the programme is reduced as required. For this purpose, the second input of the electronic speech fade-in device 136 is connected by way of three electronic signal changeover switches 156, 157, 158 to the output of the microphone pre-amplifier 140 which adjusts the sound level. The control input of the speech fade-in device 136 which, like the fade-in device 135, is a modified electronic signal changeover switch, is connected to the output of the electronic speech switch 152 which is connected in series with the microphone 139.

The second additional microphone 138 can be switched off by a manually operated switch 159, and the first additional microphone 137 may also be connected in place of the second microphone to the channel for the second programme. This changeover is effected by means of the electronic signal changeover switch 158 which has one input connected to the output of the microphone pre-amplifier 140 of the microphone 137 and its other input to the output of the microphone pre-amplifier 140 of the microphone 139.

The first additional microphone 137 also has a push-button switch 160 connected to it, which, when operated, connects the microphone 137 to the input of the low frequency end stage amplifier 153. The microphone announcement may thus be transmitted to all the passenger loudspeakers in the same way as when microphone 132 is used, regardless of whether the loudspeakers are switched on and the volume to which a selected programme is adjusted, since the signal changeover switch 155 is shifted when the push-button switch 160 is closed. At the same time, depression of the push-button switch 116 shifts the signal changeover switch 155 by means of an electronic signal changeover switch 161 which is connected in series with the electronic speech switch 152 of the microphone 137.

When the gooseneck microphone 132 is in use, a second push-button switch 162 serves to transmit an announcement only to those loudspeakers which have been switched on by passengers by selection of a programme. The programme is transmitted at reduced volume while the announcement is transmitted. For this purpose, an electronic signal changeover switch 163, which is shifted by operation of the second push-button switch 162, is connected in series with the electronic speech switch 152 connected in series with the pre-amplifier of the microphone 132, so that the output signals of the speech switch 152 are switched to the control input of the two electronic signal changeover switches 154 and 157 through another electronic signal changeover switch 164. These switches 154 and 157 are thus automatically adjusted to the position in which they connect the microphone 132 to the two speech fade-in devices 135 and 136 when the microphone 132 is in use.

Claims

1. A system for the transmission of speech and music to a plurality of seats, for example in a coach, comprising for each seat a programme selector switch, an amplifier, a volume control, and at least one loudspeaker.

2. A system according to claim 1 including a radio receiver, a tape and/or cassette recorder, and at least one microphone.

3. A system according to claim 1 or claim 2 wherein a pair of stereo loudspeakers is associated with each seat and the amplifier is a stereo amplifier.

4. A system according to any preceding claim wherein the programme selector switch, the amplifier and the volume control are installed in or above the respective seat.

5. A system according to any preceding claim wherein the or each loudspeaker is installed in the associated or above the respective seat.

6. A system according to any preceding claim wherein electronic components installed in or above the seats are plug-in modular units.

7. A system according to any preceding claim wherein at least some of the seats are equipped with a tone control and a balance control.

8. A system according to any preceding claim having plug-in connections between components built into the seats and leads supplying such components.

9. A system according to any preceding claim wherein all the amplifiers are connected to a common low frequency programme loop and to a common energy supply line.

10. A system according to any preceding claim wherein all the amplifiers are connected to a pre-amplifier and tone control unit having a volume control which fixes the maximum volume that can be selected at any seat.

11. A system according to claim 7 having a programme selector connected in series with the pre-amplifier, the programme selector having a mechanical or electronic selector switch for at least one programme selectable by the selector switch, by means of which switch, in its various settings, one of several inputs connectible to several sources of sound is connected to the output leasing to the pre-amplifier.

12. A system according to claim 2 wherein a changeover switch, in one of its positions, connects the microphone to the amplifiers at the

seats, the microphone signal being faded in at the correct amplitude for listening at all the seats, regardless of the selected programme and adjusted volume.

13. A system according to claim 12 wherein, in the other setting of the changeover switch, the microphone is connected to speech fade-in devices, one such device being provided in each programme supply lead connected to the amplifiers, the said devices fading in the microphone signal to each of those seats which have their volume control adjusted to an audible volume, the volume of the selected programme being at the same time reduced.

14. A system according to claim 13 having at least two additional microphones which, in one setting of the changeover switch, are each connected to one of the speech fade-in devices.

15. A system according to claim 14, wherein, in the second setting of the changeover switch, at least one of the additional microphones can be connected to all the loudspeakers.

16. A system according to any preceding claim, wherein at least one loudspeaker, one programme selector switch, an amplifier and a volume control are associated with an additional seat in the same way as the other seats, the said loudspeaker, selector switch amplifier and volume control being connected in series with a radio programme fade-in device which, in the event of a radio programme characterised by an identifying signal, fades this programme in at the appropriate volume regardless of the programme selected by the selector switch or the volume selected by the volume control.

17. A system according to claim 11, claim 12 or claim 16, wherein the switches and changeover switches are electronic signal changeover switches.

18. A system according to claim 1, wherein the programme selector switch is an electronic switch and has electronically lockable keys.

19. A system according to claim 2, wherein the or each microphone is connected in series with an electronic speaking switch.

20. A system for transmission of speech and music to a plurality of seats in a bus or coach, constructed and arranged substantially as herein described and shown in the drawings.

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