BROADCASTING HOUSE

PART 6. DRAMATIC CONTROL UNITS.

There are three dramatic control panels known respectively as D.C. No. 1, D.C. No. 2 and D.C. No. 3. D.C. Nos. 1 and 2 are each eleven-channel equipments to the Designs code DC/3 and formed part of the original equipment at Broadcasting House. D.C. No. 3 was added later and is a fifteen-channel equipment to Designs code DC/5, incorporating special auxiliary switching facilities and echo switching. The auxiliary switching is designed to cater for shows such as the Christmas Day Empire Exchange programme in which certain of the Dominions overseas not only take the programme via Radio Terminal, but also contribute part of it ; in such cases when incoming programme is being received from overseas, the line supplying the particular Dominion is switched to another output of the D.C. unit from which the incoming programme is omitted in order to prevent all possibility of a howl occurring round the radio loop.

As regards the normal type of dramatic production, the operation of all three dramatic control panels is similar except for the echo arrangements. The operation of a dramatic control panel for a dramatic production of the normal type will, therefore, first be described, any differences which exist in the operation of the three panels being noticed in passing. The auxiliary switching on D.C. No. 3 will be dealt with separately afterwards.

Normal Programme Switching.

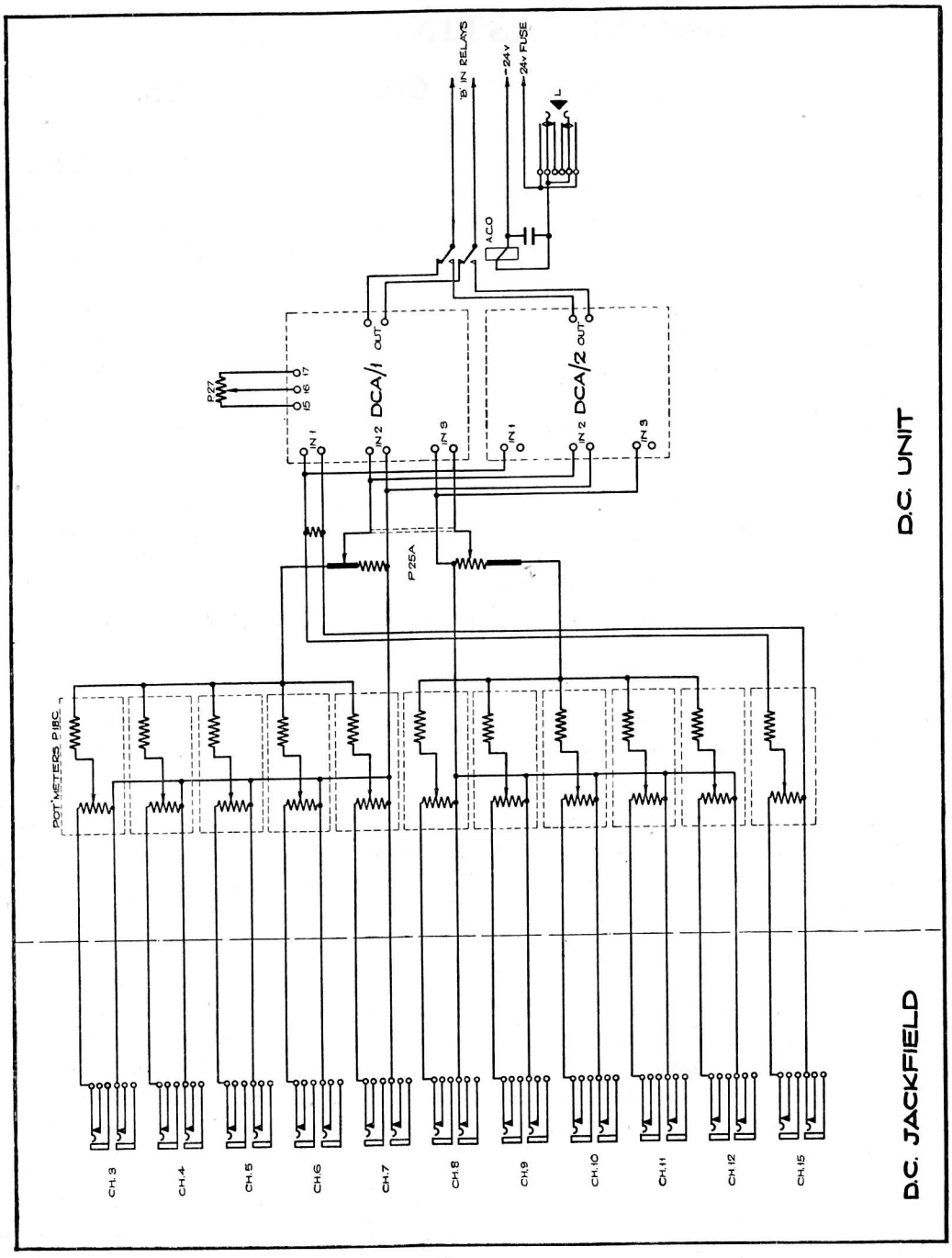
D.C. Nos. 1 and 2 each have eleven programme input channels numbered 3-12 and 15, and comprising two groups each of five channels, 3-7 and 8-12 respectively, and an independent channel, No. 15.

D.C. No. 3 has fifteen channels numbered 1-15, and comprising two groups 1-7 and 8-14 respectively, and an independent channel, No. 15.

> The reason for the special numbering of the input channels of D.C. Nos. 1 and 2 is to enable the same chart to be used in the case of all three D.C. units for indicating the programme connections required for any particular show.

The programme connections are carried out on the Echo & D.C. jackfield. In this jackfield the D.C. programme input channels are terminated in input and listen jacks. The No. 1 and No. 2 outputs of the studio ' A ' and ' D ' amplifiers and the echo room inputs and echo ' A ' amplifier outputs are available in this jackfield, together with tie-lines from the Line Termination bay for other programme sources. Thus, any of the available programme sources can be connected as required to any of the D.C. input channels by means of double-ended cords.

Associated with each of the channels there is a fade control on the D.C. unit. There is also a group mixer for selecting the output of either of the groups for connection to the D.C. output. The output of the independent channel is connected in parallel with the output of the group mixer so as to enable the programme source plugged up to this channel to be superimposed upon the D.C. output whenever required.



Drawing B 3535 Issue 1

Fig. 1. Programme Wiring—D.C. No 1.

Normal Programme Switching (*Contd*)

The mixing arrangements are shown in the programme wiring drawings, Figures 1 and 2 for D.C. Nos. 1 and 2 respectively, and Figure 9 for D.C. No. 3. The latter drawing also includes the auxiliary switching connections which will be dealt with later.

The incoming channels are all fed from amplifiers having output impedances of 300 ohms, and the fade potentiometers each have a total resistance of 600 ohms which is the normal output load for the amplifiers. The wipers of the potentiometers of the channels comprising each group are connected in parallel across the associated 100,000 ohm potentiometer in the group mixer. A 10,000 ohm resistance is included in series with each wiper so as to prevent the level obtained from any one channel being appreciably affected by the fading up or down of other channels.

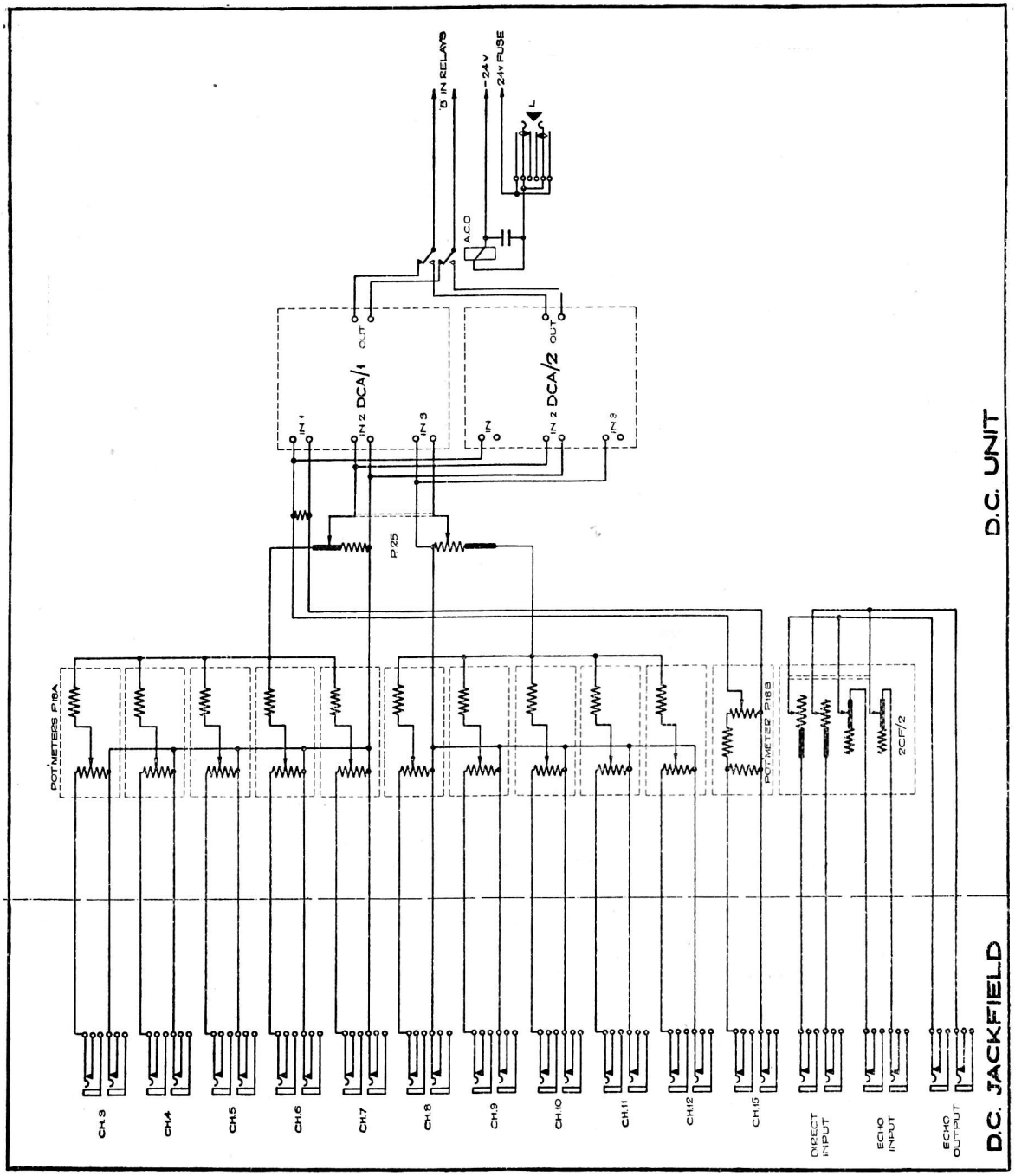
For example, in the case of D.C. Nos. 1 and 2, if only one channel is faded up it works through 10,000 ohms into a resistance made up of four 10,000 ohm resistances in parallel with the 100,000 ohm potentiometer in the group mixer, i.e. into a load of 2,400 ohms. In the case of D.C. No. 3, if only one channel is faded up it works through 10,000 ohms into a load made up of six 10,000 ohm resistances in parallel with the 100,000 ohm potentiometer in the group mixer,i.e. into a load of approximately 1,640 ohms. If the remaining channels in the group are now fully faded up, each channel works through 10,000 ohms into a resistance made up, in the case of D.C. Nos. 1 and 2 of four resistances of 10,200 ohms (10,000 ohms in series with the 600 ohm fade potentiometer and 300 ohm amplifier output in parallel) in parallel with the 100,000 ohm group mixer, and in the case of D.C. No. 3 through 10,000 ohms into a resistance made up of six resistances of 10,200 ohms in parallel with 100,000 ohms, i.e. into a load of approximately 2,485 ohms in the case of D.C. Nos. 1 and 2, and of approximately 1,672 ohms in the case of D.C. No. 3. The level obtained from each channel thus remains practically unaffected by the fading up or down of other channels.

In the case of the independent channel, the fade control incorporates a shunt resistance in addition to the 10,000 ohm series resistance, in order to adjust the output to the same value as that obtained from any of the other channels.

It will be seen that both groups are at full volume in the mid position of the central mixer, and as the mixer is moved to an extreme position one group is faded out while the other remains at full volume.

The two outputs of the central mixer and that of the independent channel are combined in a two-stage amplifier having individual first stages for each of the inputs and a common output stage. The gain of the amplifier is adjusted to compensate for the loss introduced in the mixing system so that the volume available in the output of the D.C. unit is approximately the same as that available in the output of the ' A ' amplifiers connected to the D.C. input channels.

In both D.C. No. 1 and D.C. No. 2 amplifier DCA/1 is incorporated in the unit and amplifier DCA/2 is mounted as a spare, under the D.C. unit ; the inputs are capacitatively coupled. In the case of D.C. No. 3 the amplifier, type DCA/4A, is mounted in the control room and transformer coupling is used. An additional amplifier, type DCA/4B, is used with D.C. No. 3 when the auxiliary switching circuits are required. The amplifier equipment in each case is duplicated, relay switching shown in Figures 1, 2 and 9, controlled by a key on the D.C. unit, being provided to enable the output connections, and in the case of D.C. No. 3 the input connections as well, to be changed-over to the spare amplifier in the event of failure of the amplifier in use.



Drawing B 3536, Issue 1

Fig. 2. Programme Wiring—D.C. No. 2.

Normal Programme Switching (*Contd*)

On D.C. No. 1 a control panel is provided, of which the potentiometer is connected in circuit between the two stages of the DCA/1 amplifier, and the programme meter can have its input plugged up (on the programme meter amplifier bay) to the output of the programme meter amplifier associated with the ' B ' amplifier to which the D.C. output is connected.

Arrangements for Echo.

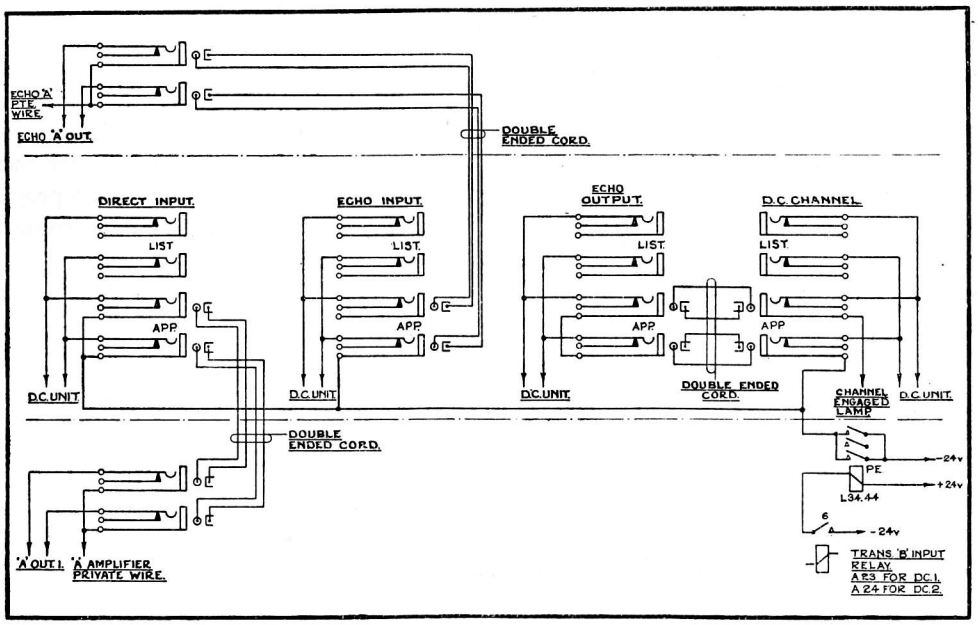
In the case of *D.C. Nos. 1 and 2* a separate echo room is required for each channel on which echo is to be superimposed. The connections are set up on the Echo & D.C. jackfield and the arrangement of the switching is shown in Figure 4. The No. 2 output of the studio ' A ' amplifier is plugged up to the echo input, and the echo ' A ' output to a separate D.C. input channel. The direct input and the echo input are then separately controlled by means of the fade controls associated with the two channels.

On *D.C. No. 2* a special mixer is provided for mixing the direct and echo sources prior to their connection to the D.C. panel, so as to enable both to be controlled by the same fade control. The arrangement of the switching is shown in Figure 3. The mixer inputs are wired to jacks in the Echo & D.C. jackfield, designated **Echo In** and **Direct In,** and the mixer output to a jack designated **Output.** The No. 1 output of the ' A ' amplifier of the studio on which echo is required, is connected to the **Direct Input** jack and its No. 2 output to the input jack of the echo room to be used. The echo ' A ' output is then plugged up to the **Echo Input** jack of the mixer. The mixer **Output** jack is plugged up to one of the D.C. channel input jacks.

D.C. No. 3 is arranged so that no more than two echo rooms, one for each group, are required, however many of the programme sources need to have echo superimposed. Separate channels are still necessary for the direct and echo sources, but the echo level is controlled on the input side of the echo room. If, therefore, echo is simultaneously required on more than one channel in a group, the echo sources are mixed at the appropriate levels prior to being fed to the echo room. The mixed echo output is connected, over the contacts of a relay, in parallel with the mixed direct outputs, to the input of the central mixer associated with the particular group. The only limit to the number of studios which can have echo superimposed on them is the number of channels available. For example, if there are four studios connected to the group of channels 1-7, then it will only be possible to have echo on three of them.

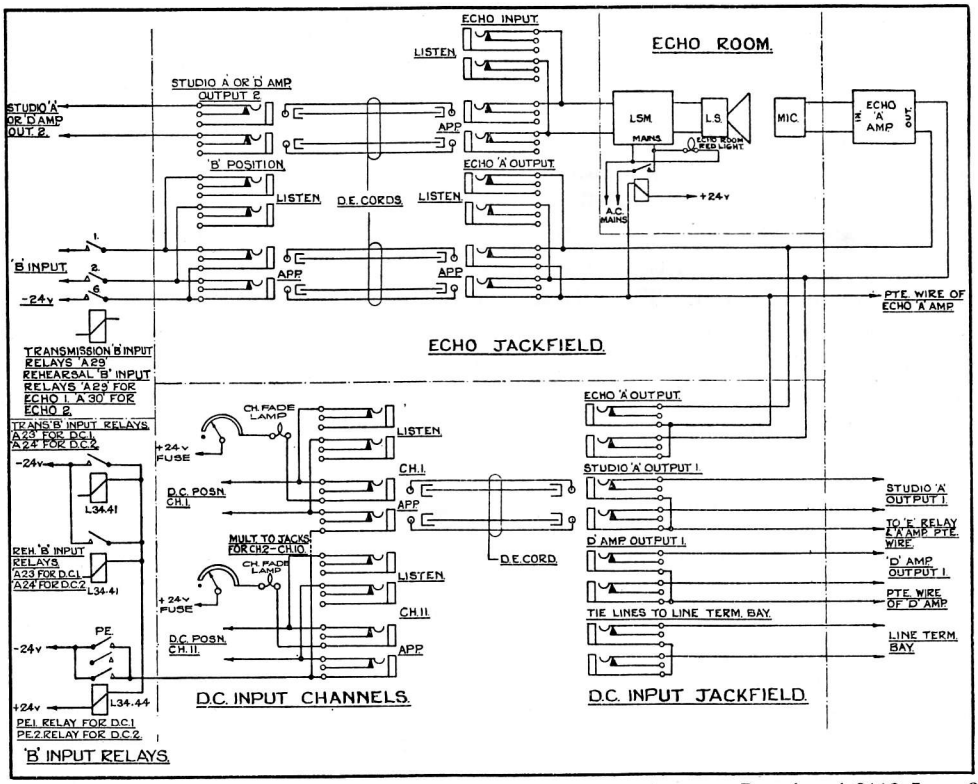
The switching arrangements are shown in Figure 9.

In the case of a studio source with which echo is required, the No. 1 output of the ' A ' amplifier is connected to one of the D.C. input channels and the No. 2 output to another in the same group. A two-position key is equipped for each of the channels on the D.C. control panel. When these keys are in their normal position the output of the fade control potentiometer is connected across one input of the group mixer. If a channel is to be used for echo (i.e. a channel plugged up to an ' A ' amplifier No. 2 output) the key must be thrown to the **Echo** position. The output of the channel is then transferred from the group mixer input to the input of an echo trap valve amplifier, and a 10,000 ohm compensating resistance is connected across the input to the central mixer in order to prevent the volume from the



Drawing A 1866 *Issue* 4

Fig. 3. Special Echo Mixer—D.C. No. 2.



Drawing A 2112 *Issue* 3

Fig. 4. Echo and D.C. Switching—D.C. Nos. 1 and 2.

Arrangements for Echo (*Contd*)

other channels in the group being affected. There are two echo trap valve amplifiers, one associated with each group of D.C. input channels, No. 1 with group 1-7, and No. 2 with group 8-14. The output of each echo trap valve amplifier is connected to an **ECA Out** jack in the Echo & D.C. jackfield. This is plugged up to an echo input and the associated echo ' A ' output is plugged up to the **Echo In** jack for the particular group, and is thus connected via the make contacts of a relay, in series with a 10,000 ohm resistance, across the appropriate input of the group mixer. The operating circuit of the relay is completed, via the contacts of the echo key and in series with the channel fade lamp circuit, when the channel is faded up. The echo output is thereby superimposed on the group output when that is faded up. Alternatively, the echo ' A ' amplifier output can be connected, via the **Echo In CH. 15** jack, across the output of channel 15, in which case the echo will be independent of the central mixer.

The independent channel No. 15, is provided with a three-position key which enables it to be connected to either of the echo trap valve amplifiers. This facility was originally designed to enable channel 15 to be used as an echo source with either group if required, but as the echo output relay circuits are not wired to the key it is no longer available.

Amplifier Switching.

The amplifier switching is controlled by means of the ' B ' amplifier input switching. Assuming the programme input connections have been set up as described, then when the D.C. output is punched up to the input of a ' B ' amplifier, the associated **A** relay in the ' B ' amplifier input switching relay field completes a circuit for the operation of the **PE** relay associated with the particular D.C. unit, see Figure 4. This relay upon operation connects −24 volts, via the sleeve circuit of the D.C. input channel jacks and of the jacks associated with the various programme sources plugged up to them, to the private wire of the ' A ' or ' D ' or echo ' A ' amplifier, as the case may be. In the case of an ' A ' amplifier, −24 volts is also applied to the winding of the **E** relay which lights the circuit engaged lamps. In the case of an echo source, −24 volts is applied both to the private wire of the echo ' A ' amplifier and also to the relay which switches on the loudspeaker amplifier and red light in the echo room. The D.C. ' A ' amplifiers for talking back are also switched by private wire from the No. 6 contact of the **A** relay associated with the particular D.C. Output in the ' B ' amplifier input switching relay field.

The operation of the **PE** relay also applies −24 volts to one side of the channel fade lamps equipped above the fade controls on the D.C. unit. (See Figures 8 and 10). The other side of these lamps is connected each to an auxiliary switch equipped on the fade unit, by means of which, as soon as the particular channel is faded up, the +24 volts connection is completed and the lamp is lighted. (This switch also controls the loudspeaker switching as described later). The channel fade lamps are each provided with a socket into which can be fitted a lamp-cap indicator marked to indicate the programme source connected to the particular channel. In the case of D.C. No. 3 the circuit is identical with the above for channels connected to direct programme sources but for channels connected to echo sources the channel fade lamp, as mentioned previously, gets its earth via the contacts of the echo key, which is operated, and the winding of the echo output relay. In the case of D.C. No. 3,

Amplifier Switching (*Contd*)

there is also a second auxiliary switch operated by the channel fade controls, and shown in Figure 10, which comes into action with the auxiliary switching described later.

The DCA amplifiers are switched manually, with the exception of amplifiers DCA/4B which are automatically switched on when the auxiliary circuits are plugged up. In the case of amplifiers DCA/4A, a single key switches on both the amplifiers.

Loudspeaker Switching.

Provision is made for each of the studios to receive the complete D.C. programme by loudspeaker, excepting when the particular studio is contributing its part of the programme. The programme is also reproduced by a loudspeaker in the dramatic control room. The arrangement of the switching is shown in Figure 8 for D.C. Nos. 1 and 2 and in Figure 10 for D.C. No. 3. A simplified schematic is given in Figure 5.

Connections must be made in the Loudspeaker jackfield between the LS input jacks of the studios in use and the DC.LS channel jacks, the loudspeaker in a particular studio being connected to the loudspeaker channel jack corresponding to the D.C. channel to which the particular studio output has been connected. For example, if the microphone in studio No. 6A is connected, via its ' A ' amplifier No. 1 output, to No. 3 D.C. input channel, then the loudspeaker in studio No. 6A must be connected to No. 3 DC.LS channel jack.

When echo is being used on a programme source, connection must also be made between the **DC.LS Echo Chan** jack of the channel to which the direct source is connected and the **DC.LS Chan** jack of the channel to which the echo source is connected. The purpose of this connection is explained later.

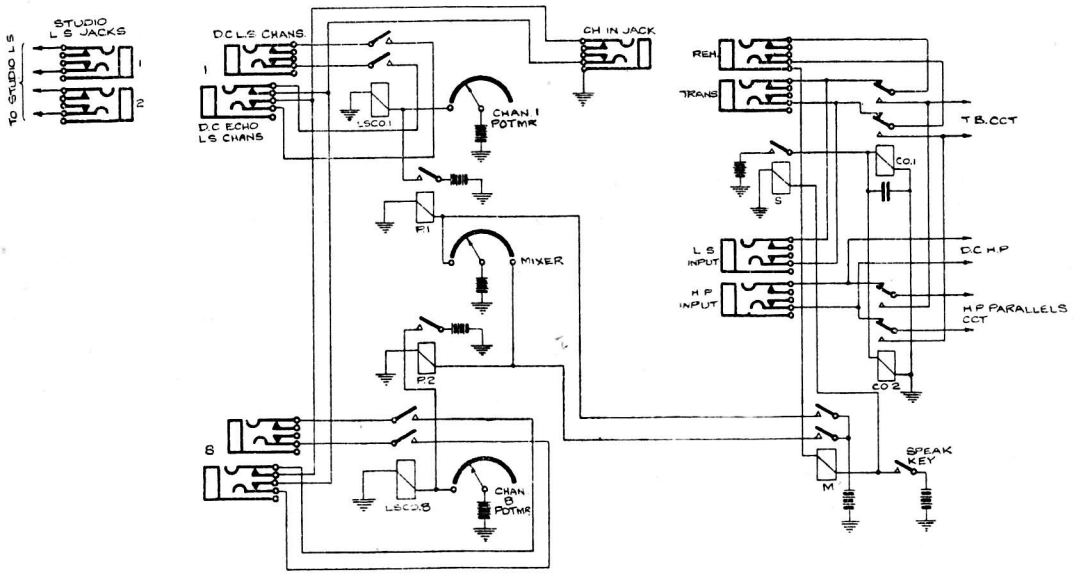
In the case of a *transmission*, connection must be made from the **CH.In** jack to the **Trans** jack and from the **DC.LS** and **LS Input** jacks to the **LS** output of the trap valve amplifier associated with the ' B ' amplifier on which the transmission is being controlled. The studio housephone inputs must be plugged up to the strip of parallel jacks in the Housephone jackfield, wired to the housephone circuit of the particular D.C. unit, and connection made between the **HP Input** jack and the **HP** output of the trap valve amplifier. (See Footnote page 9).

In the case of a *rehearsal*, connection must be made between the **CH. In** jack and the **Reh** jack, and between the **DC.LS** and **LS Input** jacks and the **LS Output** of the rehearsal ' B ' amplifier on which the rehearsal is to be controlled. The studio housephone inputs should also be plugged up to the D.C. housephone parallel jacks, and the **HP Input** jack to the **HP & DC** output of the ' B ' amplifier. (See Footnote, page 9).

The outers of the **DC.LS Chan** jacks, to which the studio **LS** jacks are plugged up, are connected each to the travellers of an **LS.CO** relay associated with the particular channel. The make contacts of this relay are connected to the outers of the associated **DC.LS Echo Chan** jack, the inners of which are connected to the outers of the **CH.In** jack. Thus, when the **LS.CO** relay associated with a particular channel operates, the loudspeaker in the studio associated with this particular channel will be connected so as to reproduce the D.C. output.

Loudspeaker Switching (*Contd*)

−24 volts is standing on one side of the winding of all the **LS.CO** relays. The other side of the winding is connected to the **Off** position of the auxiliary switch equipped on the fade control of the particular channel and also to one of the make contacts of the **P** relay associated with the particular group to which the channel belongs. +24 volts is thus applied to this winding of the particular **LS.CO** relay when either the particular channel is faded out through **O** to **LS**, or when the **P** relay associated with the group operates.



Drawing S.K. 337 Issue 2.

Fig. 5. Loudspeaker Switching Circuit.

One side of the winding of each **P** relay has −24 volts standing on it, and the other side of the winding is connected to one of the off positions of an auxiliary switch on the central mixer. The wiper of the auxiliary switch has +24 volts standing upon it and consequently when the mixer is turned to its extreme position on either side, in which one of the groups will be completely faded out, the **P** relay associated with this group will operate, completing the circuit for the operation of the **LS.CO** relays associated with all the channels in that group and thereby causing their loudspeaker input circuits to be completed.

At the date of issue of this instruction the wiring in the case of *D.C. Nos.* 1 *and* 2 differs slightly from that shown in Figure 8. A single **LS** & **HP Input** jack replaces the separate **LS Input** and **HP Input** jacks, and this is plugged up to the **HP** output of the trap valve amplifier in the case of a transmission or to the **HP** & **DC** output of the 'B' amplifier in the case of a rehearsal. An attenuator in series with the outers of the **CH In** jack secures the necessary reduction in volume for the loudspeaker circuits. Also relay **CO. 2** is omitted.

Loudspeaker Switching (*Contd*)

These arrangements ensure that in no studio will the loudspeaker be in operation while the channel to which its microphone is connected is faded up.

However, but for the **DC.LS Echo Chan** jack connection it would be possible, when echo is being used on any studio, for the producer to cause the whole system to howl if he omitted to fade out the echo channel at the same time as he faded out the direct programme source ; for, as soon as the studio channel was faded out, the loudspeaker in that studio would be brought into circuit while, if the echo channel had not been faded out, the microphone in the same studio would be connected, via the No. 2 output of its ' A ' amplifier and the echo room, to the loudspeaker input. To obviate this condition, connection is made, as previously stated, between the **DC.LS Echo Chan** jack of the channel to which the studio is connected and the **DC.LS Chan** jack of the channel to which the echo output is connected. For example, suppose the studio output is connected to channel 5, and the echo on this studio to channel 6, then the studio loudspeaker input is connected to the **DC.LS Chan 5** jack and the **DC.LS Chan 6** jack is connected to the **DC.LS Echo Chan 5** jack. The inners of this last jack are disconnected by the act of plugging in. Consequently, the studio loudspeaker input will only be connected across the **CH In** jack (via the inners of the **DC.LS Echo Chan 6** jack) when both the **LS.CO 5** and **LS.CO 6** relays have operated. Thus, the studio gets programme on its loudspeaker only when both the direct and echo channels have been faded out or, of course, if the group (in this case group No. 1) has been faded out on the central mixer.

Talking-back Circuits.

The rehearsal talking back arrangements differ from those for transmission. In the former case the production can be held up for the purpose and the studio loudspeakers can therefore be used, but in the case of a transmission the operation of the talking-back circuit obviously must not be allowed to interrupt the performance. Therefore, only the studio housephone circuits are used during transmissions for talking-back purposes.

The operation of the talking-back and D.C. loudspeaker switching is controlled by a three-position key equipped in duplicate.

In the case of *D.C. Nos.* 1 *and* 2 (Figure 8), when the talking-back keys are in their central or **LS** position, the **LSS** relay will be operated and the input of the LSM in the D.C. room will be connected, via the make contacts of the relay and the loudspeaker volume control, to the outers of the **DC.LS** jack which is plugged up, as previously stated, to the **LS** output of the trap valve amplifier ; operation of a talking-back key to either its **LS Off** or **Speak** position causes the **LSS** relay to release, thereby disconnecting the D.C. loudspeaker. In the case of *D.C. No. 3* (Figure 10) the D.C. LSM input is connected via the break contacts of the **LSS** relay, the operating circuit of which is broken when the talking-back keys are in their central or **LS** position. When a key is thrown to either its **LS Off** or **Speak** position the operating circuit for this relay is completed and the D.C. loudspeaker thereby disconnected.

For *transmission* purposes connection is made, as previously stated, between the **CH.In** and **Trans** jacks. The latter is connected via the **LS Input** jack to the **LS** output of the

Talking-back Circuits (*Contd*)

trap valve amplifier. The studio housephone circuits are connected, via the D.C. housephone parallel jacks, and the break contacts of relay **CO.2** in parallel with the D.C. housephone unit, across the outers of the **HP Input** jack which is connected to the **HP** output of the trap valve amplifier. The make contacts of relay **CO.2** are connected to the output of the D.C. ' A ' amplifier, to the input of which the talking-back microphone is connected over the contacts of the microphone output relay. (See Footnote, page 9).

When the talking-back key is thrown to the **Speak** position, +24 volts is connected to the winding of the microphone output relay and to that of the **S** relay. Both relays operate since they have −24 volts standing on the other end of their windings. The **S** relay upon operation connects +24 volts to the winding of relays **CO.1** and **CO.2,** which operate. Relay **CO.2** transfers the studio housephone connection from the **HP** output of the trap valve amplifier to the output of the D.C. ' A ' amplifier. The D.C. output, therefore, is still available to the studio loudspeakers via the **LS Input, Trans** and **CH. In** jacks and to the D.C. housephones (in the D.C. room) via the **HP Input** jack. The D.C. loudspeaker is, however, cut off and a talking circuit provided between the talking-back microphone and the studio housephones.

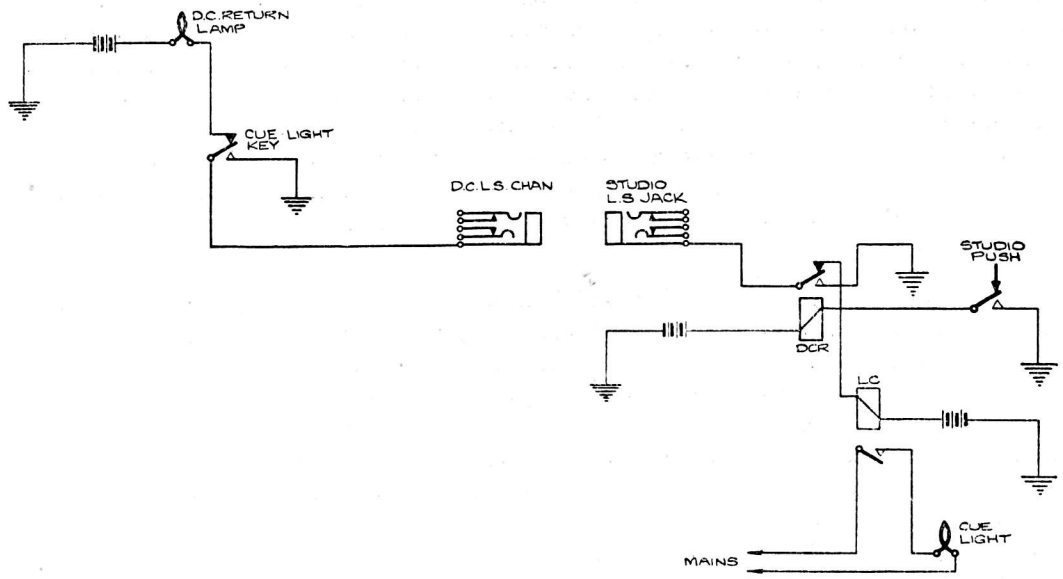
For *rehearsal* purposes the **CH In** and **Reh** jacks are plugged up to one another, and the microphone output relay, and the **S, CO.1** and **CO.2** relays operate, as before, when the talking-back key is thrown to the **Speak** position. (See Footnote, page 9). The **CO.1** relay changes over the connection to the outers of the **Reh** jack from the **LS Input** jack to the output of the D.C. ' A ' amplifier. Relay **M** also operates via the sleeve circuit of the **Reh** and **CH In** jacks and provides +24 volts for relays **P.1** and **P.2.** Both **P** relays therefore operate, completing circuits for the operation of all the **LS.CO** relays, that for channel 15 operating over one contact of each relay in series. All the studio loudspeakers are therefore connected in the output of the D.C. ' A ' amplifier. The studio headphones are also connected to the output of the D.C. ' A ' amplifier, by the operation of relay **CO.2,** and the D.C. loudspeaker switched off by the **LSS** relay.

The D.C. ' A ' amplifier has a higher gain than a normal ' A ' amplifier in order to bring the volume of its output to approximately the same as that of a ' B ' amplifier, so that the studio loudspeaker volume remains about the same for both programme and talking-back speech.

The talking-back keys are non-locking in their **Speak** position and the release of the key restores the original condition of the circuits. If, however, the **CO** and **LSS** relays were allowed to release before the **LS.CO** relays, there would be a momentary howl. A 50 μF condenser is therefore shunted across the windings of these relays in order to delay their release sufficiently to allow the **P** and **LS.CO** relays to restore first.

Cue and Return Light Circuit.

The cue and return light circuits are shown in Figure 6 and also in Figures 8 and 10. Similar equipment is provided in the case of each studio loudspeaker circuit. The operation of the *cue light* key on the D.C. panel associated with a particular channel connects −24 volts, which is standing on the break contact of the key, via the sleeve circuit of the DC.LS channel and studio LS jacks and the break contact of the **DCR** relay, to one side of the winding of the **LC** relay, on the other side of which +24 volts is standing. The **LC** relay, therefore, operates closing the mains circuit which lights the cue light in the studio.



Drawing S.K. 339 Issue 1.

Fig. 6. Cue Light and Return Light Circuits.

To acknowledge the cue, the *return light* push switch is operated in the studio. This completes the operating circuit of the **DCR** relay which cuts off the cue light circuit and connects −24 volts, via the sleeve circuit of the studio LS and DC.LS channel jacks and the break contact of the cue light key of the particular channel, to the associated D.C. return lamp on the D.C. panel, which lights.

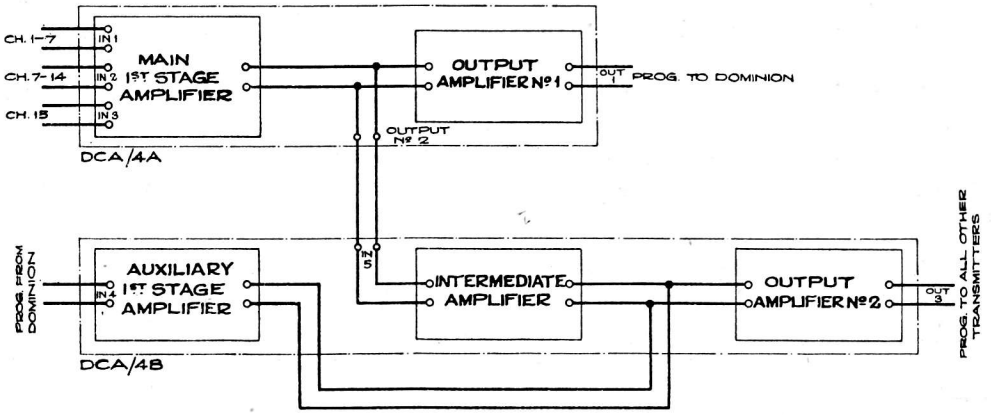
It should be observed that a common line is used for the cue and return light circuits. Therefore, while the cue key is operated, the return light in the D.C. room cannot be lighted and similarly, while the return light push is depressed it is not possible to light the cue light in the studio.

Auxiliary Switching. (*D.C. No. 3 only*).

For normal D.C. working output No. 1 is used, but where auxiliary switching is involved the normal D.C. output is No. 3 and output No. 1 is reserved for the special channels.

Auxiliary Switching (*Contd*)

The arrangement of amplifier DCA/4 is shown in block schematic form in Figure 7. It comprises amplifiers DCA/4A and DCA/4B. The former comprises the main 1st stage amplifier, consisting of three independent amplifier stages Nos. 1, 2 and 3, with their inputs connected to the two outputs of the group mixer and to the output of channel 15, respectively, and with their outputs coupled to a common output stage which is designated No. 1. DCA/4A is switched on manually from the amplifier bay in the control room. DCA/4B only comes into use in connection with the auxiliary switching circuits and is automatically switched on when these circuits are plugged up. It comprises a 1st stage amplifier No. 4, to which an auxiliary channel is automatically connected when it is faded up, and an intermediate amplifier



Drawing S.K. 343 Issue 2

Fig. 7. Arrangement of Amplifier DCA/4 for D.C. No. 3.

operating in the common output of the 1st stage amplifiers Nos. 1, 2 and 3, both coupled to a common output stage which is designated No. 2. It will thus be seen that when an auxiliary channel is faded up, Output No. 1 will contain only that part of the programme originating from other sources, while Output No. 3 will contain the complete programme. Output No. 1 can thus be used to supply, via Radio Terminal, the particular Dominion from which incoming programme is being received, and output No. 3 for supplying the complete programme to the B.B.C. transmitters and, via Radio Terminal, to those Dominions not actually originating any part of the programme at the time.

The auxiliary switching is shown in Figure 9.

Two ' B ' amplifiers are required. One, which we will call the *main* ' B ' amplifier, will have its input punched up to the D.C. No. 3 output (No. 1) in the normal manner. The other, which we will call the *auxiliary* ' B ' amplifier, will be connected to the No. 1 output of the DCA amplifier by connecting on the Echo & D.C. jackfield between **D.C. Out 1** and a tie-line jack connecting with the ' B ' Input switching relays of the auxiliary ' B ' amplifier, and by punching up this source to this ' B ' amplifier.

Auxiliary Switching (*Contd*)

It is necessary to have access to each of the ' B ' amplifier outputs on the ' C ' amplifier bay jackfield for performing the auxiliary output switching connections, and a convenient method of so doing is via a **Line** jack of a ' C ' amplifier. A ' C ' amplifier associated with one of the lines, in respect of which the auxiliary switching will be required, should therefore be punched up to the output of the auxiliary ' B ' amplifier, and another to the output of the main ' B ' amplifier. Alternatively spare ' C ' amplifiers may be used. (The ' C ' amplifiers associated with lines to which the whole programme will be fed are punched up to the output of the main ' B ' amplifier).

Connection should now be made on the ' C ' amplifier bay jackfields (using the ' C ' amplifier **Line** jacks) between the main ' B ' amplifier output and **Aux Relay In Main** and between the auxiliary ' B ' amplifier output and **Aux Relay in Aux.** Finally, the **CH.SW** jacks of the channels with which the auxiliary switching is required must be plugged to **Aux. SW** jacks and the corresponding **Aux Out** jacks respectively to the **Apparatus Input** jacks of the ' C ' amplifiers of the lines supplying programme to the particular Dominion. For example, if the incoming Canadian programme is being received on channel No. 4, **CH. SW 4** will be connected to, say, **Aux. SW.1,** then the **Apparatus Input** jack of the ' C ' amplifier of the line over which the programme is being sent to Canada should be connected to **Aux. Out 1.**

The input of the main ' B ' amplifier is normally connected, via the travellers and break contacts of the main ' B ' input change-over relay, to the No. 1 output of the DCA amplifier. When, however, connection is made between any of the channel switching and auxiliary switching jacks this relay will operate over the ' ring ' connection of the plugs. At the same time −24 volts is connected to the private wire of the amplifier DCA/4B. The input connection to the main ' B ' amplifier is thus transferred to the No. 3 output of the DCA amplifier. The input of the auxiliary ' B ' amplifier, however, remains connected to the No. 1 output.

Over the ' sleeve ' circuit of the same link, −24 volts is also applied to the stationary contact of an auxiliary switch on the fade control associated with the particular channel. However, until the channel is faded up, the ' C ' amplifier of the line supplying programme to the particular Dominion will be connected to the output of the main ' B ' amplifier, via the outers of its **Apparatus Input** jack, the outers of an **Aux Out** jack, the break contacts of the associated relay, the outers of the **Aux Relay In Main** jack and the outers of the **Line** jack of a ' C ' amplifier. A compensating resistance is also connected across input No. 4 (auxiliary 1st stage of DCA/4B).

To receive programme incoming from the Dominion, the fade unit of the channel to which that programme source has been connected will be faded up. As soon as this is done, circuits are completed, via the auxiliary switch on the fade control for the operation of the associated **CH.CO** relay, and via the 'tip' springs of the particular **CH.SW** and **Aux. SW** jacks, for the operation of the particular **Aux Out** relay. The **CH.CO** relay upon operation connects the particular channel output to input No. 4 and also transfers the compensating resistance from input No. 4 to the input of the group mixer, so as to leave the volume from the other channels in the group unaffected. The operation of the particular **Aux. Out** relay transfers the input of the ' C ' amplifier supplying programme to the particular Dominion

Auxiliary Switching (*Contd*)

from the output of the main ' B ' amplifier to the output of the auxiliary ' B ' amplifier, via the outers of the ' C ' amplifier **Apparatus Input** jack, the outers of the **Aux Out** jack, the make contacts of **Aux. Out** relay, now operated, the outers of the **Aux Relay In Aux** jack and the outers of the **Line** jack of a ' C ' amplifier.

While the particular channel is faded up, therefore, the programme transmitted to the line outgoing to the particular Dominion will exclude the programme incoming from that Dominion, since this is connected to input No. 4. All the other lines remain connected to the output of the main ' B ' amplifier, the input of which is connected to output No. 3 of the DCA amplifier, which includes the complete programme.

Summary of Connections

Programme Connections (*Echo & D.C. Jackfield*)

For direct programme sources, double-end between D.C. channel input and the ' A ' or ' D ' amplifier No. 1 output jacks, in accordance with the grouping requirements for the particular production.

For echo sources on *D.C. Nos. 1 and 2*, double-end between the ' A ' or ' D ' amplifier No. 2 outputs and separate echo input jacks and double-end between the associated echo ' A ' outputs and D.C. channel input jacks, according to the grouping requirements for the particular production.

To use the echo mixing channel on *D.C. No. 2*, double-end from the ' A ' or ' D ' amplifier No. 1 output to **Direct Input** and from the echo ' A ' output to **Echo Input** Double-end from the mixer **Output** to a D.C. channel input.

For echo sources on *D.C. No. 3*, double-end from the ' A ' or ' D ' amplifier No. 2 outputs to separate D.C. channel inputs and double-end from **ECA Out** Nos. 1 and 2 to separate echo inputs and from the associated echo ' A ' outputs to **Echo In 1-7** and **Echo In 8-14** respectively. On the D.C. panel operate the echo key of the channels to which the echo sources are connected.

On the panel insert lamp caps for the channel fade lamps designated to correspond with the programme connections set up.

Punch up the ' C ' amplifiers of the lines to which the programme is to be sent to the output of a ' B ' amplifier and punch up its input to the D.C. output.

Summary of Operations (*Contd*)

Loudspeaker and Housephone Connections (*Loudspeaker and Housephone Jackfields*)

Double-end between the studio LS inputs and **DC.LS Chan** jacks to correspond with the direct programme input connections. Where echo is used, double-end between the **DC.LS Chan** jack of the channel to which the echo source is connected and the **DC.LS Echo Chan** jack of the channel to which the direct programme source is connected.

Double-end from the trap valve **LS** output to the **DC.LS** and **LS Input** jacks and also from the trap valve **HP** output to **HP Input** (See Footnote, page 9).

Double-end between the studio HP input jacks and the DC. HP parallel jacks.

For a transmission, double-end between **CH. In** and **Trans**, and for a rehearsal double-end between **CH. In** and **Reh.**

Auxiliary Switching. (D.C. No. 3).

On the DCA amplifier jackfield, double-end between the **CH.SW** jacks of the channels to be switched away and **Aux. SW** jacks, as required.

On the Echo & D.C. jackfield, double-end between D.C. No. 3 Out 1 and an Echo tie-line to the ' B ' Input switching relays of the ' B ' amplifier to be used as the *auxiliary* ' B ' amplifier, and punch up this source to the input of the *auxiliary* ' B ' amplifier.

Punch up the ' C ' amplifier of one of the lines with which auxiliary switching is required, or a spare ' C ' amplifier, to the output of the auxiliary ' B ' amplifier and, on the ' C ' amplifier bay jackfield, double-end from its **Input Line** jack to **Aux Relay in Aux.**

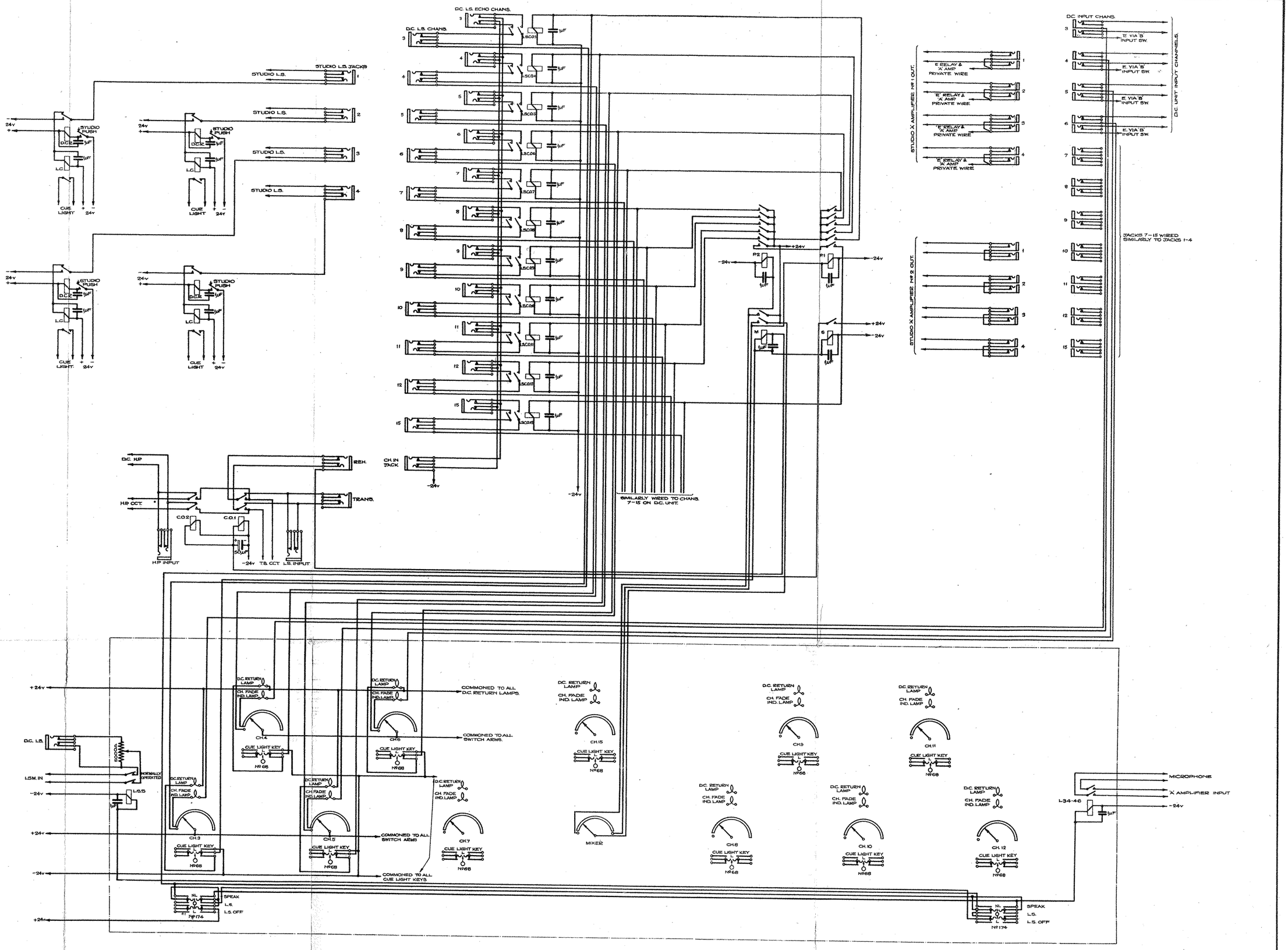
Punch up the ' C ' amplifier of another of the lines with which auxiliary switching is required, or a spare ' C ' amplifier, to the output of the *main* ' B ' amplifier and double-end from its **Input Line** jack to the **Aux Relay In Main** jack.

Punch up the ' C ' amplifiers of the lines to which the whole of the programme is to be sent to the output of the *main* ' B ' amplifier, and punch up its input to D.C. No. 3 output.

Double-end between the **CH.SW** jacks of the channels in connection with which auxiliary switching is required and **Aux SW** jacks, and double-end between the **Apparatus Input** jacks of the ' C ' amplifiers feeding programme to the countries originating programme and the **Aux Out** jacks, to correspond with the connections made between the **CH.SW** and **Aux. SW** jacks.

Fig. 8. Loudspeaker and Housephone Switching for D.C.'s Nos. 1 and 2.
Drawing No. D.1927. Issue 2.

BROADCASTING HOUSE, LONDON.
Part 6. Dramatic Control Units.
Technical Instructions.
Item 13.2. April, 1936.



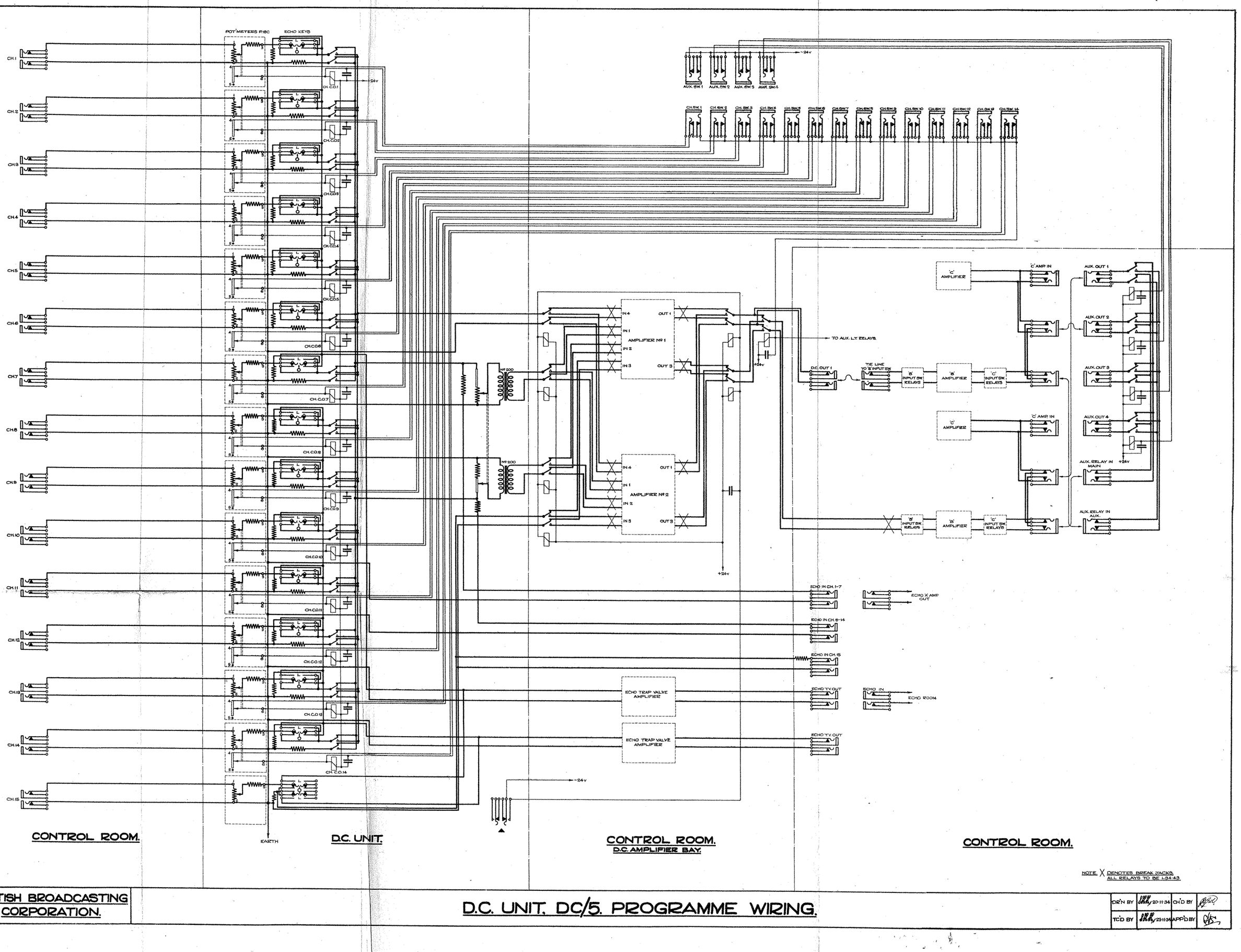
B.B.C.

D.C. L.S. & HOUSE PHONE SWITCHING CIRCUIT FOR D.C. UNIT, D.C/3

DR'N BY	10-4-35	CH'D BY	
TC'D BY	11-4-35	APP'D BY	

Fig. 9. Programme Wiring and Auxiliary Switching for D.C. No. 3.
Drawing No. D.3094. Issue 3.

BROADCASTING HOUSE, LONDON.
Part 6. Dramatic Control Units.
Technical Instructions.
Item 13.2. April, 1936.

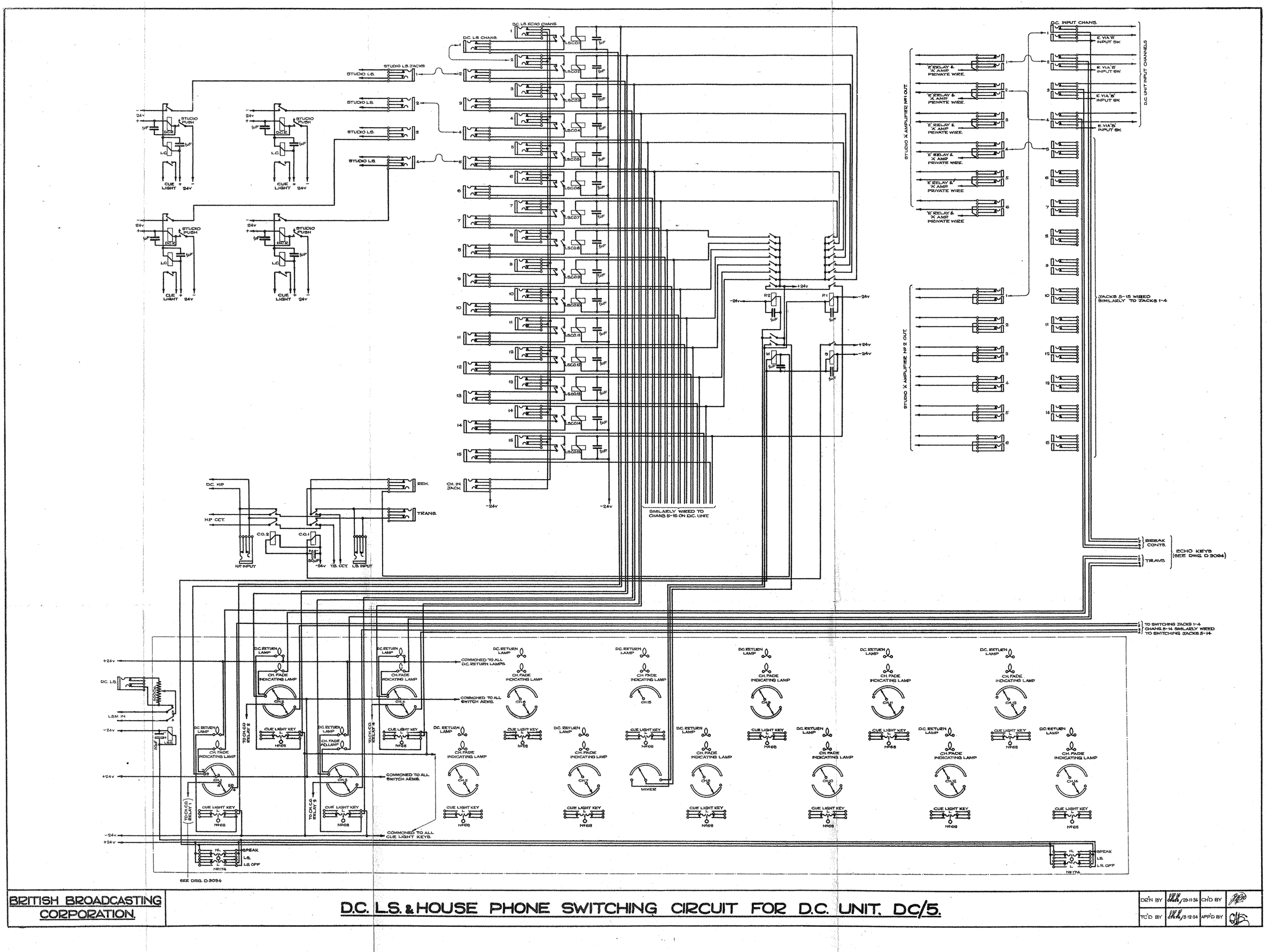


NOTE. X DENOTES BREAK JACKS.
ALL RELAYS TO BE L.94-43

BRITISH BROADCASTING CORPORATION.	D.C. UNIT. DC/5. PROGRAMME WIRING.	DR'N BY	20-11-34	CH'D BY	
		TC'D BY	23-11-34	APP'D BY	

Fig. 10. Loudspeaker and Housephone Switching for D.C. No. 3.
*Drawing No. D.*3092. *Issue* 3.

BROADCASTING HOUSE, LONDON.
Part 6. Dramatic Control Units.
Technical Instructions.
Item 13.2. April, 1936.



BRITISH BROADCASTING CORPORATION.	D.C. L.S. & HOUSE PHONE SWITCHING CIRCUIT FOR D.C. UNIT, DC/5.	DR'N BY	29-11-34	CH'D BY	
		TC'D BY	3-12-34	APP'D BY	