TECHNICAL INSTRUCTION

TVX.20

TELEVISION INTERVIEW STUDIOS

SOUND EQUIPMENT

BRITISH BROADCASTING CORPORATION
ENGINEERING DIVISION

INSTRUCTION TVX.20

TELEVISION INTERVIEW STUDIOS : SOUND EQUIPMENT

AMENDMENT RECORD

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PREFACE

This Instruction deals with the sound equipment and facilities installed in certain small television studios throughout the BBC. These studios, commonly called Television Interview Studios, are designed to produce simple programmes and also inserts for television news purposes.

As the installation on which others are modelled, the television interview studio in Broadcasting House, London is dealt with extensively in Part 1. This detailed description is the basis for Part-2 supplementary and amending information covering differences in the arrangement of studios elsewhere.

CONTENTS

(Continued overleaf)

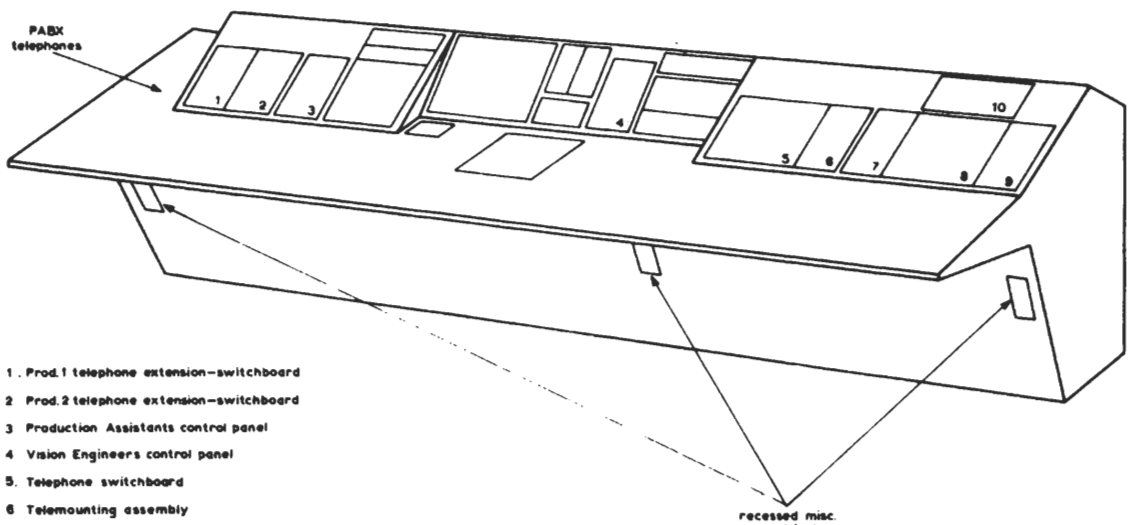
PART 1: BROADCASTING HOUSE, LONDON

SECTION 1

INTRODUCTION

The television interview studio in Broadcasting House, London, is in the basement and comprises two main areas. One is the control room, which also serves for programme-production control, and the other is a studio floor area, subsequently referred to as the studio. The studio is acoustically-treated to ensure that extraneous noise, particularly that from the underground railway system, is not picked up. The control room contains, in addition to equipment bays, a control desk placed to give a view through the double-glazed window in the wall separating it from the studio.

The control desk has a number of distinct positions from which various facilities can be controlled. The three main positions are those for the production assistant, the sound mixer and the vision mixer. Operational controls are on a series of panels mounted on the desk as shown in Fig. 1.1; untitled panels in this diagram are those used to control lighting and cameras.



1. Prod.1 telephone extension-switchboard
2. Prod.2 telephone extension-switchboard
3. Production Assistants control panel
4. Vision Engineers control panel
5. Telephone switchboard
6. Telemounting assembly
7. Sound Mixers talkback control panel
8. Sound-mixing control desk
9. Miscellaneous keys and lamps panel
10. P.P.M. panel

Fig. 1.1. Control Desk

The sound facilities fall into two main categories, namely those for programme purposes and those for communication. Programme facilities include provision for mixing, distribution and monitoring of local and external sound sources; an echo room and a twin-track tape recorder also are available. Communication facilities include talkback, telephones and visual cues.

SECTION 2

PROGRAMME CHAIN

2.1. GENERAL

Fig. 2.1 is a block schematic of the main programme chain. More detailed information can be obtained from drawings PID.8054.9.1K and PID.8054.9.2K.

For descriptive purposes it is convenient to sub-divide the programme chain under the following headings:

(a) Sources

(b) Channels

(c) Prehear

(d) Studio Output and Clean Feed

(e) Switched Clean-feed

(f) Channel Clean-feeds

(g) Echo

(h) Foldback

(i) Monitoring

(j) Studio Cue-programme

2.2 SOURCES

Sources can be either local or external. The local sources are six microphone inputs in the studio, a gramophone and a return-feed from an echo room; equipment is installed to enable a twin-track tape recorder to be used as an additional source. Four external sources can be connected to the control room by means of programme tie-lines from London Control Room (L.C.R.)

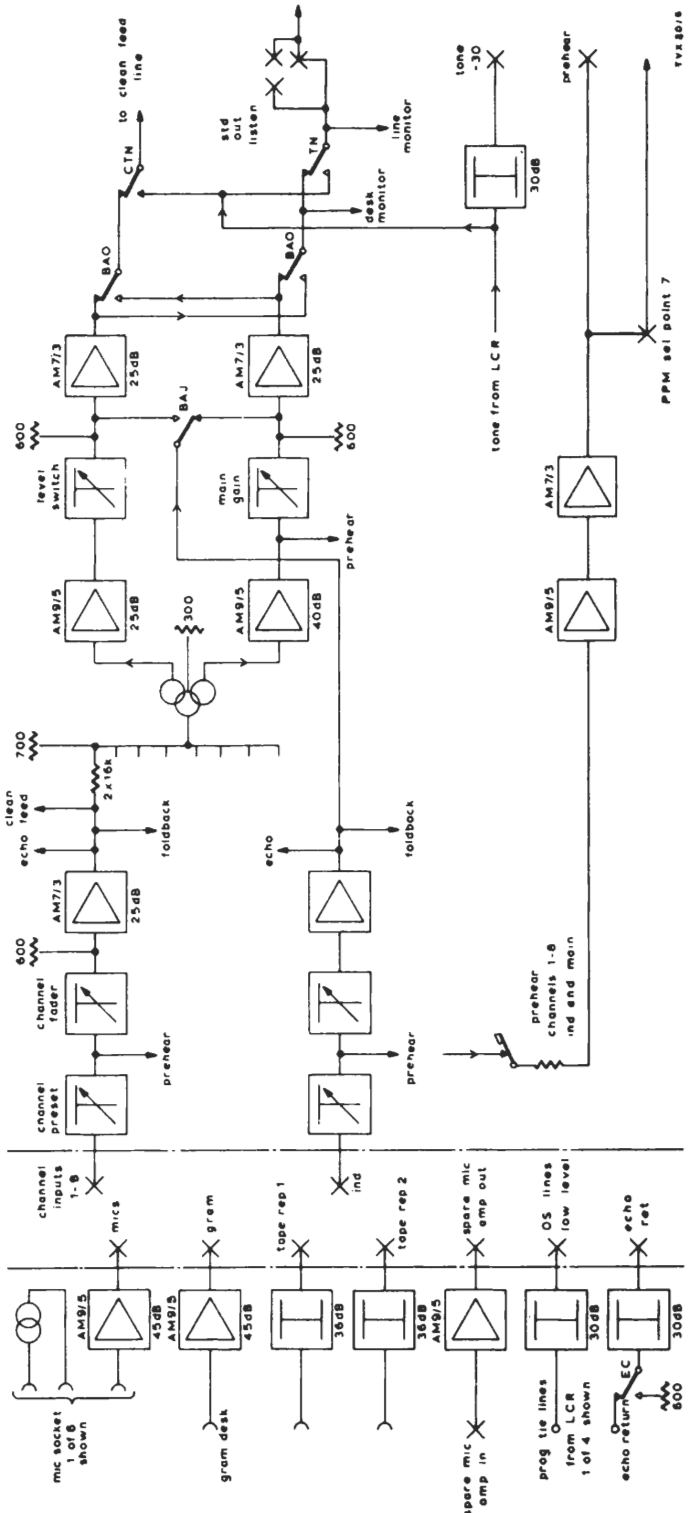


Fig. 2.1. Main Programme Chain

2.2.1. Microphone Inputs

In the studio are three wall-mounted boxes, each wired for two microphone inputs. The boxes incorporate matching transformers to enable microphones with impedances of either 30 or 300 ohms to be used. The wiring of the input sockets is arranged such that the transformers are in circuit only when matching is necessary. The AM9/5 amplifiers individually associated with these microphone points are on the equipment bay, and their outputs are wired to a jackfield on the programme apparatus bay. This particular position is referred to as the main jackfield.

2.2.2. Gramophone Input

This input is obtained from a disk reproducer RP2/1, connected via an AM9/5 amplifier to the main jackfield.

2.2.3. Echo-return Feed

See under 2.8.

2.2.4. Tape Channel

Two of the 30-dB loss pads in a general purpose panel on the equipment bay are intended for use with a twin-track tape recorder. The pads provide individual attenuation for the two outputs of the recorder and they are connected to the main jackfield. The recorder input is derived from cue-programme distribution, described under 2.12.

2.2.5. External Sources

Each of the four tie-lines for taking programme feed from L.C.R. is connected via a 30-dB pad, in the above-mentioned panel, to the main jackfield.

2.3. CHANNELS

The sound-mixing control panel, or sound desk, is placed as indicated by reference 8 of Fig. 1.1. Designed to handle nine channels, it is used with eight identical channels and one which, although similar to the others, is identified as the independent channel because it serves a different purpose.

The input to each of channels 1-8 is connected through a main-jackfield position to a preset BALANCE control followed by a channel fader and an amplifier; see Fig. 2.1. The balance control provides up to 15 dB of attenuation and enables the signal level to be adjusted

so that the fader can work at the fully-up position. The AM7/3 amplifier has a fixed gain (25 dB) and feeds into a resistive mixing network which combines the outputs of the eight channels. Connections for echo, foldback and channel clean-feed are taken from each channel-amplifier output.

The mixing network is connected to a hybrid coil to produce independent inputs for chains providing the studio main-output and the studio clean-feed output; see 2.5.

2.4. PREHEAR

This facility allows monitoring at (a) an intermediate point in all nine channels, and (b) the combined output of the channels. Fig. 2.1 indicates the prehear connection from the balance-control output to a push-button switch on the sound desk. With this switch the signal can be applied through an isolating resistor to cascaded amplifiers common to all prehear feeds. The amplifiers, with gains of 45 dB (AM9/5) and 25 dB (AM7/3), provide a zero-level signal to a listening jack on the sound desk and, via the main jackfield, the selector switch associated with the miscellaneous P.P.M.; see 2.6.

2.5. STUDIO MAIN-OUTPUT AND CLEAN FEED

One signal from the hybrid coil used with the channel mixing-network is applied to the studio main-output chain, which has a main fader between two amplifiers (Fig. 2.1). The intended setting of this fader is stop 20 of the 30-division scale, this position introducing a 15-dB loss. The main-fader output and the independent-channel output are combined at the input of the second amplifier (AM7/3), which raises the output signal to zero level.

The other hybrid-coil output serves the clean-feed chain. This has a zero-level output and is similar to the main-output chain except for the preset attenuator (with a maximum loss of 15 dB) in place of a fader.

The outputs of these chains can be interchanged by operating a sound-desk key (MAIN AMP C/O) to energise two relays, BAO and BAJ. From Fig. 2.1 it is seen that relay-BAO contacts operate to transpose the chains relative to the distribution circuits, and relay-BAJ contacts ensure transfer of the independent channel to maintain its association with the studio main-output distribution. The operated state is signalled at the sound desk by a MAIN C/O lamp supplied through series-connected auxiliary contacts (BAO1 and BAJ1) of the two relays.

The main-output and clean-feed distribution circuits can be fed with tone by operating TONE and C.F.TONE keys, respectively, on the sound desk. Disconnection of the chains and substitution of tone occurs by operation of contacts on relays TN and CTN.

2.6. SWITCHED CLEAN FEED

This term is used to refer to a miscellaneous programme input which may be required for insertion into the talkback network. Further explanation is given under 3.2.2.

2.7. CHANNEL CLEAN FEEDS

The clean feed to a channel consists of the combined outputs of all other channels, excepting the independent channel. Fig. 2.2. illustrates the arrangement by showing the clean feed to channel 4, obtained from a resistive mixing network individual to the particular channel and fed with the outputs of channels 1-3 and 5-8. Through the amplifier this combined feed is passed to a jackfield on the miscellaneous and talkback bay. Note: Amplifiers for clean feeds to channels 5-8 are not fitted.

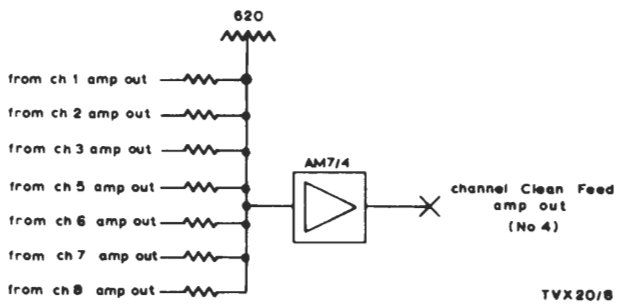


Fig. 2.2. Circuit of Channel-4 Clean Feed

2.8. ECHO

The echo facility is general to the nine channels. The signals taken from the channel-amplifier outputs (see Fig. 2.1) are passed through attenuators and combined as the echo-go feed. Fig. 2.3 shows in simplified form the arrangement providing this composite signal. The amplifier has zero-level output when the attenuators and the level switch are at their 0-dB settings. Output monitoring is possible, through a circuit using one jackfield position which makes connection with the selector switch for the miscellaneous P.P.M.

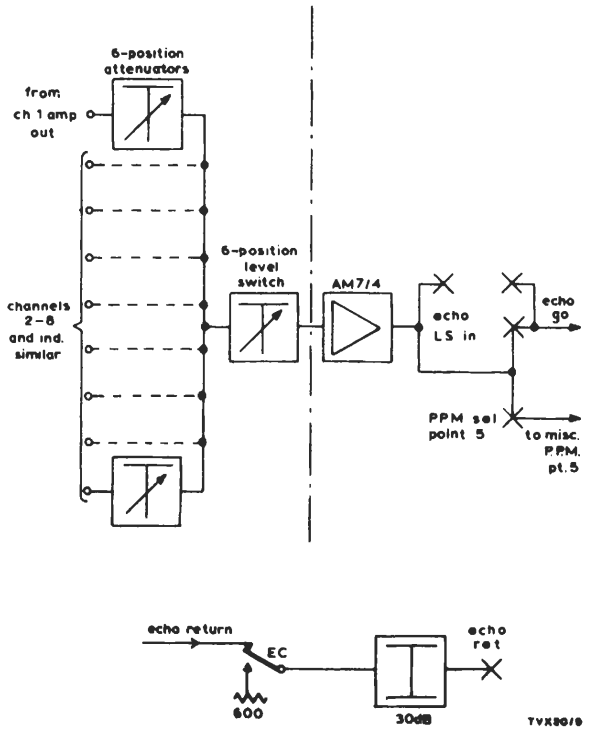


Fig. 2.3. Echo Chain

The echo-return circuit, as in Fig. 2.3, terminates in the main jackfield. Relay EC is operated by means of an ECHO CUT key on the sound desk.

2.9. FOLDBACK

The foldback chain is similar to the echo-go chain of Fig. 2.3, and the associated distribution circuits are as shown in Fig. 2.4.

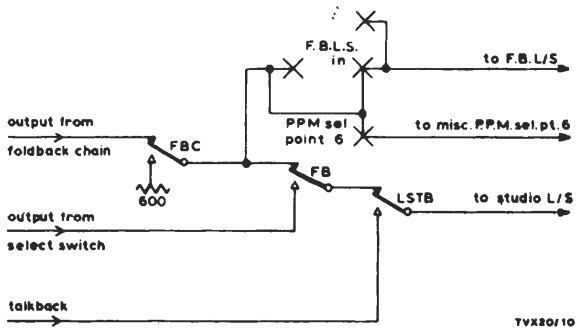


Fig. 2.4. Foldback Chain Switching Circuit

The input to this distribution system can be disconnected by using an F.B. CUT switch to energise a relay FBC. Instead of being fed from the output of the associated selector switch, the studio loudspeaker can be switched to foldback by operating a FOLDBACK STD. L.S. key-switch which releases the normally-energised relay FB; this condition is signalled by a FOLDBACK lamp supplied via auxiliary contacts of this relay. The function of relay LSTB is dealt with under 3.2.1.

Note that the method of using the three relays is such that both the foldback loudspeaker and the studio loudspeaker are connected to the foldback chain if there is a loss of relay operating supplies.

2.10. MONITORING

Aural monitoring of various sources is provided by loudspeakers in the studio and control room. The control-room complement is made up of a conventional monitoring loudspeaker and two small desk-mounted loudspeakers; the last-mentioned are known as the P.A monitoring loudspeaker and the S.M. cue-monitoring loudspeaker. Visual monitoring is provided by two P.P.M.'s on the sound desk.

2.10.1. Studio Loudspeaker

Fig. 2.5 repeats part of Fig. 2.4 in order to show the complete selector switch circuit for making various inputs, alternative to the foldback signal, to this loudspeaker. The circuit is normalled through the main jackfield. The method of using relay FB has been specified under 2.9, and the functions of relays LSTB and SLS are given under 3.2.1 and 3.4 respectively.

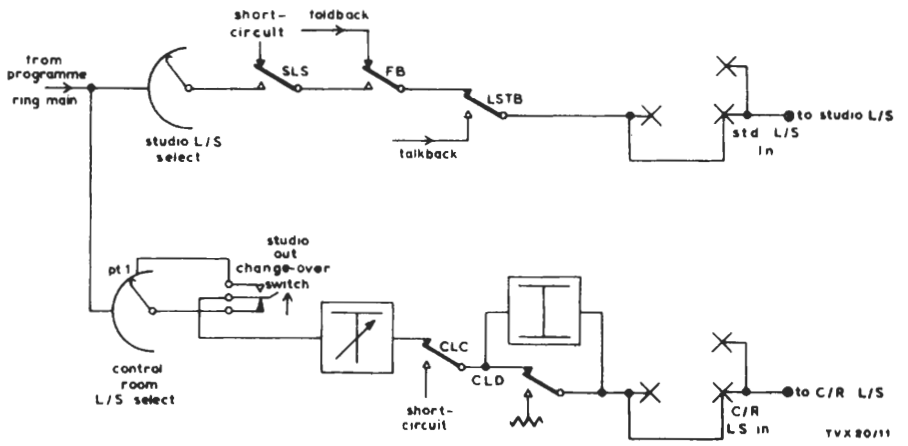


Fig. 2.5. Studio and Control-room Loudspeaker Circuits

2.10.2. Control-room Loudspeaker

The arrangement to feed this loudspeaker is given in Fig. 2.5. The selector switch, on the sound desk, can be disconnected by means of a change-over switch for substituting the studio main-output. The circuit is normalled through the main jackfield and has an attenuator shunted by relay-CLD contacts to provide a dimming facility. For information about the working of relays CLC and CLD, refer to 3.2.1.

2.10.3. S.M. Cue-monitoring Loudspeaker

This loudspeaker, its selector switch and an L/S OFF key are on the sound desk. As shown by Fig. 2.6, the circuit incorporates an amplifier preceded by a listening position in the main jackfield. The selector-switch sources do not include talkback, because that would give a liability to acoustic feedback, but camera talkback is available at position 4 of the switch. Note that the loudspeaker is automatically silenced by short-circuiting of the input while relay CLC is operated; see under 3.2.1.

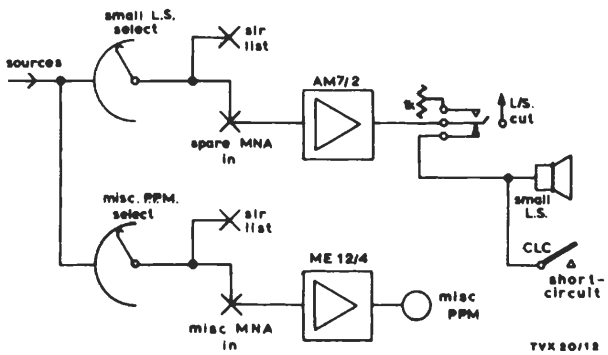


Fig. 2.6. S.M. Cue-monitoring Loudspeaker and Miscellaneous P.P.M. Circuits

2.10.4. Miscellaneous P.P.M.

Referring to Fig. 2.6, the miscellaneous P.P.M. is fed through a selector switch carrying all but one of the sources which are available to the S.M. cue-monitoring loudspeaker. Talkback, instead of camera talkback, is applied to position 4 of the switch.

2.10.5. P.A. Monitoring Loudspeaker

This loudspeaker is on the production assistant's panel and is used mainly for monitoring talkback. See 3.2.2 for details.

2.11. DESK-OUTPUT AND LINE MONITORING

The circuits of Fig. 2.7 provide for visual and aural monitoring of either the sound-desk output or the studio main-output to line. The two relays, MND and MNL, with contacts in these circuits are controlled by a three-position key-switch on the sound desk.

With the key in the central position, both relays are de-energised and the studio main-output is connected;

(a) through an amplifier to the main P.P.M., and

(b) via a loss pad and an amplifier to position 1 on each of the selector switches for the studio loudspeaker, the control-room loudspeaker and the miscellaneous P.P.M.

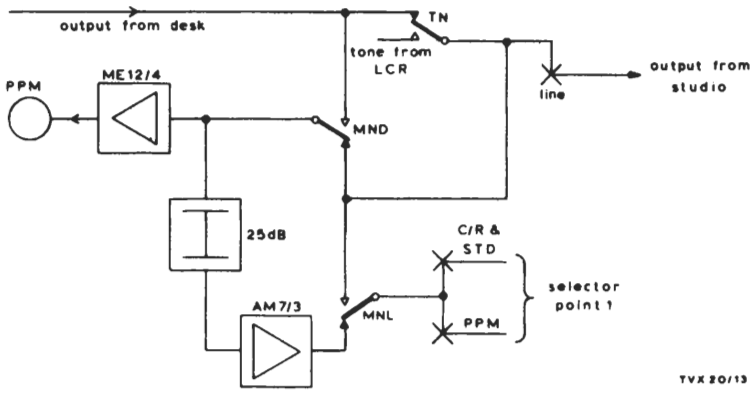


Fig. 2.7. Desk Output and Line Monitoring Facilities

Operating the key to the DESK position energises relay MND, so all the above-mentioned apparatus is switched to the output of the sound desk. In this condition tone can be sent to line without causing interference to the studio monitoring facilities.

The LINE position of the key gives a slight variation of the central-setting condition. Because relay MNL is energised, its contacts pass the studio main-output directly to the selector switches and therefore the loss pad and AM7/3 amplifier are effectively removed from circuit.

2.12. CUE PROGRAMME

For cueing purposes a programme feed is taken from the sound-desk output to a distribution system as shown in the Fig. 2.8 schematic. Connection of this input occurs only when relay MON is released to the

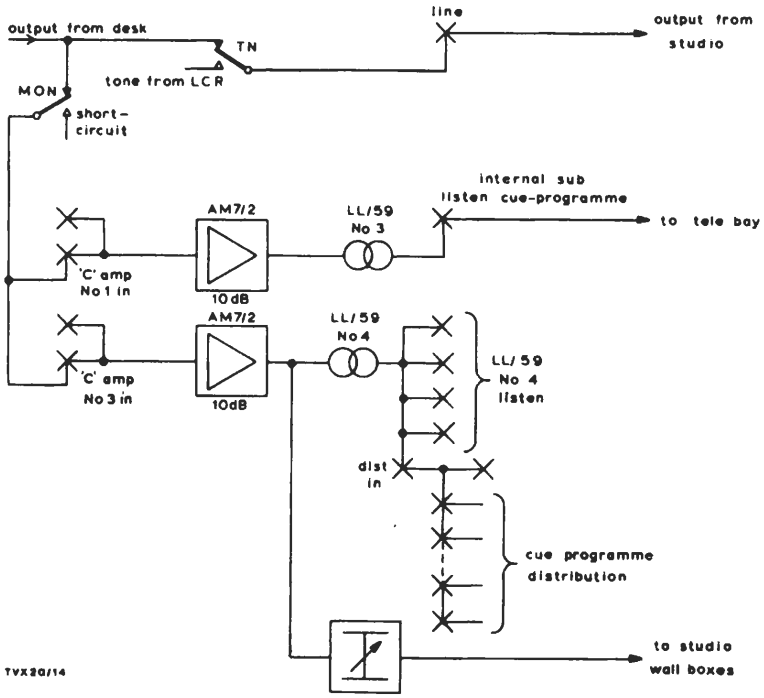


Fig. 2.8. Cue Programme Distribution

de-operated state as a consequence of selecting either the Transmission condition or the Rehearsal condition; refer to Tables 4.1 and 4.2. Distribution is via two amplifiers, one providing the exclusive feed to the jackfield on a telephone-apparatus bay, and the other connected to the talkback jackfield as well as listening points in the studio.

SECTION 3

COMMUNICATIONS

This Section deals with communication facilities in the overall sense and therefore includes information about the talkback and cueing systems as well as the telephone system.

3.1. TALKBACK SYSTEM

This system has inputs from six main sources:

(a) three panel-mounted microphones opposite to the control-desk positions for the production assistant, the vision engineer and the sound mixer,

(b) a talkback microphone connected to a point in the studio,

(c) external sources connected to the talkback jackfield, and

(d) a microphone on the caption scanner in a waiting room above the control room; talkback from this position is confined to the production assistant's loudspeaker.

The main features of the talkback system are shown in Fig. 3.1. More detailed information is available from drawings PID.8054.9.1K and PID.8054.9.3H.

The source signals are applied to an input buswire system which is connected through a main talkback amplifier to an output buswire system. Two relays provide for substitution of a spare amplifier if the main amplifier becomes faulty, the change-over being controlled from the sound-mixer position at the control desk. Ordinarily the vision engineer can use the spare amplifier for talkback to the cameras only, but in the event of an emergency change-over he has to resort to the alternative means of communication via the main talkback distribution.

Further details of talkback arrangements are included in subsequent descriptions of the various facilities available to the recognised seating positions at the control desk.

3.2. PRODUCTION ASSISTANT'S POSITION

The controls on a panel carrying the talkback microphones and the P.A.'s monitoring loudspeaker are:

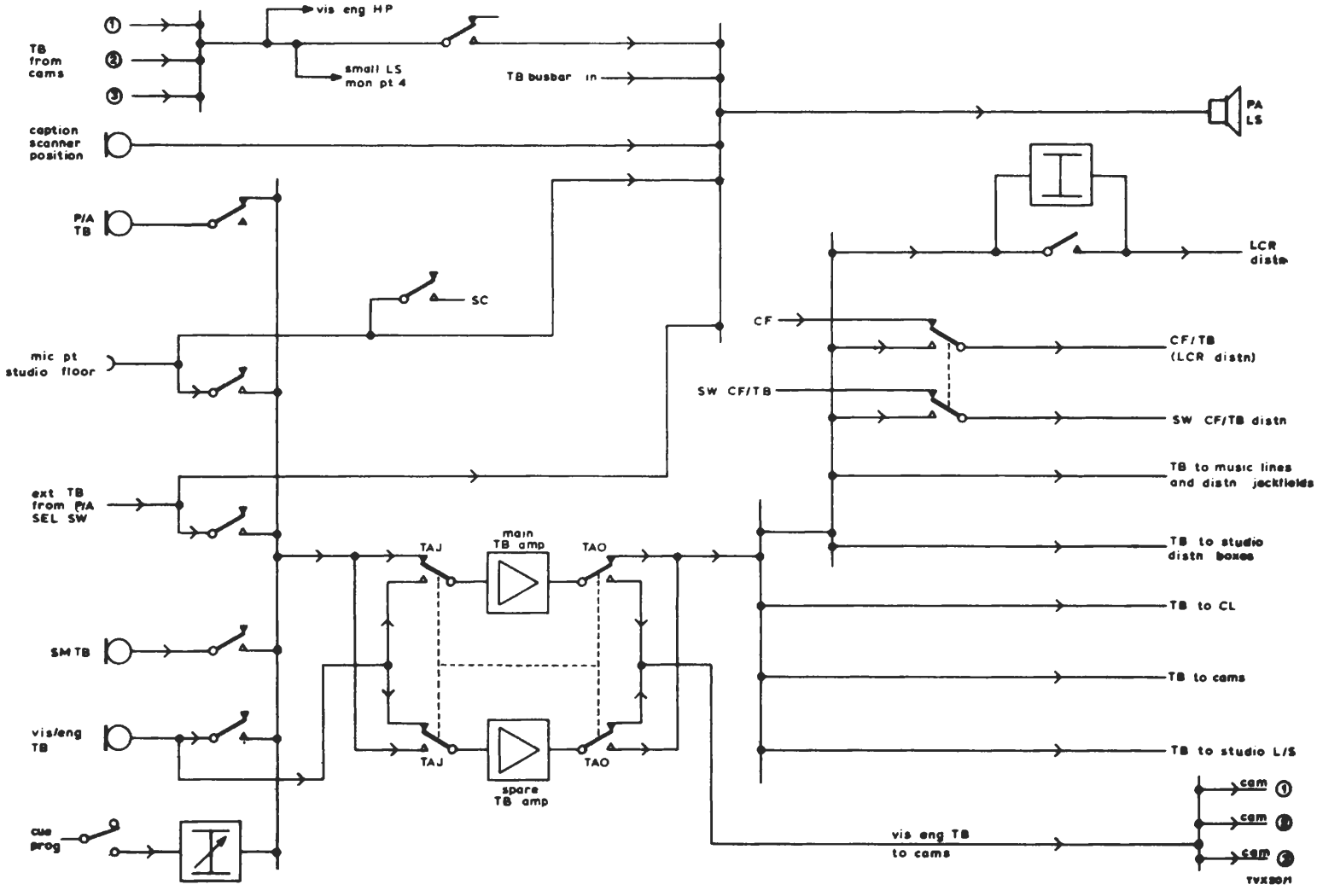


Fig. 3.1. Talkback System and Distribution

A talkback selector switch

Key-switches marked:	Push-button switches labelled:
T.B. OFF and L.S.T.B.	C.F.T.B.
FLOOR T.B.	S.W.T.B.
EXT. T.B.	CUE 1 and CUE 2
C.R.L.S. DIM and CANCEL	MASTER CUE

The microphone is the only one which is normally connected to the talkback-input buswire (see Fig. 3.1), because talkback originates mostly from this position. Disconnection occurs when the T.B. OFF/L.S. T.B. switch is moved from the unidentified central setting to the upper, non-locking, T.B. OFF position. The L.S.T.B. setting, at the opposite throw of the switch, is considered separately in the succeeding description.

3.2.1. Loudspeaker Talkback

The L.S.T.B. switch-setting enables talkback to be connected to the studio loudspeaker provided the studio is either (a) in the Non-transmission condition, or (b) in the Transmission condition and with all faders on their fully-down end-stops. These alternatives determine the extent to which circuits associated with the control-room loudspeaker, the cue-monitoring loudspeaker and the talkback microphone in the studio are affected by use of this setting. Table 3.1 summarises the various possible conditions, including nil entries to denote unaffected operation of particular circuits.

A simplified diagram of the L.S.T.B. control arrangement is given in Fig. 3.2. Moving the P.A.'s key-switch to the L.S.T.B. setting, or alternatively closing either of the switches provided at the other control positions, energises relay LSTA. With the studio in the Non-transmission condition and the faders on their end-stops, three LSTA contacts are effective and they energise relays LSTB, CLD and FC. The relay-LSTB contacts remove the input to the studio loudspeaker and substitute talkback (see 2.10.1), in addition to operating L.S.T.B. lamps at the three control-desk positions. The relay-CLD contacts insert a 12-dB pad into the control-room loudspeaker circuit (see 2.10.2) and also operate L.S. DIM lamps at the desk positions. The relay-FC contacts short-circuit a hybrid-coil output winding to prevent passage of signals from the studio talkback microphone to the P.A.'s monitoring loudspeaker.

TABLE 3.1

Circuit	Non-transmission		Transmission	
	All Faders Down	Any Fader Up	All Faders Down	Any Fader Up
Studio L/S	L.S.T.B.	L.S.T.B.	L.S.T.B.	nil*
C.R. L/S	dimmed	short-circuited	dimmed	dimmed
C.R. L/S Dim lamp	on	on	on	on
Cue Mon L/S	nil	short-circuited	nil	nil
Studio T.B. Mic.	short-circuited	short-circuited	short-circuited	short-circuited

*Foldback available.

Fig. 3.3 shows the transmission-interlock system indicated by blocks in Fig. 3.2. So far it has been convenient to ignore this system because, for the Non-transmission condition, it permits operation of relay LSTB irrespective of fader positioning. If a fader is moved from its end-stop, however, the action already described is accompanied by operation of relay CLC also. Referring to Figs. 3.2 and 3.3, relay MC is released if any fader is moved off its end-stop, and the MC1 contacts transfer an earth from relay SLS to the coil circuit of relay CLC. Thus when the L.S.T.B. switch is used to energise relay LSTA, relay CLC is operated and its contacts short-circuit the control-room and cue-monitoring loudspeakers; see 2.10.1, 2.10.2 and associated diagrams.

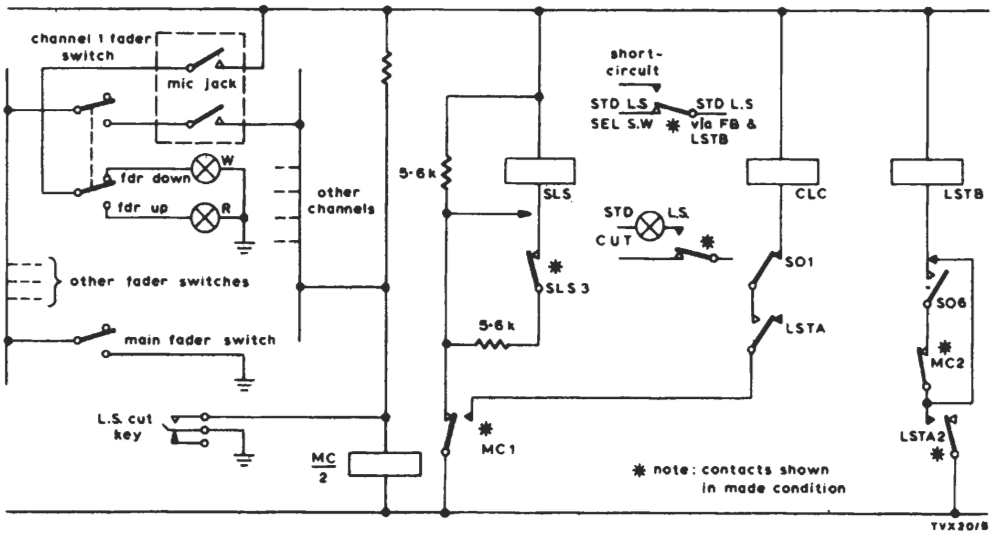


Fig. 3.3. Transmission Interlock Circuits

The studio is put into the Transmission condition by operating a sound-desk TRANSMISSION key-switch to energise a relay (SO). This relay has make-before-break contacts (SO6 in Fig. 3.3) which open to remove a short-circuit from MC2 contacts in the relay-LSTB coil circuit. Consequently energising of relay LSTB to connect talkback to the studio loudspeaker is possible only while relay MC is operated, that is, when all faders are fully down. By opening, SO1 contacts disable relay CLC to ensure that the control-room and cue-monitoring loudspeakers are incapable of being silenced by short-circuiting action while the Transmission condition is selected.

3.2.2. Auxiliary Talkback-source Switches

(a) Selector Switch

This enables various sources, mainly talkback, to be connected to the P.A.'s monitoring loudspeaker. Four external lines from L.C.R. are normalled to the switch via the talkback jackfield; other talkback lines appear in the jackfield and can be plugged up as required.

(b) FLOOR T.B. key-switch

This switch enables the studio talkback microphone to be connected to the talkback input-buswire provided the L.S.T.B. condition is not selected. The circuit for the switch is shown in Fig. 3.4. When the switch is operated, relay F is energised and its contacts perform the

necessary talkback switching in addition to operating a FLOOR T.B. lamp on the panel. If the L.S.T.B. condition is selected, the LSTA3 contacts break the coil circuit of relay F.

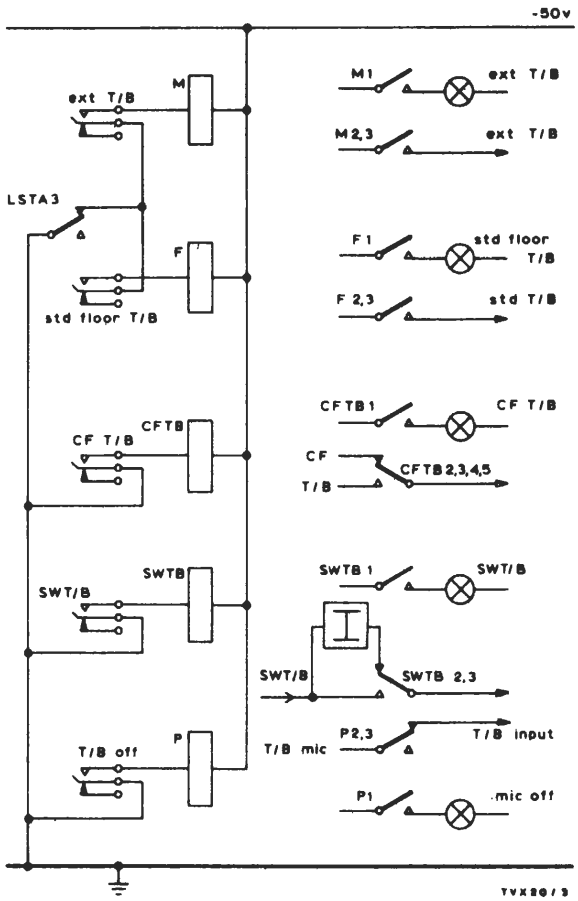


Fig. 3.4. Auxiliary Facilities at P.A. Position

(c) EXT. T.B. key-switch

Like item (b), this switch is capable of energising the associated relay (M) provided LSTA3 contacts are unoperated; see Fig. 3.4. When operated, relay M switches external talkback to the buswire system.

(d) C.F.T.B. push-button switch

This switch is for energising relay CFTB in order to substitute talkback for the normal inputs of the clean-feed and switched clean-feed distribution systems. Fig. 3.4 includes the relay-operating

circuit, and Fig. 3.5 shows the arrangement in which CFTB contact-sets provide for transfer of the two systems. Indication that talkback is selected is signalled by other CFTB contacts operating a lamp on the desk.

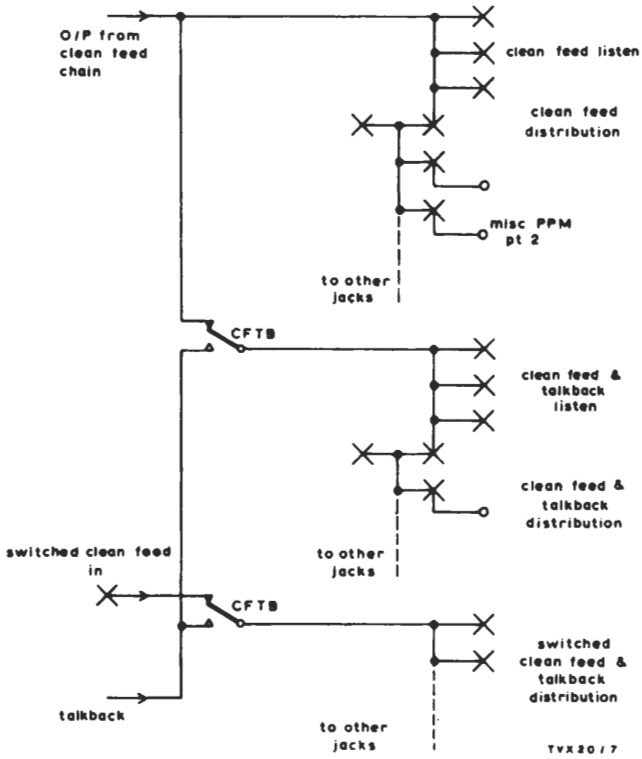


Fig. 3.5. Clean-feed and Talkback Distribution

(e) S.W.T.B. push-button switch

The talkback signal-level sent to L.C.R. can be raised by using this switch to energise relay SWTB. As shown by Fig. 3.4, SWTB contacts are normally disposed to take the feed for L.C.R. talkback distribution via a loss pad (30 dB), which is bypassed when the relay is operated. Other SWTB contacts indicate the increased-level condition by operating an S.W.T.B. lamp on the desk.

(f) C.R. L.S. DIM/CANCEL key-switch

This switch is one of three at the individual desk positions. Use of the DIM setting results in energising of relay CLA, and its contacts provide a holding circuit in addition to making the supply for relay CLD. In turn, contacts of relay CLD operate to insert a 12-dB pad into

the loudspeaker circuit; see 3.2.1 and Fig. 3.2. Removal of the pad occurs when the switch is set to CANCEL, thereby short-circuiting the coil of relay CLA and so releasing both relays.

3.2.3. Cue Switches

The P.A.'s control position has three-push-button switches labelled CUE 1, CUE 2 and MASTER CUE, for operating cue lamps in the studio; the same facilities are available at the other control-desk positions. Fig. 3.6 shows the relay circuits in connection with these switches.

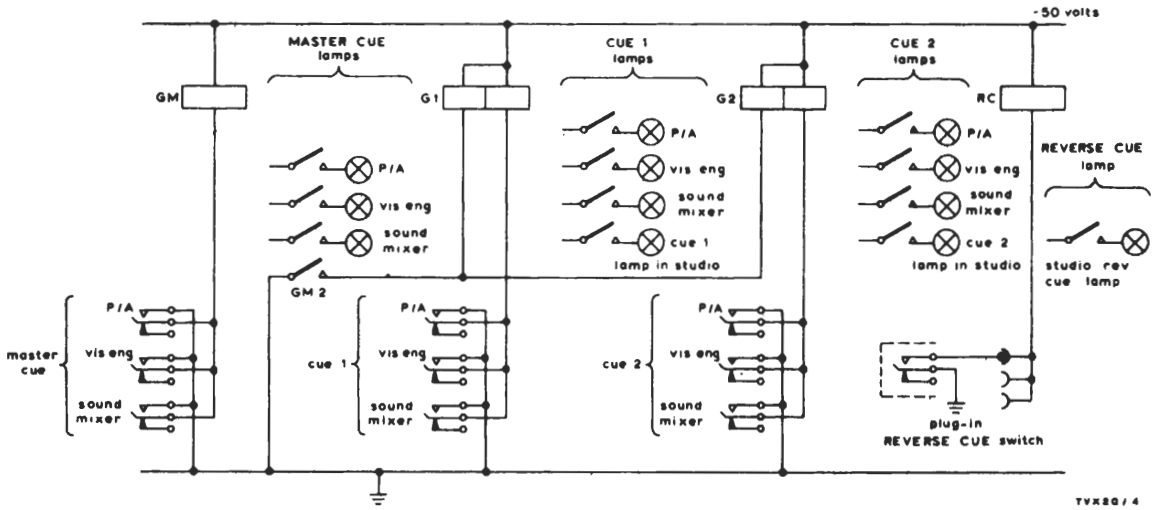


Fig. 3.6. Cue-lamp Relay System

The CUE 1 switch energises one winding of twin-coil relay G1, carrying four contact-sets which operate the Cue 1 lamp in the studio and corresponding indicator lamps at the control-desk positions. The CUE 2 switch and relay G2 are employed similarly with the Cue 2 lamp in the studio and lamps on the desk.

All these cue lamps can be operated simultaneously by using the MASTER CUE switch controlling relay GM. This relay has one contact-set that switches the supply to the second windings of relays G1 and G2, and three to operate Master-cue lamps at the desk positions.

The relay system allows for optional use of a reverse-cue facility. The relay, RC, is made operable by plugging a switch into any one of the three distribution boxes on the studio walls. When the switch is closed, the relay makes a supply to the REVERSE CUE lamp above the control-room clock.

3.3. VISION ENGINEER'S POSITION

On the panel at this position are the talkback microphone and the following controls:

Key-switches marked:	Push-button switches labelled:
CAM. T.B. ON P.A. L/S	T.B
L.S. DIM/CANCEL	L.S.T.B.
	CUE 1 and CUE 2
	MASTER CUE

Most of these are parallel-connected counterparts of switches on the P.A.'s panel, and relevant information is given under heading 3.2. The two exceptions are:

(a) T.B. push-button switch

This switch is used to energise relay V. By its operation the talkback microphone is switched to the talkback-input buswire (see Fig. 3.1) and a T.B. lamp on the panel is operated.

(b) CAM. T.B. ON P.A. L/S key-switch

This switch enables talkback from cameras to be connected to a buswire system which feeds the P.A.'s monitoring loudspeaker. Operation of the switch energises a relay (CTB) with contacts which perform the necessary switching and signal the condition by lighting a lamp on the panel.

3.4. SOUND MIXER'S POSITION

The sound mixer's panel has a talkback microphone, the S.M. cue-monitoring loudspeaker and the following controls:

Key-switches marked:	Push-button switches labelled:
STUDIO L/S CUT	T.B.
T.B. MAIN AMP. C/O	L.S.T.B.
L.S. DIM/CANCEL	CUE 1 and CUE 2
L/S OFF (applies to cue-monitoring loudspeaker)	MASTER CUE

Six of these switches have equivalents at the other desk positions and their purposes are explained in 3.2. The three exceptions are:

(a) T.B. push-button switch

This switch enables the talkback microphone to be connected to the talkback-input buswire. It controls a relay (S) which has contacts to make the buswire connection (see Fig. 3.1) and operate a lamp on the desk.

(b) STUDIO L/S CUT key-switch

Referring to Fig. 3.3, the switch is connected to release relay MC by short-circuiting its coil. Consequently MC1 contacts remove an earth from the coil circuit of relay SLS, which is thereby released and mutes the studio loudspeaker. The relay-SLS contacts for this silencing are arranged to disconnect the loudspeaker selector-switch and apply a short-circuit to the loudspeaker input (see Fig. 2.5); other contacts operate an L.S. lamp on the desk.

Note that use of the switch has the same effect as moving a channel fader from its end-stop while the Transmission condition is selected, in that it removes all studio-loudspeaker inputs except foldback.

(c) T.B. MAIN AMP C/O key-switch

Tjis switch operates change-over relays TAO and TAJ which, as mentioned in 3.1, provide for transposition of the main and spare talkback amplifiers. These relays have signal-switching contacts as in Fig. 3.1, and other series-connected contacts (TAO1 and TAJ1) to indicate change-over by operating a lamp on the panel.

3.5 TELEPHONE ARRANGEMENTS

The control room is equipped with a main telephone switchboard which has call, ring and answer facilities for interconnecting up to five internal subscribers and ten external subscribers. Two of the internal

subscribers, referred to as No.2 and Prod, are each provided with an extension switchboard which has independent call, ring and answer facilities to four subscribers on the main switchboard.

Circuits associated with other systems are:

(a) four lines from Broadcasting House PABX switchboard,

(b) a direct exchange line (DEL),

(c) a line from the PABX of the Columbia Broadcasting System.

Additionally, in reserve to item (b), there is a spare PABX line connected to a telephone handset in the control room and extended into the studio; it can be used as a spare DEL.

3.5.1. Telephone Switchboard

Fig 3.7 is a simplified schematic of the switchboard matrix, and Fig. 3.8 gives the essentials of the call, ring and answer facilities. More detailed information is available from drawings PID.8054.9.4K an PID.7910.3.1C.

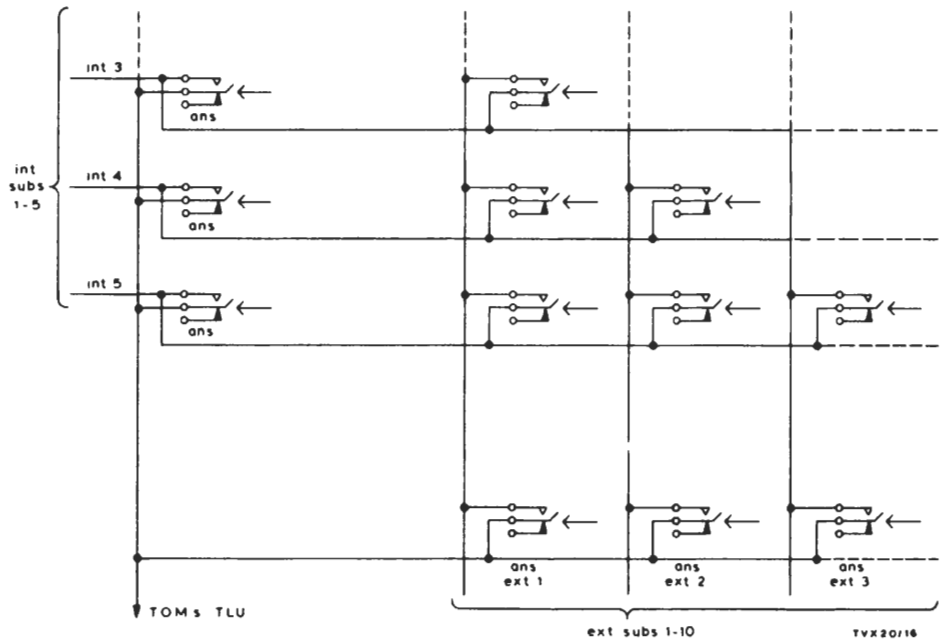


Fig. 3.7. Construction of Switchboard Matrix
(Answer contacts only shown)

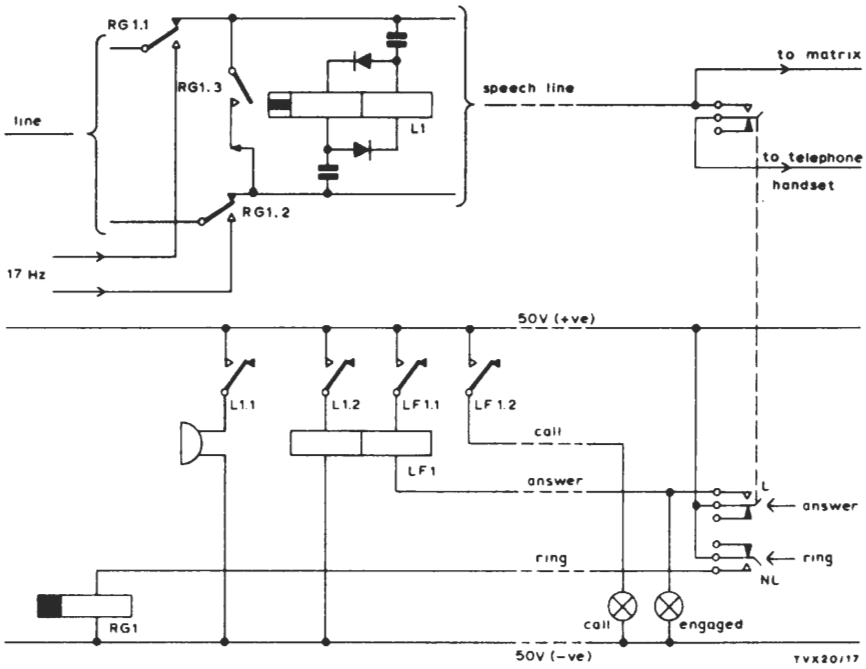


Fig. 3.8. Telephone Circuit

The following description, with reference to Fig. 3.8, applies to internal and external subscribers. A subscriber calls the switchboard by applying 17-Hz ringing tone to line, and in the switchboard the tone is rectified to obtain d.c. which operates relay L1. Thus contact-sets L1.1 and L1.2 make the operating supply to the buzzer and one winding of twin-coil relay LF1, repectively. As it operates, this relay provides itself with a holding circuit by energising the second winding via contacts LF1.1 and an engaged lamp (ENG). Contacts LF1.2 operate a CALL lamp on the switchboard.

For the purpose of answering the incoming call the appropriate ANS switch is operated. Thus (a) the switchboard handset is connected to the subscriber's line, (b) relay LF1 is released by short-circuiting of the holding coil, and (c) the ENG lamp is kept lit through an alternative supply-connection. The incoming subscriber can be connected to another subscriber by operating the relevant inter-connecting switch and associated RING switch on the switchboard. The RING switch energises a relay (RG1), the contacts of which disconnect the matrix from the outgoing line and substitute ringing tone.

A head-and-breast set can be paralleled to the handset through a socket on the switchboard. Associated with this socket is a switch for transferring the head-and-breast receiver from the matrix output to the output of the selector switch in connection with the cue-monitoring loudspeaker.

3.5.2. Extension Switchboards

Separate working of the extension switchboards is obtained by providing parallel connections from the ring, call, answer and speech circuits (Fig. 3.8) of the appropriate subscribers on the main switchboard.

3.5.3. Telephone Numbers

PABX Extensions	Direct Exchange Lines
2546	MUSeum 1450
4174	LANgham 1166, Ext.17 (C.B.S. switchboard)
4318	
5017	
2525	

A paralleled handset is provided in the studio on each of the PABX extensions 5017 and 2525. The last-mentioned extension is the one which can be used as a spare DEL (MUSeum 1935).

3.5.4. Visual Call Circuit

The call circuit of PABX extension 5017 is arranged to disable the phone's internal buzzer and to signal incoming calls by a white lamp, above the studio clock, when either the transmission key or the rehearsal key is operated.

The buzzer is in series with a diode bridge across the incoming line, and is paralleled by normally-open contacts of two relays (R and B). By operating one of the above-mentioned keys, the associated relay is energised and its contacts short-circuit the buzzer. Thus the diode bridge is capable of receiving the full ringing-tone voltage, sufficient for its output to operate a relay (L) controlling another relay (WL) which makes the white-lamp supply. Relay WL is in a power-supply cabinet.

Relays R and B have additional functions; see Tables 4.1 and 4.2.

SECTION 4

MISCELLANEOUS

This Section covers power supplies and other general facilities not already described.

4.1. POWER SUPPLIES

The sound equipment has a 250-volt single-phase feed from a ring main and takes the 50-volt relay-operating supply from a source meeting various group needs of the complete installation. Maintained supplies are available for operating all equipment.

For the purpose of distributing a number of main feeds a fuse-alarm system is used in connection with the 50-volt source. The sound-equipment supply is identified by an A3 reference and is distributed via an FR/7 fuse panel providing additional alarm indication; this feature is incorporated in the one branch only.

4.1.2. 50-volt Fuse-alarm System

Fig. 4.1 illustrates the essentials of the system by giving the typical arrangement as applied to the sound-equipment feed and showing how individual-indication and common-alarm circuits are associated with relays on other main feeds. For details, refer to drawing PID.8054.9.5B.

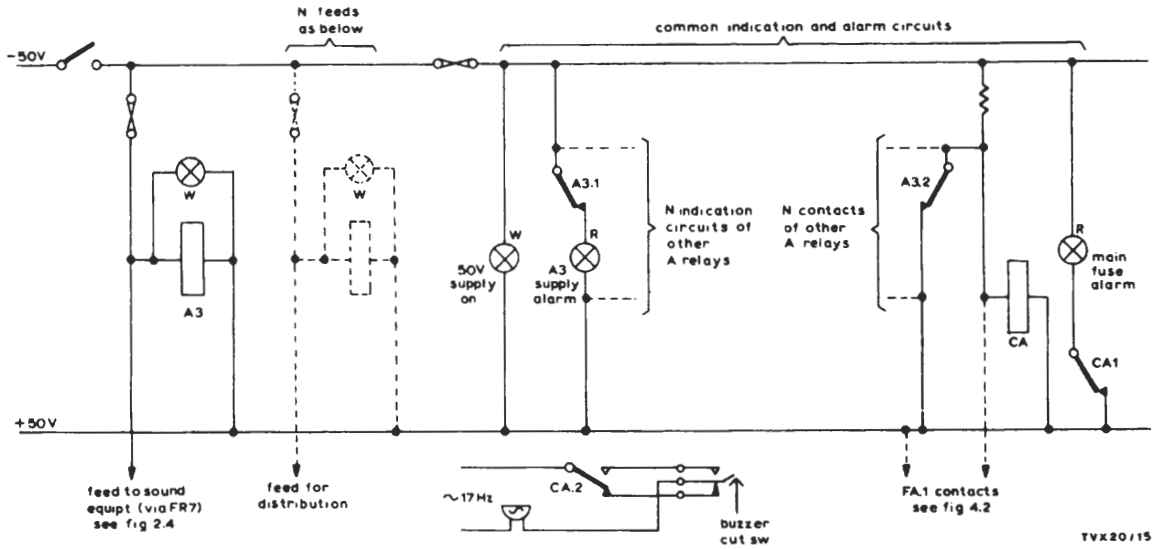


Fig. 4.1. 50-volt Fuse-alarm System

With the isolator closed a white lamp indicates the presence of the 50-volt supply and all A relays are energised with their contacts open. Assuming the sound-equipment fuse ruptures, relay A3 is de-energised and A3.1 contacts make to indicate the particular circuit affected by loss of supply. The A3.2 contacts short-circuit the coil of relay CA, which provides a general alarm by CA.1 contacts making the supply for a red lamp as CA.2 contacts switch 17-Hz ringing tone to a buzzer.

An ALARM CUT key-switch can be operated to prevent the buzzer sounding continuously while the fault is being cleared. By this action the circuit is prepared to issue a subsequent warning, when relay CA becomes energised as a normal condition is established, that the switch must be restored to its usual setting.

4.1.2. Fuse Panel FR/7

Fig. 4.2 is a basic circuit diagram of the panel in connection with the 50-volt supply for sound equipment. The fuses are a conventional pattern with a springy metal tongue which moves into contact with an alarm bar when rupture occurs. Thus the supply is applied to a failure-indication lamp and one relay-FA winding. The FA.1 contacts make across the coil of relay CA in the main-feeds alarm system (Fig. 4.1) and thereby originate a general alarm as explained for A relays in 4.1.1.

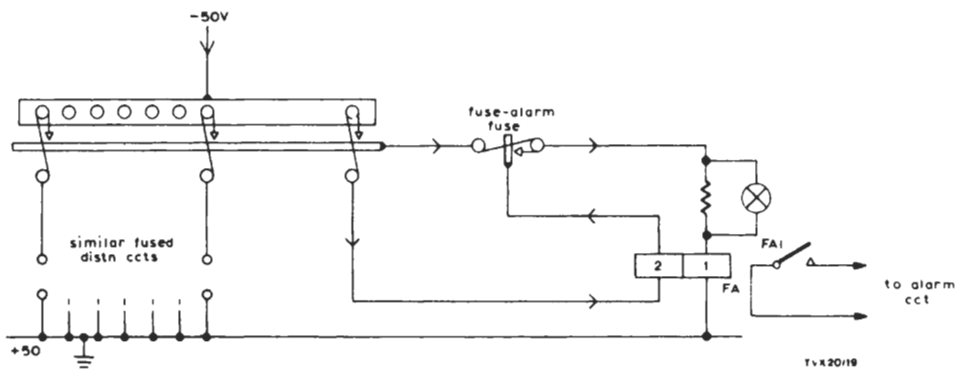


Fig. 4.2. Fuse Panel FR7

The second winding of relay FA is used for issue of a general alarm if the alarm circuit is affected by an earth fault which blows the fuse. The tongue of this fuse is attached to the earthy side of the supply circuit. Suppose there is a direct earth on the wire connecting the fuse to the lamp. In that event rupture of the fuse results in connection of the separate alarm bar to +50 volts via the tongue and earth-fault path, so relay FA is operated by full voltage applied to the second winding. The voltage is, of course, dependent on the

position and ohmic resistance of the earth fault. Note that faults are revealed only by either failure of a distribution fuse or bridging of the distribution and alarm bars to check alarm operation.

A lamp to indicate the presence of the 50-volt supply is placed inside the 50-volt main distribution panel and wired across the input to the fuse panel.

4.2. SIGNALLING-LAMP SYSTEMS

Two signalling-lamp panels are placed one each above the control-room and studio clocks. Additionally there are pairs of red and blue (Transmission and Rehearsal) lamps above the doors leading into the studio area, the studio and the control room.

4.2.1. Signalling-lamp Panels

The functions and operation of the lamps are as follows:

Red: Indicates that the studio is in the Transmission condition; operated by means of the TX key on the control desk.

Blue: Indicates that the studio is in the Rehearsal condition; operated by the REH key on the control desk.

Green: The reverse-cue lamp; operated as described in 3.2.3.

White: Indicates that a subscriber is calling extension 5017 on B.H. PABX; applies only when the studio is in either the Transmission or Rehearsal condition.

4.2.2. Transmission and Rehearsal Lamps

These lamps are operated in parallel with the red and blue lamps on the signalling-lamp panels.

4.3. TRANSMISSION AND REHEARSAL SWITCHES

The following description is a summary of conditions set up by operating these switches, including some effects necessarily referred to previously.

(a) Transmission Switch

This three-position key-switch is on a panel to the right of the sound desk. Its upper position is labelled TX ON; the lower (non-locking) position is labelled TX CANCEL.

When the switch is operated to TX ON, the contacts transfer an earth from relays RH, TN and CTN to relays SO and R. Removal of the earth from the first three relays ensures cancellation of the Rehearsal condition, given later, and prevents connection of tone to the studio main-output and clean-feed lines. Through the transferred earth connection the relays SO and R are energised to perform operations set out in Table 4.1.

Table 4.1

Relay	Contacts	Function
SO	SO.1	De-operates relay CLC, thus ensuring that the control-room loudspeaker will not be disconnected.
	SO.3	Holding circuit via RH.3
	SO.4	Lights the transmission lamp above the key.
	SO.5	De-operates relay MON to connect the cue-programme distribution; see 2.12.
	SO.6	Interlocks the loudspeaker-talkback to all faders; see 3.2.1.
R	R.1	Short-circuits the buzzer of PABX 5017.
	R.2	Switches on the red lights outside the studio doors, in the control room and in the studio.

Note that the switch is arranged to energise a vision-circuits relay at the TX ON setting, thereby disconnecting sawtooth signals from outgoing vision lines.

By moving the switch from TX ON to the central setting, relay R is released and the earth is restored to the tone relays (TN and CTN), but relay SO remains energised via its holding circuit. This gives a modification of the Transmission condition in that, although various facilities including the ability to send tone to line are available, the talkback arrangements are left undisturbed as for the TX ON setting.

The distinction between the two states for the above-mentioned settings is provided by the red-lamp signals. The full Transmission condition at the TX ON setting is marked by lighting of all red lamps, whereas for the partial condition obtained at the central setting the only lamp lit is the one above the key; see SO.4 in Table 4.1.

At the TX CANCEL position the relay SO is released by short-circuiting of its coil, this giving a return to the initially-assumed neutral condition.

(b) Rehearsal Switch

This three-position key-switch is next to the TRANSMISSION switch. It has upper and lower positions, designated ON and CANCEL respectively, which are non-locking because only momentary operation is required to establish the alternative states.

By setting the switch to ON for a short period, relays RH and B are energised provided the studio is not in the Transmission condition. Even after successful operation a cancellation can result from use of the Transmission switch, for which purpose the switch has contacts connected in the holding circuit of relay RH. The operations performed by the two relays are listed in Table 4.2, see overleaf.

Table 4.2

Relay	Contacts	Function
RH	RH.1	Lights the rehearsal lamp above the key.
	RH.2	De-operates relay MON, thus connecting the cue-programme distribution; see 2.12
	RH.3	De-operates relay SO if TX key is in the central position.
	RH.4	Energises relay B.
B	B.1	Short-circuits the buzzer of PABX 5017.
	B.2	Switches on the blue lights outside the studio doors, in the control room and in the studio.

PART 2: OTHER INSTALLATIONS

SECTION 1

SOUTHAMPTON

1.1. GENERAL

The interview studio at Southampton is constructed on similar lines to that in B.H. London. The positions of various controls on the main desk have been altered to meet local requirements, so the layout shown in Fig. 1.1 of Part 1 is not applicable.

The subsequent description is a comparative treatment referring to main modifications and additions relative to the London installation. Minor alterations such as changes in terminating resistors and matching pads are ignored because the items concerned were not mentioned directly in Part 1.

The drawings giving details of this installation are:

Programme Schematic	PID.8747.9.1K
Switching Schematic	PID.8747.9.5K
Talkback Schematic	PID.8747.9.3J

1.2. MODIFICATIONS

The main sound mixing desk is a redesigned version to enable up to twelve channels to be handled. The total is made up of six channels in Group A, five in Group B, and an Independent channel.

Channel amplifiers 1-6 are used in the Group-A formation. Their outputs are taken to a resistive mixing network followed by an AM9/6 amplifier feeding the A group-fader. For channels 7-11 there are similar arrangements in connection with the B group-fader. The signals from both groups are combined and applied to a hybrid transformer producing independent feeds for the studio main-output and clean-feed distribution circuits.

The channel-prehear signals are derived from the primary side of transformers connected between the sound-desk input jackfield and the channel pre-set Balance controls. This change is to avoid induction due to unbalance in signal paths.

Main additions to switching circuits include two key-switches providing a remote record/replay facility for two tape machines. The switches are on a miscellaneous lamps-and-keys panel. Also on this panel is a RED OPERATE key controlling a relay (RO) to operate the transmission warning lights during recordings. The studio is put into the Transmission condition by operation of relay SO via RO2 contacts.

The production assistant's panel has a TK BUZZ key providing cueing facilities to a telecine area. Operation of the key energises a relay (BZA) which, through one pair of contacts, substitutes buzzing tone for talkback on the telecine tie-line. The tone is produced by using another pair of BZA contacts to energise a relay (BZB) via a normally-made pair of its own contacts. This causes relay BZB to execute a continuous operate-and-release action, and the resultant a.c. signal induced into another winding of the relay is taken for the required calling purpose.

Instead of being used to short-circuit the output of the associated selector switch, the L/S OFF key in connection with the S.M.'s cue-monitoring loudspeaker is arranged to divert signals to a jack beneath the table-top of the control desk.

With a circuit as in Fig. 3.3 (Part 1) the L.S.T.B. system is liable to be affected by switching transients due to operation of the transmission-interlock relay MC. This has been obviated by making relay MC a low-current type operated by a transistor working as a switch. The transistor is biased such that it normally conducts and so relay MC is energised. Operation of the L.S. CUT key, or the faders, connects the transistor base and emitter together, this giving a cut-off condition which releases the relay. The circuit as modified is to be seen in drawing PID.9196.9.5K; referred to in the following Section dealing with Bristol.

The telephone switchboard is associated with two extension-switchboard positions, one in the telecine area and the other on the apparatus bay. The last-mentioned switchboard position is provided also with call, ring and answer facilities to Southampton control room through wiring independent of the main switchboard. Calls between the main and extension switchboards are indicated by call-lamps only.

Although it is not disconnected automatically when either the TX key or the REH key is operated, the PABX telephone buzzer can be muted by operating a CUT switch on the instrument, and then the incoming calls are indicated visually. The white lamp for that purpose is on the signal-lamp panel; it is operative only when the studio power supplies are switched on.

The significance of signal-lamp colours is slightly different, with yellow for the reverse-cue lamp and green for the master-cue lamp.

All 50-volt supplies are maintained. A modification with reference to Fig. 4.1 is the connection of the ALARM CUT switch in series with relay contacts CA1 and the buzzer. Therefore in this instance the buzzer will not operate while the key-switch is operated.

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SECTION 2: BRISTOL

2.1. GENERAL

This interview studio is one of the studios in Broadcasting House, Bristol, and is known locally as Studio B. The arrangements closely resemble those at the Southampton interview studio, so there are few differences warranting mention as distinguishing features of the particular sound installation. As in the preceding Section, no consideration is given here to minor differences sush as changed values for terminating resistors and matching pads, because the basic information in Part 1 is not directly concerned with details of that sort.

Detailed information for the Bristol sound equipment is obtainable from the following diagrams:

Programme Schematic	PID.9196.9.1K
Switching Schematic	PID.9196.9.5K
Monitoring	PID.9196.9.2K
Talkback Schematic	PID.9196.9.3J
Telephone Schematic	PID.9196.9.4K

2.2. MODIFICATIONS

The sound desk is the type used at Southampton, and the twelve channels are grouped as stated in the opening of 1.2 (Part 2). Note, however, that at Bristol the channel prehear signals are taken from the output side of the preset gain controls.

The desk has an L/S TO H.P. switch in place of the L/S CUT switch referred to in 2.10.3 (Part 1). By operating this switch the input for the cue-monitoring loudspeaker is transferred to a jack for headphone monitoring.

In conjunction with the echo chain it is possible to use either of two type-EMT/140 reverberation plates (see Instruction S.9, Section 1) in general service with various studios at this Centre. Use with the interview studio is conditional on their not being engaged by other areas, and the means of selection is a three-position ECHO switch. Red and white lamps are placed near each of the working settings of

the switch, designated A and B to correspond with the letter identification of the plates. When the switch is operated to either setting the red lamp lights if the associated plate is in use elsewhere. Otherwise the white lamp lights to signal that the plate is connected between the echo-chain output and the echo-return circuit, taken via normally-closed contacts of a relay (EC) and a 15-dB pad to a main-jackfield termination.

The telephone switchboard has four internal subscribers, but only three of these are capable of interconnection with each other and any of nine external subscribers. The exception applies to the circuit from the Studio Lighting Position. The sole extension switchboard belongs to the producer, and with this it is possible to obtain direction connection to four subscribers as the alternative to that offered by interconnection from the main switchboard. Calls are indicated by lamps and a buzzer.

One PBX extension only is provided. The associated buzzer is disconnected automatically when the studio 50-volt supplies are switched on, and subsequently incoming calls are signalled by a white lamp on the signal-lamp panel.

A master-cue lamp is not provided in the control room.

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