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SEMI-AUTOMATIC MIXING FACILITIES

This article deals with the problems which had to be considered for CHCH Niagara Television, Hamilton, Ontario, in their presentation room and is very typical of problems which are associated with other commercial broadcasting stations throughout the world.

INTRODUCTION

IN ALL PRESENTATION SUITES, there is always the problem of being able to switch a large number of television sources, with married sound and vision, into a relatively small or even large number of outputs, in such a way that any or all of the inputs can be switched to any of the outputs. In addition, facilities often have to be added to permit the announcer to speak over a slide.

In commercial stations a second problem occurs during a commercial break when a large number of often complicated operations has to be performed in a very short time. This tends to lead to errors on the part of operators, and occasionally difficulties arise when arranging the programming of the outgoing commercials so that operationally difficult sequences are prevented. It is, therefore, advantageous to be able to pre-select all the sources required for the commercial break prior to the break taking place, and then punching up these selected signals at the required time simply by depressing a single button.

THE MAIN MIXER

In the case of the CHCH switcher, the problem was to be able to select any one of twenty-five inputs to be fed to any or all of four destinations. The inputs were to be sources derived from studios, telecines, vision tape recorders, presentation cameras and remote sources. Up to five of each of these sources had to be catered for and all with married sound and vision. Separate sound facilities were also required.

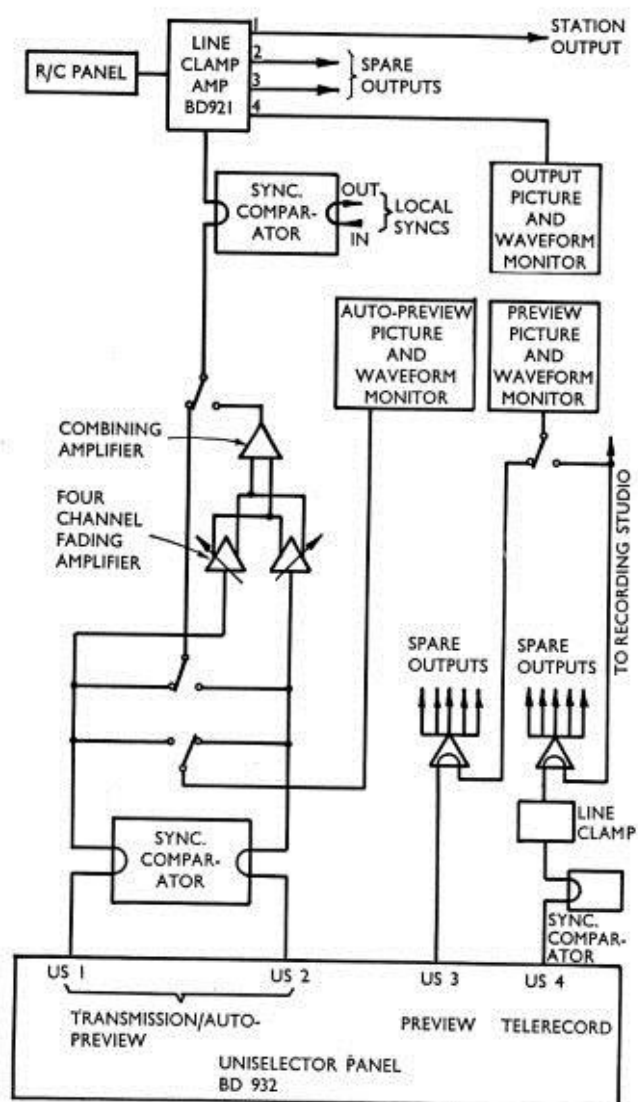


Fig. 1(a). Block diagram showing the vision facilities at CHCH-TV.

The outputs which were required were one for transmission, one for automatic preview, one for roving preview and one for a telerecorder. All of these outputs had to be monitored both aurally and visually.

As remote signals were entering the switching system provision had to be made to detect non-synchronous sources. Also, since mixing facilities were required, the mixing of non-synchronous sources had to be prevented, and in the event of a "cut" being made to a non-synchronous source the appropriate line clamp amplifier had to be switched automatically to its remote condition.

The uniselector switching panel, type BD932, which provides four independent outputs from twenty-five inputs provided an obvious answer to the problem. All switching can be done for both sound and vision by the uniselectors within this panel. The remaining processing of the signals was carried out by the extremely versatile processing units especially designed for use in many varying complex configurations.

FACILITIES

The two diagrams, Figs. 1(a) and 1(b), show the facilities which were provided for both sound and vision. It will be seen that two uniselector banks were used in conjunction with one another to give the transmission/auto-preview and pre-listen switching. The movement of these two uniselector banks is controlled by the one set of control buttons on the main control panels (only the uniselector which is on auto-preview at the time a new selection is made will move to this new source). On depressing the cut button, the switch is made between the transmission line and the auto-preview line. This switch can also be made by operating the mixing faders.

As indicated above, it is necessary to compare the synchronizing pulse between these inputs and the main station pulses. This is carried out by two sync. comparator units. The first of these is situated across the output of the transmission/auto-preview bank and prevents mixing between non-synchronous sources, and the second is situated between the input to the line clamp amplifier and the station sync. pulses, and switches this unit to its remote condition in the event of a non-synchronous source being switched to line.

The remaining two uniselector banks are both controlled from the single set of selector buttons on the second control panel. Two separate buttons on this panel route the control signals from the selector buttons to the required uniselector. The main point to notice is that in this case the uniselector banks are completely independent and not linked, as are the

transmission/auto-preview banks. These two outputs are fed to the roving preview and pre-listen monitors, and also to the telerecording equipment. The method of monitoring the sound by use of a single VU meter and loudspeaker is shown in Fig. 1(b).

Separate sound is injected from an existing sound mixer via a dual sound fading amplifier, which is situated in the outgoing transmission line. This permits the separate sound source to be injected into the system at whatever level is required.

THE CONTROL DESK

CHCH required that the control desk should be built up from five standard Marconi consoles (type 4785), two of which would be fitted with the control panels

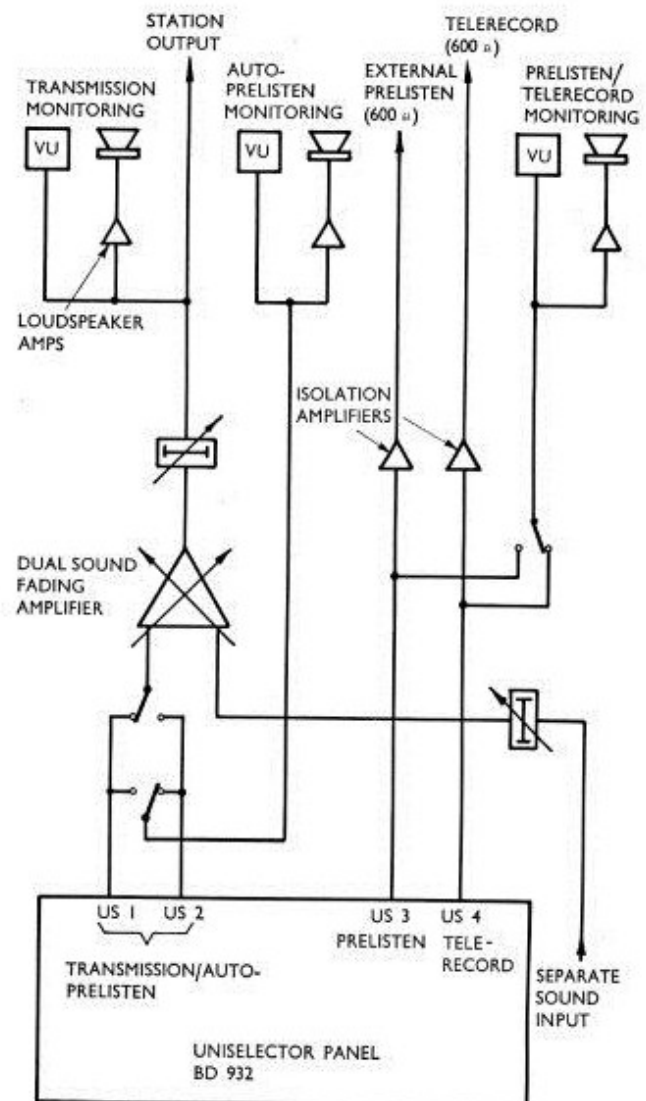


Fig. 1(b). Block diagram showing the sound facilities at CHCH-TV.

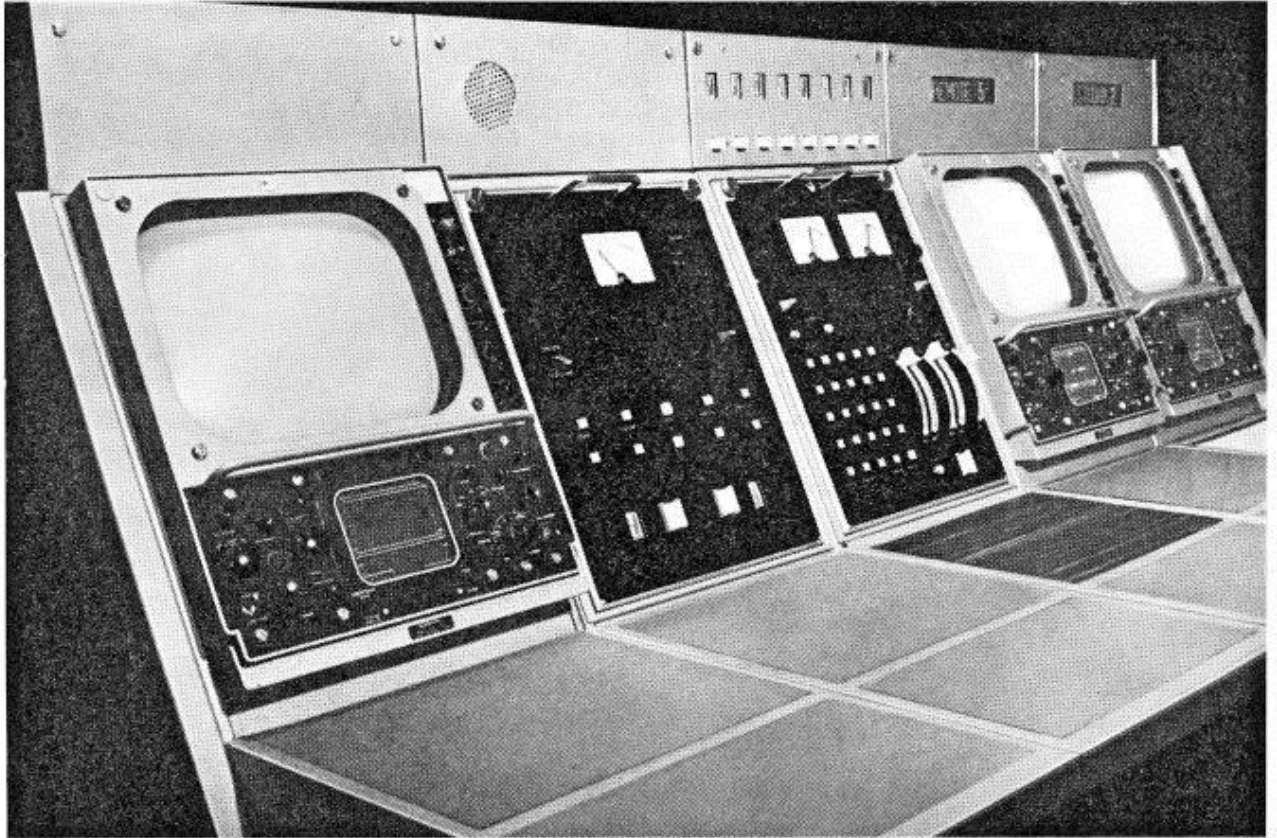


Fig. 2. The control desk at CHCH-TV.

on swinging frames, and the remaining three of which would hold picture and waveform monitors (Fig. 2).

The desk section of the consoles was to be laid out as a script space. Indicators were to be situated above each of the picture and waveform monitors to indicate which source appeared on the respective monitor. These three monitors were employed on the outputs of the transmission, auto-preview and roving preview unselector banks. Two of these were placed on one side of the control panels and the third on the other. This enables the operator to observe easily all the controls and necessary pictures and waveforms without any unnecessary stretching.

The main control panel contains twenty-five selector buttons (one for each input) and the required mixing faders as well as a cut button. Two VU meters are provided, one for visual monitoring of the sound on the transmission output, and the other for monitoring the output from the automatic pre-listen unselector. A small loudspeaker was also placed in this control panel for monitoring the auto pre-listen output. The

main loudspeaker for the transmission bank was situated externally to the control desk. Volume controls are provided for each of the loudspeakers, together with a dim switch which automatically puts in 6 dB of attenuation on depressing the keys. This permits the operator immediately to reduce the volume from a particular loudspeaker when he is engaged on the telephone, or monitoring another source on a different loudspeaker.

The second control panel has coded selector buttons. This means that there is one button associated with each of the five groups of services and five other buttons marked 1 to 5. If the required output is from Studio 3, then the buttons marked Studio and 3 will be depressed, and the required unselector will select the Studio 3 input. Two small indicators are mounted on this panel to show the control operator which input is being taken from the "roving preview" and "tele-record" unselector banks. For aural monitoring, the VU meter and monitor loudspeaker are also mounted on this panel. Here again, a volume control and dim switch are provided.

THE AUTOMATIC EQUIPMENT

Very often during a commercial break, up to six or eight separate operations have to be made in the space of two or three minutes. The purpose of the automatic section of the equipment is to minimize faults due to incorrect selection or mistiming of the selections. The equipment was designed so that up to eight sources can be pre-selected. This is done by further use of uniselectors in conjunction with a relay logic box.

Two additional items, which are on the main control panel, are a switch designated "auto" in one position and "manual" in the other and a reset switch. When

the first switch is in the "manual" position, any selections which are made by one of the transmission/auto preview buttons causes the auto-preview uniselector to move to the new selected source ready for putting on air by a cut, fade or mix; i.e. the mixer operates in the more conventional manner. When this switch is in the "auto" position, the selector buttons control the store uniselectors.

In normal circumstances the store would be loaded during programme time with information for the next station break. Table 1 shows a typical sequence of events during a break and the store will be loaded as follows.

The first source to be selected will be Telecine 2. The relevant buttons will be pressed and a signal will pass via a routing uniselector to the first store uniselector, which will in turn move to the new source. On releasing the selector button the routing uniselector steps on one place. The next event will be Presentation Camera 1. When the relevant button is pressed, the routing uniselector will send the information to the second store uniselector which will move as required. Again the routing uniselector will step on one place after the selection button is released. The remaining three sources are selected in a similar way until the five entries have been made in the store. Each entry is indicated on KGM indicators in the order in which they have been made. At this point three entries are vacant and not required; the "reset" switch is therefore operated, and the routing uniselector moves until it will route any signals it may receive to the first store uniselector.

At the required times the operator takes action as indicated in Table 2 to put the stored sources on air in the previously selected correct sequence. At first sight this table may seem to be complicated, but it will be appreciated that the only operations left at this time are cueing and cutting or fading to the new sources. During these operations the auto-preview monitor and loudspeaker etc. automatically preview the next source to be put "on-air", immediately after putting the new source on air. The transmission/auto-preview uniselectors receive their information from the store instead of the selector buttons as in the case during manual operation.

A self-illuminated push button is situated under each KGM indicator. Only one light will be on at a particular time, and this shows the position of the routing uniselector. Should a change be required, due to an error or change in requirement, the appropriate

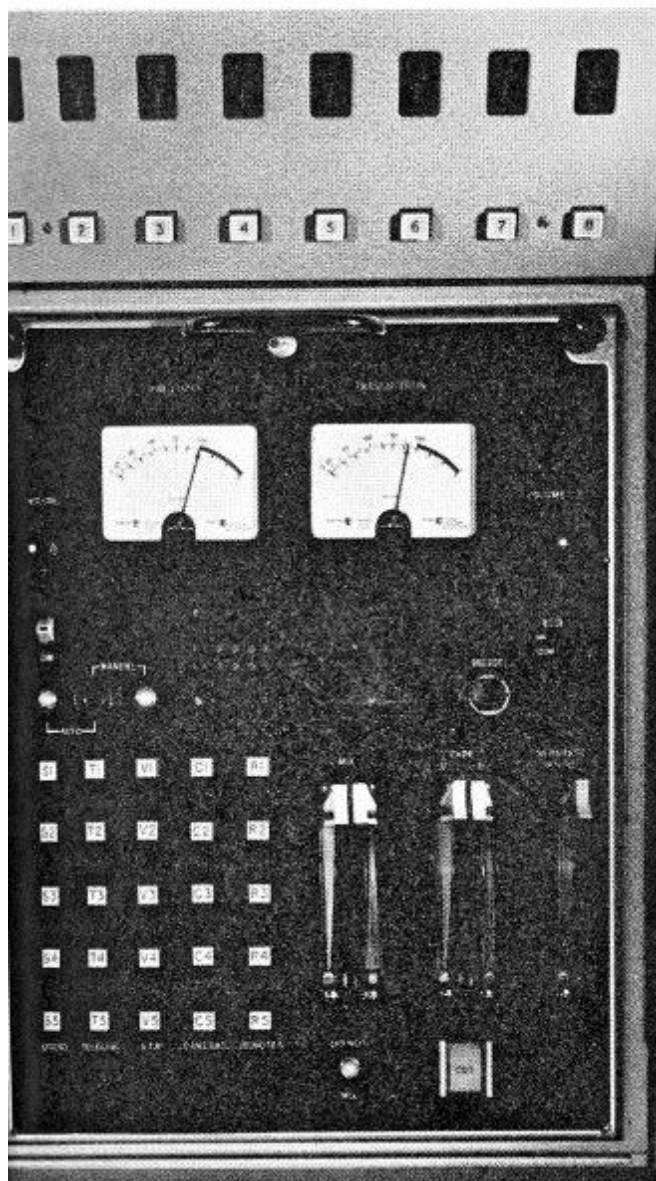


Fig. 3. The main control panel.

buttons can be pressed and a selection operation made. The routing uniselector is by-passed and the control signal causes the relevant store uniselector to move to the new source without interfering with any of the rest of the store.

CONCLUSION

The new mixer has given CHCH an efficient, accurate and comparatively cheap form of presentation switching, and removed the ever-present problem of patching. An additional advantage, which might be used at a later date, is that the semi-automatic operation can easily be connected to a fully automatic system using a coded tape with very little modification.

TABLE 1

<i>Time</i>	<i>Source</i>
Already "on Air"	Studio 3
18 58 00	Telecine 2
18 58 30	Presentation Camera 1. (Slide with announcer on separate sound)
18 58 50	Telecine 3
18 59 30	Studio 5
18 59 55	Presentation Camera 3. (Station Clock with superimposed Station Ident.)
19 00 00	V.T.R.4 (New programme)

TABLE 2

<i>Time</i>	<i>Operator's Actions</i>	<i>Source On Air</i>	<i>Source On Auto Preview</i>
18 57 55	Cue: Roll Telecine 2	Studio 3	Telecine 2
18 58 00	Depress cut button	Telecine 2	Presentation Camera 1 and announcer (sound only)
18 58 25	Cue Presentation Camera 1 and announcer	" "	" "
18 58 30	Depress cut button and move separate sound fader	Presentation Camera 1 and announcer (sound only)	Telecine 3
18 58 45	Cue: Roll Telecine 3	" "	" "
18 58 50	Depress cut button, take out sep. sound fader	Telecine 3	Studio 5
18 59 30	Depress cut button	Studio 5	Presentation Camera 1 and Station Ident. (sound only)
18 59 50	Cue Presentation Camera and sound tape operator	" "	" "
18 59 55	Depress cut button, move sep. sound faders. Cue V.T.R.4 to roll	Presentation Camera and Sta. Ident. and announcer (sound only)	V.T.R.4
19 00 00	Depress cut buttons	V.T.R.4	