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RE-EQUIPPING A TV CENTRE

Part 2

INTRODUCTION

An article in the Spring 1969 issue of *Sound and Vision broadcasting* outlined the planning problems involved in the re-equipment of Granada's Television Centre in Manchester, and their solutions. The work is being undertaken to make the centre ready for colour and 625-line transmission and this

article briefly describes the installations which resulted from that planning, which was jointly undertaken by Granada Television and The Marconi Company. The electrical and technical installations are being undertaken by The Marconi Company in the role of main contractor.

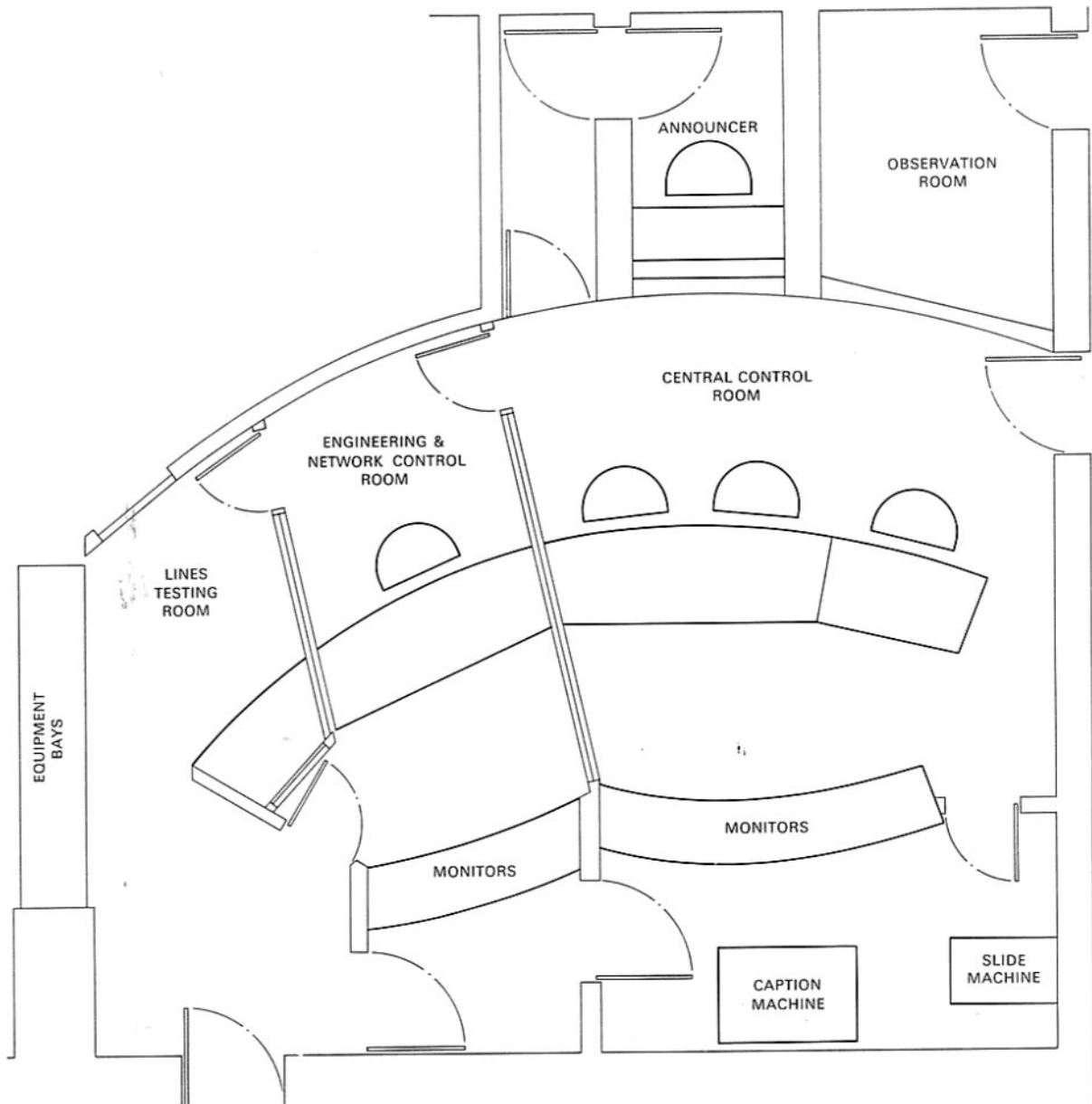


Fig.1 Layout of the Central Control area.

CENTRAL AREAS

The Central Control (i.e. Transmission Control) room and the adjacent Engineering and Network Control Room are laid out using a curved desk. A plan of the area is shown in figure 1. The desk continues through a glazed partition between the two control rooms and continues through a further glazed partition to a lines termination area beyond Engineering Control. The curved desk enables all members of the crew responsible for transmissions and network to see each other and feel part of a single team. Monitors are curved in the opposite direction to the desk to give the best viewing angles and are set as low as possible to minimize the change in the direction of view necessary when looking from the programme schedules and control panels on the desk to the picture monitors. Monitors are installed at a viewing distance of ten feet giving a reasonable field of view when scanning a block of five monitors wide by three monitors high. The Engineering Control area has a separate monitor bank. In addition there are two desk-mounted picture and waveform monitors which can be switched to the inputs to, and the outputs from the area for assessment of picture quality. The main output monitors in these two areas will be changed for colour units by mid-1969. Figure 2 is a general view of the Central Control Room and figure 3 shows the Network Control area with the network output switcher in the foreground. The Peak Programme Meters show the sound levels of the outgoing programmes and the sound levels associated with the programmes selected on the picture and waveform monitors.

The dark surround to the monitor screens shown in the pictures has subsequently been changed to off-white to reduce the contrast between the

monitors and the surrounding areas, resulting in much more comfortable viewing conditions.

The main switchers for station and network output and for emergency use and monitoring were supplied by Marconi and utilize their well-proven uniselector units. The main switcher is in two identical halves, each incorporating an eight event store allowing eight sources to be preset for selection in sequence on the married sound and vision switcher. The system works on the 'automatic preview and take' principle; faders enable separate fading of sound and vision, cross mixing, or wiping from preview to transmission. Automatic genlock is incorporated to synchronize local sources to incoming signals and is initiated when the mixer is put in the mix or wipe mode by back pressure on the fader levers. Separate sound sources (e.g. announcers or cassette sound tapes) can be mixed onto line by a further sound fader.

VIDEO TAPE RECORDERS

The VTR area layout was a difficult problem to solve but an elegant solution was eventually found. The conflicting problems were to keep noise to a minimum (in an area where machine noise, compressed air, programme loudspeakers and talkback tend to form a major distraction) and to provide quick access and easy supervision of machines. The machines are grouped around the perimeter of a nearly square room facing towards the centre, each being located in an open-fronted acoustic booth (Fig. 4). Loudspeakers are mounted behind the 'pelmet' forming the top of the open front wall, playing into the booth to reduce disturbance to other operators in the area. The pelmet also houses concealed indirect lighting giving good illumination without allowing stray light to fall onto the monitors.



Fig.2 A general view of the Central Control Room.



Fig.3 The Network Control Room.

All the compressors are sited in a separate room which is accoustically separated from the main area. A glass-enclosed booth is provided for the senior engineers and incorporates sound and vision monitoring facilities and the main assignment control panel for all the VTR machines. All the machines can be seen from this position and figure 5 shows one such position viewed from it. An adjacent and connecting editing room is equipped with an elevated production control desk as illustrated in figure 6. Simple sound and vision mixing facilities are provided ready for the installation of a third machine which will enable AB roll editing with mixing and special effects to be executed.

As well as the piped compressed air previously mentioned each machine is fitted with a small drain so that the water traps can be drained directly without the danger of spilling water which is usually blown out under pressure.

Each machine is equipped with an input selector switch for selecting one of a number of monochrome or colour test signals or the assigned programme feed from the assignment switcher. In addition to the machine monitor a second black-and-white monitor is provided in a side console but it will be exchanged for a colour monitor at a later date. It can be switched either to the machine's

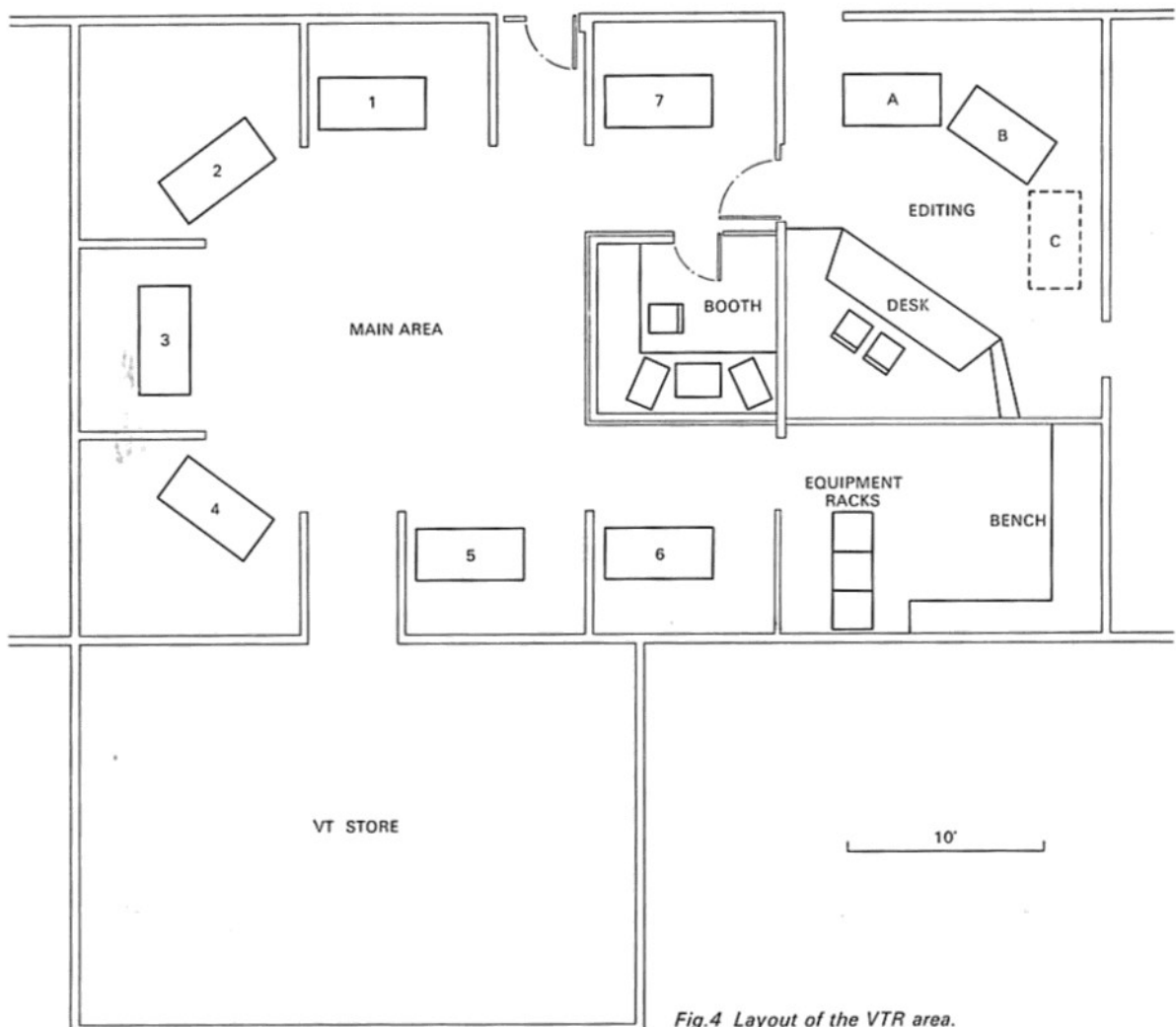


Fig.4 Layout of the VTR area.

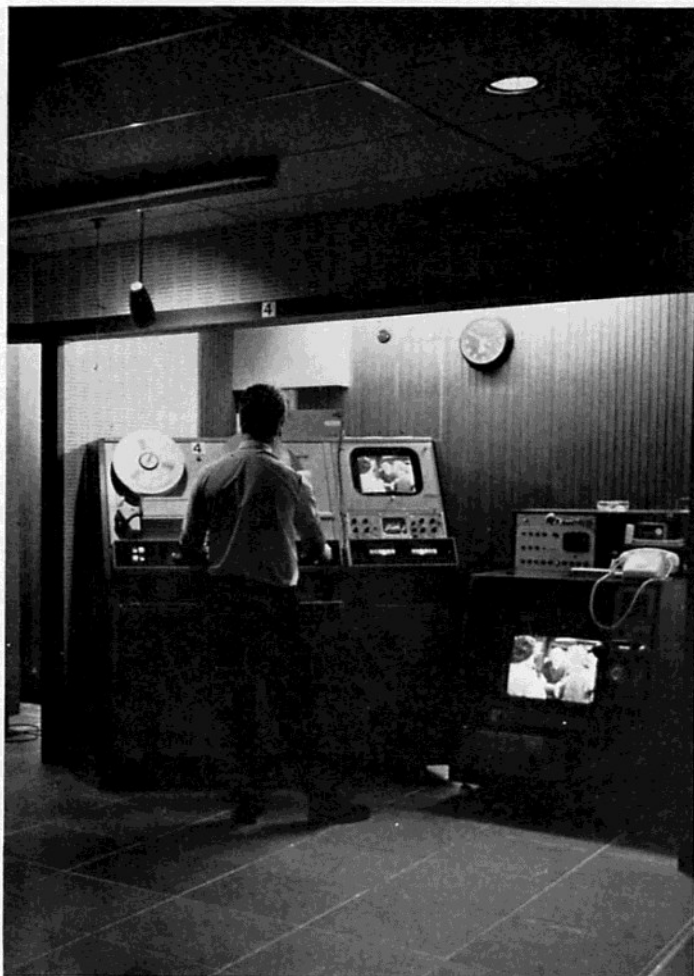


Fig 5 One VTR booth viewed from the central control booth.

assigned input or to the output of the recorder; in the latter mode it displays either the replayed signal or the 'E to E' input signal. As explained previously¹, the reverse programme feed is of transmission quality and provides the signal for recording from a studio, or a return monitoring feed when the recorder is playing back.

TELECINE

For telecine the same semi-boothed design of areas was impossible because of the space required, the different types of machine envisaged, and the different operating problems.

Full control of telecine machines (i.e. projector controls, including reverse run, and picture black and white) is possible from studios and so machines carrying film for a studio production are set up and left for control by studio operators both during rehearsal and transmission. Staff in telecine must have facilities to take control if necessary. The control of telecine within the area is, therefore, mainly restricted to films for direct transmission and, occasionally, for local review.

Schemes to assign controls to a single control booth were rejected due to the complexity of the assignment equipment involved and the difficulty of providing the flexibility required.

The final solution consists of a desk with control

positions for all the telecine machines arranged in a line. Each position has its own control panels, monitor and talkback facilities, but these are arranged so that adjacent positions are sufficiently close together as to allow operators to control different machines in succession. This desk, at the right-hand end of which is the assignment control panel with the facilities which have already been described,¹ is shown in figure 7.

Sound monitoring would appear at first sight to be a problem with this arrangement. However, only one source of transmission sound is required at any one time because normally only machines on transmission are being controlled. In the event of telecine staff taking control of studio machines the sound engineers in the studio still have final control of sound level and are in the best position to monitor sound quality. Furthermore, sound feeds to the transmission control switcher are passed through 'Audimax' units to assist in maintaining constant sound level to the transmitters. Correctly adjusted they do much to alleviate the problem of controlling a mixture of compressed and uncompressed tracks in such a way as to present the viewer with sound of reasonably constant loudness.

The machines are grouped to provide the easiest possible access between desk and projectors for loading and setting up. The room is acoustically treated to minimize noise, and is air-conditioned with a ventilated ceiling to provide even air distribution.

A colour viewing room is being established for the setting up of TARIF (equipment to adjust colour balance of film to compensate for processing errors etc.). Although at the time of writing experience in this field is limited, it is expected that feature films and well-graded film for studio inserts will be previewed in this area and the best compromise TARIF settings obtained for the whole film or insert. These settings will be repeated when the film is loaded for transmission and will remain set for the duration of the film.

To handle news films and films with widely varying densities or colour balance a control position at one end of the main control desk is being provided with colour monitors and joystick colour balance controls for the Marconi Mark VII Photoconductive Telecine. With these controls the operator can make adjustment of white and black colour balance while the film is running. The joysticks are arranged so that they can be immediately returned to the normal position by pressing down on the control knob and thus there is no danger of 'getting lost' with successive adjustments of colour balance.

CENTRAL APPARATUS ROOM

The Central Apparatus Room houses the transmission vision equipment for the whole station with the exception of signal processing in Flying Spot telecine machines and VTR equipment. The heart of the CAR is the assignment switcher, which routes the sound, vision, pulses, communications, machine controls and reverse programme feeds for the assignment of Telecine and VTR machines; it can



Fig.6 The VTR editing room.



Fig.7 A general view of the telecine area control desk.

handle twenty-eight sources and forty destinations. Miniature sealed relay transmission line matrices are used for switching vision and single wire coded colour synchronizing signals, while motor uni-selectors are used for all other feeds including four-wire 405-line pulses, which will continue until the centre is changed over to full 625-line colour operation. The digital indicators give visual indication of the state of the switcher and repeat the information given on the control panels in the telecine and VTR control booths.

A single wire, coded synchronizing signal is used to distribute sync information throughout the installation. A pulse encoder is associated with each sync pulse generator and produces a single composite signal containing all the information necessary to reconstitute the seven sync signals required for the PAL system. Each item of picture generating equipment requiring pulses is equipped with a pulse decoder which reconstitutes the seven pulses from the single assigned incoming signal.

Assignment and cabling problems are considerably simplified by use of this system and the pulse changeover units for changing generators are single coaxial switches. The pulse decoders are equipped with variable delay networks to simplify timing.

The general layout and construction follow exactly the plans described previously and have proved very satisfactory. The nozzle distributed air-conditioning works well and the modular false floor proved the expected boon during installation.

STUDIOS

Each of the existing studio control rooms is being rebuilt and re-equipped while the studios remain on air. A temporary black-and-white control suite has been built in a vacant part of the building adjacent to the two larger studios and is being used during re-equipment to control each of these studios in turn.

The controversy which has raged since the start of television concerning studio control room design came to the fore again when the plans for the new control rooms were first discussed. Should the control rooms face forwards, backwards, or sideways? Should they have windows? Should there be direct access to the studio?

As the sound engineer is not able to use the cameras as his 'eyes', the Sound Control Room is provided with a large window giving the best possible view of the studio acting area (Fig.8). Direct access to the studio floor is provided by a staircase leading directly out of the Production Control Room, but no viewing window is provided. In the Picture Control Room there is a small window for the convenience of the lighting control staff, but to avoid disturbing the ambient light conditions it is equipped with a black venetian blind. It is normally necessary to go to the window to see out but the lighting staff are able to see the lights and examine some of the possible causes of lighting problems. The control areas are arranged to face towards the studio and are equipped with a curved



Fig.8 The Studio Sound Control Room.

desk running through the three rooms. Double glazed windows allow the staff in the Picture and Sound Control areas (on the director's left and right respectively) to have a clear line of sight to the director and production control room staff.

Production control is conventionally laid out (by British standards) with positions for Director, Vision Mixer, Production Assistant and a Studio Supervisor.

The Picture Control area has three main operating positions for Lighting Control, Camera Control and a third for general duties including control of any Telecine and VTR machines assigned to the studio.

The Sound Control Room has the sound console situated near the window at the end of the curved desk. Tape units are housed in the desk between the sound console and the Production Control Room. The whole control suite is designed to create a team spirit between all staff.

Equipment and, to some extent, layout differ slightly between studios, and the equipment descriptions apply to the first and largest studio to be re-equipped.

The sound mixer has twenty-four channels with provision to plug in a further twelve channel sub-mixer to make thirty-six in all. Facilities include fully selectable channel groups, equalizers with automatic switching tied to vision switching (e.g of telephone distort equalizers), volume compressors and an 'Audimax' unit.

The vision mixer of the ABCD four-bus type is provided with mixing or special effects on the outputs of both the AB and CD banks with the ability to mix in an additive or non-additive mode between those mixes or effects. Two sub-carrier amplitude and phase shifters are provided by joystick controls for synthesizing colour captions independently on the AB and CD banks. The provision of two sets of special effects equipment enables mixing between two keyed and artificially coloured captions or between two split-screen effects.

In the Production Control Room two colour monitors are provided, one on the transmission output and the other coupled to a roving preview switch. In Picture Control three colour monitors are installed, one on the studio output feed, the second coupled to a roving preview switch and the third, which is for picture matching, switched to any camera when that camera's control joystick is depressed. When no joystick is depressed the monitor is normally connected to the studio output thereby enabling the operator to make quick com-

parisons between camera and studio output. In addition this monitor can be switched to any source available to the studio or to the outputs of the vision switcher mix and effects units, enabling direct comparisons to be made between cameras and other sources. The camera control units, vertical aperture correctors, coders, vision switcher, vision distribution and associated studio equipment are all installed in one line of bays in the Central Apparatus Room where a Picture and Waveform Monitor, vectorscope and colour monitor are available for monitoring purposes.

In the largest 8,000 square foot studio a computer lighting control system is installed operating SCR dimmers. Three hundred 5kW socket outlets are provided and the lighting control system can store up to 100 lamp and dimmer combinations. The intensities of all the lamps used to light any scene are set during rehearsal and stored in an electronic file. At any time during the programme this combination of lamp settings can be obtained by selecting the appropriate file. Facilities are available for manual or automatic cross-mixing at variable speeds between one set of dimmer settings and another. This studio is equipped with 300 dual purpose lanterns which can act as either flood or spot lights and which can be switched from 2.5kW to 5kW output. Three hundred such lanterns permanently suspended from telescopes on a grid system have considerably reduced the labour required for lamp rigging.

CONCLUSIONS

This brief outline of the installations at the Granada Television Centre in Manchester can only deal superficially with the details and with the thought that has gone into the creation of a colour capable television centre which must be second to none as a modern facility of this size.

I would like to thank my colleagues of the Engineering Department at Granada Television for all their co-operation, ideas and help and the Projects Group and Installation team of The Marconi Company who have so efficiently handled all the detailed planning and installation.

I also wish to thank the Directors of Granada Television for permission to publish these articles.

REFERENCE

- 1 D. A. Tilsley: Re-equipping a TV Centre. Part I; *Sound and Vision broadcasting*, Vol.10, No.1, Spring 1969.