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The Marconi Contribution to Colour Television

Graham Green

The completely new Southern Television colour centre situated on land reclaimed from the River Itchen.

INTRODUCTION

One of the most massive broadcasting operations ever undertaken came to a successful conclusion last year when Britain, after two years of colour on BBC2, introduced it to the remaining television services. On 15 November the Independent Television Authority and the British Broadcasting Corporation went over to full colour operation and officially brought into being one of the finest colour television services in the world. At the end of 1969 colour television signals were being radiated to most areas of Britain.

It has been an enormous undertaking, with a great deal accomplished in a very short time. All the various colour services were able to go 'on-air' on the day planned, an achievement which both the television companies and the equipment manufacturers can view with some satisfaction.

The Marconi Company has supplied a large share of the equipment required for the formation of this colour service. To The Company it has meant sales worth between £5 million and £6 million over a four-year period. But of equal significance is the part it has played in setting the tone of the new service and establishing its high technical standards. A number of the independent programme contractors asked Marconi to supply specialist engineers to assist in the planning of their studio complexes and to supervise the installation of equipment. In all, twelve organizations are using Marconi studio or transmitting systems which are as advanced as any in the world.

At the same time, The Company has not neglected its overseas markets and during the past four years has exported more colour television equipment than it has supplied to British customers.

In the space available it is impossible to detail all that The Company has done to help launch colour television in Britain but what follows highlights some of its major contributions.

The Telecine area at Independent Television News.

TRANSMITTERS

Three u.h.f networks are being established to radiate the three colour services (BBC1, BBC2 and ITV) on the 625 line PAL system. BBC1 and ITV will continue to be available in black-and-white on the 405 line v.h.f system for some years to come.

Three years ago The Company supplied twelve 25kW u.h.f transmitters to the BBC to establish the BBC2 service. These employ external cavity klystrons and were installed in parallel pairs on six sites. More recently a further twelve transmitters have been commissioned to expand the existing BBC2 service and to open the BBC1 u.h.f service. At Crystal Palace two parallel pairs of 40kW transmitters give an output of 80kW on both BBC1 and BBC2. The other transmitters all operate in the multiplex mode.[1] A further twenty-four, ranging in power from 10kW to 40kW, are to be installed for the BBC over the next twenty months.

Also at Crystal Palace, the ITA has installed a parallel pair of 40/55kW transmitters using integral cavity klystrons. This equipment is remotely controlled from the ITA's v.h.f site at Croydon.

COLOUR CAMERAS AND TELECINE

The MkVII four-tube colour camera[2, 3] was introduced late in 1965 and soon became noted for the quality of its colour pictures. Since that time continued development, coupled with widespread operational experience, has resulted in the addition of a number of refinements and improvements. Thus the latest version, the MkVIIB, is lighter and more sensitive than the original camera; its geometry has been improved and a host of minor circuit modifications have led to even better picture quality.

The MkVII has enjoyed particularly wide sales in the United States and Canada, where more than 200 are in operation. It is also used in Latin America, Asia, Australasia, and both Eastern and Western Europe. In the United Kingdom more than eighty have been installed by the BBC and six of the independent programme companies. The BBC uses seventeen in their presentation studios and in their news studios which are housed in the recently opened spur at the White City Television Centre in London. Other major users are Scottish Television, Southern Television, Thames Television, Tyne Tees Television and Yorkshire Television.

At the heart of the Full-Facilities Telecine System, of which fifteen are in operation with nine organizations in the United Kingdom alone, is a specially adapted version of the MkVII. By using a multiplexer up to two film projectors (16mm or 35mm) and one dual slide projector can be associated with each camera, according to customers' requirements. The multiplexer employs fully silvered mirrors, for high optical efficiency, but they can be moved rapidly enough to allow 'on-air' optical cuts between sources. The film projectors are ideal for television purposes, having facilities for forward and reverse running, for showing still frames and, with the addition of foil markers to the edge of the film, for stopping automatically on a particular frame. The colour analysing system has narrow lobes which are best for the reproduction

of colour film because in this way the film dye errors are minimized.[4] However, ample light is available from the quartz halogen lamphouses to enable the densest of films to be exposed correctly without loss of signal-to-noise ratio. ITN, whose job it is to gather and present news, use four of these telecine systems and find that excellent results can be obtained even from poor quality film. Their installation is described in more detail elsewhere in this issue.

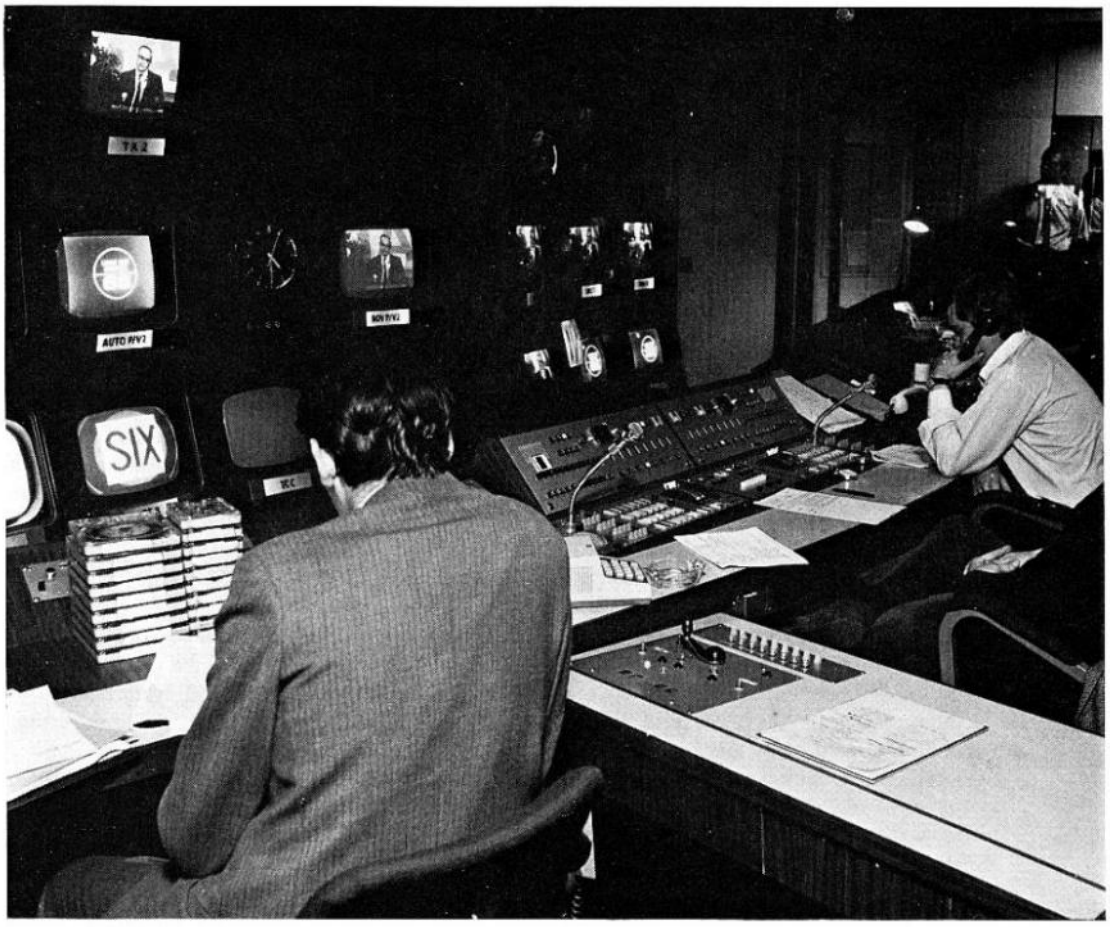
ASSIGNMENT SWITCHERS

It is becoming common practice in television studio centres, particularly with the introduction of colour, for all the vision equipment to be installed in one central area with the VTR and telecine suites in close proximity. Many advantages accrue from this centralization both in terms of reduced costs and improved performance. For example, with the distances between tandem connected video equipments reduced, the tasks of cable loss and delay equalization are considerably simplified and more efficient utilization of expensive equipment such as VTR,s and telecines becomes possible.

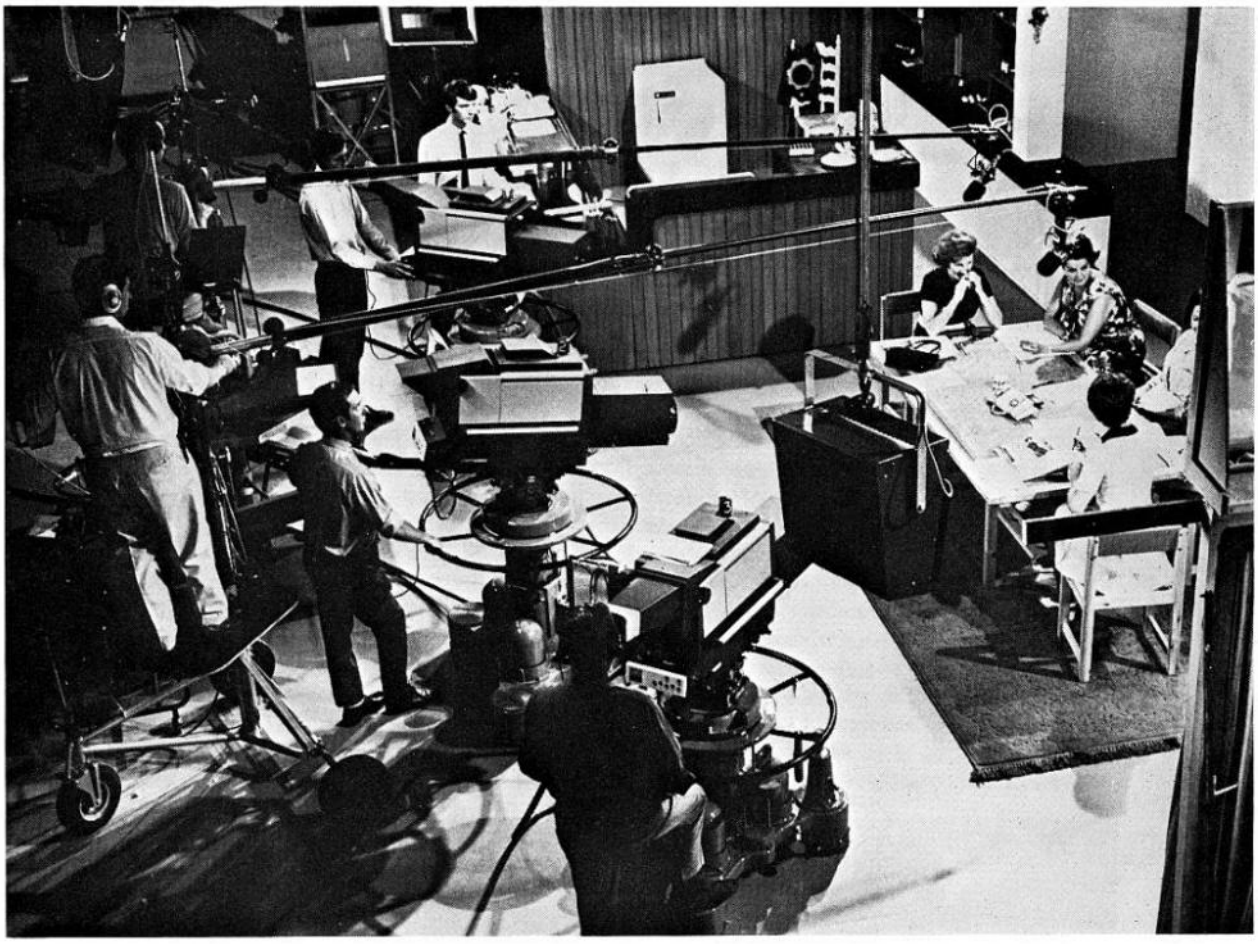
To obtain all the advantages of equipment centralization an assignment switcher is necessary.[5] Its purpose is to establish a two-way link between a particular piece of equipment, e.g a telecine, and the area from which it is to be controlled, perhaps a studio control room. The link is made only for the time that a particular source is required at a given destination. The switcher feeds correctly timed pulses to the source and sets up all the necessary signal, control, monitoring and talkback connections between it and the destination. The Marconi Company has recently installed six assignment switchers for independent programme companies in Britain. At ITN the machine and video controls of the four telecines can be assigned to a central control desk or to either of two studios; the controls of four VTR's can also be assigned to the studios. The switcher at Granada Television's Manchester studio centre can assign fifteen telecines and ten VTR's to forty destinations; it can easily be expanded both in terms of sources and destinations should the need arise.

PULSE DISTRIBUTION

With the introduction of colour more pulses have to be distributed to the video equipment – six pulses and subcarrier for the PAL system. In addition overall timings must be maintained to a much higher degree of accuracy than is the case for black-and-white operation. The Marconi Monosync system,[6] employed in seven studio centres in the United Kingdom, helps to solve these problems.



Part of the control suite at Granada. The operator on the right controls the station output to the network. The operator on the local left is concerned with the assembly of individual programmes including advertisement and continuity insertions for transmission.



Mark VIIB cameras in operation at the new Southern Television Colour Centre.

The coder combines the pulses and subcarrier into one signal which is then distributed by a single cable. At the destinations, decoders separate the subcarrier and reconstitute the original pulses. Subcarrier phase shifters and pulse delays can be included in the decoders to simplify station timing.

STUDIO AND PRESENTATION MIXERS

Since the introduction of the new solid-state studio vision mixer[7] at the Montreux Television Symposium last year, three have been put into service at Tyne Tees Television and ITN. Its vision switching matrix utilizes active microelectronic crosspoints. Not only is the physical size of the matrix thus considerably reduced, but its performance is also much improved especially so far as crosstalk is concerned. The mixer is controlled by integrated logic circuitry and the use of binary coding considerably reduces the complexity of the intercabling. Being of modular construction, the mixer is available in many different configurations to suit customers' requirements ranging from a simple eight-input version suitable for O.B vans or small studios to a thirty-two input double re-entry version with special effects.

Like assignment switchers, presentation mixers are usually designed for specific applications. Five of the British programme companies have chosen Marconi presentation mixers. The one installed at Southern Television's new Southampton studios is particularly interesting. Southern's programmes are radiated from two transmitters, one at Dover and one on the Isle of Wight, and the two programmes are not always identical. Thus the presentation mixer is a dual equipment with separate stores for Dover and the Isle of Wight. The mixer can be operated either in the combined mode, when both transmitters are radiating identical programmes, or in the split mode when the programmes differ.

A COMPLETE SERVICE

Excellent equipment alone will not result in a first-class television service. Much painstaking care must go into the planning of facilities and into the installation and commissioning of equipment. This is true both for transmitting stations and studio centres.

The Company's engineers have many years of experience in planning television systems large and small, black-and-white and colour. This expertise is readily available to customers so that they can obtain the best results from the capital they invest in equipment. The Propagation and Systems Studies Group has carried out field strength surveys and predictions for the Independent Television Authority to help in choosing the best sites for its

transmitters. Studio planning engineers have collaborated with their counterparts at ATV Network, Granada, ITN, Southern and Tyne Tees to plan their colour facilities, and the installations at these centres have been supervised by Marconi engineers. Some of these operations have involved the commissioning of completely new studio centres while others have necessitated the complex procedure of converting existing black-and-white installations to colour, with the minimum of interruptions to daily operation.

Neither have the equipment operators and maintenance engineers been forgotten. At the start of colour operation they are faced with much unfamiliar complex equipment which must be correctly operated and well maintained if good results are to be achieved. Marconi College at Chelmsford runs courses on studio equipment and transmitters for the benefit of customers' engineers.[8] To date the ITA and six programme contractors have taken advantage of these courses.

Thus it is that The Marconi Company attempts to provide a complete service, in the real meaning of the words, to its customers.

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