SUMMER 1965

VOLUME 6 · NUMBER 2 · SEVEN SHILLINGS AND SIXPENCE

SOUND and VISION BROADCASTING

INFORMATION ★ PRACTICE ★ TECHNIQUE

Marconi pulse and vision distribution equipment

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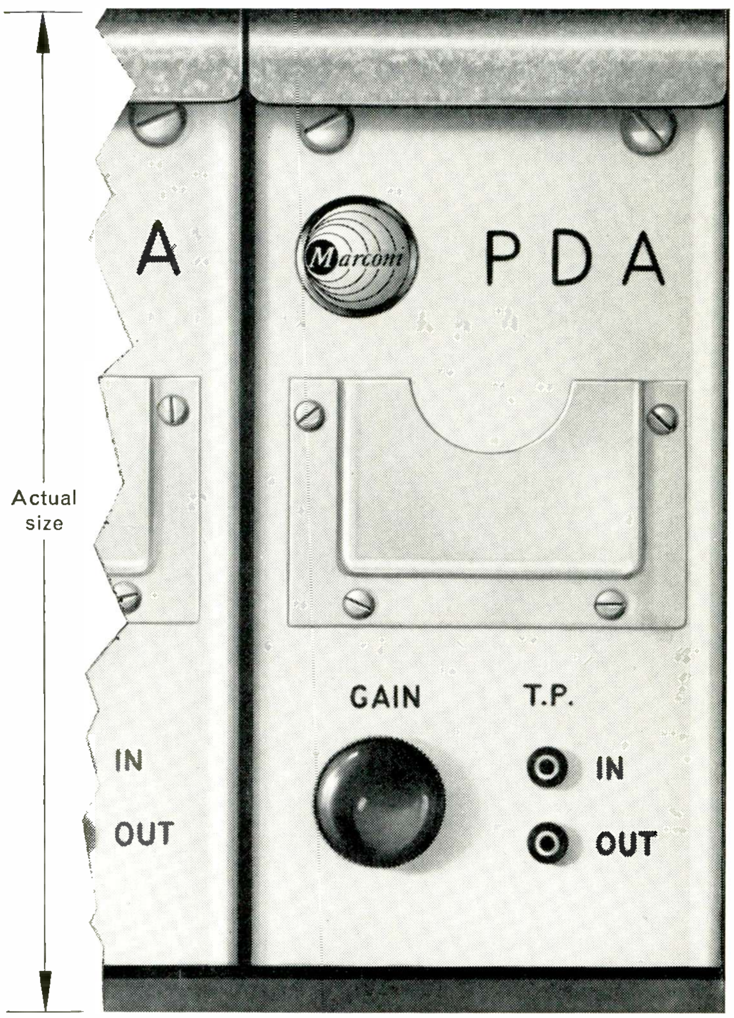

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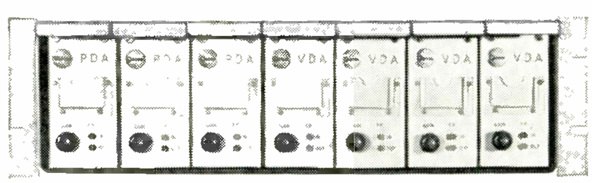

Complete rack

Marconi television systems

The Marconi Company Limited, Broadcasting Division, Chelmsford, Essex, England

LTD/B65

SUMMER 1965

VOLUME 6 · NUMBER 2

SOUND *and* VISION
BROADCASTING

INFORMATION ✶ PRACTICE ✶ TECHNIQUE

The Editor welcomes article suggestions and correspondence with a view to publication, but cannot be responsible for opinions expressed, or statements made by authors from outside the Marconi Organization.

Front Cover:

Springtime in Swedish Lapland where a chain of translator stations has recently been installed.

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The Contents and Our Contributors

Z CARS

DAVID E. ROSE

Crime has an undeniable fascination for the general public and this is undoubtedly true of television viewers. Many programmes dealing with crime are, however, a trifle hackneyed. When "Z Cars" appeared three years ago it achieved an immediate response because it took a lively and authentic attitude towards crime. The author who is the Producer of this popular series writes on the idea behind it and some of the production problems associated with a programme that is produced 'live' each week.

David Rose was born at Swanage in Dorset in 1924. After studying at the Guildhall School of Music and Drama he entered repertory as a stage manager in 1949. From 1953–55 he was Stage Director and Business Manager for the Sadlers Wells Theatre Ballet. He joined the BBC Drama Department as Assistant Floor Manager in 1955. Since 1960 he has produced many plays and documentary features including "Medico" which won the Italia Prize. He has produced "Z Cars" since 1962. He won the Guild of Television Producers and Directors Award of 1962 for this programme.

A COMPACT V.H.F TELEVISION TRANSMITTER

D. G. JARVIS

The early development of television tended to take place in areas of dense population such as Western Europe and US. Coverage was therefore achieved by fairly high-powered transmitters. Following this, areas of less concentrated population and gaps left by the higher-power transmitters needed to be catered for. These can be met by lower-power transmitters or translators. An equipment designed to meet both these cases is described in this article.

D. G. Jarvis was born at Southend-on-Sea in 1922 and educated at Cranleigh School. After studying at University College, London, where he gained his degree and the Clinton Prize in 1942, he joined R.E.M.E where he worked on radar. He joined Marconi's in 1947 where he has been engaged mainly on the development of television transmitters, including some of the earlier high-power equipment and lately on gap fillers. At present he is engaged on development of Bands IV and V transmitters.

A NEW SOUND MIXER FOR TELEVISION

D. B. MANNING and D. R. MYNARD

Considerations of cost have increasingly influenced the introduction of standard equipment for television. The design of such equipment is of the greatest importance if it is to satisfy the differing demands of users. This article describes a standard sound mixer which has 12 basic channels to which additional channels and facilities can be added with standard units.

D. B. Manning was born at Witham in 1921. He joined Marconi's as an apprentice in 1937. He was in the Test Division from 1941 to 1946 when he joined the Receiver Development Group. In 1950 he started work on audio equipment for broadcasting studios and is now Section Leader of the Sound Studio Section of Broadcasting Division.

D. R. Mynard was born at Colchester in 1932. He was educated at N.E Essex Technical School and the Mid-Essex Technical College, gaining his Higher National Certificate in Electrical Engineering. He was with G.E.C from 1948 to 1962. He joined Marconi's in 1962 and has been engaged on switching systems and amplifier development.

continued overleaf

A CHAIN OF FOUR TELEVISION TRANSLATORS IN THE NORTH OF SWEDEN

B. G. SELLIN

OVERSEAS

page 23

Through mountainous North Sweden runs the vital railway carrying iron ore to Narvik. The welfare of the maintenance staff who live along this line was the concern of the authorities who realized that the provision of a television service would brighten their lives during the long dark winter. The equipment used in this service demonstrates one facet of the transmitter described in D. G. Jarvis's article. Mr Sellin, who was concerned with the surveying and installation of the service, relates the difficulties and problems encountered during the project.

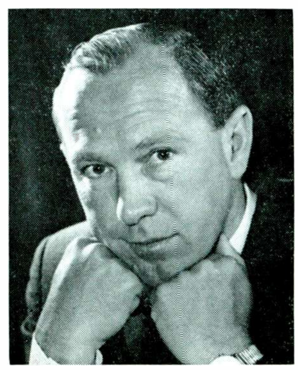
Bengt Georg Sellin was born in Stockholm in 1931 and educated at Stockholm Technical College. After three years with the Swedish Forces he joined the Telecommunications Administration's Radio department in 1956, where as a planning engineer he took part in building the Swedish Television and Radio link networks. In 1964 he joined Svenska Radioaktiebolaget, a Marconi associated company in Sweden.

JAMHURI

R. J. DAVEY

OPERATIONAL

page 31



When Kenya achieved her independence in 1963 the young broadcasting organization was faced with providing sound and television coverage of the celebrations connected with it. The following year, on becoming a republic, Kenya again had a large programme of festivities. The Voice of Kenya again reported on the events, but this time with the added complication of having to improvise a television O.B unit in a very short time.

R. J. Davey, M.I.E.E, was born in 1920. After service in the Signals Branch of the R.A.F during the war, he joined the Ministry of Civil Aviation in 1948 working on navigational aids, telecommunications, transmitters etc. He then joined International Aeradio Ltd and spent a year in E. Africa on airport ground service. He left to join the newly formed Uganda Broadcasting Service in 1953, transferring to the Kenya Broadcasting Service in 1959 as Superintendent Engineer (Transmitters). He became Chief Engineer in 1963.

VARIABLE OR FIXED FOCAL LENGTH LENSES?

A.G.HUSSELBURY

LENS TECHNIQUES

page 35

Constant research has improved the zoom (variable focal length) lens to a point where it can be said to have distinct advantages over the fixed focal length lens, both in the studio and for outside broadcasts. In this, the second article in the series of philosophical articles appearing occasionally in these pages, the author discusses the relative merits and disadvantages of the two systems. Though the bulk of television cameras in use today employ turrets, there is no doubt that both production and engineering personnel are impressed once they have the opportunity of handling a zoom camera.

A. G. Husselbury began his career in radio as a marine radio operator in 1943. He was with Marconi International Marine Communications Company until 1946, after which he worked for various radio equipment manufacturers before joining Marconi's in 1951. At present he is working as a Sales and Planning Engineer in the Broadcasting Division.

A NEW STUDIO CENTRE IN AUSTRALIA

ERIC HITCHEN

TELEVISION AUTOMATION

page 38

Economic considerations and the dilution of technical man-power following rapid expansion are two main factors that caused the demand for more automation in present-day life. This is equally true in television, and an increasing number of stations are introducing systems designed to conserve man-power. A good example of this can be found at Sydney, Australia, where a recently opened station was planned from the outset with these principles in mind. E. Hitchen, who was concerned with the planning of United Telecasters station Ten-10, describes the station and how these principles were implemented.

Eric Hitchen was educated at Burnley Grammar School. After service with the Royal Navy he studied at Norwood Technical College. He joined Marconi's in 1951 and became an instructor in television at Marconi College. In 1956 he became an installation engineer, installing television stations in UK and Australia. He joined Amalgamated Wireless (Australasia) in 1964 and is with their Engineering Products Division.

DAVID E. ROSE, British Broadcasting Corporation

Z CARS

Early in 1962 a new crime series appeared in BBC television that set a new standard for this type of programme. It had an authenticity and immediacy that won a quick approval from the viewing public. After running successfully for more than three years the series is due to come to a finish at the end of this year and the author, who is the Producer for the series, writes on the background and production of this series.

As EIGHT O'CLOCK approaches on Wednesday night, a team of actors, production staff and technicians prepare for fifty minutes of live television drama. The programme—transmitted weekly from the BBC Television Centre—is about policemen in 1965.

In the early 1950's, the BBC Drama Department output included a series of features, transmitted about four times a year. Subjects ranged from alcoholism to open-cast coal mining, deep-sea fishing to prostitution; from work at the United Nations to provincial symphony orchestras. These Dramatized Documentaries as they were called invariably attracted large audiences who were well satisfied by the authenticity of scripting and production.

Careful research by writers into practices and attitudes provided revealing scripts; at this time the direct television interview was relatively novel and could be self-conscious and not always penetrating.

More recently the Dramatized Documentary output included two separate aspects of police work. Firstly, in 1959 a single programme "Who, Me?" a story of criminal investigation set in Liverpool. And secondly in 1960 "Scotland Yard", a thirteen-week series produced with Metropolitan Police co-operation. Particular interest was taken in "Who, Me?" by several police forces, notably the Lancashire Constabulary.

When in 1960 a new major police series was being planned, the decision was for a provincial setting. With knowledge of recently instigated Crime Patrols, research was carried out in Lancashire with the assistance of the County Constabulary. The purpose of the Crime Patrols is to deal immediately with crime and disturbances, and to set up any necessary procedure for enquiry. With speed and efficiency the patrols reduce the already heavy burden upon the Criminal Investigation Department. A format was required by which this particular aspect of police work could be communicated weekly through television. If this was to be achieved with any authenticity—and truth—the format could not be what is all too often understood by the word—rigid and predictable. The need was for a vital locale for a chosen set of characters. Any set pattern had to emerge through police routine and be made a virtue. Preliminary research by writers in the spring of 1961 followed by the production team in the summer saw the first episode of "Z-Cars" transmitted on 2nd January 1962.

The setting is south Lancashire. An imaginary police area, Victor Division, embraces dockland and rich residential seaboard to the east, known as Seaport—and inland to the west an industrial estate and housing development, known as Newtown. Neighbouring Liverpool City lends added vitality with its Merseyside characteristics.

Two constables in a plain radio car constitute a Crime Patrol—with a call sign prefixed by the letter Z for crime. The series operates two such cars in Victor Division—hence Z-Victor One and Z-Victor Two. In the scripts these two units of the cast forming the foundation of the programme are supported by the uniform branch and C.I.D.: A uniformed sergeant and police constable—a detective chief inspector, detective sergeant and detective constable. Radio communication to the cars is made through the Information Room of County Headquarters. The female radio operator completes the regular cast—and it is from this headquarters that senior officers occasionally descend and, when the seriousness of the crime warrants, take command.

The writers work individually. By working 'on the ground' with the police they are able to build strength on character and detail, recognizing regional 'differences'. The best possible writers are selected with the capacity to be excited by the subject and the medium.

Because of the nature of mobile police work, the scripts generally move fast, covering numerous interior and exterior locations. The stories provided by writers themselves or retired police officers are considered for their contribution to the series by the Story Editor and Producer. A balanced impression of the crime in Victor Division is important to the development of the characters. Newtown must not have more than its share of murders and serious crime—neither must any single officer be involved unrealistically in either too much serious crime or a rush of crimes of a similar nature. Character development must be watched through personal involvements and experiences. Careers and particularly promotion must be considered. Episodes are scheduled when scripts are commissioned. Writers must conform to the 'controls' of cast as well as to the studio and film facilities.

Actors engaged for a fifty-minute drama programme rehearse for eleven days within a fourteen-day period, which is preceded by film shooting. "Z-Cars" transmits live, weekly, and for this reason the crews of Z-Victor One and Z-Victor Two basically appear in alternate episodes. The other 'regular' members of the cast are rationed to the writers, depending on story requirements.

A Director is generally in active production for four weeks. A longer 'turn round' helps the

Fig. 1. A mock-up of a Crime Patrol car being shot against moving back projection during a rehearsal of a "Z Cars" episode *The Listeners*.

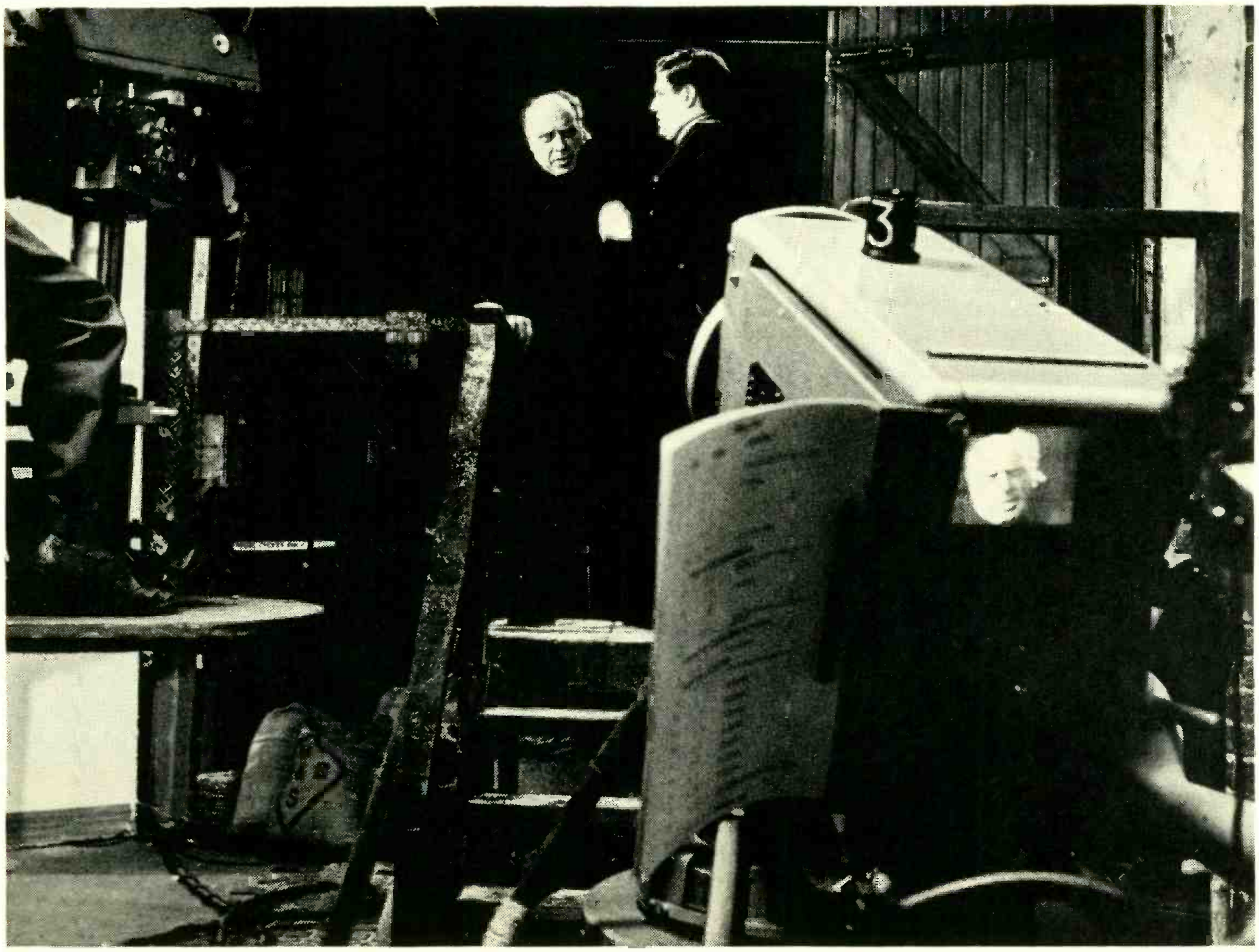


Fig. 2. Colin Welland (PC Graham) takes hold of the night watchman (George Colouris) in a scene from *The Main Chance*.

preparation of more than usually complex scripts—problems often arising out of the use of film. Provided the general intention of the series is understood, an individual approach through direction can be vitally stimulating to all concerned. Direction falls into three phases—planning, pre-filming and the rehearsals which culminate in the live transmission.

Much of the initial nine days' preparation can be taken up considering the non-regular characters in an episode. By the time the Director has discussed the script with the Producer and, if possible, the writer, his cast requirements become evident. It is the casting that can help keep a series fresh. Careful selection of both experienced acting talent and relatively new faces can prove enormously exciting.

A Director's early work with the Designer is all-important to the images that finally make up the programme. The cameras and microphones must be free to examine and highlight the behaviour of the characters from continually fresh angles. Whilst allowing for this, the Designer must create a positive atmosphere in an authentic setting. Suggestion by shape, texture and lighting is complemented by attention to detail. Often, studio sets must match film locations, and these complementary sets must be determined at an early stage.

Scripted basically for the television studio, film is used for three main purposes: (1) Exterior and some interior locations which cannot be contained in the studio for reasons of space and economy; (2) expansive movement of vehicles; and (3) selected sequences which can benefit by film cutting. A fight could fall into the last category; but here the immediacy of the television studio has always to be balanced against additional film camera angles and pace achieved through editing. Film provides an average

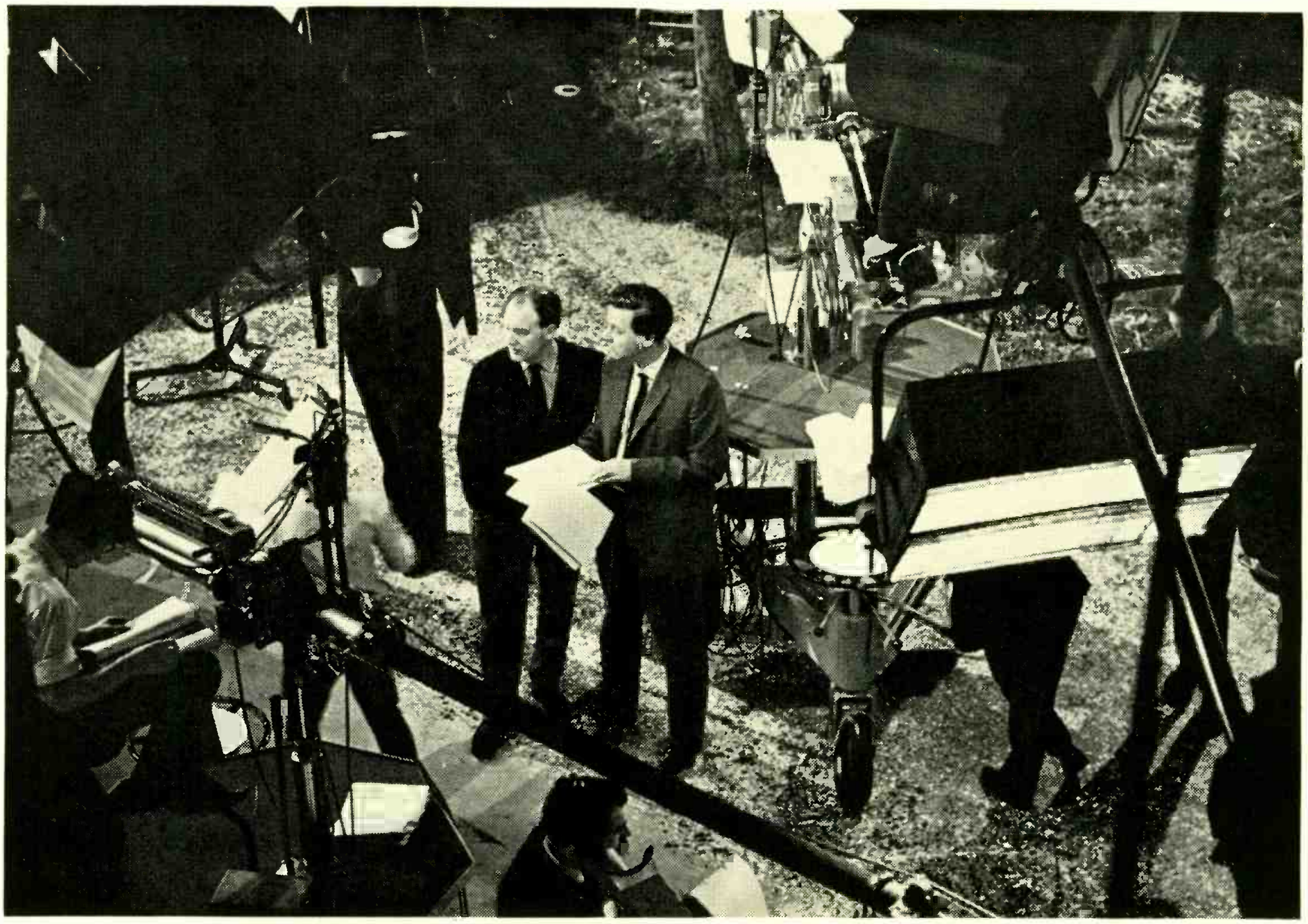


Fig. 3. The author who is Producer of the series discusses a point with Detective Sergeant Watt during rehearsal.

of ten per cent of the total programme and is time-consuming in preparation and execution. This is inevitable as its main purpose is story-telling through many and varied locations.

Pre-filmed sequences, later to be inserted into the live programme, can only be shot satisfactorily if related closely to the subsequent studio work. Quality of the 35-mm film must match the live pictures and the greatest possible care taken with the lighting. Again, the immediacy of the continuous television performances must not be lost by either actors' performances and general continuity, or seem to be out of key through any departure of camera operation or tempo of cutting. The first and last shots of each film sequence are all-important as is the sound when bridging film to studio. Sound overlap mixed in before and out after picture is occasionally advantageous.

Studio scenes following film sequences employed to establish location are handled either in built sets or against back projection. Whether it be still slides, moving static plates or travelling backgrounds for vehicles, they are shot whenever possible under the same lighting conditions as the related film sequence.

As with the writers, so the Directors gain by visiting Lancashire and seeing and hearing the police at work. The rehearsal period is similar to that of any other television play, but a Director's first-hand knowledge of the subject complements the authenticity of the script.

With a weekly 'live strike' (and frequent appearances in subsequent episodes) the regular cast have to divide their attention between two rehearsal rooms. Schedules are prepared calling the entire cast to the first hour of the first day, to enable the script to be read and timed in the presence of the writer, Story Editor and Producer. For the first few rehearsals, the Director is without certain regular cast, but they join for their scenes to be plotted in time for the first run-through. A complete rehearsal, for the benefit of the technicians, takes place three days before the cast move from the rehearsal room to the television studio. Those present, who have already attended a planning meeting during the Director's period of preparation, include the Designer, Lighting Supervisor, Sound Supervisor and Technical Manager. Camera plans and running orders issued for this occasion indicate the movement of cameras and sound booms during the running of this episode. Five or six cameras are mounted on pedestals with the occasional use of a motorized or crane mounting for additional height. If the setting demands, pedestals are elevated on to scaffolding either built into the scenery or standing freely. Four sound booms may be augmented by stand mikes or 'fishing-rods'.

The last two days of rehearsal take place in the 63000 sq. ft. of Studio 3 or 4 at the BBC Television Centre where overnight the scenery is set and the lighting rigged. Having completed the detailed rehearsals the Director and cast are ready to combine with the technicians. Over a period of eight hours, an average of three hundred and fifty individual shots are set up. Throughout, adjustments are made to lighting; the Designer, watching shot by shot, notes necessary adjustments to the sets and dressings. Sound engineers balance studio output to effects on tape and disc. Film sequence and moving back projection are both cued from the Director's gallery with the live action for the first time. Film or telecine sequences require an eight-second cue—if, however, studio scenes between film sequences run less than twenty seconds, the film continues to run and a second cue is dispensed with.

During the seven hours of the second camera rehearsal, the episode is run through completely twice or three times, giving everyone the opportunity to perfect the operation and acclimatize to the ultimate pace. Scripts sometimes demand more sets than can be accommodated in the studio or create other problems which make continuous running of the episode impossible. In these circumstances, short scenes are pre-taped during the camera rehearsal and inserted during transmission on a ten-second cue.

The live transmission each Wednesday night brings a very real sense of occasion. Fifty minutes of absolute concentration bring an excitement to technicians and actors alike. The audience is there; communication is immediate with the best possible picture quality. Any reaction—whether it is a telephone ringing, press criticism the following morning or an appraisal by fellow professionals—is stimulating and an important factor in keeping the programme 'alive'.

Two new television stations in Argentina

Two important television stations will be starting operation later this year in Argentina. Marconi's have received the order for the complete studio and transmitting equipment for each station, one of which will be situated at Santa Fé and the other at Mar del Plata.

The former will provide complete coverage of Santa Fé and the neighbouring town of Parana, and will be operated by Televisora Santafecina S.A. The studios, situated in Santa Fé, will be equipped with Mark IV 4½-in. image orthicon cameras for normal programme work, with a broadcast vidicon camera for announcements, news and interviews. Telecine facilities will consist of two 16-mm film projectors and a slide projector, coupled to the Mark IV vidicon camera. A full range of sound equipment is also to be provided, together with synchronizing and test signal generators and control mixing and switching equipment.

The transmitting station will have a 5-kW Band III vision transmitter and a 1-kW frequency-modulated sound transmitter. The high-gain omnidirectional aerial system, mounted on a 150-metre mast, will also be provided together with the transmission feeders and associated equipment. Link equipment is also being furnished.

The station at Mar del Plata will have similar equipment and will serve the coastal area 250 miles to the south of Buenos Aires.

The beach at Mar del Plata.

D. G. JARVIS, B.Sc(Eng.)

A COMPACT V.H.F TELEVISION TRANSMITTER

Television started in areas of large population, the metropolitan areas of Europe and the United States, and the transmitters used were of comparatively high power as, besides the immediate area of the transmitter, the suburban areas around the cities had to be covered. In areas of very high general population such as occur in Great Britain, a system of high-power transmitters will serve a very large portion of the population. As television spreads to other parts of the world, the areas to to be covered in the immediate vicinity of the transmitter become smaller. This is because the cities are smaller or because the population is more concentrated in areas close, for example, to a river, and the distances between centres of population are greater.

The coverage of a television transmitter, as is well known, is limited by the horizon, however great the power, and even fairly close to a transmitter a range of hills will cast a sharp shadow. Intermediate size areas can be covered by transmitters giving an e.r.p of between 10 and 50 kW, but for smaller areas small size transmitters of between $1\frac{1}{2}$ and 5 kW e.r.p give a completely satisfactory service. In flat terrain, with an aerial height of 300 ft (100 metres) above the surrounding country, a transmitter of 3 kW e.r.p will give a range of 10 miles to a Grade A service and 20 or 25 miles to a Grade B service. The Grade A service will deal satisfactorily with an urban area where noise level is high, and the Grade B is quite satisfactory in rural areas where the noise level is low.

We have, therefore, two basic requirements for low-power transmitters. The first, in time, came in the highly developed countries where relatively small areas of poor signal strength between high-power transmitters had to be filled in, and the second comes in countries where the population is less dense and where, perhaps, there are large gaps of open country between the population centres.

The 500-W television transmitter described here is a transmitter which is suitable for providing a service to these two types of area. The figures given for the transmission range will, of course, vary with effective aerial height and can be increased in certain directions where the terrain is suitable by use of directional aerials.

TRANSMITTER OR TRANSLATOR

Where a local area is to be served with local programmes, a conventional transmitter requiring input sound and vision signals can be used, and if a network is available, network signals can be used in addition to local signals. Where a network is not available, but the transmitter, or a site not very far from it, is within range of another major transmitter, a high-quality v.h.f receiver can be used and its output fed by line or by microwave link to the transmitter.

In certain cases, however, where local signals are not required to be transmitted, a more satisfactory arrangement can be obtained by picking up the signals from another television transmitter and "translating" them to another transmission channel. This method avoids the great complexity of the high-quality receiver which is necessary if the quality of the transmitted signal is not to deteriorate. In this case the satellite transmitter must be within range of the main transmitter it is reproducing.

The translator-type station receives the incoming r.f signal and applies it to a mixer in which an intermediate frequency signal is generated. This intermediate frequency signal is then amplified and

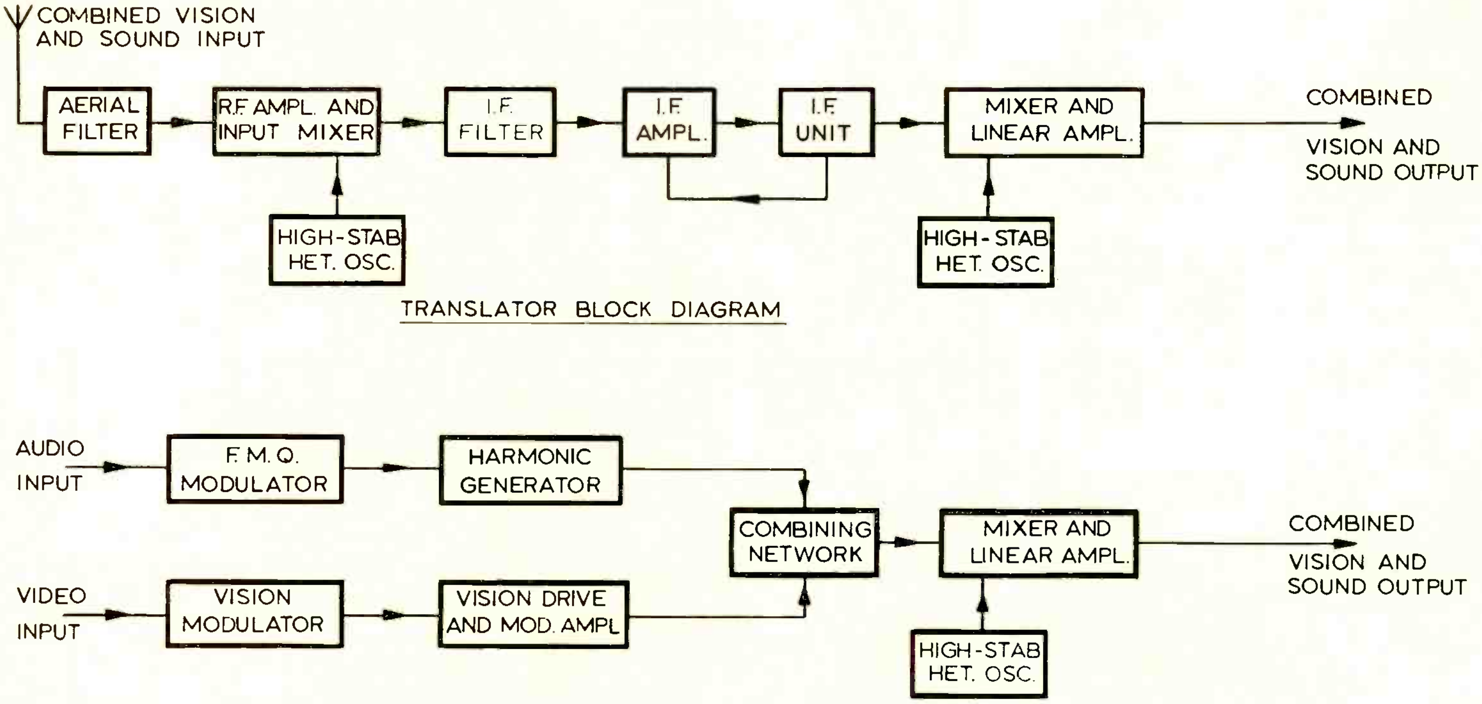


Fig. 1. Transmitter block diagrams.

followed by a further mixer stage which changes the frequency again to that required for transmission, and all that is then required are one or more stages of r.f amplification to bring the signal to the required output level. As has been stated, these translator equipments avoid a number of difficulties associated with systems where the signal is completely demodulated. In designing such a translator, considerable attention has to be given to the design of the two heterodyne oscillators to ensure an acceptable output stability.

CHOICE OF EQUIPMENT

The Marconi Company has developed a range of units from which an equipment to meet individual requirements can be built up to form either a translator or a more conventional transmitter. Block diagrams of the two types are shown in Fig. 1. The translator, by a suitable choice of heterodyne oscillator frequencies, can convert input vision and sound signals from any channel in Band I or Band III to a different channel in either band. Certain frequency conversions have to be avoided; for example, adjacent channels may not be used for reception and transmission due to the difficulty of rejecting the output signal at the input. From the receiving point of view this adjacent channel conversion has to be avoided also, since the receivers themselves may suffer from interference from the main station.

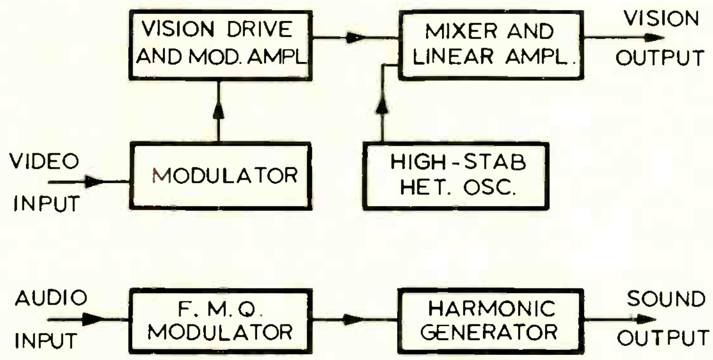


Fig. 2. Simple low-power transmitter with separate vision and sound.

In the transmitter-type equipment, low-power sound and vision transmitters are combined in a simple resistance network to replace the first heterodyne and i.f units of the translator, the vision and sound carrier frequencies being the same as the corresponding intermediate frequencies of the translator. From this point on the signal is processed similarly in both equipments, the combined intermediate frequency output being mixed with a signal of a suitable frequency from the output heterodyne oscillator to give the required radiated frequencies. These vision and sound signals are then amplified linearly to a peak vision level of 3 W. The output sound level is one-half to one-fifth of the peak vision

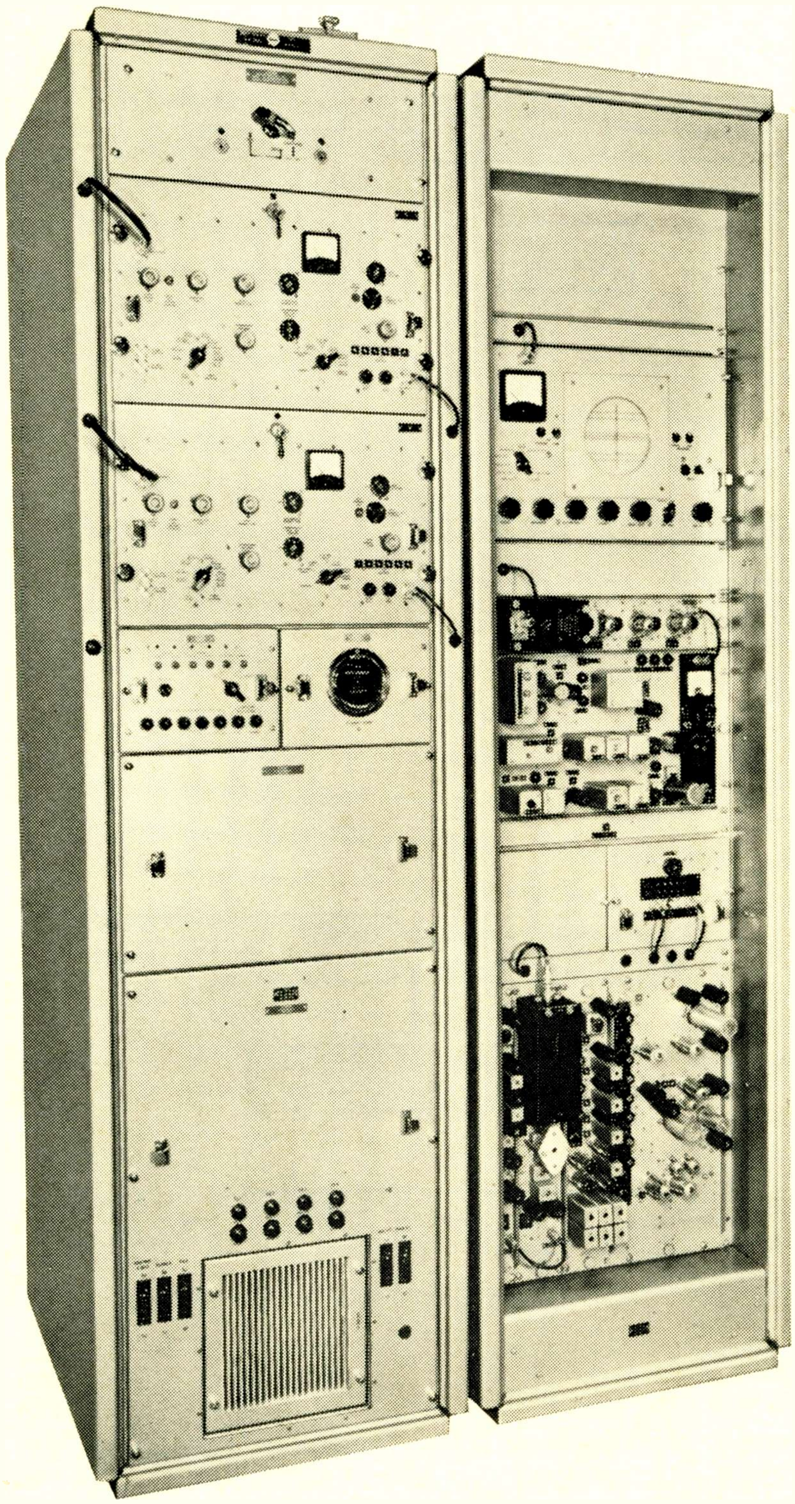


Fig. 3. The 500-W Band III television transmitter. The drive equipment and envelope monitor are in the right-hand cabinet, the amplifier cabinet is on the left.

power, depending on the transmitter standards in use. The peak envelope power varies from about twice to three times the vision peak power as the vision/sound power ratio is decreased from 5:1 to 2:1, i.e. from about 6 W to 9 W, and in order to handle this peak envelope power without excessive non-linearity, it is necessary to have a fairly large output valve. In practice, a QQVO6-40A is used. There is no great disadvantage in this as at these power levels special cooling is not required. In most cases, however, a 3-W vision power level is insufficient and amplification is required. An amplifier with a peak envelope power of up to 150 W has been designed and this is suitable for peak vision power of 50 W, but above this level the advantages of a common vision and sound amplifier are outweighed by the power loss due to the low efficiency.

Separate vision and sound amplifiers allow the economical use of higher radiated powers, but they also require separate vision and sound drives which leads to the arrangement shown in Fig. 2. This is the basis of the Marconi B6400 series of transmitters. In this equipment the vision power at the output of the linear amplifier is not limited to 3 W as the sound signal is separate and a vision peak output equal to the peak envelope power of the previous combined signal, i.e. about 10 W, can be obtained. At the same time the independent sound output can be adjusted to the appropriate level between 2 and 5 W. These signals can be fed directly to an aerial but also are suitable for driving amplifiers. The Marconi Band I amplifier B7100 and the Band III equivalent B7200 have two similar r.f units with common power supplies and control circuits built into a single cabinet. One amplifier is used as a vision amplifier of 500-W output and the other has a sound amplifier set to the appropriate level. These output levels make it possible to introduce feedback control of the radiated blanking level and an r.f envolope monitor to assist in setting up the vision levels. Fig. 3 illustrates a 500-W transmitting equipment combining a B6400 driver and a B7200 amplifier complete with these facilities. The two cubicles are each 7 ft high and $23\frac{1}{4}$ in. wide by 2 ft $4\frac{3}{8}$ in. deep.

A block diagram of the Band III transmitter is shown in Fig. 4. The output from the driving transmitter is more than adequate to drive one amplifier and in fact is sufficient to drive two in parallel. In this parallel version the two 500-W amplifiers are combined with two driving transmitters. The two amplifiers provide a 1-kW vision power and up to 500 W of sound. The two vision drive outputs are connected to the amplifier inputs by a hybrid network, and by means of detectors a drive changeover unit is used to monitor the drive level. Should the level of the drive used fail, the changeover unit selects the other and mutes the one originally in use. A similar arrangement is used in sound. In both cases phase comparators are provided so that the amplifier outputs can be adjusted to be in phase.

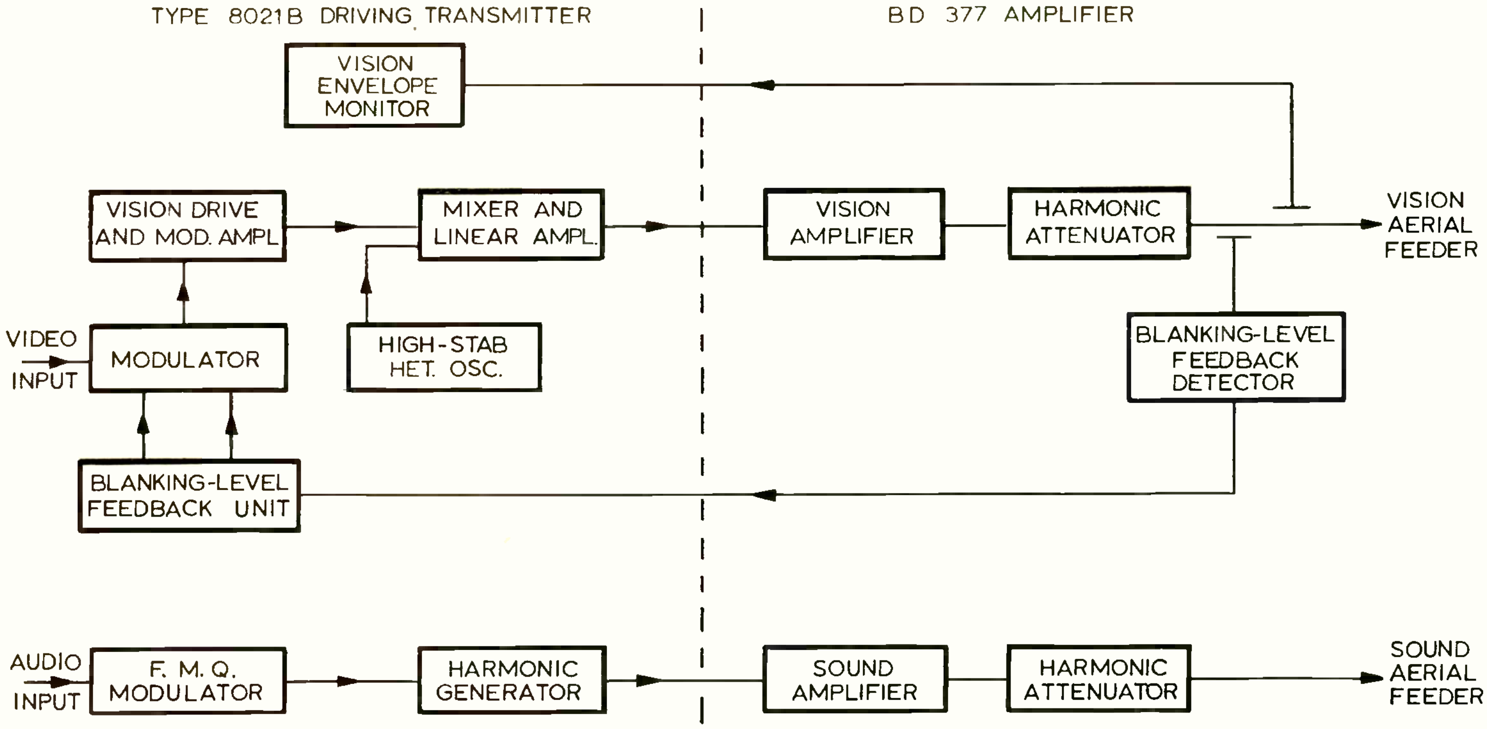


Fig. 4. Type B6400 driving transmitter with BD377 amplifier.

DRIVING TRANSMITTER

The vision and sound sections of the driving transmitter are completely separate and each has its own power supply with separate switching for the heater transformer and h.t. The switching facilities can be either local or from a control desk.

The vision units are illustrated in Fig. 5. At the bottom from right to left are the modulator, the vision drive and modulated amplifier, the mixer and linear amplifier and finally the high-stability heterodyne oscillator. Above these are the blanking-level feedback unit and a blank panel which can be replaced by a drive changeover unit when parallel operation is required. In Fig. 3, we can see the units above which comprise the 'FMQ' modulator, the harmonic generator and the r.f envelope monitor.

The first stage of the vision drive and modulated amplifier is a crystal-controlled oscillator operating at approximately 6 Mc/s: this is one-sixth of the drive output frequency and is independent of the radiated frequency. The radiated frequency is determined by the heterodyne oscillator frequency with which the drive output is mixed. In view of the low frequency of this first oscillator, the frequency stability becomes of secondary importance and temperature control of the crystal is unnecessary. The crystal frequency is multiplied by a tripler and a doubler and then applied to the final drive amplifier. The output of this stage is applied to a grid-modulated amplifier and stabilized by a simple feedback circuit. The anode circuit of this stage is the first section of a 6-stage Darlington filter which provides the required vestigial sideband frequency characteristic. Since the frequency at this point is independent of the radiated frequency, the design of this filter is much simpler than it would be if it had to be made tunable.

The input level to the vision modulator is 1 V peak to peak, and it is used also to generate clamp pulses for the blanking-level feedback unit and for the modulator itself. The modulator incorporates predistortion and limiting circuits to compensate for the non-linearity in the r.f amplifiers carrying the modulated signal and to prevent over-modulation due to an excessive input signal. This latter is, of course, particularly important in systems employing intercarrier sound reception. The unit also incorporates a stage which can be connected either as a cathode follower or as a low-gain phase inverter to permit the use of the same unit for either negative or positive modulation. The output valve of the cathode follower has a clamp acting on its grid, whose potential may be either pre-set or dependent on the amplitude of correction pulses produced by the blanking-level feedback unit. The input of the blanking-level feedback unit is a demodulated sample of the output of the associated 500-W amplifier. Its feedback corrects the reference potential of the clamp to maintain the radiated blanking level constant, and compensates for changes due to variation of mains supply voltage and variation of gain. It also reduces the radiated hum

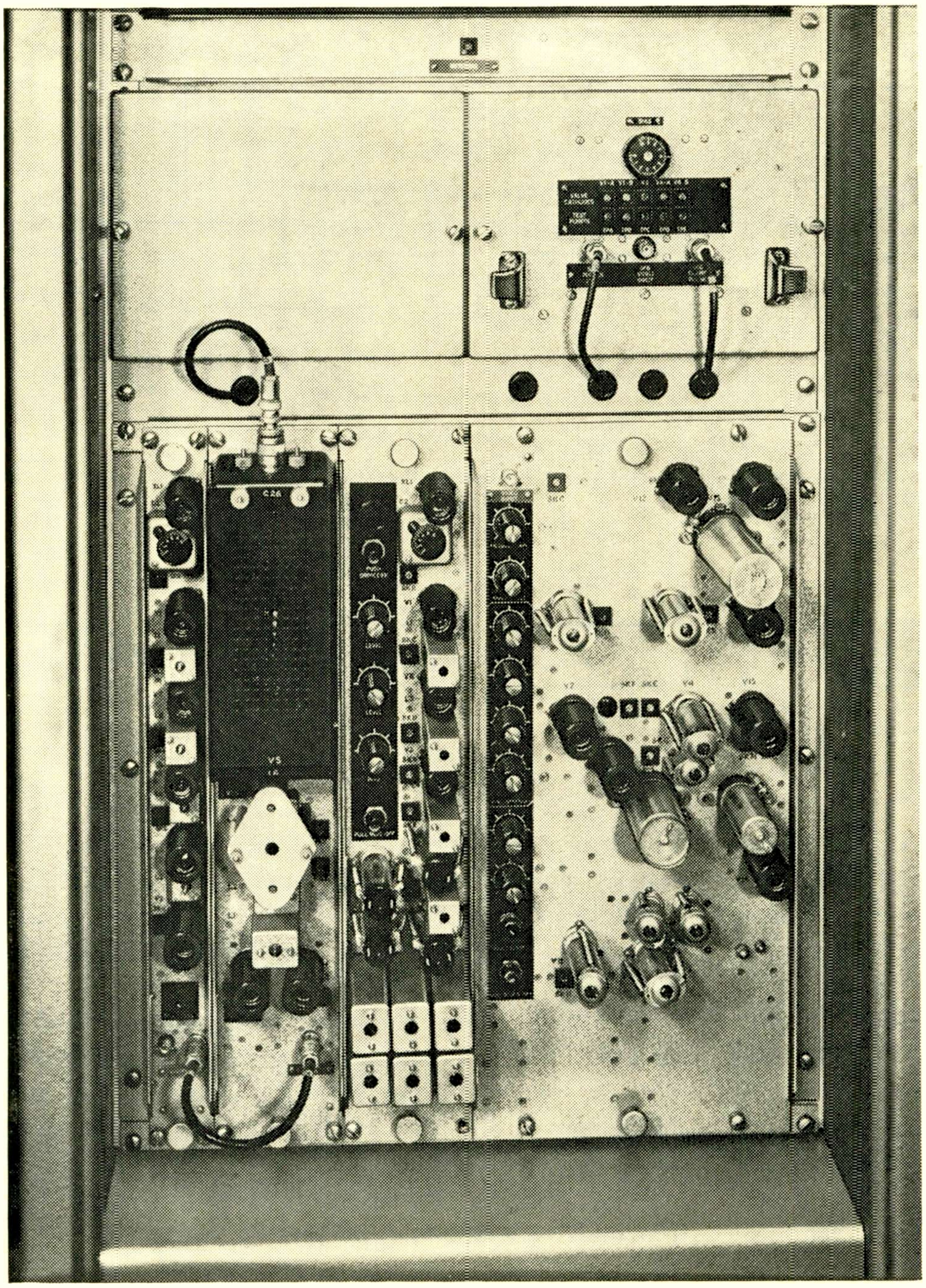


Fig. 5. Vision drive units of the 500-W transmitter.

level, although the performance in this respect is adequate without feedback.

The heterodyne oscillator is that part of the circuit which chiefly determines the radiated frequency and its crystal is housed in a temperature-controlled oven. This provides parallel feeds to the two halves of a balanced mixer in the mixer and linear amplifier, which is also fed from the output of the vision-modulated amplifier in push–pull. The output from the mixer, at radiated frequency, is taken from the anodes in push–pull. This arrangement reduces the level of the heterodyne signal in the anode circuit as well as reducing certain spurious products. Three push–pull broad-band tuned amplifiers follow, operating at radiated frequency, the final output being suitable for terminating in a 50-ohm load.

The 'FMQ' modulator is a standard type such as has been described in *Sound and Vision broadcasting*.[1] The output frequency is in the range of 3·2 to 5 Mc/s and at a level of $\frac{1}{4}$ W. Gain and frequency multiplication are provided by the associated harmonic generator to give an output of 5 W at the radiated frequency.

The 250-V stabilized power supplies for both vision and sound units employ high-efficiency regulating systems which have been described in *The Marconi*

Review.[2] The efficiency is achieved by using a saturable reactor system for the low-frequency components and a Class B amplifier for the higher-frequency elements.

The r.f envelope monitor is self-contained and the feed to the 'Y' plates is from a probe in the output of the 500-W amplifier via a passive tuned circuit, thus ensuring a performance which is independent of the aging of any amplifiers.

THE 500-W AMPLIFIERS

There are two versions of these, one for Band I and one for Band III, which differ only in the type of r.f unit used. The same basic cabinet assembly is used for both and includes power supplies, control unit, blower, air filter and isolator earthing switch. The cabinet will accommodate two similar r.f amplifiers, one for vision and one for sound. These are the second and third units from the top in Fig. 3.

After considering various possible amplifier valves, the 4CX250B, which is very compact and has all-ceramic insulation, was chosen. A pair of them are used in Class AB to give the 500-W sync. output into the aerial feeder without drawing grid current. This ensures a very good linearity as the grid-circuit damping is independent of level. It is possible to drive this pair of valves without intermediate amplification; however, as the equipment may be used with two 500-W amplifiers driven in parallel when considerably less drive is available, a QQVO6-40A pre-amplifier is employed, operating linearly. This again is operated in Class AB without grid current. The r.f input is a double-tuned circuit tuned for a good input match over the channel; the inter-valve circuit is a double, with fixed resistive secondary damping. The output circuit is a maximally flat triple-tuned circuit. The sound r.f circuits are set to a narrower bandwidth than those for the vision amplifier and the amplifiers operated at a higher bias, so as to obtain more efficient working. Input and output r.f connectors are provided on the front panel. The Band I equipment has the output harmonic attenuators mounted on the back panel of the cabinets; in the Band III equipment they are set in the main feeder run and supported from the cabinet roof. In both equipments output monitor points follow the attenuator, the types of probes used being selected according to the requirements of the station.

Each r.f unit mounts it own heater transformer but, apart from this, the vision and sound power supplies are common. All rectifiers use silicon diodes which are fully protected against surge voltages originating in the equipment and against mains-borne high-frequency surges up to 2000 V peak. In each h.t supply, the first smoothing section is common, but separate second sections are used for vision and sound to minimize crosstalk.

The control circuits are more comprehensive than for the driving transmitter because of the nature of the equipment protected, and include an air-pressure switch, a bias-proving relay, a total h.t d.c overload and cathode current overloads for the four main valves. These last are connected to a recycling system which, after a trip, will restore the h.t twice before finally removing the supply. A momentary fault will thus not cause a permanent interruption of service, but is recorded by causing an associated indicating neon to extinguish. Primary protection of all circuits is by miniature circuit breakers of the magnetic-hydraulic type.

Cooling air enters the cabinet through a washable filter on the front and cools the main body of the cabinet before being drawn into the blower. From the blower the air is ducted to the r.f units and is discharged through an aperture in the roof.

PARALLEL OPERATION

Besides the obvious advantage of doubled output power, reliability can be greatly increased by parallel operation. Failure of one amplifier need not close down the service, and one driving transmitter can be in use with the other standing by. There are two distinct problems here: amplifier phasing and automatic drive changeover.

Phasing is easier but probably the more important, as on this depends the effective power increase. Great precision is not required; a phase difference of about 23 degrees corresponds to a loss of output of 0·2 dB, while 50 degrees corresponds approximately to a 1 dB loss. Each amplifier output feeder (see Fig. 6) has a capacitive probe. These are set at equal distances from the aerials and are connected by cables of equal electrical length, thus preserving the relative phases at the probe points, to two phase comparators, one each for vision and sound. The comparators consist of rectifiers arranged to give an output dependent on the vector difference between the two inputs. No difference and zero indication therefore correspond; this is indicated on a meter adjacent to trombone-type phase adjusters, which can be adjusted in length to obtain an in-phase condition at the comparator probes, thus compensating for any difference in phase delay

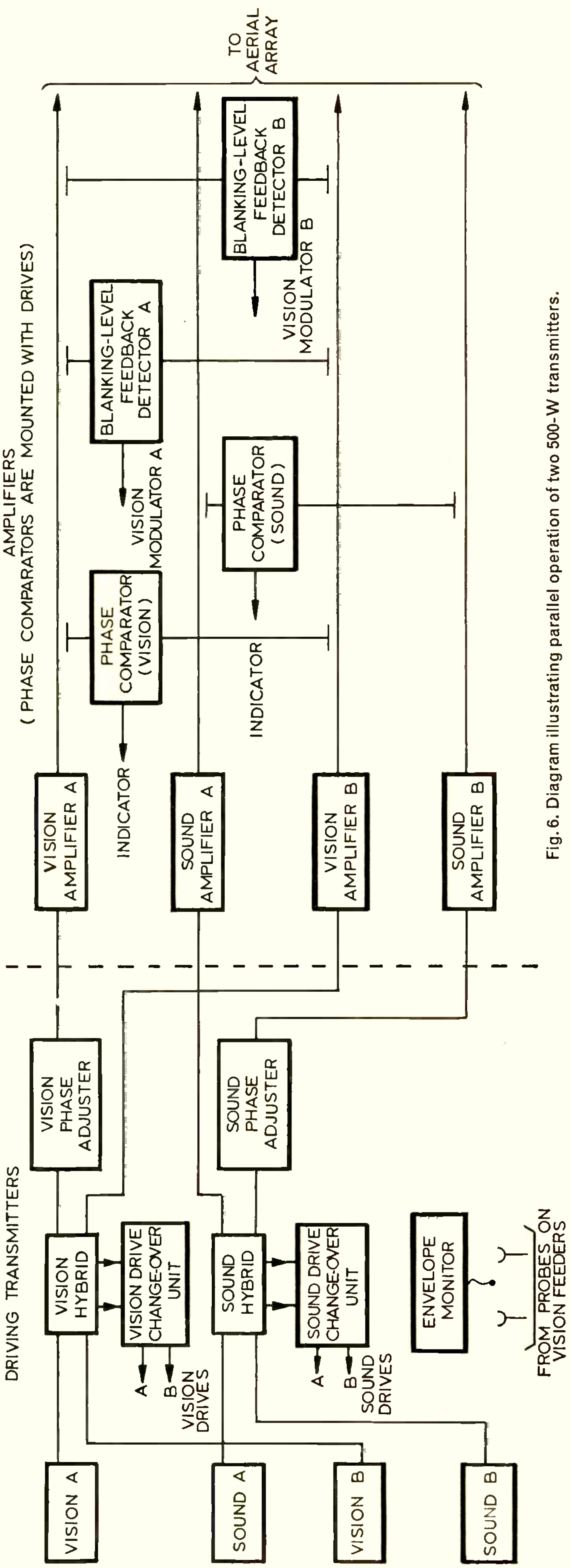


Fig. 6. Diagram illustrating parallel operation of two 500-W transmitters.

between the amplifiers. Once the phasing has been corrected manually it is rarely necessary to adjust it unless the r.f tuning is disturbed. After a brief warm-up period, a pair of transmitters switched on from cold will normally settle to within 5 degrees of their relative phase prior to switching off.

Automatic drive changeover is necessary because of the difficulties which would be associated with synchronizing and phase-locking the oscillators in the two driving transmitters. With the automatic change-over system, one drive is chosen to be preferred, by setting a selector switch. The preferred equipment drives both amplifiers in parallel through the hybrid unit. The changeover unit mutes the drive not preferred by removing the h.t from the vision linear amplifier or the sound harmonic generator. Its output circuit, however, remains connected to the second input port of the hybrid. Each input of the hybrid has an associated monitoring detector, and if the output from the preferred drive falls below a pre-determined level, a switching sequence is initiated in which the drives are changed over. As each drive is adequate to drive two amplifiers there is no fall of total output when one drive replaces the other. To provide a check on the performance of each drive, both are operated for a short period at "switch-on". The fact that both have given r.f output at that time is indicated by lamps.

The two drive changeover units are identical relay units into which are plugged the appropriate sound or vision printed-board transistor amplifiers. The sound is the simpler unit; a fall in drive level of a pre-selected amount—generally 2 or 3 dB—initiating the relay-switching action. The vision unit is more complicated in that the picture component of the signal is first removed so that the action is not dependent on picture content. The point of changeover can again be pre-set and depends on the degree below normal to which the sync. level at the hybrid unit falls.

In a parallel system a drive changeover unit is fitted in each drive transmitter cabinet, one for vision and one for sound. The hybrid units, phase comparators and phase adjusters are housed in the second cabinet where the envelope monitor is fitted in the first. The envelope monitor may be connected to either vision amplifier output by coaxial links. All the low-frequency wiring associated with these units is built into every cabinet so that no changes are needed whether one cabinet is used alone or as either of a paralleled pair. This facilitates the addition of any cabinet to another, in parallel. Inter-cabinet low-frequency connections are by simple multi-way plugs and sockets on the cabinet roofs as are the external control and mains connections. A dummy plug permits isolation of two paralleled drive transmitters and allows maintenance to be carried out on one unit while the other continues in operation.

Since the blanking-level feedback unit acts on the final clamp of the vision modulator, it is necessary, when two equipments are paralleled, for whichever modulator is in use to have its clamp controlled by the combined output of the two amplifiers. This is achieved by combining r.f signals from probes on the two vision feeders before detection, the detected output being fed to the blanking-level feedback unit. Because of the complexity of switching a single blanking-level feedback unit from one modulator to the other, two detectors and sets of probes are provided, each permanently connected to its associated modulator and blanking-level feedback unit. The range of action of the blanking-level feedback is deliberately restricted so that failure of one amplifier does not result in excessive over-driving of the other.

INSTALLATION

In the preceding section, the simplicity of the plug-and-socket connections for supply, control and paralleling has been mentioned. The video input cables and the r.f connections between the cabinets also enter overhead through thick flexible pads which permit them, complete with terminating plugs, to be connected direct to their corresponding units without the need for a break at the skin of the cabinet. The r.f output from the amplifiers is taken from the feeder-monitoring sections again at high level. No air ducting is needed for the amplifiers, and this, together with the overhead wiring, means that the installation of this equipment is simple and rapid.

REFERENCES

1 J. A. Brisbane: High Stability F.M.Q Drive; *Sound and Vision broadcasting*, Vol. 3, No. 1, Spring 1962.

2 A. N. Heightman: New Methods of Regulation for Stabilised Power Supplies; *The Marconi Review*, Vol. xxi, No. 130, 3rd quarter 1959.

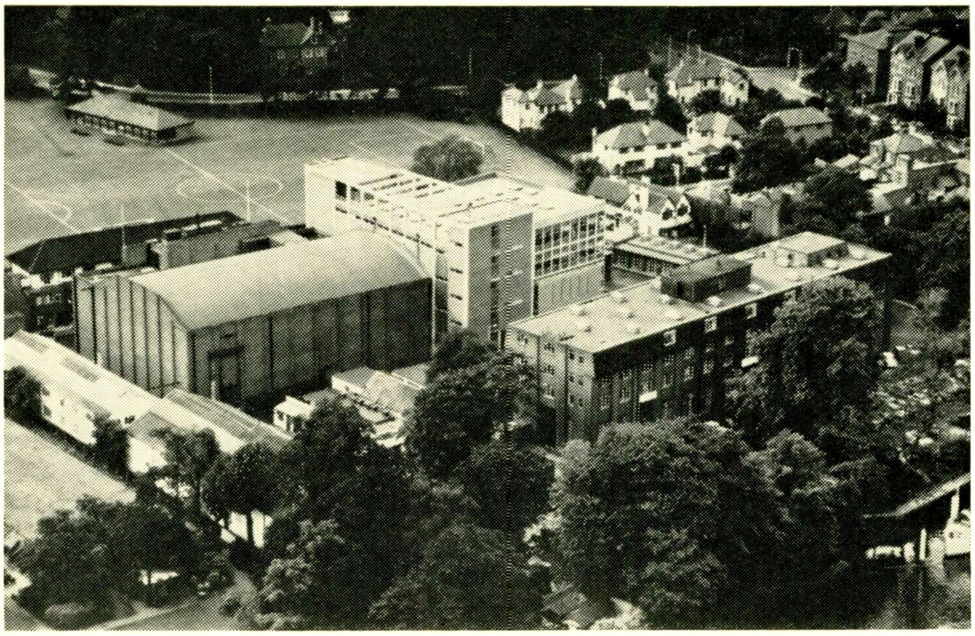
Major British programme companies order the Mark V camera

Although it was launched only in March, the Marconi Mark V 4½-in. image orthicon camera has been ordered by two of the major Independent Television Programme Contractors in the United Kingdom.

ABC Television Ltd has ordered 16 complete channels together with modules for sound mixers, picture and waveform monitors and synchronizing pulse generators to re-equip their mobile division. Three new O.B vans will undertake major outside broadcasts and location drama. They are of revolutionary design and are planned on the same lines as a studio production suite. This type of layout is made possible by the small size of the new range of Marconi Mark V camera equipment and is aided by the stability of the cameras, which reduces to a minimum the number of controls required during a production.

Granada Television Network Ltd will also be among the first users of the Mark V. The Marconi Company are acting as engineering consultants for a major re-development of the principal Granada Studio Centre at Quay St, Manchester. The new studios will provide Granada with the most up-to-date production facilities, including full 625-line capability. Marconi's, acting on behalf of Granada, will undertake all aspects of the work involved in providing Granada with the entirely new installation.

The Mark V has achieved a remarkable success in the ten weeks since its introduction. Sixty-three firm orders have been received, more than 50% of which have come from abroad.



ABC Television's studios at Teddington.

D. B. MANNING and D. R. MYNARD

A NEW SOUND MIXER FOR TELEVISION

INTRODUCTION

OVER THE LAST FEW YEARS the number of facilities required on Sound Control Equipment has gradually become more stabilized, and there is now a recognized maximum which any one operator can control. As a result of experience with the modular-type construction described previously in these pages[1] much knowledge has been gained of requirements and this has led to the design of a standard control panel which can readily be expanded to meet today's maximum demands.

It must be appreciated that custom-built equipment, with its unique circuit diagrams, cable layouts and case assemblies, becomes rather costly on a 'one off' basis. This new concept of a larger "major" module system offers a more economic unit through quantity production, and yet it is flexible enough to give a choice in the number of available channels together with various auxiliary facilities as and when required.

This new standard range is known as the Type B1103 Sound Control Equipment. The design is suitable for studio or mobile use and can be extended from 12 to 24 or 36 channels, by coupling basic 12-channel units together. This increases all the auxiliary facilities and the available outputs, as well as the number of channels. The mechanical design is simple and easily mounted into flat wooden desk surfaces. Suitable metal cases are also available.

BASIC FACILITIES

The basic item in this design range is a 12-channel unit which can handle up to 12 microphones of low or medium impedance and 4 high-level inputs (Fig. 1). The latter can be routed to either of the two group or sub-master controls. Channels 1 to 6 are permanent low-level channels and connected to Group A control fader. Channels 7 to 10 can each accept either a low-level input or a high-level input and they can be individually routed to either Group A or Group B. The remaining two channels 11 and 12 are permanently low level and connected to Group B. Every channel has its own input impedance selector key on the front panel, together with an operational pre-set gain control which enables the channel amplifier to accept signal peaks of up to −30 dBm. A miniature quadrant-type fader permits the smooth adjustment of channel gain (Fig. 2).

Each group is electronically divided into two isolated output paths. One goes to the Main Control fader and then to two separate output amplifiers. The other path can be selected by a switch to the "Clean Feed" output, this is a third isolated output amplifier with its own level control permitting the separate transmission or recording of any group of channels without affecting the main programme. Eurovision requirements provide a typical application of the "Clean Feed" facility, where all the effects of an international event can be transmitted separately from the local programme which would include its own language commentaries. All these three programme outputs are of the best broadcast quality and have optional output impedance characteristics, 600 ohms being available for matching high-grade music-quality lines and 75 ohms being offered for feeding lower-grade 600-ohm lines.

Important as these main programme facilities are, no sound equipment can produce good results without certain vital auxiliary circuits. Pre-listening enables each source to be checked for level and quality before fading up on transmission. This is effected by pressing the quadrant fader gently against its stop in the "Off" position. An over-ride micro switch within the fader connects the channel output to another amplifier. The

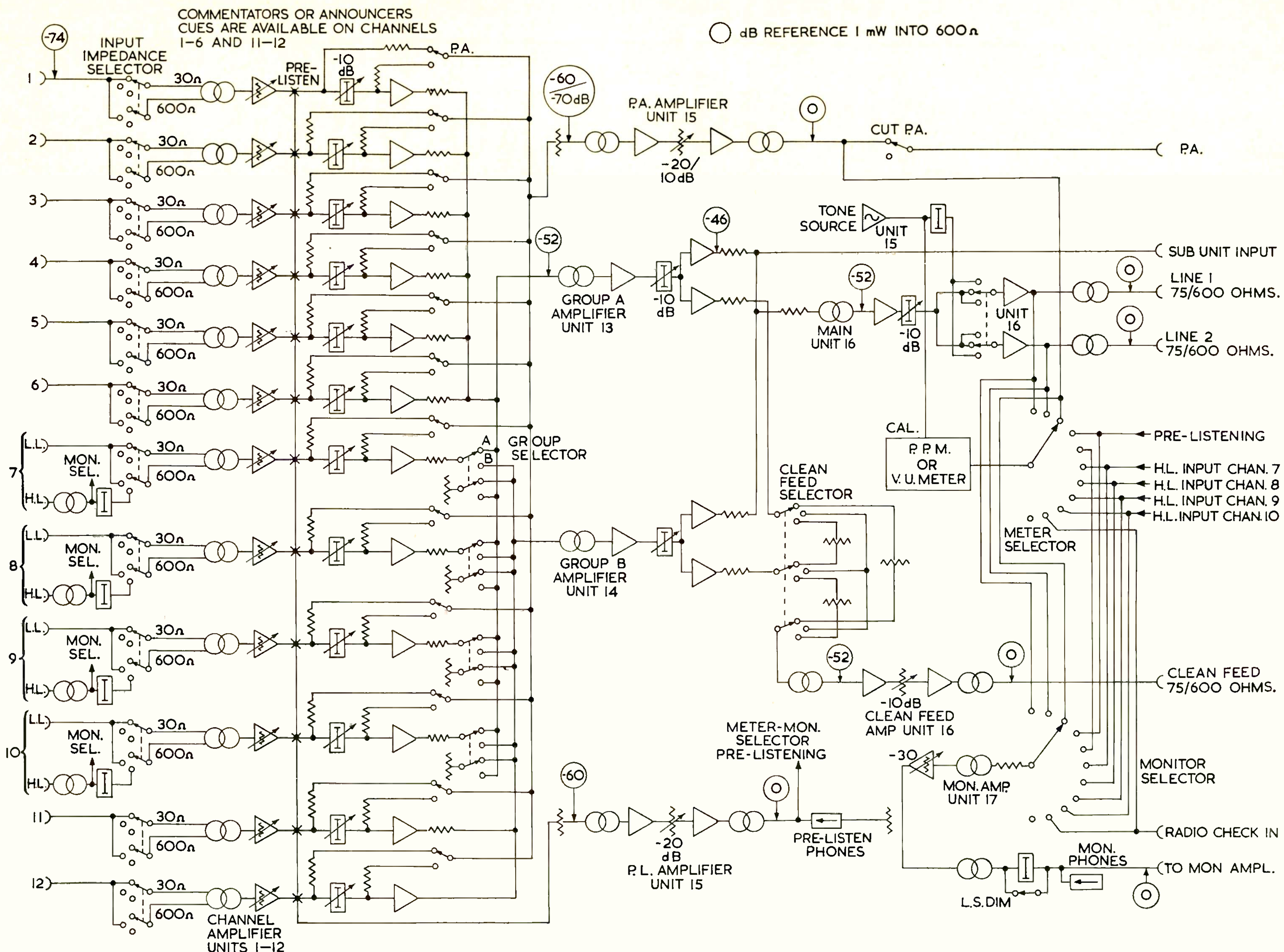


Fig. 1. Block schematic diagram of the basic 12-channel Sound Mixer B1103).

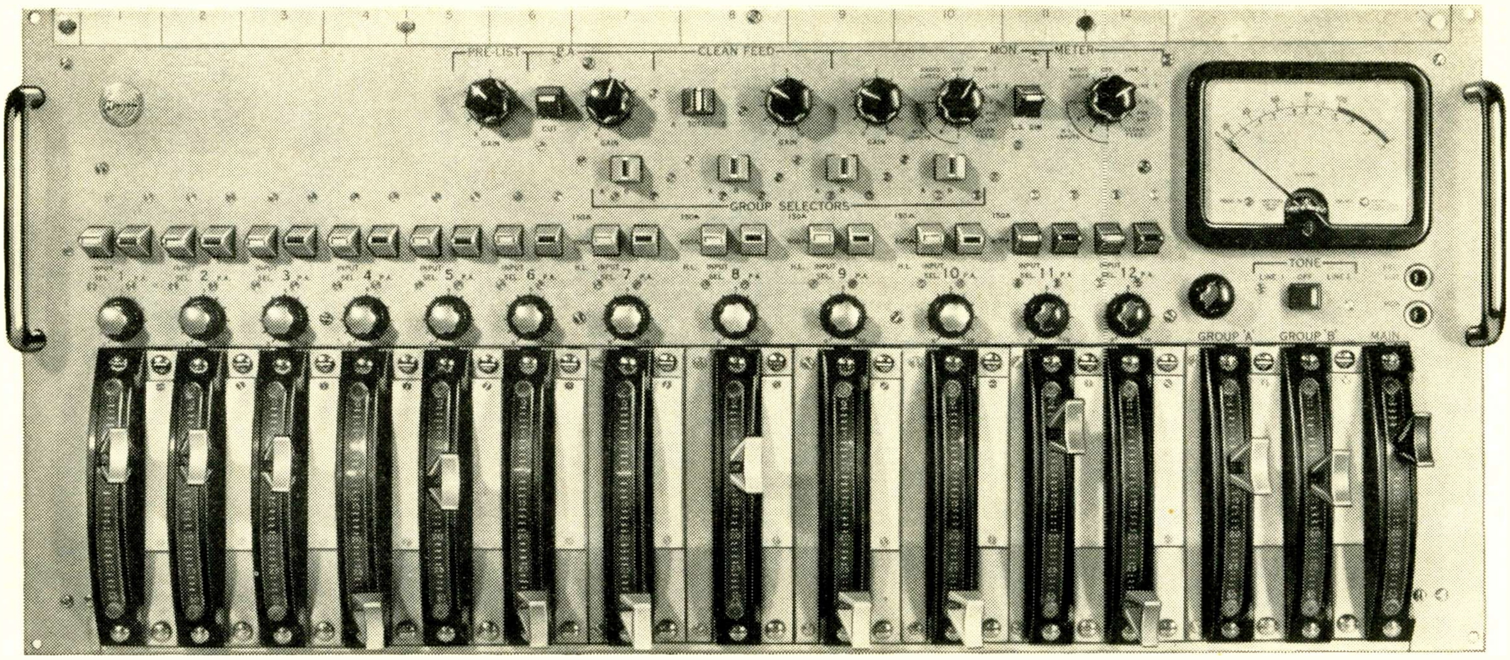


Fig. 2. The control panel of the 12-channel Sound Mixer.

operator can then check the circuit on headphones, loudspeaker or programme meter. This facility is available on every quadrant fader including the group controls.

Public Address (P.A) facility is also essential for many programmes. By pressing a key above each channel fader, it is possible to provide selective sound reinforcement to separate power amplifiers and loudspeakers. This enables an audience in the studio to appreciate fully the programme and react in the correct manner. Acoustic feedback can be prevented by a gain control and "Cut" key on the front panel. There is a second use for this particular output; it can be used for feeding loudspeakers on the studio floor to cue artists or to permit miming, or to feed separate studios with selected sound for complicated programmes such as opera, where the orchestra is in a different studio from the artists. This application is generally termed "Foldback".

The outputs of all these programme and auxiliary outputs have to be monitored both aurally and visually. The human ear is still the best judge of actual volume level and the B1103 Control Panel incorporates a special bridging isolation amplifier with its own input selector switch, gain control and "L.S Dim" key. This enables the operator to switch a loudspeaker around all the outputs and high-level inputs without disturbing those lines. There is also one position on the switch for an external input, normally the "Radio Check" receiver, which permits the cueing-in of live programmes. The "L.S Dim" key is to quieten quickly the loudspeaker temporarily when necessary, but to return immediately to the same sound listening level.

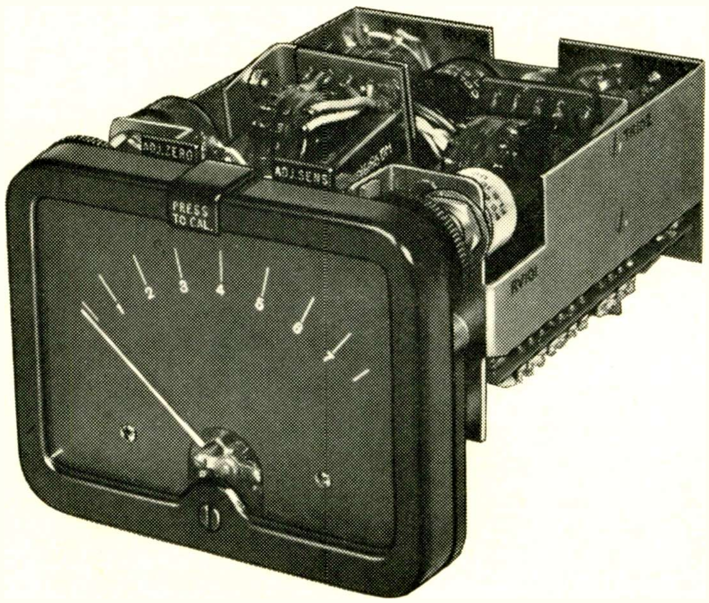


Fig. 3. The peak programme meter.

To help the operator establish correct sending levels a programme meter is provided with the same selection facility as the loudspeaker monitor. In this unique design, a standard V.U meter can be fitted or a transistorized Peak Programme Meter, type B1756, which has been specially designed to fit in the same space. The Peak Programme Meter, described in detail later, conforms to the stringent BBC specifications and can drive several remotely mounted slave meters if necessary (Fig. 3).

A stable tone source is incorporated and provides two useful features. It can be used for calibrating the sensitivity of the Peak Programme Meter, and it can be switched to either of the main output lines to keep them "engaged" while a rehearsal can proceed utilizing the second output.

This completes the basic unit. Where more complex programmes have to be produced an auxiliary unit is available which fits neatly across the top edge of the main unit. It is joined with a hinge so that it can be adjusted to mount at any suitable angle. Its facilities include echo hybrid amplifiers and their mixture switches together with an "Echo return" level control (Fig. 4). By the use of external reverberation equipment "Echo" effects can be added to eight of the twelve channels. Two variable equalizers, controlling high, low, and mid-frequencies can be connected into any four channels, normally 7 to 10, but easily adjusted to other channels if required. Finally, a second "foldback" output is provided from any channel, with its own output amplifier, completely independent of the main unit.

Both the main and auxiliary panels are permanently wired together. They also have a suitable input socket available for coupling in a sub-mixer unit, normally another 12-channel unit.

HIGHLIGHTS OF CIRCUIT DESIGN

Channel Amplifier (Fig. 5)

The channel amplifiers are printed wiring board assemblies which plug into the front panel, being easily removable and completely interchangeable. In the unlikely event of a failure, a new amplifier can be fitted in seconds. A test board is also supplied to facilitate fault finding and provide access to the input and output circuits. The design of this amplifier has been carried out with special attention to noise, bandwidth and distortion. To achieve a minimum amount of noise generation, the first stage utilizes a low-noise silicon planar NPN transistor. This has a mean wideband noise figure of 2 dB and is operated as near as possible to its optimum conditions for minimum noise. Nyquist's equation $E_N^2 = 4KTBR$ gives a thermal noise figure of approximately -128 dBm referred to the input for a bandwidth of 15 Kc/s. Noise levels of -125 dB to -123 dB are achieved on this amplifier, giving a noise figure of 3 to 5 dB. Better transistors are available with narrow band noise figures of less than 1 dB, but as they are rather expensive it was considered uneconomic to use them at present. Due to the large numbers used in the equipment, a disproportionate increase in cost would result for the slight improvement in performance.

The amplifier has three directly coupled common emitter stages incorporating overall d.c feedback and d.c stabilization for each stage. Fixed series feedback reduces distortion in the second stage, while variable series feedback in the first and third stages gives a pre-set gain control of 30 dB, allowing a wide range of input levels to be accommodated without distortion. The transistor chosen for the second stage had to be a silicon planar type due to the low bias current available from the collector resistor of the first stage. This is followed by a silicon-grown junction NPN transistor presenting a 600-ohm unbalanced output impedance to match the quadrant-type fader.

After the fader, each amplifier has a buffer stage

Fig. 4. The basic panel with ancillary echo unit in a typical desk.

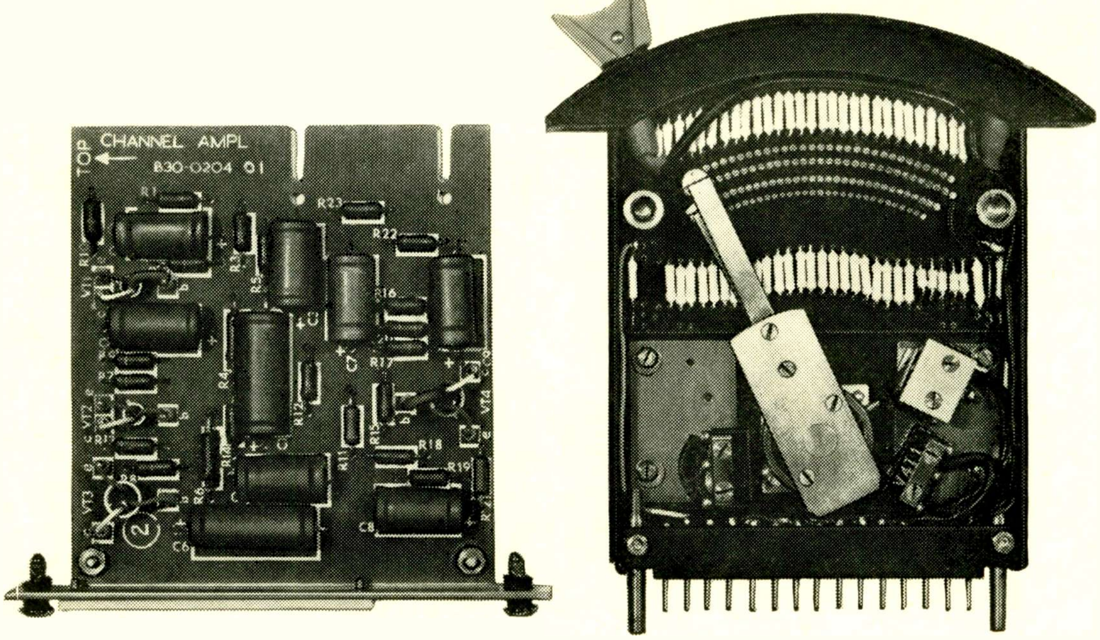


Fig. 5. Channel amplifier and quadrant fader.

before mixing to the common group circuit. This gives good channel isolation for the "P.A" and "Foldback" circuits where it is important to achieve at least 50 dB protection between the wanted and unwanted channels. The P.A take-off point can be before or after the channel fader as required.

Group Amplifier

The requisite number of channels are resistively mixed and fed to two group amplifiers. These are also plug-in printed board assemblies similar to the channel amplifiers, but a barrier key-way prevents them being fitted incorrectly. As this amplifier is an intermediate stage, its main design considerations are low distortion and stability. This is achieved by two stages of directly coupled common emitter amplifiers. Distortion is minimized by overall feedback and individual feedback circuits. D.C feedback is employed for bias stability. These stages feed the 600-ohm quadrant faders which are identical to the channel faders. The output from the fader is electronically split by three stages of directly coupled transistors, their bias being set by the first stage. Two common collector output stages are driven from the emitter of the first stage. The isolation between these two outputs is at least 40 dB, enabling the groups to be mixed or transmitted separately as required.

Main Programme Amplifier

The main design requirements here are stable amplification, suitable output impedance characteristics and power to feed various line requirements. Similar circuits are utilized to feed the two "Main Programme" outputs and the "Clean Feed" output. They have a balanced input feeding a two-stage amplifier, again a large amount of a.c and d.c negative feedback is applied overall, as well as to each stage. This feeds the Main Control fader which is followed by the output amplifiers. These each consist of four stages, one common emitter, one common collector and two push–pull stages, using silicon transistors throughout. The first stage here utilizes a low-noise transistor to give the lowest possible noise output when the Main fader is closed. This is directly coupled to the second stage and is biased from the emitter of the second stage, a.c and d.c feedback being applied over the same path. The low-output impedance of the second stage is coupled via a capacitor to the low-input impedance of a hybrid cross-coupled "short-tailed pair" phase splitter. This drives a push–pull class A output stage using two high-power diffused junction silicon transistors, very much under-run. Matched pairs of transistors in the push–pull stages give a balanced d.c output to the transformer, which avoids saturating the core and minimizes distortion.

By varying the connection to the secondary of the transformer it is possible to have either a 600-ohm output impedance or a 75-ohm output impedance. The latter, with its reactive component kept below 20% at frequencies up to 10 Kc/s, is specially designed to feed low-grade lines, where the line impedance may vary between 100 ohms and 1,000 ohms. It can also be utilized in studio applications where very long lines can cause high-frequency losses if 600-ohm circuits are used.

Pre-listen and P.A Amplifiers
These auxiliary circuits are identical and use low-cost PNP silicon transistors. The amplifiers have a gain of 86 dB and a maximum output of +10 dBm which is adequate for all normal applications. The first stage, which has a transformer input, incorporates the normal stabilization and series negative feedback. It feeds a moulded track low-noise rotary potentiometer gain control which is followed by a three-stage output amplifier. As the collector load of the final stage consists of the transformer primary, provision is made to adjust the collector current by means of the bias control to give minimum third harmonic distortion while maintaining correct bias conditions.

"ECHO" CIRCUIT

The amplifier necessary to create echo effects has several interesting features. It is necessary to divide the channel circuit in order to cross-fade between "direct" sound and "echo effect" sound, and in order to avoid positive feedback around the "Echo Return" circuit, there must be maximum isolation between the two outputs. This is achieved here by an electronic version of the hybrid transformer. However, unlike the transformer this amplifier has zero power loss, flat frequency response and extremely low distortion due to the large amount of feedback.

It has a common emitter first stage, directly coupled to the two output stages. These have 100% feedback as they are connected in the common collector configuration. These collectors are grounded by a decoupling capacitor, which is necessary in order to achieve an isolation of at least 45 dB between outputs. These are both 600-ohm impedance and are fed into an "Echo Mixture" fader. When this control is in mid-position, it has 0 dB loss in both paths, therefore equal "Echo" and "Direct" signals are transmitted. Turning the control clockwise, maintains full "Echo" signal while reducing the "Direct" signal, resulting in a fuller echo effect. Similarly turning the control anti-clockwise will not affect the "Direct" signal level but will reduce the "Echo" signal. This, used in conjunction with an "Echo Return" gain control in the circuit from the echo facility, will produce any required effect, from the slight increase of "liveness" in a dead studio to the full reverberation of a castle dungeon.

It should be appreciated that it is almost essential to have this echo effect, for most television studios are designed to be very "dead" acoustically. They are normally multi-purpose studios and have to handle drama, classical music and light entertainment, all of which require different degrees of reverberation. They also occasionally require adjustment to their frequency response, and this is why the two variable equalizers are fitted.

EQUALIZERS

These are electronic devices with 0 dB insertion loss at 1,000 c/s. The gain at 60 c/s and 10 Kc/s can be varied from +10 dB to −10 dB. To replace "presence" lost on certain types of microphones a variable boost is provided at 3 Kc/s with +10 dB maximum. A.C feedback from the emitter of the second stage is varied in response at either end of the audio spectrum by two continuously variable moulded track resistor and fixed capacitor networks. Attenuation of the feedback provides the boost at 3 Kc/s by means of a tuned circuit. The Q of this can be varied by switched resistors giving 5 steps of 2 dB each.

PEAK PROGRAMME METER (Type B.1756)

This 24-V peak programme meter, which uses an instrument possessing the ballistic characteristics specified by British Broadcasting authorities, is $4\frac{1}{4}$ in. by $3\frac{1}{4}$ in. and governs the front panel dimensions of the amplifier (see Fig. 2).

The amplifier designed to drive the meter uses 8 PNP low-cost silicon transistors, 2 germanium diodes and 3 silicon diodes. An isolated input is provided with an impedance of 10 K ohms. To regain the loss in the input circuit there is a common emitter voltage amplifier working in class A push–pull. Directly coupled to this amplifier is a common collector amplifier. Bias for the first stages is obtained from the emitter circuit of the current amplifier; this circuit also providing overall d.c feedback and stabilization. A low-impedance input to the solid tantalum timing capacitor is provided by the current amplifier and the transformer.

The signal is full-wave rectified by two germanium diodes. These also control the first part of the meter law with their logarithmic low-voltage forward characteristics. A discharge time constant of 3 sec is provided by a 220-K ohm resistor and the back resistance of the diodes. The voltage loss is regained by a two-stage "long-tailed pair" d.c amplifier, voltage gain being provided by the first pair of transistors and power gain by the second pair. As the first is a voltage amplifier, it is sensitive to differential changes in base to emitter voltage (Vbe) that can be caused by a temperature gradient being established across the amplifier, due to any nearby sources of heat. This is minimized by thermally coupling the transistors together in a standard copper cooling clip.

Pairs of transistors can be obtained in one transistor case for the same purpose, but the cost makes their use uneconomic. Matched pairs of transistors are used, however, any discrepancies in matching being accommodated by differentially adjusting the bias with the control labelled "Adjust Zero" on the front panel.

A.C gain is set by the front panel adjustment marked "Sensitivity", this controls the first part of the law in conjunction with the rectifier diode characteristics. The remaining part of the law is obtained by shunting the output impedance of the amplifier with diodes having logarithmic forward characteristics. Deviations in the diode characteristics are corrected by four pre-set controls to give 4 dB steps over the range 2 to 7.

MECHANICAL DESIGN

The B.1103 Sound Mixer is a flat control panel, designed to match the same series of equipment as the B.3714 Vision Mixer. It fits a simple rectangular cut-out in a desk. This is usually designed to suit the studio décor and can often be built on site, however a standard design of desk is also available. Where compatibility with old-style equipment is required, the basic mixer will fit into a similar case to the BD.580 Sound Mixer and the BD.841 Vision Mixer.

All connections are by plug and socket on the rear panel. One point of interest is the use of multi-pin 17-way connectors for the low-level inputs. These are used in conjunction with composite 8-pair sound cables which greatly reduce installation or setting-up time, whether in fixed installations or mobile control rooms on outside broadcasts. For the latter application simple splitter boxes are available, making the equipment instantly compatible with the customer's standard microphone connectors. The rear panel also carries certain heavy components such as output transformers, together with the printed wiring board assemblies for the main amplifiers.

INSTALLATION

The equipment is admirably suited for clean installations where a good line of sight is essential. A low profile is easily achieved as illustrated in Fig. 6. It

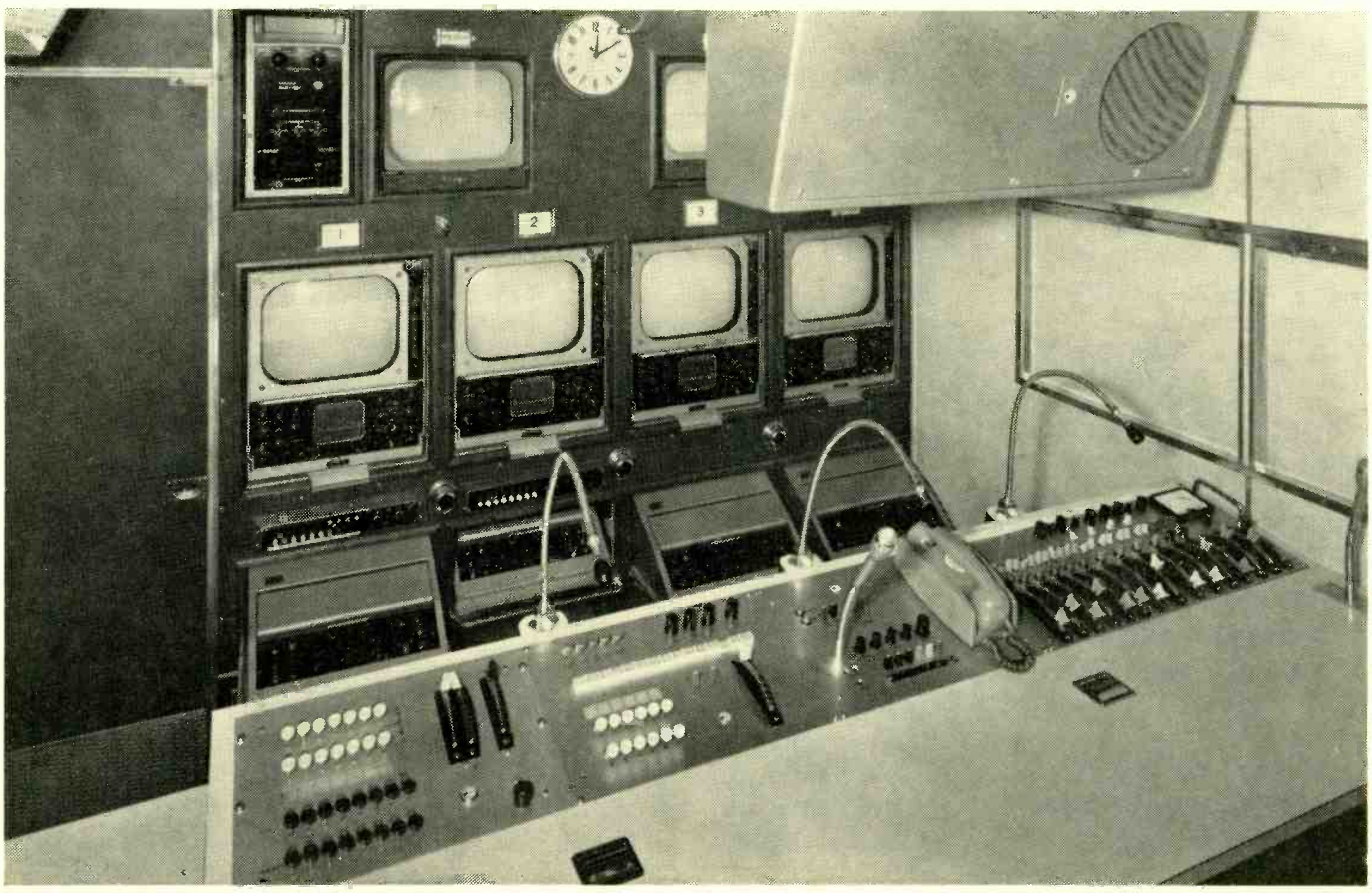


Fig. 6. A 12-channel Sound Mixer installed in an O.B van for Yugoslavia.

requires a 24-volt d.c supply which is normally supplied by the Type B.4203 regulated supply unit. The consumption of a basic unit is approximately 700 mA and this increases to 1 A when the Auxiliary Unit is added. A separate d.c supply is recommended for the signal light circuits. These include illumination of the quadrant faders, together with voltages available from the fader cueing switches for remote warning lights and muting relays.

REFERENCE

D. B. Manning: A New Design of Sound Control Desk for Television; *Sound and Vision broadcasting*, Vol. 4, No. 1, Spring 1964.

Unveiling the Mark V

Lord Nelson opens New Television Development Laboratories

The first public presentation of the Marconi Mark V broadcasting television camera and the opening of the new Television Development Laboratories happily coincided on 12th March.

Television development was until recently carried out at Marconi's Pottery Lane establishment which was taken over by the Company in 1939, and where a great deal of important development work on radar took place. More recently it saw much of the later development work on the world-famous Mark IV camera and colour and closed-circuit television equipment.

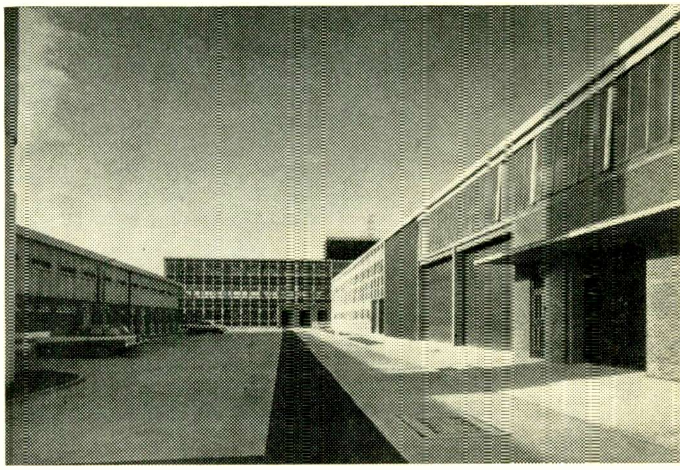
With expansion, however, conditions were becoming cramped, and the need for more commodious and convenient accommodation was apparent. The Company has, therefore, recently completed a £750,000 building at Waterhouse Lane, Chelmsford. The new building is a great improvement on the Pottery Lane site. The total floor space taken up by television development work has been increased to 37,500 sq. ft, more than one and a half times the previous figure. Laboratory facilities include a central apparatus room which provides 'piped' synchronizing signals of all currently used television standards, v.h.f radio signals and other standard reference signals to all parts of the building.

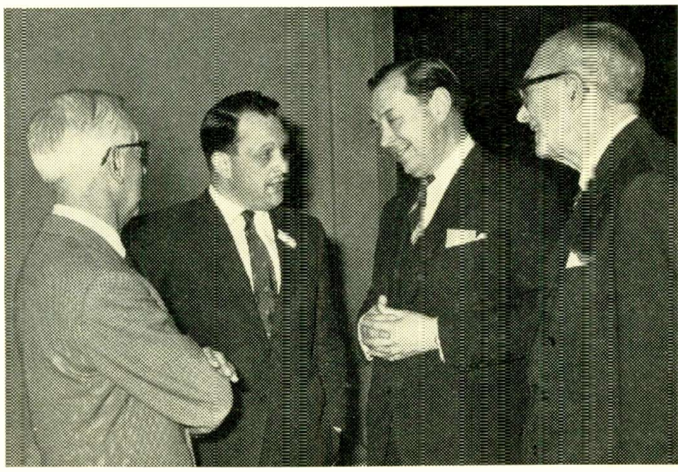
Perhaps the most important feature of the new building is the 900 sq. ft television studio which has been constructed to the same high standard as a normal production studio. It has a specially levelled floor and is fully air-conditioned and sound-proofed. Lighting facilities are designed for both black-and-white and colour camera work.

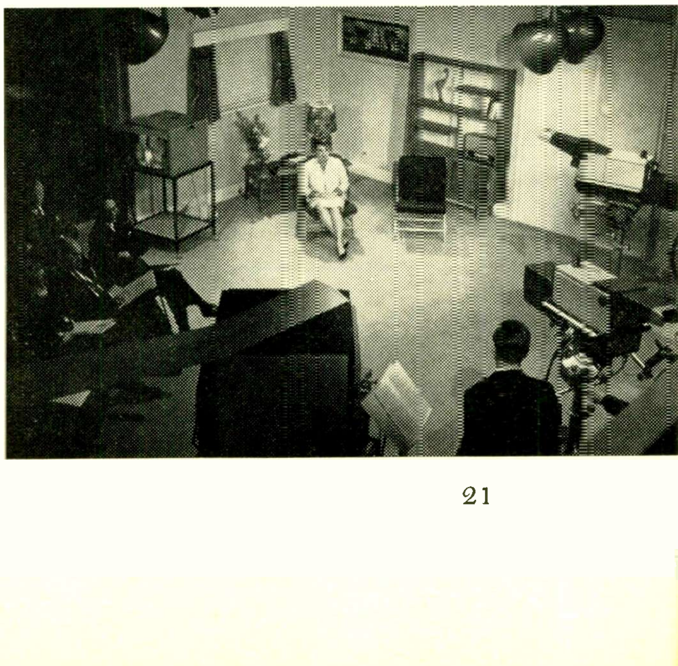
It was here that the full working demonstration of the Mark V camera was held. Important representatives from the television world, the national and technical press and many other distinguished guests were able to examine the camera in close detail.

Tours of the spacious new laboratories were conducted and several other items of new equipment were on show, including the semi-automatic master switcher, the 1-kW one-valve m.f transmitter and the Band IV/V television drive transmitter.

Lord Nelson of Stafford, Chairman of the English Electric Company, on formally opening the new laboratories, said, "I would like to say here that we are very proud of the fact that not only have we been able to provide an important part of the equipment used in providing the television service in this country . . . , but we have supplied equipments to 48 countries overseas. No less than 70% of the television equipment we manufacture is for export. I would here particularly draw attention to our position on television studio cameras. Our Mark IV television camera has been a best-seller—no less than 843 have been sold in all, and 716 of these were sold in the export market, including 267 to the USA and 103 to Canada. A sales record of this kind can only result from unrivalled excellence of the equipment. This achievement illustrates to my mind what is so important to this country, namely the successful development of a piece of equipment for the home market by close co-operation between manufacturer and user which leads to an equipment which can be sold worldwide on a large scale."







TOP RIGHT *The new Television Development Laboratories at Waterhouse Lane.*

RIGHT *Lord Nelson, Chairman of English Electric (second from right) talking to Mr T. Mayer, Manager, Broadcasting Division, at the opening of the new laboratories. Also in the picture are Sir G. Radley, Chairman of The Marconi Company (right) and Mr P. A. T. Bevan,* O.B.E, *Chief Engineer, Independent Television Authority.*

BOTTOM RIGHT *Miss Judith Chalmers provided a charming subject for the Mark V during the demonstration in the new fully equipped studio at Waterhouse Lane.*

Marconi's have sold more than 1,200 4½ inch Image Orthicon Television Cameras to half the countries in the world currently operating television services. The Marconi Mark IV Camera has become the standard against which all other television cameras are judged.

Marconi television systems

The Marconi Company Limited, Broadcasting Division, Chelmsford, Essex, England

LTD/B32

B. G. SELLIN, Svenska Radioaktiebolaget

A CHAIN OF FOUR TELEVISION TRANSLATORS IN THE NORTH OF SWEDEN

INTRODUCTION

SWEDEN IS KNOWN for and is very dependent on its export of iron ore. The most famous iron-ore district is situated in the very north of Sweden near the towns of Kiruna and Gallivare. Kiruna is about 100 miles north of the Arctic Circle as shown on the map (Fig. 1). Due mainly to the comparatively mild climate caused by the Gulf Stream flowing near the Norwegian coast, these parts of northern Scandinavia are much more populated than, for example, those parts of Russia and Canada on the same latitude.

The iron ore has to be transported to harbours in Sweden or Norway for loading on board ships. Some hundred years ago this was done by horse-drawn carts and by vessels on the rivers. Even an English company once owned important mines around Gallivare and arranged the transport down to harbours in the inner part of the Baltic. In the town of Boden you can still find a canal by-passing the waterfalls called the English Canal from this time. Nowadays, almost all the important mines are owned by the Swedish Government.

At the end of the nineteenth century, the very important railway was built between Kiruna and the harbour town of Narvik in Norway. Most of the ore is nowadays transported over this railway to Narvik as this harbour is free from ice throughout the year due to the Gulf Stream. The line winds along a beautiful landscape of mountains with peaks up to 6,000 ft (see Figs. 2 and 3). This railway, carrying heavy traffic almost continuously, demands a lot of maintenance, and many people, employed by the railway administration, therefore live along the line. As a result of the introduction of automation and remote control, the population along the line has now decreased to about 600 persons including families. Although the climate is comparatively tolerable, being so far north, yet life is hard during the snowy and cold winter and for a time the sun never shows over the horizon.

Television was more than longed for by these people as a light in the darkness. Their disappointment was therefore particularly great when the regional TV transmitter at Kiruna could only be received by a very few households along the line. The surrounding mountains formed an effective screen for the television signals. In 1962 representatives of the inhabitants therefore went direct to the Swedish Government with a call for help in getting television coverage at an early date. The Telecommunications Administration, which is in charge of broadcasting distribution in Sweden, was entrusted with the task of investigating the possibilities and costs involved in arranging a satisfactory television coverage along the line. This required studies of the topography of the area to determine the number of stations that would be needed, and investigations of accessibility, power supplies, as well as costs of buildings and approach roads, etc. After considerable studies of topographical maps and calculations, the Administration found that a coverage could be supplied with a minimum of four translator stations in series at a preliminary cost of £70,000. The project was not at all economic as the calculated cost per TV licence (normally £7 a year) would be £180. As the intention has always been to

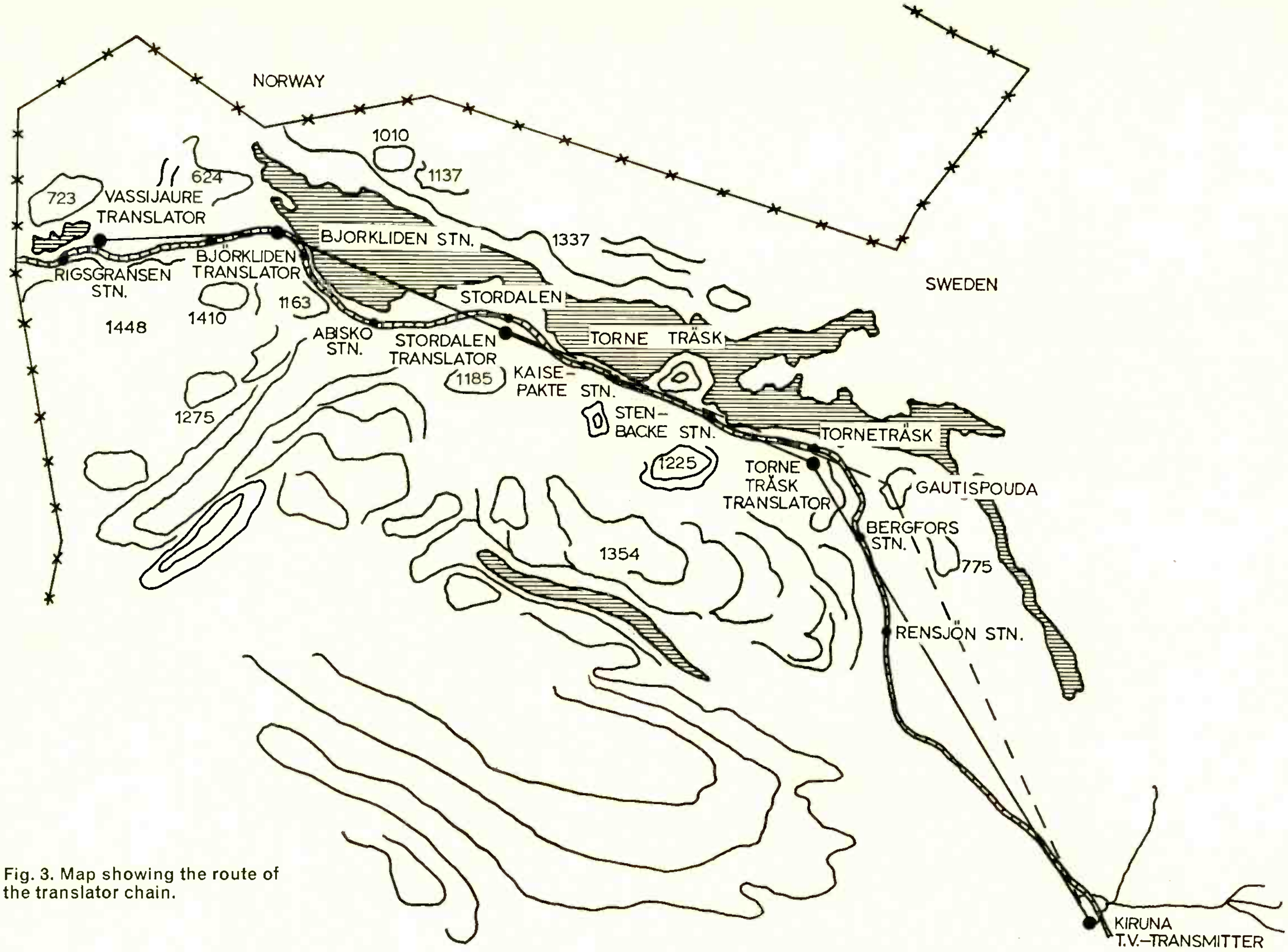


Fig. 3. Map showing the route of the translator chain.

the following transmission channels were found to be the only ones available for the chain:

Torneträsk:	Channel 4 with vertical polarization
Stordalen:	Channel 7 with vertical polarization
Björkliden:	Channel 9 with vertical polarization and
Vassijaure:	Channel 3 with horizontal polarization.

DECISION ON TYPE AND MAKE OF RADIO EQUIPMENT

The Telecommunications Administration have standardized their v.h.f translator e.r.p to approximately 1 W, 10 W and 150 W. The two first-mentioned powers are mainly used for smaller, more concentrated communities, and the higher power for more extended populated areas as, for example, river valleys. In this special case, 10-W stations could have been used but then field-strength figures were found to be only just above the limits, and no margins were available either for the coverage or the feeding of the following station. Very high-gain Yagi antennas could not be used as this would produce too narrow beams for the required coverage.

The Administration have used Marconi's 50-W Translator, type B6400, for a great part of the Swedish TV translator network. For all their f.m translator stations, they have used Marconi's 10-W F.M Translator, type B6401.

TV Translator, type B6400, can be seen in Fig. 6. This is an i.f type of translator, the received signals (sound and vision together) being mixed immediately after the receiving stage to produce an i.f in the 33–40 Mc/s range. After passing i.f filters the signal is amplified in the i.f amplifier which also is provided with automatic gain control. The signal is then converted to the transmission frequency in a second mixer. The power of 50 W is reached in a following amplifier.

F.M Transmitter, type B6401, is shown in Fig. 7. This translator also uses i.f amplification or, as it is also called, double frequencing conversion. The i.f frequency is dependent on the output frequency and is either 10·5 or 11·1 Mc/s. Normally the difference

Fig. 4. Field-strength measurement during the route survey.

Fig. 4(b). A helicopter used during the survey at the Björkliden station site.

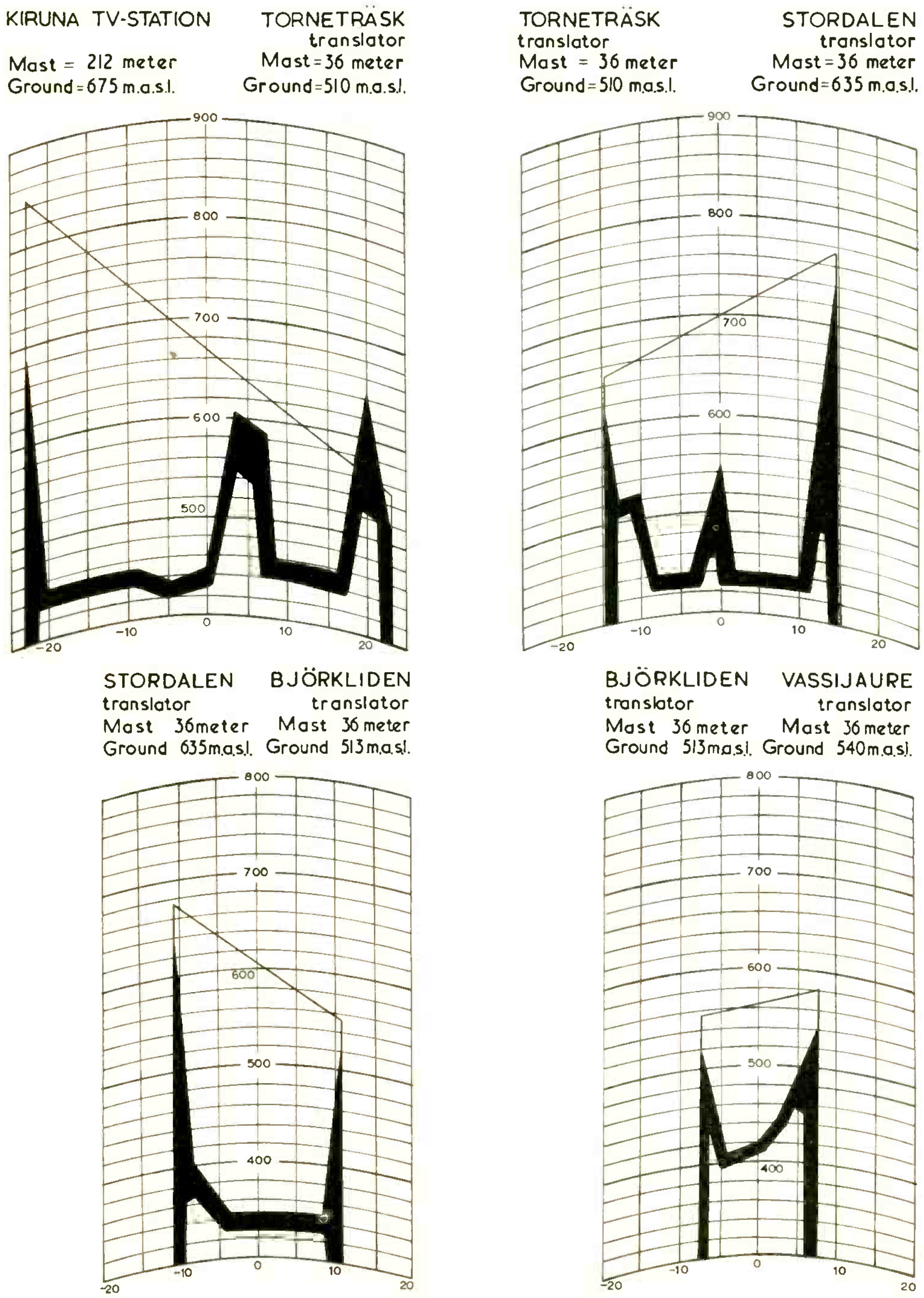


Fig. 5. Path profiles of the route.

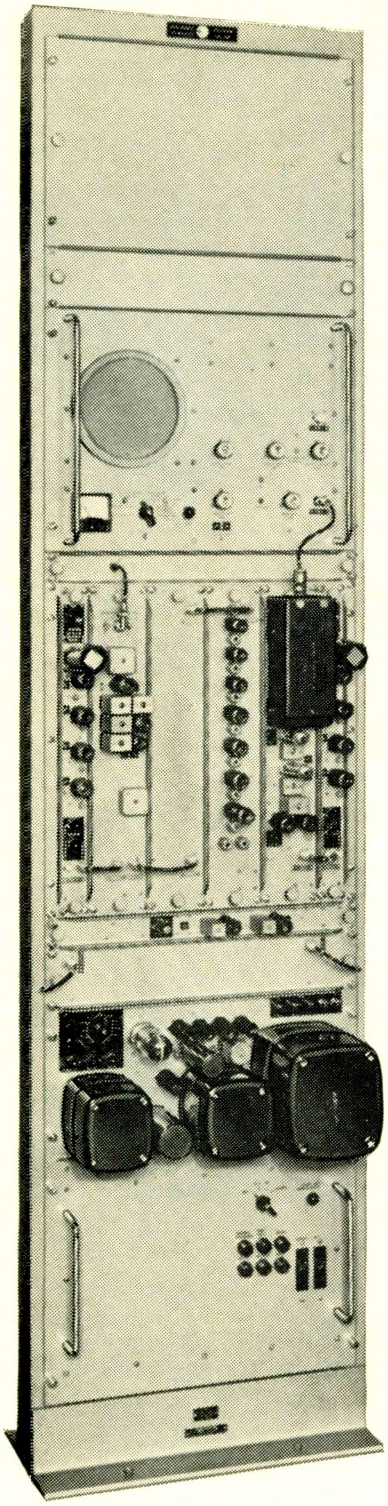


Fig. 6. B6400 TV Translator.

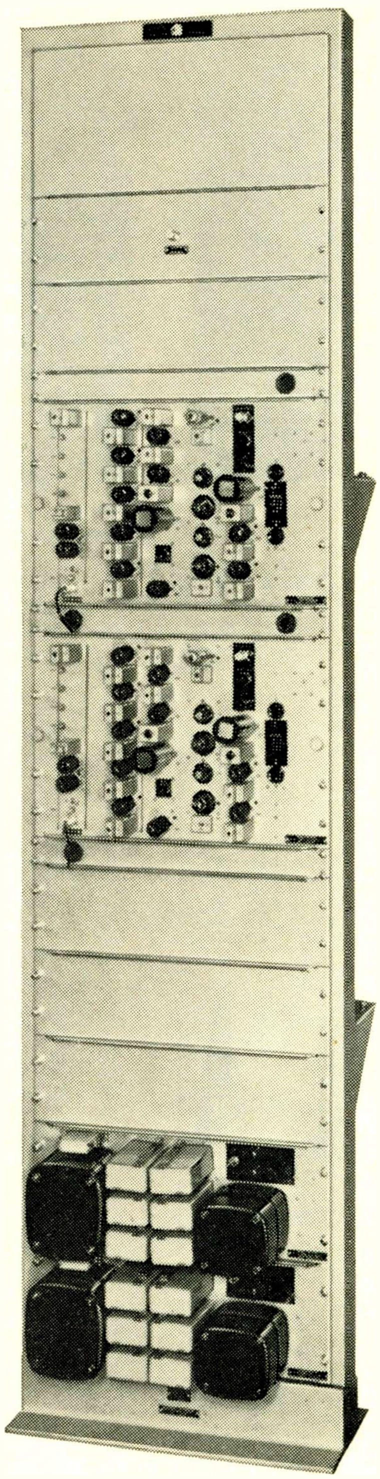


Fig. 7. Dual B6401 F.M Translator.

between received and transmitted frequencies may not be less than 1 Mc/s. With an additional aerial filter a difference down to 0·8 Mc/s has in some cases been used. The build-up of the f.m translator is much the same as for the TV translator with receiving, mixing, i.f amplifier, mixing and r.f amplifier stages. A 100-W amplifier is also available for the f.m translator.

At the time of deciding to proceed with the project the Administration had an order with Marconi's for 25 TV and 44 f.m translators, not all of which were allocated. Due to this and in view of the good experience from earlier equipment of the same type, it was decided to use 8 TV translators and 16 f.m translators from that order for the stations Torneträsk, Stordalen, Björkliden and Vassijaure. Each station would in this way be supplied with working and standby transmitters.

It was decided to buy the antennas of various gains from a Swedish manufacturer.

ERECTION OF STATIONS

(a) Access Roads

The translator stations in Sweden, today around 70, are normally not supplied with any access roads usable by cars. They have, however, always some sort of tractor-path except for a couple of stations situated on very high and steep mountain-tops. These are completely built and mainly maintained by helicopter or rope-ways.

This project was, however, very special as there were no motor-roads within reach of the stations. tractors could, nevertheless, be transported by railway, and in spite of the very steep access to the stations, it was found that tractors and snow-vehicles could be used for the erection work. Some help by helicopter was, however, later found to be necessary. The tractor-paths were very easy to make. As almost no vegetation is to be found on these mountains, it was only necessary to find the easiest drivable way for the tractor or snow-vehicle. Material for the buildings, masts, equipment, etc. were thus transported by tractor and trailers. For maintenance one has to walk, use skis or, when heavy equipment has to be transported, use snow-vehicles.

(b) Mains Supply

Power supplies sometimes produce problems and increase costs when stations have to be sited in a very unpopulated part of the country. Wind-driven power sources have never been used in Sweden as the powers required are usually quite high; 15 kW is a normal power requirement for a complete station with two TV translators and four f.m translators. The power is also used for heating, cooling, lighting and instruments.

For these stations, the problem of power supply would be fairly easily solved. There was a high voltage "service" power line following the railway. The "service" line was, however, not modernized

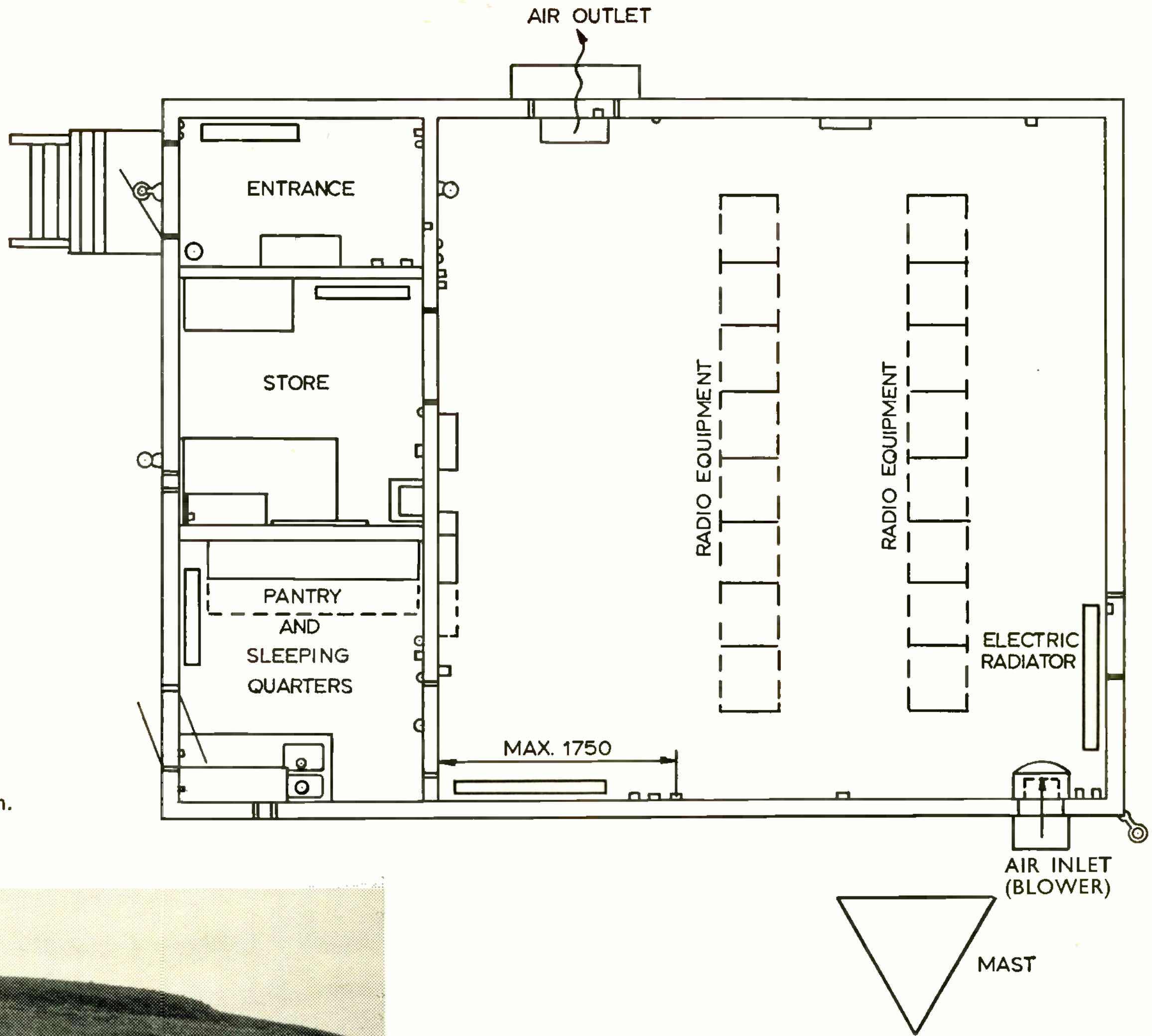


Fig. 8. Plan of a translator station.

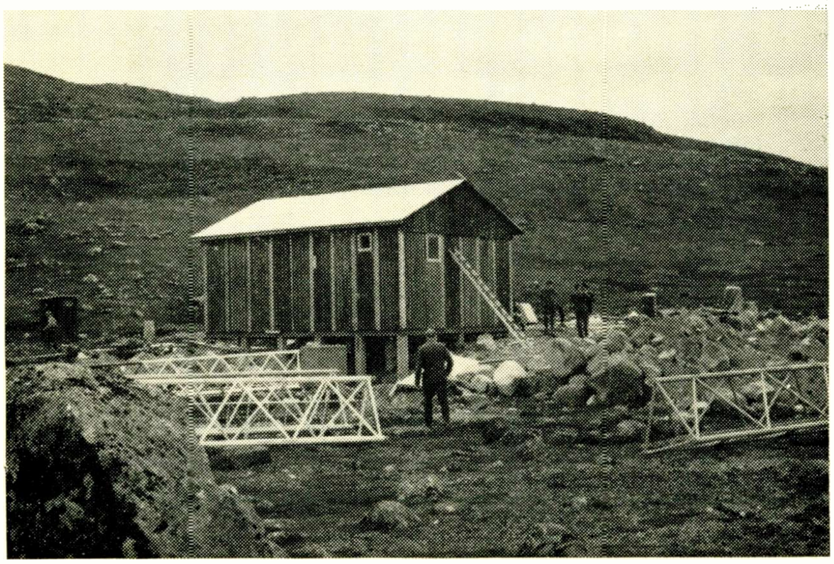


Fig. 9. The Torneträsk Translator Station during erection.

(3-phase) in all sections, and as the Railroad Administration had a very long-term programme for this modernization, the power supply was more costly than had been calculated.

Transformer stations were built near the railway and low-voltage (3×380 V) underground cables were laid to the translator stations. Ten telephone circuit cables were also laid with the main cable. The telephones were connected to the automatic exchange in Kiruna via a cable running along the railway.

(c) Buildings

The Administration have different types of standard buildings for translator as well as for transmitter stations. The type used here was a wooden building supplied in prefabricated wall-blocks. The layout of the building is shown in Fig. 8 and a photograph taken during erection can be seen in Fig. 9. The erection of these buildings could only be made during the snow-free season from June to September. The work was carried out by the Administration's building department with long experience of this type of work.

The buildings as shown on the layout are divided into transmitter room, stores and kitchenette combined with bedroom. The latter is very necessary as a sudden snowstorm can keep one at the site for days. In the transmitter or rather translator room both TV and f.m translators are situated. The buildings have to be well anchored to the rock because of the wind which otherwise could sweep them down into the valley —such things have happened. The houses are heated by electrical heaters and by the dissipated power from the radio equipment.

(d) Masts and Antennae

The mast is a standard type of lattice mast used for all translator stations. It is stayed, internally climbable and can be built to a height of 100 metres if necessary. In this case, all four masts are 36 metres high. This was the highest possible with the room available for the stays on the narrow shelves of the slopes. The masts are divided into four 8-metre sections and one 2-metre section, and are stayed at 16 and 32 metres. It was very important to orientate the masts so that no stays were in the direction of the Yagi antennae, otherwise reflections and attenuation could be caused.

The Yagi antennae are made of aluminium and are of three-, six- or eight-element type. The orientation of the transmitting antennae both horizontally and vertically is very important as both the coverage and signal supply to the following station have to be accounted for. The transmitter antennae had thus to be tilted downwards. Both masts and antennae had to be designed for high ice and wind load. Fig. 10 shows an example of the heavy ice loads that could be expected.

OPERATION AND MAINTENANCE

The maintenance service of the Swedish Telecommunications Administration's radio stations for broadcasting, radio link traffic, aeronautical, etc. is divided into eight radio sections. The radio section of the northern part of the country has its headquarters in the town of Luleå. Here are found the more skilled radio engineers in charge of the translator chain in question. The north of Sweden is, however, a land of long distances, and the distance between Luleå on the coast of the Baltic and Torneträsk is about 200 miles. The immediate maintenance and operational staff is therefore situated at the manned television station of Kiruna. From Kiruna maintenance people can proceed to the translator stations by train or by helicopter.

The stations are also supervised by local inhabitants, who, although they are not very often technicians, check meter readings, report faults, change fuses, etc.

The operation of the unmanned stations mostly represents no problem as the translators are kept switched on the whole time, but only radiate when a signal is received. An equipment for automatic changeover from service to standby translator will be installed in the near future. For the moment, the changeover is made locally from nearby villages via the telephone line.

It is planned that every translator station in the future will automatically report its operational situation via the telephone network to a control centre, in this case situated in Luleå.

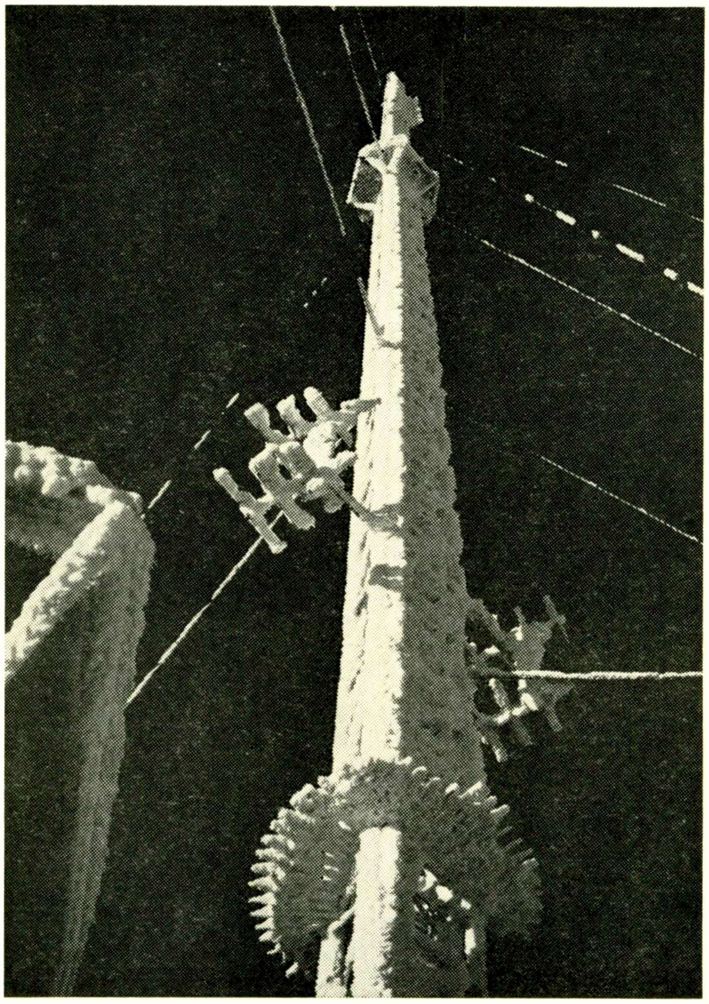


Fig. 10. The mast of a translator station heavily coated with ice.

CONCLUSION

The radio equipment for the chain of translators was installed in the autumn of 1963, the two first stations being put into service for TV only in December 1963 and the two following in January 1964. Because of interference problems the start of the f.m service has been delayed until new frequencies have been allocated.

Unfortunately, more comprehensive test results from the chain are not yet available. The coverage of the stations is, however, satisfactory and the people living along the railway are quite satisfied with the service. The picture quality from the fourth translator is better than originally anticipated. Furthermore, during one year of operation of the translators the amount of out-of-service time has been very low.

The author hopes to describe the results and experience gained from the chain in a future article in *Sound and Vision broadcasting* and wishes to thank the Swedish Telecommunications Administration for supplying photos and drawings used in the article.

R. J. DAVEY, Chief Engineer, Voice of Kenya

JAMHURI — DECEMBER 1964 COVERAGE OF KENYA'S REPUBLIC CELEBRATIONS

In December 1963 Kenya celebrated its independence (Uhuru). Sound and television coverage of the celebrations, which lasted more than a week, was successfully achieved by dint of much enterprise and ingenuity, including borrowed television cameras. Seldom has a broadcasting organization as young as that in Kenya been called on to present both in words and pictures the birth of a new country. The following December saw the official celebrations for the creation of Kenya as a republic. This article describes the sound and television coverage given to these, and some of the difficulties and problems that had to be overcome.

THERE WAS TO BE no resting on our laurels—for almost as soon as the last report had been signed and the last of many meal-claims paid, we were meeting again; this time to discuss coverage of the first anniversary of Uhuru and the official celebration of the new Kenya, a republic, within the Commonwealth.

Our experience in covering outside events on television a year previously was invaluable as we intended similar coverage—though this time with our own equipment, for protracted negotiations finally resulted in a rush order to the Marconi Company for delivery of a 2-camera Outside Recording Unit equipped with Mark IV $4\frac{1}{2}$-in. image orthicon cameras and an Ampex VR1100 Recorder. A second recorder was to be installed in the main studio centre.

On our Sound Services a pattern similar to that which had proved so successful during Uhuru a year earlier was adopted and detailed planning commenced. Early in November, a provisional coverage chart was produced, but this was subject to so many variations, as celebrations were altered or shifted from one day to another, that at its conclusion it bore little semblance to the original! However, engineering work continued and on 4th December installation had already started and was progressing well.

Fig. 1. The President of Kenya, Mzee Jomo Kenyatta, takes the salute at Jamhuri Park, Nairobi, at Republic Day celebrations.

Pictures by kind permission of Hon. R. Achieng Oneko, Minister of Information, Broadcasting and Tourism.

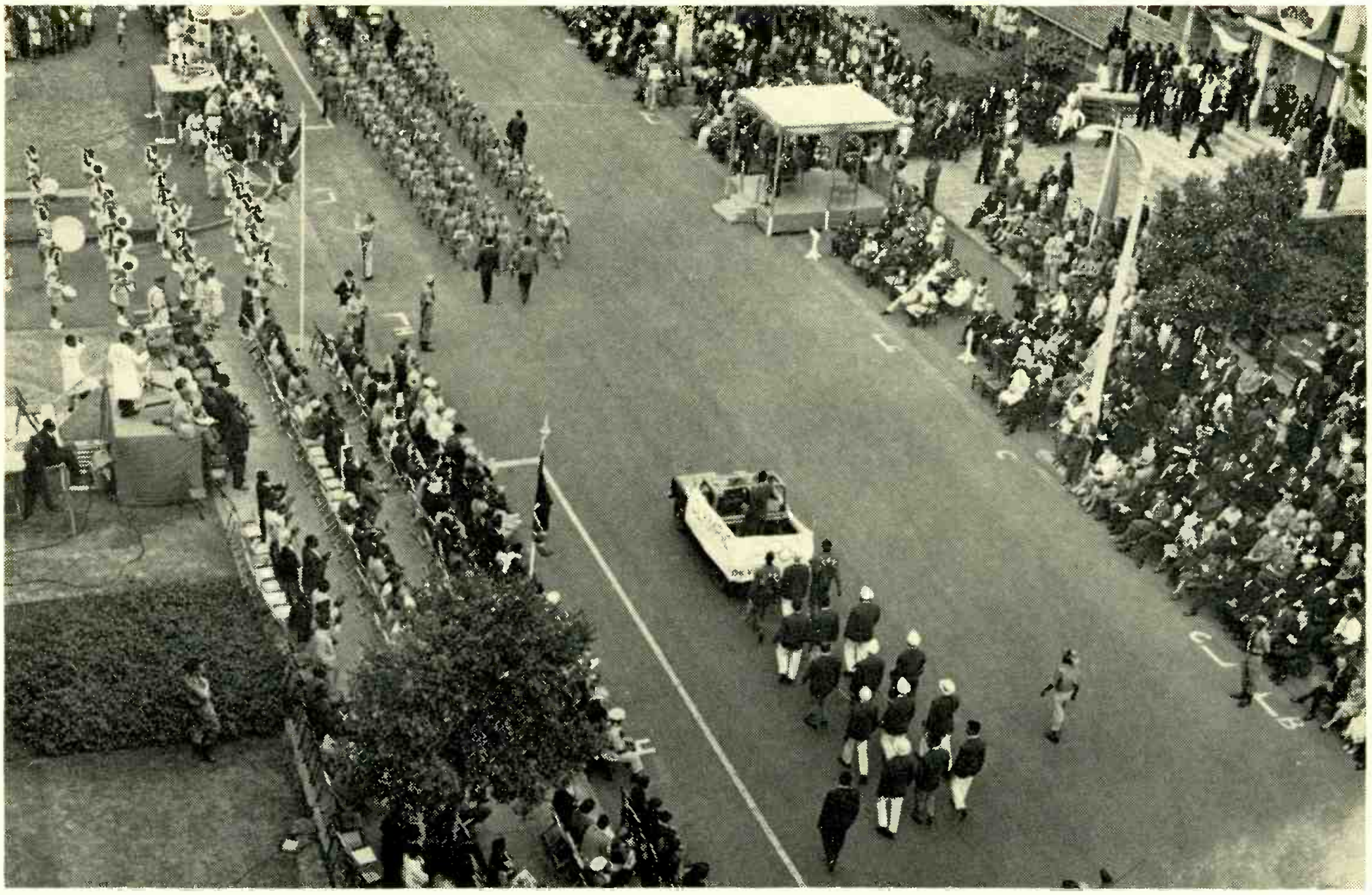


Fig. 2. The Parade of National Unity at Nairobi on Republic Day. Two television cameras can be seen on the left.

On the television front, however, matters had been rather chaotic! Most of the camera equipment for the truck had been shipped on a freighter and this was delayed. The vehicle itself was not ready and arrangements had been made to "borrow" a new 26-seater bus from the local agents and adapt it to take the equipment. Marconi's in England then flew out a further set of camera equipment, sound mixing equipment was diverted from studios, and by 1st December some sort of installation seemed possible. The Ampex Videotape Recorders were due on 6th December but these too were delayed, finally arriving on the 8th. An Ampex engineer had by then appeared to help in the installation, and for operational training.

On 4th December, our Stores Supervisor was despatched 300 miles to Mombasa to meet the freighter due the following morning, but his report caused consternation when it was learnt that it would not berth until 11th December. The situation in Nairobi was now reaching its peak—air-freighted equipment under test, cable harness being prepared, no intercommunication units, pulse generator giving trouble, one picture monitor with a faulty scan coil, and the bus delayed by fitting of seat and bench. From Mombasa, constant situation reports were not encouraging in our efforts to obtain the shipped equipment.

By Sunday, 6th December, the situation began to clear; some of the cargo had been sighted in the hold, installation of video equipment was progressing, faults were rectified, and we were well ahead with installation in the bus. On the sound side most installations were in their final stages, and there had been no major problems.

An additional commitment had been undertaken. The East African Institution of Engineers (Electronics Branch) had organized an ambitious Exhibition and, as one of the founder members, the Voice of Kenya was to take part, and by the 6th our exhibit was almost ready for the official opening on the following day.

Monday, 7th December, was bright and sunny, and at last it looked as if we were going to be ready. The Electronics Exhibition was opened by a Cabinet Minister and the first of the events of the official celebration timetable had been successfully completed.

From the coast, 300 miles away at Mombasa, came regular reports of our efforts to obtain the shipped equipment from the TV Mobile Unit. On Sunday work had commenced at 7.00 a.m and by 10.30 we had located some of the packing cases in No. 4 hold underneath nine motor-cars—at 6.00 p.m six of the cars had been shifted and three remained to move before unloading could commence.

However, Monday was to be the successful climax to these days of hot and unpleasant working amid the tropical heat of the African coast. By 8.00 a.m railway vans had been organized, and by 8.30 a.m they were on their way to the freighter by motor-boat—it was still anchored in stream. The day wore on, three other cars had been moved from the hold, a second shift of stevedores had come on duty, nine more cars had been found over the remaining cases and these too had been moved. By 2.00 p.m twenty-five cases had been located and loaded into the lighter alongside. By 9.00 p.m only four cases remained to be found and loaded and we had reached the stage of offering 5 shillings to the finder of each case! But our efforts were to be crowned with success—at 10.30 p.m all had been found and loaded, the lighter had left for the berthing sheds, and a tired but jubilant call to Nairobi got the Chief Engineer out of bed at midnight!

In Nairobi, the day had not been without its incidents; among them was the arrangement made for one of the Senior Engineers to fly his own light plane from Mombasa to Nairobi on the Tuesday with the more urgently needed items of pulse generator, communications unit and camera cables.

Tuesday, 8th December: all goods were loaded in Mombasa, for consignment on the 3 UP, arriving in Nairobi on Wednesday, 9th December. Our private plane left at 10.15 a.m and arrived in Nairobi at 12.30 p.m, the cases being rushed back to Broadcasting House for installation in the bus.

And so to Wednesday, the last day available for "working up" the new O.B Unit in its temporary bus. Work proceeded all day—the cases ex-Mombasa were collected and delivered and those items actually needed were unpacked. Both cameras had been tested and set up; vision control and switching were finished. Audio installation could now be completed with the arrival of the mixers, and intercommunications were now available. The mobile Ampex Recorder had been installed and was working, and its studio-installed companion recorder was installed but not yet tested out. By 6.00 p.m the bus was ready, and a dummy-run to Jamhuri Park, scene of some of the forthcoming pageantry was timed for 8.00 p.m.

The Sound units had in the meantime wired up City Hall, Jamhuri Park, University College, Parliament Buildings, Nairobi Airport and State House. Doonholm Road Stadium had been completed. In all, several miles of microphone and control cabling had been installed and tested, not only for sound

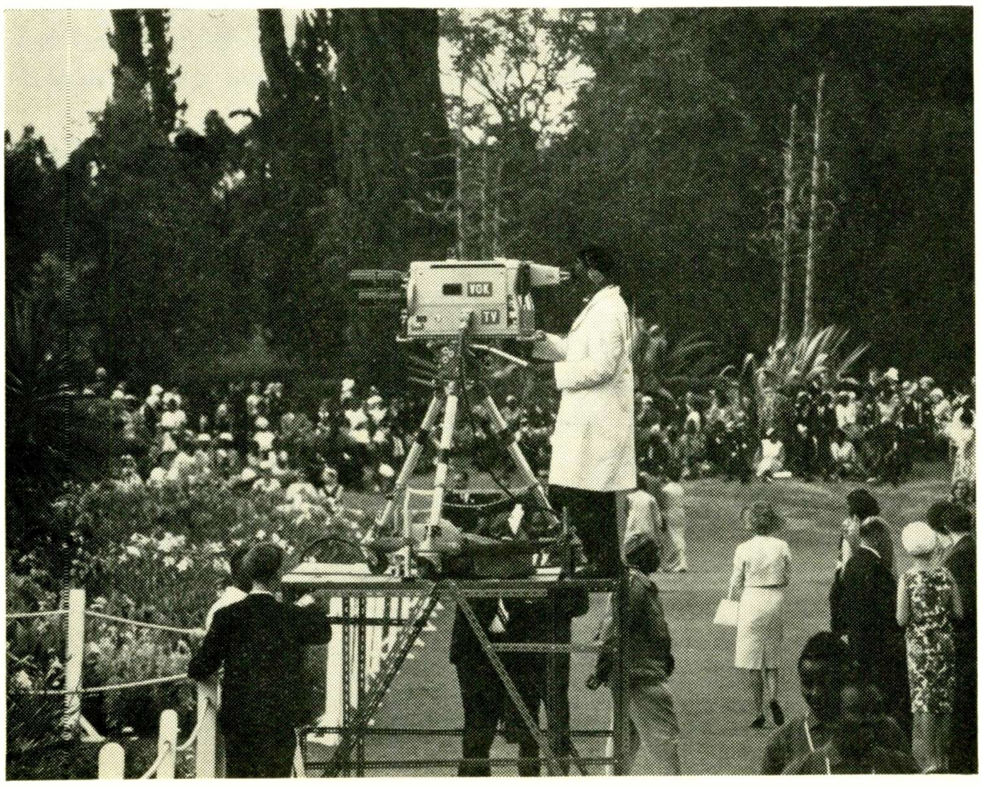


Fig. 3. A Voice of Kenya television camera at the garden party held in connection with the celebration.

Fig. 4. Traditional dances during the celebration.

broadcasts, but also for effects feeds to sound-on-film camera teams and the television recording unit. Clean speech was also made available to these units from all principal speakers at each event, and this was both recorded on site and back in Broadcasting House for the tape-dubs needed by visiting press and radio representatives.

Of the dummy-run at Jamhuri Park, one impression remains: the scratch crew collected from all over the Engineering organization sitting in the cramped interior of the bus, a bit damp as it had been raining heavily, consuming fish and chips brought by Mrs Davey, the Chief Engineer's wife, as at 11 p.m we went over the problems and how we would overcome them the following morning.

Quite suddenly it was Thursday, 10th December, and at 6.00 a.m the crew started to assemble at Broadcasting House. The first event was to be the ceremonial departure of the British troops from Kenya, at Nairobi Airport, and the attendance of the President and all the leading personalities was good material for the first Videotape to be made in Kenya.

From then onwards event followed event; Jamhuri Park, swearing in of the new President and his Ministers, Freedom of the City, garden parties and football matches, boxing and parades. At Jamhuri Park, a police despatch-rider carried the first hour's programme on Videotape outside the park and one mile from the gates, handed over to a Voice of Kenya vehicle, which rushed it to Broadcasting House for immediate transmission some forty minutes after the last scene recorded. From then on a stream of tapes followed, bringing these momentous events to television viewers away on farms, and on the shores of Lake Victoria many miles from Nairobi, the same evening.

Tuesday morning, 15th December, and one impression which will remain long after the pomp and pageantry of the events have dimmed in the memory of those who saw them: In the parking area of Broadcasting House, two dusty, finger-marked by hundreds of excited Kenyans, and rather dirty vehicles; one the Sound O.B Unit's Vehicle, full of cables, plugs and sockets, microphone stands and alongside it, the Bedford 26-seater bus, its roof-rack full of camera tripods, boxes and cables, its windows temporarily blacked out, but a worthy forerunner to the new vehicle to follow.

The Staff were all missing—enjoying a thoroughly well-earned day off!

For without their willingness and ability to work long hours and overcome shortage of equipment and staff by sheer ingenuity, the whole operation could not have been successful. It is summed up most satisfactorily by a letter from the President, and there is no better way to conclude than to quote Mzee Kenyatta's remarks in full:

"I am writing to congratulate you on the excellent coverage which you gave both on the radio and television to the Independence celebrations recently concluded.

"As a result, millions of people in Kenya and in neighbouring territories who were unable to attend in person were, nevertheless, able to enjoy the ceremonies and rejoice together on this momentous occasion.

"In addition, I should like to thank you for providing the commentators who performed so competently at the Arena, and also for your co-operation in the installation of the public address system, which worked admirably.

"I should be glad if you would pass my Government's thanks to all those who were in any way concerned."

A. G. HUSSELBURY

VARIABLE OR FIXED FOCAL LENGTH LENSES?

This is the second in the series of the philosophical articles on different aspects of sound and television broadcasting practice, and, in dealing with the relative advantages of fixed and zoom lenses, it introduces a subject that is becoming increasingly important to both engineers and operators.

INTRODUCTION

A TELEVISION CAMERA must normally provide for a horizontal viewing angle varying between:

6° to 50° for studio use;

2° to 50° for outside broadcasts.

Occasionally, it is useful if an extra-wide angle of 60° is available in the studio and an extra-narrow angle of 1° on outside broadcasts.

Until the early 1950's only one means of satisfying this requirement was available. This was the provision of a multi-position lens turret together with a range of fixed focal length lenses. At this time variable focal length (zoom) lenses, suitable for use with television cameras, first began to appear. However, these early lenses offered only a restricted range of focal length variation, and their optical performance was poor. The focus across the zoom range changed noticeably, as did their light output and resolution across the field. Consequently, their use tended to be restricted to providing zoom effects in the studio and to outside broadcasts. The next ten years saw the continual and intensive development of the variable focal length lens. This process was considerably aided by the increasing use of electronic computers in their design. The result is the wide-range, high-performance lenses now available.

This development now provides the camera user and designer with a choice. Basically, the decision is whether or not to use a lens turret. This article sets out to compare the relative merits and demerits of these alternatives. It should be noted that this comparison relates primarily to monochrome image-orthicon cameras.

COST

The overall cost may conveniently be considered under the two broad headings:

Capital Cost;

Operating Cost.

The capital costs of zoom and turret cameras may be compared by considering the typical cases of a three-camera studio and a three-camera outside broadcast unit.

With turret cameras the studio's lens complement would consist of some fourteen fixed focal lenses, plus one zoom lens. The cost of this complement would be approximately one-third less than the cost of three zoom lenses required if three zoom cameras were used (one zoom lens includes servo iris facilities with manual control for zoom and focus). However, these figures do not take account of the cost of incorporating turret and servo iris facilities for the three turret cameras. The cost of such facilities in most representative turret camera designs is more than sufficient to offset the extra zoom lens cost for the three zoom cameras.

With a three-camera outside broadcast unit the zoom camera offers a greater capital saving as O.B's inherently demand more zoom cameras than studio work.

It is also pertinent to note that many turret camera users are equipping an increasing number of such cameras with zoom lenses—in some cases all cameras.

The zoom lens also makes possible other capital cost savings. Their extent will depend on the operating methods employed. For example, the zoom camera tends to be more "static" than its turret counterpart. This allows the use of somewhat less costly camera mountings, permits greater latitude in the specification of the studio floor, etc.

The lower capital cost results in lower depreciation charges, and it follows that operating costs will also be lower with the zoom camera.

The relative simplicity results in longer life, lower maintenance and technical operating costs. The same applies to production operating costs where the extent of the saving will be influenced by the methods employed.

To summarize, the zoom camera offers a very definite overall cost saving. This saving can be quite significant with "zoom orientated" users.

TECHNICAL PERFORMANCE

From the engineering viewpoint, zoom and turret cameras may be compared from the aspects of performance, reliability and ease of operation and maintenance.

The optical performance of modern zoom lenses is comparable to that of the fixed focal length lenses to which they are an alternative. On the maintenance side, there is little difference between a zoom lens as opposed to five fixed focal length lenses. The technical comparison can thus be resolved into consideration of the effects of the two lens systems on the camera.

The great merit of the zoom camera is its mechanical simplicity. Simple zoom lens mounting, servo iris and pre-set image-orthicon yoke focusing facilities replace:

1. A lens turret with its complex support, indexing and non-linear operating mechanism. With a complement of O.B lenses the moving mass of this system can exceed 30 lb. This has to move quickly and quietly, and be indexed with an accuracy of better than one-quarter of a degree.

2. A carriage system for the I.O yoke assembly with its non-linear focusing mechanism. The yoke assembly typically weighs about 18 lb and carries moving cabling and air connections. Special facilities are needed if the camera centre of gravity is to remain unaltered when racking the yoke assembly.

3. A complex multiple-iris drive system. This must incorporate a relatively fragile slip-ring arrangement.

The considerable simplification of zoom lenses results in a more rugged and reliable camera, which is relatively simple to operate and maintain and is obtainable with only a minor increase in electrical and optical design problems in the lens package. These relate mainly to the provision of constant focusing sensitivity and the elimination of mechanical noise from the servo system(s).

PRODUCTION PERFORMANCE

This heading covers the comparison from the viewpoint of the director, producer and cameraman. Here, in contradistinction to the economic and technical aspects, there is less unanimity as to what should be classed an advantage or disadvantage. However, there does appear to be fairly general consent on a number of points.

Firstly, the desirable qualities of lightness, compactness and "technical unobtrusiveness" are better realized in the zoom camera. Secondly, the zoom camera offers significantly greater flexibility in horizontal viewing angle—at the expense of a minor restriction at the extreme ends of the range. (Note that a restriction applies equally to turret cameras at the extreme narrow angle end of the range. This inasmuch as lenses with an angle of less than 2°—over 40-in. focal length—require special mounting arrangements which render the turret inoperative. It is equally simple to arrange for a zoom camera to accommodate such a lens in place of the zoom lens.) This makes exact coverage possible over a considerable range of camera positions—at the possible expense of some distortion in perspective. These benefits make the zoom camera particularly suitable for outside broadcast work (where the majority of turret cameras are in any case equipped with zoom lenses).

The control arrangements for zoom lenses commonly provide up to eight pre-set horizontal viewing angles. Lens turrets generally provide only four positions. Optical interference problems restrict the permissible lens combinations on turret cameras; with a zoom camera this does not arise.

Both zoom and turret cameras provide an effectively constant aperture throughout the zoom range or when changing lenses. The zoom lens may have the disadvantage of a slower speed at the wide angle end of its range. This is only relevant in night-time outside broadcasts, when the need for wide viewing angles is restricted.

The zoom camera is quieter than the turret camera and not prone to on-air lens changes. It offers the cameraman very smooth control, particularly when servos are incorporated for zoom and focus. With turret cameras a lens change makes refocusing necessary—this does not arise with zoom cameras.

The zooming feature is not greatly used as an optical effect nowadays. It is, however, a useful feature to have available at will. It also provides, with some distortion in perspective, an alternative to dollying, very smoothly over a wide range of speed. This is particularly valuable to the smaller station or anywhere where studio floor area is limited. For such situations two zoom cameras are equivalent to three turret cameras, and a surprising amount can be done with a single camera.

It should be noted that the whole question of perspective is somewhat controversial. Theory and practice sometimes seem to be at variance. The subjective effect of typical receiver viewing conditions has possibly been studied insufficiently.

For the cameraman, the focusing sensitivity characteristic of a turret camera is superior to that of a manually controlled zoom lens, but inferior to the zoom lens with servo control.

SUMMARY

On economic and technical grounds, the zoom camera appears unquestionably and markedly superior to the turret camera. The same is also generally true from the production aspect, particularly where full servo control of the zoom lens is employed. The zoom camera is relatively recent, whilst almost 100% of the broadcast television cameras presently in service employ a turret. This notwithstanding, production and engineering personnel alike seem to be immediately impressed once they have an opportunity of handling a zoom camera. It seems almost certain that the zoom camera will quickly come to dominate new procurement.

A final point relates to the increasing use of "unattended" cameras, which are often remotely controlled. A zoom camera is generally better suited to such applications, and even when this is not so, a turret is rarely of much use. This is also true of another field now making increasing use of broadcast quality cameras—namely the "industrial" one (this market now accounts for over 10% of total I.O camera chain procurement).

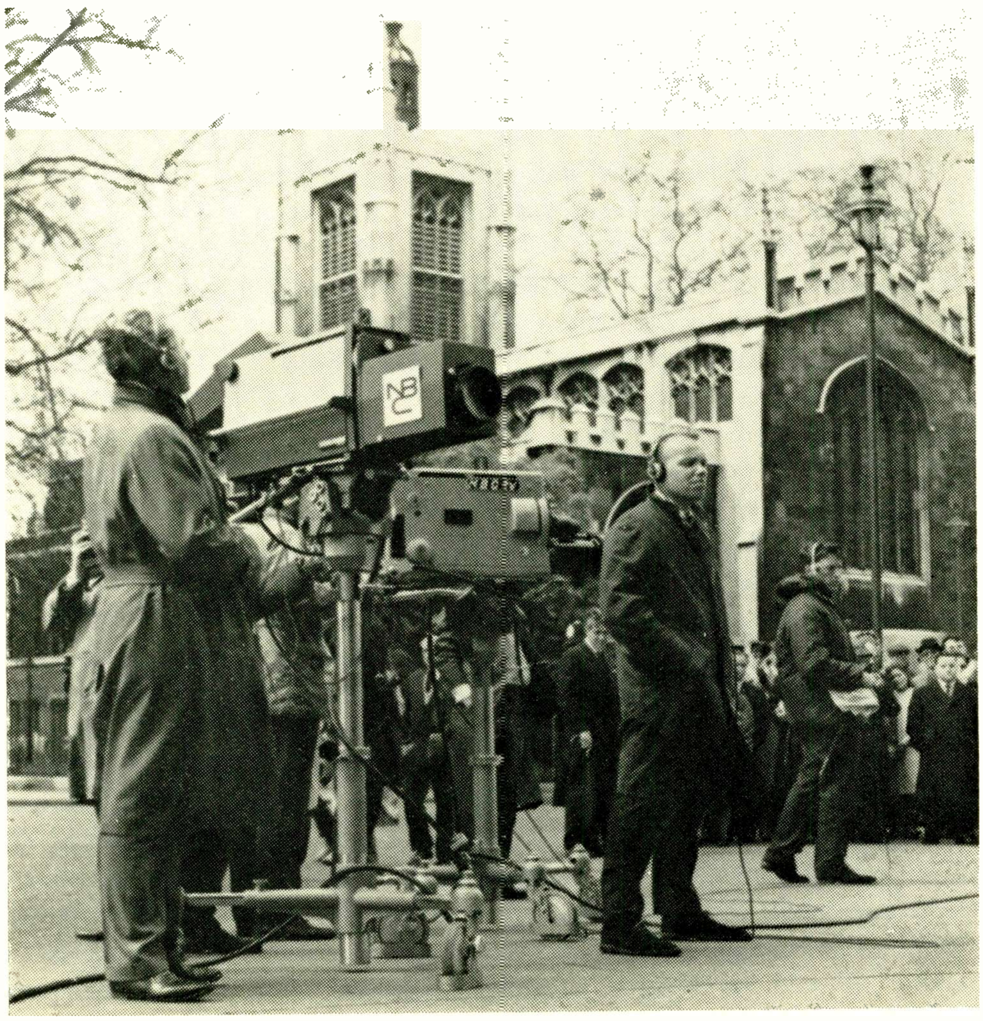
Marconi cameras catch the Early Bird

With the launching of Early Bird, the latest communications satellite, new possibilities in international television communications are opened up. As part of the inaugural programmes which took place at the beginning of May the Rt Hon. Herbert Bowden, C.B.E, M.P, the Leader of the House of Commons, in London and Vice-President Hubert H. Humphrey, the Leader of the American Senate, were linked directly by television.

For the London end of this link the National Broadcasting Corporation of America hired the Marconi Television Demonstration Unit. Three cameras were used, two in the St Stephen's entrance to the Houses of Parliament and one in Parliament Square for background shots. Of the former two, one was the recently unveiled Mark V image orthicon camera.

The television signals were converted to the American 525-line standard by the BBC in London, and then sent by land-line to the G.P.O. satellite communications station at Goonhilly, Cornwall, thence by Early Bird satellite, which is in synchronous orbit, to the American Telephone and Telegraph Company's satellite ground station at Andover, Maine. Land-lines linked Andover with the Senate House in Washington.

The American ground station at Andover employs Marconi B3900 Picture and Waveform Monitors, which were installed at the time of the first television relays by Telstar, and a Marconi Instruments white-noise test set.



Marconi's T.D.U at the St Stephen's entrance to Parliament during one of the inaugural programmes for Early Bird.

ERIC HITCHEN, A.M.I.E.E, A.M.I.E.R.E, Amalgamated Wireless (Australasia) Ltd

A NEW STUDIO CENTRE IN AUSTRALIA

INTRODUCTION

TELEVISION HAS GROWN STEADILY since its advent in Australia in 1956 and today 90% of the population is covered by 48 stations. The major cities of Sydney and Melbourne, with populations of 2,215,970 and 1,956,400, respectively, have been served by one national and two commercial stations each since 1956.

Recently applications were called for a third commercial station to cover the Sydney and Melbourne areas. United Telecasters were granted the licence to operate the Sydney station, using the call sign TEN-10.

The planning of the new station was undertaken by Amalgamated Wireless (Australasia) Ltd and Marconi's in close collaboration with United Telecasters, and in creating a station which will be among the most advanced in the southern hemisphere, they have not hesitated to depart from conventional practice. Since the start of Australian television there have been a number of changes in the techniques of operating studio centres. Apart from the introduction of transistors, the two that possibly stand out most are the 'hands off' operation of 4½-in. image orthicon cameras in studios and the introduction of continuity switches. Both these innovations have been incorporated in the TEN-10 studio centre, the planning of which has concentrated in centralization and economy of man-power.

CENTRAL APPARATUS ROOM

Because of the increase in the stability of modern television equipment, it was decided to group all the electronic rack equipment with the exception of studio audio in the one area. This would facilitate the setting up and supervision of this equipment and would minimize the transmission video cable runs.

Thus all camera control units, both vidicon and image orthicon, all video switching equipment, test waveform generators, associate V.D.A's and v.h.f link equipment are housed in this area. The natural flow of vision signals, i.e. from telecine to studios A and B and from studios A and B to studio C and thence to the master control switcher, led to the arrangements of racks as shown in Fig. 1.

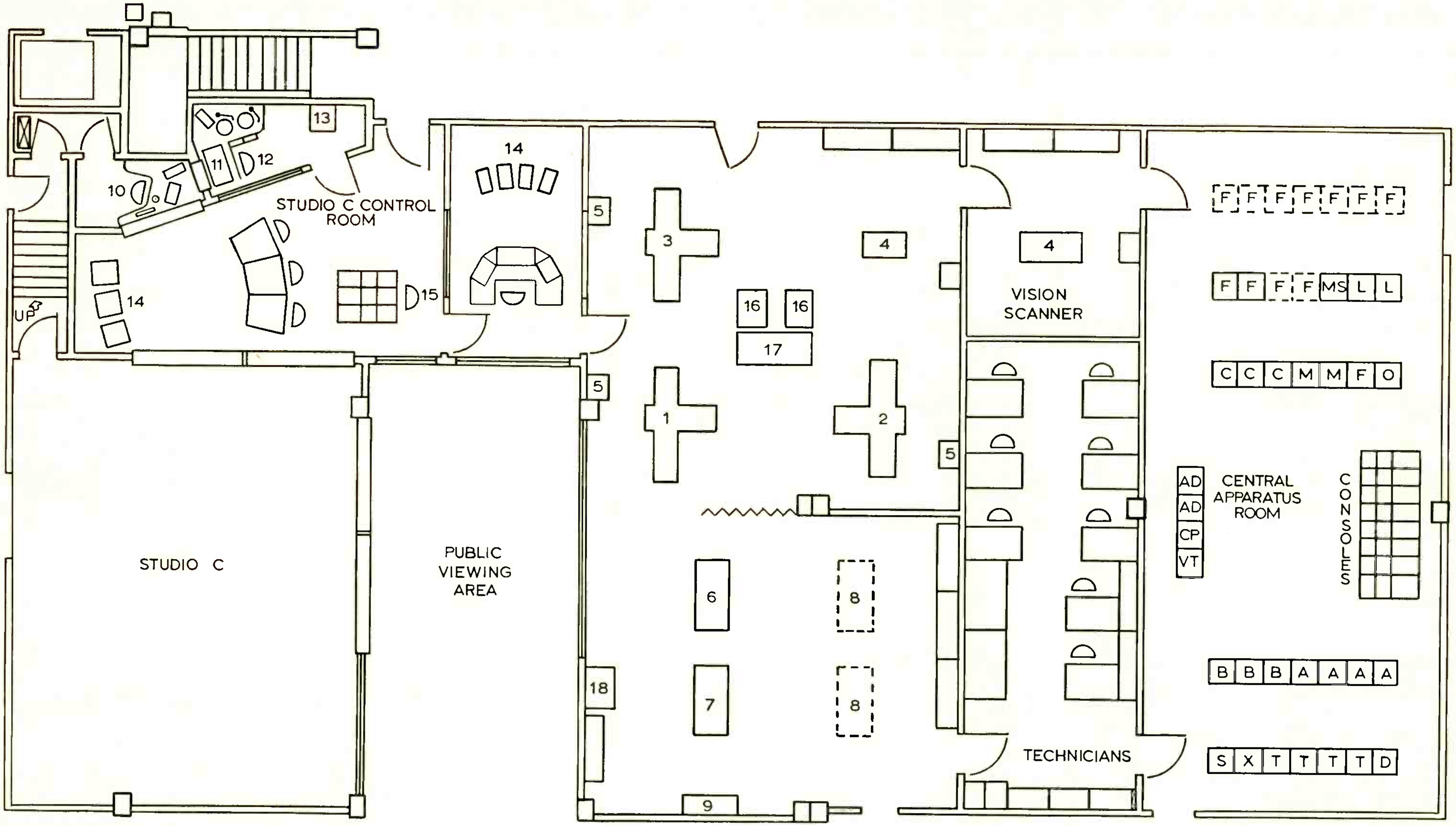
In order to supervise and set up this equipment it is necessary to have comprehensive monitoring facilities. The consoles in the area house the Marconi Mk IV image orthicon camera control units and the A.W.A telecine vidicon camera control units. The vision output from any one of these cameras can be switched to a B3900 picture and waveform monitor via a B3716 uniselector panel, the control of which is by coded buttons mounted in front of the monitor. There are two such positions on the desk. (Fig. 2.)

The middle picture and waveform monitor can monitor any vision input to the master control switcher, again using a coded button control panel. As the master control switcher basically uses married sources, the audio associated with the video can be monitored at the same time on a V.U meter and loudspeaker.

TELECINE AND VIDEO TAPE RECORDER

The basic requirement for all machines was that they should be remotely controlled from studios and the master control room. The main operation in this area would thus be one of loading machines with film and tape. This has been accomplished totally with the telecine and caption machines and in part with the v.t.r machines.

There are at the present time three telecine machines, two Ampex VR2000 Videotape Recorders and an opaque caption scanner. Provision is made for the expansion to six telecines, six v.t.r's and two caption scanners. A further caption scanner is available



1 – TELECINE 1
2 – TELECINE 2
3 – TELECINE 3
4 – CAPTION SCANNER
5 – VIS. MON.
6 – V.T.R. 2
7 – V.T.R. 1
8 – V.T.R. (FUTURE)
9 – TAPE ERASURE
10 – ANNOUNCER
11 – AUDIO CONSOLE
12 – OPERATOR

13 – RACK
14 – MONITORS
15 – VISION
16 – FILM TRANSP'T
17 – WORK BENCH
18 – V/T TRANSP'T

A – STUDIO A EQUIPMENT
B – STUDIO B EQUIPMENT
D – DELEGATE PATCH
S – SYNC. GEN. & P.D.A.'S
T – TELECINE RACK EQUIPMENT
C – STUDIO C EQUIPMENT
O – OFF AIR MONITORING
M – MASTER CONTROL EQUIPMENT
L – U.H.F. LINK EQUIPMENT
AD – AUDIO DISTRIBUTION & TEST EQUIPMENT
CP – CENTRAL PATCHING

VT – VIDEO TEST EQUIPMENT
X – MACHINE RELAY UNITS FOR AUTOMATION
F – FUTURE
MS – MONITOR SWITCHING EQUIPMENT

Fig. 1. The central apparatus room, master control and studio C.

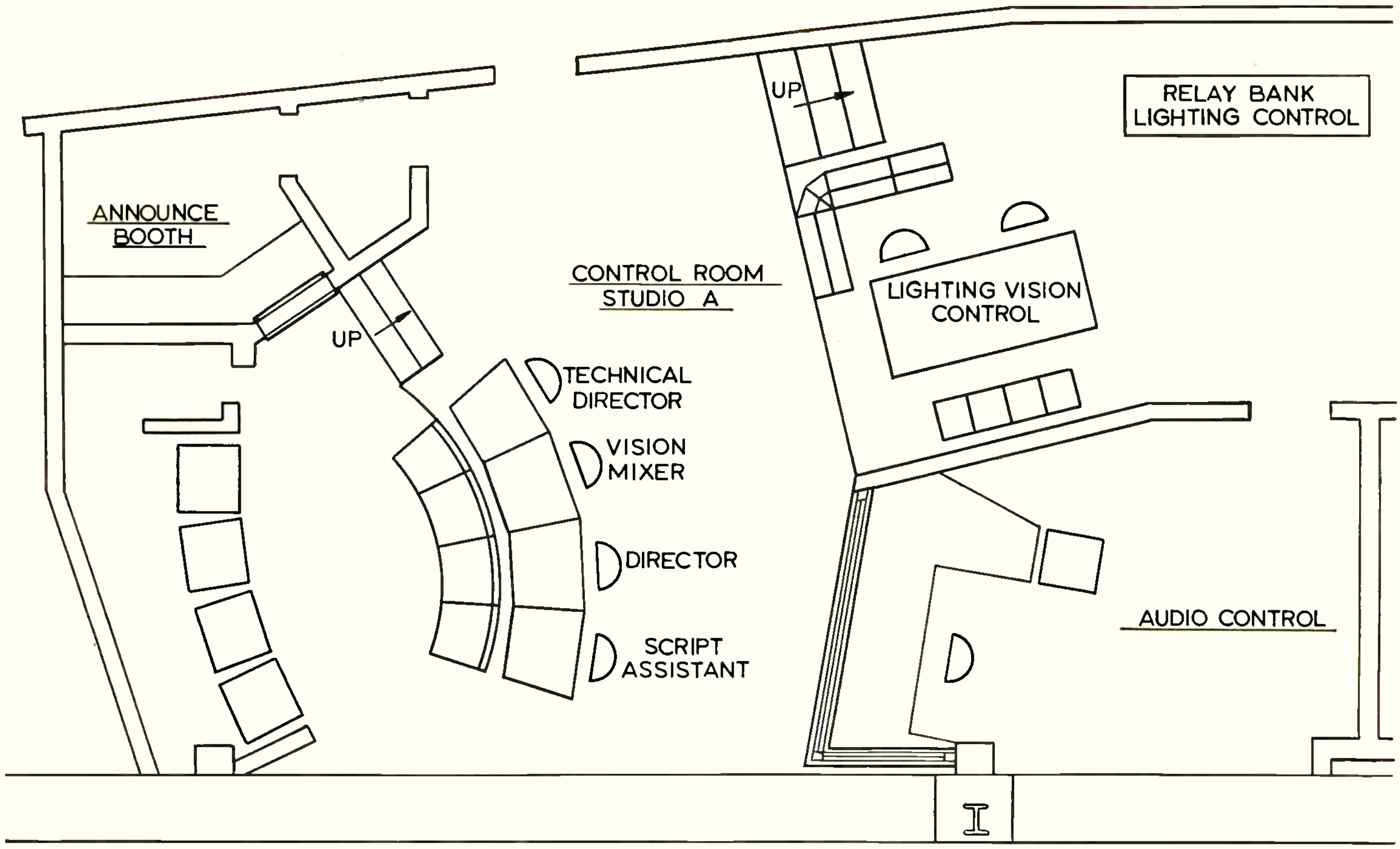


Fig. 5. Layout of studio A control area.

construction of large studios in the commercial stations in both Sydney and Melbourne. To help finance this expensive form of programme material, the commercial stations of Australia have banded into three networks in order to exchange the programme material so produced. Channel 10's requirement was thus for two large studios—studio A of 800 square metres and studio B of 480 square metres.

The variations in possible control room layouts are unlimited, the final configuration decided on being as shown (Fig. 5). The curved production control desk and curved monitor bank are similar to those being employed in modern studios in the United Kingdom.

Vision and lighting control are at one desk and conveniently placed to allow easy communication with the director and technical director. Audio is contained in a separate control room and there is a separate announcer's booth.

There are three levels.

(a) A well in front of the production desk with seats for make-up, wardrobe, etc.

(b) Production desk and announce booth level. The line of sight from the sitting position at the production desk to the top row of monitors is $-5°$, which is thought necessary for comfortable viewing.

(c) Vision, lighting control and audio booth level. The raising of this level enables audio to obtain a view of the 21-in. production monitors and gives the lighting director a reasonable view of the studio floor.

The vision/lighting desk follows the now familiar pattern for 'hands off' operation in that one man controls four Marconi Mk IV image orthicon cameras by means of joysticks. In order to match in the telecine inserts it is also possible to control the two telecine vidicons available in the studio on similar joysticks (Fig. 7).

The audio booth contains an A.W.A transistorized sound mixer of a modular design using quadrant faders. As the audio rack equipment was closely associated with the operation of the mixer, it was decided to install it in the booth rather than in the central apparatus room with the other electronic rack equipment.

STUDIO C

To handle news, weather, interviews, etc., a small studio is constructed next to the master control room (Fig. 1). Two Mk. IV Image Orthicon cameras are installed, one of which is fitted on a remote pan and tilt head and with a remotely controlled R.T.H 10:1 zoom lens. This camera is controlled from the production desk.

A special feature of the studio is that it is fitted with a presentation switcher built around the B3715

Fig. 6. Studio A control desk.

mixer. It can be used to produce more elaborate presentation than the master control mixer in that it is fitted with dissolve and special effects facilities. All switching and running of machines is performed manually.

In an emergency, studio C can take over the output switching of the station from master control. The switcher can be operated as a married switcher, but normally the audio is controlled from the audio booth in which is installed an A.W.A console built up with the same type of modules as used in studio A. Joystick control of the two image orthicon cameras and the vidicons is used as in studio A. The announcer's booth associated with the studio can also work with master control.

O.B VAN

A Marconi two-camera outside broadcast vehicle is used for remotes. As the transmitter is geographically in a more advantageous position than the studio centre, the signals from the van are picked up at the

Fig. 7. Vision and lighting control.

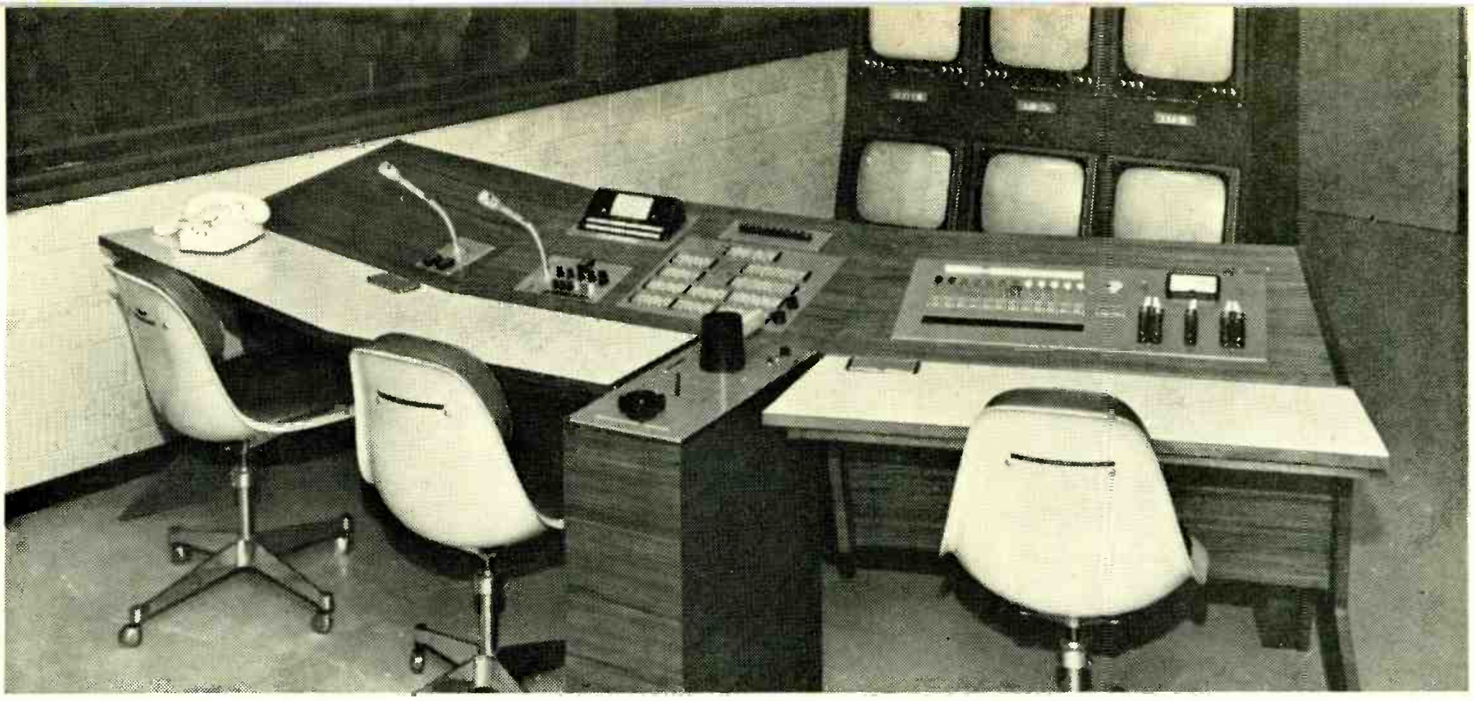


Fig. 8. Studio C control room.

transmitter on a rotatable u.h.f dish and then passed to the studio via a further u.h.f link.

CONCLUSIONS

At the time of writing the station has been on air for a few weeks. It is not therefore possible to form any final conclusions on the operation of the special facilities. However, in this short time it has been shown that the programme can be put to air with one man in the central apparatus room, responsible for the delegate patching and the monitoring of signals, one man in telecine handling films and audio cassettes, one man in v.t.r and the controller of the master control switcher. Although there are three modes of operation for the master control switcher, it has been found that automation is used some 99·9% of the time. It is hoped to produce a further article on a detailed explanation of the automation switcher and the problems and solutions in the operation of such a switcher.

ACKNOWLEDGEMENT

Acknowledgement is made to the management of United Telecasters, Sydney Ltd, Channel TEN-10, for permission to publish this article.

REFERENCE

1 H. Mirzwinski and R. G. Moore: Store Controlled Programme Switcher; *International TV Technical Review*, Vol. 4, No. 9, 1963.

Big American Television Order

First British Television Transmitters in US

Television Chicago, a joint venture controlled by Field Communications Corporation, has ordered Marconi television cameras and transmitters for a new u.h.f television station to be opened in Chicago.

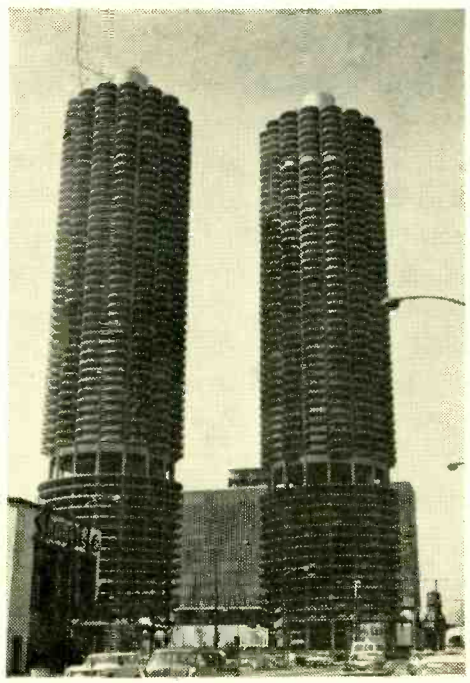
Field Communications Corporation is a wholly owned subsidiary of Field Enterprises Inc., whose Newspaper Division publishes the Chicago *Sun-Times* and the Chicago *Daily News*.

Television Chicago has chosen Marconi equipment after an intensive appraisal of equipment available on the market, and this important export order was won in competition with all the principal television manufacturers in the United States.

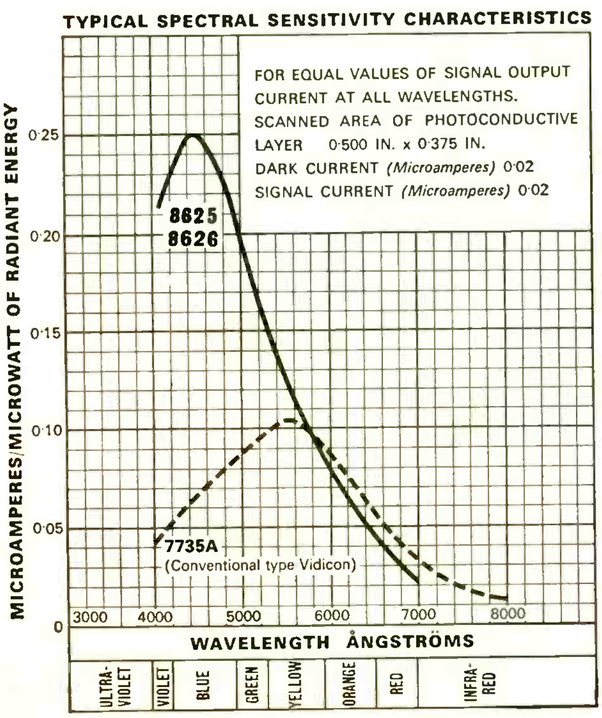
The purchase includes six of the new Mark V $4\frac{1}{2}$-in. image orthicon cameras which were described in our last issue and which were introduced in the US at the National Association of Broadcasters Convention in March this year.

Television Chicago has also ordered two 25-kW u.h.f transmitters and associated drive equipment. These transmitters, the first British television transmitters to be sold in the United States, are similar to those ordered by the BBC for their second channel, and were described in *Sound and Vision broadcasting*, Vol. 5, No. 1.

Television Chicago plans to include a transmitter station and studios at Marina City, a twin-tower, 60-storey residential and business development on the bank of the Chicago River.



Marina City, Chicago.



ENGLISH ELECTRIC

ENGLISH ELECTRIC VALVE CO., LTD., can now supply from stock new high sensitivity vidicons which represent an important development in television camera tubes.

These new separate mesh tubes are characterised by their high sensitivity, short lag and high resolution. The spectral response peaks in the blue to provide correct panchromatic reproduction when used with tungsten lighting yet the sensitivity is equal to that attainable with "red sensitive" types such as the 7735A. Although primarily intended for broadcast television these tubes have many industrial applications especially where fluorescent lighting is employed. Two types are available, differing in heater ratings.

8625 with 6.3V/0.6A heater.
8626 with 6.3V/0.095A heater.

Please write for comprehensive data on these and other EEV vidicons.

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EEV

AP237A

Marconi transistorized synchronizing pulse unit

B 3600

Long-term reliable performance

Advanced design—two independent synchronizing generators, two automatic genlocks and two power units contained in one case.

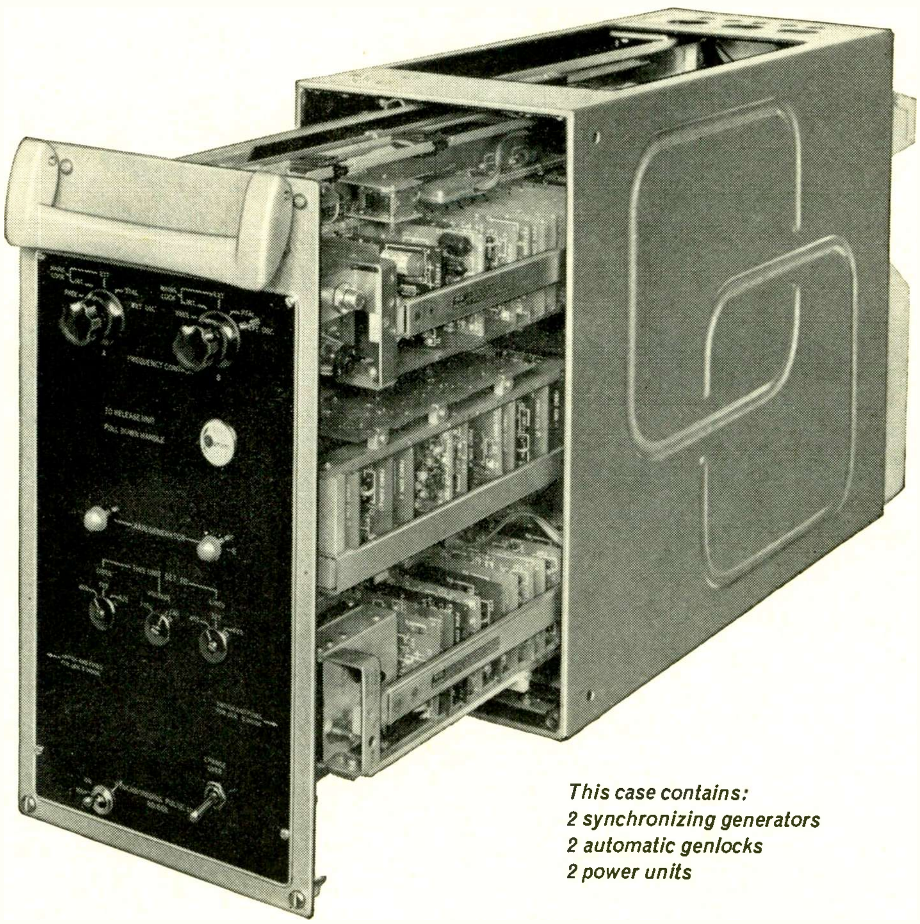
Low power consumption—can operate from standby 12V battery if necessary.

Exclusive two-mode locking circuit gives a fast pull-in but slow following characteristic when in lock.

Suitable for 405, 525 or 625 standards.

Designed for rapid and easy maintenance.

Automatic genlock operation from six external sources selected by remote control panel, with automatic reversion to mains lock on loss of remote input signals.



This case contains:
2 synchronizing generators
2 automatic genlocks
2 power units

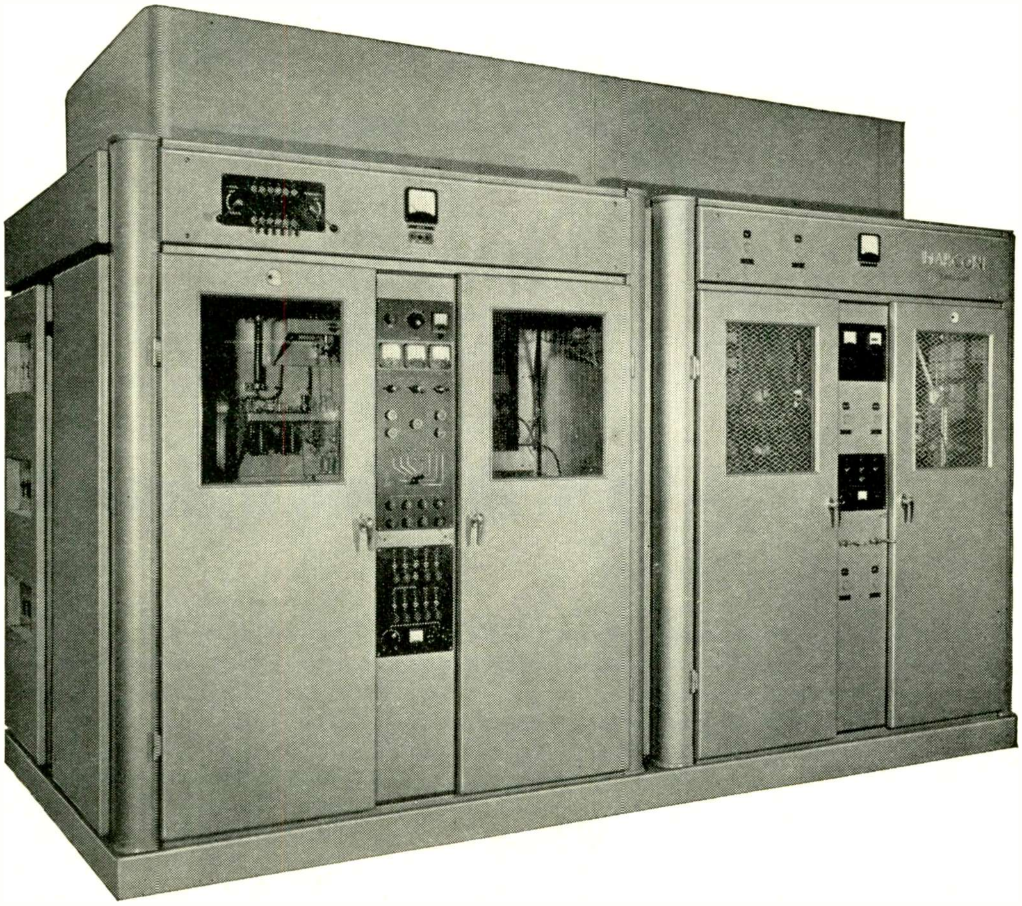
Marconi television systems

The Marconi Company Limited, Broadcasting Division, Chelmsford, Essex, England LTD/B55

Marconi 50 kW m.f high efficiency broadcast transmitter

B 6022

overall efficiency of more than 60%



Final amplifier stage yields a conversion efficiency of over 90% with an anode voltage of only 8.5 kV and with an overall efficiency higher than 60%

Particularly easy to install—made up of only two cubicles, transportable without dismantling—no floor ducts.

Compact design—ancillaries and regulators contained in cabinet with good accessibility.

Facilities for parallel operation available.

Remote operation facilities.

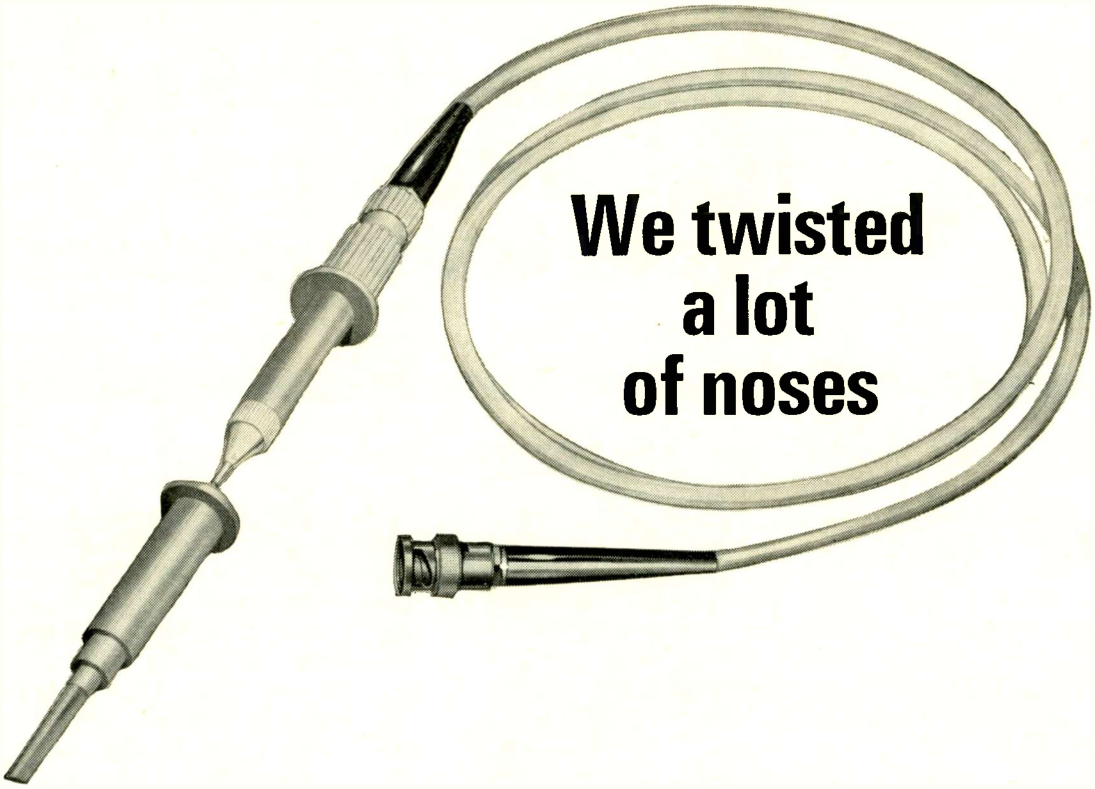
Suitable for unattended operation.

High audio performance and high level Class B modulation.

Marconi broadcasting systems

LTD/B51

The Marconi Company Limited, Broadcasting Division, Chelmsford, Essex, England



— to make this unique probe

Size for size, this new oscilloscope probe represents as much development, as many new ideas and as much manufacturing know-how as a new scope.

It looks conventional—provides a prod or hooky connection to the circuit under test, and fits *any* scope with BNC connector (UHF/BNC adaptors are readily available). *But twist the nose* through 60° and the new Marconi Instruments probe switches from being a x1 'straight through' device to a 10:1 divider. In the x10 position, the probe has a passband of 30 Mc/s and presents a load of approximately 9 pF in parallel with 10 MΩ to the circuit under test. *Twist the nose* to x1 and the circuit under test sees the oscilloscope input impedance direct with an additional shunt capacitance of about 35 pF due to the probe and cable.

The cable is as new as the probe (Provisional Patent 20953/64). Resistive cable inners usually take the form of very fine resistance wire which become open-circuit the first time they are jerked sufficiently to stretch the braiding. Not this cable. A silicone rubber outer sheath is fitted over the braiding, which is woven over a polythene tube. Braiding and tube determine the mechanical strength of the cable; and inside the tube the resistive inner conductor follows a sinuous path with only the peaks and troughs in contact with the tube. *Every point of contact is welded to the wall of the polythene tube by a patented manufacturing process,* and the result is a super-flexible cable of extremely low microphony, free from static build-up, resistant to accidental damage by hot soldering irons, docile and almost unbreakable in use.

There is no other oscilloscope probe like the new Marconi Instruments Type TM 8110. Please write or telephone for full technical and commercial information.

This new probe — and other oscilloscope accessories, are fully described in the latest issue of 'Marconi Instrumentation'. Are you on our mailing list for regular technical information?

TC 287

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COCHES "Z"

por David E. Rose

La Coches "Z" es una serie de episodios policíacos que se viene transmitiendo por la BBC Television con todo éxito desde hace tres años.

Se basa en las peripecias de dos automóviles de la Patrulla Crímenes de una zona policial imaginaria denominada División Víctor en la región sud del Lancashire. Además de los patrulleros contra crímenes, en el elenco estable hay un comisario, un sargento y un agente de policía.

Los episodios son preparados por escritores profesionales o por ex-funcionarios de policía, los que trabajan en estrecha colaboración con la policía regular, garantizando así la autenticidad de cada episodio.

Debido a la naturaleza de las tareas de la policía móvil, los libretos son de gran acción y se refieren a muchas ubicaciones interiores y exteriores. Los autores están obligados a someterse al "límite" impuesto por el elenco regular y por los medios disponibles en cuanto a estudios y películas; con esta salvedad, tienen rienda libre para preparar episodios emocionantes y auténticos.

Es necesario mantener una impresión equilibrada de los delitos que se cometen en la División Víctor. Los crímenes graves deben contenerse dentro de límites realísticos.

Estos episodios son objeto de una transmisión "viva" los miércoles; los dos equipos de patrulleros generalmente se turnan cada semana y los demás artistas están repartidos entre los distintos episodios.

El director por lo general trabaja unas cuatro semanas en cada episodio y—siempre que se sostenga la intención básica de esta serie—se favorece el individualismo en la dirección.

Los artistas ocasionales del elenco son seleccionados por el director y luego se filman las partes necesarias para cada episodio. Las películas ocupan algo así como el 5 per ciento en la serie, y se utilizan principalmente en las vistas exteriores, para tráfico muy intenso y para las secuencias que resultan mejores en película. Al insertar acciones filmadas en el programa "vivo", es necesario cuidar prolijamente la iluminación.

Aparte de la primer lectura, el elenco estable no concurre a repetidos ensayos porque está en demanda continua. Se realiza un ensayo pleno de guía a los técnicos dos ó tres días antes de pasar al Estudio 3 ó 4 del Centro de Televisión de la BBC, donde luego tienen lugar los últimos dos días de ensayos intensivos.

La transmisión "viva" del miércoles produce una verdadera impresión de acontecimiento. Los cincuenta minutos de pura concentración en su tarea producen emoción en los actores, los técnicos y el público igualmente.

COMPACTO TRANSMISOR DE TELEVISION M.A.F

por D. G. Jarvis B.Sc(Eng.)

Como es bien sabido, la cobertura de cualquier transmisor de televisión queda limitada por el horizonte—sea cual fuere la potencia irradiada—y aún una cadena de cerros producirá una "sombra" pronunciada. En países densamente poblados como ser el Reino Unido, los transmisores de alta potencia proveen el servicio fundamental, pues hay gran número de centros de población cercanos entre sí. Luego viene un rango intermediario en que los transmisores con potencias efectivas de radiación de 10 á 50 Kw son los más indicados, pero para las zonas pequeñas—ya sea para cubrir los "espacios" entre transmisores de mayor potencia, o para aquellas naciones en que los centros de población son relativamente compactos y están a gran distancia entre sí—el transmisor de 3 Kw P.E.R podrá ser el más indicado. Con él se consigue un alcance de 16 Km en servicio Clase A y de 32 á 40 Km en servicio Clase B. El presente artículo describe un transmisor que da esta P.E.R.

Según las circunstancias, puede recurrirse ya sea a un retransmisor ó traductor, sea a un transmisor normal. Toda vez que se desee irradiar programas de origen local, será imprescindible el transmisor, pero en cambio podrá utilizarse un retransmisor si es que se desea re-irradiar las señales provenientes de otro transmisor. Con todo, su empleo queda supeditado a la disponibilidad de una señal adecuada desde el transmisor principal. La estación tipo retransmisora recibe la señal a R.F y la aplica a una mezcladora, a un amplificador de frecuencia intermedia y a otra mezcladora más, para luego retransmitirla por el nuevo canal.

La Compañía Marconi ha perfeccionado una serie de unidades, con las cuales se puede armar un equipo "a medida", en forma de transmisor o retransmisor. En la Fig. 1 aparecen diagramas simplificados de ambos tipos. El artículo ofrece una explicación bastante detallada de estos equipos, describiendo incluso los niveles de potencia que es posible alcanzar en diferentes condiciones. A baja potencia un tipo de amplificador servirá para video y sonido, y ésto vale hasta los 50 Kw, pero pasando este nivel las ventajas del amplificador común a video y sonido son descontadas por la pérdida de potencia resultante del escaso rendimiento. En la serie de transmisores Marconi B6400 se utilizan amplificadores separados para video y sonido; la disposición queda ilustrada en la Fig. 2. Por efecto de esta separación puede lograrse una potencia de salida de 10 vatios en el excitador, cuya salida podrá excitar a un amplificador B7100 para Banda I o a un amplificador B7200 para Banda III.

Se utilizan amplificadores separados para video y sonido para obtener una potencia de salida de 500 vatios de cresta en video y la salida correspondiente en sonido—según la norma en uso—que varía entre 100 y 250 vatios. Los amplificadores emplean control a realimentación para el nivel de supresión irradiado y, como se observa en la Fig. 3, en el equipo completo se incluye un monitor de la envolvente R.F. Cada uno de los compartimientos de la Fig. 3 tiene 213 cm de alto por 59 cm de ancho por 72 cm de fondo.

La Fig. 4 muestra un diagrama simplificado de los transmisores Banda III. La salida del transmisor excitador es más que sufficiente para excitar a un amplificador, pudiendo excitar a dos de ellos en paralelo, en cuyo caso se combinan dos amplificadores de 500 vatios con dos transmisores excitadores a fin de lograr una potencia de salida de 1 Kw. Las salidas de excitación están conectadas a los amplificadores a través de una red diferencial y, con el intermedio de detectores, se emplea una unidad conmutadora de excitación para controlar el nivel de excitación. Si el nivel del excitador en uso cae, esta unidad conmutadora selecciona al otro excitador y atenúa al primero de ellos.

La Fig. 5 ilustra las unidades de excitación video que son, de derecha a izquierda en la parte baja: El modulador, el excitador video y amplificador modulado, el mezclador y amplificador lineal y por último el oscilador heterodino a alta estabilidad.

Justo encima de estas unidades se encuentran la unidad realimentadora del nivel de supresión y un panel libre, el que puede reemplazarse por una unidad conmutadora de excitador cuando se desea trabajar en paralelo. En la Fig. 3 vemos las unidades que se hallan encima de las recién indicadas, a saber: El modulador F.M.Q, el generador de armónicas y el monitor de la envolvente R.F. El artículo sigue con una descripción de detalles de los circuitos que se utilizan. El excitador F.M.Q fué explicado en *Sound and Vision broadcasting*, Vol. 3, No. 1.

Hay dos modelos de amplificador de 500 vatios; uno para Banda I y el otro para Banda III. La única diferencia entre ellos consiste en el tipo de unidad de R.F que se utiliza. En la Fig. 3 los amplificadores son la segunda y la tercera unidad contando desde arriba. Las partes restantes de los gabinetes alojan las fuentes de poder, la unidad de control, el ventilador, filtro de aire y el ruptor de aislación a masa. En los amplificadores se emplea la válvula 4CX250B, de tipo muy compacto y con aislación total de cerámica. Se utilizan dos de estas válvulas en Clase AB para pasar 500 vatios de potencia video a la antena, sin consumo de corriente de rejilla.

Se utilizan amplificadores absolutamente idénticos para video y sonido, pero los amplificadores de sonido tienen sintonía diferente. El equipo cuenta con atenuadores de armónicas y asociados a ellos hay unos puntos de medición y control, cuyos detalles precisos quedan definidos por el tipo de instalación a efectuarse.

Los rectificadores son diodos al silicio, con plena protección contra las crestas de tensión producidas en el equipo y contra las crestas de alta frecuencia de hasta 2.000 voltios provenientes de la red de suministro. Entre los circuitos de control se cuentan un interruptor de presión de aire, un relé de prueba de polarización y protección contra sobrecargas totales de C.C a alta tensión para las cuatro válvulas principales. Estos últimos dispositivos se hallan conectados a un sistema de reposición que—después de cada desconexión—repone la A.T dos veces antes de desconectarla definitivamente. De ello se desprende que las fallas instantáneas no podrán causar interrupción de los servicios. La protección primaria de todos los circuitos se realiza mediante disyuntores miniatura.

El artículo continúa hablando de las reconocidas ventajas de la operación en paralelo y describe la disposición de fasaje, demostrando que no se exige gran precisión en él.

Gracias al empleo de conectores a ficha y tomacorriente entre las unidades la instalación de las mismas es muy sencilla; la mayor parte de las conexiones va por la parte superior, de manera que puede prescindirse de los trabajos especiales de fundación o base. De forma análoga, no es necesario colocar conductos para aire, por lo que la instalación de estos equipos es sencilla y rápida.

NUEVO MEZCLADOR DE SONIDO PARA TELEVISION

por D. B. Manning y D. R. Mynard

En estos últimos años se ha llegado a mayor estabilización en cuanto a la cantidad de medios que se requiere en equipos de control de sonido. Como derivación de la experiencia en el proyecto de una serie de equipos modulares fabricados especialmente a pedido de diversos clientes, ha resultado factible perfeccionar una serie de paneles de control normalizados, los que cumplen casi todas las exigencias de la actualidad.

Esta innovación lleva el nombre de Equipo de Control de Sonido Tipo B1103. Es completamente transistorizado y se lo ha proyectado para explotación en estudios o móvil; también se presta a una fácil conversión de 12 á 24 canales. Mediante paneles suplementarios, pueden agregarse medios adicionales, como ser efectos de eco y ecualizadores de la respuesta de frecuencia.

Medios fundamentales (Fig. 1)

El panel básico tiene 12 canales con dos controles de grupo o submaestros y un control maestro. La agrupación de los canales es variable, conmutando a cuatro de ellos a uno ú otro de los controles sub-maestros. Estos cuatro canales también sirven para seleccionar entradas de alto nivel y además entradas de micrófono. En todas las posiciones de control se utilizan atenuadores a dial del tipo enchufable (Fig. 5). Los pre-amplificadores de canal también son enchufables en el panel delantero, entre los atenuadores a dial.

Los dos amplificadores de grupo cuentan con dos salidas independientes cada uno. Una de ellas pasa al atenuador de control maestro y a los amplificadores de salida principal, a la vez que la otra salida puede seleccionarse a voluntad para una salida de "alimentación libre". Este último medio permite transmitir un grupo de efectos microfónicos en programas internacionales sin el comentario en el idioma del país.

El amplificador principal tiene dos salidas independientes que alimentan a las líneas de salida y a los equipos de comunicación locales.

Entre los medios auxiliares se cuentan la escucha previa en cada uno de los canales, controles de amplificación semi-fijos que evitan las sobrecargas debidas a señales fuertes y una salida aparte para sistema de amplificación sonora. Este último consiste en una llave para cada canal, con cuyo medio se pueden pasar dados canales a voluntad a un amplificador separado. El mismo puede conectarse a amplificadores de altavoces en el estudio, ofreciendo así a artistas y público auditorio una participación más completa en el programa.

La supervisión de todas las salidas—principales y secundarias—puede realizarse individualmente mediante un parlante de supervisión y un monitor de emisión. El último de los citados puede ser bien un vúmetro conforme a las especificaciones normalizadas de los EE.UU o bien un modulómetro de valor de cresta, conforme a las especificaciones de la British Broadcasting Corporation (Fig. 3).

El equipo tiene integrado un generador de tonos, que suministra una señal de calibración para el monitor de emisión y una señal de prueba hacia la línea.

Por intermedio de un panel secundario es posible enviar a ocho de los doce canales el efecto de eco proveniente de una fuente aparte. Para más, hay dos ecualizadores para variar la respuesta de frecuencia a 60 Hz, 3 KHz y 10 KHz. Los mismos pueden intercalarse en ciertos canales según las exigencias.

Construcción mecánica

El mezclador de sonido Tipo B1103 es un panel de control plano de diseño compatible con el mezclador de video Tipo B3714. Entra en una sencilla cavidad rectangular del pupitre. Se dispone en posición inclinada a unos 15° respecto a la horizontal (Fig. 6). De esta manera el operador tiene fácil acceso a los diales a la vez que ve sin impedimento alguno el instrumento y todos los controles de operación. La unidad auxiliar (para ecos)—cuando se la utiliza—va conectada permanentemente al panel principal, pudiéndosela levantar a un ángulo más agudo si así se desea (Fig. 4).

Todas las conexiones a los paneles se realizan mediante fichas y zócalos montados en la parte trasera. Con ello se logra una instalación libre de complicaciones, a la vez que se facilita el mantenimiento.

Lleva incorporada una fuente de poder aparte que suministra dos salidas a 24 V C.C, hasta 1 A para los amplificadores y hasta 750 mA para las lámparas y circuitos de señales de acción.

CADENA DE CUATRO ESTACIONES DE TELEVISION EN EL NORTE DE LA SUECIA

por B. G. Sellin

La Suecia es una nación que depende en gran parte de sus exportaciones de mineral de hierro. El mineral se encuentra principalmente en las zonas Kiruna y Gallivare del norte del país. El ferrocarril entre Kiruna, a unos 160 Km al norte del círculo ártico, y Narvik en el norte de Noruega, lleva este mineral hasta dicho puerto noruego.

El personal de manutención de este ferrocarril tan importante y de gran tráfico, junto a sus familiares, debe soportar los inviernos nocturnos de tanta duración; para ellos la televisión—que funcionaba ya en Kiruna—sería algo así como una bendición. Pese al costo involucrado en suministrar este servicio a un número relativamente bajo de personas en una zona montañosa, el bienestar del personal de manutención del ferrocarril fué razón suficiente para que las autoridades se decidiesen a instalar una cadena de retransmisores de TV y M.F que cubriese la zona respectiva.

La Fig. 4 muestra las condiciones del terreno en esta ruta. Después de realizar el estudio de los mapas, se efectuó un reconocimiento físico de la misma. Teniendo presente el mantenimiento, fué menester ubicar las estaciones lo más cerca posible a la línea ferroviaria. La Fig. 5 ilustra los perfiles de la ruta en sus distintos tramos. Los equipos encargados del reconocimiento emplearon helicópteros para su transporte durante estas tareas.

Como resultado de acuerdos con Finlandia y Noruega se optó por el siguiente plan de frecuencias:

Törnetrack:	Canal 4 con polarización vertical
Stordalen:	Canal 7 con polarización vertical
Björliden:	Canal 7 con polarización vertical
Vassjaure:	Canal 3 con polarización horizontal.

La Dirección de Telecomunicaciones sueca ha empleado con éxito retransmisores Marconi B6400 de 50 vatios en gran parte de la enorme red sueca de retransmisoras de televisión. En todas sus estaciones retransmisoras a M.F han utilizado retransmisores Marconi B6401 (ver Figs. 6 y 7). En la ruta que nos ocupa se decidió utilizar estos mismos equipos.

Puesto que en esta región no existen caminos, el acceso a las estaciones se obtuvo con sendas de tractor desde el ferrocarril; gracias a la falta de vegetación en esta zona, resultó facil cortar los senderos. Se emplearon además unos helicópteros para transportar los equipos.

La energía eléctrica (15 Kw por estación) fué derivada de la línea de alta tensión de servicio, a lo largo del ferrocarril. Puesto que la potencia disponible no es trifásica, se construyeron estaciones transformadoras al costado de la línea férrea, instalándose cables subterráneos hasta cada estación. Se tendieron además diez circuitos telefónicos.

En las Figs. 8 y 9 pueden verse las casillas de retransmisores y su disposición interna. El montaje tuvo que efectuarse en la estación sin nieve, de junio a septiembre. Los edificios tenían que estar fuertemente anclados en la roca, para resistir al fuerte viento predominante en esas partes.

Se utilizaron mástiles de celosía normalizados de 36 m, con guías orientadas muy cuidadosamente a fin de evitar atenuación y reflejos en las antenas Yagi, que son de aluminio y tienen 3, 6 ú 8 elementos. Se estudió muy bien su orientación, a los efectos de asegurar buena cobertura y una señal fuerte para las estaciones subsiguientes. Mástiles y antenas están proyectados para cargas elevadas de escarcha y viento.

Las tareas mayores del mantenimiento son realizadas por personal de la estación supervisada en Kiruna, pero la población local se ocupa de vigilar las lecturas en instrumentos, de informar sobre las fallas, de cambiar fusibles, etc.

La operación de las estaciones sin personal no presenta dificultades ya que los retransmisores están conectados en todo momento pero transmiten solamente al recibir señales. En fecha futura se instalará equipo de conmutación automática entre la instalación de servicio y la de emergencia, pero por ahora la conmutación se realiza localmente desde los poblados vecinos mediante línea telefónica.

JAMHURI—DICIEMBRE DE 1964

por R. J. Davey

Cuando Kenya festejó su independencia en diciembre de 1963, la entonces nueva dirección radiodifusora supo estar al nivel de las cosas y ofreció cobertura total de los eventos, gracias a muchas improvisaciones y a gran ingeniosidad. El mes de diciembre siguiente Kenya se convirtió en República ("Jamhuri") dentro de la Comunidad británica y la Voice of Kenya ("La Voz de Kenya") se vió nuevamente frente al problema de difundir los festejos correspondientes. Sus planes se basaron en las experiencias adquiridas en el momento de la independencia, pero esta vez se estableció que debían usar equipos propios y no ya prestados, como había acontecido el año anterior. La Compañía Marconi recibió por ello un pedido urgentísimo por una unidad de transmisiones exteriores a dos cámaras, equipada con un Ampex VR1100. En el centro de los estudios de difusión había de instalarse un segundo grabador.

En cuanto al sonido, todo salió de acuerdo a los planes, y ya el 4 de diciembre las instalaciones estaban bien adelantadas.

Por lo que respecta a la televisión, sin embargo, hubo bastante confusión. Casi todo el equipo de cámaras para la unidad móvil tuvo que embarcarse en un fletero que había sufrido demoras; para más, el vehículo para exteriores tampoco estaba pronto. Pese a ello, fué posible tomar prestado un ómnibus y convertirlo al uso, y la Marconi envió por avión un segundo juego de equipos de cámara. Los equipos mezcladores fueron redestinados desde los estudios y comenzó entonces el trabajo de instalación. Los grabadores de cinta video llegaron el día 6, acompañados por un ingeniero de la Ampex que ayudó a instalarlos.

El buque fletero con los equipos de cámara llegó a Mombasa el 5 de diciembre y—tras bastantes inconvenientes—pudo llegar finalmente a Nairobi el 8 de ese mes. Se redoblaron los esfuerzos, y así fué que la unidad para grabaciones quedó terminada justo a tiempo.

Los festejos comenzaron el 10 de diciembre con la partida de Kenya de militares británicos. A partir de ese momento los eventos se sucedieron continuamente por toda la semana, ofreciéndose comentarios en radio y televisión acerca de todos los acontecimientos de mayor importancia, inclusos la jura del nuevo Presidente y sus ministros, las nuevas ciudadanías honorarias, las fiesta de jardín, desfiles militares, fútbol y pugilato.

Las cintas video se enviaron a los estudios de difusión mediante moto-ciclistas de la policía, para ser transmitidos dentro de 40 minutos después de cada acontecimiento.

Escribiendo a las autoridades encargadas de las transmisiones más tarde, el Presidente Kenyatta dijo: "Les escribo para felicitarles por la excelente cobertura que ofrecieron en radio y televisión de los festejos de la independencia que concluyeron recientemente. . . ."

OBJETIVOS DE FOCO VARIABLE O FIJO

por A. G. Husselbury

En estos últimos diez años se ha visto perfeccionar el objetivo de gran campo, alto rendimiento, a distancia focal variable (denominado "zoom"). Ello significa que el usuario y el proyectista de la cámara tienen una elección entre un cabezal giratorio con objetivos de foco fijo o un objetivo zoom. En este artículo se comparan los méritos respectivos de ambos sistemas.

Costo

La inversión inicial para equipar un estudio con cámaras a cabezal giratorio puede decirse que es mayor que la que demanda una instalación con cámaras provistas de objetivos zoom. El precio más elevado del equipo zoom en sí—frente al precio de un equipo a cabezal giratorio—queda más que compensado por el costo del cabezal y del servo-iris que se requieren.

Lo dicho tiene aún más fuerza en el caso de unidades para transmisiones exteriores, donde por lo general existe ya un equipo de cámaras tipo zoom.

Las cámaras a objetivo zoom, con ser más estáticas del punto de vista manual, demandan montantes de cámara menos costosos.

Los gastos de explotación son también menores para cámaras a objetivo zoom.

Rendimiento Técnico

El rendimiento óptico de los objetivos zoom modernos es comparable con el de los objetivos a distancia focal fija y, desde el punto de vista del mantenimiento, existe poca diferencia entre ellos.

El gran mérito de la cámara zoom es su sencillez mecánica. Un simple montaje para el objetivo zoom, el servo-iris y el núcleo semi-fijo del orticonoscopio de imagen substituyen al complejo soporte para el armazón giratorio de los objetivos, el sistema portador para el núcleo del O.I y un sistema complejo de mandos múltiples para el iris.

Rendimiento en explotación

Aunque en este ámbito no es fácil decir cuál es la desventaja o cuál la ventaja, hay algunos hechos que no pueden contradecirse:

1. En la cámara zoom se logran más fácilmente la liviandad, las dimensiones mínimas y el disimulo en su ambiente de trabajo.

2. Las cámaras zoom ofrecen mucha más flexibilidad en el ángulo de visión horizontal.

3. Los medios de control de objetivos zoom normalmente consisten en ocho ángulos de visión horizontal semi-fijos; el cabezal giratorio tiene cuatro. La interferencia óptica limita las combinaciones posibles del objetico en cámaras a cabezal giratorio.

4. La cámara zoom es más silenciosa y su control es más suave, especialmente al utilizar servos para variar la distancia focal y el enfoque.

5. La disposición zoom, pese a que se utiliza menos en la actualidad, es un medio muy útil en reserva. También se presta como alternativa a los movimientos del carro de la cámara, en especial, en estudios pequeños.

Por razones técnicas y económicas, queda demostrado que la cámara zoom es notablemente superior a la cámara con cabezal giratorio.

NUEVO CONJUNTO DE ESTUDIOS EN AUSTRALIA

por Eric Hitchens, A.M.I.E.E, A.M.I.E.R.E

El continuo desarrollo de la televisión en Australia a partir del año 1956 ha resultado en el advento del tercer canal comercial en Sydney y Melbourne. La United Telecasters recibió una licencia para operar la estación de Sydney, cuya sigla es "TEN-10". La Amalgamated Wireless (Australasia) Ltd (A.W.A) y la Marconi, trabajando en colaboración con United Telecasters, proyectaron una estación donde la economía de personal y la centralización fueron los objetivos principales, y que incluye las técnicas más adelantadas, como ser la operación "sin manos" de las cámaras y la conmutación de continuidad.

Sala central de aparatos

Gracias a la mayor estabilidad ha sido posible agrupar todos los equipos electrónicos (excepto el audio de los estudios) en una zona única. (Ver Figs. 1 y 2.) Los medios muy completos para control instalados en esta zona comprenden el orticonoscopio de imagen Marconi Mark IV y las unidades de control de cámaras vidicones A.W.A. La salida video de cualquier cámara puede enviarse a un monitor de imágenes y formas de onda B3900 por intermedio de un panel "uniselector" B3716 que se controla mediante pulsantes identificados en la parte frontal del monitor. El monitor central de imágenes y formas de onda puede supervisar cualquier entrada de video al conmutador principal de control.

Grabador de cinta video telecine

En la actualidad hay tres máquinas telecine, dos grabadores en cinta video VR2000 y un analizador de sub-títulos opacos. Desde la sala central de control pueden controlarse las máquinas telecine y analizadora de sub-títulos (totalmente) y los grabadores en cinta video (parcialmente). Se ha previsto una ampliación hasta seis telecines, seis grabadores en cinta video y dos analizadores de sub-títulos. Los proyectores de diapositivas están dotados con unidades sonoras de fondo para chásis audio con indicador para automatización.

Un tablero de transferencia secundario en la sala central de aparatos sirve para encaminar los distintos medios controlados a los estudios y al control central. Cada estudio y la sala de control central puede disponerse con control de dos telecines, dos grabadores en cinta video y el analizador de sub-títulos.

Sala de control central

Desde aquí una sóla persona puede controlar las operaciones de transmisión de los programas, y la compleja conmutación que tiene lugar durante el intervalo para anuncios es automatizada. El conmutador que se utiliza es del tipo para "canal siguiente", con el panel "uniselector" B3716 y un almacén de ocho eventos que sirve de "memoria". Se lo puede operar en forma manual, a secuencias o automáticamente. En cualquiera de estos sistemas, pueden usarse indicaciones de acción desde el chásis audio para hacer cambiar las diapositivas y los sub-títulos. Se ha instalado un modernísimo control automático del nivel de audio. Existe asimismo un mezclador de sonido para cuatro canales, que maneja las distintas fuentes de audio.

Estudios A y B

La "TEN-10" tiene dos grandes estudios, el Estudio A de 800 m² y el Estudio B de 480 m². En la Fig. 5 se ilustra la disposición de la sala de control.

El pupitre de video e iluminación permite operar "sin manos"; un sólo operador controla 4 orticonoscopios de imagen Mark IV mediante palancas de mando, pudiendo hacer lo mismo con los vidicones de telecine.

Estudio C

Un pequeño estudio adyacente al control central sirve para los noticiosos y las entrevistas. Se utilizan dos orticonoscopios de imagen Mark IV; una de estas cámaras tiene control remoto de la inclinación vertical y horizontal y lleva un objetivo zoom de 10:1. Existe un conmutador de presentación (B3715), y en casos de emergencia el Estudio C puede substituir al control central en las operaciones de conmutación de la estación.

Vehículo para exteriores

Se utiliza una unidad móvil con dos cámaras Mark IV para las transmisiones exteriores.

Z-CARS (PETERWAGEN)

von David E. Rose

"Z Cars" ist eine Kriminalserie, die in den letzten drei Jahren mit grossem Erfolg von dem BBC-Fernsehen gesendet wurde.

Die Serie basiert auf den Vorkommnissen von zwei Patrouillenwagen für Verbrecherjagd in einem imaginären Polizeigebiet mit dem Namen Victor Division in Süd-Lancashire. Ausser der Patrouillenwagenbesetzung spielen regelmässig noch ein Kriminal-Oberinspektor, ein Polizei-Hauptwachtmeister und ein Polizeiwachtmeister mit.

Der Stoff wurde von berufsmässigen Drehbuchautoren oder pensionierten Polizeibeamten geschrieben, welche zusammen mit der aktiven Polizei arbeiten, um die Glaubwürdigkeit zu wahren.

Wegen der Arbeit bei der motorisierten Polizei wechseln die Szenen schnell und schliessen viele Innen- und Aussenaufnahmen ein. Die Drehbuchschreiber müssen sich an die Regeln der normalen Besetzung, des Studios und der filmischen Möglichkeiten halten, haben aber sonst in der Gestaltung spannender und glaubwürdiger Geschichten eine freie Hand.

Bei den in der Victor Division vorkommenden Kriminalfällen muss ein ausgeglichener Eindruck gewahrt bleiben. Eine unrealistische Anhäufung schwerer Kriminalfälle muss vermieden werden.

Die Episoden werden an jedem Mittwoch direkt übertragen. Die beiden Patrouillenwagenbesatzungen erscheinen im allgemeinen in wöchentlicher Abwechslung und die anderen regelmässigen Mitwirkenden werden auf die Episoden verteilt.

Ein Regisseur arbeitet gewöhnlich vier Wochen an einer Episode und unter der Voraussetzung, dass die allgemeine Absicht der Sendereihe erhalten bleibt, wird eine individuelle Behandlung durch die Programmleitung befürwortet.

Nicht ständig zur Besetzung gehörende Mitwirkende werden von dem Regisseur ausgewählt und in diesem Fall wird dieser Teil der Episode gefilmt. Etwa 5 prozent der Sendereihe wird gefilmt. Dies betrifft hauptsächlich Aussenaufnahmen, grössere Fahrzeugbewegungen und Szenen, die durch einen Filmschnitt verbessert werden können. Beim Einblenden von Filmszenen in Direktübertragungen muss sehr auf die Beleuchtung geachtet werden.

Abgesehen von einer ersten Lesung kommen die ständig Mitwirkenden nicht zu Vorproben, da ihre Zeit sehr in Anspruch genommen ist. Eine Hauptprobe zur Unterstützung der Arbeit der Techniker wird zwei oder drei Tage vor der Übernahme des Studios 3 oder 4 im Fernsehzentrum der BBC angesetzt, wo zwei Tage lang konzentriert geprobt wird.

Die Direktsendung, welche jeden Mittwoch erfolgt, weckt ein wirkliches Erlebnisgefühl. Fünfzig Minuten absoluter Konzentration erfüllen Darsteller, Techniker und Fernsehteilnehmer gleichermassen mit Spannung.

EIN RAUMSPARENDER V.H.F-FERNSEHSENDER

von D. G. Jarvis

Die Reichweite eines Fernsehsenders wird bekanntlich durch den Horizont begrenzt, wie gross auch immer seine Ausgangsleistung sein mag. Schon eine Hügelkette wirft einen scharfen Schatten. In dichtbevölkerten Ländern, wie dem Vereinigten Britischen Königreich, dienen Hochleistungssender zur Grundversorgung, weil eine grosse Zahl von Ballungsgebieten benachbart liegt. Für die mittlere Reichweite sind Sender mit einer effektiven Strahlungsleistung zwischen 10 und 50 kW am geeignetesten. Für kleinere Gebiete, d.h. für die Auffüllung der von grossen Sendern gelassenen Lücken und für Länder, in denen die Bevölkerung in verhältnismässig dicht besiedelten und weit voneinander liegenden Gebieten wohnt, mag jedoch ein Sender mit einer effektiven Strahlungsleistung von 3 kW genügen. Hiermit lässt sich eine Reichweite von etwa 16 km für eine Versorgungsgüteklasse A oder etwa 30–40 km für eine Versorgungsgüteklasse B erreichen. In diesem Aufsatz wird ein Sender für eine solche Strahlungsleistung beschrieben.

Je nach den Umständen kann entweder ein Frequenzumsetzer oder ein Sender benutzt werden. Wenn Programme an Ort und Stelle erzeugt werden sollen, dann ist ein Sender nicht zu umgehen. Wo jedoch die Signale von einem anderen Sender wieder abgestrahlt werden sollen, kann ein Frequenzumsetzer benutzt werden. Die Verwendung des letzteren hängt jedoch von dem Vorhandensein eines geeigneten Signals von einem Hauptsender ab. Der Frequenzumsetzer empfängt das ankommende Hochfrequenzsignal und führt es einer Mischstufe zu, auf die ein Zwischenfrequenzverstärker und eine weitere Mischstufe folgen, bevor das Signal in einem anderen Kanal wieder abgestrahlt wird.

Die Firma Marconi hat eine Reihe von Baugruppen entwickelt, aus denen eine Anlage nach individuellen Anforderungen, d.h. zur Bildung eines Frequenzumsetzers oder eines Senders, zusammengesetzt werden kann. Blockschaltbilder beider Ausführungen sind in Fig. 1 wiedergegeben. In dem Aufsatz wird die Anlage in Einzelheiten beschrieben und zwar mit Angabe der Leistungspegel, die sich unter den verschiedenen Bedingungen erreichen lassen. Bei niedriger Leistung kann ein gewisser Verstärker sowohl im Bild- als auch im Tonteil verwendet werden. Dies ist bis etwa 50 W möglich. Oberhalb dieses Pegels werden jedoch die Vorteile eines gemeinsamen Bild- und Tonverstärkers durch den Leistungsverlust infolge eines geringen Wirkungsgrades aufgewogen. Die Marconi Sender der Baureihe B6400 benutzen getrennte Bild- und Tonverstärker. Die Anordnung ist in Fig. 2 gezeigt. Wegen der Trennung steht eine Ausgangsleistung von 10 W von der Steuerstufe zur Verfügung. Damit kann ein Verstärker B7100 für Band I oder ein Verstärker B7200 für Band III ausgesteuert werden. Getrennte Verstärker für Bild und Ton werden zur Erzielung einer Spitzenausgangsleistung von 500 W im Bildkanal verwendet. Die entsprechende Tonkanal-Ausgangsleistung liegt je nach der angewendeten Norm zwischen 100 und 250 W. In den Verstärkern wird eine Rückkopplungsregelung für den abgestrahlten Auslöseimpulspegel angewendet. Wie in Fig. 3 ersichtlich ist, enthält die ganze Anlage eine Überwachungsschaltung für die Hochfrequenzhüllkurve. Die beiden Schränke in Fig. 3 sind 2,14 m hoch, 0,59 m breit und 0,72 m tief.

Fig. 4 zeigt ein Blockschaltbild des Senders für das Band III. Die Ausgangsleistung von dem Steuersender ist mehr als genug zur Aussteuerung eines Senderverstärkers und kann sogar zwei in Parallelbetrieb aussteuern, wobei die beiden 500 W Verstärker zur Erzielung einer Ausgangsleistung von 1 kW mit zwei Steuersendern kombiniert werden. Die Ausgänge der Steuersender sind über eine Brückenschaltung mit den Verstärkern verbunden. Die Überwachung des Steuerpegels erfolgt mittels Detektoren in Verbindung mit einer Steuersignal-Umschalteinheit. Wenn der Pegel eines Steuersenders ausfällt, dann wählt die Umschalteinheit den anderen Steuersender und legt den zuerst benutzten still.

Fig. 5 zeigt die Steuersendereinheiten für den Bildkanal und zwar unten von rechts nach links den Modulator, den Bild-Steuersender und den modulierten Verstärker, die Mischstufe und den linearen Verstärker sowie schliesslich den hochkonstanten Umsetzeroszillator. Unmittelbar darüber befinden sich die Rückkopplungseinheit für den Austastpegel und ein Blindfeld, welches durch eine Steuersender-Umschalteinheit ersetzt werden kann, wenn ein Parallelbetrieb gewünscht wird. In Fig. 3 sind die Einheiten über den gerade beschriebenen zu sehen und zwar der FMQ-Modulator, der Frequenzvervielfacher und die Überwachung für die Hochfrequenz-Hüllkurve. Des weiteren beschreibt der Aufsatz die verwendeten Schaltungen in Einzelheiten. Der FMQ-Steuersender wurde in *Sound and Vision broadcasting*, Band 3, Nr. 1 beschrieben.

Es gibt zwei Ausführungen des 500 W Verstärkers und zwar einen für Band I und einen für Band III. Diese unterscheiden sich nur in der eingebauten Hochfrequenzeinheit. In Fig. 3 sind die Verstärker die zweite und die dritte Einheit von oben. Die übrigen Teile der Schränke enthalten die Netzgeräte, die Bedienungseinheit, das Gebläse, das Luftfilter und den Trenn-Erdungsschalter. In den Verstärkern wird die Röhre 4CX250B benutzt, welche sehr raumsparend ist und eine rein keramische Isolation besitzt. Zur Erzielung einer Bildkanalleistung von 500 W für die Antenne ohne Gitterstromfluss arbeiten zwei dieser Röhren in AB-Betrieb.

Im Bild- und im Tonkanal werden genau gleiche Verstärker benutzt. Allerdings sind die Tonkanalverstärker verschieden abgestimmt. Die Anlage enthält Oberwellenunterdrückungsschaltungen. Zu diesen gehören Messpunkte, deren schaltungstechnische Einzelheiten von dem verwendeten Aufbau abhängen.

Als Gleichrichter werden Siliziumdioden verwendet, die gegen Spannungsspitzen aus der Anlage und gegen Hochfrequenz-Spannungsspitzen bis zu 2000 V aus dem Netz vollkommen geschützt sind. Die Überwachungsschaltungen enthalten einen Kühlluft-Sicherheitsschalter, ein Vorspannungssicherheitsrelais und eine Anoden-Gleichspannungsüberlastschaltung für die vier Hauptröhren. Die zuletzt genannten Schaltungen sind zu einer Wiedereinschaltautomatik zusammengefasst, welche nach einer Abschaltung die Anodenspannung wieder zweimal anlegt bevor die Versorgung restlos abgeschaltet wird. Damit wird bei einem momentanen Ausfall der Betrieb nicht unterbrochen. Ein direkter Schutz aller Schaltungen ist durch Miniatur-Schaltschütze gegeben.

In dem Aufsatz werden dann weiterhin die bekannten Vorteile des Parallelbetriebes erwähnt und die Einrichtungen zur Phasenregelung beschrieben. Es wird gezeigt, dass hierzu keine hohe Genauigkeit notwendig ist.

Durch die Verwendung von Steckern und Buchsen ist der Aufbau der Anlage sehr einfach und die meisten Leitungen liegen oberhalb der Anlage, so dass keine besonderen Fundamente erforderlich sind. Ebenso sind keine Luftkanäle notwendig. Somit kann der Einbau in einfacher und leichter Weise erfolgen.

EINE NEUE TONMISCHANLAGE FÜR FERNSEHSENDER

von D. B. Manning und D. R. Mynard

In den letzten Jahren hat sich die Zahl der Einrichtungen für die Tonsteuerung langsam weiter stabilisiert. Auf Grund von Erfahrungen bei der Konstruktion einer Anzahl von Moduleinheiten nach speziellen Käuferwünschen konnte eine Baureihe standardisierter Bedienungsfelder geschaffen werden, welche den modernsten Anforderungen entsprechen.

Diese sind als Tonregelgeräte Typ B1103 bekannt. Sie sind vollkommen transistorisiert und sowohl für den Studiobetrieb als auch für fahrbare Anlagen geeignet und können leicht von 12 auf 24 Kanäle erweitert werden. Besondere Einrichtungen, wie Echoeffekte und Frequenzgangentzerrer können in Form von Zusatzfeldern hinzugefügt werden.

Grundausrüstung (Fig. 1)

Das Grundfeld besitzt 12 Kanäle mit zwei Gruppenreglern und einem Hauptregler. Die Gruppierung der Kanäle kann durch Zusammenlegung von je vier auf einen der beiden Gruppen regler verändert werden. Diese vier Kanäle können sowohl mit Eingängen für hohe Pegel als auch mit Mikrophoneingängen belegt werden. In allen Regelfeldern werden quadrantenförmige, einsteckbare Überblender (Fig. 5) verwendet. Die Kanalvorverstärker werden ebenfalls eingesteckt und zwar an der Vorderseite zwischen den Überblendern.

Jeder der beiden Gruppenverstärker hat zwei einzeln gepufferte Ausgänge. Einer ist mit dem Hauptüberblender und dem Hauptausgangsverstärker verbunden, während der andere nach Wunsch als Effekt-Ausgang gewählt werden kann. Die letztere Art der Schaltung gestattet die Durchschaltung einer Gruppe von Effektmikrophonen bei internationalen Programmen ohne nationalen, gesprochenen Kommentar.

Der Hauptverstärker hat zwei einzeln gepufferte Ausgänge zur Durchschaltung auf abgehende Leitungen oder örtlichen Sprechverkehr.

Zusätzliche Einrichtungen umfassen Mithörmöglichkeit in jedem Kanal vor der Überblendung, voreinstellbare Verstärkung zur Vermeidung einer Übersteuerung bei starken Signalen und ein getrennter Lautsprecherausgang. Letzterer hat einen Hebelschalter für jeden Kanal, mit welchem ausgewählte Kanäle mit einem getrennten Verstärker verbunden werden können. Dieser kann mit Lautsprecherverstärkern im Studio verbunden werden, wodurch die Künstler und das Publikum besser an dem Programm teilhaben können.

Mit einem Überwachungslautsprecher und einem Aussteuerungsmesser können alle Ausgänge, sowohl Haupt- als auch Hilfsausgänge getrennt überwacht werden. Der Aussteuerungsmesser kann entweder ein Pegellautstärkemesser für amerikanische Erfordernisse oder ein transistorisierter Höchstwertzeiger sein, der den Vorschriften der BBC entspricht (Fig. 3).

Zur Erzeugung eines Eichsignals für den Aussteuerungsmesser und eines Prüfsignals für die Leitungen ist ein Tonfrequenzgenerator eingebaut.

Mit Hilfe eines zusätzlichen Feldes kann ein von einer ankommenden Leitung gelieferter Echoeffekt in 8 der 12 Kanäle gemischt werden. Hier stehen wiederum zwei Entzerrer zur Veränderung des Frequenzganges bei 60 Hz, 3 kHz und 10 kHz zur Verfügung. Diese können nach Wunsch in verschiedene Kanäle geschaltet werden.

Mechanische Konstruktion

Die Tonmischeinrichtung Typ B1103 ist ein flaches Bedienungsfeld, welches zur Bildmischeinrichtung Typ B3714 passend gebaut wurde. Sie lässt sich in einen einfachen rechteckigen Ausschnitt in einem Tisch einpassen. Die Neigung der Tischfläche soll etwa 15° gegenüber der Horizontalen betragen (Fig. 6). Dadurch kann das Bedienungspersonal die Quadrantenüberblender einfach handhaben und dabei das Messinstrument und alle Bedienungseinrichtungen doch noch überblicken. Die Zusatzeinheit (für Echos) kann, falls gewünscht, fest mit dem Hauptfeld verdrahtet und auf Wunsch in einem spitzeren Winkel hochgeschwenkt werden (Fig. 4).

Alle Verbindungen vom und zum Feld gehen über Stecker und Buchsen an der Rückseite. Dadurch werden Einbeau und Wartung vereinfacht.

Ein getrenntes 24 V Gleichstrom-Netzgerät mit zwei getrennten Ausgängen ist vorhanden. Ein 1 A Ausgang versorgt die Verstärker und ein 750 mA Ausgang die Lampen und die Studiosignalschaltungen.

EINE KETTE VON VIER FERNSEHSENDERN IM NORDEN SCHWEDENS

von B. G. Sellin

Schweden ist wegen seines Exports von Eisenerzen bekannt und seine Wirtschaft hängt davon ab. Die Erzfunde liegen hauptsächlich in den Gebieten von Kiruna und Gallivare im Norden des Landes. Eine Eisenbahnlinie von Kiruna, etwa 160 km nördlich des Polarkreises, bringt das Eisenerz zu dem norwegischen Hafen Narvik.

Das Wartungspersonal dieser wichtigen und stark befahrbaren Linie, sowie die Angehörigen des Personals sind einem langen, dunklen Winter ausgesetzt. Das Fernsehen, welches in Kiruna in Betrieb war, würde eine wahre Wohltat für die Leute sein. Trotz der Ausgaben für die Bereitstellung eines Sendedienstes für verhältnismässig wenig Leute in dem gebirgigen Gelände haben sich die Behörden auf Grund der Wichtigkeit des Wohlergehens des Eisenbahnpersonals veranlasst gesehen eine Kette von Frequenzumsetzern sowohl für Fernsehen als auch für U.K.W-Rundfunk zur Versorgung des Gebietes bereitzustellen.

Fig. 4 zeigt das Gelände entlang der Linie. Nach einer Kartenstudie wurde eine physikalische Vermessung der Route durchgeführt. Zur Ermöglichung einer Wartung der Stationen mussten diese so nahe wie möglich an die Eisenbahnlinie gelegt werden. Fig. 5 zeigt die Geländeprofile der verschiedenen Verbindungen. Bei der Vermessung wurden von den Vermessungsmannschaften Hubschrauber benutzt.

Nach Besprechungen mit Finland und Norwegen legte man einen Frequenzplan für die Stationen fest:

Tornetrack:	Kanal 4 mit senkrechter Polarisation
Stordalen:	Kanal 7 mit senkrechter Polarisation
Bjorliden:	Kanal 7 mit senkrechter Polarisation
Vassjaure:	Kanal 3 mit horizontaler Polarisation.

Die schwedische Fernmeldeverwaltung benutzt mit grossem Erfolg den Marconi 50 W Frequenzumsetzer B6400 bei einem grossen Teil des ausgedehnten schwedischen Fernseh-Frequenzumsetzernetzes. In allen U.K.W-Tonfunk-Frequenzumsetzerstationen haben sie den Marconi F.M-Frequenzumsetzer B6401 (siehe Fig. 6 und 7) eingesetzt. Man entschloss sich zur Benutzung dieser Geräte für die Eisenbahnlinie.

Da es in diesem Gebiet keine Strassen gibt, musste man über Traktorenwege von der Eisenbahn zu den Stationen gelangen. Für den Transport der Geräte wurden ebenfalls Hubschrauber eingesetzt. Wegen des Fehlens einer Vegetation konnten Wege leicht hergestellt werden.

Die Stromversorgung (15 kW pro Station) erfolgt von der Hochspannungsversorgung entlang der Eisenbahnlinie. Da dies keine Drehstromleitung ist, mussten Transformatoren in der Nähe der Eisenbahn aufgestellt und unterirdische Kabel zu den Stationen ausgelegt werden. Zehn Fernsprechleitungen wurden ebenfalls verlegt.

Fig. 8 und 9 zeigen die Umsetzerhäuschen und die innere Anordnung. Der Aufbau musste in der schneefreien Zeit von Juni bis September durchgeführt werden. Wegen der auftretenden starken Winde mussten die Gebäude mit dem Fels fest verankert werden.

Einheitliche 36 m Antennen-Gittermasten wurden benutzt, wobei die Verankerungsseile im Hinblick auf eine Vermeidung von Dämpfungen und Reflexionen für die Yagi-Antennen sorgfältig orientiert werden mussten. Die Yagi-Antennen bestehen aus Aluminium und haben 3, 6 oder 8 Elemente. Die Wahl der Aufstellungsorte erfolgte mit grosser Sorgfalt im Hinblick auf gute Reichweite und hohe Signalpegel für die nachfolgenden Stationen. Die Masten und Antennen wurden für starke Eis- und Windbelastungen gebaut.

Die Hauptwartungsarbeiten werden von dem Personal der bemannten Station in Kiruna ausgeführt. Die örtlichen Einwohner prüfen jedoch die Messinstrumentenanzeigen, melden Fehler, wechseln Sicherungen aus usw.

Der Betrieb der unbemannten Stationen ist kein Problem, da die Frequenzumsetzer dauernd eingeschaltet bleiben, aber nur abstrahlen, wenn ein Signal empfangen wird. In Zukunft wird eine automatische Umschaltung von Betrieb auf Reserve eingebaut. Zur Zeit erfolgt die Umschaltung örtlich von benachbarten Dörfern aus über eine Fernsprechleitung.

JAMHURI—DEZEMBER 1964

von R. J. Davey

Als Kenia im Dezember 1963 seine Unabhängigkeit feierte, zeigte sich die verhältnismässig junge Rundfunkorganisation von der besten Seite und sorgte für eine lückenlose Übertragung der Veranstaltungen unter Anwendung von viel Improvisation und Erfindungsgeist. Ein Jahr später im Dezember wurde Kenia eine Republik in dem britischen Commonwealth und die Rundfunkorganisation von Kenia—"The Voice of Kenya"—stand wiederum vor dem Problem der Übertragung der Feierlichkeiten. Die Pläne für die Sendungen basierten auf der bei den Unabhängigkeitsfeiern gesammelten Erfahrungen. Diesmal wurde allerdings entschieden, dass eigene Geräte verwendet werden sollten und nicht geliehene wie im Jahr vorher. Aus diesem Grunde wurde der Firma The Marconi Co. ein dringender Auftrag zur Lieferung eines Aussenaufnahmewagens mit 2 Kameras und einer Ampex Videobandaufzeichnungsanlage VR1100 erteilt. Ein zweites Bandaufnahmegerät sollte in dem Hauptstudio aufgestellt werden.

Auf der Seite des Tonrundfunks ging alles nach Plan und am 4. Dezember waren die Einbauarbeiten sehr gut fortgeschritten.

Beim Fernsehen zeigte sich jedoch ein ziemliches Chaos. Der grösste Teil der Kamerageräte für den Aufnahmewagen wurden per Frachter verschifft, der aufgehalten worden war. Das Fahrzeug war ebenfalls nicht fertig. Es wurde jedoch ein Autobus ausgeliehen und umgebaut und die Firma Marconi verschickte einen weiteren Kamerasatz per Flugzeug. Mischeinrichtungen, die für Studios bestimmt waren, wurden umgeleitet und die Einbauarbeiten konnten beginnen. Die Video-Bandanlage kam am 6. Dezember mit einem Ingenieur von Ampex an, der bei der Einstellung half.

Der Frachter mit den Kamerageräten erreichte am 5. Dezember Mombasa und nach erheblichen Schwierigkeiten kamen die Geräte schliesslich am 8. Dezember in Nairobi an. Nach grossen Anstrengungen wurde die Aufzeichnungsanlage schliesslich doch noch gerade zur rechten Zeit fertig.

Die Feierlichkeiten begannen am 10. Dezember mit dem Abmarsch der britischen Truppen aus Kenia. Von da ab folgte ein Ereignis dem anderen für den Zeitraum einer ganzen Woche. Ton- und Fernsehfunkkommentare wurden bei allen grösseren Veranstaltungen gegeben einschliesslich der Vereidigung des neuen Präsidenten und seiner Minister, der Verleihung der Ehrenbürgerschaft, der Gartenfeste, Paraden und Fussballspiele, sowie Boxkämpfe.

Die Video-Bandaufnahmen wurden durch einen Meldefahrer der Polizei zum Rundfunkhaus gebracht und innerhalb von 40 Minuten nach der Veranstaltung gesendet.

Der Präsident Kenyatta schrieb nachher an die Rundfunkbehörde: "Ich möchte Ihnen schriftlich zu der ausgezeichneten Rundfunk- und Fernsehübertragung anlässlich der vor kurzem beendeten Unabhängigkeitsfeiern danken. . . ."

EIN VERGLEICH ZWISCHEN LINSEN MIT VERANDERLICHER UND FESTER BRENNWEITE

von A. G. Husselbury

In den letzten 10 Jahren ist die Entwicklung von Hochleistungslinsen mit einer über weite Bereiche veränderlichen Brennweite (Gummilinsen) stark fortgeschritten. Dadurch hat der Benutzer und der Konstrukteur von Kameras die Wahl zwischen einem

Linsenrevolver für Linsen mit fester Brennweite oder einer Gummilinse. In diesem Aufsatz werden die relativen Vorteile der beiden Arten beschrieben.

Kosten

Es lässt sich zeigen, dass die Anschaffungskosten für Studioanlagen mit Kameras mit Linsenrevolvern höher sind als bei Kameras mit Gummilinsen. Die zusätzlichen Kosten für die Gummilinseneinrichtung selbst werden mehr als aufgewogen durch die Kosten für den Revolver und die notwendigen Iris-Servoeinstellungen.

Dies betrifft in noch stärkerem Masse die Aussenaufnahmeeinheiten, bei denen gewöhnlich bereits eine Ausrüstung mit Gummilinsen-Kameras vorhanden ist.

Gummilinsen-Kameras, welche mehr für ortsgebundene Aufgaben verwendet werden, kommen mit billigeren Kamera-Aufstellungsvorrichtungen aus.

Die Betriebskosten sind bei Gummilinsen-Kameras geringer.

Technische Leistungsfähigkeit

Die optische Leistungsfähigkeit moderner Gummilinsen ist mit derjenigen von Linsen mit fester Brennweite vergleichbar. Auf Seiten der Wartung besteht kaum ein Unterschied.

Der grosse Vorteil der Gummilinsen liegt in der mechanischen Einfachheit. Die komplizierte Linsenrevolveranordnung, die verschiebbare Fokussierungsspule für das Superorthikon und die komplizierte Einrichtung für die verschiedenen Blendeneinstellungen werden durch eine einfache Gummilinsen-Anordnung und eine Voreinstellung für die Fokussierungsspule des Superorthikons ersetzt.

Betriebliche Leistungsfähigkeit

Obwohl es in diesem Zusammenhang schwierig ist zu sagen, was und was nicht von Vorteil ist, sind doch verschiedene Punkte unbestreitbar.

1. Leichtigkeit, Raumeinsparung und Behinderungsfreiheit lassen sich bei der Gummilinsen-Kamera besser verwirklichen.

2. Gummilinsen-Kameras ergeben eine grössere Vielseitigkeit in der Wahl des horizontalen Blickwinkels.

3. Die Bedienungseinrichtungen für Gummilinsen haben im allgemeinen 8 Voreinstellungen für den horizontalen Blickwinkel gegenüber 4 bei Linsenrevolvern. Eine optische Behinderung beschränkt die Zahl der Linsenkombinationen bei Kameras mit Linsenrevolvern.

4. Die Gummilinsen-Kamera arbeitet ruhiger und besitzt eine feinere Einstellung, besonders wenn eine Servoeinstellung für Bildwinkeländerung und Fokussierung benutzt wird.

5. Obwohl Gummilinsen heutzutage noch nicht so viel angewendet werden, sind sie doch eine sehr nutzbringende Einrichtung. Ferner stellen sie eine gute Alternativlösung für Kamerawagenverschiebungen dar, besonders in kleinen Studios.

Aus technischen und wirtschaftlichen Gründen ist die Gummilinsen-Kamera der Kamera mit einem Linsenrevolver merklich überlegen.

EIN NEUES STUDIOZENTRUM IN AUSTRALIEN

von E. Hitchens

Das stetige Anwachsen des Fernsehfunks in Australien seit dem Jahr 1956 führte zur Einrichtung eines dritten kommerziellen Kanals für Sydney und Melbourne. Die Firma United Telecasters erhielt die Lizenz zum Betrieb einer Station in Sydney mit dem Rufzeichen TEN-10. Die Firmen Amalgamated Wireless (Australasia) Ltd (A.W.A) und Marconi planten in Zusammenarbeit mit United Telecasters eine Station mit wirtschaftlichem Personaleinsatz und Zentralisation als Hauptziel. Sie sollte die neueste Technik einschliesslich einer Kamerabedienung ohne elektrische Einstellungen ("hands off" Betrieb) und einer Einsatzumschaltung enthalten.

Der zentrale Geräteraum

Eine erhöhte Betriebskonstanz erlaubte eine Konzentration aller elektronischen Geräte mit Ausnahme des Studio-Tonteils an einem Ort (siehe Fig. 1 und 2). Die vielseitigen Überwachungseinrichtungen in diesem Raum umfassen die Bedienungseinheiten für die Marconi Superorthikon-Kameras Mark IV und die A.W.A Vidikon-Kameras. Der bildfrequente Ausgang jeder Kamera kann über ein mit bezeichneten Druckknöpfen an der Vorderseite des Bildmonitors gesteuertes Drehwählerfeld Typ B3716 mit einem Bild- und Impulsüberwachungsgerät Typ B3900 verbunden werden. Das mittlere Bild- und Impulsüberwachungsgerät kann zur Überwachung jedes bildfrequenten Signals zum Hauptprogrammschalter benutzt werden.

Film- und Bandaufzeichnungsanlagen für Video

Zur Zeit sind drei Filmaufzeichnungs- und Wiedergabeanlagen, zwei Videobandaufzeichnungs- und Wiedergabemaschinen VR2000 und ein undurchsichtiger Titelabtaster vorhanden. Die Filmmaschinen und der Titelabtaster sind vollkommen und die Bandmaschinen teilweise vom Hauptregieraum aus bedienbar. Die vorgesehenen Erweiterungen umfassen 6 Filmmaschinen, 6 Bandmaschinen und 2 Titelabtaster. Die Diaprojektoren sind mit Tonbandmaschinen mit automatischer Einsatzsteuerung ausgerüstet.

Ein Schnursteckerfeld im zentralen Geräteraum dient zur Verbindung verschiedener gesteuerter Einrichtungen mit den Studios oder dem Hauptregieraum. Jedem Studio und dem Hauptregieraum kann die Bedienung von zwei Filmmaschinen, zwei Bandmaschinen und dem Titelabtaster zugeteilt werden.

Der Hauptregieraum

Von hier aus kann ein Mann die Arbeiten zur Ausstrahlung eines Programms ausführen. Die komplizierten Umschaltungen, die beim Programmwechsel ausgeführt werden müssen, erfolgen automatisch. Der verwendete Programmschalter arbeitet nach dem Vorwahlprinzip mit dem Drehwählerfeld B3716 und einem Speicher für 8 Vorgänge. Die Drehwählereinrichtung kann durch Einzeleinstellung, Folgeeinstellung oder automatisch betätigt werden. In jeder dieser Betriebsarten können Einsatzzeichen auf dem Tonband zum Wechseln von Diapositiven und Titeln benutzt werden. Eine ausgefeilte automatische Tonpegelsteuerung ist eingebaut. Um getrennte Tonquellen verarbeiten zu können, ist eine Tonmischeinrichtung für 4 Kanäle eingebaut.

Die Studios A und B

Die Station TEN-10 besitzt zwei grosse Studios: Das Studio A mit 800 m^2 und das Studio B mit 480 m^2. Die Anordnung des Regieraums ist in Fig. 5 wiedergegeben.

Der Tisch für Bildwahl und Beleuchtungseinstellung gestattet einen Kamerabetrieb ohne elektronische Bedienung ("hands off" Betrieb). Ein Mann bedient 4 Superorthikon-Kameras Mark IV mit Hilfe eines Steuerhebels, sowie die Filambtast-Vidikons.

Studio C

Ein kleines Studio neben dem Hauptregieraum wird für Nachrichtenansagen und Interviews eingesetzt. Es werden 2 Superorthikon-Kameras Mark IV benutzt, davon eine mit ferngesteuerter Neigung und Schwenkung und einer 10:1-Gummilinse. Es ist ein Programmumschalter (B3715) eingebaut und im Notfall kann das Studio C die Programmumschaltung vom Hauptregieraum übernehmen.

Der Aussenaufnahmewagen

Für Aussenaufnahmen wird ein Fahrzeug mit zwei Kameras Mark IV benutzt.

Z CARS

David E. Rose

"Z Cars" est une série policière qui passe avec succès à la Télévision BBC depuis trois ans.

Elle est basée sur les aventures de deux voitures de Patrouille de Police dans une zone imaginaire de la police appellée Victor en Lancashire du Sud. A part les Patrouilles, la distribution comprend un commissaire, un sergent et un agent.

Les séries sont écrites par des écrivains professionnels ou des officiers de police en retraite qui travaillent en collaboration avec la police régulière pour assurer l'authenticité.

A cause de la nature du travail de la police mobile, les scénarios sont mouvementés, et s'étendent sur des scènes intérieures et extérieures. Les écrivains doivent se conformer aux "contrôles" de la distribution régulière, des facilités du studio et du film, mais, ceci mis à part, ont entière liberté pour développer des histoires passionnantes et authentiques.

Une impression équilibrée des crimes ayant lieu dans le Secteur Victor doit être maintenue. Il ne faut pas avoir un surplus non réaliste de crimes graves.

Les épisodes sont joués sur le plateau tous les mercredis et deux équipes de Patrouilles anti-crimes jouent normalement une semaine sur deux et les autres personnages distribués équitablement suivant les épisodes.

Un metteur en scène travaille généralement quatre semaines pour un épisode, et à condition que l'intention générale de la série soit maintenue, une approche individuelle par ce metteur en scène est encouragée.

Les acteurs occasionnels sont choisis par le metteur en scène et les morceaux filmés pris. La partie film occupe environ 5 pour cent du temps et elle est surtout utilisée pour les scènes extérieures, le mouvement des voitures et les scènes qui nécessitent un montage. Insérer des morceaux de films dans des programmes sur plateau nécessite beaucoup de soins pour l'éclairage.

A part une première lecture du texte, les acteurs réguliers ne viennent pas aux premières répétitions car ils ont beaucoup à faire. Une répétition générale pour les techniciens a lieu deux ou trois jours avant de passer au Studio 3 ou 4 du Centre de Télévision de la BBC où les deux derniers jours de répétition concentrée a lieu.

La transmission sur le plateau qui a lieu les mercredis donne un sens de réalité très prononcé. Cinquante minutes de concentration absolue passionnent acteurs, techniciens et spectateurs également.

UN EMETTEUR DE TELEVISION T.H.F COMPACTE

D. G. Jarvis, B.Sc(Eng.)

La zone d'action d'un émetteur de télévision, comme il est bien connu, est limitée par l'horizon, quelle que soit sa puissance et même une chaîne de collines projetera une ombre vive. Dans des pays fortement peuplés comme le Royaume-Uni, des émetteurs puissants fournissent le service fondamental à cause du grand nombre de centre peuplés voisins les uns des autres.

Puis il y a une zone intermédiaire où des émetteurs avec une énergie rayonnée efficace de 10 à 50 kW conviennent le mieux, mais pour des régions moins étendues, soit pour boucher les trous laissés par des émetteurs plus grands, soit pour les pays où les centres de populations sont relativement compacts et éloignés les uns des autres un émetteur d'une énergie rayonnée efficace de 3 kW peut convenir. Il donnera un rayon d'action de seize kilomètres pour un service Qualité A et de 32 à 40 kilomètres pour un service Qualité B. Cet article décrit un émetteur donnant une telle énergie rayonnée efficace.

Un traducteur ou un émetteur peuvent être utilisés suivant les cas. Où un programme régional est diffusé, un émetteur est essentiel, mais pour rediffuser des transmissions d'un autre émetteur un traducteur peut suffire. Son utilisation, cependant, dépend de la disponibilité d'un signal convenable d'un émetteur principal. La centrale type-traducteur reçoit un signal entrant haute fréquence et l'applique à un mélangeur, un amplificateur à fréquence intermédiaire et ensuite un autre mélangeur avant de rediffuser sur la nouvelle bande.

Marconi Company ont développé une gamme de monoblocs grâce auxquels un équipement pour faire face aux besoins individuels peut être incorporé pour former soit un traducteur soit un émetteur. Des diagrammes synoptiques des deux types sont indiqués (Fig. 1). L'article décrit l'équipement assez en détail, y compris les niveaux d'énergie disponibles dans certaines conditions. Pour une basse énergie, un certain amplificateur peut être utilisé et pour l'image et pour le son, jusqu'à 50 kW, mais au-dessus de ce niveau les avantages d'un seul amplificateur pour image et son sont contrebalancés par la perte de puissance due à un rendement bas. La série B6400 des émetteurs Marconi utilise des amplificateurs séparés pour le son et l'image. Cette disposition est indiquée (Fig. 2). A cause de la séparation, on peut obtenir une puissance de sortie de 10 W du tube d'attaque et ceci peut actionner un amplificateur B7100 pour une Bande I ou un amplificateur B7200 pour une Band III.

Des amplificateurs séparés sont utilisés pour l'image et le son, donnant une puissance de sortie de 500 W vision de pointe et la sortie son appropriée suivant le standard employé entre 100 et 250 W. Les amplificateurs se servent de contrôle à réaction du niveau de suppression émis et comme on peut voir Fig. 3 l'équipement comprend aussi un moniteur d'enceinte haute fréquence. Les deux boîtiers (Fig. 3) mesurent tous deux 2,1 m de haut, 59 cm de large et 71 cm de profondeur.

Fig. 4 donne un diagramme synoptique des émetteurs de la Bande III. Le rendement de l'émetteur de commande est plus qu'il ne faut pour actionner un amplificateur et peut en actionner deux en parallèle, auquel cas les deux amplificateurs 500 W sont combinés avec deux émetteurs de commande donnant une puissance de sortie de 1 kW. Les sorties de commande sont reliées aux amplificateurs par un réseau hybride, et au moyen de détecteurs un élément moteur de passage est utilisé pour contrôler le niveau de commande. Si le niveau de commande utilisé échoue, l'élément de passage choisit l'autre et réduit celui qui a d'abord servi.

Fig. 5 montre les éléments contrôlant l'image qui sont de droite à gauche en bas: le modulateur, l'étage modulateur et la commande d'images, le mélangeur et amplificateur linéaire et enfin l'oscillateur autodyne. Immédiatement au-dessus il y a l'élément à réaction niveau de suppression et un panneau vide qui peut être remplacé par un élément de passage lorsqu'un fonctionnement parallèle est requis. Fig. 3 nous montre les éléments au-dessus de ceux décrits qui sont le modulateur m.f, le générateur harmonique et le moniteur d'enceinte h.f. L'article décrit ensuite des circuits utilisés. La commande m.f.q fut décrite dans *Sound & Vision*, Vol. 3, No. 1.

Il y a deux versions des amplificateurs 500 W, l'un pour la Bande I, l'autre pour la Bande III. Ils ne diffèrent que par l'élément h.f posé. Dans la Fig. 3 les amplificateurs sont les deuxième et troisième éléments du haut. Le reste des meubles comprend arrivée de courant, élément de contrôle, appareil de soufflage, filtre à air et sectionneur à la terre. Les amplificateurs utilisent la valve 4CX250B qui est très compacte et a un isolement entièrement en céramique. Deux de ces valves fonctionnent dans la Classe AB pour donner 500 W de puissance d'image à l'antenne sans tirer sur le courant de grille.

Des amplificateurs exactement pareils sont utilisés pour image et son, bien que les amplificateurs du son soient accordés différemment. Des atténuateurs harmoniques sont fournis dans l'équipement et associés à ceux-ci il y a des sondes de contrôle dont les détails exacts sont déterminés par l'installation à utiliser.

Les rectificateurs utilisés sont des diodes au silicium entièrement protégées contre les tension de choc ayant leur origine dans l'équipement et contre des excès sur la tension h.f du secteur jusqu'à 2000 V. Les circuits de contrôle comprennent un disjoncteur à commande pneumatique, un relai à tension de polarisation, une surcharge totale c.c haute tension pour les quatre valves principales. Ces dernières sont reliées à un système de recyclage qui, une fois déclenché, rétabliront deux fois la haute tension avant de couper finalement le circuit. Donc une panne momentanée n'entraînera pas une interruption du service. La protection primaire de tous les circuits se fait par disjoncteurs miniatures.

L'article mentionne ensuite les avantages bien connus de fonctionnement en parallèle et décrit les dispositions de phase et démontre qu'il ne faut pas une très grande précision.

Grâce aux commutateurs à fiches et à douilles entre les éléments l'installation est très simple et la plupart des connexions peuvent être aériennes de sorte qu'il ne faut pas de fondations spéciales. De même il ne faut pas de canalisation d'air et ainsi l'installation de l'équipement est simple et rapide.

UN NOUVEAU MELANGEUR DE SON POUR LA TELEVISION

D. B. Manning et D. R. Mynard

Au cours de ces dernières années, les facilités disponibles avec les Equipements pour le Contrôle du Son sont peu à peu devenues plus stabilisées. Grâce à l'expérience acquise en concevant nombre d'équipements modulaires spécialement construits, il s'est avéré possible d'élaborer une gamme de panneaux de contrôle standards qui font face à la plupart des besoins modernes.

Cet equipement est connu comme Type B1103 pour le Contrôle du Son. Entièrement transistorisé et conçu pour studio ou utilisation mobile, il peut s'étendre de 12 à 24 bandes. Des caractéristiques supplémentaires telles qu'image double et filtres correcteurs des courbes de fréquence peuvent être ajoutées sur panneaux auxiliaires.

Facilités fondamentales (Fig. 1)

Le panneau de base a 12 voies avec deux groupes ou commandes de sous-régie et une commande principale. On peut varier le groupage des voies en commutant quatre d'entre elles sur une des commande de sous-régie. Ces quatre voies peuvent aussi choisir des entrées haut niveau ainsi que des entrées microphone. Des potentiomètres de réglage à type fiche quadrant sont utilisés dans toutes les positions de contrôle (Fig. 5). Les pré-amplificateurs de voie peuvent aussi être enfichés dans le panneau avant entre les potentiomètres de réglage à quadrants.

Les deux groupes d'amplificateurs ont chacun deux sorties isolées. L'un vers le potentiomètre de régie et les amplificateurs de la sortie principale, tandis que l'autre sortie peut être choisie comme on veut vers une sortie "alimentation propre". Cette dernière facilité permet de transmettre un groupe d'effets sons sur programmes internationaux sans avoir le commentaire dans la langue locale.

L'amplificateur principal a deux sorties isolées pour alimenter les lignes sortantes et l'équipement de communication local.

Des facilités auxiliaires comprennent l'écoute préfondue sur chaque voie, les commandes de gain pré-réglées pour empêcher surcharge de signaux forts et une sortie séparée pour sonorisation extérieure. Cette dernière consiste en une clef pour chaque voie qui permet d'alimenter les voies choisies par amplificateur séparé. Celui-ci peut être relié à des amplificateurs de haut-parleurs au studio afin qu'acteurs et spectateurs puissent participer davantage au programme.

Le contrôle de toutes les sorties, principale et auxiliaires, peut se faire séparément par haut-parleur et programmemètre. Ce dernier peut être soit un volumemètre conçu pour faire face aux spécifications standards américaines, soit un programmemètre de pointe transistorisé se conformant aux spécifications de la British Broadcasting Corporation (Fig. 3).

Un oscillateur est construit pour fournir un signal d'étalonnage pour le programmemètre et un signal d'essai en ligne.

Un panneau auxiliaire donne un effet "image double" qui se mélange sur huit des douze voies. Il y a aussi deux filtres correcteurs pour varier la fréquence de réponse à 60 c/s, 3 Kc/s et 10 c/s. Celle-ci peut être commutée sur certaines voies si nécessaire.

Conception mécanique

Le Mélangeur de Son, Type B1103, est un panneau de contrôle plat conçu pour être assortie avec le Mélangeur d'Images, Type B3714. Placé dans un simple retrait rectangulaire dans un pupître, il doit avoir une surface en pente de 15° environ de l'horizontal (Fig. 6). Ceci permet à l'opérateur de faire fonctionner les potentiomètres de réglage facilement et pourtant de voir le compteur et toutes les commandes de fonctionnement. L'élément auxiliaire (écho), si nécessaire, est monté de façon permanente sur le panneau principal et peut être placé à un angle plus aigu si on le désire (Fig. 4).

Toutes les connections avec les panneaux sont par fiches et douilles montées à l'arrière. Ainsi l'installation est simple et l'entretien facile.

Un circuit d'alimentation séparé de 24 V c.c est doté de deux sorties, 1 A pour les amplificateurs et 750 mA pour les lampes et circuits de signalisation.

CHAINE DE QUATRE STATIONS DE TELEVISION EN SUEDE DU NORD

B. G. Sellin

La Suède est connue pour et dépend en grande partie de son exportation de minerai de fer. Ce minerai de trouve surtout en Kiruna et en Gallivare, régions du nord du pays. Un chemin de fer allant de Kiruna, à 160 km au nord du cercle arctique, prend le minerai à destination du port de Narvik en Norvège du nord.

Le personnel d'entretien et leurs familles, s'occupant de ce chemin de fer important et mouvementé, doivent passer l'hiver long et noir là-bas, et la télévision de Kiruna aide beaucoup. En dépit du coût élevé d'assurance d'un service pour un nombre comparativement limité de gens dans une région montagneuse, l'importance du bien-être du personnel s'occupant des chemins de fer décida les autorités à fournir une chaine de télévision et de traducteurs à modulation de fréquence pour desservir la région.

Fig. 4 montre le terrain sur la route. Après une étude de la carte, une expertise physique de la route eut lieu. Afin de pouvoir les desservir, les stations devaient se trouver le plus près possibles de la gare. Fig. 5 montre les profiles des chemins des différents réseaux. Des équipes d'experts se servirent d'hélicoptères pour le transport pendant l'expertise.

Après des discussions avec la Finlande et la Norvège un plan de fréquence pour les stations fut élaboré:

Tornetrack: Voie 4 avec polarisation verticale
Stordalen: Voie 7 avec polarisation verticale
Bjorliden: Voie 7 avec polarisation verticale
Vassjaure: Voie 3 avec polarisation horizontale.

L'Administration des Télécommunications de Suède s'est servie avec succès du traducteur Marconi B6400 50 W pour une grande partie du réseau traducteur TV suèdois étendu. Pour toutes les stations de traducteurs à modulation de fréquence elle s'est servie des traducteurs Marconi B6401 (voir Figs. 6 et 7). Il fut décidé d'utiliser cet équipement pour cette route.

Comme il n'existe pas de routes dans cette région, accès aux stations se fit par chemins frayés par des tracteurs depuis la gare. Des hélicoptères servirent également pour transporter l'équipement. Du fait qu'il y a peu de végétation dans cette région, il est facile de créer des chemins.

L'énergie (15 kW par station) fut obtenue des lignes de service haute tension le long du chemin de fer. Comme cette énergie n'était pas triphasée des stations transformateurs furent construites près du chemin de fer et des câbles souterrains amenés à la station. Dix circuits téléphoniques furent aussi posés.

Figs. 8 et 9 montrent les cabanes de traducteurs et le dispositif interne. Il fallut construire de juin à septembre quand il n'y avait pas de neige. Il fallait ancrer fermement les bâtiments au rocher à cause des vents qui soufflent.

Des pylones à treillis standards de 36 m furent utilisés, les haubans soigneusement dirigés pour éviter atténuation et réflections des antennes Yagi qui sont en aluminium avec 3, 6 ou 8 éléments. Le positionnement fut choisi avec soin pour donner un balayage suffisant et pour fournir un bon signal aux stations suivantes. Pylones et antennes sont conçus pour des charges lourdes de glace et un vent très fort.

L'entretien principal se fait par personnel venant de la station à Kiruna mais les habitants locaux vérifient les lectures du compteur, indiquent les fautes, changent les fusibles, etc.

Le fonctionnement des stations sans personnel ne constitue pas un problème car les traducteurs sont toujours mis, mais ne transmettent que lorsqu'un signal est reçu. Un équipement pour passage automatique de service à repos sera installé par la suite. Actuellement le passage se fait localement des villages voisins par ligne téléphonique.

JAMHURI—DECEMBRE 1964

R. J. Davey

Lorsque le Kenya célébra en décembre 1963 son indépendance, la jeune organisation de radiodiffusion fit honneur à l'occasion en fournissant un programme englobant tous les événements qui fit preuve d'improvisation et d'ingénuité. Le décembre suivant le Kenya devint une République au sein du Commonwealth, et l'organisation de radiodiffusion du Kenya—la Voix du Kenya—dut à nouveau faire face au problème de rapporter les événements. Elle basa ses plans sur l'expérience acquise pendant les manifestations en honneur de l'Indépendance mais cette fois-ci il fut décidé qu'elle aurait un équipement à elle et non emprunté comme l'année précédente. Une commande fut donc passée d'urgence à The Marconi Company pour deux Ensembles Enregistrements Extérieurs à 2 caméras munis d'un Ampex VR1100. Un deuxième enregistreur fut installé dans la salle principale du studio.

Côté son, tout alla conformément aux prévisions et l'installation au 4 décembre était en bonne voie.

Mais côté télévision, les affaires étaient plutôt pagaille. Il fallait envoyer la plupart de l'équipement pour prises de vue extérieures par cargo et il y avait eu du retard. Le véhicule aussi n'était pas prêt. Un autobus fut donc emprunté et converti et Marconi envoya par avion un autre jeu d'équipement caméra. L'équipement de mixage fut reprise aux studios et un début d'installation eut lieu. Les magnétophones vidéo arrivèrent le 6 avec un ingénieur Ampex qui put aider à mettre au point.

Le cargo avec l'équipement caméra arriva à Mombasa le 5 décembre, et après des difficultés considérables arriva à Nairob le 8. De grands efforts furent faits et l'installation d'enregistrement fut terminée juste à temps.

Les fêtes commencèrent le 10 décembre avec le départ des troupes britanniques du Kenya. Puis les événements se succèdèrent rapidement pendant toute une semaine, avec commentaires radio et télévision pour tous les événements d'importance, y compris l'assermentation du nouveau Président et de ses Ministres, le droit de cité, les fêtes, parades, match de football et de boxe.

Des bandes vidéo furent livrées à Broadcasting House par chauffeurs de la police et transmises 40 minutes après l'événement.

En écrivant aux autorités de la radio plus tard, le Président Kenyatta déclara: "Je vous écris pour vous féliciter de l'excellent travail que vous avez fait à la radio et à la télévision pour les célébrations d'Indépendance récemment terminées. . . ."

OBJECTIFS A FOCALE VARIABLE

A. G. Husselbury

Au cours de ces dix dernières années les objectifs à focale variable à gamme étendue et haute performance se sont beaucoup développés. Ceci veut dire que le cameraman et le dessinateur ont maintenant un choix entre une tourelle d'objectifs avec lentilles à focale fixe ou un objectif à focale variable. Cet article fait une comparaison entre les mérites respectifs de ces deux systèmes.

Coût

Le coût d'achat pour équiper un studio de caméras à tourelle est plus élevé que l'achat de caméras à objectifs à focale variable. Le coût supplémentaire de l'objectif à focale variable ("zoom") sur l'équipement à tourelles est plus que compensé par le coût de la tourelle et des facilités servo-iris nécessaires.

Ceci est encore plus vrai avec les ensembles pour prises de vue à l'extérieur où il y a d'habitude déjà des caméras à objectif à focale variable.

Ces caméras à objectif à focale variable, manuellement plus statique, ont besoin de montages moins coûteux.

Les frais de fonctionnement sont aussi moindres pour les caméras à objectif à focale variable.

Performance technique

La performance optique de l'objectif zoom est comparable avec celle de l'objectif à distance focale fixe, et il n'y a guère de différence entre les deux du point de vue entretien.

Le grand mérite de la caméra zoom est sa simplicité mécanique. Une simple lentille à focale variable, un servo-iris et un distributeur présélectionné à image orthicon remplacent un support complexe de tourelles, un système chariot pour le distributeur à image orthicon et un système de commande complexe multiiris.

Performance de production

Bien qu'il ne soit pas si facile ici de dire ce qui en fait constitue un avantage, certains points sont indéniables.

1. Légèreté, volume restreint et discret sont mieux réalisés avec la caméra à objectif à focale variable.

2. Les caméras à objectifs à focale variable sont beaucoup plus flexibles pour l'angle de visée horizontale.

3. Les arrangements de contrôle pour les objectifs à focale variable permettent huit angles de visée horizontale préréglés au lieu de quatre pour les tourelles. L'interférence optique limite les combinaisons d'objectifs possibles avec les caméras à tourelles.

4. La caméra à objectif à focale variable est plus silencieuse et donne un contrôle plus uniforme, surtout lorsque des servo-mécanismes sont utilisés pour mise au point et changement de plan.

5. Changements de plan, bien que moins utilisés de nos jours, sont fort utiles. Ils servent aussi pour "travelling" surtout dans les petits studios.

Pour des raisons économiques et techniques, la caméra à objectif à focale variable est nettement supérieure à la caméra à tourelle d'objectifs.

NOUVEAU CENTRE DE STUDIO EN AUSTRALIE

Eric Hitchens, A.M.I.E.E, A.M.I.E.R.E

L'extension continue de la télévision en Australie depuis 1956 a amené l'introduction d'une troisième programme commercial à Sydney et Melbourne. United Telecasters ont obtenu une licence pour faire fonctionner la station de Sydney utilisant l'appel TEN-10. Amalgamated Wireless (Australasia) Ltd (A.W.A) et Marconi en collaboration avec United Telecasters ont conçu une station avec économie de personnel et centralisation comme but principal, en incorporant les plus récentes techniques, dont le fonctionnement "sans mains" des caméras et la commutation continue.

Salle d'appareils centrale

Une stabilité accrue a permis de grouper dans une seule zone tout l'équipement électronique à l'exception de l'audio studio. (Voir Figs. 1 et 2.) Des facilités de contrôle compréhensives installées dans cette zone comprennent l'image orthicon Marconi Mark IV et les appareils de contrôle de caméras vidicons A.W.A. L'image de sortie de toute caméra peut être commuté sur un moniteur de forme d'onde et image B3900 par un panneau unisélecteur B3716 contrôlé par boutons de code devant le moniteur. L'image du milieu et le moniteur de forme d'onde peuvent contrôler toute entrée d'image à la commande de la régie centrale.

Magnetophone vidéo télécinema

Il y a à présent trois appareils de télécinéma, deux magnétophones vidéo VR2000 et un explorateur de sous-titres opaque. Les appareils de télécinéma et de sous-titres sont entièrement contrôlables, et les magnétophones vidéo partiellement contrôlables de la salle de régie centrale. Le nécessaire est prévu pour recevoir six télécinémas, six magnétophones vidéos et deux explorateurs. Des projecteurs de diapositifs sont munis d'un élément bande d'essai basse fréquence avec liaison automatique.

Un panneau de commutation délégué dans la salle centrale des appareils est utilisé pour diriger différentes facilités contrôlés vers les studios et la régie centrale. Chaque studio et salle de régie peuvent avoir contrôle de deux télécinémas, deux magnétophones vidéo et de l'explorateur.

Salle de régie centrale

Ici, un seul homme peut diriger la projection du programme à transmettre, et les commutations complexes nécessaires pendant un changement de stations. Le commutateur utilisé est un dispositif de voie voisine utilisant le Panneau Unisélecteur B3717 et une mémoire à huit événements. Il peut fonctionner manuellement, séquentiellement ou automatiquement. Un niveau de contrôle son automatique sophistiqué est installé. Pour les sources de son séparés un mélangeur son à quatre voies est posé.

Studios A et B

TEN-10 a deux grands studios, Studio A de 800 m² et Studio B de 480 m². La salle de régie est indiqué (Fig. 5).

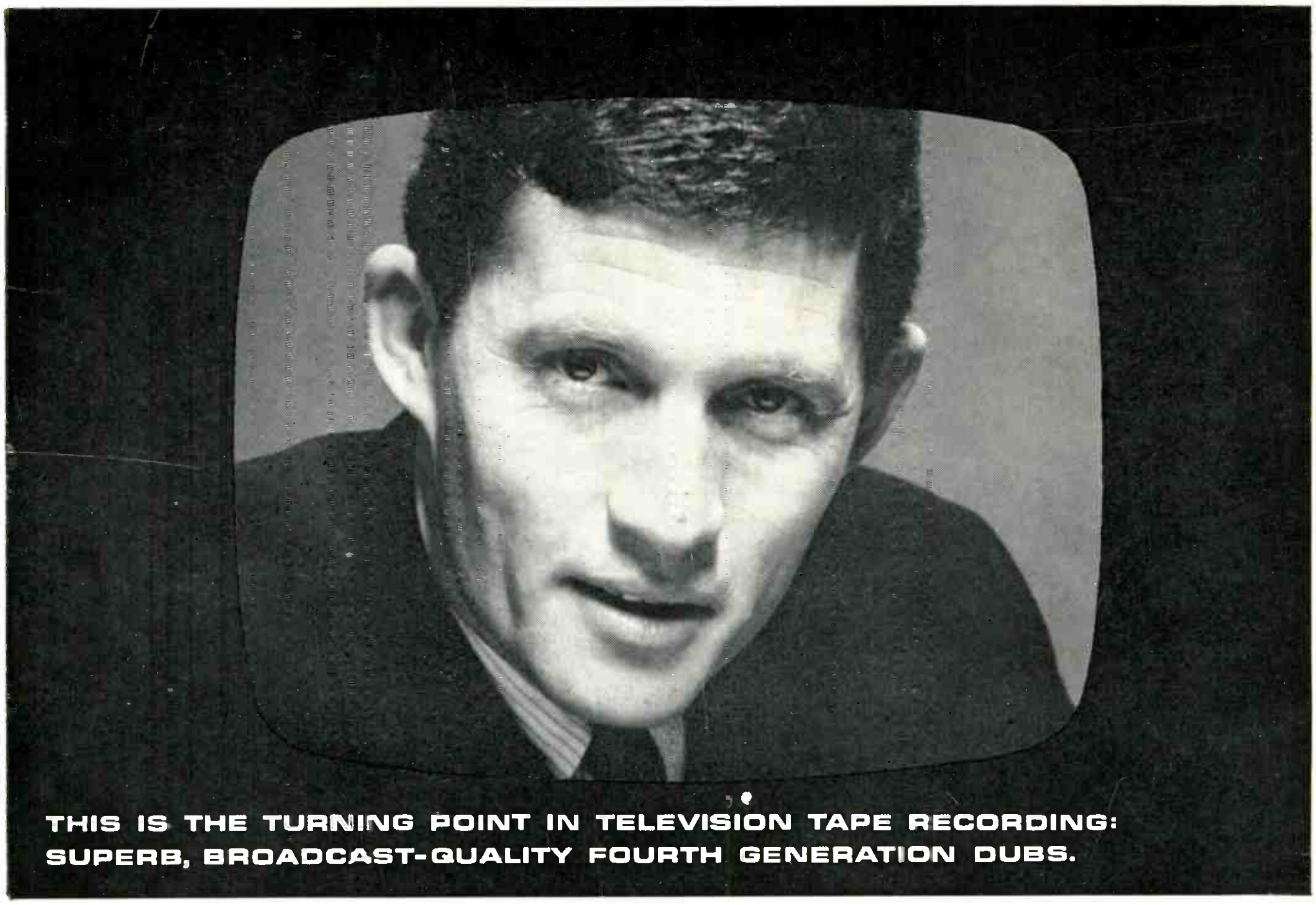
Le plateau vision et éclairage permet le fonctionnement "sans mains" et un seul homme contrôle les quatre caméras image orthicon Mark IV avec un levier de commande, ainsi que les vidicons téléciné.

Studio C

Un petit studio près de la régie centrale est utilisé pour les nouvelles et des interviews. Deux caméras image orthicons Mark IV sont utilisés, l'un avec décentrage contrôle et objectif à focale variable 10:1. Un commutateur d'aspect de l'image (B3715) est installé et un studio de secours C peut faire la commutation des stations à la place de la régie centrale.

Camionnette pour prise de vues à l'extérieur

Pour les prises de vues à l'extérieur, une camionnette-caméra 2 Mark IV est employée.



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