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The B3404 telecine in New Zealand

Summary

This article relates how the monochrome telecines were replaced by Marconi B3404 telecines at three television centres in New Zealand and mentions factors affecting the floor plan adopted.

The Marconi B3404 telecines are paired in adjacent booths and may be operated either locally from the booths or remotely from vision control rooms. When in remote they are controlled by a single wire multiplex system of New Zealand design. The staffing arrangements in New Zealand as regards telecines and how telecines are used operationally are discussed briefly.

Introduction

With the decision to convert the then existing monochrome service to colour it became necessary to replace the monochrome telecine chains. As a first step in the conversion programme it was decided that two colour telecines would be purchased for Auckland Studios.

Following the evaluation of world-wide tenders two Marconi B3404 telecines were selected. Approximately one year later approval was given to convert the Christchurch and Dunedin studios to colour. As a result of this, and the decision to start a second channel also in colour, an additional eight Marconi B3404 telecines were bought, again following the calling of tenders.

The distribution of telecines when they had been delivered was four in Auckland and three each in Christchurch and Dunedin. Subsequently, one of the Christchurch telecines was shifted to Hamilton, a small monochrome station, which was being converted to colour.

Facilities chosen

The Marconi B3404 telecine model purchased by New Zealand Television was the edition with two 16mm projectors and dual slide projectors. As they would be moved only at infrequent intervals, and as it was intended to run the telecine from 24 hour power sources to minimize the drift of parameters, it was decided that the Automatic Registration Unit was unnecessary. Subsequent experience has proved this design point valid as only minor adjustments to registration are needed each day and the time required for these is minimal.

Of the other options available the following were bought for all telecines:

(a) Auto-exposure and Auto-black
(b) Auto colour
(c) Variable gamma.

Two other options, the Frame Counter and the Preview Camera, have been fitted to one machine so that they can be evaluated to determine whether they are of some benefit operationally considering the uses to which telecines are put here in New Zealand. The other option currently available, Optical Mix, has not been purchased.

Layout

An exercise was carried out to determine how many colour telecines could be physically accommodated in each station as replacements for the monochrome machines already installed. It was soon apparent that with the space limitations in each telecine area, the choice of colour telecine type was limited to those which adopted a cabinet or similar front-loading layout.

Following this decision detailed drawings were prepared of possible layouts for the telecines in each area. Eventually, and after considerable discussion, it was decided to pair the telecines in booths. See figure 1.

This layout was standardized for all the television stations and it became possible to do direct telecine to tape dubbings without the need to involve a control room. Thus a saving could be made in the number of control rooms needed at any one time.

(A) TELECINE BOOTH LAYOUT

As can be seen from figure 1 two machines are placed facing each other. Normally they are pushed back against the walls behind them, and only rolled forward

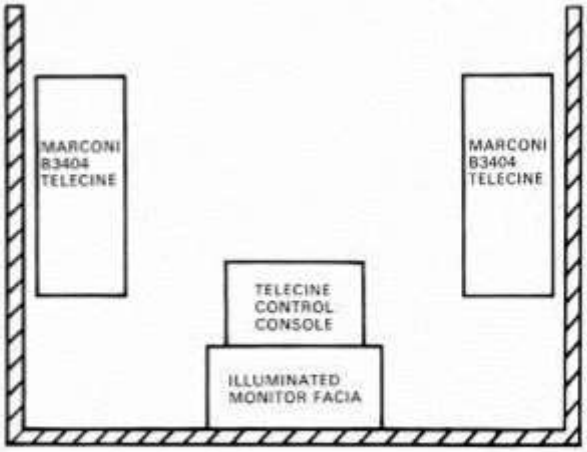

Figure 1. Telecine booth layout

Figure 2. Auckland showing console and illuminated surround

when access to the back is required. This arrangement was adopted for all the centres except Dunedin where there was more space available. In the case of Dunedin no walls have been built behind the telecines and in effect their backs become the outer lines of the booth. This has proved to be better from the point of view of servicing but sound isolation between the booths and the rest of the room is poor.

Between the telecines a booth comprising a console and an illuminated surround for picture monitors was built (figure 2). The two halves of the console and monitor facia are identical. The intention was that two operators could sit side by side and each control a telecine with no sharing of any controls or monitors.

There was some concern initially that with two programmes running simultaneously in the one booth either operator could be distracted by the other's programme. To overcome this it was intended that one operator or both would monitor the sound using headphones and that a blind or blinker could be pulled down between the monitors so that each operator could see only their own programme. In practice these measures have not proved necessary, partly because one telecine could be operating on remote assignment to a control room and partly because the distraction was not as great as was first feared.

(B) MONITOR FACIA

The monitor facia (figure 3) incorporates two 38cm colour monitors, two 35cm monochrome monitors and two Tektronix 528 waveform monitors. The ratio of surround-to-monitor area is considerably less than recommended, the size of the facia being determined basically by the size of the booth, but has nevertheless proved adequate. For this reason the facia is only a little deeper than the monitors. The illuminated surround is lit directly by a mixture of fluorescent and incandescent lamps to achieve a colour temperature of 6500K. For servicing, the monitors are removed from the front, and there is a limited access through doors in the sides for lamp changing, etc.

(C) CONSOLE

Panels on the console are arranged in two rows with the camera controls nearest the operator and traction

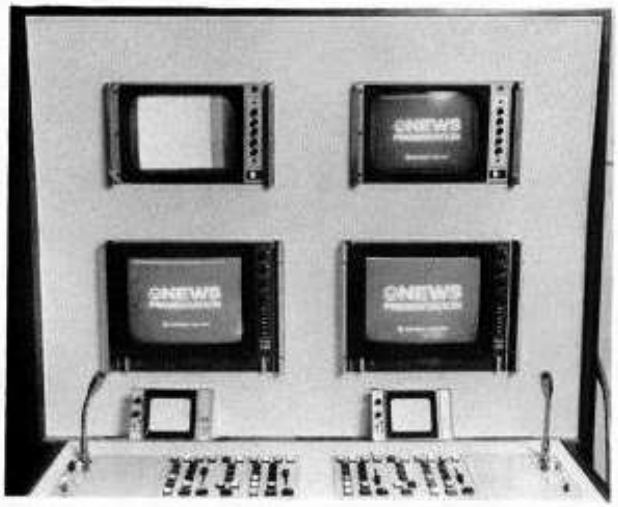

Figure 3. Monitor facia

controls farthest away (figure 4). In between the two rows of telecine panels a monitor selector panel for sound and vision is mounted. Also provided in the same row as the traction controls are talkback panels and a blank panel where a frame counter remote control panel could be installed in the future if necessary (figure 5). At present no space has been allowed for optical mix panels as this option was not available at the time the console design was finalized. It is expected that this panel could be fitted if required with only small alterations to the layout.

Camera controls were placed nearest each operator as it was considered they would be used frequently

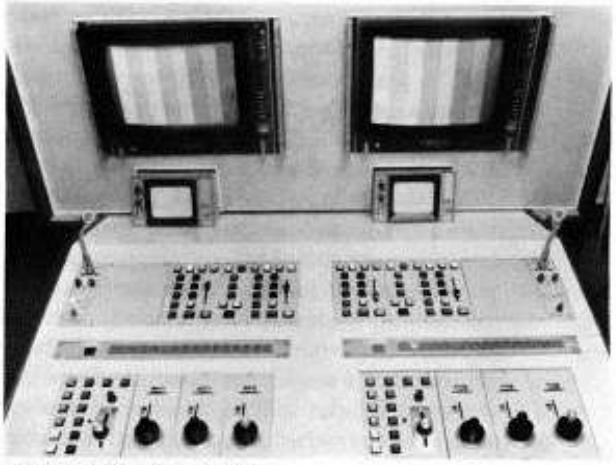

Figure 4. Control console

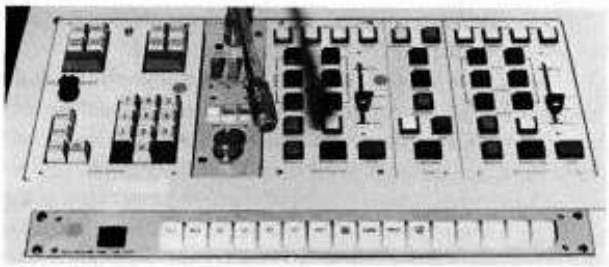

Figure 5. Console showing the frame counter panel

during a programme, whereas the traction controls, once a selection had been made, would be seldom touched again. However, this has proved to be not always the case, particularly when doing short items such as commercials or when using a frame counter. As a consequence this makes it a little awkward for the operators to use these controls without disturbing the camera controls.

(D) OTHER FACILITIES

Located in or near each booth is a rack of equipment which is not shown on the diagram of the booth layout. This rack contains the colour black to sync pulse decoder for each telecine, the Data Link Terminal, the telecine local/remote control unit and the sound follower assignment panel which enables any sound follower to be assigned to any film projector on any telecine. The sound followers themselves are located adjacent to the telecine booths. Sondors are provided in Auckland and MagnaTechs in Christchurch and Dunedin with no sound follower provided for Hamilton.

(E) AUDIO AND VISION DISTRIBUTION

The first output of each telecine coder is connected to the station video distribution system for programme use and monitoring. One output of this distribution system is controlled by each telecine's monitor selector panel located in the facia booth console. This output is connected to the A inputs of the facia monitors for that telecine. With this system the operator can select his own or other telecines, control rooms, off-air and test signals. A similar, but less extensive, system is provided for audio monitoring.

The second output of each telecine coder is wired directly to the B input of that telecine's monitors, which enables the operator to view the output before it goes through any amplifiers.

Remote control and assignment

When a telecine is assigned to a control room, the vision and sound are routed through matrices to the control room, talk back circuits are made and all the remote controls and tallies for the telecine, with a few exceptions, appear in the control room. As a large number of conductors would normally be required to achieve this, a single wire multiplex Data Link System, designed by the BCNZ, is used. Thus controls and tallies are not routed via a matrix but are interconnected by sending a destination address with each 'packet' of data along the Data Link. In operation the remote control panels can be regarded as being physically connected to the assigned telecine.

With this system the telecines can be controlled from a remote destination with only loading of films and slides being done in the booth. In each control room two complete sets of telecine panels are usually provided. An additional facility, a Telecine Change-over Unit, is provided, which enables each telecine to be controlled from its booth or from its assigned destination. If assigned to a destination with remote control panels it is controlled there unless the local/remote switch on the Change-over Unit is in the local position when local (booth) control is obtained. When assigned to a destination with no remote panel, control remains automatically at the booth. Mechanical and electronic controls can be switched separately and the local/remote switches on each telecine still function as normal.

To overcome the possiblity of a serious failure in the Data Link and Telecine Change-over Unit the same connectors as are used on the telecine panels are used on the Data Link so that the booth panels can be connected directly to the telecine if necessary. The only major item that cannot at present be assigned using the Data Link System are the frame counter remote panels. If the need is shown for these units to be used extensively in remote control rooms it will be possible to extend the Data Link System to accommodate them. This limitation would apply similarly to optical mix remote panels should this option be purchased in the future.

Staffing

The Marconi B3404 telecines are operated by girls designated as Technical Operators who load films and slides, colour-grade the pictures and who usually carry out the daily alignment check which includes checking and adjusting if necessary resolution, registration and grey-scale tracking.

Skilled back-up is provided by telecine maintenance technicians who do the normal servicing required and more thorough alignments at regular intervals. They have had instruction on how the Marconi B3404 telecine works from Marconi installation engineers and BCNZ engineering staff during visits to the various television stations, and some have now been on a formal training course for the Marconi B3404 telecine conducted by the BCNZ Training Section.

Where specialist knowledge is needed, such as for major overhauls or modifications and for serious problems, BCNZ engineering staff provide assistance. BCNZ Engineering consults with Marconi at intervals, or as needed.

Operational usage

The first two telecines delivered were installed at the Auckland studios early in the colour conversion programme. There were few colour facilities available as little work had been done on converting the station. The two telecines were therefore placed in a temporary area for about a year before being shifted to one of the new booths. During this time they were used extensively for training and also for simple production work such as the transferring of film commercials to tape, the origination of film excerpts for studio productions and for news inserts. This workload gradually increased as the colour conversion programme gathered momentum.

With the commencement of the second television channel which originates from Auckland, the workload increased dramatically. Consequently at Auckland two

telecines and one booth are committed to transmission. These machines are used for the playing of programmes, and provision of slides for programme summaries. Normally, however, no commercials are played as these are all on quad video cassettes. Outside transmission hours these two telecines are used for production work.

The other two telecines in the second booth are set aside for production. Typical work includes the making of commercials, news inserts, viewing of films by film censors, film inserts for productions, transfer of filmed productions to videotape and supply of slides for chroma key effects generators.

The one frame counter and memory purchased has been installed on one of these telecines and one of its uses will be to provide a frame count superimposed on to the video signal to be recorded on a helical video tape recorder. This will enable film censors to view the recorded videotape and make their editing decisions away from the telecine. When decisions are finalized the frame counter equipped telecine will be used to carry out the actual editing. By adopting this approach the chances of film damage are considerably reduced as well as the amount of time taken for each job, thus making more time available for other work.

The single B3404 telecine at the Hamilton Studio is used for minor production work and the preparation of commercials. It is installed in a cinetape room with a booth console and monitor facia similar to those in other stations. The console has mounted in it, in addition to telecine control panels, the control panels for the studio camera. Consequently the cinetape room is used as the vision control room for the station.

The B3404 telecines at Christchurch and Dunedin are used for news inserts, production work, preparation of commercials and the playing of stand-by programmes for the South Island if programmes ex Avalon or Auckland Studios cannot be received due to microwave link failure. At Christchurch both telecines are in a standard booth and at Dunedin two telecines are in a standard booth while the third is in a half booth (figure 6) where the console and monitor facia are only large enough to accommodate one set of telecine panels and monitors. This arrangement was adopted because of space limitations.

Until recently the telecines in all centres were controlled from the booth consoles as the Data Link Units were still being installed. Therefore the decision to build the booths has been well justified for without them it would have been difficult to utilize all the telecines so extensively. With the Data Link System now being operational, full advantage can be taken of the assignment and remote control facilities in addition to the desirable features provided by the booths.

Owing to the instant start and high speed spooling of the 16mm projectors the telecines have proved to be very good for news inserts. Practically, it has meant that the deadline for when material needs to be loaded can be very much closer to the on-air time compared with telecines with conventional single-speed type projectors. The fast spooling feature has also proved useful in the preparation of trailers for coming programmes on feature films as the excerpts required are often widely separated on the one reel.

Figure 6. Dunedin showing half booth

Modernization

As the initial orders for the Marconi B3404 telecine were placed soon after its release date, New Zealand was supplied with very early models, in fact the first and third off the production line. The second order for eight placed at a later date meant that modification states varied widely. As part of the programme to maintain and improve standards it was decided to update all telecines to the same modification state and carry out further work so that they would be at the same state as the current production ones. This involved the BCNZ in a considerable amount of work, but with the close co-operation of Marconi most of the work outstanding has now been completed with entirely satisfactory results.

Conclusion

The B3404 telecine has been found very suitable for the operational requirements of New Zealand Television. Despite its advanced design technical staff have had little difficulty in changing from monochrome valve telecines to these solid-state colour telecines. The use of booths achieved satisfactory conditions for grading colour films with only a small financial outlay at a relatively early stage of the colour conversion programme and this enabled the telecines to be fully utilized. Training of operators was as a consequence made much easier.

Acknowledgement

The author wishes to thank the Controller of Engineering Services, Broadcasting Corporation of New Zealand, for granting permission to have this article published, and to the technical staff in Auckland, Christchurch and Dunedin for the valuable assistance given in installing the telecines and booths.

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Engineering a television service for British Forces in Germany, Part 2

Summary

In the previous issue, Part 1 of this article dealt with the Planning, Engineering and Management of the project.

Special considerations applying to the transmission of the signals from the United Kingdom to Germany were discussed and also the conditions applying to the redistribution of programmes to widely separated pockets of viewers.

Part 2 deals with the implementation of the project and discusses some of the problems yet to be solved.

Implementation phases

As explained in the first part of this article the system has for convenience been divided into 6 main phases, with further sub-divisions being made as found necessary in the large sections.

PHASE 1

The Company was asked first to provide a service for personnel stationed in the more isolated Celle region which has limited amenities. Following a visit to the town and careful analysis of the number of potential viewers serving in each location within the area, the Company were asked to provide the 5 stations shown in figure 6.

The programme provided by the transportable control room currently sited at Celle is used to modulate the local transmitter and the NERA microwave link 0·5W transmitter, the single output of which is used to feed both the Bergen and Fallingbostel facing antennas via a 3dB waveguide splitter. On subsequent phases using the 10W EEV TWT amplifier, consideration is being given at multiple distribution branch points, to extending this technique to feed four antennas from one transmitter. Due to its passive nature this arrangement is reliable in service and most cost effective in deployment of equipment.

At Bergen, sited not far from Belsen, and Fallingbostel the link demodulated video and sound channels are used to feed the local broadcast transmitters while a second i.f output from the receivers drives the microwave link transmitters for onward transmission to Munsterlager and Soltau respectively. Since these two stations are termination points in the present arrangement and the system is uni-directional, microwave transmitters are not required at these points and the demodulated signal is connected only to the input circuits of the broadcast transmitters. On Phase 1 only the sound channel is transmitted on a sub-carrier

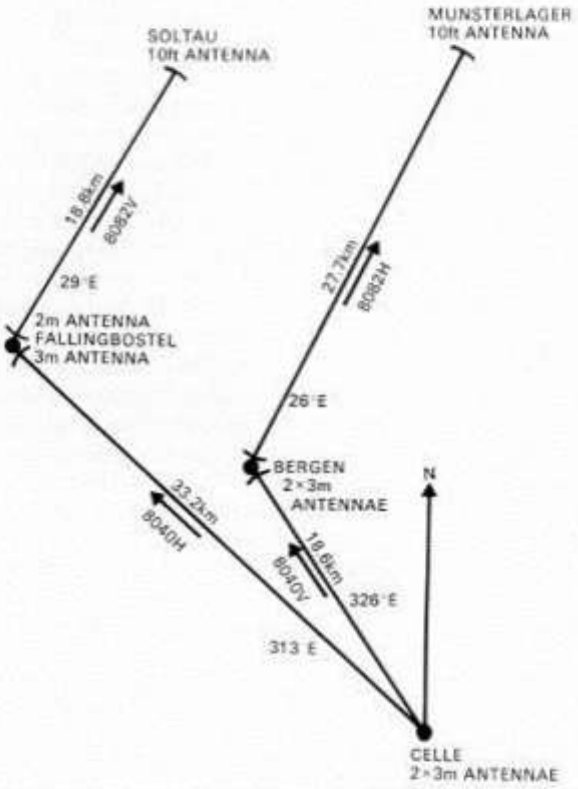

Figure 6. Phase 1 microwave routeing diagram showing bearings, distances and frequencies.

placed above the video band. In the interests of high performance, sound in sync will be used for the remainder of the system.

It will be noted that both routes use the same microwave frequencies in the 8GHz military band, sufficient protection being obtained by the use of 2 and 3m antenna dishes and 90° polarization rotation. Fading margin is of the order of 30dB for each path. Link equipment is duplicated with automatic changeover to provide a continuity of service for well over 99.9% of programme time.

Even before the supply contract was received, a prototype B7303 television broadcast transmitter was designed, tested and sent on a loan basis to Celle in the early spring of 1975 for trials. The results were so successful that the transmitter was retained on site until the production equipment had been installed at

the beginning of 1976. Prior to the arrival of the transportable studio at Celle, test patterns and audio tones were used to modulate the transmitter. The inaugural BFBS VTR transmission from Celle took place at 1900 hours on 19 September 1975.

Formal installation activity in Germany commenced in the late autumn of 1975 and towers at the four outstations were erected by Company riggers on prepared foundations as soon as local weather permitted in 1976. Early spring saw delivery of the first completely installed container to Bergen, the remainder following in quick succession. Soltau, the last station of this phase to be installed was completed by the end of May. Following overall testing and adjustments outside programme hours, the system was finally handed over, using standard MOD (PE) procedures in early July. The Company provided initially a small team of engineers, based on Bergen, to supervise maintenance of the system until local staff could be recruited and trained. Since the broadcast transmitters are not duplicated, two spare equipments have been supplied enabling a maintenance philosophy based on module replacement to be implemented.

It is understood that the service now available is much appreciated by the British Forces and their families stationed within the coverage areas since this additional amenity, apart from providing entertainment, forges a much closer link with relations and friends at home by seeing the news and pictures only a few hours old. Parallel screening of popular television programmes like Coronation Street, also generates discussion and engenders correspondence on items of topical interest. Currently transmissions run for approximately 56 hours a week, including schools programmes and 'Good Afternoon' for wives from 13.30 to 15.00 and main features with news from 17.00 to 23.30 hours.

Figure 7. Test transmissions in progress from Soest.

PHASES 2 AND 3

Long before completion of Phase 1, planning of Phase 2 commenced. Originally the backbone of this phase was planned to follow the STARRNET route back to Werl.

Following a detailed study of requirements, and taking into consideration the present loading of existing towers, a divergent route via Hunenburg, Lippstadt and Soest was suggested from Luebbecke to Werl.

Representatives of the MOD (PE) Project Manager, the Communications Project Agency of the School of Signals (Blandford) are now stationed in Germany to liaise with the CSO of BAOR, the Joint Frequency Planning Board, the German Construction Agency, the Deutsche Bundespost and many other authorities responsible for siting and planning permission.

The planning of Phase 2 is well advanced and arrangements for site preparation have been made. For these two phases the Property Services Agency is responsible for the purchase and erection of all antenna supporting structure ready for Marconi riggers to install the antennas and the associated waveguide runs. Since nearly 60 stations are involved each phase will be spilt into stages for the purpose of handover and early expansion of the viewing audience. On Phase 2 the aim is to complete the microwave link from Celle to the Werl area first so that the transportable control room can be transferred to this station.

The containers involved will also be fitted, of course, with broadcast television transmitters where appropriate to provide an almost immediate service during the summer of 1978 on this backbone route.

PHASES 4 AND 5

A preliminary study of the Phase 4 route from London to the South Coast has already been made and a microwave link from the London control centre (LCC) via three existing radio relay stations to Swingate is proposed.

The LCC at Wembley has been purpose built for BFBS by London Weekend Television who also staff it. Four RCA 600 videotape machines are used to record approximately 80 programmes a week from BBC 1, BBC 2 and ITV 'off air' transmissions. Selected programmes are then prepared for presentation by the addition of announcements and insertion of suitable links between the recorded programmes. These are transported to Germany for reproduction in the Celle transportable control room equipped with three similar VTR machines.

A major challenge is presented by the Phase 5 requirements eventually to transmit live programmes, with minimum distortion and maximum reliability, from the UK to West Germany. The following possibilities have been considered:

(a) tropospheric scatter;
(b) line-of-sight microwave links – purchase or rent;
(c) satellite;
(d) balloon.

Several years ago MOD (PE) awarded the Company a contract for the supply and installation of a wideband communications quadruple diversity tropospheric link between the UK and Germany. Channel signal/noise performance and reliability have been reported as extremely good and consideration has been given to expanding this system to carry the television video signal.

The existing two 18m (60ft) reflectors could be used for transmission and reception of an additional modulated r.f carrier by the fitting of a further feed horn assembly connected to new transmitter and receiver equipment. This arrangement would provide a direct link to Germany over 336km (210 miles) at minimum cost but theoretical calculations indicated that the extremely high availability/performance standard demanded for this project could not be guaranteed due to phase changes under rapid fade conditions affecting the colour sub-carriers.

Although apparently simple to implement at first sight, an all microwave link solution presents many problems. The provision of 13 or 14 stations in four or five countries is involved, each link in the chain degrading slightly programme quality. Planning permission, frequency allocation, the national approval of each country, maintenance problems, and where existing sites are not available, land purchase, new buildings and towers all have to be negotiated and implemented. The renting of existing channels, even if available, can be costly besides presenting performance problems and affect availability of the signal in Germany.

A satellite link is very attractive, reliable and meets fully the performance required but rental charges could be high. Although a suitably placed experimental geostationary satellite is known to exist it is not under UK control and there is no guarantee of end of life replacement. It would, therefore, be unwise to invest in space ground stations, even if use of a wideband channel could be obtained, without an assurance of service continuity.

The possibility of using a balloon as a sky reflector/repeater station was briefly considered but ruled out as impractical for this type of service.

At this moment in time microwave links appear to be the best practical solution and negotiations with the countries involved continue.

PHASE 6

The real proof of all the System calculations made, specifications written, alignment of equipment and the overall planning of the project will be established by this last phase, when end to end measurements will be made against the performance specifications figures.

In practice it will not be easy to have all the equipment on such a large system (some stations having been in service for two years or more) simultaneously aligned to peak performance and extremely careful planning with judicious deployment of engineers and test equipment along the route will be essential. Furthermore, most of these measurements will have to be made outside programme hours if disruption is to be kept to a minimum.

Conclusion

Few companies in this country have the necessary range of equipment, depth of research, development and planning support and installation capacity to tackle a project of this quality, size and complexity.

The technical challenge and overall system design responsibility presented by this project, together with the knowledge that satisfactory completion will bring pleasure to perhaps 200,000 British subjects living overseas, provides continuing impetus to all engaged on the task.

It is not possible at present, with many unknown factors yet to be studied, to give a realistic estimate for completion of the entire project, but all reasonable effort is being made by the many planners and engineers concerned to provide a service to the maximum number of viewers in the shortest possible time.

When the remaining phases have been successfully completed, a final article will be written, probably in about two or three years' time.

Acknowledgements

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