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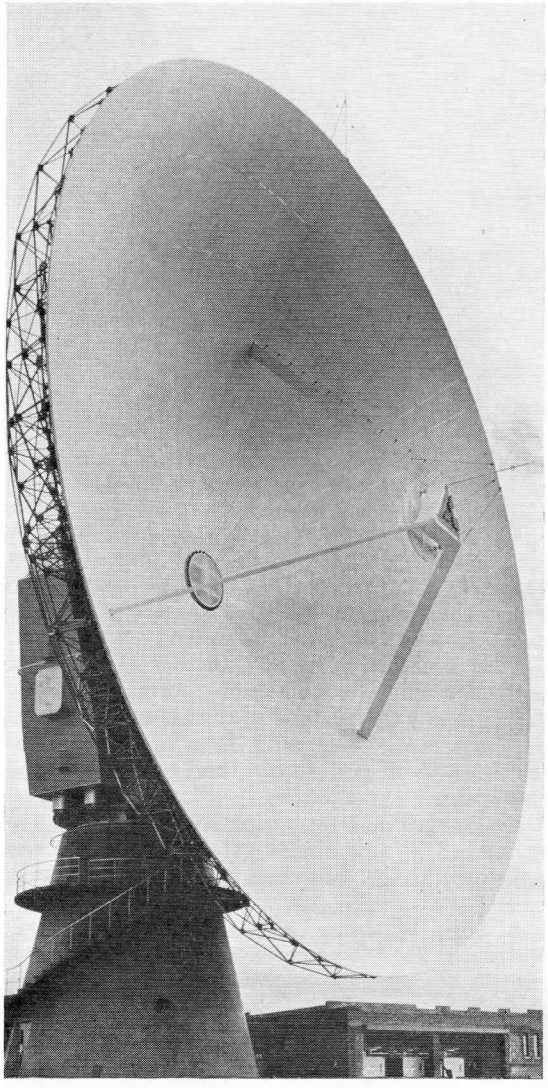


The Tulancingo earth station in Mexico from which all the television pictures were sent across the Atlantic to Goonhilly, Cornwall.

LIVE BY SATELLITE FROM MEXICO

By W. G. GEDDES

MILLIONS of television viewers in many countries had a grandstand view of the Olympic Games in Mexico and were able to watch the events as they happened—in black-and-white and in colour.

This was yet another notable achievement in the history of satellite communications since, although television by satellite has lost much of its earlier novelty and is now an accepted means of bringing world events to the viewers' screens as they happen, nothing on the scale of televising the Mexico Olympics had ever been attempted before.

The measure of the success of the operation was nearly 200 hours of high-quality picture transmission which was used by the broadcasters in Europe and elsewhere, either live or recorded, in their television programmes covering the two weeks of the Olympic Games.

Television coverage on this scale required international co-operation and co-ordination of the highest order, and planning began almost a

OVER

IN THIS ISSUE

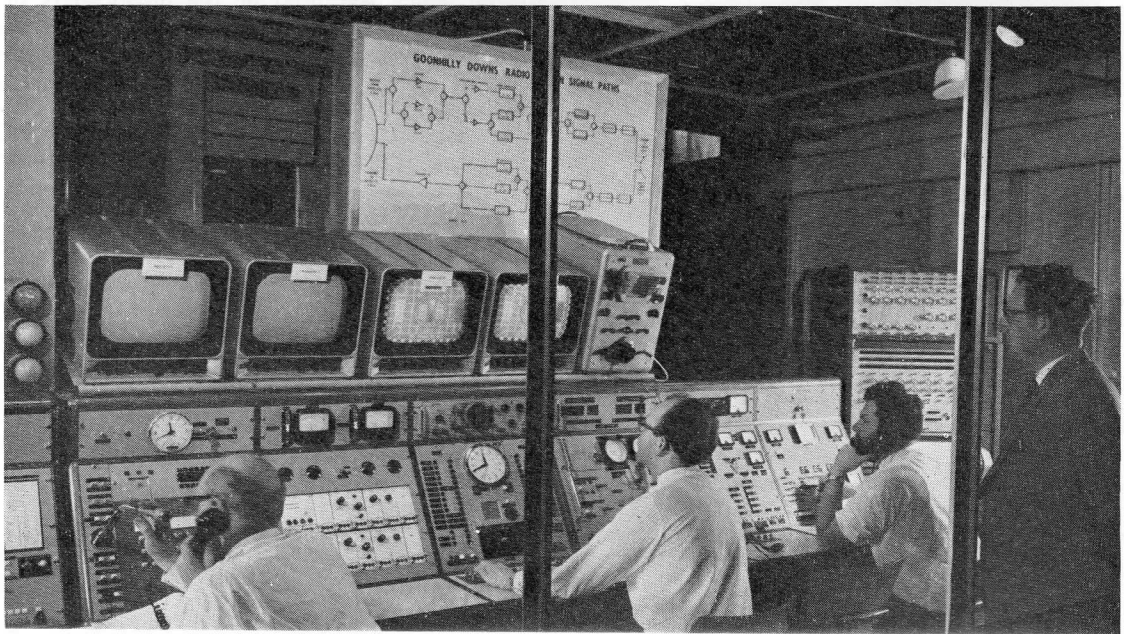
An aerial view of the 80,000-capacity Olympic Stadium at University City, Mexico. Pictures and commentaries went from here by microwave to Tulancingo earth station and from there to Europe.

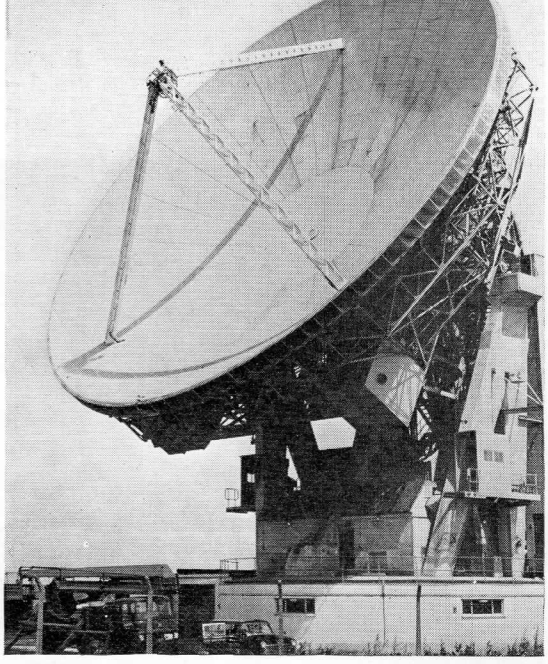
year before the start of the Games. In Europe, the BBC and the British Post Office played leading parts. The European telecommunications administrations nominated the British Post Office to coordinate Europe's television requirements with the BBC who acted on behalf of the European Broadcasting Union, and the broadcasters selected the BBC, which had developed Europe's first colour converter, to convert the 525-line American NTSC colour standard to the 625-line PAL standard used by most European countries. The broadcasters also nominated Goonhilly as the earth station for reception of the television transmissions from Mexico.

The earliest considerations were quick to show the possibilities, but it was only too clear from the beginning that there were likely to be many snags. The main difficulty was the provision of satellite capacity. The two satellites serving the Atlantic, *Intelsat* I (Early Bird) and *Intelsat* II-F3, were both expected to be saturated by normal telephony requirements by the time of the Games, and held out little prospect of other than limited use for television in off-peak hours—and even that at the risk of many uncertainties.

By far the most promising solution was to use the first of the new *Intelsat* III satellites which was scheduled to be launched over the Atlantic, a

Below: Engineers monitoring satellite transmissions at the main operating console at Goonhilly. Right: Map shows the locations of the earth stations and satellites used for TV and radio coverage of the Games.





The Goonhilly No. I aerial, suitably modified, received the TV video signals from Mexico.

month or so before the beginning of the Games, and this formed the basis for the primary plan. While this satellite could cater for most of the requirements, the margin for bringing it into service in time for the Games was very small, and assumed that delivery, launch and injection into orbit all went according to plan.

Scarcely any delay could be tolerated and the launch of a satellite and the subsequent manoeuvres which are required to place it in the desired position in orbit, are always attended by a certain element of risk.

In such circumstances, an alternative plan was highly desirable. It was, therefore, decided to investigate the possibility of using the United States National Aeronautics and Space Administration's *ATS* 3 satellite which had been launched in November, 1967, to carry out experiments in orbit and was in position over the Atlantic. NASA agreed to co-operate and the use of *ATS* 3 formed the nucleus of the contingency plan.

Although a satisfactory solution had been found to the space problem, there were other and equally difficult problems to be overcome on the ground.

On this side of the Atlantic, the new aerial being built at Goonhilly—Goonhilly II—was planned

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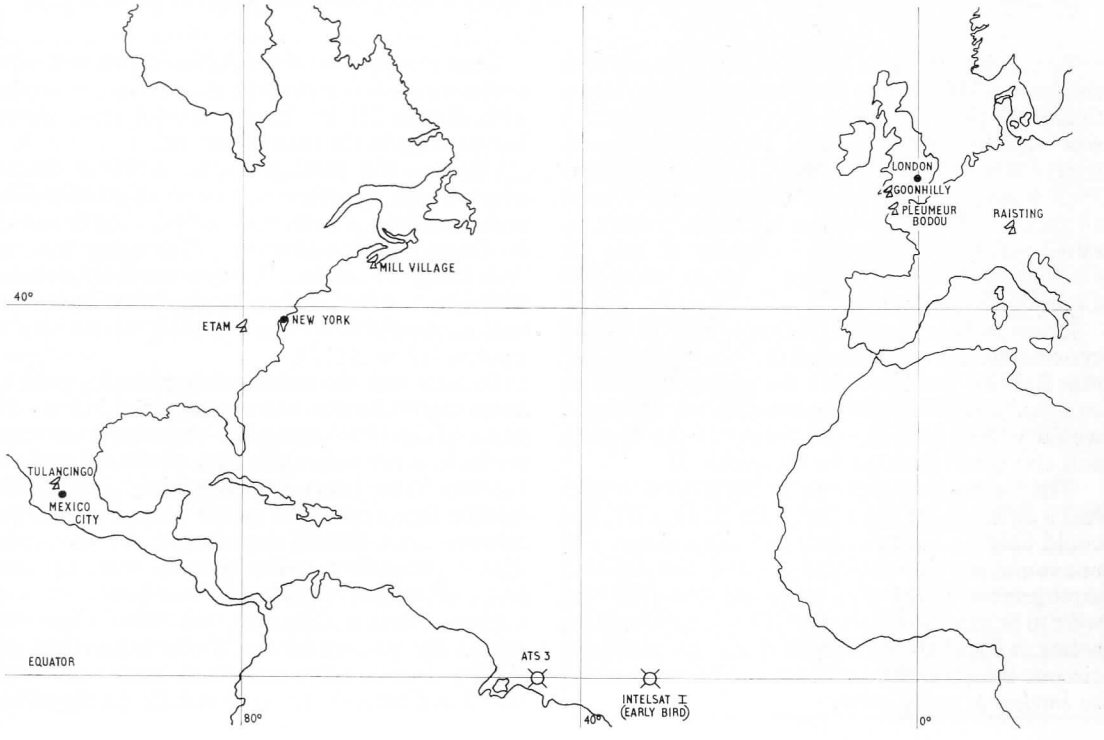

A general view of the colour television monitoring console at the Goonhilly satellite earth station.

to be ready for service in September to work with the *Intelsat* III satellite. Once again the margin was fine in which to bring in a new earth station with a new satellite, but by pooling European resources it was possible to develop a plan whereby the French station at Pleumeur Bodou would receive all northern Europe's normal telephone traffic carried by *Intelsat* I, leaving Goonhilly II and the German station at Raisting free to carry the Olympic Games traffic.

It was further planned that Goonhilly II should concentrate on reception of the video signal and that Raisting would receive the additional forty or so sound circuits which the broadcasters estimated would be required for the period of the Games, and also act as standby for Goonhilly II.

The contingency plan employing *ATS* 3—which had a different configuration from *Intelsat* III, and could only be used to carry the video signal plus one sound circuit—required an altogether different arrangement. In this plan Goonhilly I and Raisting were to be modified to work to *ATS* 3, with Raisting acting as stand-by to Goonhilly, and the additional circuits being carried by Pleumeur Bodou working to *Intelsat* I, or by cable.

On the other side of the Atlantic, two new earth stations were being planned to come into operation with *Intelsat* III in time for the Olympic Games but once again the margin was fine.

One was the Mexican earth station at Tulancingo, about 85 miles north east of Mexico City and the other, a new United States earth station at Etam in West Virginia. The plan was for Tulancingo to be the primary transmitting station with Etam acting as standby, and that both these stations would have the capability of working to *Intelsat* III or *ATS* 3.

In the event the contingency planning paid off handsomely. *Intelsat* III was launched in the early hours of the 18th September—with just over three weeks in hand before the start of the Olympics—but the Thor Delta launch vehicle carrying the satellite into orbit went out of control within two minutes after lift-off, and had to be destroyed. Plan A, therefore, quite literally went up in a cloud of smoke, but Plan B held good.

From Mexico City, the television video was routed by microwave to Tulancingo, then via *ATS* 3—22,300 miles over the Atlantic—to Goonhilly I in Cornwall. From Goonhilly the signal was

sent by microwave link to the Post Office Tower in London and then on to the BBC for colour standard conversion before being fed into the domestic television network and routed across the channel into the Eurovision networks. Eastern Europe and the Soviet Union were also provided with the same programme transmissions via an interconnection with Intervision, the Soviet bloc equivalent of Eurovision.

The sound commentary circuits for the television programmes and for sound radio were routed either by cable or by *Intelsat* I. United Kingdom circuits from Mexico were routed to New York and then by transatlantic cable to London.

Circuits for other countries were routed from Mexico through the United States to Canada then via the Canadian earth station at Mill Village and *Intelsat* I to Pleumeur Bodou in France, and finally distributed to the required destinations.

The ability to set up a complex communications network on the scale provided for the Mexico Olympics is a measure of the progress which has been made in satellite communications.

Perhaps even more important was the demonstrated flexibility of the system and the ability to maintain service. For this, much credit is due to the communications engineers who were responsible for the actual transmissions in the various countries and to the way they co-operated in overcoming their problems.

A typical example of this was the voice circuit set up between Goonhilly and Etam with the facility of being extended to Tulancingo for control purposes. In practice Etam had rather more Spanish speakers than Goonhilly, and rather more English speakers than Tulancingo. As a result the Etam engineers played a key co-ordinating role in the control link between Tulancingo and Goonhilly.

The end product of the exercise, and the one by which the public judge the result of all the efforts was the pictures which appeared on the television screens. These were excellent and reports from all over Europe highlighted the quality of the pictures seen by viewers. Here, and rightly so, credit belongs to the broadcasters. The basic ingredient was the video signal relayed from Goonhilly and its consistent excellence was convincing evidence of the high quality of satellite transmission and of the efforts of those at Goonhilly and Tulancingo who were responsible for maintaining the link.

The XIX Olympiad is now history but many stories will be told of the events behind the events. This is one of these stories—and if by chance there happened to be one of these gold medals going spare we should like to see it awarded to *ATS* 3 the satellite upon which so much depended and which responded magnificently, enabling millions to see the Olympic Games—live by satellite from Mexico.

THE AUTHOR

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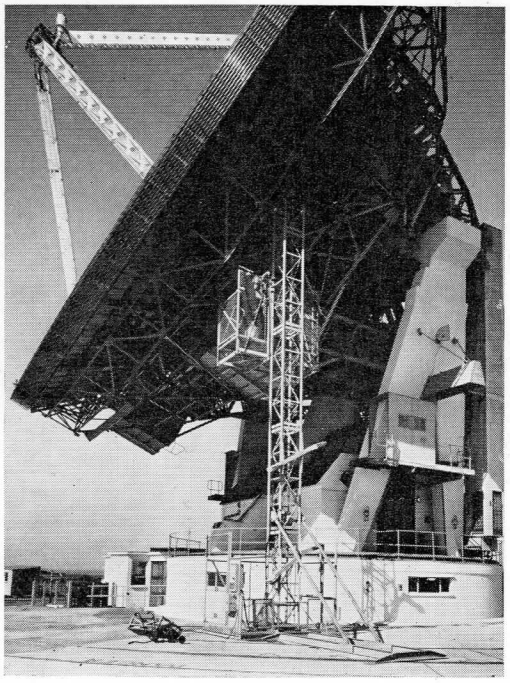

One of the modifications recently carried out to the Goonhilly No. 1 aerial was the installation of an Alimak Solett hoist (shown here) which solves the problem of transporting men and materials up to the maser cabin in high winds. The new hoist is used every 24 hours for carrying supplies of helium in flasks to the cabin, some 40 ft above ground level. The hoist operates on a rack and pinion system, which eliminates ropes and balancing weights. It can be erected to a height of 40 ft in less than three minutes and carries eight passengers or 1,450 lb of material.