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TWENTY-FIVE YEARS OF B.B.C TELEVISION

This article is not intended to be a history of the development of television in the world generally, or even in this country. It is merely an attempt to comment on what happened during the two or three years before the opening of the B.B.C Television Service in its present form, and some of the things which have happened subsequently.

BEFORE TALKING about the events which led up to the opening of the B.B.C service as it exists today, it is necessary to mention briefly some experiments which had been made with a very different system of television. This was devised by the late John Logie Baird who had worked for several years on a system of very low definition using the well-known Nipkow disk in conjunction with selenium light cells. He used 30 lines per picture and 12½ pictures per second, and "live" scenes were scanned by a "flying" spot of light.

Somewhat better results were obtained with a film scanner also developed by Baird. However, the very limited definition, and the flicker resulting from the low picture frequency, prevented really satisfactory results being obtained. Many demonstrations were given which aroused very considerable interest and a company was formed called Baird Television Limited to carry on further development. At this time television did not exist outside the laboratory, so that a moving picture transmitted by wireless, even if rudimentary, was an extreme novelty.

In 1929 the B.B.C agreed to radiate regular experimental transmissions using programmes originated in the Baird studio. The next step was the installation of equipment in Broadcasting House. Because only 30 lines per picture and 12½ pictures per second were used, the channel width was much smaller than it is today; thus it was possible to use one of the relatively high-power transmitters at Brookman's Park, the main station radiating sound programmes in the South-East of England. This still further aroused public interest in television generally and a few receivers were manufactured.

At the same time, however, research was going on to produce systems obviating the disadvantages of this early effort. In this country two companies in particular were independently engaged on this work; Baird Television Limited and Electric and Musical Industries Limited. Various other firms, including Marconi's Wireless Telegraph Co, were also working on the many difficult problems involved in the transmission of a permanent public service of what came to be called "high-definition" television. Work of a similar nature was going on in other countries, notably the U.S.A and Germany. In 1933 the two British firms each gave demonstrations to the B.B.C

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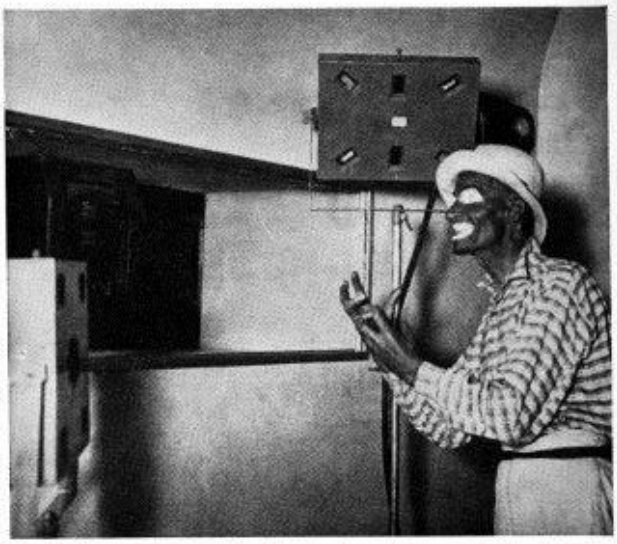

Fig. 1. The B.B.C transmitted an experimental low-definition television service using the Baird system between 1929 and 1936. Here is an artist performing in front of the camera.

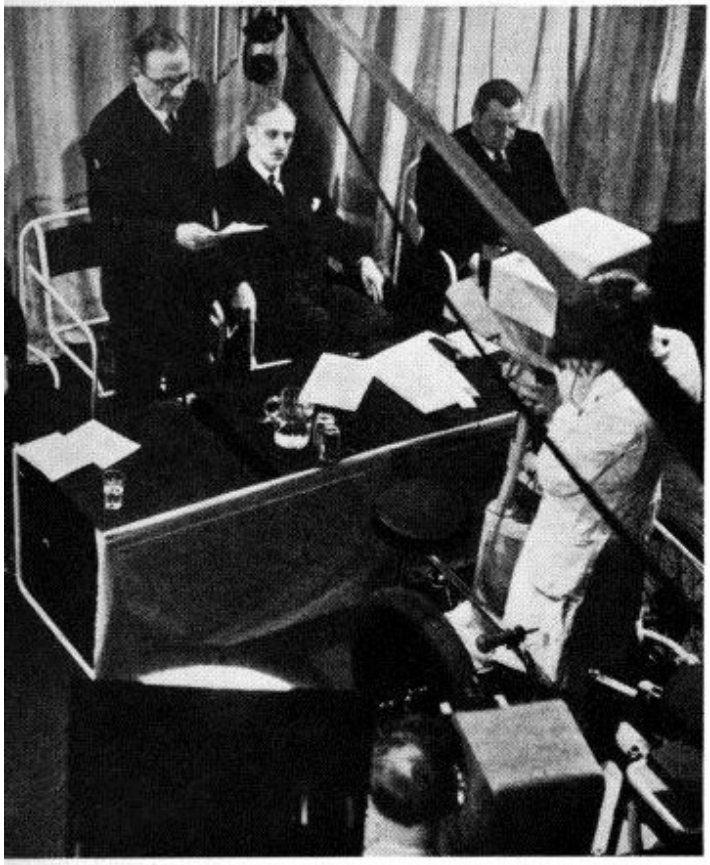

Fig. 2. The opening of the world's first public television service by the B.B.C. The Right Honourable G. C. Tryon, H.M Postmaster-General, performing the opening ceremony at Alexandra Palace.

and others concerned, which made it clear that a great deal of progress was being made. The work was directed by J. L. Baird for the Baird Company and Isaac Schoenberg for the E.M.I Company. The Marconi Company was primarily concerned with the production of the high-power transmitter and aerial, working on VHF and wide bandwidth, which would be necessary if a high-definition broadcasting service was eventually to be established.

Other problems had to be considered in addition to which of the two contending systems would be likely to prove the more satisfactory. For example, there were non-technical questions such as: was there sufficient demand for such a service, and if so would cost be prohibitive. There was also the question of what would be the cost of a reliable receiver, and would it be low enough to attract a worthwhile number of buyers.

Finally there were the obvious questions: who should operate the service if there was to be one, and how should the cost be met. To report and make recommendations on all such matters, the Postmaster-General appointed—in May 1934—the well-known "Television Committee" under the chairmanship of the late Lord Selsdon. The membership consisted of an independent vice-chairman, and representatives from the General Post Office, the British Broadcasting Corporation and the Department of Scientific and Industrial Research. The terms of reference, although brief, were very wide and allowed for the consideration of almost anything connected with television.

The committee put in a tremendous amount of work, interviewed some 38 witnesses, and attended numerous demonstrations. Finally the committee divided into two parties, one visiting the U.S.A and the other Germany, to make sure that there was no system in prospect which would soon make anything available in this country out of date. The report was submitted in January 1935, and it made a large number of recommendations and suggestions.[1] It is only possible here to deal with one main recommendation. This was the proposal that a public service of television should be established as soon as possible by the B.B.C and paid for out of B.B.C funds, to serve the London area.

Equipments employing both the new Baird system and the E.M.I system were to be installed, and each should operate during alternate weeks. One hour of transmission for demonstrations in the morning, and two hours of actual programme time in the evening were suggested. A Television Advisory Committee to guide future development was also proposed.

These main recommendations were adopted by the Government, and thus it came about that the Alexandra Palace Station was opened on 2nd November 1936 by the late Lord Tryon, the then Postmaster-General. The ceremony was transmitted first by the Baird Company's equipment then by the Marconi–E.M.I Company's equipment. (The order was decided by spinning a coin.)

This is the first mention of the Marconi–E.M.I Company and it must be explained that in April 1934 this company was formed, the Marconi Company to be responsible for the VHF transmitters and aerial arrays and the E.M.I Company for the cameras and studio equipment.

The Committee had recommended that each of the two competing companies should themselves decide what they considered would be the most favourable characteristics for their respective systems, and this resulted in the two sets of equipment being different in almost every respect, except the frequency of the

channel on which the vision transmitters worked. At the same time it was necessary for receivers to be so designed that they could receive each system by the operation of a changeover switch. This led to a good deal of criticism of the decisions by would-be manufacturers of receiving sets, since obviously their design problems were greatly complicated, and the question of selling price was seriously affected. However, there was considerable controversy about television generally at that time and the Television Committee decided that the fairest way possible of settling which was the better system all round was to give a public demonstration of each giving regular daily programmes.

The following very brief particulars indicate the more important differences between the two systems.

Picture Characteristics	*Baird*	*Marconi–E.M.I*
Number of lines per picture	240	405
Number of complete pictures per second	25	25
Scanning	Sequential	Interlaced (50 frames/sec.)

METHOD OF SCANNING STUDIO SCENES

The Baird system

The studio scene was photographed on to film by an adapted film camera. The exposed film then passed through a quick developing process, and was immediately scanned and the result transmitted. The flying-spot method of scanning the object directly, similar in principle to that used with the original 30-line system, was also used for certain programmes.

The Marconi–E.M.I system

An electronic camera was used similar, as to the general method, to those in use today. It used an "Emitron" tube.

The Vision transmitters

Each system used its own separate transmitter for sending out the vision signals. The arrangements for modulation and transmitting synchronizing pulses were different.

The "peak white" power was about 17 kW.

The common frequency channel used was 45 megacycles per second (approximately 6·66 metres).

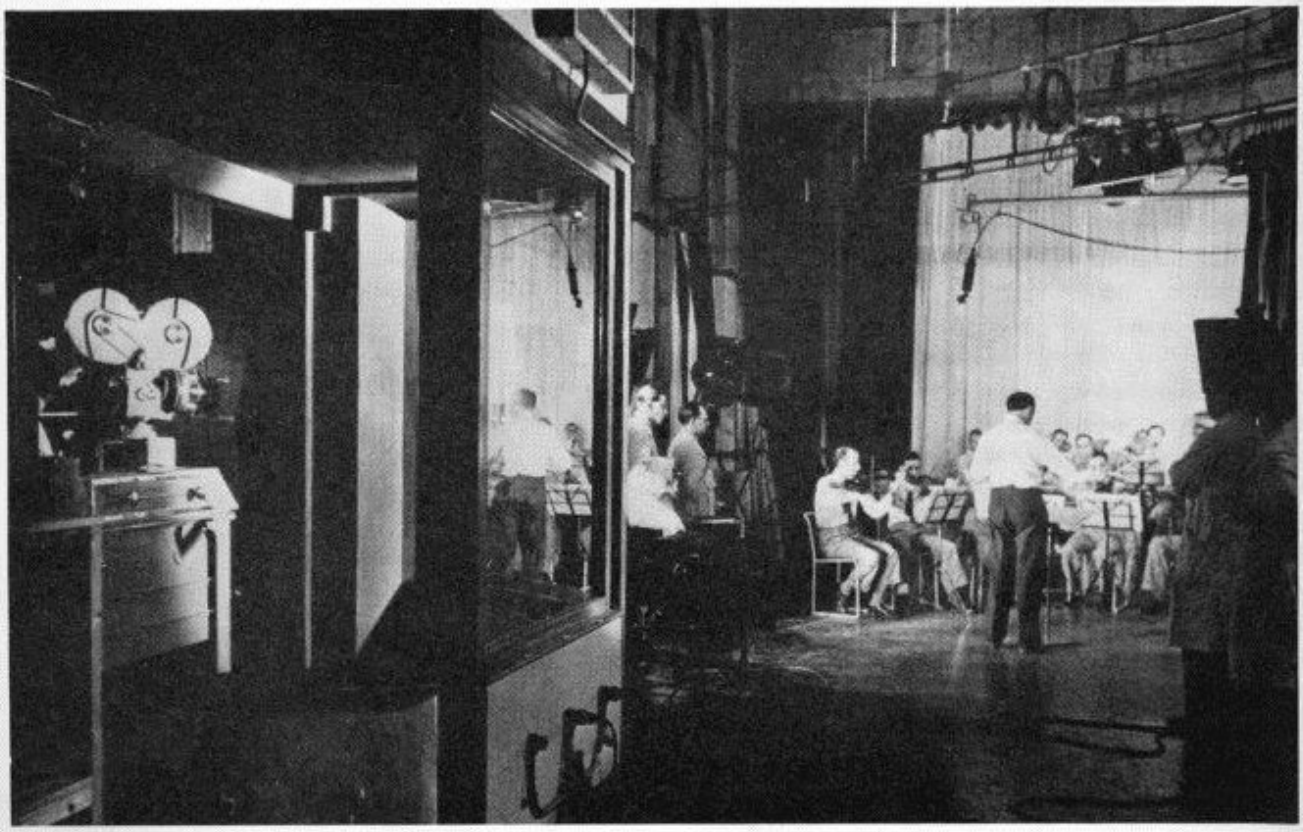

Fig. 3. The Baird studio at Alexandra Palace showing the intermediate film scanner on the left.

Fig. 4. The Television Advisory Committee watching the preparation for televising the Coronation of King George VI in 1937. The author is seen on the plinth and Isaac Schoenberg of Marconi-E.M.I is seen next to Lord Selsdon, the Chairman, who is next to the plinth.

The Sound transmitter

This was common to both systems and was designed and manufactured by Marconi's. It used a power of approximately 3 kW and worked on a channel of 41·5 megacycles per second (approximately 7·4 metres).

Soon after the adoption of the Television Committee's recommendations, the Television Advisory Committee was appointed whose main duties were to assist the development of the new service during its early stages, and to make recommendations to the Postmaster-General concerning any changes which appeared necessary. It had almost the same personnel as the original committee.

After some weeks of observation it recommended that the transmissions by the Baird system should be discontinued, and that the service should continue using only the Marconi–E.M.I system. There was little difficulty in arriving at this decision, after an opportunity had been given to everyone concerned of seeing both systems in practical operation. The advice was accepted, and from 8th February 1937 the service continued on this basis.

Thus, apart from the superior performance and capabilities of the Marconi–E.M.I equipment, the extreme difficulties of operating two very different systems in alternate weeks, from the points of view of both the producers of programmes and the receiver industry, were removed. It can be said that from February 1937 television in this country never really faced serious difficulties, if the effect of the war is disregarded.

At this point it may be interesting to consider briefly what were the technical prospects of developing a nation-wide service, once this definite decision as to system had been taken. As one largely responsible for providing, eventually, reliable coverage over the whole of the United Kingdom and Northern Ireland, my main pre-occupations were:

1. Would the receivers be reasonably reliable in the home when operated almost entirely by people with no technical knowledge whatever.

2. The difficulty of achieving coverage on a truly national basis considering the necessity of using very short wavelengths to transmit the wide frequency band-width involved.

3. It is now well known that the ignition system of almost all motor vehicles can cause severe interference to reception on VHF, and nothing had been done in those days about "suppression". It was known, however, that this could be eliminated at source, but it was necessary to devise something very inexpensive and easy to fit, if compulsory regulations were to be introduced. In any case it was going to take time to introduce such regulations and make them effective.

I regarded these difficulties as capable of retarding the development of the service very seriously, but not in the end of making a television service unworkable. However, if the service developed very slowly as a result of widespread poor reception caused by one or all of them, financial troubles would result fairly quickly, owing to the high cost of television programmes compared with sound programmes.

It may be of interest, therefore, to look back and see what actually did happen in the early years. First, with regard to the reliability of receiving sets. This was certainly somewhat of a problem for some time and, as expected, was largely due to rough handling during house cleaning operations (even now this is not unknown!). As for the danger of installing in the home apparatus using a voltage of the order of 10,000 for the cathode ray tube, I must admit that I had

some qualms at first. In the event it is doubtful if this particular danger has been any greater than that associated with ordinary mains voltages.

As for the problem of the comparatively high rate of attenuation to which very high radio frequencies are subject, it can be said that this has gradually been obviated to a large extent.

Thanks to the steps taken by the General Post Office, aided by various committees, ignition interference has largely been eliminated, except perhaps in areas of weak field strength. This was eventually achieved by devising very simple, inexpensive and easily fitted suppressors, and then making it compulsory to use them. This took time, but it has worked much better than some of us expected twenty-five years ago, when it became clear that something of this kind would become essential.

At this stage, perhaps, a few words about the rate at which the service in this country progressed may be of interest. On the outbreak of war in September 1939 the service in this country immediately closed down. This had been decided some time before by a governmental committee which made general recommendations concerning the control of wavelength channels. There were a number of reasons for this rather drastic action, the principal one being that the frequency channels used for television would have to be used for military purposes, and no sort of avoidable interference could be tolerated. There was some danger also that the station might have been used as a radio beacon by hostile aircraft if they

Fig. 5. Watching television in 1937

Fig. 6. An act during the first high-definition television programme in the world.

possessed VHF direction-finding equipment. Another reason was the necessity of cutting out all unnecessary production of such things as television receivers, cathode ray tubes and so on.

Between November 1936 and September 1939 only about 20,000 television receivers were sold. This might be considered a very slow rate of growth, and there were several reasons for it. The principal one was that people were apparently convinced that vast technical improvements would be made during the first few years of the new service and it was thought that new receivers would very soon become obsolete.

In point of fact a good receiver manufactured in say 1937, after certain minor adjustments, should still work today, assuming all its components were still sound. Before the end of the war a committee under Lord Hankey was appointed by the Postmaster-General to recommend, among other things, whether the television service should re-open as soon as possible after the conclusion of hostilities, or whether a fresh start altogether—perhaps with different characteristics—should be made considerably later.

The transmitters at Alexandra Palace had been considerably modified during the war, and used for a totally different purpose by the RAF, and the studios had been dismantled. Thus some delay was inevitable in any case, and practically all the television staff were working elsewhere. The technical alternative which was mainly discussed was to standardize, so far as characteristics were concerned, with those adopted in the U.S.A. This would have meant a change to 525

lines as well as certain other modifications of considerable importance in the synchronizing and modulating arrangements.

The CCIR system was not, of course, proposed until much later, while the 525-line system had developed considerably during the war years. This change would have involved modifications to all existing receivers. However, it was doubtful how many of the 20,000 or so existing receivers were in anything like reasonable condition, having regard to the severe bomb damage in the London area. However, the change would certainly have meant increasing the delay in restarting by at least a year, and possibly more.

The committee eventually decided that for several reasons the importance of the earliest possible re-opening was paramount. Had it been found possible to standardize with U.S television on re-opening after the war, one can speculate that this system would have been adopted almost universally. The result of the decision to retain the pre-war characteristics was that, with a tremendous effort, the Alexandra Palace station re-opened with a public service of television in June 1946—a highly creditable performance in the circumstances of those days.

Although no fundamental changes of a technical nature have been made on the transmission side, it must not be inferred that little or no improvements have been effected, apart from the large amount of work done on radiating systems. But the technical improvement, since the end of the war, which has most affected the actual "programme quality" is undoubtedly in the camera and the camera tube. The gradual perfection of the $4\frac{1}{2}$-in. Image Orthicon tube manufactured by the English Electric Valve Company has involved a vast amount of development work. The development of the present-day camera itself has also called for the utmost patience and ingenuity to meet the requirements of programme producers and cameramen.

There have, of course, been other important developments; to mention only one, a great deal of work has been done (mainly by the B.B.C) on the various methods of producing special effects. These and many other developments greatly increase the interest of programmes and were quite unknown when the service re-opened in 1946.

REFERENCE

1 Report, Television Committee, Jan. 1935. H.M Stationery Office. Cmd 4793.