

I.E.E.E. BROADCAST SYMPOSIUM, WASHINGTON

Luncheon: Thursday, 21st September 1967

COLOUR TELEVISION IN THE UK AND EUROPE

by

Sir Francis McLean, Director of Engineering, BBC

The auguries for colour in Europe are good. Services have already started in the United Kingdom and Germany; services in France and the USSR are due to start on 1st October, and a large number of other countries will start within the next two years. In the UK at least, the demand for colour receivers exceeds the supply and, although it will be a year or so before colour receiver sales, in any country, reach as much as 10 per cent of total sales, everybody in the business is very anxious that this kind of figure should be achieved as soon as possible and that we should not have a long period of years with very discouraging sales.

We spent a long time in Europe seeking the merits of various systems, and unfortunately have not been able to reach agreement on a common system for Europe, so that, in addition to the basic difference between American and European television in that you have 60 fields and we have 50, we have also the difference of colour television systems to contend with. Moreover even in the 50-field area, there will be at least two systems - maybe three. This is a great pity but now seems inescapable. In a large number of countries in Western Europe, the PAL system will be used, but in France and the Eastern Bloc some form of SECAM will be used. The PAL system is now very well defined and the implications of its introduction are pretty well understood. The exact form of the SECAM system to be used still does not seem to be entirely clear nor whether the same form will be used in the USSR as in France. As far as the UK is concerned, we are getting on well with the PAL system, which of course only differs from NTSC in respect of one component of the chrominance signal and in the addition of an identification signal.

The advantages we gain from departing from the NTSC system are quite real, and in my view quite positive in some respects. It does enable the whole system to be operated with somewhat easier tolerances than for NTSC. This shows up particularly in things such as head-banding in recording, where we virtually have no trouble. I think it is particularly useful also in the extra tolerances that it gives when lining up and tuning a domestic receiver. This is probably the most telling of its advantages. On the other hand, in addition to somewhat increasing the difficulty of programme exchange, we have to pay the price in that switching is a little more difficult and we can carry it out only on every fourth field and, because the sub-carrier is not in a direct relationship to the line frequency, the colour sub-carrier generation is a little more complicated. However, all these things are clearly coped with and we have to see how things will turn out.

In Europe we are trying to give a reasonable number of hours of colour programming right from the start; perhaps the number of hours that I shall quote will seem small to you, but you must remember that in Europe we do not have television from early morn 'til late at night, but operate for restricted hours of the day only. On the BBC colour service we already have about ten to fifteen hours a week of colour after nearly three months in service. We are building this up, and by December we will be doing about twenty-five hours colour a week. This colour will be originated from film, which we either make ourselves or buy, from colour tapes which we make or buy, or from live facilities. For these latter, at the moment we have three studios, two of 8,000 square feet and one of 1,000 square feet, and two mobile outside broadcast units each fitted with four cameras, radio links, etc. With these outside broadcast units we have already taken such items as tennis from Wimbledon, football matches, concerts from the Albert Hall, and so on. We have so far kept off anything in the nature of a colour spectacular; we shall be doing this sort of thing in time,

but we want to build up to this carefully. We are very concerned that we should build up a widespread expertise before we become too ambitious. This at least is the view of the engineers.

For the start of a colour service, we on the broadcasting side and the Radio Industry have profited enormously from your experience. This profit has come in two ways, in that we have been able to get advantage of the improved designs that you have evolved for various pieces of equipment and also we have seen where some things did not go as well with you as they might have done and we are trying to profit from our observation. We are, for example, putting colour only on high-band tape recorders and we are using timing circuits such as PALTECH to ensure that we get the highest quality.

We have paid particular attention to the personnel problems involved. We in the BBC have been doing colour experimentally since 1950, and we had a considerable amount of expertise locked up in people who have been working on these problems since then. What we were faced with however was the need to spread this expertise over the whole of our network, and in television we have about 150 transmitters, and 50 studios and switching centres. This called for an extension of the training at our residential training college at Wood Norton and in the practical training that we give in experimental studios. We set up residential courses of about three weeks at Wood Norton followed by practical training courses in an experimental colour studio of two weeks for people engaged in programme origination. Between the summer of 1966 and the early summer of this year, we had put about 200 people through these courses and this process still continues. Other courses were laid on for lines engineers, transmitter engineers, and so on. Prior to the start of the service, and still at the present time, we had quite a lot of unscheduled colour transmissions, and here again our system of limited total hours of television gives us an enormous advantage in that we have the time available in which we can put on unscheduled items and

do a certain amount of experimentation over the air. In all this period, we have, as far as possible, moved people around so as to give them as much experience of the problems involved as is possible.

As far as we are concerned, colour reception is on UHF only, although in other countries in Europe colour will be on UHF and VHF. Because of the 405-line situation, which fully occupies the VHF bands, we are restricted to UHF, at least for very many years. We have taken a very great interest in the UHF position in the United States and have followed the field trials carried out by the FCC in the New York area some years back. We have carried out quite a number of series of tests over the last few years on UHF, both in the London area and in other areas of the U.K., using transmissions from the same site and on the same frequency, taking two transmissions 80 MHz apart. These earlier tests were engineering tests using measuring equipment. We have however carried out another series of tests in which our observations were carried out on the viewers' own equipment. I would like to read out the conclusions that we drew from these tests:-

"It is concluded that more than 90 per cent of viewers in the sample of households investigated would assess their UHF reception as being satisfactory provided they have an adequate aerial and a correctly-adjusted receiver of good performance. In the London service area, the figure is probably as high as 98 per cent.

"In those cases where UHF reception is unsatisfactory, the major cause, which accounted for more than 50 per cent of the cases, is the use of inadequate or badly-adjusted aerials. Because of this and other factors e.g. incorrectly adjusted receivers, the present percentage of viewers assessing their reception as satisfactory is reduced to 64 per cent.

"As the survey was carried out during the winter when there is no Sporadic E interference in the VHF band, the immunity of UHF reception from this form of interference and the advantage over VHF band I reception, which would have been shown up in the summer, was not evident.

"The survey results confirm that multipath propagation causing 'ghosting' is not a serious problem with UHF reception. 'Ghosting' on VHF is frequently troublesome."

As a result of this we really feel very optimistic about giving an even wider service on UHF, so much so that we have now put in hand a plan to get rid of the 405-line service over a period of years by duplicating the service on 625-lines in the UHF band, after which the VHF 405-line will go out of service, and the VHF bands will then be re-engineered for additional 625-line services. We shall start putting colour into the other two programmes (that is, BBC and ITA) at the end of 1969 and early 1970 so that, from that date, we shall have three networks giving about 150 hours colour per week. In making this appraisal, we have realised, and particularly so in the estimates of the success of colour television, how dependent we are upon the receiver Industry.

Collaboration has existed between ourselves and the Industry, and it has been particularly close in this launching of colour. We have for many years carried out transmissions of colour for the benefit of the Trade and we are now helping them subsequently in three ways:-

- 1) We give confidential and impartial reviews to the various receiver manufacturers as to what we think of their receivers;
- 2) We transmit as part of our daily Trade Tests a colour film which shows some of the colour problems to be solved by the radio serviceman. It is not a detailed explanation but is intended to make the radio serviceman aware of the problems involved and to help him get a knowledge of the equipment or particular make of receiver on which he is engaged. In conjunction with this, receiver manufacturers have been running courses for the radio servicemen and provide a number of recorded lectures illustrated by slides to tell them exactly how to carry out convergence, adjust colour purity, and so on.

3. We are cooperating with the Trade in a series of exhibitions throughout the country and for these we have equipped a mobile laboratory to take a signal off the air, measure its performance and feed it to up to fifteen points in an exhibition. One of these points will be a BBC stand where we shall be showing what we regard as adequate pictures. That the Industry are prepared to compete with each other and with us where the public can make a direct comparison augurs well for the kind of colour pictures we expect to get. Incidentally I have seen a mobile equipment picking up an adequate signal from a location almost entirely surrounded with steel-frame buildings up to 18 storeys high.

We demonstrated in London a few weeks ago the BBC all-electronic field-store converter, which converts the field frequency either way between 50 and 60, the line frequency either way between 625 and 525, and the system between NTSC and PAL. The device can also be made to operate on the SECAM system. As a part of the demonstration we took signals originating from North American networks and from our own studios on tapes, and on conversion gave very good quality pictures. We also took live 525-line/60-field pictures from the CBC studios in Toronto; these were then transmitted over the Early Bird satellite, and after conversion gave very good pictures in London. The experience that we and the other people concerned gained in this will be very useful in dealing with the problems of transmitting pictures from the Olympic Games next year. The equipment is reversible so that I hope you will be seeing pictures in North America coming over this converter.

Although from my remarks it might seem that we are perhaps somewhat complacent about our efforts and the situation in the colour field, this is not so and we are anxious that neither our thoughts nor our practice should be rigid. We are watching all the time to see what happens and to amend as it may be necessary.

The position in the camera field is particularly fluid. Here we are undecided as to preference for the three-tube or the four-tube camera, and similarly between the flying-spot telecine or the camera-type telecine, again using three tubes or four. At the present time, all our cameras are using plumbicons. How long this will continue however, I would not like to say.

Public reaction to colour is very favourable, and receiver demand is good inspite of costs being on the high side. In our case the receiver cost is increased by the need to display not only 625 lines but also 405 lines with a need for duplicate I.F. circuits and duplicate scanning circuits.

As I said, the outlook is good and, in saying this, I would like to say again how much we owe to the pioneers in this country who established the NTSC system, on which both PAL and SECAM are founded, and who persisted for so long against very great difficulties to solve the many problems involved in operating a colour service for the public and in finding manufacturing methods to make receivers at reasonable prices.

FCMcL/MKPR
11.9.67