INTRODUCTION

This instruction details the National Colour Insertion Test Signals (ITS) as described in the "Specification of Television Standards for 625 Line System I Transmissions" January 1971.

1: Waveforms of the National Colour Insertion Test Signals

Figures 1 and 2 show the National Colour Insertion Test Signals as used, at present, on the Independent Television Network.

The waveforms occur in the field blanking period of the television signal, lines 19 and 20 being in the even fields and lines 332 and 333 being in the odd fields.

2: Measurements

Measurement of video parameters may be made using the ITS waveforms displayed on a suitable oscilloscope or video waveform monitor fitted with an IBA K-rating graticule (see Fig.3).

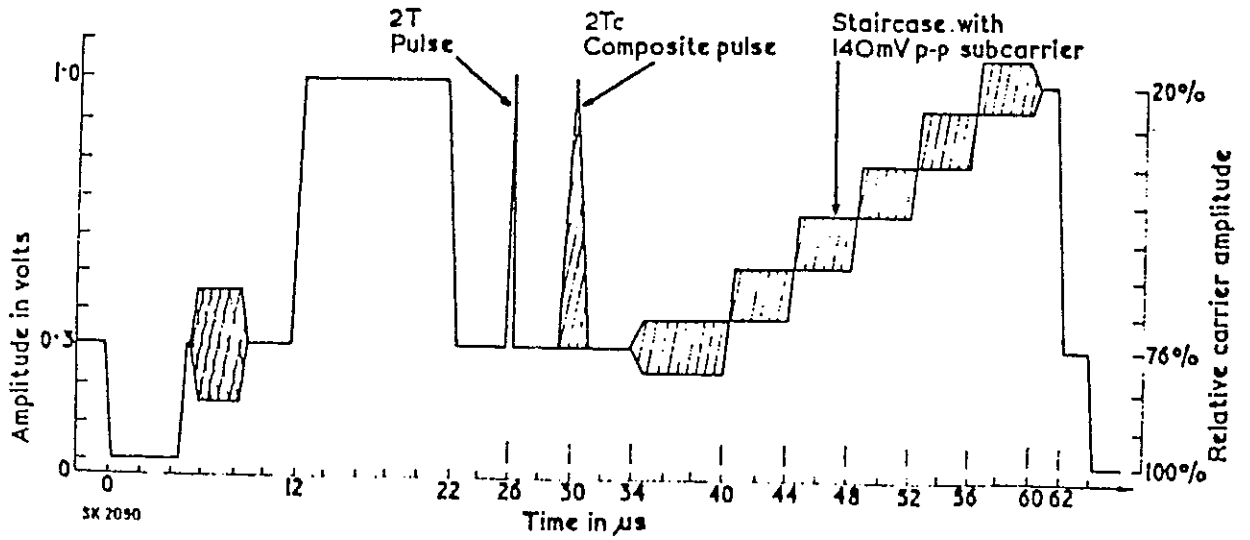

Fig.1 INSERTION TEST SIGNAL 1 (LINES 19 AND 332)

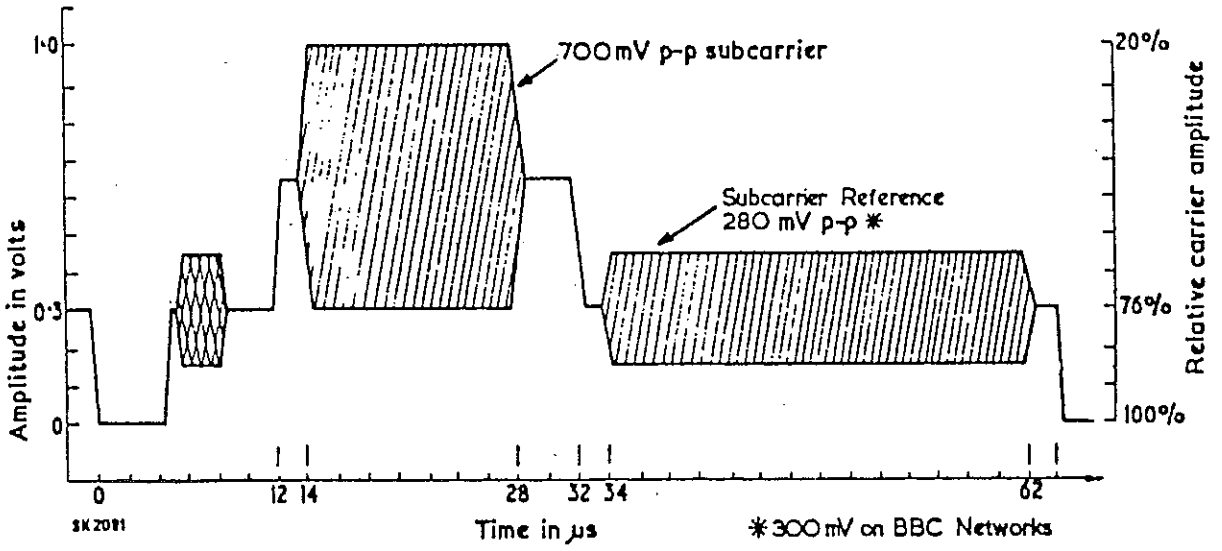

Fig.2 INSERTION TEST SIGNAL 2 (LINES 20 AND 333)

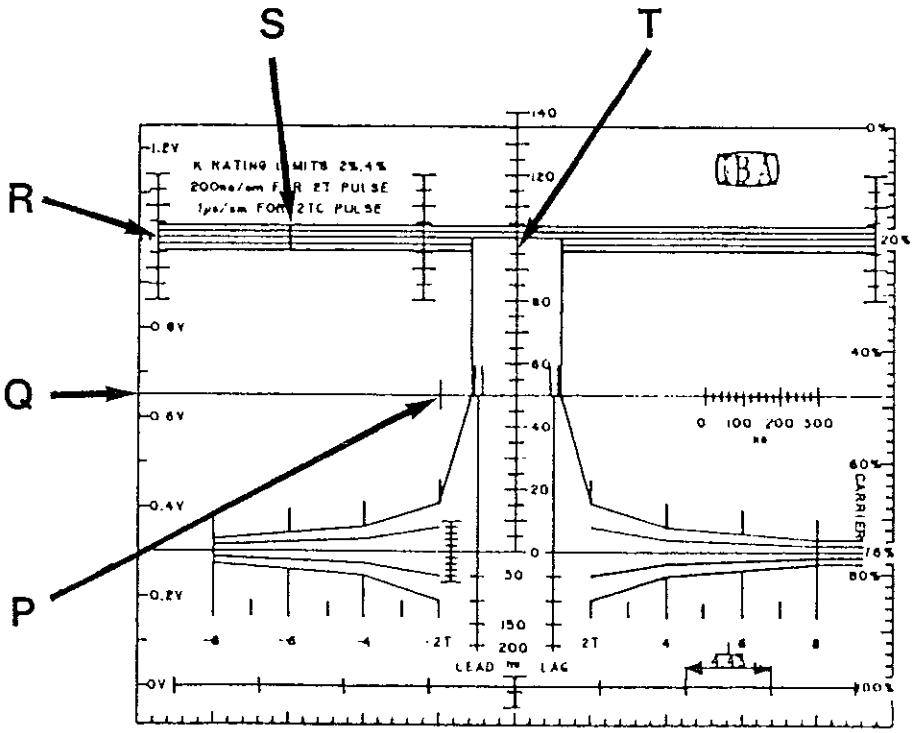

Fig.3 IBA K-RATING GRATICULE

3: Bar amplitude measurement

The amplitude of the luminance bar is measured between points A and B, see Fig.4, on a calibrated oscilloscope. The departure of this measurement from 700mV is expressed in dB.

When Bar Amp Error =

$$20 \log_{10} \frac{V(A-B)}{700} \text{ dB}$$

Alternatively the measurement may be expressed to a percentage deviation from 700mV.

Where Bar Amp Error =

$$\frac{V(A-B)}{700} \times 100\%$$

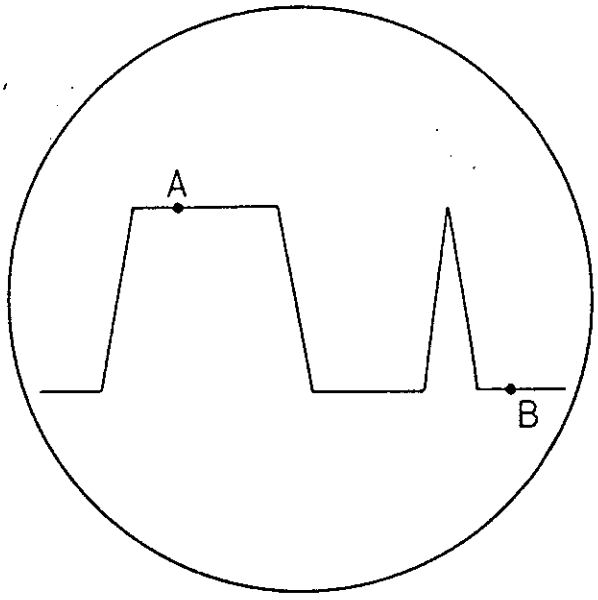

Fig.4 INSERTION TEST SIGNAL 1 (LINES 19 AND 332)

4: Sync amplitude measurement

The amplitude of the sync pulse is measured between points A and B, see Fig.5, on a calibrated oscilloscope.

The departure of this measurement from 300mV is expressed in dB.

Where Sync Amp =

$$20 \log_{10} \frac{V(A-B)}{300} \text{ dB}$$

Alternatively the measurement may be expressed as a percentage deviation from 300mV.

Where Sync Amp =

$$\frac{V(A-B)}{300} \times 100\%$$

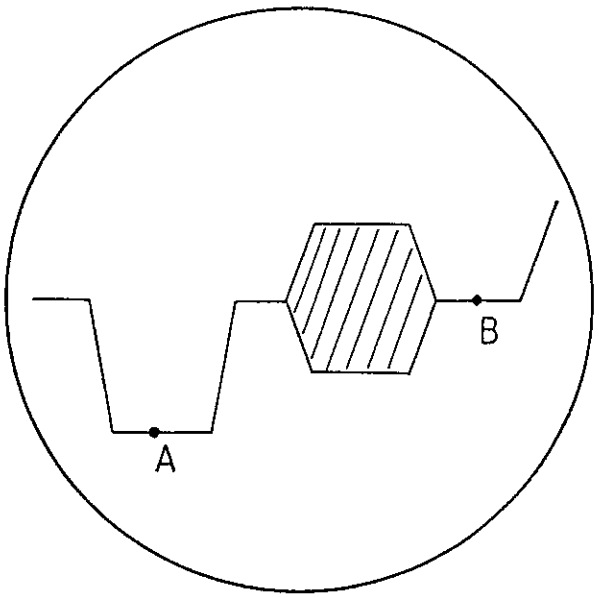

Fig.5 MEASUREMENT OF SYNC AMPLITUDE

5: Picture sync ratio measurement

The luminance bar amplitude as defined between the points A and B, see Fig.6, should be adjusted to 100 divisions on the oscilloscope. The amplitude of the synchronising pulse should then be measured and the result expressed as a ratio, e.g. 100/43.

6: Bar tilt measurement

Adjust the X and Y gains of the oscilloscope such that the mid-point of the bar top aligns with point T (see Fig.3).

Ignoring the first and last 10% of the bar, assess the worst half of the bar tilt. The inner and outer limits are 2% and 4% respectively.

Express the result of the measurement as Bar Tilt %.

Note...

This measurement is analogous to the Bar Tilt measurement made by the Marconi Automatic Measuring Equipment (AME), but is NOT directly related to the Bar K rating (see para. 7 Bar K Rating Measurement).

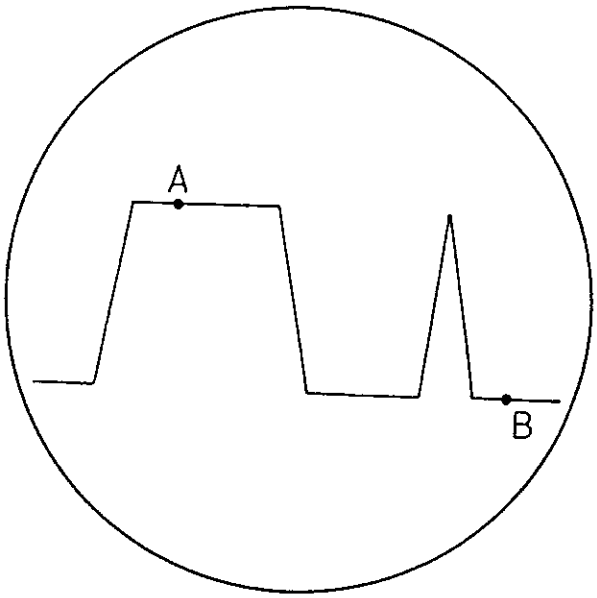

Fig.6 INSERTION TEST SIGNAL 1 (Lines 19 and 332)

7: Bar K-rating measurement

Adjust the X and Y gains of the oscilloscope so that the bar half-amplitude points pass through points P and Q and the top of the bar coincides with point S (see Fig.3). Adjust the horizontal shift until the top passes through the point R, taking care that vertical displacement of the bar does not occur. The K-rating of the bar is then read from the graticule, the inner and outer limits indicating 2%K and 4%K respectively. Ignore the first and last 2.5% of the bar.

Note...

The Bar K is measured for the worst half of the bar only. Express the result of the measurement as 10µs Bar K%.

When making full field measurements using a 50Hz signal the result is obtained again for the worst half of the bar only, and is expressed as 25µs Bar K%. There is a nominal 2:1 ratio between the two measurements, but it is preferable to standardise the ITS measurement on the 10µs bar.

Note...

Bar K rating is NOT directly related to bar tilt measurements as performed by the Marconi Automatic Measuring Equipment (AME), see para.6 Bar Tilt Measurement.

8: Chrominance/luminance gain inequality measurement

Adjust the amplitude of the luminance bar to 100 divisions on the oscilloscope graticule (see Fig.3).

Measure the amplitude of the normal 700mV chrominance bar at its mid duration point. The difference in amplitude of the chrominance bar to the 100 divisions of the luminance bar, expressed as a percentage, is the chrominance/luminance gain inequality. If the amplitude of the chrominance bar is greater than that of the luminance bar the result is positive. If the amplitude of the chrominance bar is less than that of the luminance bar, the result is negative.

Note...

If the receiver or demodulator used for the measurement has a band-limited (5.8MHz) envelope detector as opposed to a synchronous detector the chrominance bar amplitude will be reduced by approximately 4% relative to the luminance bar amplitude in an ideal system. It is, therefore, necessary to add 4% to the measured amplitude of the chrominance bar before recording the result.

Express the result as chrom/lum gain % where chrom/lum gain =

$$\frac{Vchrom}{Vbar} \times 100\%$$

or chrom/lum gain inequality % where chrom/lum gain inequality =

$$100 - \frac{Vchrom}{Vbar} \times 100 \quad \%$$

9: Chrominance to luminance crosstalk measurement

Using ITS waveform 1 adjust the luminance bar to 100 divisions on the graticule. Filter out the subcarrier and measure the amplitude of any displacement on the 50% pedestal of the chroma bar on ITS waveform 2 see Fig.7. The result should be expressed as a percentage of the 50% pedestal bar. If the displacement is upwards the result will be positive, if downwards the result will be negative.

10: 2T pulse K measurement

Using ITS waveform 1 adjust the oscilloscope SHIFT and GAIN controls to set the pulse to 100%. Set the TIME BASE control to give 100ns per T division on the graticule see Fig.3.

Position the half amplitude points of the pulse symmetrically within the "window" of the graticule, assess the pulse against the 2K and 4K limits.

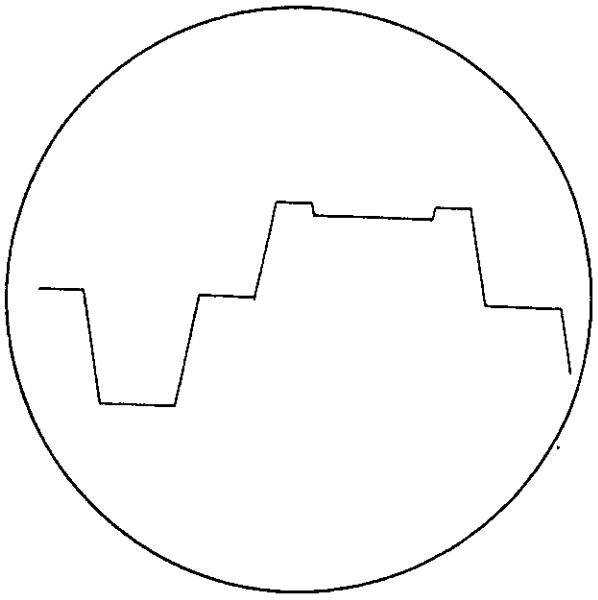

Fig.7 INSERTION TEST SIGNAL 2 (Lines 20 and 333)

11: 2T pulse to bar ratio measurement

Using ITS waveform 1, adjust the oscilloscope SHIFT and GAIN controls set the bar centre to 100%. Read the amplitude of the 2T pulse as a percentage of the centre of the bar.

Alternatively, measured as a K-rating, the ratio of the pulse-to-bar is equivalent to:

$$\frac{1}{1 \pm 4K}$$

To obtain this measurement, set the 2T pulse to 100% and compare the centre of the bar to this. The resulting difference should then be divided by 4 and becomes the 2T pulse-to-bar % K-rating.

12: Luminance non-linearity measurement

Using ITS waveform 1 filter out the chrominance signals and pass the remaining waveform through a differentiating and shaping network to obtain a comb of five narrow pulses see Fig.8. The distortion is expressed as a percentage deviation of the smallest pulse, the height of the largest pulse being taken as 100%

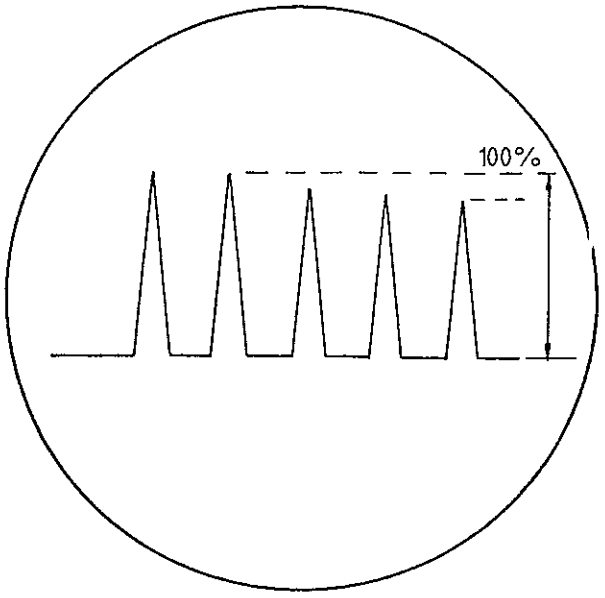

Fig.8 LUMINANCE NON-LINEARITY MEASUREMENT

13: Chrominance/luminance delay measurement

Using ITS waveform 1 adjust the oscilloscope SHIFT and GAIN controls to set the Chrominance bar to 100 divisions. Set the TIME BASE to give 500ns per T division and centre the 2Tc pulse in the graticule, Fig.9a.

Move the pulse until the distorted base line intersects one of the 1T calibration lines at the zero point.

The delay in nanoseconds can then be read directly from the intersect to the second calibrated scale.

If the delay in the chrominance channel exceeds the luminance channel the delay is positive. If the chrominance is less than the luminance the delay is negative.

14: Differential gain measurement

Using ITS waveform 1 filter out the sub-carrier. Take the blanking level sub-carrier from the staircase as reference and measure the largest departure from this reference of the amplitude of the displayed waveform, Fig.9b. The result should be expressed as a percentage differential gain.

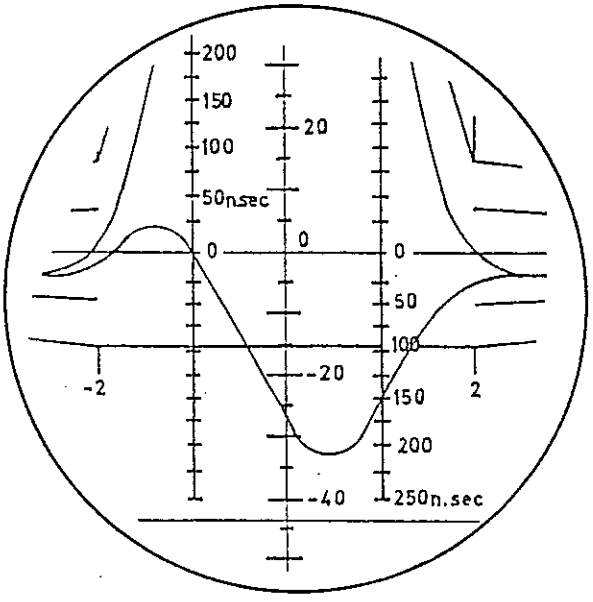

Fig. 9a CHROMINANCE/LUMINANCE DELAY MEASUREMENT

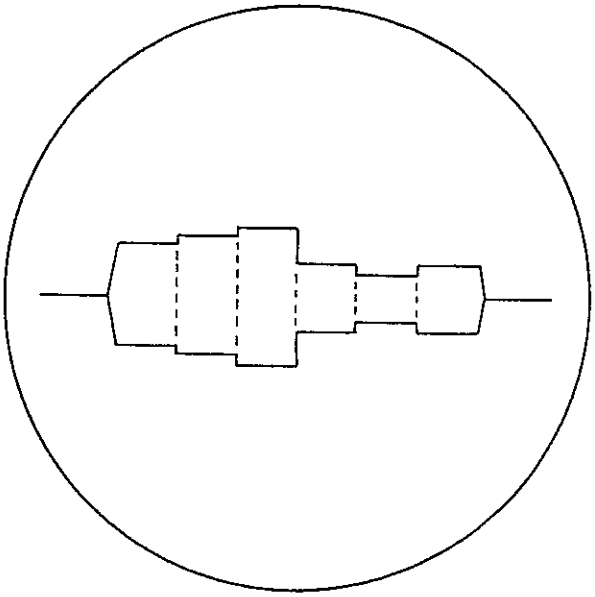

Fig.9b DIFFERENTIAL GAIN MEASUREMENT

15: Differential phase measurement

Using ITS waveform 1 filter out the sub-carrier. Take the blanking level sub-carrier from the staircase as reference and measure the largest departure from this reference of the amplitude of the displayed waveform. The result should be expressed as degrees differential gain.

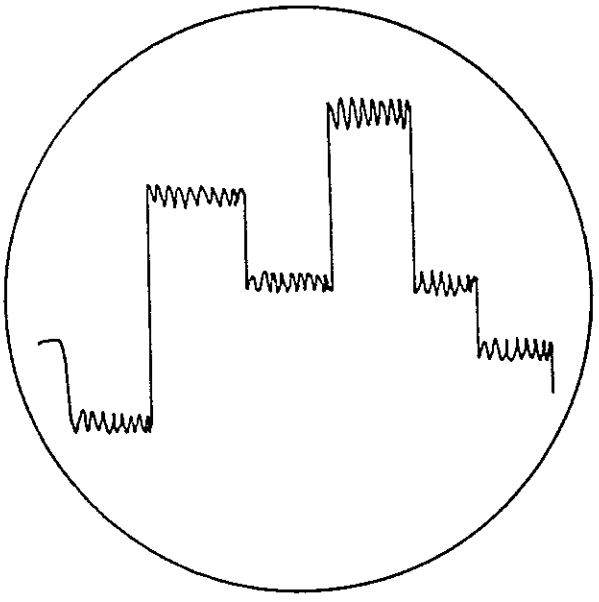

Fig.10 DIFFERENTIAL PHASE MEASUREMENT