RECOMMENDATION ITU-R BT.796*

Parameters for enhanced compatible coding systems based on 625-line PAL and SECAM television systems

(Question ITU-R 42/11)

(1992)

The ITU Radiocommunication Assembly,

considering

a) that there are proposals to introduce new systems of television broadcasting with improved quality of picture and sound, including wider aspect ratio;

b) that many broadcasting organizations will wish to enhance the quality of their existing services;

c) that the majority of television receiving installations can receive only terrestrial transmissions;

d) that most broadcasting organizations are committed to maintaining a service to these viewers;

e) that enhancements of existing terrestrial standards must maintain RF compatibility with current broadcasting systems;

f) that enhancements of existing terrestrial standards must maintain a high degree of picture and sound compatibility;

g) that in order to deliver improved images and sound by enhanced television transmission, the principal areas of enhancement ideally required are:

picture
- wider aspect ratio;
- reduced cross-effects;
- ghost cancellation;
- enhanced resolution;

sound
- digital multi-channel sound;

h) that a modular approach to enhancements will allow flexibility for different broadcasters to implement those enhancements independently or collectively;

j) that for economical processing in the receiver, there is an advantage to maximize the commonality for PAL and SECAM enhancements,

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* Radiocommunication Study Group 6 made editorial amendments to this Recommendation in 2002 in accordance with Resolution ITU-R 44.

recommends

that, when enhancements to existing PAL or SECAM television systems are made, some or all of the modular enhancement methods should be used, according to the following specification:

1 Picture enhancement techniques

1.1 Coder requirements for accommodating wide aspect ratio signals

a) Method of format conversion from 16:9 to 4:3

b) Method of encoding additional information:

- method of deriving additional information;
- method of processing the additional information;
- method of including the additional information in the broadcast signal.

1.2 Coder requirements for reducing cross-effects and making optimal use of the signal spectrum

a) Method of luminance filtering

b) Method of chrominance filtering

c) Method of modulation

d) Method of combining luminance and chrominance.

1.3 Ghost cancellation

a) Insertion test waveform

b) Position in the signal.

1.4 Coder requirements for increased resolution

a) Method to derive extra information

b) Method of including the extra information in the channel.

1.5 Data signalling

a) Details of the data waveform

b) Position in the signal

c) Data to be transmitted.

2 Sound enhancement methods

a) Details of the sound coding technique

b) Method of including the sound signal,

and further recommends

that enhanced terrestrial television broadcasting should not cause interference subjectively greater than that considered acceptable with current broadcasting services in the VHF/UHF bands.

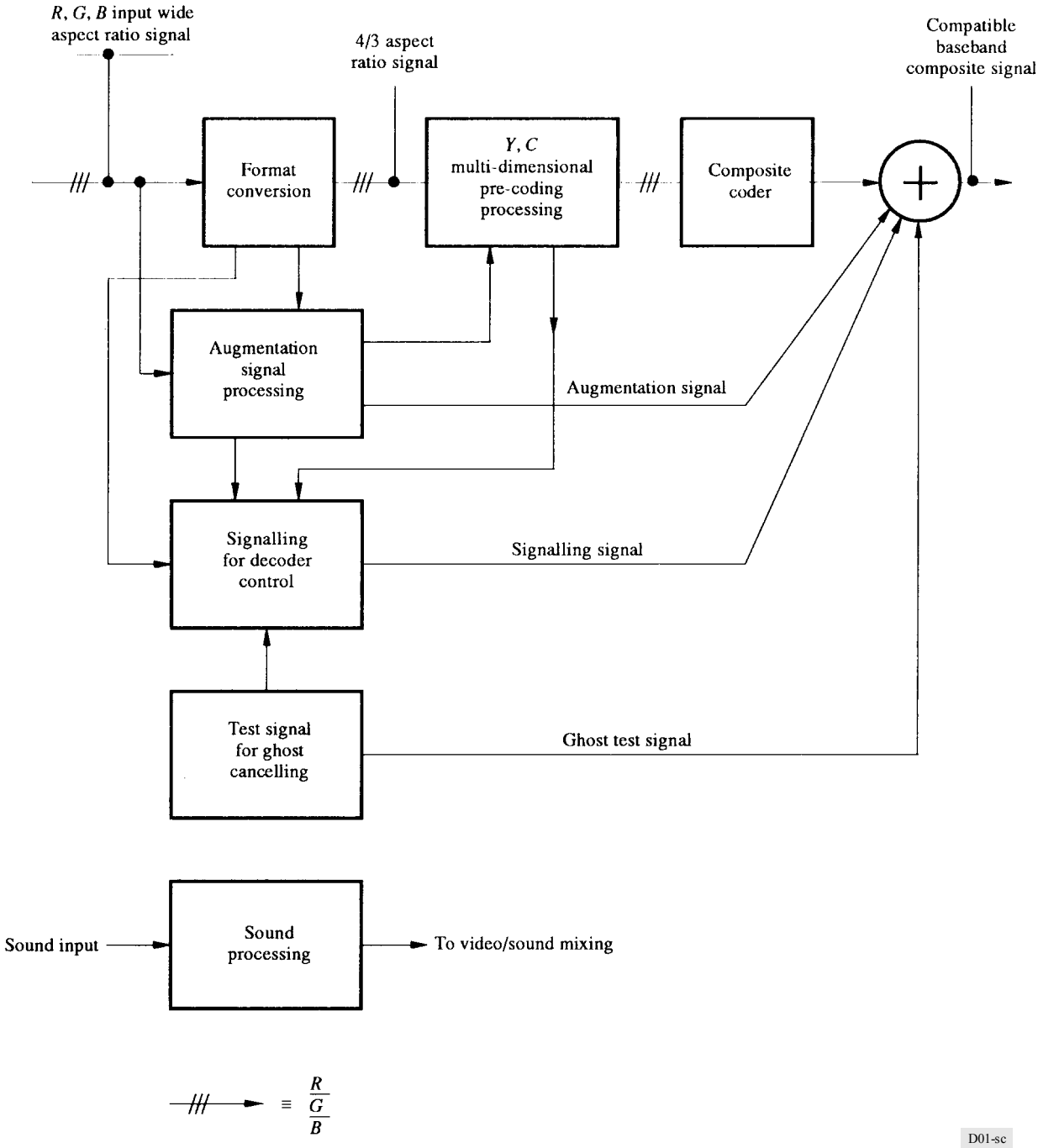
The main features of such a system, emphasizing the modular approach, are shown in the block diagram of an enhanced coder given in Fig. 1.

The considerations to be borne in mind for each of the above categories are described in more detail in Annex 1.

NOTE 1 – Administrations are invited to conduct further studies with the aim of making more specific proposals.

FIGURE 1

Block diagram of enhanced coder



ANNEX 1

Factors which will influence the choice of parameters

1 Picture enhancement techniques

1.1 Wide aspect ratio coding

There are three approaches to accommodating the wide aspect ratio frame in a conventional 4:3 signal:

1.1.1 The letter-box format

Widescreen displays with a 16:9 aspect ratio are being made in Europe for enhanced television services. The most straightforward way to convey the 16:9 signal in the 625-line PAL/SECAM channel, and at the same time preserve the correct geometry for the viewer with a standard 4:3 receiver, is to use a letter-box format. In this format 432 of the 575 active lines are used to carry the 16:9 active picture area.

In the widescreen receiver, the 432 lines are arranged, by up-conversion or other means, to fill the full height of the display. In the standard 4:3 receiver the viewer sees black bands above and below the active picture.

1.1.2 The side-panel approach

The side-panel approach involves conveying additional picture information that is invisible to the 4:3 aspect ratio receiver, which in principle, continues to display a normal picture with full vertical and horizontal resolution. The enhanced widescreen receiver recovers this extra information and "stitches" the edges onto the central portion of the picture, to recreate a widescreen picture for 16:9 aspect ratio display.

The additional picture information required for the side panels could be carried in various ways, including:

– quadrature modulation of the vision RF carrier;

– signals carried in the Fukinuki hole (in human vision);

– signals carried in the vertical blanking interval;

– signals carried at the extremities of each active picture line, that would not normally be visible on conventional televisions due to overscan.

1.1.3 Window options

There are several possible choices for a compromise "letter-box" window solution, and one of these could be the mean aspect ratio between 4:3 and 16:9, i.e., 14:9. In this case, the blank bands displayed on a conventional 4:3 aspect ratio receiver would be reduced from the 12.5% of a 16:9 letter-box to some 6% of full picture height at top and bottom. However, in practice, the viewer would be likely to see only about 2% black bands, due to the typical receiver overscan.

1.2 Reduction of cross-effects

Two approaches have been considered for reducing cross-effects in the PAL system, known in broad terms as band segregation and phase segregation.

Band segregation is the simplest method to understand because the luminance and chrominance components are separated in the frequency domain. In the phase segregation method, high frequency luminance and chrominance signals are effectively carried on orthogonally-phased subcarriers. Both methods involve complex multi-dimensional comb filter processing.

It remains to be seen whether similar techniques can be applied in the SECAM system.

1.3 Ghost cancellation

Proposals for ghost cancellation depend on the use of a test line signal. The form of the signal would consist of a rectangular pulse with sin x/x edges. The proposals for the duration and position of the pulse in the test line vary. Alternatively, the use of a pseudo-random data sequence or the use of existing insertion test line signals has been proposed. In most cases there is the difficult requirement to allocate a test line in the already crowded vertical blanking interval.

1.4 Increased resolution

In the circumstance where the source signal standard contains more resolution than conventional composite signals, there are proposals to include this information in the compatible enhanced signal. Such information might be accommodated by spectrum folding techniques and conveyed in the signal by coding methods such as those listed for the side-panel approach in § 1.1.2.

1.5 Data signalling

The enhanced signal coder would need to include information on the status of the coder processing methods to the decoder. Such information might simply indicate which parameters are being used in the coder or could consist of signal-related information, such as movement vectors, to assist the decoder in, for example, up-conversion processes in the display.

2 Sound coding

It is expected that improved quality sound coding, by digital means, will form an important enhancement to the broadcast composite signal. The choice of technique needs to be made in association with other requirements in the signal.