

RECOMMENDATION ITU-R BT.802-1<sup>\*,\*\*</sup>**Test pictures and sequences for subjective assessments of digital codecs conveying signals produced according to Recommendation ITU-R BT.601**

(1992-1994)

The ITU Radiocommunication Assembly,

*considering*

- a) that digital signals defined according to Recommendation ITU-R BT.601 are required to be transmitted through point-to-point transmission links;
- b) that coding algorithms have been devised and standards established or proposed to enable such transmission to be effected using bit rate reduction techniques;
- c) that prototype codec equipment using these algorithms is being developed and needs to be assessed;
- d) that Recommendation ITU-R BT.800 defines the relevant user requirements;
- e) that bit rate reduction techniques are also being considered for other applications, e.g. recording;
- f) that the evaluation of such codecs can best be performed on a subjective basis, due to the complex and adaptive natures of the multi-dimensional impairments introduced by bit rate reduction;
- g) that subjective testing methods are defined in Recommendations ITU-R BT.500 and ITU-R BT.800;
- h) that the selection of appropriate test material is a key step in the planning of subjective assessment and that when results are to be correlated between a number of testing sites or groups the same pictures should be used and should be available at the highest level of quality;
- j) that the availability of digital recording according to Recommendation ITU-R BR.657 enables a consistent level of high quality to be achieved in the compilation of subjective test sequences,

*recommends*

- 1** that the still pictures and moving sequences specified in Recommendation ITU-R BT.800 and used in the subjective evaluation of codecs conveying signals originated according to Recommendation ITU-R BT.601 be selected from the library tape defined in Annex 1.

NOTE 1 – A number of methods for subjective tests are under consideration, each requiring a somewhat different arrangement of material. The arrangement defined in Annex 2 is the one currently preferred.

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\* This Recommendation should be brought to the attention of Telecommunication Standardization Study Group 9.

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

## ANNEX 1

## Content of library tape

TABLE 1

Scene No.	Title	Characteristic	Motion	Source	Availability	
					525	625
1	Formal pond	Luminance resolution	Still	Slide	o	o
2	Boats	Luminance and colour resolution	Still	Slide	o	o
3	Clown	Horizontal resolution	Still	Slide	o	o
4	Boy with toys	Skin and colour edges	Still	Slide	o	o
5	Girl with toys	Skin and colour edges	Still	Slide	o	o
6	Young couple	Luminance and fine detail	Still	Slide	o	o
7	Blackboard	Colour, vertical resolution	Still	Slide	o	o
8	Tree	Luminance patterns	Still	Slide	o	o
9	Old master	Chroma key FG	Still	Video	–	o
10	Old master	Chroma key BG	Still	Video	–	o
11	Still life	Chroma key FG	Still	Video	o	o
12	Still life	Chroma key BG	Still	Video	o	o
13	Kiel Harbour-1	High resolution	Still	8 × 10 slide	o	o
14	Sailboat	Luminance resolution	Slow	Video	o	o
15	Flower garden	Colour details	Slow pan	Video	o	o
16	Susie	Skin tones	Slow	Video	o	o
17	Diva with noise	Rapid entropy changes	Prod. wipe	Video	o	o
18	Dinner party	Chroma key BG		Video	o	o
19	Boy with toys	Skin and colour edges	Pan (H, V)	Slide	–	o
20	Old master	Chroma key FG	Slow pan	Video	–	o
21	Old master	Chroma key BG	Slow pan	Video	–	o
22	Clown	Luminance and colour horizontal resolution	Pan (H, V)	Slide	–	o
23	BBC disc	Random movement	Circular	Video	–	o
24	Kiel Harbour-2	Cycle motion (narrow filter)	Rapid rocking	Component	o	o
25	Kiel Harbour-3	Cycle motion (wide filter)	Rapid rocking	Component	o	o
26	Kiel Harbour-4	High resolution in H, V, T dimensions	Slow pan/zoom	Component	o	o
27	Balls of wool	Moving colours	Medium	Video	o	o
28	Popple	Moving colours	Pan/rotate	Video	o	o
29	Table tennis	Multiple rapid motions	Pan/zoom/cut	Video	o	o
30	Mobile and calendar	Random motion of objects	Slow	Video	o	o
31	Autumn leaves	Colour details	Slow pan/zoom	Camera	o	–
32	Summer flowers	Saturated colours, texture	Slow pan	Camera	o	–

TABLE 1 (end)

Scene No.	Title	Characteristic	Motion	Source	Availability	
					525	625
33	Birches	Luminance details, sky	Slow tilt up	Camera	o	–
34	Horse riding	Landscape	Zoom	Camera	o	–
35	Bicycles	Bicycle wheels	Complex, fast	Camera	o	–
36	Ferris wheel	Luminance and colour details	Fast, complex	Camera	o	–
37	Shinjuku	Horizontal and vertical detail	Slow pan	Camera	o	–
38	Football	Sports	Rapid motion	Camera	o	–
39	Cheerleaders	Fast, complex	Zoom	Camera	o	–
40	Ciao!	CK, FG, Luminance, colour details	Slow pan/zoom	Camera	o	o
41	Ciao!	CK, BG, Luminance, colour details	Slow pan/zoom	Camera	o	o
42	Portrait de famille	Progressive utilization	Wipe	Camera/SE	o	–
43	Diva	Cuts on titles/busy scene	Cuts	Camera/SE	o	–
44	Tempête	H, V, Luminance, colour details	Random motion	Camera	o	o
45	Tempête with noise	H, V, Luminance, colour details	Random motion	Camera	o	o
46	TV trip	3D graph, H, V luminance, colour details	Zoom/rotate	Graphics	o	–
47	Cruising	Animated freeze frames	2-10 freezes	Camera	o	o
48	Decoded NTSC	Cross luminance colour	Slow pan/zoom	Camera	o	–
49	Decoded PAL	Cross luminance colour	Slow pan/zoom	Camera	–	o
50	Un générique	Rolling and crawling titles	Crawl/roll	Camera/CG	o	o
51	Error recovery	Frame and calibration	Slow	Camera/Key	o	o
52	Text for 625 diva	Cuts on titles	Cuts	SE		o
53	Basketball	Sports, multiple motion, detailed background	Zoom, H pan	CCD camera	–	o

NOTE 1 – The content of the library tape will be updated from time to time; information about the criteria governing the selection of items for the library tape is given in Annex 3; the library tape is available in the D1 digital format specified in Recommendation ITU-R BR.657; all segments of the library tape are in the public domain and may be used freely for evaluations and demonstrations.

NOTE 2 – Scene No. 17, “diva with noise”, is known to contain pixels with  $Y$ ,  $C_R$ ,  $C_B$  combinations that result in out-of-range values when converted to  $R$ ,  $G$ ,  $B$  or composite signals.

Copies of the test material can be made available; requests should be addressed to the ITU Radiocommunication Bureau.

## ANNEX 2

**A possible arrangement for use in the assembly of a subjective  
test tape using sequences selected from Annex 1**

TABLE 2

Block No.	Duration (s)	Time code (start)	Video	Audio
1	60	00:54:15:00	Colour bars – Full level	Tone – 440 Hz (All channels)
2	30	00:55:15:00	Flat field 1	Tone (all channels) 400 Hz
3	30	00:55:45:00	Flat field 2	Tone (all channels) 400 Hz
4	30	00:56:15:00	Ramp	Tone (all channels) 400 Hz
5	20	00:56:45:00	Zone plate – Y only – Still $C_B = C_R = 128$	Tone (all channels) 400 Hz
6	20	00:57:05:00	Zone plate – $C_B$ only – Still $Y = 16, C_R = 128$	Tone (all channels) 400 Hz
7	20	00:57:25:00	Zone plate – $C_R$ only – Still $Y = 16, C_B = 128$	Tone (all channels) 400 Hz
8	20	00:57:45:00	Zone plate – Y only – Mobile $C_R = C_B = 128$	Tone (all channels) 400 Hz
9	20	00:58:25:00	Zone plate – $C_B$ only – Moving $Y = 16, C_R = 128$	Tone (all channels) 400 Hz
10	20	00:58:05:00	Zone plate – $C_R$ only – Moving $Y = 16, C_B = 128$	Tone 400 Hz (All channels)
11	10	00:58:45:00	Title caption – Test tape according to Recommendation ITU-R BT.800, YY/MM/DD	Voice announcement
12	10	00:58:55:00	Credits	Voice over
13	40	00:59:05:00	Rolling index	Silence
14(a)	10	00:59:45:00	Title: “Formal pond”	“Formal pond” (Ch. 1)
14(b)	05	00:59:55:00	Grey ( $Y = 64, C_B = C_R = 128$ )	Silence
14(c)	30	01:00:00:00	Test scene 1 – Formal pond	Tone seq. (Ch.1)
14(d)	15	01:00:30:00	Grey	Silence
15(a)	10	01:00:45:00	Title: “Boats”	“Boats” (Ch. 1)
			Etc.	Etc.
NN	60		Colour bars – End of video	Tone (all channels) 400 Hz

NOTE 1 – Further information about the compilation of subjective test tapes from material contained in the library tape is given in Annex 4.

## ANNEX 3

**Criteria governing the choice of items  
included in the library tape**

In the preparation of subjective assessments, the assessor must have available a variety of scenes than can be considered critical but not unduly so, and which are representative in quality and production values with the best of television broadcasting. The level of difficulty may be checked by objective measurements, such as the determination of the worst-case differential entropy.

Subjective assessments may also consider a range of possible applications and situations making necessary the inclusion of scenes suitable for the evaluation of basic quality, processibility (chroma key, slow-motion, special effects, etc.), error performance and sound/vision synchronization. Tests for consistency of results as between the 525- and 625-line systems would require also that near-identical scenes for both systems be included.

A library of test scenes must then be based on the essential following criteria and should include:

- images at a number of levels of difficulty and with different rates and modes of motion including stills;
- material suitable for contribution and distribution uses;
- scene pairs suitable for colour matte evaluation;
- highest quality images with the lowest possible noise levels, but noting the need for some scenes to have known amounts of noise added to evaluate certain facets of codec performance;
- scenes covering a range of programme types;
- scenes suitable for testing codec performance under normal conditions and in the presence of errors, both concealed and unconcealed.

It should be noted that because  $Y$ ,  $C_R$ ,  $C_B$  signals can represent a substantially greater gamut of signal values than can be supported by the corresponding range of  $R$ ,  $G$ ,  $B$  signals, care should be taken to ensure that sequences for subjective assessment do not contain pixels with combinations of  $Y$ ,  $C_R$ ,  $C_B$  which would result in out-of-range  $R$ ,  $G$ ,  $B$  values.

Table 1 describes a library of scenes meeting these criteria, which has been assembled in both the 525-line and the 625-line versions. The scenes were developed by a number of organizations engaged in codec development and evaluation including the Administrations of Canada, France, Germany, Italy, Japan and the United Kingdom.

## ANNEX 4

**Compilation of subjective test tapes**

The need for a large selection of scenes and for their presentation in a random order for different presentations precludes the preparation of a tape suitable for direct use in sessions for subjective evaluation. A better arrangement is to produce a library tape of the scenes in a format that will allow the assembly of tapes for specific sessions with a minimum of inconvenience by editing between the play back of the library tape and the specific play back medium for that session. The quality loss in this process can be very small, if the interface between machines is in the digital form specified in Recommendation ITU-R BT.601 and Recommendation ITU-R BT.656.

The library tape consists of a leader for technical evaluation, time-code for edit control, an index in video form and a number of scene blocks to be used for evaluation.

Scene identification is carried in a caption title located in the video and audio ahead of the actual scene. Scenes may thus be located visually or by reference to time-code based on addresses from the Index Page at the head of the tape.

Scene identification can be carried in time-code and in the longitudinal or digital audio areas of the D1-DTTR format specified in Recommendation ITU-R BR.657.

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