EBU Tech 3305

Digital Television Test Pattern Sequence for Operational Use

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Contents

Digital Television Test Pattern Sequence for Operational Use

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PMC	2005		

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1 Introduction

This document specifies a television test pattern sequence that is suited for operational use. It consists of a static element and two motion elements in order to enable temporal checks in conjunction with respective audio signals. The test signal sequence is originated as an SDTV signal with an aspect ratio of 4:3 and supports a picture aspect ratio of 16:9 as an anamorphic image in 270 Mbit/s 4:3 signals, where the distinction between 4:3 and 16:9 test patterns is supported by a corresponding geometric square element.

The test pattern sequence is generated in the digital signal domain, however its specification remains legal if it is converted into the analogue domain. The test pattern sequence is intended mainly for economical implementation into all signal sources, including mobile equipment e.g. camcorders, which may feed into contribution/transmission lines. For this reason, the basic test pattern sequence is designed to enable low-cost implementation. It contains no circles and can be built from only 32 stored TV lines.

2. Test sequence signal structure

The test sequence signal is composed of a static element together with two motion sequences (1 & 2) that are consecutively superimposed on the red area of the static element. The temporal behaviour of the motion sequences is specified below. The following description of the elements necessary to compose the complete test pattern is done in a TV-line oriented form. This allows easy comparison with visual presentations and related diagrams.

2.1 Static element structure

The static part of the test pattern is shown in Fig. 1 and it contains the following components:

- Underlying colour bars with red area

- Geometrical square element for the indication of the aspect ratio

- Pattern which marks the centre of the picture

- Ramp signal with 10 bit resolution

- Two "End of Line Pulses" at each end, which mark both the analogue and digital horizontal blanking

- The first and last active line of each field are White lines, where the White signal element starts with the first "End of Line Pulse" and ends with the last "End of Line Pulse"

- Reserved area for the insertion of visual information, e.g. source identification, time code, etc.
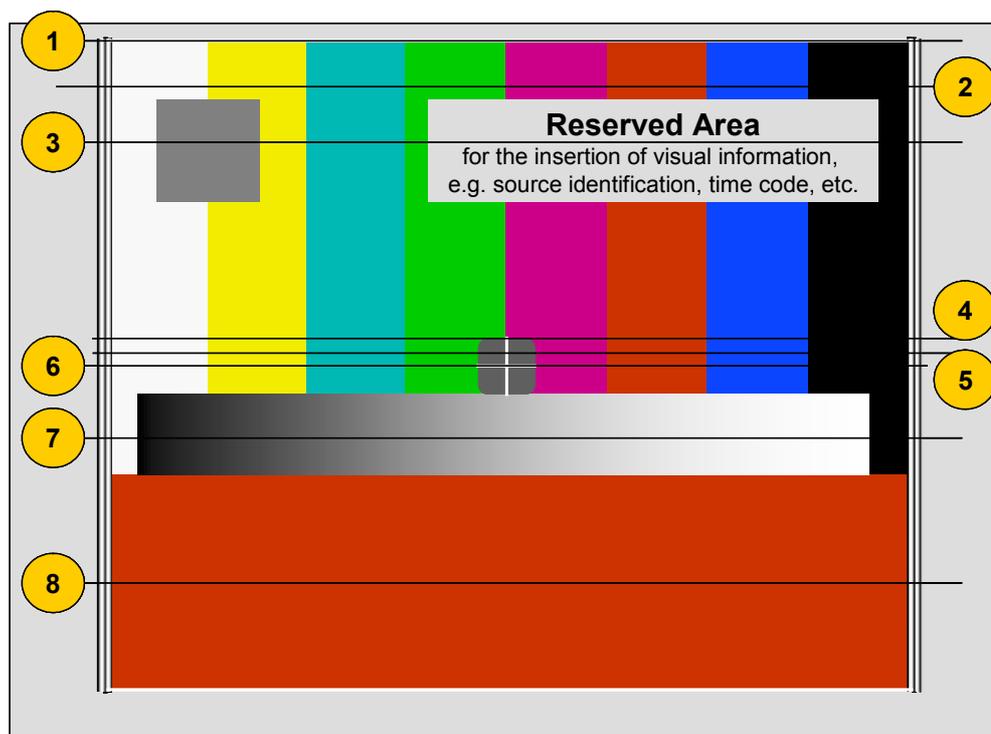
Fig. 1: Structure of the static element showing Patterns 1 to 8

Referring to Fig. 1:

Pattern 1   consists of a 100% white signal preceded by a single pulse and followed by a single pulse.

Pattern 2   consists of a 75% colour bar signal.

Pattern 3   consists of a 75% colour bar signal in which a 50% Grey signal centred on the white-yellow transition is inserted. The inserted reserved area centred on the red bar shall be provided for visual information.

Pattern 4   consists of a 75% colour bar signal in which a 50% Grey signal centred on the green/magenta transition and a 100% White signal in the picture centre, are inserted.

Pattern 5   consists of a 75% colour bar signal in which a 50% Grey signal centred on the green/magenta transition and a 100% White signal at the picture centre, are inserted.

Pattern 6   consists of a 75% colour bar signal in which a 100% White signal at the picture centre, are inserted.

Pattern 7   consists of a 100% White signal followed by a Black-to-White ramp signal and a concluding 0% black signal.

Pattern 8   consists of a 75% Red signal.

Patterns 2 to 8 contain two pulses before and two pulses after the signals described above.

2.1.1 Waveforms

The following figures are not exactly to scale but they illustrate the general shape of the waveforms.
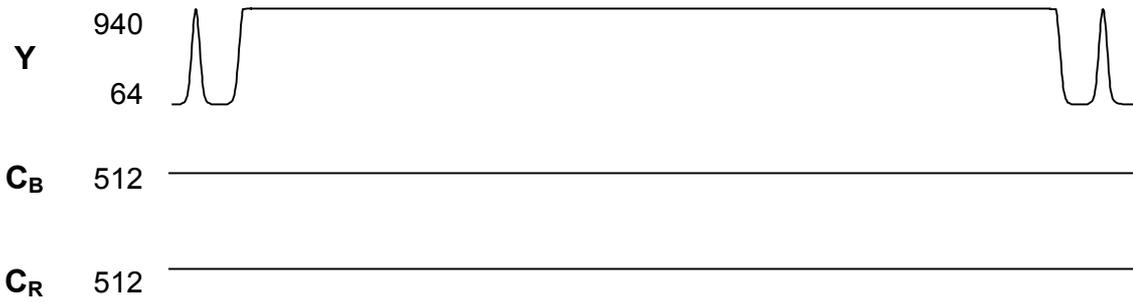
Pattern 1

Fig. 2: Pattern 1 Waveforms

Pattern 2
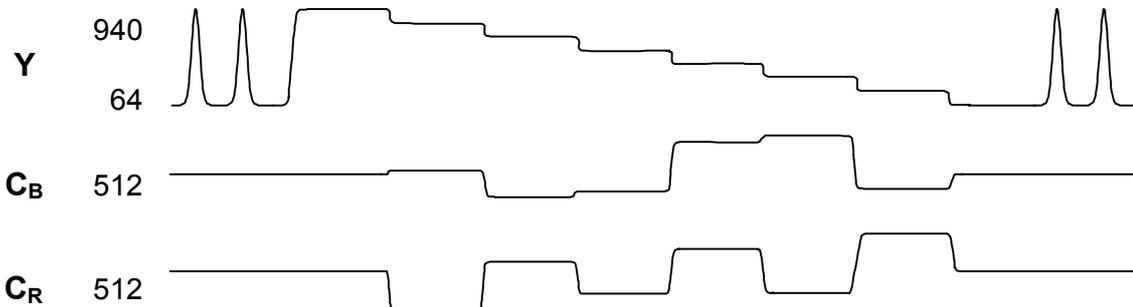
Fig. 3: Pattern 2 Waveforms

Pattern 3
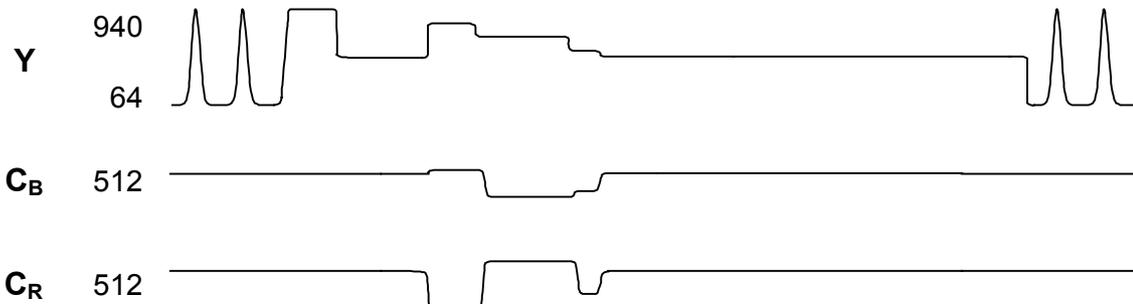
Fig. 4: Pattern 3 Waveforms for 4:3

Pattern 4
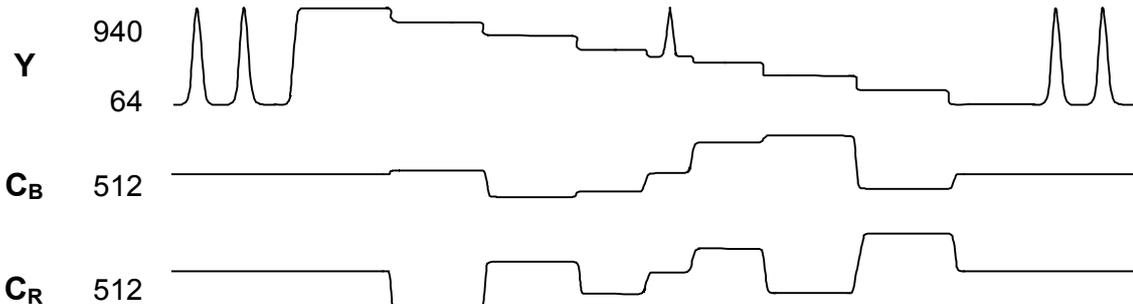
Fig. 5: Pattern 4 Waveforms

Pattern 5
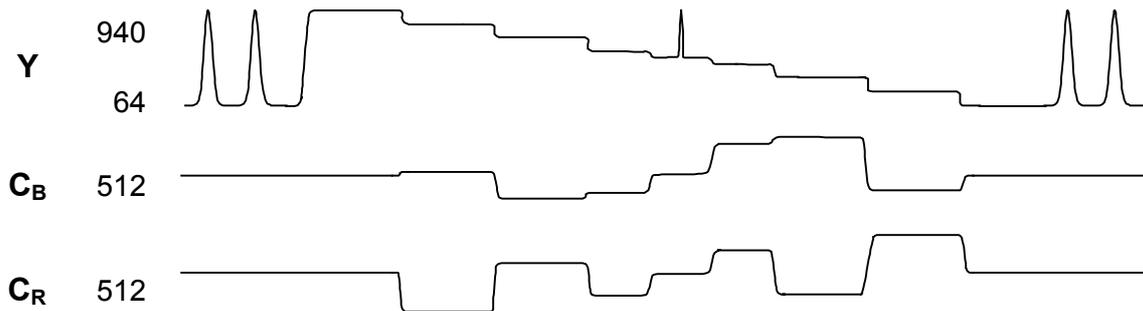
Fig. 6: Pattern 5 Waveforms

Pattern 6
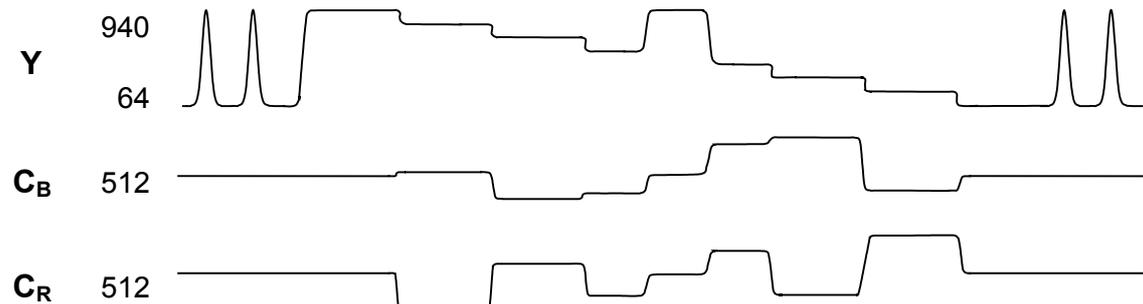
Fig. 7: Pattern 6 Waveforms

Pattern 7
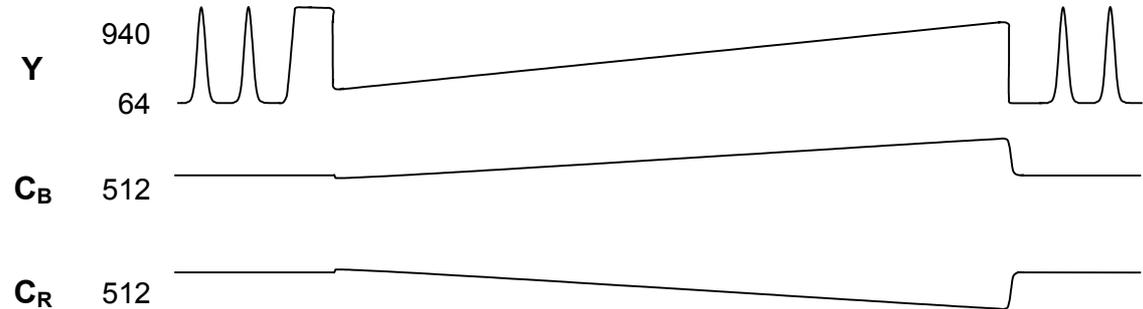
Fig. 8: Pattern 7 Waveforms

Pattern 8
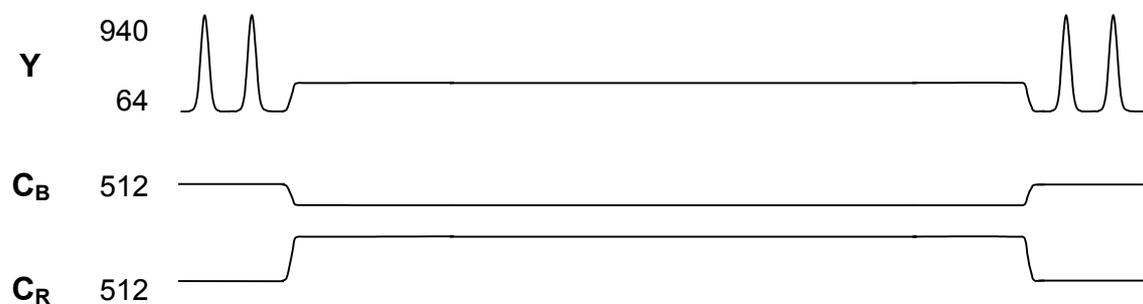
Fig. 9: Pattern 8 Waveforms

2.1.2 Coding values

The following are the digital coding values for 10 bit implementations of the patterns for the static element of the test pattern.

Pattern 1

Pixel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14-707
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	940
C_B	512		512		512		512		512		512		512		512
C_R		512		512		512		512		512		512		512	512

Pixel	708	709	710	711	712	713	714	715	716	717	718	719
Y	940	916	484	124	64	64	176	616	940	616	176	64
C_B	512		512		512		512		512		512	
C_R		512		512		512		512		512		512

Pattern 2

Pixel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	484	124	64	64	64	100	282
C_B	512		512		512		512		512		512		512		512		512		512		512
C_R		512		512		512		512		512		512		512		512		512		512	

Pixel	21	22	23	24-99	100	101	102	103	104	105	106	107	108-183	184	185	186	187	188	189
Y	580	836	934	940	940	938	918	844	740	668	646	646	646	646	646	644	632	584	536
C_B		512		512	510		452		304		192		176	180		276		480	
C_R	512		512	512		520		546		564		566	566		562		480		304

Pixel	190	191	192-269	270	271	272	273	274	275	276	277	278-355	356	357	358	359	360	361	362
Y	524	524	524	524	522	510	486	464	452	448	448	448	448	444	420	382	348	336	336
C_B	612		626	618		534		380		296		290	304		434		636		730
C_R		188	176		178		192		216		228	230		248		414		668	

Pixel	363	364-441	442	443	444	445	446	447	448-529	530	531	532	533	534	535	536-611
Y	336	336	336	330	310	284	266	260	260	260	246	210	168	142	138	138
C_B		734	718		606		456		398	430		596		786	846	
C_R	788	792	796		814		838		846	818		674		510		456

Pixel	612	613	614	615	616	617	618-705	706	707	708	709	710	711	712	713	714	715	716	717	718	719
Y	138	126	102	76	66	64	64	68	256	740	616	484	124	64	64	176	616	940	616	176	64
C_B	812		680		546		512		512		512		512		512		512		512		512
C_R		462		484		506	512		512		512		512		512		512		512		512

Pattern 3

Pixel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	484	124	64	64	64	100	282
C_B	512		512		512		512		512		512		512		512		512		512		512
C_R		512		512		512		512		512		512		512		512		512		512	

Pixel	21	22	23	24-61	62	63	64	65	66-139	140	141	142	143	144	145	146-183	184	185
Y	580	836	934	940	904	725	546	512	512	512	524	580	636	646	646	646	646	646
C_B		512		512	512		512		512	476		344		212		176	180	
C_R	512		512	512		512		512	512		540		560		566	566		562

Pixel	186	187	188	189	190	191	192-269	270	271	272	273	274	275	276	277	278-315	316	317	318	319
Y	644	632	584	536	524	524	524	524	522	510	486	464	452	448	448	448	448	448	448	353
C_B	276		480		612		626		618		534		380		296	290	292		312	
C_R		480		304		188		176		178		192		216	228			230	257	372

Pixel	320	321	322	323	324-659	660	661	662	663	664-705	706	707	708	709	710	711	712	713
Y	480	507	512	512	512	472	288	104	64	64	68	256	740	916	484	124	64	64
C_B	394		486		512		512		512		512		512		512		512	
C_R		487		512		512		512		512		512		512		512		512

Pixel	714	715	716	717	718	719
Y	176	616	940	616	176	64
C_B	512		512		512	
C_R		512		512		512

Pattern 4

Pixel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	484	124	64	64	64	100	282
C_B	512		512		512		512		512		512		512		512		512		512		512
C_R		512		512		512		512		512		512		512		512		512		512	

Pixel	21	22	23	24-99	100	101	102	103	104	105	106	107	108-183	184	185	186	187	188	189
Y	580	836	934	940	940	938	918	844	740	668	646	646	646	646	646	644	632	584	536
C_B		512		512		510		452		304		192	176			180		276	480
C_R	512		512	512	520		546		564		566		566	562			480		304

Pixel	190	191	192-269	270	271	272	273	274	275	276	277	278-337	338	339	340	341	342-357	358
Y	524	524	524	524	522	510	486	464	452	448	448	448	448	464	496	512	512	552
C_B	612		626		618		534		380		296	290		342		448	512	512
C_R		188		176		178		192		216		228	230		302		442	512

Pixel	359	360	361	362	363	364-377	378	379	380	381	382	383	384-441	442	443	444	445	446	447
Y	616	940	616	525	512	512	512	510	477	371	338	336	336	336	330	310	284	266	260
C_B	512		512		512		512		568		680		734		718		606		456
C_R	512	512		512		512		512		582		722		792		796		814	838

Pixel	448-529	530	531	532	533	534	535	536-611	612	613	614	615	616	617	618-705
Y	260	260	246	210	168	142	138	138	138	126	102	76	66	64	64
C_B	398		430		596		786		846		812		680		512
C_R		846		818		674		510		456		462		506	512

Pixel	706	707	708	709	710	711	712	713	714	715	716	717	718	719
Y	68	256	740	616	484	124	64	64	176	616	940	616	176	64
C_B	512		512		512		512		512		512		512	
C_R		512		512		512		512		512		512		512

Pattern 5

Pixel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	484	124	64	64	64	100	282
C_B	512		512		512		512		512		512		512		512		512		512		512
C_R		512		512		512		512		512		512		512		512		512		512	

Pixel	21	22	23	24-99	100	101	102	103	104	105	106	107	108-183	184	185	186	187	188	189
Y	580	836	934	940	940	938	918	844	740	668	646	646	646	646	646	644	632	584	536
C_B		512		512	510		452		304		192		176	180		276		480	
C_R	512		512	512		520		546		564		566	566		562		480		304

Pixel	190	191	192-269	270	271	272	273	274	275	276	277	278-335	336	337	338	339	340-357	358
Y	524	524	524	524	522	510	486	464	452	448	448	448	448	464	496	512	512	552
C_B	612		626		618		534		380		296		290		342		448	512	512
C_R		188		176		178		192		216		228		230		302	442	512	

Pixel	359	360	361	362	363	364-379	380	381	382	383	384	385	386-441	442	443	444	445	446	447
Y	616	940	616	525	512	512	512	510	477	371	338	336	336	336	330	310	284	266	260
C_B		512		512		512		512		568		680		734		718		606	456
C_R	512		512		512		512		512		582		722		792		796	814	838

Pixel	448-529	530	531	532	533	534	535	536-611	612	613	614	615	616	617	618-705
Y	260	260	246	210	168	142	138	138	138	126	102	76	66	64	64
C_B	398		430		596		786	846		812		680		546	512
C_R		846		818		674	510		456		462		484	506	512

Pixel	706	707	708	709	710	711	712	713	714	715	716	717	718	719
Y	68	256	740	616	484	124	64	64	176	616	940	616	176	64
C_B	512		512		512		512		512		512		512	
C_R		512		512		512		512		512		512		512

Pattern 6

Pixel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	484	124	64	64	64	100	282
C_B	512		512		512		512		512		512		512		512		512		512		512
C_R		512		512		512		512		512		512		512		512		512		512	

Pixel	21	22	23	24-99	100	101	102	103	104	105	106	107	108-183	184	185	186	187	188	189
Y	580	836	934	940	940	938	918	844	740	668	646	646	646	646	646	644	632	584	536
C_B		512		512	510		452		304		192		176	180		276		480	
C_R	512		512	512		520		546		564		566	566		562		480		304

Pixel	190	191	192-269	270	271	272	273	274	275	276	277	278-335	336	337	338	339	340-379
Y	524	524	524	524	522	510	486	464	452	448	448	448	448	571	817	940	940
C_B	612		626		618		534		380		296		290		342		448	512
C_R		188		176		178		192		216		228		230		302	442	512

Pixel	380	381	382	383	384	385	386-441	442	443	444	445	446	447
Y	940	938	789	487	338	336	336	336	330	310	284	266	260
C_B	512		568		680		734		718		606	456	
C_R		512		582		722		792		796	814	838	

Pixel	448-529	530	531	532	533	534	535	536-611	612	613	614	615	616	617	618-705
Y	260	260	246	210	168	142	138	138	138	126	102	76	66	64	64
C_B	398		430		596		786	846		812		680		546	512
C_R		846		818		674	510		456		462		484	506	512

Pixel	706	707	708	709	710	711	712	713	714	715	716	717	718	719
Y	68	256	740	616	484	124	64	64	176	616	940	616	176	64
C_B	512		512		512		512		512		512		512	
C_R		512		512		512		512		512		512		512

Pattern 7

Pixel (i)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	484	124	64	64	64	100
C_B	512		512		512		512		512		512		512		512		512		512	
C_R		512		512		512		512		512		512		512		512		512		512

Pixel (i)	20	21	22	23	24-95	96	97	98	99	100	101	102	103	104-613	614	615
Y	282	580	836	934	940	928	804	504	264	254	254	254	255	$(i + 152)$	766	767
C_B	512		512		512		512		511		511		512		$(i_{even}/2 + 461)$	768	
C_R		512		512		512		512		512		512		511	$(563 - (i_{odd} + 1)/2)$		255

Pixel (i)	616	617	618	619	620	621	622-705
Y	768	768	750	504	200	76	64
C_B	768		723		572		512
C_R		255		285		452	512

Pixel (i)	706	707	708	709	710	711	712	713	714	715	716	717	718	719
Y	68	256	740	616	484	124	64	64	176	616	940	616	176	64
C_B	512		512		512		512		512		512		512	
C_R		512		512		512		512		512		512		512

Pattern 8

Pixel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16-19	20	21	22
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	484	124	64	64	69	212
C_B	512		512		512		512		512		512		512		512		512	512		456
C_R		512		512		512		512		512		512		512		512			542	

Pixel	23	24	25	26-695	696	697	698	699	700	701	702	703	704	705	706	707	708	709
Y	255	260	260	260	260	260	255	212	69	64	64	64	64	64	68	256	740	916
C_B		400		400	400		456		512		512		512		512		512	
C_R	680		818	848		818		680		542		512		512		512		512

Pixel	710	711	712	713	714	715	716	717	718	719
Y	484	124	64	64	176	616	940	616	176	64
C_B	512		512		512		512		512	
C_R		512		512		512		512		512

2.1.3 Composition of the static element for 625/50 and 525/60 test pattern sequences

The static elements for 625/50 and 525/60 systems are composed as shown in Tables 1 & 2 respectively.

Table 1: Static element for 625/50 systems

Line	Pattern	Description
Field 1		
23	Pattern 1	
24 to 50	Pattern 2	
51 to 94	Pattern 3	
95 to 141	Pattern 2	
142	Pattern 4	
143 to 166	Pattern 5	
167	Pattern 6	
168 to 190	Pattern 5	
191	Pattern 4	
192 to 207	Pattern 7	
208 to 309	Pattern 8	
310	Pattern 1	
Field 2		
336	Pattern 1	
337 to 363	Pattern 2	
364 to 406	Pattern 3	
407 to 453	Pattern 2	
454	Pattern 4	
455 to 478	Pattern 5	
479	Pattern 6	
480 to 502	Pattern 5	
503	Pattern 4	
504 to 520	Pattern 7	
521 to 622	Pattern 8	
623	Pattern 1	

Table 2: Static element for 525/60 systems

Line	Pattern	Description
Field 1		
20	Pattern 1	
21 to 43	Pattern 2	
44 to 80	Pattern 3	
81 to 120	Pattern 2	
121	Pattern 4	
122 to 141	Pattern 5	
142	Pattern 6	
143 to 162	Pattern 5	
163	Pattern 4	
164 to 177	Pattern 7	
178 to 262	Pattern 8	
263	Pattern 1	
Field 2		
283	Pattern 1	
284 to 306	Pattern 2	
307 to 343	Pattern 3	
344 to 382	Pattern 2	
383	Pattern 4	
384 to 403	Pattern 5	
404	Pattern 6	
405 to 424	Pattern 5	
425	Pattern 4	
426 to 440	Pattern 7	
441 to 524	Pattern 8	
525	Pattern 1	

2.2 Motion sequence 1 signal structure

Motion sequence 1 is shown in Fig. 10 and it contains the following components:

- An underlying red area

- A small horizontal bar, which is moved vertically up and down within the red area.

Pattern 9 consists of a 75% Red signal in which a 0% Black signal with a 100% White signal at the picture centre are inserted, with two pulses to the left and right side respectively.
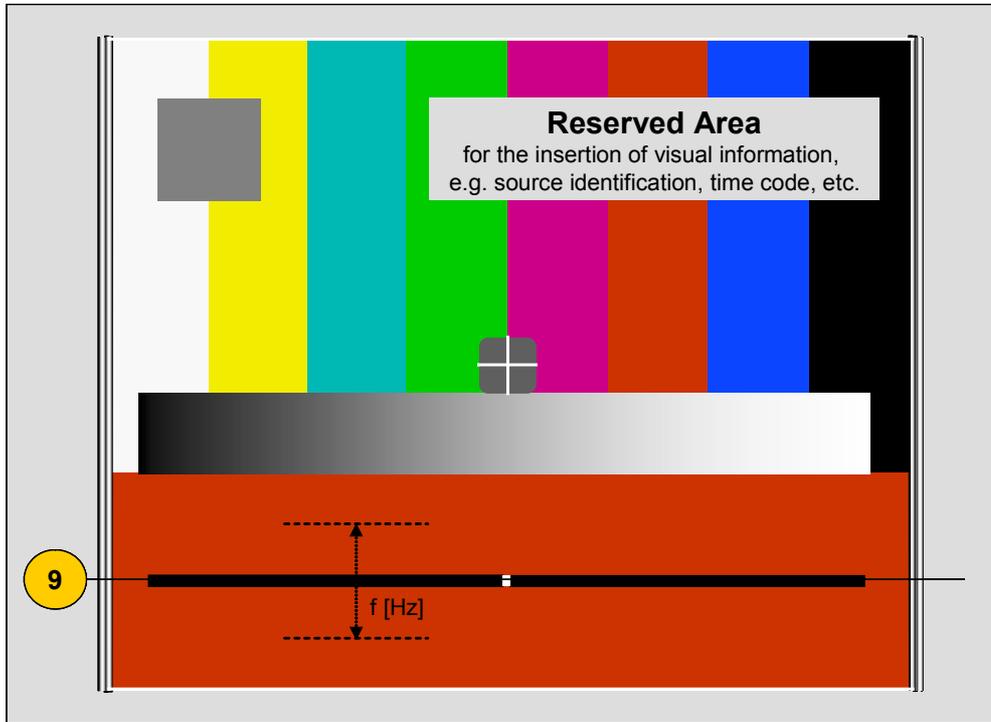

Fig. 10: Structure of motion sequence 1 inserted into the static element

2.2.1 Waveforms

The following figure is not exactly to scale but it illustrates the general shape of the waveform.

Pattern 9
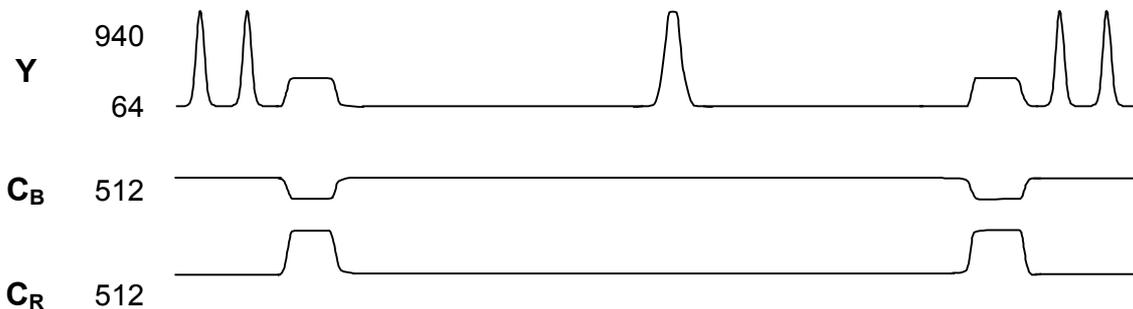
Fig. 11: Pattern 9 Waveforms

2.2.2 Coding values

The following are the digital coding values for 10 bit implementations of the patterns for motion sequence 1 of the test pattern.

Pattern 9

Pixel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16-19	20	21	22
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	484	124	64	64	69	212
C_B	512		512		512		512		512		512		512		512		512	512		456
C_R		512		512		512		512		512		512		512		512	512		542	

Pixel	23	24	25	26-77	78	79	80	81	82	83	84	85	86-355	356	357	358	359	360	361
Y	255	260	260	260	260	260	260	260	255	212	69	64	64	64	176	616	940	940	616
C_B		400		400		400		400		456		512		512		512		512	
C_R	680		818		848		848		818		680		542		512		512		512

Pixel	362	363	364-635	636	637	638	639	640	641	642-695	696	697	698	699	700	701
Y	176	64	64	64	69	212	255	260	260	260	260	260	255	212	69	64
C_B	512		512		456		400		400		400		456		512	
C_R		512		542		680		818		848		818		680		542

Pixel	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719
Y	64	64	64	64	68	256	740	916	484	124	64	64	176	616	940	616	176	64
C_B	512		512		512		512		512		512		512		512		512	
C_R		512		512		512		512		512		512		512		512		512

2.2.3 Composition of motion sequence 1 for 625/50

Motion sequence 1 for 625/50 systems is composed from the arrangement of patterns specified in Table 3.

Table 3: Motion sequence 1 for 625/50 systems

Line	Pattern	Description
8 lines in each field	Pattern 9	

2.2.4 Composition of motion sequence 1 for 525/60

Motion sequence 1 for 525/60 systems is composed from the arrangement of patterns specified in Table 4.

Table 4: Motion sequence 1 for 525/60 systems

Line	Pattern	Description
7 lines in each field	Pattern 9	

2.2.5 Temporal behaviour for 625/50 systems

Motion sequence 1 moves up and down between line 218 (531) and 299 (612) with a frequency of 0.1 Hz.

2.2.6 Temporal behaviour for 525/60 systems

Motion sequence 1 moves up and down between line 177 (440) and 253 (516) with a frequency of 0.1 Hz.

2.2.7 Associated audio signal

The "three-level test signal" specified in ITU-T Recommendation J.27 "Signals for the alignment of international sound-programme connections" is applied with motion sequence 1.

The audio sequence described in Annex B should start at the same time as motion sequence 1. The end of motion sequence 1 should end with a completed audio sequence described in Annex B. The numbers of these audio cycles are not specified but experience shows that one cycle of motion sequence 1 and five cycles of motion sequence 2 are a good operational compromise.

2.3 Motion sequence 2 signal structure

Motion sequence 2 is shown in Figs. 12 to 14 and it contains the following components:

• An underlying red area

• A broad horizontal bar, which is horizontally altered in its composition within the red area.

Arrangement of Patterns

Pattern 10 is a dynamic pattern that consists of a 75% Red signal with two small inserted 0% Black bar signals of variable breadth, with two end-of-line pulses to the left and right side respectively. The inserted 0% Black bars become broader in the direction of the picture centre in a sequence of successive patterns (pattern "10+" to pattern "10xx").

Pattern 9 consists of a 75% Red signal in which a 0% Black signal with a 100% White signal at the picture centre are inserted, with two end-of-line pulse to the left and right side respectively.
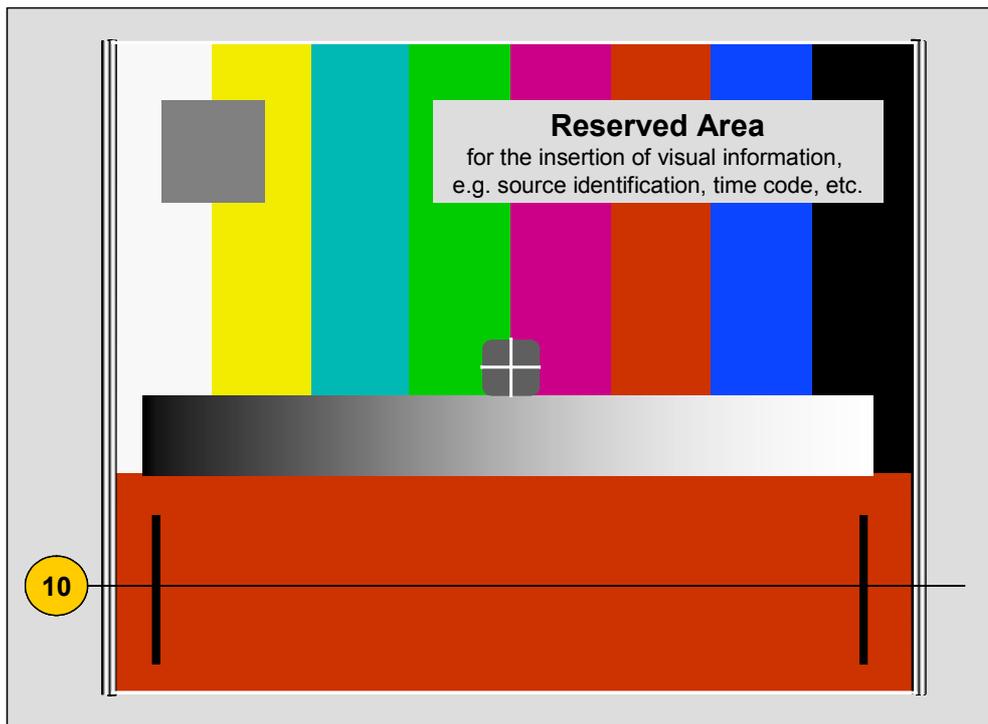
Fig. 12: Structure of motion sequence 2 – Start position
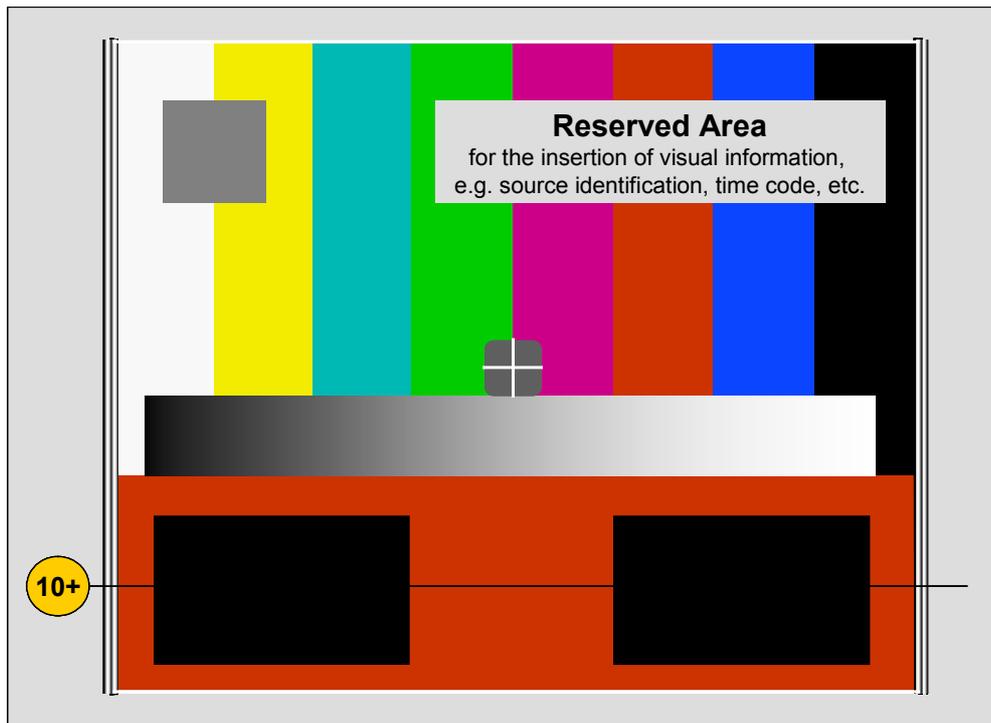
Fig. 13: Structure of motion sequence 2 – intermediate position
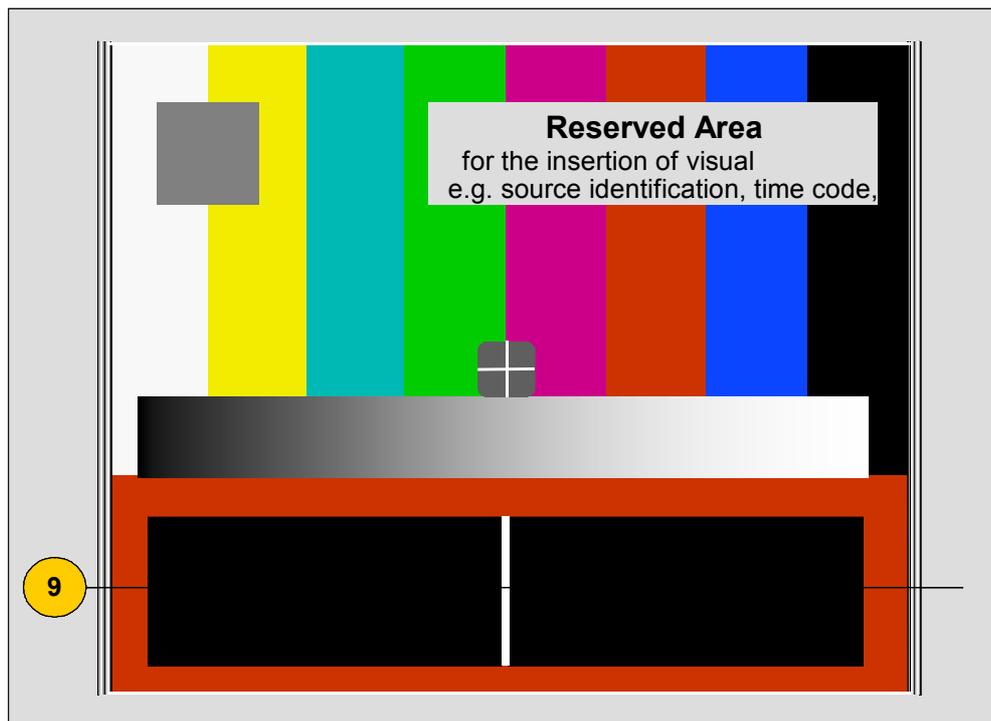
Fig. 14: Structure of motion sequence 2 – End position

2.3.1 Waveforms

The following figures are not exactly to scale but they illustrate the general shape of the waveforms.
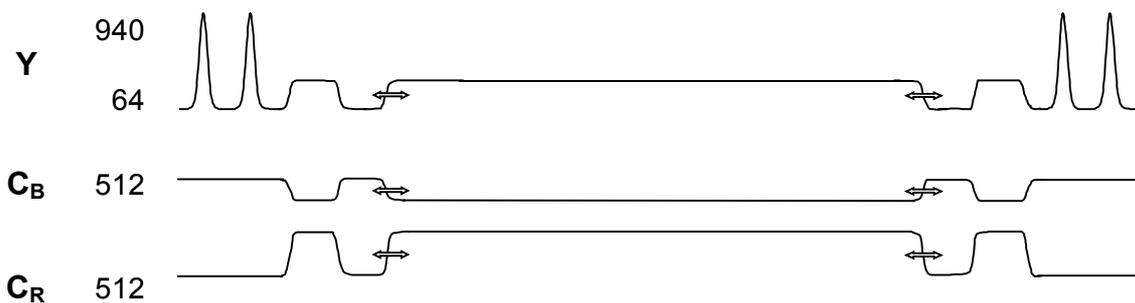
Pattern 10

Fig. 15: Pattern 10 Waveforms

Pattern 10+n
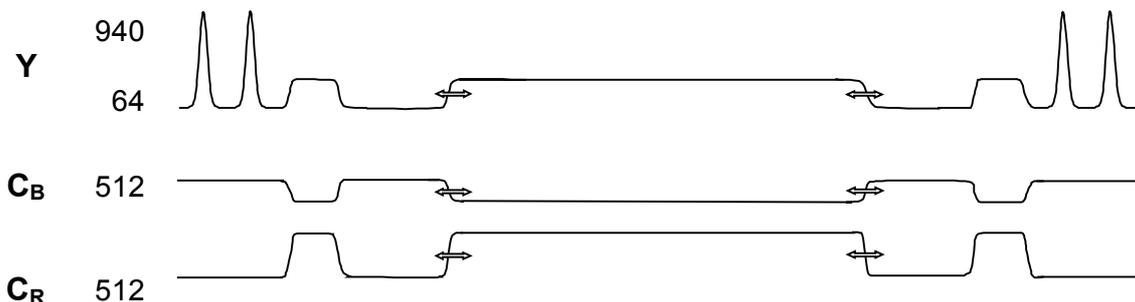
Fig. 16: Pattern 10+n Waveforms

Pattern 9

See Fig. 11.

2.3.2 Coding values for 625/50 pattern

The following are the digital coding values for 10 bit implementations of the patterns for motion sequence 2 of the test pattern.

Pattern 10

Pixel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	484	124	64	64	64	64	64
C_B	512		512		512		512		512		512		512		512		512		512		512
C_R		512		512		512		512		512		512		512		512		512		512	

Pixel	21	22	23	24	25	26-77	78	79	80	81	82	83	84	85	86-89	90	91	92	93
Y	69	212	255	260	260	260	260	260	260	260	255	212	69	64	64	64	69	212	255
C_B		456		400		400			400		400		456		512		512		456
C_R	542		680		818	848		848		818		680		542	512		512		680

Pixel	94	95	96-625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641
Y	260	260	260	260	260	255	212	69	64	64	64	64	64	64	69	212	255	260	260
C_B	400		400	400		456		512		512		512		512		456		400	
C_R		818	848		818		680		542		512		512		542		680		818

Pixel	642-695	696	697	698	699	700	701	702-705	706	707	708	709	710
Y	260	260	260	255	212	69	64	64	68	256	740	916	484
C_B	400	400		456		512		512	512		512		512
C_R	848		818		680		542	512		512		512	

Pixel	711	712	713	714	715	716	717	718	719
Y	124	64	64	176	616	940	616	176	64
C_B		512		512		512		512	
C_R	512		512		512		512		512

Possible example for Pattern 10+n

Pixel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Y	64	176	616	940	616	176	64	64	64	64	68	256	740	916	484	124	64	64	64	64	64
C_B	512		512		512		512		512		512		512		512		512		512		512
C_R		512		512		512		512		512		512		512		512		512		512	

Pixel	21	22	23	24	25	26-77	78	79	80	81	82	83	84	85	86-102	103	104	105	106
Y	69	212	255	260	260	260	260	260	260	260	255	212	69	64	64	64	69	212	255
C_B		456		400		400		400		400		456		512		512		512	
C_R	542		680		818		848		848		818		680		542		512		680

Pixel	107	108	109-612	613	614	615	616	617	618	619	620	621-640	641	642	643	644	645	646
Y	260	260	260	260	260	255	212	69	64	64	64	64	64	69	212	255	260	260
C_B	400		400		400		456		512		512		512		456		400	
C_R		818		848		680		542		512		512		542		680		818

Pixel	647-691	692	693	694	695	696	697	698-705	706	707	708	709	710
Y	260	260	260	255	212	69	64	64	68	256	740	916	484
C_B	400		400		456		512		512		512		512
C_R		848		818		680		542		512		512	

Pixel	711	712	713	714	715	716	717	718	719
Y	124	64	64	176	616	940	616	176	64
C_B		512		512		512		512	
C_R	512		512		512		512		512

Pattern 9

See paragraph 3.2.2

2.3.3 Composition of motion sequence 2 for 625/50

Motion sequence 2 for 625/50 systems is composed from the arrangement of patterns specified in Table 5.

Table 5: Motion sequence 2 for 625/50 systems

Field	Line 218 (531) to 299 (612)	Description
N	Pattern 10	Start position
N+n	Pattern 10+n	* See note
N+x	Pattern 9	End position

Where N is some integer and 1 ≥ n ≤ x and x = No. of steps between the start position and the end position.

*Note: At each step between start and end positions (minimum 20 steps recommended) the horizontal enlargement of both black bars shall be moved linearly step by step towards the centre. **Figure 13** shows an example of an intermediate step.*

2.3.4 Composition of motion sequence 2 for 525/60

Motion sequence 2 for 525/60 systems is composed from the arrangement of patterns specified in Table 6.

Table 6: Motion sequence 2 for 525/60 systems

Field	Line 177 (440) to 253 (516	Description
N	Pattern 10	Start position
N+n	Pattern 10+n	* See note
N+x	Pattern 9	End position

Where N is some integer and $1 \geq n \leq x$ and x = No. of steps between the start position and the end position.

*Note: At each step between start and end positions (minimum 20 steps recommended) the horizontal enlargement of both black bars shall be moved linearly step by step towards the centre. **Figure 13** shows an example of an intermediate step.*

2.3.5 Temporal behaviour for 625/50 and 525/60 systems

Operational experience has shown that the duration of one cycle of the horizontal enlargement of both black bars of motion sequence 2 towards the centre should be 2 s.

2.3.6 Associated audio signal

A 1020 Hz tone burst with a level of 9 dB below the maximum programme level (0 dBm0s) is applied for the duration of Pattern 9.

3 References

ITU-R BT.601   Studio encoding parameters of digital television for standards 4:3 and wide-screen 16:9 aspect ratios (Part A)

ITU-R BT.801   Test signals for digitally encoded colour television signals conforming with Recommendations ITU-R BT.601 (Part A) and ITU-R BT.656

ITU-T J.27   Signals for the alignment of international sound-programme connections

ITU-R BT.471   Nomenclature and description of colour bar signals

Annex A

A.1 Composition of the test pattern sequence

A.1.1 Introduction

The composition of the test pattern sequence described in this draft document is intended for use with 625/50 systems. However, the final document should also provide a 525/60 version. Further effort to include the composition for 525/60 systems should be minimal since the number of samples in each line is identical to the 625/50 case and only the number of lines is different.

The test pattern sequence is described for an aspect ratio of 4:3. However, it also supports a picture aspect ratio of 16:9 as anamorphic image in 270 Mbit/s 4:3 signal.

The distinction between 4:3 and 16:9 test patterns is supported by a corresponding geometric square element. The square element is of sufficient size that a clear identification can be made even with a relatively small picture monitor used in TV operations. This supports a quick visual aspect ratio inspection.

Basically the test pattern sequence for operational use consists of a static element and two different motion sequences, which are subsequently superimposed to the red area of the static element. Each motion sequence is accompanied by a defined audio signal. The temporal behaviour of the successive sequences is specified in agreement with the operational demands.

Motion sequence one is intended for the "**Transmission alive check**" and Fig. B-1 shows the general composition of the test pattern for this case.

Motion sequence two is intended for the "**Audio/Video delay check**" and Fig. B-2 shows the test pattern for this case.

A.1.2 Static elements

The static element of the test pattern is composed by the following components (the enumeration refers to the numbering within Fig. A-1 and Fig. A-2:

a) Underlying colour bars with red area

b) Geometrical square element for the indication of the aspect ratio

c) Pattern which marks the centre of the picture

d) Ramp signal with 10 bit resolution

e) Two "End of Line Pulses" at each end, which mark both the analogue and digital horizontal blanking

f) Lines 23, 310, 336 and 623 are white lines. The white signal element starts with the first "End of Line Pulse" and ends with the last "End of Line Pulse":

g) Possibility for insertion of an arbitrary text, e.g. source identification

A.1.3 Motion elements and sequences

There are two different types of motion elements within the test pattern which are accompanied by synchronised audio test signals in order to support simple visual and acoustical inspection.

- Element one consists of a small horizontal bar, which is vertically moved up and down.

- Element two consists of a broad horizontal bar, which can be horizontally altered in its composition.

The two motion sequences are composed from the following elements (the enumeration refers to the numbering within Fig. A-1 and Fig. A-2:

1. The complete small black bar including the small white bar inserted in the middle moves up and down within the red area of the colour bar. The continuous vertical up and down movement is accompanied by a three-level audio test signal in order to indicate that the associated audio is available.

2. Small white bar inserted in order to provide simple bearing.

3. The complete broad black bar consists of two side-by-side black bars, whose horizontal width oscillates with a defined frequency. At their concurrence in the horizontal middle of the picture, a white bar appears at this point for one frame duration only. The appearance of the white bar is accompanied by a synchronised sound burst of equal duration and a frequency of 1 kHz.

Fig. A-1: Test pattern with motion element one (Transmission still alive check)

Fig. A-2: Test pattern with motion element two (Audio/Video delay check)

Annex B (informative)

B.1 Audio test signal format

Audio signals of two types shall be used in conjunction with the DTV Test Pattern Sequence for operational use:

- The "three-level test signal" specified in ITU-T Recommendation J.27 "Signals for the alignment of international sound-programme connections" Fig. B-1 is applied with the motion sequence one that is intended for the "Transmission alive check".

- A 1020 Hz tone burst with a level of 9 dB below the maximum programme level (0 dBm0s) is applied with motion sequence two which is intended for the "Audio/Video delay check".
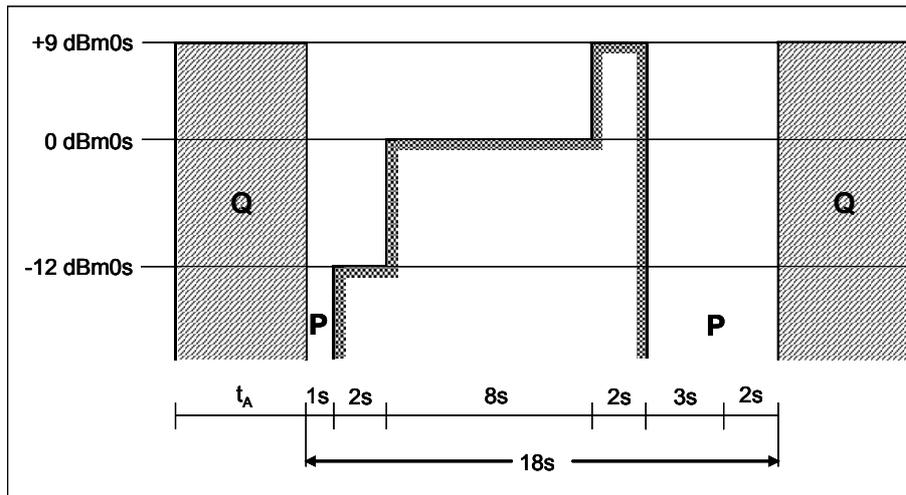
a) S1: left stereo information or monophonic information
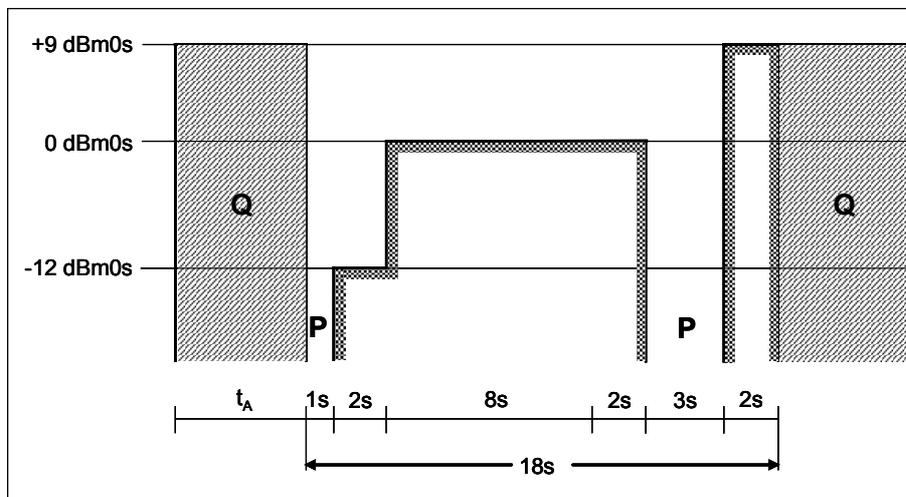
b) S2: right stereo information

Fig. B-1: Format for the three-level test signal for sound programme connections

Annex C (informative)

C.1 HDTV

This Draft does not include a test signal sequence description for use with HDTV systems so far. However, there is the possibility for future extension.

In order to support HDTV, the 4:3 SD image needs to be converted and extended such that

- the 4:3 end pulses remain and are in the proper location and shape when cutting a centred 4:3 image from the 16:9 HD version,

- the 4:3 image is symmetrically extended to fill the 16:9 aperture. The extension contains scaled versions of the 4:3 end pulses such that the end pulses of the 4:3 version are generated when scaling the 16:9 HD version to be transmitted as an anamorphic image inside the 270 Mbps 4:3 signal raster.

Note: This has the advantages that the 4:3 functionality is preserved and that there is "HD-source" signalling for the derived anamorphic 16:9 SD signal.