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Changes to the terrestrial television systems in Central and East European countries

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1. Introduction

After political changes at the beginning of the 1990s, for some Central and East European countries the questions of a transition from the SECAM to the PAL system in terrestrial television broadcasting, and a possible modification of the vision/sound intercarrier-frequency from 6.5 MHz to 5.5 MHz, became important. The main reasons for such changes included the gradually diminishing range of SECAM studio equipment, prospect of com-monality with the neighbouring countries and, to some extent, political reasons as well.

Problems of the emission system change were discussed in the SECAM/PAL Ad-hoc Group working within the framework of EBU Ad-hoc Group V/EPS in the period 1992-94 and consisting of delegates from Bulgaria, Czech Republic, Hungary, Poland, Romania and Slovakia. The situation in these countries in February 1994 is described in the EBU Information I27-1994 [1].

The present EBU Technical Information records the situation of all EBU Members from Central and East European countries in February 1996.

2. SECAM to PAL transition

The EBU Members from Central and East European countries may be divided into four groups according to the present state of SECAM to PAL transition:

- countries that started colour broadcasting somewhat later than the rest and directly in PAL (Albania, Romania);
- countries where the transition has now been realized (Czech Republic, Hungary, Poland, Slovakia and partly Bulgaria);
- countries where the transition is planned in the near future (Estonia, Latvia and Lithuania);
- countries that do not plan to change the emission system SECAM for the present (Belarus, Moldova, Russian Federation, Ukraine).

There are no unknown technological problems connected with a transition to PAL. The following have to be ensured:

- a suitable system for television studios, i.e. PAL or components (analogue or digital);
- enough multi-standard receivers and the possibility to modify the majority of current single-standard receivers;
- adaptation of the transmission network to the PAL system, particularly from the standpoint of measurement and test equipment;
- implementing the transition to PAL at the same time for the whole transmitter network of a given programme channel.

The above-mentioned requirements imply making investments, and they have to be solved individually in each country, according to the specific circumstances; it may be more appropriate to stay with the SECAM system in some countries. The starting position is an important element. In former Czechoslovakia, for example, all television studios were working in PAL from the beginning of colour television broadcasting and most receivers were dual-standard (SECAM/PAL). In Bulgaria, on the other hand, there is a lack of PAL programmes because SECAM production still prevails in most television studios. The situation in other countries is mostly between these two extremes. There is a specific situation in the Baltic countries which plan a gradual transition to the PAL system (for some transition period) either by alternating PAL and SECAM broadcasting for a given programme

service or by step-by-step installation of new transmitters already in the PAL system and, probably also in new RF standards (B1, G).

3. Modification of the vision/sound intercarrier-frequency from 6.5 MHz to 5.5 MHz

In the former OIRT countries, RF standards D (VHF bands I - III) and K (UHF bands IV and V) with the vision/sound intercarrier-frequency 6.5 MHz had been introduced for television broadcasting.

The main reason for changing the intercarrier-frequency is the possibility of exploiting the complete range of unified imported transmitting and receiving equipment (including equipment for the PALplus system). Retuning of main and complementary transmitters is in principle possible, but in case of outdated transmitters it might cause difficulties. New transmitting might be required in those cases, as well as associated test equipment. Frequency coordination with neighbouring countries is necessary when changing the vision/sound intercarrier-frequency from 6.5 MHz to 5.5 MHz.

The change of intercarrier-frequency has to be implemented at the same time for each main transmitter and its system of complementary and rebroadcast transmitters. The transition of individual main transmitters to the new intercarrier-frequency is usually carried out over a period of several years in the given country for technical and economical reasons. Multistandard receivers are necessary during the whole period.

In the case of intercarrier-frequency change, it is assumed that the vision carrier frequency is not changed. For the VHF transmitters this situation creates a new emission standard with a draft designation "B1" which has not been yet incorporated to the relevant ITU-R Recommendation. The intercarrier-frequency is 5.5 MHz, channel width 8 MHz and vision carriers the same as in system D.

The principal characteristics of B, B1, D, G and K systems are stated in *Table 1*. These systems all have 625 lines, 0.75 MHz vestigial side-band, C3F negative vision modulation and F3E sound modulation.

Table 1 - Some characteristics of television systems B, B1, D, G, K.

System	VHF/UHF	Channel numbers	Channel width (MHz)	Vision bandwidth (MHz)	Vision/Sound separation (MHz)
B	VHF	2 - 12, A - H2	7	5	+5.5
B1	VHF	R1 - R12	8	5	+5.5
D	VHF	R1 - R12	8	6	+6.5
G	UHF	21 - 69	8	5	+5.5
K	UHF	21 - 69	8	6	+6.5

4. Present situation in individual countries

The basic information on television systems, and implemented or planned changes, in the Central and East European countries are given in *Table 2*. The table does not contain countries where no changes of colour television system or RF emission system have been implemented or planned (former Yugoslavia and most countries of the former Soviet Union).

Table 2 - Terrestrial television systems in Central and Eastern European countries (Situation in February 1996).

ISO-2 code	Country Programme	Private	Coverage of population (%)	TV system	Change to PAL (Plan)	RF standard (sporadic)	%	Period of RF standard change	Stereo sound system	Start of sound system change	Notes
Countries which have always broadcast in PAL											
AL	Albania TVA	-	80	PAL	-	B, (G)		-	-	-	1
RO	Romania TVR-1 TVR-2 ProTV Antena 1 Tele 7 ABC local ()	- - yes yes yes yes	98 55 ca. 40 ca. 30 ca. 30	PAL PAL PAL PAL PAL PAL	- - - - - -	D D G G G G	55 45	- 1994-98	- - -	- - -	1, 2

Countries which have completed a transition to PAL												
BG	Bulgaria	Kanal 1	-	92	SECAM	(1997)	D, K	-	-	-	2	
		Efir 2	-	82	PAL	1994	K	-	-	-	4	
		NTV	yes	12	SECAM	(1996)	K	-	-	-	-	
		7 days local (10)	yes	12	PAL	1995	K	-	-	-	5	
			yes		PAL	1995-96)	K	-	-	-	5	
CZ	Czech Republic	CT1	-	97	PAL	1992	K	-	F	1993	2	
		CT2	-	80	PAL	1993	K	-	F	1995	exCT3 exCT2 5	
		Nova	yes	98	PAL	1994	D, (K)	-	-	-		
		Premiera	yes	60	PAL	1993	K	-	-	(1997 F)		
HU	Hungary	MTV-1	-	98	PAL	1996	D, K	1997-98 B1, G	-	(1997 N)	1, 2	
		MTV-2	-	96	PAL	1995	(D), K	1997-98 B1, G	-	(1997 N)	6	
		local()	yes		PAL	(1996)	K				7	
PL	Poland	TVP-1	-	92	PAL	1995	D, K	-	-	-	1, 2, 8	
		TVP-2	-	82	PAL	1994	(D), K	-	-	-		
		TVP local (11)	-	82	PAL	1993-94	(D), K	-	-	-		
		Polsat	yes	60	PAL	1994	(D), K	-	-	-		
		Wisla	yes	7	PAL	1995	(D), K	-	-	-		
		Canal +	yes	17	PAL	1994	(D), K	-	-	-		
		local (14)	yes		PAL	1993-95	(D), K	-	-	-		
SK	Slovakia	STV-1	-	96	PAL	1993	D, K	62	-	F	1993	2, 8
							B1, G	38	1993-99	F		
		STV-2	-	95	PAL	1992	K	95		F	1995	
							G	5	1995-99	F		
		TV-sever	yes	5	PAL	1994	K			-		
STS	yes	61	PAL	(1996)	K	8		F	(1996)	7		
					G	92		F				
Countries which plan a transition to PAL in the near future												
EE	Estonia	ETV	-	100	SECAM	(1997-99)	D, (K)	1997-99 B1, G	-	(1997 N)	2	
		RTV, EVTV	yes	92	SECAM	(1998-99)	D, K	1998-99 B1, G	-	(1999 N)	5 5	
		Kanal 2	yes	60	SECAM	(1998-99)	D, K	1998-99 B1, G	-	(1999 N)		
		Tipp TV	yes	40	PAL	1995	G	-	-	-		
		TV 1	yes	25	PAL	1996	G	-	-	-		
LT	Lithuania	LTV	-	97	SECAM	(1997-99)	D, K	?1999 B1, G	-	(1997 N)	2	
		LNK	yes	96	SECAM	(1997-99)	D, K	?1999 B1, G	-	(1997 N)		
		Tele 3	yes	82	SECAM	(1998-99)	D, K	?1999 B1, G	-	(1997 N)		
		Baltic TV / PTV	yes	80	SECAM/PAL	(1996-98)	K	?1999 B1, G	-	(1997 N)		
		Vilnius TV	yes	25	SECAM	(1998-99)	K	?1999 B1, G	-	(1997 N)		
		Kaunas Plus	yes	35	SECAM	(1998-99)	D	?1999 B1, G	-	(1997 N)		
LV	Latvia	LTV-1	-	98	SECAM	(1997-99)	D, K	?1999 B1, G	-	-	2	
		LTV-2	-	98	SECAM	(1997-99)	D, K	?1999 B1, G	-	-		
		OST-1	-	86	SECAM		D, K	?1999 B1, G	-	-		
		local	yes	ca. 60	SECAM		D, K	?1999 B1, G	-	-		

Notes:

- 1 Public satellite service in PAL.
- 2 Private cable networks in PAL.
- 3 Satellite distribution to transmitters (8 Mbit/s digital channel).
- 4 Transcoding from SECAM still prevails.
- 5 PAL from the start of transmission.
- 6 From 1997, the transmitter network will be used by a private TV channel. The MTV-2 programme will probably be distributed via satellite.
- 7 Planned new TV station(s).
- 8 Private satellite service in PAL.

Stereo sound systems:

- F Dual FM carrier system
N NICAM digital system

Bibliography

- [1] EBU Technical Information I 27-1994: **Issues associated with a change of the television system in the format OIRT member countries**
- [2] **Expansion of Television during 1993/94.** EBU Technical Review No. 262, Winter 1994.
- [3] **List of VHF/UHF television stations, 1995** (ref. TV 40 0995). EBU, Geneva.