



## International Television and Bilingual Films

Any discussion of international television must take into account, either directly or by implication, its potential role in international politics and the possibility it holds for increased understanding and friendship among people now separated by language barriers. There are many problems that must be solved before international television can become an accepted part of the existence of these divergent cultural groups. Some problems are concerned with language, some with time differences, others with such matters as television-frame and line-rate

compatibility, program scheduling and economics. The solution lies within the combined technical, linguistic and cultural areas. It is the purpose of the following five papers to describe the progress that has been, and is being, made toward the solution of these problems, particularly in the technical area. This group of papers was organized for the Society's Convention at Philadelphia in October 1957 and also presented before the SMPTE Washington Section in February 1958.—*Ellis W. D'Arcy*, Program Topic Chairman.

## Problems of International Television Broadcasting

By T. H. BRIDGEWATER

**The interchange of television programmes among European countries is called Eurovision. It is not a network or planned operation under a single control, but is essentially the use of a number of independent services and networks on a cooperative basis. This paper describes certain problems encountered in this interchange, such as noncompatible line structure and frame rate, relay time coordination and language problems, and the means of solution.**

**T**ELEVISION was introduced in the United Kingdom in 1936, but public television services in other European countries have been in existence, in accordance with present standards, only since World War II. Countries with public television now in operation are enlarging and expanding their facilities and coverage. Many countries do not have television while others can offer service only on an experimental basis. Countries with public television services in full operation which cooperate in Eurovision are: Austria, Belgium, Denmark, Federal German Republic, France, Holland, Italy, Luxembourg, Monaco, Switzerland and the United Kingdom.

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### Comparison Between Countries

The organisations controlling television in these countries vary considerably in constitution and financial structure. Some rely on commercial backing in exchange for advertising; others are public corporations obtaining income from licenses; others are government departments; and others combine elements of several systems. Moreover, the scope of these organisations varies greatly. In some countries it is obligatory for all vision and sound circuits to be leased from the government Postal and Telephone Department (P.T.T.) while in others the television organisation installs its own network. In some countries the television organisations own all the cameras and broadcast stations; in others some or all of such equipment may be operated by the P.T.T.

Unfortunately, one of the most significant differences of television organisation among European countries is in the area of technical transmission standards. For various reasons the early growth of European television was accompanied by changing ideas about optimum international standards. Recently there has been a fairly general adoption of the C.C.I.R. (Comité Consultatif International du Radio) or near-C.C.I.R. 625-line recommendation, but even so, certain newcomers, such as Monaco which is adjacent to an area where the 819-line standard was already widely established, have felt it necessary to adopt their neighbours' older standard or some close variant.

Apart from the actual number of lines, there are other differences between one standard and another, such as FM or AM sound and positive or negative vision modulation—some of which, although complicating in other directions (e.g. the design of receivers) may, however, not be impeding to the operation of Eurovision. The broad differences between systems and countries are summarised in Table I.

**Table I. Comparison of Standards.**

Country	No. of lines	Fields per sec.	Vision band-width mc/s	Sound modulation	Sound carrier relative to vision, mc/s	Sense of vision modulation	Synchronising waveform
U.K.	405	50	3	AM	- 3.5	P	British Standard
France	819	50	10.4	AM	-11.15	P	French Standard*
Luxembourg	819	50	5	AM	5.5	P	French Standard
Monaco	819	50	10.4	AM	-11.15	P	French Standard
Belgium (French Service)	819	50	5	AM	+ 5.5	P	C.C.I.R.
Belgium (Flemish Service)	625	50	5	AM	+ 5.5	P	C.C.I.R.
Holland	625	50	5	FM	+ 5.5	N	C.C.I.R.
Germany	625	50	5	FM	+ 5.5	N	C.C.I.R.
Denmark	625	50	5	FM	+ 5.5	N	C.C.I.R.
Austria	625	50	5	FM	+ 5.5	N	C.C.I.R.
Switzerland	625	50	5	FM	+ 5.5	N	C.C.I.R.
Italy	625	50	5	FM	+ 5.5	N	C.C.I.R.

\* One-frame sync pulse only—no equalising pulses.

These differences when analysed signify five basic transmission standards (and even more if minor variations are taken into account) as shown in Table II.

Difference of the vision waveform, as distinct from those associated with the modulated carrier, are usually quite incompatible, and programme-sharing between countries of incompatible standards requires the interposition of a Standards Converter. Where there is a difference in the number of lines, a Converter is required to convert both picture and synchronising waveforms to the new standard, with the exception of exchanges between Standards 2 and 3, where the picture requires no conversion but the synchronising waveform needs replacing.

It has already been mentioned that an integral European network has never been planned comprehensively. Each country has, in fact, had to concentrate on building up its own domestic service and internal network. In this respect Eurovision has only been achieved by:

(a) The installation of linking circuits between neighbouring countries (though in the early stages there was some use of "ballefang," or "rebroadcasting"); and

(b) the expansion of internal networks to provide a number of transit circuits to allow the passage of programmes other than those supplying the domestic network.

An important country-to-country difference that profoundly affects the exploitation of Eurovision is, of course, that of language. Six distinct languages are spoken by the people of the countries now participating in Eurovision and conversion in one form or another must be provided. The languages are English, French, German, Dutch and Flemish, Danish, and Italian.

Another difficulty, not so much a difference as a common factor, has been a pronounced reluctance on the part of the Trade Unions representing Actors and Musicians to enter into Eurovision before securing more favorable remuneration to their members. Negotiations are going on, but the embargo has restricted the types of programmes exchanged.

Differences and difficulties have been stressed; but, fortunately, there are at least two important features shared by all the countries: a 50 cycles/sec power frequency and (with the exception of the United Kingdom in the winter months, where the difference is one hour) a common time (Central European).

**Table II. Basic Differences Between European Standards.**

Standard	Country	Basic Standard	Remarks
1:	United Kingdom	405 lines	
2:	France	819 lines	
3:	Belgium (French Service)	819 lines	compared with France, has: (a) different (vis. C.C.I.R.) synchronising waveform; (b) narrower video band.
4:	Belgium (Flemish Service)	625 lines	compared with C.C.I.R. has (a) AM sound; and (b) positive vision modulation.
5:	Switzerland	625 lines	C.C.I.R.

These many variations in the form and standard of television between one European country and another, coupled with marked disparities in the state of growth of their respective services, call for the most meticulous international cooperation in both planning and exploitation in order to make possible effective interchanges of programmes. In fact, such cooperation between both engineering and programme staffs, at first on an informal basis and now fostered by the European Broadcasting Union, has been conspicuously generous and effective from the first occasion in 1952 when French programmes on 819 lines were simultaneously converted and re-broadcast in the United Kingdom on 405 lines.

The present state of the Eurovision Network is depicted in Fig. 1.

**Standards Conversion**

Converters are located at strategic points to ensure conversion whenever necessary but always strictly avoiding double conversion. For the usual cases where the number of lines differs, the converter consists of a complete television camera and waveform generator on the desired standard retaking pictures displayed before it on the original standard. The basic problems underlying this method have been described by A. V. Lord.\* Types of pickup tube in use for this purpose are: image inoscope, 3-in. image orthicon, 4½-in. image orthicon, and vidicon.

So far, the most promising results have been achieved by the 4½-in. image orthicon which is especially notable for low noise level and good resolution. The successful operation of Standards Converters calls for the utmost skill and care. The limited case of the conversion of the synchronising waveform only (between French and Belgian 819-line systems) is readily dealt with by a straightforward obliteration of one waveform and substitution by the other, without any disturbance to the picture.

**The Vision Network**

The Eurovision Network (Fig. 1) includes national networks, transit circuits and international linkages. All the circuits comprise radio (ultra-high-frequency and super-high-frequency) links. Some are permanent, while others are still provisional and may make use of ordinary portable demodulating equipment. The numbers of transit circuits are still restricted and so in some cases a programme can only be passed through an intervening country provided that country itself also agrees to use the same programme, or, alternatively, its internal network is out of use at the time.

\* A. V. Lord, "Standards converter for international TV," *Electronics*, 26: 144-147, Aug. 1953 (also *BBC Quarterly*, 8: No. 2, 1955).



Fig. 1. The Eurovision Network as of December 1957.

The majority of these circuits are owned and operated by P.T.T. administrations but a considerable number are in the hands of broadcasting organisations (in Belgium, Italy and parts of France).

#### Language Differences: Sound

The majority of exchange programmes are of actualities or events requiring a commentator. For Eurovision it therefore becomes necessary to arrange at least

as many commentaries as there are languages spoken in the countries receiving any particular programmes. This may mean, for example, six commentators at the site of the broadcast, which, together with all the associated communication and control arrangements, results in a degree of complexity that often renders the handling of the sound side of Eurovision more difficult or uncertain than the vision counterpart. Indeed, the new demand for increased

numbers of high-quality sound circuits has been temporarily straining the European P.T.T. resources. Occasionally a commentary may be made "off the screen" at the receiving end but this is by no means easy to do effectively. It is usual for the sound "effects" to be separated from the commentary and only mixed at the receiving end: this has the advantage both of economizing in high-quality circuits and also of avoiding the complications of controlling and

Technical Arrangements for  
 International Television Relays

Dispositions Techniques pour les  
 Echanges Internationaux de Television

1. PROGRAMME					5. PRE-TRANSMISSION TEST (VISION) ESSAIS DE PRE-TRANSMISSION (VISION)				
1.1 Nature :	Giant Slalom men / Slalom géant messieurs			Nature					
1.2 Origin :	BAD GASTEIN			Origine					
1.3 Timing :	1325-1415			Horaire					
1.4 Ref. No. :	58/06/7			Ni de Ref.					
2. PARTICIPATION					Identification pattern Mise d'identification				
Or.	Destination(s)	Conversion	for pour	EBU UER Transit	Signal 3 (C)	9 min.	1230		
ORP	DPS, SRG RTP, SSR INR RAI BEC	RTP BEC	PTP BEC		Identification pattern Mise d'identification	1 min.	1239		
3. TECHNICAL DIRECTION					Signal 2 (H)				
3.1 Place : CICT, Palais de Justice, Bruxelles (tel. 12.43.04)					9 min. 1240				
3.2 Time : 1200-1420					Identification pattern Mise d'identification				
3.3 Engineers : E. Grilliths (EBU) and F. W. Prior (EBU)					1 min. 1249				
4. PROGRAMME COORDINATION					Signal 1 (A)				
4.1 Place : BAD GASTEIN					4 min. 1250				
4.2 Official : Gerard Freund					Identification pattern Mise d'identification				
					1 min. 1254				
					Moving Pictures Images mobiles				
					1255				
					Source(s) of test signals : BAD GASTEIN Source(s) des signaux-test :				
					Source(s) of moving pictures : BAD GASTEIN Source(s) des images mobiles :				
Synopsis No		Receptif		Distribution by airmail to : Distribution par avion à :		Prepared by : BG		DATE	
462				A - B - CH - D - - F - I - GB		Checked by : FP		5/2	
						Issued : 21/2/58			

Type Genre		Not Unilateral Non Unilatérale		Synopsis No 462 Page 2		DISPOSITIONS A PRENDRE POUR LA VISION ET LE SON			
Ordered by : Commande par	VISION			Tech. Coord. Circuit(s) Bruxelles to / Bruxelles à :	SOUND - SON				
	Source (i)	Circuit (ii)	Def. (iv)		Source (vi)	Comm. from Comm. de (vii)	Inter. Snd. from Snd. Inter. de (viii)	Comp. Prog. from Prog. Comp. de (ix)	
EBU/UER (B)				BAD GASTEIN CROGGER FELDBERG UTLIBERG PARIS MILANO LONDON 1220-1420					
DPS (D)	OR	SALZBURG-MUNICHEN 1225/1255/1325-1415	625		GERMAN COML.	---	---	BAD GASTEIN 1255/1325-1415	
SRG (CH)	DPS	HOENISGRINDE -UTLIBERG 1225/1310/1325-1415	625		DPS	---	---	BADEN BADEN 1255/1325-1415	
SSR (CH)					COML. FRANCAIS	---	---	BAD GASTEIN 1255/1325-1415	
RTP (P)	DPS	HOENISGRINDE - (DABO) -PARIS 1225/1255/1325-1415	625/819		COML. FRANCAIS	---	---	GENEVE 1255/1325-1415	
INR (B)	DPS	KOBLIN-BRUXELLES 1225/1255/1325-1415	625		COML. FRANCAIS	---	---	PARIS 1255/1325-1415	
RAI (I)	DPS	UTLIBERG-MILANO 1225/1310/1325-1415	625		PROPRE COML.	---	---	BAD GASTEIN 1255/1325-1415	
BEC (G)	DPS	BRUXELLES-(LILLE) 1225/1255/1325-1415	625/405		OWN COML.	---	---	BAD GASTEIN 1255/1325-1415	
RTP (F)		Transit pour la BBC							5/2

Fig. 2. Synopsis of Requirements compiled and issued by the E.B.U. Technical Centre.

mixing a large number of foreign-language commentaries at the point of origin.

#### Coordination

The clue to the successful operation of Eurovision has lain largely in the remarkable measure of international cooperation and coordination that has always been devoted to this enterprise. As mentioned earlier, the E.B.U. has been the means of further uniting broadcasters and P.T.T. administrations in the common aim. Regular international meetings are held of Programme and Technical Committees and Subcommittees to discuss longer-term planning requirements as well as month-to-month arrangements, operational procedure, technical standards, tests, etc. In addition, special Technical and Programme Control Centres have been set up to deal with the programme exchanges as they take place — in particular:

A National Technical Control Centre (N.T.C.C.) in each country;

A National Programme Control Centre (N.P.C.C.) in each country; and

An International Technical Control Centre (I.T.C.C.) at Brussels.

The first two above are usually, and preferably, at one and the same point. The last mentioned is located at a conveniently strategic point on the network (in fact, the roof of the Palais de Justice, Brussels) and is maintained and operated by the E.B.U. Technical Centre whose headquarters are also at Brussels.

Each of the N.T.C.C.'s and N.P.C.C.'s are answerable for, and in direct control of, all technical and programme arrangements (including conveyance along the network to the boundary hand-over points). They are each in continuous link by telephone with the I.T.C.C. and the latter exercises complete control over the vision network as a whole, ensuring that each country fulfills the role assigned to it (including the operation of converters when appropriate) in accordance with a previously prepared Synopsis of Requirements (Fig. 2). This Synopsis is compiled and issued by the E.B.U. Technical Centre on the basis of pro-



Fig. 3. Very acceptable example of Eurovision's technical performance and reliability, even after conversion from 405 lines to 819 lines.

gramme arrangements submitted beforehand by the participating countries.

#### Summary

Eurovision is growing fast, and the many difficulties — technical, political, economic and lingual — are being overcome through goodwill and cooperation. The numbers and kinds of exchanges are increasing and the improvements in technical resources permit the choice of (1) multilateral exchanges where one, two or more countries share the programme being broadcast in another; and (2) unilateral exchanges where one, two or more countries share a programme that is being specially produced in another country but not broadcast in that country.

In addition, there are variations, such as two-way simultaneous transmissions, that are sometimes possible.

The technical performance and reliability are becoming very satisfactory and, even after conversion, entirely

acceptable pictures are usually obtainable (Fig. 3). Eurovision has become quite an every-day affair in the homes of many peoples of Western Europe. The extension of Eurovision to other Western countries and to Eastern Europe seems only a matter of time. The Eastern European problem is partly political, partly technical. The Iron Curtain countries are somewhat behind in their television development, although limited services have started in many of them. Considerable distances are involved. The distance from Berlin to Moscow exceeds 1,000 miles. There is also the problem of the international organisation and cooperation, so essential to success, which has yet to be resolved and which is rendered the more difficult by the abstention from E.B.U. membership of all Iron Curtain countries. However, that such cooperation is not impossible has already been demonstrated by the exchanging of Eurovision programmes with Czechoslovakia on two occasions in the past eighteen months.