

Demonstration of High Definition Television to the Delegates of the ORB 1985 Conference

Robert Hopkins

September 4, 1985

I. Introduction

Good morning Ladies and Gentlemen.

On behalf of the United States Advanced Television Systems Committee (ATSC), I would like to welcome you to this demonstration of high definition television (HDTV). I am Robert Hopkins, the Executive Director of the ATSC.

I would like to describe for you the principal features of high definition television, the history of its development, and the work which has been directed toward the establishment of a single worldwide HDTV studio and program exchange standard.

Then you will see a demonstration of high definition television – an electronic imaging system which has been developed to provide the image quality of 35mm film. You will see two video tapes – one showing scenic material, and sporting and entertainment events typical of television production; the other showing a short dramatic vignette typical of single camera production for the cinema.

While 35mm film is the international standard for high quality images and for program exchange, all the new media outlets are electronic. You are all aware of the proliferation of communication satellites with wide band transponders. Several high power direct broadcast satellite systems are being prepared for launch and the penetration of cable systems and VCRs is growing at a rapid pace. Yet none of these vehicles can deliver the 35mm film experience to the consumer. In fact, 35mm film image quality has never been delivered to the home. To deliver this quality to the home, and to allow all nations of the world to produce television programs in an internationally standardized electronic medium, the world's broadcasters have undertaken comprehensive studies of a worldwide high definition television studio and program exchange standard. These studies are being coordinated through the CCIR and will have their culmination at the Final Meeting of CCIR Study Group 11 next month, and the CCIR plenary session to be held in May 1986.

II. Description

High definition Television has four specific characteristics which distinguish it from existing television systems:

- 1) improved resolution,
- 2) improved color rendition,
- 3) a wide screen aspect ratio,
- 4) meaningful stereophonic sound.

The most startling characteristic is the system's ability to resolve fine detail in a picture. Standard television pictures are composed of either 525 or 625 lines of scanned information. The HDTV system currently under study utilizes 1125 scanning lines and includes 4 to 5 times as many picture elements as standard television systems. The result is a picture 4 to 5 times more clear and detailed.

The second area of radical improvement is the system's ability to reproduce color accurately. This ability is directly related to the amount of color information conveyed by the system in each of the primary color channels – red, green and blue. High quality studio color television cameras today produce individual channel outputs of about 8 MHz each. These three signals, unfortunately, are then encoded into a single composite signal of less than 6 MHz. The HDTV System starts with individual color channels as wide as 30 MHz each. This represents a vast amount of color information, and allows the system to resolve subtle differences in hue, saturation, and intensity.

The third, and perhaps most notable, difference in an HDTV system is the wide screen aspect ratio. All present television systems utilize a screen aspect ratio of 1.33:1, or 4 units wide by 3 units high. Psychovisual studies have shown that a wider picture display creates a more natural image for the eye and creates a sensation of reality. When coupled with the higher picture resolution and accurate color rendition, the wide screen aspect ratio creates a visual experience that until now, was only available in the cinema. The HDTV system uses an aspect ratio of at least 1.66:1, or 5 units wide by 3 units high.

The fourth major difference offered by HDTV is the addition of stereophonic sound. While stereo audio has been added to some existing TV services, it becomes truly meaningful only with a wide screen and large screen high definition television service.

These four elements combined represent what has come to be defined as high definition television.

III. History of HDTV Development

HDTV is not a new technology, but a mature technology, ready for implementation. The first work in HDTV began 15 years ago. That work has progressed well beyond the laboratory curiosity stage and, in fact, the key elements in the system are well advanced. The cameras, lenses, pick-up tubes, video recorders, picture tubes, and large screen projectors have reached the early production stage and are now available for purchase. Other systems elements are being rapidly developed.

Since 1970, numerous technical papers have been published around the world discussing human perception and the requirements of a new electronic imaging system.

In late 1981, a small mobile production unit was assembled in the United States to record the first high definition television programs. CBS recorded an NFL football game and the 1982 Rose Parade. Glen Larson of Glen Larson Productions then used the unit "on location" with the drama series "The Fall Guy," and Francis Ford Coppola produced two single camera cinematographic pieces in HDTV. These sample productions, along with several others, were shown in demonstrations during 1982.

Following these productions, six European television organizations produced HDTV demonstrations for the Montreux International Television Symposium in May 1983. Swiss TV produced segments of the Montreux Jazz Festival. Austrian TV, ORF, produced the opera "The Magic Flute" in Salzburg. The French TV production organization, SFP, produced "A Tour of the Monuments of Paris." Russian TV recorded the Kirov Ballet production of "The Sleeping Beauty" in Leningrad. The BBC recorded a variety show in HDTV. Italian TV, RAI, produced a single camera cinema style vignette in Venice – photographed by the famous cinematographer Vittorio Storraro.

More recently, RAI has produced another HDTV single camera, cinema style vignette which involved many difficult production circumstances. The HDTV video tape was converted to 35mm

film for a showing at the Montreux International Television Symposium this past June. Today, you will see the video tape.

Throughout these productions the HDTV equipment performed flawlessly in a variety of studio and location situations. The cameras are rugged and are identical in size to standard television cameras.

IV. History of HDTV Standards Work

Soon after the development of HDTV began, the CCIR recognized the need for a coordinated effort to establish a single worldwide standard. In 1974 CCIR Study Group 11 adopted Question 27/11 which stated:

“The CCIR Unanimously Decides that the following question should be studied: what standards should be recommended for high-definition television systems intended for broadcasting to the general public?”

While research continued and technical contributions were addressed to that study question, it was nine years later, in March 1983, at the Fourth Conference of the World Broadcasting Unions that the need for a worldwide HDTV standard was reiterated. In the final report of that meeting the world’s broadcasting unions unanimously adopted the following resolution:

“Considering that high definition television systems will require a resolution which is approximately equivalent to that of 35mm film and corresponds to at least twice the horizontal and twice the vertical resolution of present television systems; that the advantages of a single HDTV worldwide standard include lower equipment costs for broadcasters and viewers, easier exchange of programs and technical information, and encouragement to the ideal of international solutions to common technical problems; that multiple different standards will cause difficulties among broadcasters in the future;

“The Conference recommends that the Broadcasting Unions should encourage their members to carry out studies on the preferred characteristics of a uniform world standard for a high definition television system; that the broadcasting unions should concentrate these studies at first on a single HDTV production standard...”

The nine organizations adopting this resolution were:

ABU	Asia-Pacific Broadcasting Union
AIR	Asociacion Interamericana de Radiodiffusion
ASBU	Arab States Broadcasting Union
CBU	Carribbean Broadcasting Union
EBU	European Broadcasting Union
NANBA	North American National Broadcasters Association
OIRT	International Radio and Television Organization
OTI	Organization de la Television Iberoamericana
URTNA	Union of National Radio and Television Organizations of Africa

Thus the conference gave the world’s broadcasting unions a clear indication of their responsibility: To determine the parameters of a uniform world standard for a high definition television system.

The conference further agreed that these efforts should be directed toward an HDTV production standard, recognizing that a production standard is the first step toward achieving a world communications system which will allow the nations of the world to communicate among themselves.

Later that same year, in September 1983, CCIR Study Group 11 established Interim Working Party 11/6. This IWP was given the following instructions:

“Considering that High Definition Television is a subject of intense current interest and activity in the world; that it would be clearly beneficial to broad-casters and to the public alike, if the CCIR could recommend the adoption of a single, world-wide standard for high definition television; that prompt action in this respect is required, to avoid the establishment of one or several de-facto standards;

“Decides that an Interim Working Party (11/6) should be set up ... to prepare within the present study period, a draft recommendation for a single worldwide high definition television standard for the studio and for international program exchange, to be sub-mitted to Study Group 11.”

It is significant that the statements from both the Fourth World Conference of Broadcasting Unions and CCIR Study Group 11 recognized the benefits to be gained from a single worldwide standard for HDTV. Both bodies agreed that benefits are to be realized by broadcasters and viewers alike. Equally, both bodies agreed that the establishment of multiple different standards should be avoided.

Since Interim Working Party 11/6 was formed, it has met three times and 89 documents have been submitted. At the Third meeting, in January of this year, a provisional draft recommendation was adopted. The key parameters are:

Aspect Ratio:	5:3
Number of Scanning Lines:	1125
Scan Format - Interlaced:	2:1
Field Rate:	60 Hz

The Interim Working Party will meet again just before the meeting of CCIR Study Group 11. The Final Meeting of Study Group 11 begins on October 16. It is hoped that a worldwide HDTV production standard will be established at that time.

Quoting Richard Kirby, the Director of the CCIR, “I am convinced that if a single world standard is needed for international program production and interchange, it must be agreed during the current CCIR cycle... ‘Too late’ produces a list of established practices... I am convinced that if a single standard for HDTV program production and exchange is not adopted in the current CCIR cycle, at least three will emerge. It is for broadcasting organizations and administrations to decide whether the advantages of a single world standard justify the compromises and decisions needed for a recommendation today.”

Thank you, Ladies and Gentlemen, for your attention.

V. Introduction to First Tape

The first tape you will see contains three types of material typical of television production. The scenic material at the beginning of the tape provides an opportunity to see the fine detail which the HDTV system is able to reproduce. I would call your attention to the animals in two of the scenes.

Following this, you will see some scenes from the 1984 Olympic Games. Sporting events are usually seen on small home television receivers. The HDTV system provides the viewer with a wholly new experience in viewing sporting events.

The third type of production typical of television you will see are artistic performances. One of the performances is, again, from the 1984 Olympic Games. In this scene, I would call your attention to the ability of the HDTV system to accurately reproduce a difficult night time scene.

VI. Roll Tape

VII. Introduction to Second Tape

The next tape is typical of single camera production for the cinema. Produced by RAI, the Italian Television Network, the original video tape was transferred to 35mm film and was shown at the Montreux International Television Symposium this past June. While we can not show you that film today, it demonstrated that HDTV offers the opportunity to produce programs electronically and distribute the finished product as 35mm film to existing cinema houses.

During this video tape, I would again ask that you note the ability of the system to accurately reproduce fine detail and color. Note also the faithful rendition of scenes shot outdoors under various lighting conditions – including a scene shot at nighttime and in the rain.

VIII. Roll Tape

IX. Closing

As you leave this room the monitors outside will be displaying the same material you saw on the first video tape. This is, in fact, the high definition video converted to PAL – one of the three different and incompatible television systems now in use around the world. You will note that this converted video is of the highest quality achievable using one of today's television systems. Thus, while HDTV may be converted to film for exhibition in cinema houses, it is also readily converted to the conventional television systems now in use throughout the world.