

antennas for the transport of radio and TV signals. There are also remotely operated, adjustable antennas for radio and television ENG and an auto-tracking dish for a helicopter transmitter.

The French-language public broadcaster RTBF has installed two digital continuity suites, 19 digital Betacam recorders, and an FDL 90 telecine equipped with a Renaissance corrector. The annual film production of approximately 45,000 m is gradually being converted from 16mm to Super 16. On September 27, 1994, the transmission of PALplus programs was started. The year also saw the introduction of Dolby Surround and Teletext.

Germany — Institut für Rundfunktechnik (IRT)

Research and Development

Today, both in film and in television engineering, the modulation transfer function (MTF) is normally used to evaluate the quality of camera lenses with regard to definition characteristics and detail resolution. To determine the MTF, sinusoidal or square-wave line patterns are imaged under operational conditions, and the amplitude reduction that results with increasing spatial frequency is measured. However, in practice, the MTF values obtained this

way do not automatically correlate with the visual impression of sharpness gained when real objects are imaged. In addition to the dependence on the image content and the viewing conditions when the image is reproduced, other system parameters, especially those concerning the transmission and reproduction chain, play an important role in visual impression of sharpness.

For conditions specifically applicable to modern television image recording and reproduction, the IRT has investigated the major influences on the perception of sharpness when images of real objects are transmitted and the form these could take when the MTF is evaluated. A new qualitative way of evaluating the quality of a television camera lens was discovered by manipulating the lens' MTF in defined defocusing steps while forcing subjects to choose between paired comparisons of pictures on the basis of image sharpness.

ZDF

In 1994 three major projects were concluded at ZDF. A new post-production complex in digital component technology was completed. The new digital OB van, ö1, was put into operation. At the end of 1994 a satellite uplink to ASTRA 1A was finished.

3sat Uplink for ASTRA 1A

3sat is the joint German-language satellite program of ZDF, ARD, SRG, and ORF. It will be transmitted directly from the ZDF Sendezentrum at Mainz beginning in 1995 on transponder 10 of the ASTRA satellite 1A with audio subcarriers of Deutschlandradio Berlin and Deutschlandradio Köln.

All RF-equipment is sheltered in the existing air-conditioned room beneath the EBU station. From there the RF power is transmitted to the antenna feed via waveguide. The waveguide switching system and the power budget is planned to transmit the 3sat carrier with the option of upgrading to one additional carrier in the 14-GHz or 13-GHz band on either horizontal or vertical polarization without interruption of service. An antenna position- and heating-control subsystem is installed. The modulation process takes place within the ZDF broadcasting center, about 1 km from the earth station. From there the combined video and audio signals are transmitted to the shelter by a fiber-optic system on 70-MHz IR level. Like all other transmitting equipment, these links are built up in a 1:1 redundancy. The complete uplink is monitored and controlled by a real time control system from the main control room as well as from the the shelter of the earth station.



NETWORKS

CBS

During the year progress continued in the transition to all-digital systems. The CBS Broadcast Origination Center was further expanded to provide 12 separate computer-controlled outputs, with all playback originating from digital VCRs.

The design of the CBS Net-Q system was completed. This system provides affiliated stations with a complete network switching schedule with accurate timing information for the next 24-hr broadcast day. Any immediate changes to the schedule are transmitted instantly to the local stations. The schedule information is sent as data packets in the VBI and is processed by the local Net-Q comput-

er system. If desired, the local station can set this terminal to initiate the playback of local station breaks, on command from New York. Shipment of equipment is now in progress.

CBS Engineering took delivery of the first Hewlett-Packard video server system, and the evaluation is now completed. Employing MPEG-2 and operating at a data rate of 15 Mbits/sec, the server stores 20 hrs of programming, sufficient for approximately 3,000 commercials. An additional buffer store is provided, with 6 hrs of storage, adequate for a full day's schedule of commercials. The first system will be installed in a CBS-owned station.

The studio cameras in New York have been replaced with Ikegami HK

377 cameras. These have the special feature of independent and automatic control of facial flesh tones and detail. CBS News increased its use of nonlinear editing systems with equipment supplied by Avid, ImMix, and D-Vision. For the coverage of the Congressional elections, the SGI Onyx Video File Server was successfully used for the real time generation of all graphics.

With the addition of three more production studios in TV City, CBS now has a total of 22 stages in Studio City, 9 in TV City, and 9 in New York. One studio in TV City has been reequipped with Hitachi digital cameras, a digital switcher, and digital VTRs. The sensitivity of the cameras allows shooting with only 30 to 50 fc of light.

For the Sony Game Show Channel, TV City has transferred more than 23,000 programs from 2-in. quad and 16mm film format to digital Betacam videotape. This was accomplished in a continuous 24-hr/day operation, with excellent results.

An Animation Group has been established at TV City, equipped with SGI Indigo and Onyx systems. The group provides sophisticated animation and effects for CBS-produced programs.

NHK (Japan Broadcasting Corp.)

The Asian Games in Hiroshima

The 12th Asian Games, held in Hiroshima from October 2 to 16, were attended by a record 42 teams, with a total of 7,300 athletes and officials. The Hiroshima Asian Games Organizing Committee (HAGOC) set up an International Broadcasting Center in NHK's newly built Hiroshima Broadcasting Center in order to provide separate signals for each visiting Asian broadcaster.

As the host broadcasters, NHK and the Tokyo Broadcasting System (TBS) jointly organized Hiroshima Asian Olympic Games Radio and Television Organization '94 to produce international signals for 15 events and the opening and closing ceremonies. The master control room in the International Broadcasting Center was used to provide 12 international signals to broadcasters in other countries, and 12 circuits were also set up for satellite relay transmissions overseas. International signals produced by the host broadcasters totalled about 620 hours and the satellite relay transmissions by foreign broadcasters reached approximately 900 hours.

NHK's HDTV Coverage of the Lillehammer Olympics

The most outstanding feature in the NHK coverage at the Lillehammer Olympics was HDTV co-production between NHK and Eureka. NHK produced programs on ski jumping, figure skating, speed skating, short track events, and the opening and closing ceremonies, while Eureka produced programs on ice hockey, slalom, and the giant slalom.

NHK and Eureka exchanged their

programs, with NHK converting Eureka 1250 programs into 1225 Hi-Vision with HD-HD converters at the IBC. The HDTV signals were encoded into digital MUSE, then to DPCM, and transmitted to Japan via satellite in the Indian Ocean region. The Hi-Vision channel carried 110 hours of programming, 25% of which were supplied by Eureka.

NHK's Coverage of World Cup '94

NHK transmitted the host broadcaster's NTSC signals via a satellite in the Pacific Ocean region (POR). Stereo audio signals and Japanese commentary were encoded by digital audio compression systems and transmitted to Japan through ISDN circuits. All 52 soccer matches were aired in Japan.

NHK also provided Hi-Vision coverage via two relay vans. The matches were recorded on 1-in. DVTR tapes, taken to an earth station and encoded into MUSE signals, and relayed to Japan by a satellite in POR. The Hi-Vision signals used the same satellite transponder as the NTSC signals on a timesharing basis.

In the semifinal and final matches, NHK's Hi-Vision signals were converted to the Eureka system, digitized, and transmitted to Europe.

Swiss Broadcasting Corp.

PALplus

At FERA, the consumer electronics exhibition held in Zurich in August 1994, the Swiss Broadcasting Corp. (SRG) demonstrated for the first time the live production and distribution of programs in the new 16:9 widescreen format. The introduction of the PALplus format is having an effect on studio technology, namely on the production equipment used in the SRG studios. This report gives an overview on the production needs and describes how the transition from PAL to PALplus production can be achieved.

Reasons for Introduction of PALplus

From the TV consumer's point of view, the most significant difference between PAL and the new PALplus format is the picture aspect ratio of 16:9. Widescreen movies and future 16:9 productions may be reproduced

on a PALplus receiver in full size and, compared to the 4:3 PAL format, with improved picture quality.

The second, and perhaps the most important point, is the full backward compatibility of PALplus with PAL. On a 4:3 PAL TV set, programs in PALplus format can be received with full picture quality, although in the so-called letterbox format, i.e., with a black bar on the top and at the bottom.

A third characteristic of PALplus is its improved picture quality. A modification of the color encoding process used with PAL, the introduction of the "motion-adaptive colorplus," led to increased luminance resolution, reduction of cross color, and reduction of cross luminance.

Separation of Production and Transmission Standards

An important principle of PALplus is the strict separation of production and transmission standards. PALplus is a transmission standard that is used for the transmission from the studio to the end user (TV set); however, it is not suitable for production and post-production within the studio.

To achieve compatibility with a 4:3 PAL receiver, the PALplus technique reduces, by vertical low-pass filtering, the 576 lines of picture information to produce the 432 lines used for the letterbox display on conventional 4:3 sets. The remaining 144 lines are used to carry information that enables the PALplus set to restore the full detail contained in the original 576 lines. The splitting of visible picture information on the one hand, and helper signals on the other, make conventional picture processing impossible. For PALplus, signal distribution, recording, and processing within the studio have to be executed in component technique. The encoding takes place at the end of the processing, i.e., just before the television signal leaves the studio.

Component Technology

In the SRG studios, component equipment for recording and processing was introduced some years ago. With the development of digital equipment, in particular with the availability of the 270 Mbit/sec serial digital interface as part of a replacement and investment program, the signal interconnection will also be set up in digital component format.

The switching centers in Zurich, Geneva, and Lugano are currently equipped with routing switchers in composite form. As a transitional solution, hybrid switching systems are being used (the combination of an analogous composite crossbar and a digital component crossbar).

Adaptation of the Production Equipment to the 16:9 Picture Aspect Ratio

The most important factor in the production of the new picture format is the camera, which has to be equipped with a 16:9 CCD chip. All cameras obtained within the last two years can be adapted to the new 16:9 format — some are even able to switch between the 16:9 and 4:3 formats. The new picture aspect ratio has to be taken into account in all production equipment having a direct influence on the geometry of the picture,

i.e., with electronic graphic systems as well as effect and video mixers. In most of the equipment the adaptation occurs through a software update.

On-Air Studio

The on-air studios all use PAL technology. The first on-air studio totally using component techniques is scheduled to become available in autumn 1995. Therefore, for the introduction of PALplus, a solution had to be found that was somehow isolated from the rest of the equipment.

Link Network

In the outside broadcast (OB) and link networks, the signals are usually transmitted in composite technology according to the PAL standard. A solution is the new digital 34 Mbit/sec transmission system for the contribution of video signals in component form. The transmission links present no problem, as they are conceived in

composite technology and are therefore transparent for PALplus signals.

Signaling of the Picture Ratio

For optimal reception of the picture signal, in the first half of line 23, four data packets are transmitted that contain information on the picture width to height ratio (4:3; letterbox; 16:9) and on the positioning of the subtitles (within the picture or teletext).

Summary

The introduction of component technology within the SRG studio started in August 1994, with the introduction of the PALplus encoding format for the German-language TV program SIFDRS. The French program TSR and the Italian program TSI will begin utilizing PALplus in 1995. The full conversion of the studio equipment, however, will be a gradual process taking place within the limits of the SRG studio replacement program.



HOPE REPORTS

Media Overview

Video/Film

Motion media (videotape and film) represent one-quarter of the non-broadcast, nontheatrical media industry, accounting for \$7.8 billion spent in 1994. This does not include a probable \$1.5 billion spent for national and regional television commercials, in addition to several more billions for television programs and Hollywood feature films for theatrical exhibition. In this particular market, video accounts for 96% of the total, and film the remaining 4%. Actually, film plays a growing role in the production phase, while videotape accounts for 98 or 99% of the final presentation or exhibition format. An overview of the presentation media is shown in Fig. HR-1.

The video segment has been on a plateau for several years and actually has declined slightly over the past five years. Two factors are probably at the heart of the problem.

The first is that the corporate world, especially over the past 15 years, and

particularly the last five, has cut down on its video production as a part of the downsizing trend. During 1994, Hope Reports found that almost every month at least one of the Fortune 1,000 companies either reduced its video unit or entirely eliminated it.

The other factor presents a true dichotomy. As new technology

explodes into the production marketplace, the cost of post-production equipment has dropped sharply. This, in turn, holds down the overall production costs. One important supplier has advertised that the cost of equipping an off-line edit suite, formerly about \$500,000, can now be as low as one-tenth the price, or \$50,000.

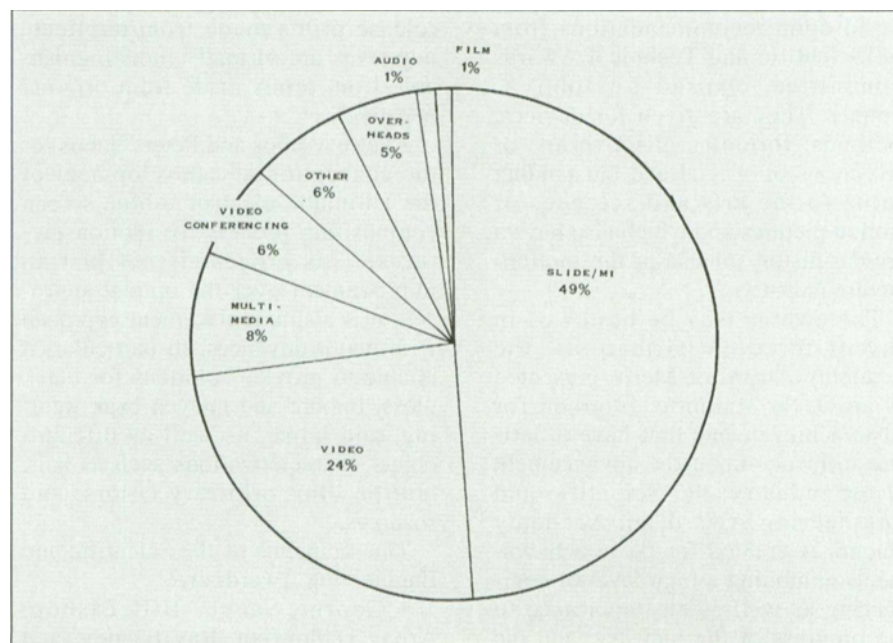


Figure HR-1. Presentation media – 1994.

This material contributed by Hope Reports, a market research organization in Rochester, NY 14618.