

## Report on HDTV '85

By Joseph Roizen

The Dept. of Communications (DOC) of the Government of Canada launched a Colloquium on High Definition Television a few years ago. It was so successful that they held a second one in Ottawa, May 13-16, 1985. Sponsored by the DOC, the Canadian Broadcasting Corp. (CBC), and the National Film Board of Canada (NFB), it was chaired by the assistant deputy minister of the DOC, the Hon. Ken Hepburn. Guy Gougeon, vice-president of engineering, CBC, was the keynote speaker. Two of his top staff members, Ken Davies and Marcel Auclair, ran the conference sessions and the complex demonstrations.

The conference attracted the top echelons of HDTV experts from around the world. Such major system proponents as Dr. Fujio, (NHK, Japan), Dr. Kerns Powers (RCA), Werner Habermann (IRT, Germany), Joe Flaherty (CBS), Dr. Bill Glenn (NYIT), Raymond Melwig (CCETT, France), H. Mertens (EBU, Brussels), and representatives from the ATSC, the BBC, the IBA, Philips, Scientific Atlanta, Mullard, and many others were also on hand. It was, in fact, a comprehensive cross section of virtually every point of view with regard to the future of higher definition television.

Meeting on somewhat neutral ground, since Canada is not a proponent of any particular HDTV system, the speakers and delegates explored literally every potential avenue that HDTV could take, from enhancing present NTSC, PAL, or SECAM standards to adopting entirely new systems with higher horizontal line scan rates, higher field rates, and progressive or interlaced scanning. In addition to the three days of technical papers, workshops were arranged where a wide variety of important

topics were scrutinized in roundtable settings. These included the socio-economic, production, and distribution aspects of HDTV.

On the demonstration side, a special TV studio was set up in a screened-off section of one of the conference halls. According to Marcel Auclair, the set designer was told to ignore every rule of normal television and create a set with super-fine detail and sharp contrasts. The two female models used were dressed in fabrics whose patterns would drive an NTSC system to distraction. In fact, based on their unusual dresses, one of the models became known as Miss Zone Plate, and the other as Miss Color Bars.

Using both a standard and an HDTV color camera, the audience in the adjacent auditorium could look at four simultaneously projected large screen displays of 525-line, 60-field and 1125-line, 60-field images of the same subject. In addition, a film transfer of an HDTV videotape had been made which could be projected on a screen next to the HDTV display.

Every delegate received an over 400-page compendium of the papers presented, labelled Volume 1. A second volume for those papers that arrived too late to print was subsequently sent out to all attendees. These two volumes represent perhaps the most comprehensive and complete compilation of up-to-date information on the current status of high-definition television available at this time.

### The Equipment

Four distinct sets of equipment were on active display during the conference, and scheduled demonstrations were made periodically. The most dramatic system there was the Sony High Definition Video System (HDVS), supporting the NHK proposed 1125-line, 60-field HDTV standard. Sony had provided a studio color camera, a 1-in. helical VTR, a 40-in. direct view monitor, and a large

screen projector. They had also transferred their HDTV demo tape to 35mm film using their own film recording system, and a second screen next to the video projector was used to show the film copy.

The Sony HDVS camera was coupled on a common mount with a Hitachi SK97 which provided *RGB* output at 525 lines, 60 fields. These signals could be used in their *RGB* form, be encoded to NTSC, or processed to produce a 1049-line pseudo-HDTV display. In the last mode, a Leitch codec was used for A/D conversion. It fed a Hitachi HD210 digital line doubler, which then went to a D/A converter and a large screen projector.

The two color cameras looked at the same scene, and the lenses were set to cover approximately the same area. The result was that delegates could see, on four projection screens, the various image quality levels produced by the different HDTV systems.

There were two other HDTV approaches on display at the back of the conference hall. One of these was based on the New York Institute of Technology proposal to achieve better images through a different approach to handling luminance and chrominance information. Dr. Bill Glenn and his wife and associate, Dr. Karen Glenn, have developed a color system that puts the maximum of practical information through the minimum of bandwidth. It is done by selective low-frequency sampling at rates which do not tax the transmission channel. The equipment used was a U-Matic player feeding a color monitor with a special recording showing a moving flower arrangement in front of a standard RETMA test pattern.

Another hardware display fielded by the Centre Mondiale Informatique et Ressource Humaine of Paris, and demonstrated by Dr. Bahman Nabati, used a LaserVision disc player modified to record 1125-line images on multiple tracks to show monochrome

A contribution received from Joseph Roizen, president, Telegen, Palo Alto, Calif.

pictures with very fine detail. By using six tracks with a 3-MHz bandwidth on each, the total image bandwidth can exceed 15 MHz, thus producing an HDTV image at the output. The system is designed for archival storage and rapid retrieval of static images, and a color system is under development.

Notwithstanding the fact that there were no hardware demonstrations of progressive-scan systems or of the various multiplex analog component (MAC) systems now in use in various parts of the world, there was no shortage of detailed, well-illustrated papers on these topics.

### The Conference

While many of the papers given at this colloquium were repeats or updates of papers given at other recent conferences, there was some new ground broken as a result of continuing research work done in Canada, the U.S., the U.K., West Germany, and France. All of the present Japanese HDTV development work seems to be concentrated on improving the 1125-line, 60-field NHK system for actual implementation, so there was not much presented in Ottawa that had not been seen or heard before. Supported by the superb live images from the Sony camera, and by the excellent recordings made by NHK for the Los Angeles Olympics, there was little doubt that this system is the front-runner in the HDTV global competition.

The quest for a worldwide HDTV standard has prompted some very esoteric research in many countries, and the papers given in Ottawa reflected this. Papers by BBC and German Bundespost authors showed very clearly the advantage of raising the field rate to 80 Hz for a European HDTV system that would have to be transcoded to 50 fields for compatible transmission. Many of the papers from Canada, the U.S., and Europe supported the progressive-scan approach first proposed by Dr. Kerns Powers of RCA, and even those who favor the NHK 1125/60 system for origination were pushing for a compatible 1050/60 system for on-air transmission and distribution.

The progressive-scan proponents claim that this approach will simplify the receiver, will give better horizontal resolution without a severe bandwidth penalty, especially if offset sampling and diagonal filtering is used, and will

once and for all eliminate the major annoyances of interlaced scanning, interline flicker, and interfield motion.

There were also a number of papers on just enhancing existing TV systems with a growing number of MAC schemes. The most notable one was described in a pair of papers given by two Scientific Atlanta authors, John Lowry and Charles Rhodes. Each described a different aspect of their B-MAC system, which has now been adopted by the Australian government for DBS service in that country. Lowry's paper was an update of his previous work, presented at the most recent IBC and SMPTE meetings, and he closed his paper with a most emphatic statement. He said that later this year, the best public service television pictures in the world would not be seen in New York, London, Los Angeles, Tokyo, or Paris, but by the Australian ranchers and farmers in the remote Outback, where their B-MAC TV receive-only systems (TVROs) will pick up DBS broadcasts.

His colleague, Charles Rhodes, gave a separate paper on an enhanced B-MAC system aimed at producing compatible 525-line and 1050-line dual-channel HDTV with wider aspect ratio images. Rhodes also showed how, with the use of CCD field stores in the receiver, the wider screens could accommodate both a main picture and a series of smaller images at the side of the main screen. The smaller images could be teletext pages or other channels being previewed. He referred to this as "non-invasive" picture in picture, since the side images do not interfere with the main picture.

### The Workshops

The workshops were very interesting because they raised questions not usually associated with a scientific or technical meeting. One of the more provocative titles for a well-attended workshop was, "Who Pays for the Dream." The participants, many of whom were from the programming side of television or film, were concerned with the real cost of HDTV, and who would bear the brunt of that. The most provocative question was raised by Carol Darling of Nordicity. She asked whether HDTV would be the field for entrepreneurial services directed at affluent closed user groups, or whether it would be a universal service (like public broadcasting) and therefore be paid for by everyone, re-

gardless of an individual's benefit from it.

The point made here was that even if the service was compatible with present-day TV systems, the better pictures would only be seen by those who could afford the new sets. One projection of the future cost of an HDTV receiver was made by Dr. Kerns Powers, who maintained that volume production should make the high-definition set no more than 125% of the price of a normal NTSC receiver.

Frank Oda of TeleSat pointed out that the primary market for large-screen television is in North America, because traditional home and room sizes are large enough to accommodate them. In other countries, this factor may not apply, and people are likely to stick with smaller screen sizes, thus negating the effect of greatly improved TV picture quality. The question of picture size also affects the desirability of stereo sound on TV. Without adequate speaker spacing, stereo audio is not very effective.

### Conclusion

It was quite evident from the discussion that went on in Ottawa at the conference sessions, at the workshops, and even during the social events, that there is little current consensus on a worldwide HDTV standard.

The likelihood that an agreement can be reached among these widely divergent proposals in time for CCIR ratification later this year is very small, and the next such CCIR plenary session is four years from now. Ottawa, however, did serve a very useful purpose in flushing out all of the HDTV system proposals that the best minds in the industry can generate. The next confluence of this prestigious group of HDTV experts will be in Montreux, where no doubt more committee meetings will take place, and more discussion occur.

It must also be said that for all of the problems that the NHK 1125/60 HDTV system confronts the broadcaster with, it is still the only system for which there actually is working hardware available, and for which there is multi-manufacturer support in Japan. For that reason alone, it may become the *de facto* HDTV world standard for original program production. Ironically, the better the standards conversion systems become, the less urgent is the need for a truly universal HDTV standard.