switcher interface. For the more complex editing systems, the following is a partial list of the commands available:

- close crosspoints
- select wipes, effects functions
- start automatic transitions, set dissolve rate
- command switcher to "learn" an effect, then dump the information back to the editing machine
- command the switcher to report operator actions so an edit list can be created
- request that the operator's movement of the lever arms be transferred to the editing machine for storage
- allow the editing machine to send commands to character generators and still store devices via the switcher "peripheral interface"
- transfer the contents of E-MEM registers to the editing machine or back to the switcher.

The protocol and command structure is intended to be used as a design guide by the manufacturer of editing equipment. Thus, he may use only as much of the interface capability as he deems necessary. The protocol has already received considerable exposure in the field. Presently, two manufacturers are using the interface protocol, and it is being considered by at least three others.

Future Applications

The new effects and capabilities of a switcher-intelligent interface described above are possible with current production switchers. What will happen when a new generation of switchers appears on the market? In the past, manufacturers of editing equipment have been required to design new interfaces. With an intelligent-interface approach, the hardware and protocol would remain the same. Modifications to the editing software would allow use of any new data formats.

Summary

Post production editing can benefit greatly if the editing machines can use an intelligent interface to switchers, analogous to the intelligent interface used to control VTRs. In the E-MEM system described, the system's microcomputer can also provide several new production effects, which previously were not possible. It is also suggested that standardizing the use of a serial switcher interface protocol will help promote the introduction of more sophisticated and capable editing systems.

Report on the Eleventh International Television Symposium and Technical Exhibition at Montreux, Switzerland

By JOSEPH ROIZEN

When a conference or symposium or exhibition is chosen by manufacturers as the right place to introduce revolutionary new machines, and when engineers gather there from all over the world to discuss and decide what will happen in their profession — and their industry — for the next five years, that meeting must be reckoned as a major event. The Eleventh Montreux Symposium, held 27 May to 1 June this year, qualifies on both counts.

There were more than 155 exhibitors (up 15% from the Tenth Symposium) occupying over 10,000 m^2 of space, part of which was in a temporary structure put up between the exhibition hall and the pavilion. Exhibitor staff members at Montreux numbered about 3000; there were 2100 registered delegates, including the invited lecturers and panelists; and according to the estimate of Montreux Director Raymond Jaussi a total of 8000 participants came to Montreux.

As at three other major expositions over the past year (IBC in London, SMPTE Television in San Francisco, and NAB in Dallas), it was digital videotape recorders (DVRs) that had everyone talking. Ampex, Sony, and Bosch Fernseh all demonstrated feasibility models that may evolve into marketable machines; (each DVR will be discussed shortly in some detail). But the hardware and technology developments — as dramatic and exciting as they were — were not the whole story.

More important probably over the long term was a kind of "ecumenical spirit" — a growing sense of mutual respect and cooperation among the many organizations involved in television and motion-picture technology. Six officers of the SMPTE attended: President Robert Smith, Executive Vice-President Charles Anderson, Engineering Vice-President Roland Zavada, Financial Vice-President Joseph Flaherty, and Governors Anthony Lind and Joseph Roizen. In addition to the SMPTE, there are at least a half dozen other organizations that share many of the same concerns regarding motion pictures and television — the EBU (European Broadcasting Union), the FKTG (Fernseh- und Kino-Technische Gesellschaft), the BKSTS (British Kinematograph, Sound and Television Society), the Royal Television Society, the CCIR (International Radio Consultative Committee), and the IEC (International Electrotechnical Commission).

Traditionally most of these organizations have operated within their own limited framework — seeking quite properly to avoid conflicts of interest or poaching on each other's preserves. This year the beginnings of change were evident — when it became widely evident that new technology was so complex that no single organization had access within its ranks to the kind of expertise it wanted and needed. EBU, for example, for the first time invited manufacturers' representatives to meet with its committees — a practice long and successfully followed by the SMPTE. This practice does have its drawbacks — potential conflict of interest and difficulty of ascribing responsibility — but the advantages are considerable in that with goodwill an effective dialogue can be established between manufacturers and users via the standardizing organizations. It was through just such a dialogue that SMPTE arrived at the helical Type C Format for 1-in VTRs. And it was this achievement within the span of a single year that earned for SMPTE new recognition at Montreux.

At this time, digital video recording and the prospects for standardizing on machines that can interchange tapes are on everyone's mind. Many at Montreux were hoping that when the time comes the SMPTE can repeat its standardizing achievement. Perhaps with the new sense of the interrelatedness of our interests and activities, whether we are users, manufacturers, or standardizing groups, and operate nationally or internationally, it will be possible and to our mutual benefit to standardize.

Another very important development at Montreux — from the standpoint of international cooperation in our industries — is the agreement in principle arrived at between Robert Smith, President of the SMPTE, and Helmut Schoenfelder, President of the Fernseh- und Kino-Technische Gesellschaft (FKTG), to work for closer ties between our Societies. What this means in practical terms is the encouragement of the exchange of technical papers for conference presentation and publication and also the mutual participation and recognition of both societies at their respective conferences. Efforts will also be made to improve the availability of the *SMPTE Journal* to the many German motion-picture and television engineers who read English.

There were two particularly notable social highlights at Montreux which we will describe in detail shortly: Bosch Fernseh

A contribution submitted on 22 June 1979 by Joseph Roizen, Telegen, 800 Welch Road, Suite 354, Palo Alto, CA 94304.

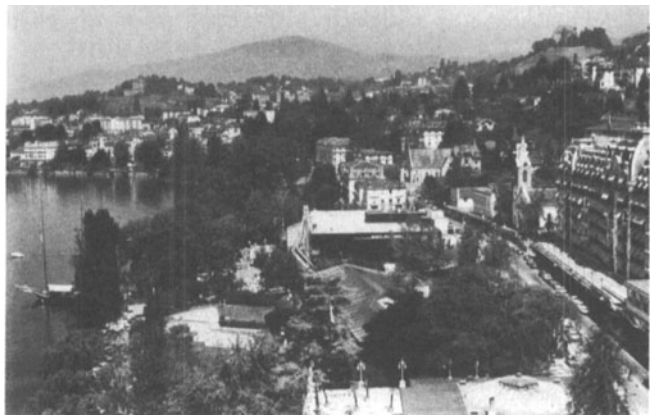

Fig. 1. The natural beauty of Montreux is evident in this "post-card" view of the Symposium site.

Fig. 2. At the opening ceremony for the Symposium, the delegates heard welcoming speeches by (left to right): Hans Probst, Montreux Symposium Chairman; Fritz Locher, General Director of the Swiss PTT; Marcel Julian, former Board Chairman of Antenne 2; Paolo Zaccarian of Italian TV (RAI); and Raymond Jaussi, Symposium Director. Mr. Julian's interesting theme was "The Springtime of Television."

celebrated their fiftieth anniversary in the TV hardware business, and Joseph Flaherty (CBS Vice-President of Engineering) won the Montreux Gold Medal Award.

Technical and marketing developments were, of course, also notable: Thomson-CSF, for example, privately displayed an instant record/replay laser-operated videodisk of broadcast quality. RCA was making a major push to sell high power transmitters in Europe, and their TK-47 automated camera is still leading the industry in that area. A variety of digital video effects machines operating in the PAL and SECAM standards were to be seen. And signs publicizing various exhibitors as "official suppliers for the 1980 Olympics in Moscow" were everywhere.

A few other companies had some surprises as well. Dolby Laboratories teamed up with IVC for the first exposure of a Dolby video noise reduction system applied to a newly configured IVC 1-in helical format. Quantel's floppy disk memory made it seem extraordinarily easy to produce a wide variety of complex digital effects at the push of a button or the positioning of a lever. Editing systems at all levels of complexity, from the expanded keyboard of the CMX-340X down to the joystick units on the simpler Convergence Corp. control track editors, were on hand for delegates to practice on.

The Digital VTRs

Seldom has a technology been the subject of such guarded comment (from suppliers) or such ominous interest (to broadcasters) as digital video recording. Each of the three major contenders in this arena had yet another generation of DVRs, operating on the PAL standard, and showing excellent results. Each claimed this was just another milestone in the evolutionary cycle of DVR development until a practical machine is produced for eventual television application. Each machine was physically and electrically different from the others, and the variations warrant some description.

The BCN/DVR

Bosch Fernseh has built on the work done by the IBA to produce a BCN based digital recorder which had several advantages over the experimental unit shown by John Baldwin and his group at IBC last year. The BCN/DVR on display at the Bosch Fernseh booth in Montreux was operating at a tape speed of 5 in/s recording information at an 80-Mbit/s rate on the 1-in tape. All of the electronics were housed in the machine's own frame and the picture results with error correction and concealment were excellent. With the concealment circuitry turned off, there were visible white dots on the color monitors, but they were minimal, and a vast improvement over the IBC demo. The recording technique includes conversion from analog video to $4f_{sc}$ then reduction to $2f_{sc}$ before recording on tape. The reverse takes place during playback.

Hans Groll and Henry Zahn of Bosch Fernseh, both emphasized that another version of this digital recorder, running at 10 in/s could handle digital data at a rate of 160 Mbits/s, and they saw this as potentially attractive for the EBU digital VTR of the future. Bosch Fernseh, in my opinion, seems closest to a marketable digital recorder, and although they claim to be far from selling this machine, it does offer some attractive possibilities for post production houses and major program origination facilities.

The Sony DVR

Sony engineers have repackaged and redesigned the NTSC/DVR they showed at NAB into a more compact PAL unit, using the BVH-1100 as the basic tape transport. The digital electronics were in a separate unit, much reduced in size over the machine shown privately in Dallas at the NAB. Most impressive was the fact that Sony had two such machines on which they had made copies down to the fiftieth generation of the original test pattern or color camera image input. The Sony DVR also had high quality digital sound with a large number of audio channels possible. It was almost impossible to distinguish the fiftieth generation from the first, even though, as Takeo Eguchi explained, the machines were going through the full cycle of conversion from $4f_{sc}$ to $2f_{sc}$ and back at each dub. This fact was later pointed out by Tom Robson and John Baldwin of the IBA, as adequate proof of the validity of the IBA proposals for digital signal handling in DVRs via bit rate reduction techniques.

When the ultimate test was applied to the Sony DVR and the concealment circuits were shut off, the pictures were still very good with the errors seeming somewhat less noticeable than on the BCN machine.

As they did at NAB, both Howard Steele and Masahiko Morizono reiterated their statements about the interim nature of this latest Sony DVR. Morizono stated that Sony considers this modified C-Format DVR as a device with which they could solicit user opinion while working toward a more compact and practical end product.

The Ampex DVR

Secluded in a private suite at the Montreux Palace Hotel behind bold signs reading "Ampex Digital Theater" (admission by signed invitation only), the latest Ampex DVR continued the "Cadillac" approach shown at the SMPTE Television Conference last February. The transport was an AVR-2 with some extra electronics in a rack. The scanning system was still octoplex (eight heads) with regular 2-in quad tape as the medium, but there the similarity ended. Engineers Lemoine and Diermann have now gone the extra step to tailor the tape geometry to optimize digital parameters. The video track width is now only 2.0 mils with a guard band of 0.6 mils. With this track configuration the longitudinal tape speed is now reduced to 6.6 in/s instead of the former 15.0 in/s. The head writing velocity is approximately 2100 in/s and the PAL signal is sampled at $4f_{sc}$ and recorded at 135 Mbits/s (actually in two channels each at 67.5 Mbits/s).

Audio is still being proposed in the same way that the NTSC machine was supposed to handle it, but Ampex adhered to the digital VTR tradition of not actually demonstrating any working sound channels.

Most impressive about the Ampex DVR was its ability to reproduce nearly flawless images even with the concealment circuits off, an indication that with their linear packing density of 33 Kbits/in (measured along

Fig. 3. *International* socializing is *de rigueur*. From left: Helmut Schoenfelder (FKTG President), Georg Drechsler (FKTG Secretary), Charles Anderson (SMPTE Executive VP), and Herbert Fix (IRT Director).

Fig. 4. Hans Probst is Head of Radio and Television of the Swiss PTT. He has been associated with the Montreux Symposium from the earliest days. Here he is flanked by Robert Smith and Roland Zavada of the SMPTE.

the track length), they are operating in a very safe region as far as errors are concerned.

Ampex executives Steinberg and Kleffman insist that this is not a saleable product, and that if a digital VTR is to emerge, it should be a top quality approach with no compromises such as bit reduction. Undoubtedly the DVR they showed had the best performance characteristics, but whether that's what users really want remains to be seen.

It seems inevitable that some special purpose digital VTRs will be sold in the near future to production or post production houses who are not concerned with an industry-wide standardized machine and to whom the high initial cost is not overly significant. In the meantime, it would be beneficial to the TV industry as a whole if the first initial organizational steps were taken toward establishing standards for that universal DVR that will emerge 4 or 5 years from now.

Perhaps the only way for this to happen, is for the users to declare their intention of not acquiring any digital VTRs until such standard is established.

Awards and Accolades

The opening session on Sunday was held at the Montreux Casino where a full house listened to welcoming addresses by Fritz Locher, Director General of the Swiss PTT and Hans Probst, the Symposium Chairman.

The keynote speaker was Marcel Jullian, a noted television executive in France and former Board Chairman for Antenne 2, one of the three national networks. Jullian's speech was entitled the "Springtime of Television" and he gave high praise to the "magicians" of television (the inventors and engineers) present in Montreux who had brought the means of global communication into every home. He ended on the positive theme of how the new developments being demonstrated or discussed in Montreux would further widen viewers' horizons as they gained access to interactive teletext, videodisk devices, and direct satellite-to-home television. Most of all, the viewers' choices would be broadened, thus giving a better chance for comparisons and intelligent selection of future program material.

The high point of the opening session was this year's presentation of the Montreux Gold Medal Award for outstanding personal achievement of new techniques or equipment which have significantly contributed to the improvement of television broadcast engineering. Presented by Paolo Zaccarian of RAI, the Gold Medal went to Joseph A. Flaherty, Vice-President of Engineering and Development at the CBS Television Network. Flaherty's citation included his pioneering work with ENG from concept to operational implementation. In accepting the award, Flaherty expressed his special appreciation and noted that an award from one's international peers was the highest honor he could aspire to.

On Sunday evening, CBS held a special reception at the Montreux Museum Club, where Flaherty presented an historic Minicam to Hans Groll of Bosch Fernseh in honor of that company's fiftieth anniversary.

This special occasion was also celebrated at a buffet at the Casino and later in the week a banquet in the Chateau de Chillon, Montreux's most historic landmark. Local folk singers and dancers provided entertainment, and Bosch Fernseh executives gave historical reviews of their company's technical achievements over this half century.

Thomson-CSF's soiree featured a cocktail party and sit down dinner for more than 1000 guests. Delegates with their wives and friends filled the Montreux Casino to capacity.

Sony hired a three-masted schooner that was moored at the jetty by the Maison des Congres. Buffet lunches and cruises on the lake were the order of the day. Ampex also used a Lac Leman cruiser as a vehicle for hosting a party, and 3M had their regular elegant banquet at a local chateau.

Many organizations used the opportunity of Montreux to properly combine business and socializing. The IBC organizing committee held a sumptuous buffet at the Eurotel for all of the corresponding members present and distributed up-to-date information on the 1980 International Broadcasting Convention to be held in Brighton. The Swiss PTT invited all the members of the press to a raclette party at a remote high altitude Swiss resort that took two hours of driving through spectacular mountain scenery to reach.

An Australian evening was sponsored by several companies (Rank Australia, etc.) which drew some 50 guests who represented the top television technical talent from the "down under" contingent.

As always, this aspect of the Montreux Symposium provides the best possible interface between the far flung delegates. The very compact nature of the town and the constant mingling that results helps to create a communication channel between broadcasters, suppliers, technical experts, and newsmen which is not achieved when a meeting is held in a larger, more diverse place. Notwithstanding the oft-expressed concern of many exhibitors that Montreux has become too expensive and unwieldly, the general opinion of the delegates who attend is that they enjoy Montreux and want to see it continue. Since they are the main source of revenue for the manufacturers, there is not much doubt that it will.

The Technical Sessions

Although in this Eleventh Symposium there were 85 papers and 8 round tables vs. 185 papers and one round table in the Tenth Symposium, it still took parallel sessions to fit in this full roster of technical presentations. The major topics such as satellite communications, production and post production techniques, digital video, teletext, and CATV were well attended. European broadcasters seem perennially on the threshold of using ENG in any significant way. They are still reluctant to fully accept the lower quality images from portable color-under ¾-in cassette VTRs and are using them mostly for evaluation and limited testing. Many of the networks reported using 1-in helical machines (mostly the BCN format up to now) for ENG or EFP until they can be convinced that the smaller

format is acceptable. Some television organizations privately attributed the delay in implementation of an ENG style of operation to labor union resistance or other nontechnical hindrances. Swiss TV which claims to be the most advanced European country in this area reported on their use of 3/4-in cassette VTRs and lightweight cameras for regional news reporting, and said they were still evaluating the quality/convenience tradeoffs of the system.

Electronic film (single camera) techniques continue to be used at the SFP in France according to a paper by Michel Oudin of that organization. Peter Rainger of the BBC described new production techniques used at his facility. A wide range of other papers delved into such diverse subjects as digital effects, CCD scanners, teletext generating equipment, and automated cameras.

The satellite sessions drew full audiences, and questions regarding the use of domestic satellites for individual countries were thoroughly explored. Direct satellite-to-home transmission is considered technically feasible, and many national television network representatives were willing to predict (off the record) that their countries would use such services. There are still a lot of political and legal problems to solve and a lot of international agreements to sign before such services become widespread. Ratification may be difficult to get if satellite "footprints" extend across borders into adjacent countries. A few speakers warned that single-country satellites were not the panacea for TV services everywhere. Small flat countries (like Holland or Denmark) may not benefit greatly by replacing terrestrial links by a geostationary satellite that they pay for and operate. Only larger countries with more rugged terrain, isolated pockets of inhabitants, and very extended frontiers (Norway, Chile, etc.) may benefit greatly by adopting a satellite service rather that setting up or constructing a new set of ground microwave links for additional television service.

Post production techniques, especially program editing, were well covered in a series of papers that for the first time married telecine papers with computer assisted editing systems. The reasons became obvious when the delegates looked at what was happening on the exhibit floor and listened to the text of the papers. The new telecines being described by authors from Bosch Fernseh, Rank, and Thomson-CSF are more versatile than they have ever been from a program production standpoint. All these flying spot or CCD scanners, with their optional digital framestores, can now be fitted with interface units that permit first generation film-to-tape transfer by time code addresses. The editing system "looks at" the telecine as just another picture source and manipulates it with the same precision as a VTR. CMX, Datatron, Bosch Fernseh, and others were showing such combinations on the floor, and papers by various authors described the new flexibility offered by these new combinations.

Post production editing has become a very complex operation — some would say *too* complex. Nevertheless, bigger keyboards such as the new extended version of the CMX 340X are now claiming simpler, more understandable functions that utilize skills already familiar to film editors who are now switching to tape.

The digital video sessions continued to extend the dilemma already confronting many broadcasters, namely whether to buy now and risk instant obsolescence or wait and risk being short of needed production capacity while the digital coding and recording problems continue to elude resolution. Papers by experts from both sides of the fence (suppliers and users) continued to present a confusing if not conflicting set of parameters for the delegates to consider: composite vs. component decoding; twice, three-times, and four-times subcarrier encoding — with or without bit rate reduction; the permissible number of cascaded codecs; and a growing variety of formats with vastly different tape geometry. All of the manufacturers had learned representatives give papers on their "experimental" digital VTRs, and all predicted long cycle times for the final production version of such a machine. If a market for these machines is to develop in an orderly fashion, it seems essential that representatives of the manufacturers along with prospective users and the involved standards organizations should convene soon to work on tape interchangeability standards.

The teletext session also had a dichotomy that paralleled the digital video problems. Two major techniques are in confrontation here; Ceefax/Oracle system developed in the UK and the more recent Antiope approach conceived and executed in France.

Teletext tests are now going on in Germany, Switzerland, Sweden, Denmark, Holland, the U.S., Japan, Canada, and elsewhere. At the teletext round table, speakers from many of these countries presented their findings regarding the various teletext systems. Complicating the picture is the fact that on the horizon there are newer systems such as Telidon from Canada which offer yet greater possibilities. The problem is a common one in research and development: the engineers are forever reluctant to freeze a design and go to the manufacturing and marketing stage because if everyone would just wait a little longer they can create still more features that are still more marvelous. And of course there is the "chicken and egg" problem: manufacturers and broadcasters won't make big investments in teletext equipment if few viewers have receivers that can decode teletext signals, and receiver manufacturers are not going to provide expensive decoders if there is no extensive teletext service being provided. For all these reasons, a single universal teletext standard seems likely to remain elusive.

Japanese and United States teletext developments were also reported, and a discussion of decoder complexity and cost concluded the round table.

Fig. 5. A notable technical achievement at Montreux was the instant-playback, broadcast-quality color videodisk machine displayed privately by Thomson-CSF. The disk is rigid plastic with a thermally activated layer. Images, recorded and played back by lasers, can be still-framed, time-shifted, or run at normal speeds.

Conclusion

Whether one talks about the Eleventh Montreux Symposium in terms of the treatment of issues or display of hardware or elegant entertainment, the proper description is "lavish." For the foreseeable future exhibitors will continue to show their wares here because Montreux more than ever is a place where corporate images can be polished and reputations can be made. The Montreux Symposium Committee did a good job in reorganizing the sessions to the new arrangement that was in effect at this year's meeting. In addition, the seven volumes of printed proceedings are a comprehensive addition to any technical library dealing with television related topics.