

The 25th Annual SMPTE Television Conference

Westin Hotel, Detroit, Mich., February 1–2, 1991

Over 350 people attended the 25th Annual SMPTE Television Conference and participated in a two-day program that included educational presentations, engineering meetings, and special social functions celebrating the conference's 25th year and the Society's 75th anniversary. The event took place at the Westin Hotel in Detroit, Mich., February 1 to 2, 1991.

All reports indicate that the event was inspiring. The educational program generated much interest and discussion and attendees were very enthusiastic about the conference and satisfied with the knowledge they gained by attending.

"A generally poor economy and a war in the Middle East, which caused restrictions on travel by several companies, caused us some anxious moments," said Program Chairman Rudy Kryger, CBC. "However, with the cooperation and professional assistance of others, we were able to provide a complete program that we are very proud of."

Of note, the decision to hold the conference in Detroit was a special part of the anniversary celebration: the first SMPTE Television Conference was held there in 1967. This conference was held simultaneously with the Audio Engineering Society (AES) International Conference. Delegates from each society were welcome at sessions offered by both groups.

The Technical Program

The conference, which was themed "A Television Continuum — 1967 to 2017," offered attendees a look at the history of television technology as well as a glimpse into its future. The two-day event featured 30 presentations and was divided into four sessions: A Path to the Future, Forward to the Present, Back to the Future, and Crossroads to the 21st Century, which is the first joint conference session between the SMPTE and AES.

"We are very pleased with the results from our initial efforts to share our conference with the AES," said

SMPTE President Blaine Baker, MPL Film and Video. "Discussions have already begun regarding the possibility of future common meetings."

In addition to the technical papers presentations, there was a panel discussion following the Back to the Future session. "It was a very interesting interchange," said Session Chairman Keith Neff, Grace & Wild Studios.



Program Chairman Rudy Kryger welcoming attendees to the 25th Annual SMPTE Television Conference.

"The papers were fairly complex and we had a good mixture of attendees, ranging from technicians to engineers. Many of the papers dealt with digital signals within the plant, and there was quite a bit of discussion devoted to implementation and error detection."

The technical program was supervised by Program Chairman Kryger and SMPTE Editorial Vice-President Frank Haney, Capital Cities/ABC. The topic and session chairmen were Frederick M. Remley, University of Michigan (who was also the featured speaker at the Get-Together Luncheon); John F. X. Browne, John F. X. Browne & Associates; Keith Neff, Grace & Wild Studios; Kenneth P. Davies, CBC Television; and Esio Marzotto, University of Windsor. Serving as session co-chairmen were Stan Nalski, Film Craft Laboratories, Inc.; Chris Hill, Archdiocese of Detroit; Harold Miller, Technicolor Video; Gene Wilczak, WJBK-TV; and Ioan Allen, Dolby Laboratories.

Other members of the conference committee were Registration Chairman Donald T. Balousek, Producers Color Service; Registration Chairwoman Herta Horn, Keras Film; Display Chairman Helge Blucher, PRO Vision; Display Co-Chairman Rick Bail-



Thirty technical papers were presented as part of the conference's education program.

largeon, CBC Television; General Arrangements Chairman Leonard Eden, John F. X. Browne & Associates; Assistant Auditor Richard O. Painter, Midwest Corp.; A/V and Projection Chairman Robert Schlorff, Wayne State University; Opening Film and Tapes Chairman Benjamin Stone, Eastman Kodak Co.; Opening Film and Tapes Co-Chairman Stan Nalski, Film Craft Laboratories, Inc.; and PA and Recording Chairman Harlan Singal, Joseph Productions.

Service was also provided by Technical Arrangements Chairman Henry J. Root, Hy James, Inc.; Operations Chairman John P. Rusche, Sandy Corp.; Facilities Chairman Richard F. Strauss, Sony Broadcast Co.; Sponsorship Chairman Robert E. Swayze, General Television Network; Sponsorship Co-Chairman William H. Smith, Allied Film and Video; Session/Hospitality Chairman Eugene D. Wilczak, WJBK-TV; Hospitality Co-Chairman Marcus Williams, WDIV-TV; Reception/Luncheon Chairman James A. Gibeau, Detroit Institute of the Arts; Transportation Chairman David O. Grover, WKBD-TV; Facilities Co-Chairman Chris Hill, Archdiocese of Detroit; Student Assistance Chairman Esio Marzotto, University of Windsor; and Spouses Program Chairwoman Judi Stefani, Film Craft Video.

Special Activities

Frederick M. Remley, who has a long list of SMPTE achievements, spoke before a filled room during the Get-Together Luncheon held on Friday, February 1, and received a standing ovation. The text of his speech is included elsewhere in this issue.

Remley, the recipient of the Society's 1990 Progress Medal Award, is recognized worldwide as an expert in television recording and standardization. He was the chairman of both the Type C and D-1 Video Recording Working Groups, for which the SMPTE was recognized, and he received a Citation and an Emmy from the National Academy of Television Arts and Sciences. He was also the chairman of the SMPTE Television Tape Recording Committee and the Standards Committee and was one of the organizers of the first SMPTE Television Conference.

A Fellow of the Society, he has been very active in the SMPTE since joining in 1954. He has been manager,



SMPTE President Blaine Baker addressing the press briefing. Those who attended the event included (from left) Conference Vice-President L. John Spring, Jr., AES President-Elect Roger Furness, Western Region Governor Peter Hammar, and Mark Schubin, a member of the SMPTE Board of Editors.



Conference Vice-President L. John Spring, Jr., Program Chairman Rudy Kryger, and General Arrangements Chairman Leonard W. Eden.



Session Chairman Frederick M. Remley (right) and Session Co-Chairman Stan Nalski during the Friday morning presentations.



The final technical session was a joint effort between the SMPTE and the AES. (From left) Session Chairman Esio Marzotto, Session Co-Chairman Gene Wilczak, and Session Chairman (AES) Ioan Allen.

secretary/treasurer, and chairman of the Detroit Section and was awarded the SMPTE Citation for Outstanding Service in 1978. He is now chairman of the SMPTE Board of Editors. A 1951 graduate of the University of Michigan, he has spent his career at the university, currently serving as the staff video specialist at the Information Technology Division.

Remley was introduced by SMPTE President Baker, who gave a brief presentation. Marshall Buck, president of AES, greeted luncheon attendees and also said a few words.

On Friday evening a special banquet celebrating the anniversaries of both the conference and the Society was held at the International Banquet and Conference Center, housed in Detroit's Greektown. C. Robert Paulson, AVP Communication, opened up the speaker presentations with a slide show depicting both successful and unsuccessful television technologies. He was followed by Robert Kreipke, Ford Motor Co., who showed film clips documenting Ford's involvement in motion pictures, which dates back to 1914, and provided a tribute to the SMPTE. Music and dancing were a part of the evening's festivities.

Engineering Meetings

Several SMPTE Engineering Committees met during the conference. T14.40 Working Group on Digital Audio Interfaces for Television held its first meeting. Under the leadership of Chairman Dave Elliot, Capital Cities/ABC, the group will generate standards for interfaces that tailor underlying AES/EBU techniques to the particular needs of television. The group will also handle other aspects of digital audio and will establish liaisons with AES and other relevant groups.

The Subcommittee on Digital Control, under the direction of Chairman Ted Staros, Sony Corp., discussed ES-Net supervisory protocol and production switcher dialects. A number of proposals were put on the table for future consideration. The Ad Hoc Group on Digital Pictures, led by Chairman Charles Poynton, Sun Microsystems, also held a meeting.

Additional Activities

Attendees were able to meet their peers and renew old acquaintances during an Opening Reception held on Thursday, January 31.

Spouses were invited to participate

in a two-day Spouses Program, which began with a tour of the Cadillac Detroit Hamtramck Assembly Center, an automated automotive plant. "We saw the finished assembly of the Allanté," said Spouses Program Chairwoman Judi Stefani. "The tour was supposed to last two hours, but the interest was so great that it took three-and-a-half hours to complete." After the tour, the group visited Stroh River Place, a renovation of a Parke-Davis

pharmaceutical complex, had lunch at the Rattlesnake Club, and received a guided tour of the Detroit Institute of the Arts (DIA), where they were given in-depth explanations of the history of the DIA as well as the muraled halls that it is famous for.

On the second day of the Spouses Program, attendees went to Birmingham, a suburb of Detroit, to see the Cranbrook House and its grounds and the Cranbrook Institute. Spouses



AES Executive Director Donald Plunkett with SMPTE Editorial Vice-President Frank J. Haney.



Glen Pensinger (left) talks with General Arrangements Chairman Leonard W. Eden (center) and Chairman of the Public Relations Advisory Committee C. Robert Paulson.



General Arrangements Chairman Leonard W. Eden (standing) introducing people seated at the dais.

were treated to a catered luncheon at Cranbrook House. After lunch the group split up; part went to the Detroit Zoo while the rest shopped and saw the sights in downtown Birmingham. All spouses who participated in the program received a 25th anniversary commemorative pin. These limited-edition items proved to be so popular that Sony Corp. offered to supply identical pins to all conference attendees.

During the conference, attendees were invited to sign a get well card for former SMPTE President Carlos

Kennedy, Ampex Corp., who is recuperating from open-heart surgery. A list of the original television conference attendees was displayed in the conference lobby. Those who were also present at this year's event were urged to sign their names.

The Society would like to thank its sponsors, each of whom helped to make the conference an event that was enjoyed by all. The sponsors were AES, Allied Film & Video, American Sound & Video, Ampex Corp., Ampex Recording Media Corp., Audio Technical Corp., Shure Brothers Inc.,

Dolby Laboratories, Eastman Kodak Co., Film Craft Video, Grace & Wild Studios, General Television Network, The Grass Valley Group, Image Express, Inacom Computer Centers, JBL Inc., Odetics Inc., Panasonic Broadcast Systems Co., Premiere Video Inc., Producers Color Service, PRO-Vision Inc., Sony Communications Products, Sony Corp. of America, Sony Magnetic Products Group of America, Technicolor Videocassette of Michigan Inc., 3M Co., and WDIV/TV4.

—Carol King

Opening Address

By Frank J. Haney

Good morning ladies and gentlemen, members, and guests. Welcome to the 25th Annual Television Conference of the Society of Motion Picture and Television Engineers. Welcome also to the "Motor City." The theme of this conference, "A Television Continuum — 1967-2017," and the papers to be presented today and tomorrow should, we hope, generate much interest as to where we have been, where we are now, and where we are going in the future.

There are several unique aspects to this conference, which I believe may be of interest to you. This is the 25th of our television conferences. The first television conference was held in this very city in 1967. We are continuing with a preconference all-day tutorial seminar, a practice begun last year in Orlando. Finally a first, which we hope will further blossom in the future, is a joint SMPTE/AES session tomorrow afternoon.

The papers program was organized under the direction of Program Chairman Rudy Kryger and his supporting Papers Committee. We shall hear from Rudy in a few moments. The local arrangements were organized by General Arrangements Chairman Len Eden. For the Spouses Program we thank Chairwoman Judith Stefani.

Before we begin with the papers



Editorial Vice-President Frank Haney.

presentation, I would like to share some thoughts with you regarding automotive electronics in the year 2000.

For those of you who were present two years ago for the 23rd Television Conference, I mentioned in my opening address that the automobile was invented in 1885 by Gottlieb Daimler and Carl Benz. I went on to say that by the year 1914 the automobile had evolved into the car we drive today in every respect except for styling and electronics.

The emergence of electronics has changed the character of the automobile in myriad ways. From engine control to suspension leveling, from

instrumentation to entertainment, the "Electronics Revolution" has made a significant impact on the motorcar and promises more of the same. I should like to thank the people of the electronics division of the Ford Motor Co. for their graciousness in supplying much of the data for this address.

Let's get a historical perspective of this emergence of electronics. Automotive electronics has evolved in three distinct yet overlapping stages. Each stage began slowly, then advanced rapidly, only to flatten out again with an average age of 15 years. The first stage began in the early 1960s, the second stage in the early 1970s, and the third stage started in the mid-1980s. Interestingly enough these three evolutionary stages can be distinguished by the type of semiconductor devices in use in automobiles during each period. I suppose we could give credit to vacuum tube technology and say there was, in effect, a kindergarten stage, i.e. automobile AM radios.

The first stage saw the application of diodes, discrete transistors, and analog ICs. The second stage was brought about by the availability of digital ICs followed by 4, 8, and 16-bit microprocessors. The third stage, which has just begun, will see increasing use of smart power devices, smart sensors, and massive memories.

Let's look at each of these stages in more depth. Solid-state electronic devices were first widely used in the automobile in the early 1960s. First to

Text of opening address given at 25th Annual SMPTE Television Conference in Detroit, Mich., February 1990. Editorial Vice-President Frank J. Haney is with Capital Cities/ABC, Inc., Hollywood, Calif.

appear was the solid state AM-FM radio. Next was the alternator/rectifier. Then in sequence were the speed control, electronic ignition, and digital clock. Completing stage one was the electronic voltage regulator.

These first-stage electronic devices demonstrated that they could achieve the levels of reliability required by the automotive industry, while providing dependability and affordability to the customer. Radio failures became much less frequent than in the old vacuum tube days. Car clocks became more reliable timepieces. Electronic ignition eliminated the routine maintenance associated with changing the breaker points.

Applications beginning in the early 1970s were different in significant enough ways to define the second stage. The primary source for this new capability was the microprocessor. It arrived at a time when the industry was experiencing an upheaval. Long lines at the gas pump, clean air standards, and emission controls all created unprecedented challenges. The microprocessor provided many solutions.

This second stage was characterized by a shift from independent components to increasingly sophisticated systems, which link components together. Early stage-two electronic systems were used for engine controls. Several sensors were linked with a microprocessor, which in turn was linked to various output devices such as the ignition module. Then came driver information and entertainment applications, such as the electronic instrument cluster, trip computer, electronic climate control, and audio graphic equalizer.

Late stage-two developments made use of surface-mounted devices, which increased microprocessor speed and capacity, as well as increased memory and refined input/output methods. This in turn made possible anti-lock braking, electronic air suspension, variable assist power steering, and distributorless ignition.

Stage three, now in its early stages, is characterized by the emergence of a totally integrated vehicle electrical and electronic system. Designers are escaping from the mechanical function replacement and "add-on" approaches that have characterized stages one and two, and are seeking to optimize the performance of the total



SMPTE Editorial Vice-President Frank J. Haney and SMPTE Executive Vice-President Irwin W. Young.

vehicle through electronics. This in turn will offer the customer unprecedented opportunities to customize his vehicle. Characteristics such as ride quality, handling properties, steering effort feedback, brake "feel" information display format, and even engine power versus economy trade-offs will be under the driver's control.

Some of the early third-stage features now appearing are speed control integrated with engine control and transmission controls integrated with engine controls. These early stage-three features represent only the leading edge in the systematic integration of functions, a transition that will completely change the roll of electronics in the automobile by the year 2000.

What will this Auto-2000 be like? If we follow our 15-year cycle, stage three will be fully evolved when the cars of the 2000 model year roll off the assembly lines. It is estimated that the value of electronics for the average 2000 model year will be about 10% of the total value of the car. Today, electronics constitutes about 6% of total car value. In 1970 it was less than 1%. Since 1980 the rate of increase has been fairly constant at 0.4% per year, with no sign of topping out.

Let's explore some of the features of this turn-of-the-century automobile by taking a look at its window sticker. The first thing we see in the standard features column is "Torque demand powertrain, 4-cylinder, 16-valve turbocharged port injected with variable intake manifold geometry, distributed ignition, adaptive multimode electronic engine control."

What does all of this mean? Today when you press on the accelerator pedal you push a mechanical linkage that opens a valve, letting more fuel into the engine. Today's electronic engine control then reacts to this sudden increase in fuel and attempts to optimize engine performance. The automobile transmission in turn reacts to intake manifold vacuum in determining when shifting will occur.

With stage-three electronics the accelerator pedal will be connected only to the powertrain control module. This powertrain control module will in turn be connected to the engine and to the transmission, and will receive speed and slip data from the driving wheels. Thus you will be driving by wire.

If we raise the hood of the 2000-model-year car we'll find a lightweight (possibly ceramic) supercharged or turbocharged 4-cylinder (6-cylinder optional) multivalve engine of from 1.5 to 2.5-liters displacement. It will be equipped with multiport electronic fuel injection. The distributor as we know it today will be gone. Instead a high-voltage coil will exist at each spark plug. The system will control the engine on a cylinder-by-cylinder basis.

The information needed to manage the engine control will come from a small number of high-performance sensors. These sensors will monitor, analyze, and transmit data on fundamental engine performance parameters. Sensors beyond present-day capability will be required. Primary data will include combustion chamber conditions and exhaust gas chemistry. This data will be compared by the en-

gine controller to a performance algorithm of much greater sophistication than we have today. Then, all controlled variables will be adjusted to optimize vehicle performance according to the algorithm. This will be a great improvement over current systems that measure secondary parameters such as inlet charge temperature and barometric pressure.

Transmission and engine will be electronically controlled as a unit in response to the driver's demand for more power. Responding to engine rpm, vehicle speed, and command input from the driver, the powertrain controller will decide whether to supply torque by either increasing engine output, altering the drive ratio, or both.

Perhaps the most revolutionary new features and performance enhancements resulting from stage three system integration will occur in the area of the chassis system, that is, suspension, steering, and brakes. The growing capability of electronics in stage three will allow adaptive control of the suspension — springs, shock absorbers, and suspension geometry. These have been pretty much passive in stages one and two.

In order to control ride height, aerodynamic angle of attack, and dynamic response of the body, an electronic system will sense displacements and accelerations in the suspension system, and will control spring rate and damping independently at each wheel. A first step in this direction is known as ride height control and has been in effect for some time in certain vehicles.

For other than high-performance cars the suspension control in the 2000 model year will be "semi-active." This means that there will be continuous modulation of devices, like valves, to control shock absorber damping, but with no external power input. Some high-performance vehicles may have "fully-active" suspension systems incorporating controlled energy input from a dedicated power source. Electronic control of the suspension system will result in a marked improvement in handling quality and ride comfort.

Stage three front-wheel power steering will be by way of an electric motor controlled by an electronic module. Many cars will feature all-wheel steering. This will improve agility at all speeds and will enhance

low-speed maneuverability. Control of the rear wheels' steering angle will be electronic, changing according to the vehicle's speed as well as input from the steering wheel. Drivers of these cars will find that parallel parking is simplified, and maneuvering in tight quarters takes little effort. On the highway, lane changes will be accomplished crisply.

Braking performance will improve steadily as we evolve from present-day anti-lock braking systems. Later stage three traction control systems will fully integrate braking with the powertrain. The functional flexibility of these systems will be far greater than the simple "anti-lock" capability that's presently available. Conditions that could cause slippage will be monitored during both acceleration and deceleration. The system will modulate torque and braking inputs to provide both maximum acceleration without wheel slippage, as well as minimum stopping distance. The driver will be unable to break the wheels loose from the road under any normal driving conditions.

For some time now, the handling capability of an automobile has been beyond the average driver's skills. Advances in steering, braking, and suspension technology in stage three will allow the average driver to employ the full-performance potential of the vehicle in exceptional situations (like avoiding accidents), without subsequent loss of control. The subtle and rapid corrections needed to deal with the complex dynamic transients will be handled automatically.

In order to make the automobile of the year 2000 a reality, it will be necessary to develop new technologies that take full advantage of the flexibility of electronics. Four underlying technologies are needed.

The first of these is power management. Present-day electrical power requirements run about 1 kW and are handled within a single 12-V system. An additional 2 to 5 kW are required for the 2000 model year. This additional power, either 24 or 48 V, will be needed for the vehicle's heavy power loads such as cooling fans, steering motors, chassis hydraulic power sources, and motor-driven air conditioning compressors. Most of the vehicle's lighting and electronic products will continue to be supplied by the 12-V "low-voltage" system.

The feasibility of a dual-voltage sys-

tem will depend greatly on the development of suitable batteries. These batteries must provide high-energy density, flat discharge curves, tolerance for a variety of duty cycles, and high reliability. Battery reliability will be increasingly vital as the battery will assume the role of the backup power source for critical vehicle functions such as steering.

Battery-charging circuits will be electronically controlled. This will require new types of sensors to accurately measure the battery's state of charge. The system will include active load management to unload the engine on start-up or idle. Under such conditions, load shedding will be common and loads will be assigned different priorities as environmental conditions vary.

The next needed technology is multiplexing. The Society of Automotive Engineers has developed a multiplexed system network architecture known as the "SAE-J1850 Car Link." This network will share information with the vehicle's control computers. Each computer will place signals on the network where they will be available to other components. The processors will also receive signals from other components via the network. Sensors and actuators will have "smart" interfaces so that they can communicate with the multiplex system. In the event of failure, firmware will provide "limp-home" capability.

The third needed technology is software. Total on-board processing capability of the 2000-model-year auto will approach that of today's typical minicomputer, i.e., 1 Mbyte. The 1978 auto had an on-board processing capability of about $1/1000$ of this. The car's multiplexed network will be heavily dependent on software.

The fourth needed technology is diagnostics. Multiplexed systems together with massive memories will significantly improve service diagnostics by allowing capture and storage of large data bases. Data on vehicle performance will be accumulated, enabling a statistical projection of component life expectancy. This will greatly benefit the consumer by providing for optimally programmed maintenance, which in turn should make for fewer vehicle failures.

The automotive electronics industry is at a transition point where one level of technology has been achieved and the thrust toward a new level is

beginning. Stage three — characterized by extensive functional integration of systems — will bring great improvements to automobile performance and reliability. The 2000-model-year car, because of stage-three electronics, will have an exceptional quality level.

Is the automotive electronics industry on the verge of developing the “ultimate” automobile through the use of electronics? Certainly not. There is no

reason to believe that stage three will be the last stage in the evolution of automotive electronics.

Looking into the future, beyond the range where precise speculations can be made, will be the advent of stage four. Following upon our 15-year cycle, it should begin to take shape at about the time of the 2000-model-year car. Its character will be defined by the integration of the automobile into its external environment.

If we are to extrapolate to the year 2017, as per our conference theme, then I must say that stage five should be getting under way. One prognosticator has speculated that stage five would involve optical computers. I'm going to pass on that one.

Ladies and gentlemen, enjoy the conference, enjoy the many social functions, including our birthday party tonight. May I now present your Program Chairman, Rudy Kryger.

Get-Together Luncheon Address

By Frederick M. Remley

I am very pleased to speak to you today. This Get-Together Luncheon is intended especially to commemorate 25 years of SMPTE television conferences. By now, because you have heard the comments of our morning session speakers, most of you know that the first TV conference, then called the SMPTE Color Television Broadcasting Conference, was presented here in Detroit, in 1967. It was a joint effort of the Detroit, Chicago, and Toronto Sections of SMPTE. In addition, the second conference was held here in 1968 as well the tenth in 1977. Thus this is the fourth TV conference to be held in Detroit. I think that only San Francisco has been the host of the conference more times.

You have probably also heard that the day before the first conference a giant snowstorm engulfed the middle and eastern part of the United States and Canada, complete with freezing rain, wind, and sleet. I recall that the 35-mile drive from Ann Arbor to Detroit on the evening before the first conference day was really harrowing! Ice and snow made it a miserable experience. Travel into Detroit by air, rail, and car was difficult at best, and impossible for some registrants. In spite of all this, the first SMPTE television conference was a resounding success and drew an extraordinary 368 participants. Those who managed to

reach Detroit took on something of the attitude of “survivors.” Travel anecdotes were the most common form of coffee-break chatter.

The locale of the first conference was the Rackham Educational Center. The Rackham Center is a large facility about three miles from here, located in the Cultural Center near the Detroit Institute of Art. It was donated to the University of Michigan and the Engineering Society of Detroit by one of the early automobile industry investors. These excellent facilities were near to a reasonably good hotel (long since gone) that we used for housing those who attended the conference. Thus, even in the midst of the storm, at a time when Detroit had no effective conference facilities, let alone a Westin or a Renaissance Center, the SMPTE conference attendees were well housed and well fed.

We see that quite a large number of us attended the first conference, and several of us presented papers on that occasion. It seems delightful that so many have remained in this business for so long and that so many have survived the intervening 25 years.

Even so, we are missing some of the important participants in the first conference. Howard Town was the real originator and driving force behind the 1967 conference and he was its general chairman. Howard died more than a decade ago. Ted Horn, another stalwart of the Detroit Section, was with us until about a year ago. Ted's wife Herta, a past-manager of the Detroit Section in her own right, is with us today and we especially welcome

her. We miss Howard and Ted very much. We recognize, probably more than ever on the occasion of this 25th Conference, the contributions that they made to our Society and to the Detroit Section.

But why was that first conference held, and why in Detroit, and why in the winter? In the next few minutes I want to tell you something of the genesis of the conference and to put it into historical perspective. At the first conference 25 years ago, TV technology was already about 25 years old, although it had been an important medium of communication for most of us for little more than 15 years. World War II had delayed wide-scale introduction for nearly a decade. So, the TV conference has existed for half of the period of existence of TV itself. However, TV technology, like technology as a whole, has advanced at an accelerating pace. More advances by far have been made in television technology over the past 25 years than were made over the first 25 years.

At the time of the first conference, vacuum tube equipment was still common in most TV studios. UHF television was in its youth. NTSC color broadcasts were mainly limited to the NBC network, with a small number of programs on CBS and a handful of the more affluent local stations. In fact, the genesis of the 1967 conference was the realization that the years of pioneering work of NBC and RCA were really beginning to pay off. An explosive growth of color broadcasting was just beginning. But, at the same time, most engineers in broadcasting

Text of address delivered at Get-Together Luncheon at 25th Annual Television Conference. Frederick M. Remley is with the University of Michigan, Information Technology Div., Ann Arbor, Mich.

were not adequately trained in NTSC color technology. There were many worried engineers around the country wondering how to find the information they needed to meet the challenges that color TV broadcasting brought to their stations. Two decades later the digital revolution brought similar concerns to those in broadcasting.

In the mid 1960s there were horror stories about isolated stations that were 180° out of phase with the rest of the world, the proverbial blue banana stories, and so on. In fact, because Howard Town had spent many years as an RCA field service engineer, he had a large collection of anecdotes based on his real-life experiences with the initial conversion of TV facilities to color. He had gathered the stories during his work both at large network studios and at small local stations with no color monitoring equipment at all. He very much enjoyed using his yarns to emphasize the importance that he placed on education.

The idea of a practical, informative color television conference was conceived by Howard in 1966. He was then a manager of the Detroit Section and an SMPTE Governor. His occupation was that of vice-president for engineering of National Educational Television (NET), located in Ann Arbor. NET was a direct predecessor organization to PBS, the Public Broadcasting Service.

Howard's vision of the conference derived directly from his experience in organizing workshops and seminars for broadcast engineers who worked at so-called educational television stations affiliated with NET. Today we call this same group of stations public television stations. This terminology came in the 1970s, when the main focus of educational television moved away from Ann Arbor and Madison and Lincoln and Champaign/Urbana to New York and Washington and Boston.

There were very good reasons for Howard Town to propose that the Detroit Section should organize the first SMPTE television conference. In the early 1960s, NET had installed a monochrome Ampex VR-1000B quadruplex videotape recorder at each of the 40 or so educational TV stations then operating. The large project was mainly funded by the Ford Foundation, with small contributions by the stations themselves, mostly to



Get-Together Luncheon Speaker Frederick Remley with his wife.

pay for proper installation of the equipment. The purpose of the project was to allow a national videotape duplication and distribution system to be established, the first in the world. At that time no better means for nationwide interconnection of educational TV stations was feasible. AT&T could not supply suitable video circuits and NET could not have afforded them even if they had been available.

Howard had been charged by the president of NET to develop a videotape distribution system that would replace the infamous kinescope recordings that all old-timers knew and learned to hate. The "kine" recording process all too often exhibited the worst features of both the film and the television imaging systems. I know this for a fact because I made hundreds of kine recordings myself and found the technical challenge to be so frustrating that I joined SMPTE in the 1950s to learn what I could about the system. Howard's new videotape system provided much higher program quality for the national NET audience. It also looked ahead to the time when color programming would be available for videotape distribution to NET affiliated stations.

NET had promised the Ford Foundation that it would provide training in the new videotape technologies to two technicians from each station, and Howard had an ongoing commitment to provide workshops and seminars for this film and tape network. After the first round of training it became apparent to him that color television programming was finally expanding. It was time to train all TV engineers on

the details of color television.

Let me note also that more than six years of successful, high-volume NET videotape duplication and distribution passed before PBS was established and an interconnected network was put into service. And it was another four or five years before PBS began satellite program distribution. When it did come, of course, the PBS satellite system was also the first of its kind in the world and was fully as pioneering an effort as had been the establishment of the videotape distribution system.

You can imagine, I'm sure, that it was not easy to convince the managers of the Detroit Section that the ambitious idea of a national color TV conference was feasible for the small, 160-member section. But Howard was a convincing advocate and the Detroit managers promised to support the effort. In 1966 we sent a proposal to the SMPTE Board of Governors. Back in those days SMPTE had two national conferences a year. There was a large fall conference on the East Coast, which attracted many television papers. In an even larger spring conference on the West Coast, most of the film papers were presented. SMPTE had not yet elected a president with roots in the television industry. Most of the national officers were film experts. So the addition of a specialized television conference in February raised some concerns, especially since NAB and the SMPTE spring technical conference would follow shortly afterwards. But in the end Howard Town prevailed, and after considerable debate the Board of Governors approved the conference, as a one-time experiment.

Because of Howard's untiring efforts, important backing was obtained from many sources. Especially and crucially CBS, Ampex, and RCA came forward. Howard Chinn and Dick O'Brien of CBS Engineering promised to provide papers for the program and to urge others to participate. The papers did come in and they were of good quality. I believe that I had the title of program chairman for the conference, but everyone worked in close harmony on all the elements of the project.

In the 1960s, just as now, Detroit had a long term, strong involvement in advertising and industrial media production. The key people in the Detroit film production industry saw the im-

portance of television in their future. They provided the support of their best people to this significant effort. To this day, the important role Detroit plays in production and post-production reflects the same kind of enlightened leadership that our local industry enjoyed in 1966.

The roots of this conference, then, lie in education and training. The TV conference has consistently focused its technical programs on the practice of television technology, rather than on the theoretical aspects of the medium. It is interesting to think back to the technical setting for the first conference. The television systems that we discussed here in Detroit in 1967 were far different from those of today. Then, color programs were a scarce commodity. Color videotape recording had been really satisfactory for only a few years, dating from the advent of the Ampex VR-2000 and high-band recording. No broadcast-quality helical videotape recorders were on the market; quadruplex was king. The only time-base correctors available were analog — Amtec/Colortec/Intersync and the RCA ATC and CATC equivalents. These are names of the past.

Videotape editing was primitive, and no digital video systems were available for special effects or editing or much of anything else. There was no SMPTE time and control code. Very few computers were in use in broadcasting, although CBS had already installed an industrial process control computer to handle some of its network master control switching. Cameras in most local stations were still monochrome, and most of them used image orthicon pickup tubes. The local stations provided color programs from network feeds, but not very much local color production yet existed outside of the large cities. Post-production was a television term not yet invented.

Lead oxide pickup tubes were relatively new to the market in 1967 and were very much admired for their sensitivity and lack of image artifacts. Even so, many color broadcasts were produced with image orthicon cameras. A great debate was continuing about whether or not camera designs should use three or four tubes. The most successful lead oxide cameras then in use, made by Philips, used three Plumbicons®, but GE had produced a quantity of four-tube cameras

as well. At the first TV conference, we heard Henry Kozanowski, the dean of American camera designers, from RCA in Camden, explain his philosophy of camera design, including his opinions about three versus four tubes and his likes and dislikes of image orthicon and vidicon-type camera tubes. His talk was an education for all of us.

In 1967, nearly all of the automobiles on North American highways had been designed in Detroit. Most professional broadcast equipment was manufactured in North America or in Europe. All of the broadcast video recording equipment in North America, and in most of the world, was made in the U.S. How greatly the situation has changed in the intervening years, even as our TV conferences continued. For example, beginning with the EIAJ-Type 1 and the U-matic® video recorders, we saw Japan begin to emerge as a global influence in producing video equipment. After those early recorders came the 1-in. machines that in the 1970s pushed our industry toward the SMPTE Type-C format — and even later toward the strongly Japanese-influenced D-1 and D-2 formats. Today Japan has a strong position in the professional video recording field. The same can be said of the Japanese influence on camera pickup tube design and CCD camera sensor design. And, of course, the consumer video recording field has belonged to Japanese companies virtually since the beginning. This Japanese influence, coupled with the well-known lag in present-day North American manufacturing technology, has created in 1991 quite a different lineup of equipment suppliers in our industry.

Today, European and Asian manufacturers are commonly suppliers across the entire range of studio and transmitter equipment. Some of the old North American companies we knew in 1967, television pioneers such as RCA and GE Broadcast, have disappeared. Others continue to provide high-quality equipment just as they did 25 years ago, including such old timers as Ampex, Grass Valley, and Dynair.

The television conferences have also witnessed the coming of many dramatically new technologies over the past 25 years. Cable television systems and the satellite distribution of programs have revolutionized the network television business. It is as com-

mon to view CNN in a good Tokyo or Paris hotel as it is in the Westin here in Detroit. In fact, the world now watches television as a primary source of news, most of it gathered with ENG equipment that was first described in SMPTE conference papers and first published in the *SMPTE Journal*.

An important step toward worldwide standardization of digital video technology was taken in the 1980s and resulted in CCIR Recommendation 601, with very active SMPTE participation in the creation of the standard. The first dialogues leading to Recommendation 601 were held in panel discussions and committee meetings at SMPTE television conferences.

Further important changes in television technology are in the offing. At present, HDTV and other advanced television systems are absorbing much of our technical energy. The problems of the world economy face us, together with problems related to the future of consumer electronics manufacturing in North America, the difficulties of designing and building new, large screen color displays, the development of new consumer and professional digital video recorders, and a myriad of other challenges. In addition, there are fewer skilled TV station engineers today. Automation has made many broadcast engineers redundant, as has the stability of digital circuitry and the shift of production out of the TV studio into post-production houses. Change has become the way of life in broadcasting and video production.

Having heard all of this, it would be reasonable for you to ask if anything in our lives has not changed. I can list three items that remain as strong and effective today as they were 25 years ago, the time of the first TV conference. First is the SMPTE dedication to engineering excellence and to the preparation of standards that are important to our industry and to the standardization of the television systems of the entire world. Then, there is the untiring helpfulness of SMPTE's professional staff and elected officers. Finally, there is the spirit and the dedication of the members of the Detroit Section. It is the Detroit people who have made this conference possible, both in the beginning and today. I think we all owe the Detroit Section a round of applause in gratitude.