1985 NCTA ENGINEERING COMMITTEE SUBCOMMITTEE ANNUAL REPORTS

Robert A. Luff - 1984 & 1985 NCTA Engineering Committee Chairman

Wendell H. Bailey, Jr. - NCTA Staff Liaison

INTRODUCTION

The National Cable Television Association (NCTA) has, since 1952, represented the diverse and growing cable industry before Congress and Federal agencies, in courts of law and before state regulatory agencies. As the principal trade association of the U.S. cable television industry, its members comprise cable television system operators, equipment manufacturers, program suppliers and several ancillary service providers.

Members are provided with forums (notably committees and this annual convention/exposition) where they may exchange information on developments in the industry and maintain liaison with other industries, societies and groups. The NCTA Engineering Committee is one such forum. Two-day, bi-monthly meetings held mainly at NCTA's Washington, DC headquarters, attract 50-60 top level member and non-member cable engineers from all over the country. Subcommittee chairmen reports form an important segment of each agenda.

STAFF AND SUBCOMMITTEE FUNCTIONS

To the extent that it is able to identify issues of common concern to members, NCTA strives to propose or recommend ways to address these issues. The NCTA Engineering Committee, its subcommittees and staff liaison department -- Science & Technology -- play a vital role in this continuing process. When an area of concern has been pinpointed, the Engineering Committee will most frequently turn to or create a subcommittee to address the concern. Following the compilation and analysis of a combination of original testing/research, literature reviews and survey results (every effort is made to solicit technical input from all affected interests) subcommittees report their findings to the Engineering Committee. The Committee then reviews and approves final documents and/or recommendations before NCTA acts on them -- in some cases, publishing and distributing a printed product -- though, as you will read in the following ten annual reports, often a subcommittee fills an educating, liaison or monitoring function for the Committee and no published documents result.

CHARTER

The policies of the National Cable Television Association are determined by the Board of Directors. To assist in policy formulation in technical areas, the Board establishes an Engineering Committee. The duties of the Engineering Committee are:

1) To respond on a timely basis to Board requests for advice and recommendations on technical matters.

2) To forward to the Board advice and recommendations on technical matters which the Committee perceives as having an effect on the policies of the Association.

3) To advise the Board of technical developments and innovations which the Committee perceives as having an effect on the policies of the Association.

4) To advise the Board of technical developments and innovations which the Committee perceives as having an effect on the future courses of the cable business.

5) To assist the technical staff of the Association as requested.

6) To represent NCTA by establishing liaison with international and national technical groups.

The activities of the Committee shall include, but not be limited to:

1) Regular review of FCC dockets, Notices of Inquiries, Notices of Proposed Rulemaking, etc., having impact upon the technical operation or construction of cable television systems.

2) Liaison with appropriate outside technical organizations, associations and professional societies.

3) Liaison with international organizations, associations and professional societies whose work may have an impact on the industry.

Membership on the Committee shall be open to all technically oriented employees of members of the National Cable Television Association who are interested in the work of the Committee. The Chairman of the Board of NCTA appoints the Chairman of the NCTA Engineering Committee. Individual voting members are then appointed by the Chairman of the Board of NCTA after consultation with the Chairman of the Engineering Committee.

Notice of meetings shall be sent to all members of the Committee and also sent to each member of the Association for forwarding to technically oriented employees. Attendance is open to all members of the cable industry's engineering community who are NCTA members.

ACKNOWLEDGEMENTS

Participation in subcommittee work and Engineering Committee meetings are some of the cable engineering community's most challenging but rewarding endeavors, requiring unusual professional dedication and acumen. NCTA's Science & Technology department joins Engineering Committee chairman Robert A. Luff in applauding subcommittee chairmen and members for unstinting and outstanding service to the cable industry.

-1986 NCTA Technical Papers editor, K. Rutkowski-

For further information about the NCTA or Engineering Committee, call (202)775-3637 or write to the Science & Technology department at NCTA, Washington, DC.

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Annual Reports

1. Joint ARRL/NCTA Signal Leakage Committee
2. Standards For Good Engineering Practices Subcommittee
3. Consumer Interconnect Subcommittee
4. Signal Leakage Subcommittee
5. Signaling & Control Subcommittee
6. Networks and Architecture Subcommittee
7. Satellite Transmission Standards Subcommittee
8. Multichannel Television Sound Subcommitee
9. Digital Television Sets Subcommittee
10. Joint EIA/NCTA Engineering Committee

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JOINT ARRL/NCTA SIGNAL LEAKAGE COMMITTEE

Robert V.C. Dickinson, Chairman

CHARTER

1. Develop low cost measurement techniques for cable leakage. Publicize these techniques in both amateur and cable circles.

2. Quantify problem under various field conditions.

3. Develop cooperative techniques and demonstrate effective procedures through working with a test cable system. Publicize these results and foster a cooperative spirit in continuing leakage correction and maintenance efforts.

4. Assist, if requested, to resolve unusual cable leakage problems.

5. Membership shall consist of Chairman, Secretary and four members from each group.

1985 ACCOMPLISHMENTS

To date, two meter calibration equipment has been developed and given limited publication in the ham radio magizine QST [per charter item #1]. Charter items 2 and 3 were addressed in tests conducted in 1984 though more exposure needs to be given to these results. Individual committee members regularly assist in special leakage problems.

Overall, the activities of the Committee in 1985 were somewhat limited. The majority of the activity consisted of individual consulting on technical cable leakage matters, plus some field testing. The field testing was aimed at course quantification of cable system vulnerability to amateur radio ingress below 30 MHz. The testing which has been done was a good start, however, several follow-ups on test exercises will be required before any publishable data is available. Members have also worked with the ARRL in editing certain ARRL publications and have assisted in handling some for the amateur complaints within the cable industry.

1986 PLANS

The program for the coming year will consist of further high frequency testing and publication of related matters to both amateur and CATV communities.

The meetings and activities of this committee are open to parties with constructive interests in this area.

STANDARDS FOR GOOD ENGINEERING PRACTICES

Michael F. Jeffers, Chairman

CHARTER

To determine the best method (or methods) for measuring parameters that can ascertain the proper operation of a cable system and to establish performance criteria for good engineering practice. Further, to publish this information in the NCTA Recommended Practices Manual. Formed: June, 1976

1985 ACCOMPLISHMENTS

Practices submitted for incorporation into the NCTA manual during 1985.

1) Graphic Symbols

2) Carrier-to-noise - CATV Systems.

3) Carrier-to-noise - (CATV) vs. Video Signal-to-Noise

4) Cross Modulation - CATV System

1986 PLANS

A Subcommittee meeting was held in November, 1985, to commence practices for coaxial cable. Four practices will be added to the NCTA Recommended Practices in 1986.

SIGNAL LEAKAGE SUBCOMMITTEE

Frank Bias, Chairman

CHARTER

Perform the following regarding signal leakage from cable TV systems: 1) Study the engineering parameters. 2) Recommend policies to the NCTA Engineering Committee. 3) Recommend construction and operation practices. 4) Liaison with ARRL Subcommittee. Formed April, 1976.

DOCUMENTS PRODUCED

Assisted in preparation of NCTA's opposition to ARINC Petition for Reconsideration and Reply to ARINC opposition to NCTA Petition for Reconsideration in Docket 21006.

Report of working group on sources of cable system leakage submitted and accepted.

Assisted in preparation of NCTA comments in FCC Docket 85-301 Cable Terminal Devices.

Assisted in preparation of NCTA comments in Docket 85-38 Cable Deregulation.

WORK PLANNED

Participation in signal leakage portion of upcoming FCC action separated from Docket 85-38 Cable Deregulation.

CONSUMER INTERCONNECT SUBCOMMITTEE

David Large, Chairman

CHARTER

The Consumer Interconnect Subcommittee is a new addition to the NCTA this year. It was formed to study and recommend short-term solutions to the problems caused by connecting increasingly complex customer video entertainment equipment to cable systems. Its function is separate from the joint NCTA/EIA engineering committee and the various EIA committees which are all working in various ways on longer-term solutions in that the latter are dependent on changes in new equipment designs while this committee is concentrating on accommodating the existing base of installed equipment.

MEMBERSHIP

The official membership of the subcommittee includes representatives from 10 MSO's and 7 equipment manufacturers plus program suppliers and industry consultants. Meetings are held irregularly as required, but most work has been done independently by members with telephone consultations as required.

HISTORY

The consensus of the group was that we should narrow our initial concerns to issues raised by connection of descramblers, VCR's and one or more television sets (which may have extended range tuning). To that end, information was gathered from over 20 MSO's on current practices with their own subscribers. Commercially available integrated switching boxes were also evaluated and ideas solicited for new approaches to the problem.

At the October, 1985 meeting, an outline for a formal report was approved. This report will contain a tutorial on interconnection issues, an indexed list of the most useful configurations using splitters and A/B switches, a model specification for an integrated configuration and discussion of alternate approaches. Appendices will cover the work of other industry groups and discuss the shielding/ingress/egress issue. As of December, 1985, this report had not yet been issued.

Future directions of the committee may include baseband audio and video interconnections, stereo television (both BTSC and out-of-band systems) and/or off-premise equipment.

SIGNALING & CONTROL

Scott Tipton, Chairman

CHARTER

To evaluate current and recommend future design goals and implementation procedures for signaling and control of various devices in cable systems via satellite. Formed: May, 1982

ACCOMPLISHMENTS

Prepared a six-page report outlining present industry needs and future requirements for signaling and control of commercial insertion devices titled: "Tone Recommendations". Report was based in part on responses to an industry survey distributed in 4th quarter, 1982. Since its issuance in March, 1984 the Tone Recommendations (2nd rev.) have been widely adopted.

1986 PLANS

Though this subcommittee is currently a group in search of another problem to solve, the NCTA Engineering Committee has asked that the chairman and members (whose company affiliations comprise a balance of MSO and programmers) sustain an "industry education and monitoring" function.

SATELLITE TRANSMISSION STANDARDS

Howard L. Weinberger, Chairman

CHARTER

To follow developments and issues related to satellite common carriers, FCC policy, or up/down link transmission state-of-the-art, and to report on these areas to the full NCTA Engineering Committee. To assist the NCTA staff and the Engineering Committee in developing responses and/or activities to deal with developments in the above mentioned areas. [subcommittee first organized in 1980]

ACTIVITIES IN 1985

The subcommittee was identified as the focal point for reporting interference problems related to reduced spacing between satellites serving the cable television industry. No significant problems have been reported.

ACTIVITIES FOR 1986

To monitor proposals for the FCC to require tagging TV uplink transmissions with an ID code in order to facilitate rapid resolution of accidental interference to other uplinks.

NETWORKS AND ARCHITECTURE

Geoffrey W. Gates, Chairman

CHARTER

This subcommittee, formed in May of 1982, is charged with studying all aspects of data transmission on cable television based media. Technologies and services which are likely to impact the cable television industry will be evaluated and the projected nature of the impact will be reported to the NCTA Engineering Committee along with recommendations for action. The subcommittee is divided into three working groups:

Cable Media, chairman: Archer Taylor
Issues: Spectral usage, gaussian noise, ingress, cross-coupling between upstream and downstream, delay, effects of signal processing, frequency allocation and network topology.

Logical Protocols, chairman: H.W. Katz
Issues: Performance of existing protocols, support (VLSI) for protocols, survey of currently used protocols.

Data Communications Services, chairman: Lawrence Lockwood
Issues: Monitor and report on regulatory actions potentially.

DOCUMENTS PRODUCED

1. Characterization of Cable TV Networks as the Transmission Media for Data -- Working Group [Archer Taylor, chair] Cable Media
2. "Existing and Evolving New Data Communications Services" -- Working Group [Lawrence Lockwood, chair] Data Communications Services

CURRENT STATUS

In May, 1985 the chairman recommended that the subcommittee on networks and architecture be dissolved upon acceptance of its final report. The Engineering Committee voted to maintain the subcommittee and its working groups as a standing subcommittee, to work toward increased member participation/support, and charged IEEE liaison, Lawrence Lockwood, with heightening interface between the Engineering Committee and one or more of the IEEE 802 standards groups.

MULTICHANNEL TELEVISION SOUND (ad hoc)

Alex Best, Chairman

CHARTER

To investigate the technical implications of the carriage of BTSC (Broadcast Television Systems Committee) multichannel sound over cable systems. Formed: August, 1982.

DOCUMENTS PRODUCED

1) Multichannel Television Sound Report -- National Cable Television Association

2) Multichannel Television Sound NCTA/EAC Subcommittee Test Plan -- Submitted to Wendell Bailey by Alex Best on behalf of the NCTA multichannel sound subcommitee.

3) Multichannel Television Sound -- Technical Implications for the Cable Television Industry -- A report submitted to Tom Keller (Chairman of the EIA BTSC Subcommittee) from Alex Best on behalf of the NCTA multichannel sound subcommittee.

4) Multichannel Television Sound -- A letter from Alex Best to Tom Keller outlining a test plan to be conducted by the EIA BTSC Subcommittee on behalf of the NCTA.

ACCOMPLISHMENTS IN 1985

The subcommittee is presently acting in a monitoring, educating, and data gathering mode. The education takes the form of presentations at trade shows and SCTE functions. The monitoring and data gathering takes the form of soliciting inputs from cable operators who are carrying BTSC sound on their systems.

PLANS FOR 1986

In 1986 the subcomittee will continue in its present mode of operation.

DIGITAL TELEVISION SETS (ad hoc)

Nicholas Worth, Chairman

CHARTER

This group's charter was to investigate digital television technology to determine whether or not new TVs employing ITT chip sets (or their equivalent) can easily defeat sync suppressed scrambled signals. And, based upon findings, to report to the full Engineering Committee, make recommendations for preventive measures and to follow through on said recommendations. Formed: August, 1984. Disbanded May, 1985.

ACCOMPLISHMENTS

In the fall of 1984 the digital TV set subcommittee completed extensive tests demonstrating that a television set employing the ITT Digit 2000 chip set can, if externally manipulated, defeat sync suppression scrambling. A report on the group's findings was presented to the Engineering Committee in November, 1984. The Committee then empowered the subcommittee to work with NCTA staff and draft a letter to television set manufacturers pointing out the concerns of the cable industry and requesting that the manufacturers not allow easy access to the data bus for the purpose of forcing the chip set into the countdown mode.

It appears that the cable industry's concerns have been taken into account by set manufacturers -- the Engineering Committee disbanded this ad hoc subcommittee in May, 1985 commending the chairman and his members for a job well done and a charter fulfilled in a timely fashion. It was suggested that the joint EIA/NCTA committee take on the monitoring/tracking function that the digital TV set subcommittee would have maintained had it remained a standing subcommittee.

JOINT EIA/NCTA ENGINEERING COMMITTEE

Robert M. Rast, Chairman
Walter S. Ciciora, Vice-Chairman

CHARTER

To establish and maintain dialogue between the cable and consumer electronics industries for the purpose of studying and resolving engineering matters of common interest. Date formed: 1982

1985 ACCOMPLISHMENTS

RF Cable Interface

The Committee's RF Cable Interface Working Group, chaired by Walt Ciciora, finalized a RF Cable Interface Interim Standard. This technical standard applies to the RF interface between a CATV cable and a subscriber's device which tunes television channels, such as a television receiver, VCR or cable converter. This standard, in combination with a previously approved channelization standard, and a decoder interface standard, discussed below, are intended to foster compatibility between cable systems and subscriber devices connected to the cable. The RF Cable Interface Interim Standard was endorsed by the NCTA Engineering Committee and is being submitted to members of the EIA R-4 Committee for approval by mail ballot. Upon approval, it will become an EIA interim standard.

DECODER INTERFACE

The last of the three standards developed to foster compatibility between cable systems and consumer electronics devices is the Decoder Interface Standard. This standard was finalized during 1985 by the Decoder Interface Working Group of the EIA R-4 Committee. While it was not directly an activity of the Joint Committee, members of the Joint Committee attended meetings and contributed to the standard. In addition, ATC hosted three field tests, in Denver, during which consumer electronics and cable hardware manufacturers jointly tested products incorporating the new interface. The Decoder Interface Interim Standard is being submitted to members of the EIA R-4 Committee for approval by mail ballot. Upon approval, it will become an EIA interim standard.

1986 PLANS

CABLE COMPATIBILITY STANDARDS SUPPORT

Although the work is essentially completed, the Committee will provide whatever support will be required for the three cable compatibility standards discussed above.

NEW ACTIVITY

Through the RF Cable Interface Working Group, the Committee has begun to address what new activity should be undertaken. The leading candidate is an investigation of scrambling and addressability approaches, practices, and needs to determine whether there is an opportunity and a need for a common definition of parameters, and possibly, standards.

RF CABLE INTERFACE AND DECODER INTERFACE WORKING GROUPS

Walter S. Ciciora, Ph.D.
Vice President, Research and Development

AMERICAN TELEVISION & COMMUNICATIONS CORPORATION

INTRODUCTION

Standards committee progress is often painfully slow. To a newcomer, especially someone accustomed to the "fast lane," this activity can be quite frustrating. There are several points to be made about this. Firstly, if cable interface and decoder interface standards were easy to achieve, they'd have been agreed to a long time ago. There's been pressure for an extended period of time. Secondly, the issues being settled are delicate points involving trade-offs which impact the economics and performance of two industries. These two industries have a history short on cooperation and long on confrontation. Fortunately, the trend toward cooperation is on the up swing.

At first blush, it would seem difficult to find two industries with more reason to cooperate than the Cable Television Industry and the Consumer Electronics Industry. Better pictures should enhance satisfaction in cable service and better choice should increase the desire for quality images. Most of the difficulties to date have been due to a lack of information and misunderstanding. Open, honest, and frank contacts should be helpful to all.

STRUCTURE

In 1982, the National Cable Television Association, NCTA, and the Electronic Industries Association, EIA, formed a Joint Engineering Committee to discuss technical issues which impact both industries. The first order of business of that committee was to create a channelization standard for frequency assignment. After considerable debate, the committee recommended the plan which became an EIA Interim Standard for one year. It has recently emerged from this probationary phase to become an official recommended standard.

It is important to note that these standards are voluntary standards. Neither the NCTA nor the EIA have enforcement powers. Adherence to the standard depends on the good faith of the companies involved.

After the channelization standard, two Working Groups were formed to consider an RF cable interface standard and a decoder interface standard. Shortly after formation of the Decoder Interface Working Group, it was discovered that the EIA R-4 Group had its own decoder interface group. Seeing little point in duplication of effort, the Joint Committee decoder working group disbanded.

ATTITUDES

An important reason for the successes of the Joint Committee has been a change of attitude on the part of the participants. In the past, cable/consumer electronics relations were marked with finger pointing and name calling. Very important technical trade-offs were the focus of arguments which had significant economic impact. This behavior has been replaced with a realization of the importance of customer satisfaction. The customer/subscriber must be satisfied if the two industries are to prosper. It is pointless to try to shift blame. The customer/subscriber demands satisfaction from both industries.

A significant step in the right direction has been the relaxation of what has been called the "70dB syndrome." In the past, the cable industry has tended to demand that any potentially harmful phenomenon be suppressed by 70dB. The consumer electronics industry has become offended by this approach since this degree of suppression is difficult to measure for most parameters and impossible to achieve in practice. The result has been near zero progress.

The "70dB syndrome" has been replaced with a much more reasoned discussion of actual problems. A phased approach has been recommended which sets achievable targets, timed to cover frequencies ranges as they are implemented in the cable practice over time. When a cable representative believes there is a need for a specification which the manufacturers feel can't be presently achieved, a tutorial is included. This motivates the manufacturers to strive for solution in future designs.

The defensive guards have been lowered and technical people are listening to one another in open dialog. People are trying to understand each others problems and accommodate.

Occasionally, a new member joins the committee and makes moves in the old ways. The committee brings the newcomer in line and progress resumes.

THE RF CABLE INTERFACE WORKING GROUP

The RF Cable Interface Working Group's major concern is the Cable Compatible Consumer Product, such as the Cable Ready TV. The committee very quickly got over the issues of connector type, impedance, and signal levels. A more serious problem has been Direct Pick Up, DPU, of broadcast signals.

The committee has taken voluntarily committed receivers and measured them in a T.E.M. (Transverse ElectroMagnetic) cell. The tests were funded by the EIA, and each participating manufacturer received data on his products. A non branded table of data was supplied for committee use. Sets ranged in performance from satisfactory behavior to sets with considerably lower levels of tolerance. Manufacturers have been carefully considering the art of radiation immunity as it applies to their products. Progress has been made.

The committee has agreed upon an Interim RF Cable Interface Standard and has gained the approval and endorsement of its parent groups.

The most significant aspect of this new standard is a ten times increase in the direct pick up specification. Under this new standard, a complying product must not show noticeable degradation of performance in the presence of broadcast electromagnetic fields having a strength of one volt per meter. The previous specification came from the Canadian standard and was based on one tenth of a volt per meter. It is expected that the new standard will cover 80% to 90% of all cable DPU problems. The remainder will require a converter to completely solve the problem.

It is important to realize that the TV receiver manufacturers have taken on a significantly greater burden with this new standard. This level of performance will be difficult to achieve. However, the customer/subscriber will benefit. This achievement demonstrates that two industries can work together to resolve difficult issues when a cooperative approach is employed.

Cable converter product has also been measured in T.E.M. cells. The goal was to understand techniques for implementing the converter's seemingly better performance.

A reoccurring problem in this committee work is the separation of performance standards from interference standards. It is felt that the regulation of performance is best left to the market place. However, the control of interference is a bona fide standards matter. Four kinds of interference have been considered in order of increasing severity: 1) Interference with the product's own performance 2) Interference with other products in the same home 3) Interference with other subscribers' reception. 4) Interference with other users of the electromagnetic spectrum, such as aircraft navigation and communications radio.

THE LONG TERM FUTURE

The logical conclusion for the trends in CATV home terminals is for subscriber ownership. This is the best outcome for nearly all concerned. The subscriber has his favorite hardware relationship, ownership. Unlike his European cousin, the US TV receiver user has historically preferred ownership to rental. The same should apply to the decoder hardware. This will especially be the case if he can own the tuner, remote control, and other convenience features as part of the bargain. These later goals are achieved by having the descrambler come after the TV receiver's tuner. There are two ways of accomplishing this. One way has a "decoder interface plug" on the back of the TV receiver (or VCR, etc.) into which the subscriber owned (or leased) descrambler fits. The second method is to build the decoder directly into the receiver by the receiver manufacturer. The latter will happen if there is a de facto or actual decoder standard which would permit free movement from cable system to cable system. If this is not achieved for what ever reason, then plug-in, re-sell, or swap devices will be required.

The principal entity which is disturbed by this approach is the manufacturer of home terminals who doesn't also make TV receivers. He sees more than half of his "value added" eliminated. But from the bigger picture, the waste and inefficiency of having a tuner, remote control circuits, and related components in the home terminal, only to have them duplicated in the TV receiver, is undesirable.

From the cable operators' point of view, the program protection method must insure that subscribers cannot defeat the system and receive the programming for free. Another interested party in all this is the programming producers. If they believe their product can be stolen, they will not make it available to the cable operator. The cable operator realizes that the would-be pirate has nearly unlimited time and resources at his disposal. The system which meets this test will be robust indeed. Once this assurance is obtained, the cable operator will gladly give up the capital requirements caused by the need to supply the descramblers. The money would be better invested in more programming, service-enhancing facilities, or home terminals that provide new services to subscribers.

THE DECODER INTERFACE WORKING GROUP

The Decoder Interface Working Group is not a Joint Committee effort, rather it is entirely an EIA activity. In spite of this, there has been significant friendly dialog between the two industries. Cable participation in this committee work has been welcomed. Specifically, there have been cable industry contributions to the design and testing of the interface plug.

The Interface Plug is also called the Cenelec 20 pin plug. Even with twenty pins, the committee wished it had more! Red, Green, and Blue, RGB, as well as composite video in and out are provided. A data line pair to communicate logical instructions such as EIA Homebus signals, has been provided. At some day in the future, it will be possible to connect consumer electronics products to a master home system. Fast blank for text insertion and decoder restored sync input pins are provided. Devices with the interface plug are intended to be "daisy chained." That is, devices may be designed in such a matter as to be connected in series, allowing interaction between devices and an extension of product into an easy to use, consumer friendly system.

The most serious and controversial issue

regarding the interface plus is automatic gain control, AGC, design philosophy. AGC has two modes of operation with strongly conflicting demands, acquisition and stable operation. The circuit time constants must be different for these two modes. Additionally, the AGC time constants of the cable converter and television receiver must be significantly different so one is dominated by the other. If the two time constants are close together in value, oscillations may result. The problem is that some receiver manufacturers are using long time constants while others have decided upon short time constants. An important difficulty to appreciate is the fact that in scrambled mode, most systems suppress horizontal sync pulses. For decades, television AGC design philosophy has depended on finding and accurately measuring sync pulse parameters. The two processes are in fundamental conflict. Without sync pulses, there is a tendency for the amplifiers to increase gain and saturate. This crushes the signal and insures that sync pulses will never be found. This "lock-out" condition is a disaster which must be avoided. It is most complicated in systems which suppress sync pulses in the vertical interval as well. This phenomenon is extremely non-linear and not well understood. Some engineers insist that there is no theoretical basis for these systems to ever work! They claim that each time the system achieves synchronization and decoding, a fortunate electrical accident has occurred!

One serious complication is the fact that AGC expertise in television receivers is a scarce resource. There are probably less than twenty experts in the entire world. The subject is very complex with almost no published technical literature. Engineers become experts in this field through years of apprenticeship to an existing expert. A second complication is that competitive performance between manufacturers' products is largely determined by AGC characteristics. To someone who appreciates this, the committee interactions take on a whole new dimension. There is the careful guarding of secrets, the pained release of just enough information to make the interface plug system work, but the anxiety that too much may have been revealed to a competitor.

The Decoder Interface Working Group has had three field tests in ATC's cable systems in Denver, Colorado. Several TV receiver manufacturers and several decoder manufacturers participated with varying, but basically very good, results. The level of success exceeded expectations and re-energized the committee. At least one receiver manufacturer's engineers formed a strong alliance with a decoder manufacturer's engineers. Extensive cooperation and mutual sharing of information has resulted in a raising of the potential for success of these two companies. At least one other manufacturer took a very unfriendly, parochial approach in the first test which offended the other participants. This has caused embarrassment to others at that company who have worked long and hard at trying to establish a record of cooperation and leadership. By the second test, this was corrected.

The best indication of the success of the field tests has been the lively interchange that took place afterwards, resulting in significant improvements in the proposed standard. The most interesting improvement at the time of this writing is the proposal of an AGC time constant control pin which would yield control of the time constant to the decoder.

Current tests have concentrated on base-band scrambling schemes because the interface plug connections do not include RF signals.

Committee agreement on the interim standard was achieved by year end. The parent group approval process has begun.

First availability to TV receivers incorporating the interface plug will likely be in late 1986.

THE COMMITTEE PROCESS

The committee has a life cycle of its own. At first there is a small group of attendees trying to make it happen. Slowly the group expands until so many attend that it's difficult to get anything done. After several months, those low on patience cease to attend. Decision-making picks up. Then some dramatic event such as a field trial takes place. Once again, attendance soars. A new danger to progress takes place. New members attend for the first time. They start questioning the fundamental philosophy. Old ground is revisited. The skillful chairman must maintain progress, yet not turn off the new attendees. The new attendees will have their say in the final standards approval process. They must not be alienated. As the committee reaches the end of its work, two forces come to conflict. Those who have put in years of work want to bring it to a close. Others who have been alerted to the committees work by the expected issue of a new standard become alarmed. They see all kinds of threats to their interests and, of course, better ways to do the job, usually using advanced technology which wasn't available when the committee started its work. The committee chairman must manage these forces or total grid lock will result.

Another practical difficulty with committee work is the fact that the most likely contributors are industry experts and industry decision-makers. By definition, these individuals are very busy and in demand by their company's engineering departments and by other committees. Getting the right people involved is critical to success. Occasionally, a company's management's view of committee work is too parochial. Important contributors are denied permission to attend, or are not supported in this activity.

An important element of the committee process, is the mutual education of the two participating industries. Committee work is an excellent means of communication between experts in the cable and the consumer electronics industries. Well before an agreement on standards is reached, the TV receiver design experts are applying what they have learned from the committee work and are anticipating the new standard. This process makes timely introduction of product, based on the new standard, possible.

While it will be years before a significant penetration of product built around these standards takes place, those customers with an urgent need or desire will be able to purchase products in the second half of 1986. Thus, a timely impact will be made even though extensive use of the standard will take many years.

Thanks go to the EIA and the NCTA for their leadership in these issues. Special thanks to the EIA for sponsoring the meetings and to Tom Mock, of the EIA, in particular. The task would have been much more difficult, if not impossible, without his time and energy. And, of course, thanks to the committee participants for their participation and time away from home.

CONCLUSION

Progress is being made on two fronts, the RF cable interface and the decoder interface. Interim standards for both committees can be expected by early 1986. Progress is slow and painful but essential if the customer/subscriber is to be provided with the maximum utility potential of the technology. These are long term solutions. But they will never arrive without heavy investment of energy and time in current committee work.