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*This article was written in 1980. It was prepared for the Symposium on Research and Utilization of Educational Media for Teaching the Deaf.*

## **Closed-Caption Television: Today and Tomorrow**

*by Barry Jay Cronin*

*The National Captioning Institute was founded in early 1979 to produce captions for commercial and public television programs. NCI uses a system called "closed captioning," whereby the captioned information is transmitted along with the regular picture and sound portion of the television program but is not seen on a normal home television receiver. Only with a special decoder device can the captions be seen. This device is currently marketed by Sears, Roebuck and Co. and is called "TeleCaption." It has been available to the consumer since March 15, 1980. Three networks are participating in this service, PBS, ABC, and NBC. By the end of 1980, it is expected that more than 22 hours per week of captioned programming will be available to viewers.*

*The closed-captioning system, sometimes referred to as Line 21, records captioned electronic codes on Line 21 of the television vertical blanking interval—a portion of the video signal. These codes are read by the decoder, which then generates the captions that are displayed on the screen of any normal home television receiver.*

*The closed-caption system represents the culmination of almost 10 years of technological development and the cooperative efforts of the Federal Government, nonprofit agencies, professional groups, groups representing the deaf and hearing impaired, civic organizations, and commercial industry. It is a service that's designed to meet the communication needs of 14 million hearing-impaired citizens in this country.*

*For the future, many more populations can be served through closed captions. Bilingual, particularly Hispanic Americans, reading-disabled children, and hospitalized and institutionalized people who are in environments in which noise must be kept to a minimum can and will be served through closed captioning of television programs.*

*As we look to the future, we look for additional technological developments that will allow the closed-captioning service to expand beyond the captioning of prerecorded videotape programs. It will include captioning of news and public affairs, sports, real-time captioning (captioning as it is happening) and further exploration of the use of captions for bilingual groups and direct captioning of film.*

## **INTRODUCTION**

On March 15, 1980, the ABC, PBS, and NBC television networks inaugurated a new service for the benefit of this nation's 14 million hearing-impaired viewers. This service, called "closed captioning," allows captions (or subtitles) to be transmitted along with the regular sound and picture of a television program but becomes visible only with a special adapter unit attached to a normal TV receiver.

The National Captioning Institute (NCI), incorporated as a nonprofit corporation early in 1979, was created to produce closed captions. In March 1980, a combined total of 16 to 20 hours a week of predominantly prime-time entertainment programs were captioned; 6 hours on PBS and more than 5 each on ABC and NBC.

## **EVOLUTION OF THE SYSTEM**

The establishment of NCI in 1979 was the culmination of almost 10 years of technological research; market exploration and development; and community, government, and industry cooperation.

The closed-caption system began as an idea in 1971 at the National Bureau of Standards (NBS). Digital electronics was a new development in electronics that opened the electromagnetic spectrum, allowing more and different kinds of electronic signals to be transmitted in the broadcast bands and beyond.

The original idea proposed at NBS was to transmit real-time clock information as part of a television signal, which would not be seen, on normal receivers. A special device that would read this digital information was required.

While the money and time needed to perfect such a system was not justifiable in terms of clock information, it was suggested that the same concept could be used to transmit captions. The development of a special "decoder" to detect and display the captions could result in a system that would permit deaf and hard-of-hearing viewers to watch caption television at the same time, without disturbing hearing viewers.

In 1972, the Department of Health, Education, and Welfare provided a grant to the Public Broadcasting System (PBS) to begin the technological development. By 1974, the system was ready for testing and the Federal Communications Commission authorized experimental broadcasting of closed captions on PBS. Schools for the deaf throughout the country were provided with prototype decoders. Technological and operational experimentation continued, drawing on the experiences of other captioning groups such as WGBH-TV in Boston, Gallaudet College in Washington, D.C., and the National Technical Institute for the Deaf in Rochester, New York.

At the same time, cooperation and involvement of the commercial television networks, writers, producers, and program and production specialists were sought. Finally, manufacturers and distributors for the adapter units were found. President Carter, through his office, encouraged wide-scale cooperation among these groups.

By 1976, the FCC authorized Line 21 of the Television Vertical Blanking Interval for the use of closed captioning. Finally, in 1979 all the pieces needed to implement the system fell into place. ABC, PBS, and NBC had agreed to provide approximately 20 hours per week of captioned programs; NCI was established as a central agency to produce the captions; Texas Instruments Incorporated, The Sanyo Corporation, and Sears, Roebuck and Co. had joined together to market the consumer adapters and integrated receivers. NCI began hiring and training caption editors, and equipment for captioning was assembled and made operational. On Sunday, March 16, 1980, PBS aired *Masterpiece Theatre* and *Once Upon a Classic*, NBC broadcast *The Wonderful World of Disney*, and ABC telecast the *ABC Sunday Night Movie*, all with closed captions.

## The Captioning Process and Line 21

The captioning process begins when NCI receives a time-coded video cassette of the program to be captioned. *Time-code* is an electronic method of identifying every minute, second, and frame of a TV picture. It allows captioners to select precisely the time a caption will appear and disappear from the screen.

First, a skilled transcriber prepares a verbatim manuscript of the program audio while a captioning supervisor reviews the program and develops caption treatment instructions. This treatment alerts caption editors to the rate at which the caption will be displayed, special language considerations needed, and any special effects, which may require special treatment, i.e., music or sound effects.

An editor or group of editors then begins the job of condensing the original program script into captions that can be easily read. The viewer must be given time to read the captions and watch the action. NCI always tries to keep the captions as close to the original dialog as possible.

The captions are entered into a computerized captioning system. A Caption Editing Console has been developed specifically for captioning which allows for instantaneous preview of the program with the captions.

Once editing is completed and carefully checked, the captions are stored in a computer memory. When all corrections are made and NCI standards met, the captions are ready to be encoded or inserted onto Line 21.

Line 21 is at the heart of closed captioning. The caption data in the computer is coupled with the original master tape to create a new caption master. This process, called "encoding," places the electronic caption codes onto Line 21 of the Vertical Blanking Interval of the television picture.

When the caption data is transmitted via a network, cable system, or local station, the captions are generated by the home adapter unit and displayed on the screen of any TV set hooked up to the adapter.

## THE FUTURE

The ultimate success of the closed-caption service is dependent upon the number of adapters purchased and used. More adapters in use mean more viewers, which in turn mean more programs.

No technology can remain static and be successful for long. In addition to working to increase the number of caption programs on the air, NCI is continuing the technological development of the system. New developments will bring not only more innovation to the hearing-impaired community but can serve many other populations. Bilingual children and adults, reading disabled and disadvantaged children, and hospitalized and institutionalized people who are in environments where sound levels must be kept low can all be beneficiaries of closed captioning. Two sets of captions can be transmitted simultaneously—using any two combinations of language and language levels.

Research is also going forward on the system for captioning sports programs. Initially, Line 21 can be interfaced with stadium scoreboards to provide continuous information. Later, live commentary and background information on players and the game can be provided.

A text feature called “Infodata” can provide full-screen information that may be useful as a teacher’s guide in schools additional program information, even news and special information services.

Finally, research is being conducted to develop a real-time captioning system that will allow captions to be generated live and immediately. News and news events that are broadcast live represent a major, if distant, goal because captioning will then provide communication through television to the hearing impaired, just as it now does for hearing.