Extending the Audience: Delivering Closed Captions and Descriptions for First-Run Theatrical Films

By Judith Navoy, Gerry Field, and Brad Botkin

Approximately 34 million Americans with hearing or vision loss are unable to enjoy first-run films in theaters because they are not captioned or described. The WGBH Educational Foundation has developed innovative technologies that make it possible for exhibitors to provide captions and descriptions for those who need or desire them, without altering the moviegoing experience for the general audience. WGBH—working with Digital Theater Systems, General Cinema Theatres, Universal Pictures, Paramount Pictures, and Sony Pictures—has successfully demonstrated how closed captions and descriptive narration can be delivered during a film's regularly scheduled presentations in a theater. This paper provides a summary of WGBH's Motion Picture Access Project, describes the Rear Window Captioning System and DVS Theatrical, and outlines equipment and production requirements for providing theatrical closed captioning and descriptive narration.

Movies play a vital role in popular culture. They are social, recreational, and educational. However, approximately 34 million Americans with hearing or vision loss are unable to enjoy first-run theatrical films because they are not captioned or described and therefore not accessible to these populations. In 1992, the WGBH Educational Foundation launched the Motion Picture Access Project to explore ways to provide closed captions and descriptive narration for first-run films in theaters.

WGBH has developed innovative technologies that make it possible for exhibitors to provide captions and descriptions for those who need or desire them, without altering the moviegoing experience for the general audience. The closed nature of the technologies makes it possible to deliver these services without the need for special prints or separate screenings.

The patented Rear Window Captioning System, developed by WGBH and Rufus Butler Seder, displays reversed captions on a light-emitting diode (LED) text display that is mounted in the rear of a theater. Deaf and hard-of-hearing patrons use transparent acrylic panels attached to their seats to reflect the captions so that they appear superimposed on the movie screen. The reflective panels are portable and adjustable, enabling the caption user to sit anywhere in the theater.

DVS Theatrical delivers descriptive narration via infrared or FM listening systems, enabling blind and visually impaired moviegoers to hear the descriptions on headsets without disturbing other audience members. The descriptions provide narrated information about key visual elements such as actions, settings, and scene changes, making movies more meaningful to people with vision loss.

WGBH has been providing these services to specialty theaters for several years. Digital Theater Systems (DTS) of Westlake Village, Calif., has enabled WGBH to bring the technology to conventional movie theaters. DTS is the world leader in digital sound for feature films, providing multichannel digital audio on CD-ROM. A reader head attached to the film projector reads a time code track printed on the film and signals the DTS player to play the audio synchronous to the film. For this project, DTS adapted its technology to include the caption and description tracks on a separate CD-ROM. The DTS player sends the captions to the LED display and the descriptions to the infrared or FM emitter.

In November 1997, WGBH teamed up with Digital Theater Systems, Universal Pictures, and General Cinema Theatres to successfully demonstrate delivery of closed captions and descriptive narration in a conventional movie theater during regularly scheduled presentations of the film *The Jackal*. For the first time, these high-quality access services were available on the day and date of a film's national release. The services were available at all show times in the equipped theater.

More recently, moviegoers with hearing and vision loss were able to share in the excitement of the most celebrated film of all time—the Paramount Pictures/Twentieth Century Fox presentation *Titanic*. In addition to the captioned and described presentations of *Titanic* in Sherman Oaks, General Cinema also equipped one of its theaters in Framingham, Mass., with DVS Theatrical so that visually impaired moviegoers in the Boston area could enjoy the film as well. On the basis of the tremendous response to the systems, General Cinema Theatres has installed both technologies in its new Yorktown Theater near Chicago, and is considering installations in up to ten locations within the next year.

These technologies have significant implications for the motion picture industry. They make it possible to attract approximately 34 million

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new moviegoers, without altering the experience for the general audience. These technologies also provide valuable opportunities for positive public relations and can give exhibitors a competitive edge in their market.

The Equipment–Rear Window Captioning System

The Rear Window Captioning System consists of the following components.

Text Display

The caption text is provided by a DataWall, an LED panel manufactured by Trans-Lux Corp. of Norwalk, Conn. The DataWall must be 32 characters wide and 3 rows tall, in a character size appropriate to the auditorium (for most theaters, this will be 3.2 in. or 4.1 in.). It should be mounted in a location so that it is visible (via reflector) from all or most seats.

Reflectors

The reflectors consist of a panel of 1/4 in. thick transparent or semi-transparent acrylic, approximately 4 in. tall by 12 in. wide that is attached to a flexible gooseneck arm. The gooseneck is fitted with a flowerpot-shaped base, designed to fit into the softdrink holders that are part of most theater seats. Microphone stands or custom-made bases can be used in auditoriums that do not have softdrink holders. The reflectors are portable, so users can choose their seats based on personal preference, instead of being restricted to certain areas. Theaters should purchase a suitable amount of reflectors for the auditorium (at least 5% of theater capacity is recommended).

Synchronization System

The synchronization process differs depending on whether the system is being used in conventional movie theaters or specialty theaters (e.g., Imax, theme parks).

Synchronization: Conventional Movie Theaters

A DTS-6D digital audio system manufactured by Digital Theater Systems (DTS) synchronizes the playback of captions in conventional movie theaters. Special firmware enables the DTS-6D to play captions. The caption data reside on a CD-ROM that plays alongside the other discs in the unit. A reader head attached to the film projector reads a time code track printed on the film and signals the DTS-6D to play the audio and captions synchronous to the film. The DTS-6D then sends the captions to the text display.

Synchronization: Specialty Theaters

Specialty theaters have a couple of options for synchronizing the captions to the film. They can use the DTS system described above or, alternatively, they can use a stand-alone PC to play back the captions. The computer that generates the captions must receive longitudinal SMPTE time code, 30 frames/sec, as an audio signal. The software reads incoming time code and outputs captions through the serial port to the text display in the appropriate format.

The computer must have the following specifications:

- IBM-compatible PC with a 386 processor or better, 1 MByte RAM, hard disk, DOS 3.1 or higher, keyboard, monitor (VGA color recommended, but not required), and at least one serial port.
- An Adrienne LTC IOR time code reader card.
- Two DOS software programs: Closed Captioning Sequencer (which reads incoming time code and outputs captions to the text display in the appropriate format) and Motion Picture Caption Scheduler (which schedules a series of events so that an entire day's show schedule can be automated).

Equipment—DVS Theatrical

DVS Theatrical consists of the following components:

Infrared or FM Emitter

- Any commercially available infrared (95 kHz, 250 kHz, 2.3/2.8 MHz) or FM (72.1 to 75.3 MHz) assistive listening system can be used.
- The theater must have a dedicated system (or channel) on a different frequency than the assistive listening system the theater provides for hard-of-hearing patrons.
- The emitter must provide sufficient coverage for the size of the auditorium.

Earphones/Headsets

- Exhibitors can select a number of compatible commercial products according to their preference or usual vendor.
- Receivers should be provided for a minimum of 5% of seating capacity (400 seats = 20 receivers).
- Light, adjustable headsets with individual volume controls are recommended.
- Open-ear foam muffs of single ear-bud receivers may be preferred by consumers.

Synchronization System

As with the Rear Window system,

the synchronization process differs depending on whether the system is being used in conventional movie theaters or specialty theaters (e.g. Imax, theme parks).

Synchronization: Conventional Movie Theaters

The DTS-6D digital audio system synchronizes the playback of descriptive narration in conventional movie theaters.

In its current implementation, the DVS Theatrical descriptive narration track resides on CD-ROMs playing from a DTS-6D running daisy chained to the main DTS player. This second player sends the narration to the infrared or FM emitter, which in turn sends the narration to dedicated wireless headset receivers in the auditorium.

Synchronization: Specialty Theaters

Many specialty theaters employ shaft-encoding systems to translate film frame rate to SMPTE time code, allowing outboard audio devices to provide simultaneous language translation services and descriptive narration.

Specialty theaters can provide descriptive narration via the DTS-6D system described above or through a variety of other analog (8-track reel-to-reel) or digital (DAT, CD-ROM) devices connected to the shaft encoding system.

The Services

In addition to the equipment described above, the other component of this project is the creation of special caption files and descriptive narration tracks for the films. The Caption Center and DVS are the world's most experienced agencies in the fields of captioning and descriptive narration for television, video, and specialty films. Providing these services for feature films presents new challenges. Among these challenges are the heightened security surrounding major motion pictures; unpredictable—and often extremely tight—production schedules; and ensuring that the caption and description tracks are delivered to theaters along with the film. WGBH is committed to providing these services without disrupting the distribution and exhibition process and can work with studios to accommodate their release schedules and ensure that their security concerns are satisfied.

To create the closed captions and descriptive narration, WGBH needs two copies of the final (or near final) version of the film on 3/4-in. videotape along with a copy of the script. The availability of a contact person who is knowledgeable about the film is essential for answering questions that may arise during the captioning and description process.

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Creating Closed Captions

Trained caption writers transcribe the audio portion of the film using a specially designed computer program, adding or adapting information (e.g., on and off-screen sound effects, voices, attitude) to give deaf and hard-of-hearing viewers a full sense of the events occurring on screen. The caption writers rely on time code to carefully time and place the captions. They also position the captions (left, right, or center) to indicate who is speaking.

After the synchronized caption files are created, they are compiled into "display ready" data, which can be fed directly to the DataWall. The compilation process accounts for transmission time into the receive buffer of the display device, including reversing the data so that it will be displayed in a mirror-image font, readable with the reflector. The data file is created in TDS (Timecoded Data Services) format, a format for multistream data that was developed at WGBH in conjunction with PBS and other vendors. The file is then delivered via e-mail to DTS for encoding. At the DTS encoding facility, the caption file is burned onto a CD-ROM, along with the DTS software for reading the TDS file and gating out the captions. For non–DTS-equipped specialty venues, the caption files are delivered to the theaters on floppy disk.

Creating Descriptive Narration

Descriptions are written by specially trained writers called describers. A describer initially listens to the film without watching it, in order to approximate the experience of a person who has limited or no vision. The describer pays close attention to what is already communicated by the soundtrack. The describer uses specially designed computer software to map out the pauses in the movie and then crafts the most expressive and effective description possible in the space available. After a script is written, it is edited and checked for timing, continuity, accuracy, and natural flow. The script is then performed by a professional narrator in a mix-to-picture session directed by DVS staff. The completed narration track digital master (DAT or DA-88) is then shipped to DTS or other facility for duplication and delivered to the theater in the desired format.

About WGBH

The WGBH Educational Foundation in Boston, Mass., is a nonprofit institution whose purpose is to further the general education of the public by offering television, radio, and other telecommunications programs that inform, inspire, and entertain. WGBH is the country's largest public broadcasting station, producing more than one-fourth of the PBS primetime lineup. In addition to its broadcast activities,

WGBH also produces large-format films and develops educational technologies and content for CD-ROMs, interactive videodiscs, and World Wide Web sites.

WGBH has a proud tradition of making media accessible to underserved audiences. In 1972, The Caption Center at WGBH broke the silence barrier with the first captioned television show, *The French Chef,* on PBS. Today, The Caption Center captions more than 10,000 hr of television programming, home videos, music videos, large-format films, and other media each year.

WGBH is also home to the television description agency, Descriptive Video Service (DVS), and provides description on television, home video, movies, and other visual media. DVS is the sole provider of description for PBS, the Turner Classic Movies cable channel, and Imax Corp. The DVS Home Video collection includes more than 150 titles.

In 1992, WGBH created the CPB/WGBH National Center for Accessible Media (NCAM) to develop ways of making other forms of media accessible to underserved audiences. NCAM is dedicated to researching and developing access solutions for a broad range of media, including CD-ROMs, the World Wide Web, and theatrical films.

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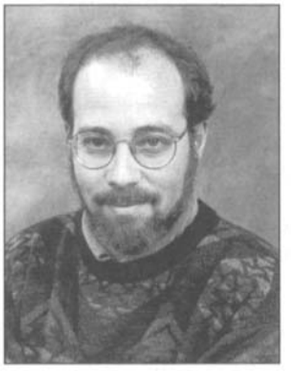

Brad Botkin

Judith Navoy is project manager for the WGBH Educational Foundation's Motion Picture Access Project. Navoy has worked in WGBH's Media Access Division since 1990. She was project director for the ATV Captioning Project, which developed a draft closed-captioning specification for advanced (digital) television.

Navoy is the author of the *Media Access Toolkit,* a manual designed to educate public television professionals about technologies and services available to make television accessible to non-English speaking viewers and audiences with hearing or vision loss.

Navoy has conducted extensive research with disabled consumers regarding desired features in access technologies and presents regularly at industry and consumer conferences.

Gerry Field is technology projects manager for WGBH's Descriptive Video Service and has implemented DVS delivery in the broadcast, cable, theatrical, and home entertainment markets since 1991. He also serves as manager for the DTV Access Project, which will create test materials to support closed captioning and video description in digital television systems.

Field is a member of SMPTE and is active in SMPTE, ATSC, and CEMA standards committees.

Brad Botkin is director of systems development for The Caption Center at WGBH, a position he has held since 1990. His responsibilities include software development, systems integration, new systems initiatives, and strategy for The Caption Center and the CPB/WGBH National Center for Accessible Media, as well as full design and operations support for network, database, data storage, and retrieval.

Botkin is chairman of the SMPTE Multimedia Working Group on Captioning and Subtitling, working with members from all areas of film, video, and multimedia production, directing efforts to create industry standards for data interchange.