



## APPLICATION NOTES

### CSX DIGITAL SIGNAL PROCESSING

CompuSonics Video's CSX digital signal processing can be applied to a wide variety of consumer, industrial, and professional digital video products. CSX dramatically reduces the amount of data required to record or broadcast the digital video/audio signal. Therefore, the cost/performance ratio of digital video products may be improved substantially by incorporating CSX signal processing in product design.

These notes suggest a few of the many new or improved products which are possible using CSX. CSX hardware and software may be licensed from CompuSonics Video by manufacturers interested in developing these and other products. Custom hardware and software development and integration is also available on a contract basis.

#### Home Video Recorder/Editor

The home video editor is a disk-based video recorder capable of recording from any standard video source such as a home VCR or video camera. Once the source material has been selected and recorded onto disk, the editing functions allow the user to select and rearrange specific video segments arbitrarily. The resulting edited video may be played directly from disk for viewing, or dubbed back to VCR tape. This gives consumers the capability to consolidate and edit their home video recordings for future enjoyment.

Using CSX, several minutes of video/audio material can be edited with inexpensive, high capacity floppy disks (12 Mb or more). Alternatively, disks with capacities of 100 Megabytes or more (such as recordable optical disks currently available) yield more than an hour of recording.

#### Video Database Computers

The video database computer is a disk-based random-access video storage and retrieval system. Video/audio segments or "records" are recorded onto the disk in any order. These records may then be played back in any desired order.

For example, one proposed product for the travel industry allows a client to peruse the sights and sounds of several prospective vacation spots before making a choice. The client inserts a disk corresponding to the area of interest, and then either watches the

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entire disk or selects search keys to show only those points of specific interest for viewing.

A similar application of the video database computer is in real estate. A home buyer plays a disk containing video/audio segments showing and describing the various rooms and surrounding property of a house for sale. Both the real estate and travel database applications are possible using inexpensive floppy disks and CSX encoding, allowing instant random access and replay.

Another database-oriented product incorporating CSX could reduce credit card abuse with picture and voice verification at a point of sale display terminal. An extensive customer database containing video/audio records and other data is easy to update and maintain using magnetic fixed disk drives and CSX encoding for efficient storage and retrieval. Currently available dial-up high speed data lines such as AT&T's Accunet can cost effectively connect points of sale to the database computer for ID verification.

### **Multimedia Computers**

A multimedia computer stores and manipulates text, numeric data, graphics, moving pictures, and sound. Digital video/audio material may be stored on the computer's main disk or on a peripheral, such as a CD-ROM. CSX makes it possible to store up to seven hours of video/audio material on a single CD-ROM.

CSX can be applied to video/audio electronic mail, electronic encyclopedias, and other multimedia computer functions. Any time video and audio are stored, retrieved, or transmitted by computers, CSX makes it less costly and more efficient.

### **Music Video Distribution**

Music television has become a key component of the entertainment industry. Presently, music television serves primarily as a means of promoting sales of records, cassettes, and compact discs. A small but increasingly significant number of consumers are also purchasing music videos in videotape format. Although the video may be recorded off the air or cable using a VCR, the resulting video and audio fidelity of the copy is poor. Digital music video distribution offers customers two significant benefits: high fidelity digital audio and video, and convenient purchasing via electronic distribution directly to the home.

The proposed music video distribution chain has three principle components that depend on CSX technology: a video database computer, a broadcast digital encoder, and a home disk-based digital video decoder/recorder. A consumer enjoying music television who chooses to purchase his own digital copy calls the distributor with his request. The distributor enables the video database computer to access the consumer's selection and transfer the video/audio data to the broadcast digital encoder. This encoder modulates the data onto a cable television subcarrier

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or other transmission format. The home decoder/recorder receives the digital video/audio data over the cable link and copies it to disk.

At a CSX data rate of about 1 megabit per second, up to ten digital video/audio signals may be broadcast simultaneously over a single cable television channel. A home digital decoder/recorder using currently available 400 megabyte write-once optical disks would capture and store about one hour of CSX format digital music video material permanently.

### **Video Surveillance System**

Video monitoring and recording systems are used in banks, stores, office buildings, airports, or other locations requiring security and constant surveillance. Video cameras which are situated in strategic locations, such as an airport security gate, provide a video image which may be viewed remotely. Recording the video signal provides a reference which may be reviewed at a later time. For example, if an airline flight has just been hijacked, an instant video replay reviewing those people who entered the gate before the flight may provide information regarding the suspected hijacker's identity.

There are several important elements to a video surveillance recording system: fast access to arbitrary recorded time points, long recording capacity, and minimal operating maintenance. While tape-based systems may provide long record times, fast access to arbitrary locations is tedious, and tapes constantly need to be replaced as they wear out. A high capacity computer disk-based system provides instant access to recorded locations and virtually no operating maintenance. A further advantage of a disk-based system is the ability to re-use the recording media by automatically recording over the oldest, unwanted material.

CSX makes the disk-based surveillance video recorder possible by dramatically reducing the enormous disk storage capacity which would otherwise be required. At a CSX rate of 100 kilobits per second, a 540 megabyte magnetic disk could continuously record and store twelve hours of video/audio material. The image and sound of any event recorded by the camera and microphone during the preceding twelve hour window may be accessed instantly using the computer's random access capability.

### **Electronic Shopping**

Most consumer product catalogs are four color printed documents. These publications are seasonal, and usually are disposed of by the consumer soon after their distribution. High quality shopping catalogs are both expensive to produce and distribute. An electronic replacement for this type of sales literature could take two forms: an on-line database accessed via teletext on conventional computer networks, or audio/video floppy disks.

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The efficiency of on-line shopping services can be improved by CSX. Reduction in database storage and download bandwidth requirements are especially important for audio, graphic image and motion image product presentations. Existing video shopping services are limited by bandwidth requirements which restrict the number of shoppers who can be on-line simultaneously. In addition, the high cost of digital storage can be reduced by CSX encoding of the product database.

An alternative approach to electronic shopping is to distribute the audio/video information on floppy disk. Floppies are inexpensive, easy to mail, and provide random access capability. Product information can be indexed, assisting the shopper to locate quickly an item of particular interest.

### **Computer-Aided Instruction**

Educators are increasingly interested in providing audio/video learning tools to be used in conjunction with personal computers. The computerized language laboratory can make effective use of random access disks that allow students to interact on a personalized basis with the instructional program. A recordable random access digital storage medium such as floppy disk lets the student record his own voice in parallel with the teacher's voice and in synchronization with the complementary video images.

Computer aided instruction has also been employed extensively in commercial and industrial training. CSX video/audio data stored on disk provides both the hierarchical structure and random access required for rapid trainee interaction. Technical training is enhanced by the ability of CSX based systems to freely mix audio, video, graphic and text information throughout the curriculum. Automatic monitoring of the trainee's responses and queries can facilitate the supervisor's management of the training process.

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