



# DAC DIGEST

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DIGITAL AUDIO CORPORATION  
A DRI COMPANY

"Technology to Make Listening Easier"

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## NEWS

### DAC Announces Sales Alliance with Pro-Tech Sales

*DAC's enhancement products will complement equipment from Pro-Tech . . .*

DAC is pleased to announce the completion of a sales alliance agreement with Pro-Tech Sales of Cleveland, OH. Effective January 1, 2001, Pro-Tech will distribute select DAC products to state and local law enforcement agencies in the United States.

"This alliance is the first of several initiatives underway at DAC to make our products more widely available to state and local agencies," said Craig Scates, DAC General Manager. "Pro-Tech is a leading distributor of law enforcement technology in its served markets. We believe DAC's world-class audio enhancement products will complement the surveillance and intelligence equipment currently available from Pro-Tech."

For more information, contact the DAC offices or Pro-Tech Sales at 1-800-888-4002.



**DAC PRODUCTS ARE AVAILABLE THROUGH GSA ADVANTAGE!**

**#GS-03F-4062B**

**GSA★ Advantage!**

## DAC DIGEST

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### DAC Launches New Website

*Register for DAC School sessions, request product literature, or join an "E-Group" . . .*

In November 2000, DAC debuted its new website located at <http://www.dacaudio.com>. In addition to a complete redesign of the format and content, the new site contains up-to-date information on the latest DAC products and services. Visitors also have the option to register for upcoming DAC School sessions, request product literature, or join a special "E-Group" to share forensic audio information with other DAC customers. Bookmark the site now in your browser and check in periodically for the latest news from DAC!



## **Bill Mauldin to Lead USG Sales Effort . . .**

**Direct all inquiries directly to Bill Mauldin . . .**

**E**ffective January 1, 2001, Bill Mauldin – DAC's Director of Business Development – will be responsible for all US Federal Government account management activities.

For the past three years, Ken Pfarr has been serving in this capacity for DAC. Ken will continue to be associated with DAC, serving as one of our domestic dealers to the state and local law enforcement market, as well as the

commercial sector. "We are grateful for Ken's many achievements during his tenure as Federal Programs Manager at DAC and certainly wish him the best in his new endeavors," said Mauldin.

US Federal Government should now direct all inquiries directly to the DAC offices in Raleigh or to Bill Mauldin in Arlington, VA at 703-856-3779. Bill can also be reached by **em ail** at [billm@dacaudio.com](mailto:billm@dacaudio.com) .



## **PRODUCTS**

### **DAC Continues Trade-In Program for 2001**

**Discounts offered on select models . . .**

**D**AC will continue its successful trade-in program for select models through December 31, 2001. The 2001 Trade-In Program is in effect for the following products:

- ◆ T-Series System - \$2,500.00 toward purchase of MCAP or PCAP II
- ◆ PCAP/JPF2 - \$2,500.00 toward purchase of MCAP or PCAP II
- ◆ MicroDAC II or III - \$1,000.00 toward purchase of MicroDAC IV

The trade-in program is available for GSA purchases as well. Trade-in allowances are limited to one trade-in unit per newly purchased unit. Be sure to take advantage of this opportunity to upgrade your DAC products to newer models that offer increased processing speed and enhanced features.

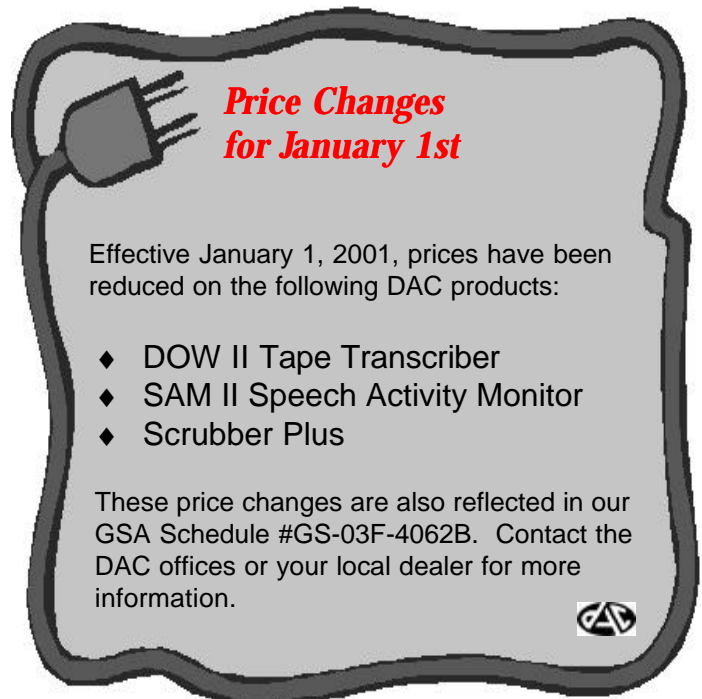


### **MiniDAC Broadens Its Horizons**

**DAC has added a broadband noise filtering feature to the recently introduced MiniDAC product . . .**

**T**o better address the specific requirements for live filtering of audio received from standard police body wires, DAC has added a broadband noise filtering feature to the recently introduced MiniDAC product. Now, in addition to being effective at reducing tonal noises, hum, reverberation, and other common time-correlated noises, MiniDAC is also effective at reducing wind and water noises, complex engine and motor noises, clothing rubbing noises, as well as RF static, hiss, and crackle.

As mentioned in the previous *DAC Digest*, MiniDAC is a perfect drop-in replacement for the Marantz PMD201/221 that is used in most body wire receivers, providing both a noise filter and a high-quality digital recorder. It is installable by the user in most cases, avoiding the need for factory retrofit and excessive downtime. Plus, it can be easily removed and reinstalled into new receivers as existing units become obsolete.



**Price Changes  
for January 1st**

Effective January 1, 2001, prices have been reduced on the following DAC products:

- ◆ DOW II Tape Transcriber
- ◆ SAM II Speech Activity Monitor
- ◆ Scrubber Plus

These price changes are also reflected in our GSA Schedule #GS-03F-4062B. Contact the DAC offices or your local dealer for more information.



*Contact DAC today to order yours!*



Recent advances in micro-digital technology, coupled with falling prices of flash memory, have led to a revolution in portable digital recorders. These new recorders offer many attractive features, including ease of use and excellent sound quality. In addition, they avoid the problems of tape hiss, wow and flutter, head misalignment, and the speed/volume fluctuations often associated with the older analog cassette and microcassette machines.

But this does not mean that all digital recorders are perfect. To the contrary, designers of these new devices are forced to compromise in the face of size, cost, and/or battery life constraints. Because of this, they often employ imperfect **lossy** data compression schemes to achieve both the necessary record time and an acceptable level of quality for the target application.

Lossy compression reduces the number of bits that the recorder needs to store by continuously analyzing the original uncompressed digital audio bitstream and discarding as many bits as are necessary to achieve the desired compression ratio. Only the remaining bits are actually stored by the recorder. Then, when the recording is played back, the decompression algorithm attempts to reconstruct the original uncompressed bitstream from that subset of the original bits.

As a result, substantial audio information that was present in the original uncompressed data stream can be lost or degraded, especially low-level signals that may be of great forensic interest. To make recordings with no loss or degradation, all the information in the original bitstream must be recorded. This can be achieved either by using no compression at all (as with DAT and CD recorders) or with **lossless** compression (a topic for the next DAC Digest!).

Getting back to lossy compression, there are three basic flavors in widespread use today. Of these three, **perceptual encoding** is the most common because of the high compression ratios that can be achieved (5:1 or higher). This is what is used in the newer MP3 and MiniDisc digital recorders. A diagram that shows how this process works is provided at the center of this page.

With perceptual encoding, the incoming audio is analyzed using a mathematical model of the human ear. This model assumes that in the presence of loud sounds at particular frequencies, lower level sounds at other *adjacent* frequen-

cies will not be audible, and can therefore be ignored and *not recorded*. Thus, very high compression ratios can be achieved with this method, with little perceived loss of *original* audio quality. This is acceptable for re-recording CDs, which are generally excellent recordings.

The problem comes when one attempts to *enhance* the audio recorded by such a device. For example, suppose a recording was made in a nightclub next to a powerful loudspeaker and the conversation of interest is either barely audible or completely masked by the loud music. Had that recording been made by a perfect stereo digital recorder (such as a DAT or CD recorder), we would stand a good chance of being able to reduce the music and reveal that conversation back in the lab using standard DAC "two-channel" noise filtering.

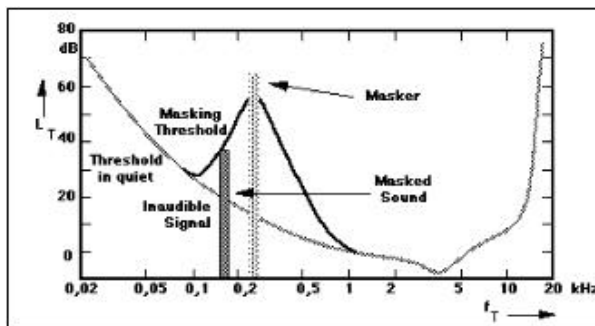
But if that recording was made on a MiniDisc machine, chances are that once the music is taken away by the processing, there will be little or no speech left to be revealed, as the compression algorithm on the recorder would have thrown all or most of it away when the recording was made, wrongly assuming that no one would ever want to hear it.

***This is the big danger with MiniDiscs, and DAC has produced sample recordings to demonstrate the danger is real! Our E-Group members can download these recordings from our website at [www.dcaudio.com](http://www.dcaudio.com).***

Other lossy compression schemes, which aren't quite as

problematic as perceptual encoding, include **predictive encoding** and **non-linear sampling**. The best example of predictive encoding is ADPCM, which is used on most digital mobile phones. It is also used on the ADS EAGLE and FBIRD recorders. The best examples of non-linear sampling are "Mu-law" and "A-law" companding. A high-performance version of Mu-law is used on the Sony NT-2 miniature digital recorder.

**In conclusion, digital recorders are not necessarily perfect, even those that claim to offer "CD-quality audio." Most of these devices achieve longer record times at the expense of poor low-level signal quality, which can have a negative impact on post-processing of forensic audio evidence. Because of this, departments contemplating purchases of digital recording equipment should be wary of purchasing any device that offers only lossy compression, as critical audio evidence could be discarded, and this evidence will be unrecoverable with any type of post processing.**



*Diagram of a perceptual encoder. In this frequency-domain graph, two pure tones are represented by the two vertical lines around 0.2 kHz. The lower amplitude tone is above the threshold of human hearing, but below the masking threshold of the louder tone. The perceptual encoder realizes that the softer tone will not be perceived by a human listener and ignores it in the encoding process.*

## **Craig's Corner**

*Craig Scates, General Manager*



**I**t's been quite a wild ride since our last issue in October where I parodied the upcoming Presidential elections. Who would have thought an election could become so engaging that we'd overlook the fact that

most of the federal government went almost three months into the 2001 fiscal year without an approved budget! I remember the big "shutdown" in 1995 when the budget didn't get signed until mid-November. Everyone thought the world was coming to an end and the government was on the verge of collapse. Looks like we're more resilient than anyone would have believed in the past.

Now that we're beyond all of that, it's back to business as usual. Let me encourage you to



visit the new DAC website at <http://www.dacaudio.com> and see what's available for the year 2001. Now is the time to stock up on our current selection of products. We will also have a series of new

products available this year so check in with us on a regular basis for the latest news. And don't forget our specialty – research and development projects. Don't hesitate to call if we can help solve a specific problem you have with audio collection or enhancement.

I would like to express my thanks and appreciation to Ken Pfarr for his contributions to DAC's sales efforts these past three years. Serving as our "Man in Washington," Ken has been a valuable source for new contacts and emerging product ideas in the federal law enforcement community. We wish him the best of success in his regional sales initiatives!



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