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DAC DIGEST

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DIGITAL AUDIO CORPORATION
A DRI COMPANY
Technology to Make Listening Easier™

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NEWS

SSABR!



Coming This Summer!

(To a Space This Small.)

Another Successful DAC School . . .

DAC PRODUCTS ARE AVAILABLE THROUGH GSA ADVANTAGE!

#GS-03F-4062B

GSA★Advantage!

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DAC School April, 2001, gave these attendees a challenging mix of audio enhancement theory and hands-on. Register now for our next session September 10-14, 2001.

SOUND BYTES

New Products Set for Launch

DAC will introduce four new products at the upcoming NATIA 2001 Conference this July 28 – August 3 in Memphis, TN. This exciting debut will include new additions to all three DAC product groups: audio enhancement, audio collection, and countermeasures. Plan now to attend NATIA 2001 and see why DAC continues to be the leader in audio products for law enforcement and security agencies worldwide!



LEA to Carry Select DAC Products

Law Enforcement Associates, Inc. (LEA), a leading supplier of intelligence equipment, has entered into a sales agreement to offer select DAC audio enhancement and collection products through its worldwide product catalog. These offerings are available immediately from LEA – for more



information please contact LEA at 1-800-354-9669.



ITS Consultants Top Dealer in 1Q 2001

Congratulations to Brian Beauchamp of ITS Consultants in Ontario, Canada for being named DAC's top international dealer for the 1st quarter of 2001. A relative newcomer to the DAC dealer ranks, Brian has quickly established himself as a trusted source for audio solutions in the Canadian security market. Way to go, Brian!



New Dealer for Southwest

AM&S Associates has signed a dealer agreement to promote DAC products to state and local agencies in the southwest United States. AM&S will focus its sales efforts on Texas, Oklahoma, and Colorado. For more information, please contact the DAC offices or Bob Gerlenter of AM&S Associates at 512-482-0069.



And the Food Was Great, Too!

Steve Zimmerman, DAC's Operations Manager, doubled as chef and official taster at the DAC School April, 2001 picnic.

LOOK FOR DAC AT THESE SHOWS:

- **FRENZY MAY 15-18, WASHINGTON, DC**
- **NATIA JULY 28-AUGUST 3, MEMPHIS, TENNESSEE**
- **ASIS OCTOBER 1-4, SAN ANTONIO, TX**

PRODUCT UPDATES

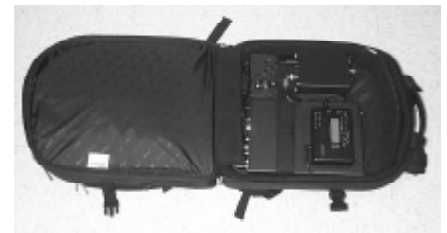
Put DAC on Your Back

DAC recently compiled a special tactical audio kit for use in field deployments. Packaged in a knapsack, the **MD4 Audio Kit** includes the **MicroDAC IV** portable 2CH digital filter, a DAT recorder, a **TIP II** amplifier, an accelerometer, a Knowles microphone, and a rechargeable 3-hour battery pack with spare Li-Ion battery. This provides a uniquely portable, lightweight solution for collecting and processing critical audio intelligence in SWAT or SORT incidents.



Audio Kit in a knapsack . . .

Also for tactical use, **MiniDAC** is now available with a broadband filter option to reduce RF static noise. It is perfect as an upgrade for your old analog RF receiver kit, or can be used standalone! We also continue to offer trade-in allowances for your aging DAC equipment toward the purchase of a new **PCAP II** or **MCAP** digital processor, and can offer complete turnkey audio/video enhancement solutions based on either of these products. Call us for details today!



The MicroDAC IV portable kit on display.



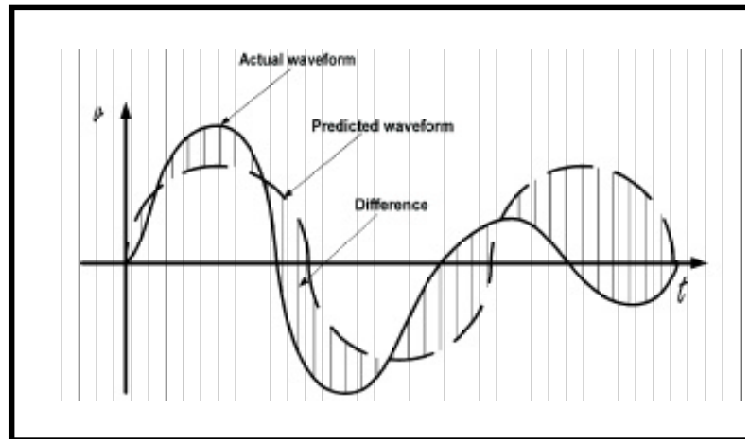
In the February 2001 *DAC Digest*, we discussed **lossy** digital audio compression and the effect it has on digital audio evidence. If you would like to re-read the article, it can be viewed in PDF format from the DAC website at <http://www.dacaudio.com/>.

In this issue, we'd like to introduce a new concept: **lossless audio compression**. By **lossless**, we mean a data reduction process in which a digital signal processor within the recorder is able to reduce the bits that need to be stored, thus extending the record time, *without sacrificing any of the information* in the original digital audio stream. From a forensic audio standpoint, a digital recorder that employs lossless compression is ideal, because the storage requirements can be reduced while retaining complete capability to perform subsequent post-processing and analysis of the recorded audio. Lossless compression always produces exactly the same final product as recordings made without compression.

A good example of a lossless compression system is PKZIP, a file compression program that is commonly used to crunch computer files to the minimum possible size before being transferred or copied. The PKZIP program works by intelligently analyzing which bits in the original file are *redundant*, using a very carefully crafted, patented algorithm. Once these redundant bits are removed, file size can be reduced by 50% or more, which yields substantial reductions in both required disk space and transmission time.

However, unlike the perceptual compression used on a MiniDisc recorder, which has a *guaranteed* compression ratio of 5:1 at all times regardless of the nature of the audio data, PKZIP provides a *variable* compression ratio. In other words, it crunches the bits as much as it can wherever it can within the file. Any bits that cannot be crunched without losing information are left intact. Unfortunately, PKZIP is particularly ineffective at reducing the size of digitized audio files. If you've ever tried to compress a WAV file using PKZIP, you probably found that it did not compress very much, if at all. This is why so many people these days like to use MP3, because it is able to compress WAV files and CD audio very effectively, though it does sacrifice low-level information (MP3 is a perceptual encoding algorithm, just like the one that MiniDisc recorders use).

So the question now is, can we get the type of ideal lossless compression that programs like PKZIP provide, and still be effective at compressing audio data? Yes, we can! The solution lies in a technique that DAC refers to as *polynomial predictive decorrelation*. This summer, DAC will introduce products that include a proprietary implementation of this technique called **DACPak**. Unlike PKZIP, DACPak is able to consider audio data in terms of an *equation*, as opposed to a set of random, unrelated numbers. To yield an effective compression ratio, DACPak identifies an equation that most closely models the original audio and then stores the *differences* between the actual values and those predicted by the equation. When the audio data is uncompressed, DACPak simply determines what equation was used to compress the data, recalculates the equation, and then applies the stored difference values to reproduce the original, uncompressed audio data; absolutely *no information is lost* in this process!



This is how a lossless encoder works. Based on the original audio samples, the encoder selects an equation to calculate the Predicted waveform that most closely matches the Actual waveform. The Difference information and equation can then be stored in much reduced space, and the original audio can be perfectly reconstructed on playback.

DACPak typically yields a compression ratio of 2:1 (a 50% bit reduction) on real-world monaural audio. The actual ratio obtained can vary, depending upon how closely the selected equation models the actual audio. For example, if the audio signal is a sine wave, the compression ratio will be very high (perhaps as high as 15:1), because such a signal is very predictable, and the equation will produce values that closely match the audio.

However, if the signal is Gaussian, or "white" noise, the compression ratio will be very close to 1:1, because that type of signal is random and very unpredictable. Most real world audio falls somewhere between these two types of signals, so there will generally be some degree of predictability that DACPak can exploit and good compression results can be obtained.

In conclusion, DACPak is an ideal, lossless compression algorithm that is well suited for forensic audio recordings. Typical compression ratios of 2:1 or more can be achieved – and higher compression ratios can be achieved with stereo audio – all without the loss of critical audio information. For more information about this exciting new technique, call or e-mail the DAC offices today.



Craig's Corner

Craig Scates, General Manager

We all expect more from a leader. As consumers, we pay extra for leading brands because we expect product quality, reliability, and performance to be unmatched by the competition. We also demand innovation from these market leaders to keep us advancing through new features. As the world leader in forensic audio technology, the DAC team understands these expectations and is prepared to respond.

Between now and NATIA 2001, DAC will roll out four new products, expanding our offerings in audio enhancement, collection, and countermeasures. These new products will not only provide exciting new capabilities, they are emblematic of DAC's commitment to remaining the first name in audio technology for law



enforcement. And shortly following this debut, we will begin preparations for announcing more new products for delivery later this year and into 2002.

At DAC, we like to think we're not just about audio filters anymore. We want to be – and are – the leader in solving audio problems for enforcement, intelligence, and security applications. We demand more because you demand more. There's an old saying that the farther up the ladder you go, the more your

behind is exposed. At DAC, that's just fine by us. Call us today and let us show you why we love being at the top of the ladder!



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