

by Jeffrey Sloman N1EWO

The AEA DSP-2232

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Suggested List Price: \$999

DSP—it seems that you just can't avoid hearing these three letters today anywhere analog signals are in use. Amateur radio gear is no exception. Manufacturers of just about anything that uses filters have jumped on the DSP bandwagon—taking advantage of this up-and-coming technology. The subject of this review—AEA's DSP-2232—is a great example of how DSP can bring intelligence and flexibility to a product traditionally hardwired for a job.

What is DSP?

DSP stands for Digital Signal Processing. DSP uses microprocessor technology to simulate analog filter circuits (in the case of the DSP-2232, the filters used in the modems). DSP has two principle advantages over traditional analog filter design. First is performance: A DSP filter can have very good skirt characteristics. The "skirt" of a filter is the slanted line you see on either side of the filter's frequency response when you plot it on paper. DSP filters are exceptionally sharp, much sharper than even very expensive and sophisticated analog designs.

The second attraction of DSP filters is the fact that they are "virtual." That is, they really only exist in the "mind" of the computer as software. This makes impossible things possible. There are things that a DSP-based filter can do that no amount of time, energy, and money could do to an analog filter. For example, DSP can be used to create "adaptive" filters that actually change their characteristics on-the-fly to adapt to changing conditions. The soft nature of DSP filters also means that new filters—hence new modems, for example—are only a download away. A controller like the DSP-2232 need never become obsolete, thanks to DSP. New mode? Download the firmware and you are on the air. (Note: As of this writing, AEA has not yet set up their BBS to allow downloads, but it is their intention.)

Inside the Unit

The heart of the DSP-2232 is a 24 MHz Motorola 560001 DSP chip. This specialized IC provides the modems for all operating modes. The list of supplied modems is

impressive:

- 300 bauds HF packet (FSK)
- 1200 bauds VHF packet (FSK)
- 2400 bps packet (DPSK)
- 1200 bps packet (BPSK—satellite)
- HF RTTY (FSK)
- Morse
- Facsimile
- SSTV (256 levels)
- 9600 bps (FSK—KK9G)
- 1200/4800 bps ASCII (satellite)
- Dual-port 300/1200 or 1200/1200 packet
- Dual-port RTTY or AMTOR/1200 baud packet

The DSP-2232 uses a Zilog Z-180 embedded microprocessor to handle protocol conversion—that is, to deal with the logic of maintaining an intelligent connection like packet or AMTOR. On the back of the unit are two radio interface ports which operate simultaneously, allowing true dual-port operations in some modes. The DSP-1232 is a single-port version of the controller, though it too provides radio interface connections which may be used one at a time. These radio connections are traditional 5-pin DIN connectors and the manual provides diagrams for connecting the unit to most popular radios using the supplied cables. The five lines available at the interface are: receive audio, transmit audio, PTT capable of +25 to -40 VDC, squelch input, and ground.

Each radio is also supplied with a direct FSK (Frequency Shift Keying) output—available from a single 5-pin DIN—for high speed operation, and a CW keying output (RCA jack)—positive or negative—for Morse code operation. Next to the CW outputs is a satellite up/down frequency control output for Doppler compensation. The current firmware does not use this jack, though some frequen-

cy compensation scheme is in the works.

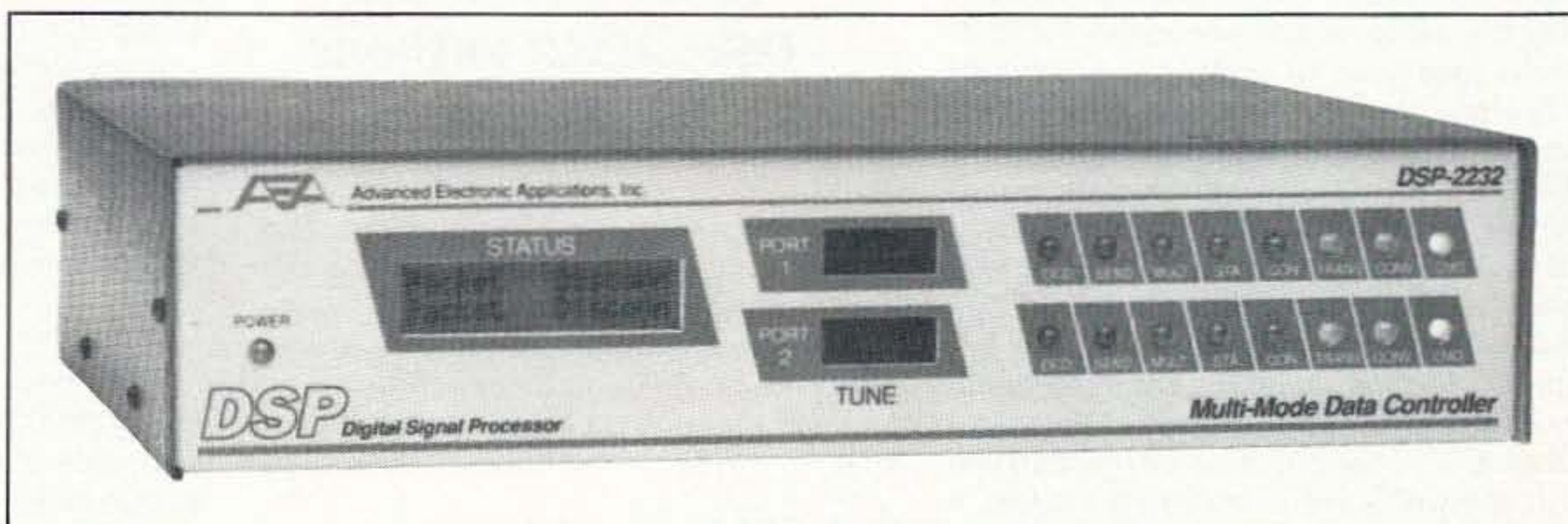
The computer or terminal device is connected to an AT standard 9-pin D connector which provides RS-232 I/O. The unit is also capable of driving a Centronics parallel printer directly through a 25-pin D connector. Power for the DSP-2232 is a nominal +13 VDC (12-16) @ 1.1 A through a coaxial power connection on the rear panel. No power supply is provided, though a terminated pigtail is included for connection to your shack's supply.

The DSP-2232 is housed in a sturdy aluminum cabinet with an attractively silk-screened front panel. In addition to a full set of standard LED status indicators, the unit sports an easy-to-read backlit LCD display which provides plain text status messages—a very hale feature. Between the LCD and LEDs are two LED bar graph tuning indicators—one for each port.

The Manual

I have mixed feelings about AEA's manuals. As is typical for AEA controllers, the DSP-2232's is quite complete as far as technical information goes. In addition to the extensive radio wiring information, AEA has provided full schematics for the unit. The manual provides step-by-step installation and check-out instructions and extensive tutorials on the various operating modes. Also included is a complete and well-written reference to the commands understood by the controller—though it is not broken down by mode. So, what's the problem?

Most of the beginning users that I spoke to had a hard time getting started using the AEA manual, even with the extensive information provided. It seems that there is no middle ground in reading it. A novice must go through the (potentially) tedious installa-



The AEA DSP-2232.

tion process outlined in the manual step-by-step to use it. Though the described procedure is an excellent one, there is much that could be left out unless a problem arises. Many of the users I spoke with found this process daunting—taking nearly a day to complete in some cases. To be honest, though, I'd much rather use an AEA manual with whatever its flaws than most others I have seen. The AEA manual has the information you need, if you can find it.

Compatibility

The DSP-2232 control firmware is essentially the same as the venerable PK-232. This is good news for those of you who wish to upgrade your PK to a DSP—your current terminal software will work. Those using the PC-Pakratt II (or MacRatt) terminal software will find operation the same. One thing that will need to be improved, though, is the 1-bit (black and white) facsimile display. The DSP-2232 can produce gray scale fax images, but PC-Pakratt II cannot use them. Those of you just starting with AEA products will be able to use any terminal program you wish. If it works with a telephone modem, it will work with the DSP-2232—except for fax.

Performance

If performance is the bottom line, then I

recommend the DSP-2232 without hesitation. On VHF packet, the unit performs like a champ. This isn't too hard, and most TNCs/controllers do. On HF, though, the DSP-2232 shows what it can really do to pull packet, RTTY, and AMTOR signals out of the mud, which other units will not. AEA has lived up to their own tradition of top-

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notch HF performance. Though I was not able to test it myself, those I have spoken to who use the DSP-2232 for satellite operations are very pleased with its performance there—the only disappointment being the lack of Doppler shift compensation at this time.

Some Flaws

The DSP-2232 is not perfect; what is? The good news is that what is lacking is software. All of the complaints are not-yet-implemented features. The frequency

up/down control, for example. There is also currently a lack of software to take advantage of the SSTV and gray scale facsimile, but these are on the way. The DP-2232 is a relatively new product using a relatively new technology. AEA has been very responsive in correcting problems as they are brought to light, and adding features as the production schedule allows. For example, a PACTOR upgrade for the unit is due out soon. This will be a software upgrade—proving the value of DSP.

The other area that some might consider a problem is cost. The DSP-2232 is not cheap. On the other hand, "you get what you pay for" applies to this product as much as any. The box is protected against obsolescence by its DSP technology until our digital modes exceed its computer power. This will certainly happen someday, but it isn't an imminent concern.

Conclusion

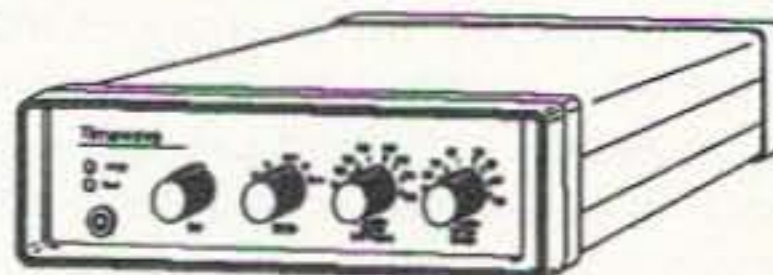
If the price isn't a problem, I can recommend the DSP-2232 without hesitation. It is truly state of the art. Those of you involved in high speed packet, satellite, or HF operations will have a hard time doing better at any price. The DSP-2232 has a safe future. As the VHF packet and HF digital networks mature, the DSP-2232 will follow with just a change of firmware. 73

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