

AE-3

Reviewed by Charles Hansen



■ PHOTO 2: Preamplifier rear view.



■ PHOTO 1: Preamplifier front view.

Audio Electronic Supply, 111-A Woodwinds Industrial Ct., Cary, NC 27511, 1-919-460-6461, E-mail info@audioelectronicsupply.com, www.audioelectronicsupply.com. Kit \$399, assembled \$599, Oil-filled cap upgrade \$118; JAN 6SN7 upgrade \$70. Dimensions: 7" W ×

5.56" H × 10" D; net weight: 12 lbs. Limited three-year warranty.

The Audio Electronic Supply AE-3 is a Class-A triode preamplifier. *Photo 1* shows the front panel, which has a three-position input selector (CD, Aux1,

Aux2), a volume control, and a blue LED indicator.

CONSTRUCTION

The preamplifier uses a heavy-gauge steel chassis, with decorative wood side panels. The top of the unit has a large power transformer, two 6SN7 tubes and an LT8512 linear regulator IC in a TO-3 package.

The rear panel (*Photo 2*) has the IEC power receptacle, the power switch, and eight high-quality gold-plated Teflon®-insulated RCA jacks for the three pairs of line-level inputs and one pair of outputs. There are no provisions for a tape loop or phono stage.

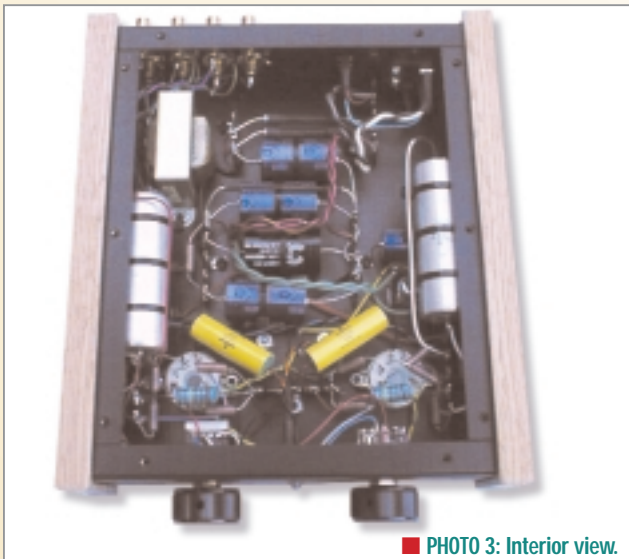
Photo 3 shows the amplifier with the bottom cover removed. While this particular unit was factory assembled, the assembly and operating manual is well-thought-out, with sequential assembly sketches reminiscent of the Heathkit manuals. There is no PC board since the unit is hand-wired to tube socket lugs and seven terminal strips.

The unit is furnished with a heavy power cord. The power transformer primary can be connected for 120V or 240V mains. A line fuse is located in a drawer in the IEC power receptacle. The third pin of the AC receptacle is connected to the chassis.

TUBE-POLOGY

The selected input signal is applied to an Alps 100k dual audio pot. Each wiper is connected to the grid of half a 6SN7 (or optional 6DN7) triode. The output of the first stage is capacitor cascaded to the second stage, which is configured as a cathode follower. This inverted output will require you to reverse the normal speaker connections to most power amplifiers to achieve normal polarity. The cathode is coupled to the output jack through a 1µF capacitor (see the following optional cap description).

The power supply is full-wave rectified by semiconductor diodes and applied to a capacitor-choke



■ PHOTO 3: Interior view.

pi-filter. A pair of 110V zeners provide shunt B+ regulation. The heaters are connected in series, and supplied from a rectified, filtered, and IC-regulated 12V DC source.

Audio Electronic Supply supplied the following tube complement with the review AE-3:

Two Chinese 6SN7GTs with no markings whatsoever on the tubes
Two upgrade Philips ECG JAN 6SN7WGTs

There are a number of upgrade options listed on the “Tweak Sheet” for the AE-3, and the sample unit had the JAN 6SN7s and the oil-filled coupling caps—220nF for the cascade stage and 2μF for the output stage.

MEASUREMENTS

I installed the upgrade JAN 6SN7s and ran both channels at 2V RMS for one hour into 10kΩ. The AE-3 inverts polarity. The input impedance measured 82k left channel and 87k right channel at minimum volume. At maximum volume, these numbers dropped to 76k and 80k. The output impedances for both channels measured 660Ω at 1kHz.

The AE-3 showed unity gain when the volume control was set at approximately 11 o’clock. I made all the measurements at a volume setting corresponding to 2V RMS output with a 0.5V RMS test signal (12dB gain). With my ear against the speaker, I detected a very low level of hum and hiss, but the AE-3 was absolutely quiet from my listening position with

my own power amplifier. There was a slight hush sound during power-up, but no noise at shutdown.

I recorded the response for loads of 100k, 47k, and 10k. The 2μF output coupling cap will roll off the low frequency –3dB at $f = \frac{1}{2\pi RC}$. At 10k, this –3dB point is 8Hz. The frequency response for the AE-3 was within ±3dB from 7Hz to 92kHz, with 0dB defined as 2V RMS at 1kHz into 10k. It was –0.6dB at 20Hz and –0.2dB at 20kHz. With a 100k load, the response was flat down to 20Hz and down –3dB at 2Hz.

HF response rolled off gradually above 20kHz and there was no additional gain peaking. Only a 0.05dB difference in output voltage at 1kHz existed with loads of 10k to 100k.

The output voltage (1% distortion) is a generous 13.9V RMS for the left channel and 16V RMS for the right. The AE-3 never really goes into hard “brick wall” clipping. The peaks of the waveform are softly compressed with increasing output voltage. At 2V RMS output, 20Hz–20kHz, the THD+N never exceeded 0.1%.

The CCIF intermodulation distortion (19 + 20kHz) at 2.84V pk-pk into 10k was 0.019%. Multitone IMD (9kHz + 10.05kHz + 20kHz) was 0.008%.

The AE-3 provides a maximum of 21dB gain. When I used it with the AE-25 power amp, which provides only 15dB of gain, I set the volume control around 9 o’clock. You will need to set it much lower for amplifiers with more gain. This should not be a problem, since the volume-control tracking was very

good, with only 0.3dB difference for 0.5V RMS output.

Figure 1 shows THD+N versus output voltage into 10k at 20Hz, 1kHz, and 20kHz. I engaged the test-set 80kHz low-pass filter to limit the out-of-band noise.

Using a 1kHz signal, I achieved 13.9V RMS at 1% THD+N. Nearly the same 1% THD+N level is available at 20Hz (13.5V RMS) and 20kHz (12V RMS). Clipping at 3% THD+N was nicely rounded at the peaks.

The distortion waveform for 2V RMS into 10k at 1kHz is shown in Fig. 2. The upper waveform is the amplifier output signal, and the lower waveform is the monitor output (after the THD test-set notch filter), not to scale. This distortion residual signal shows

mainly the second harmonic, with just a bit of high-frequency noise. This noise is of no significance since THD+N at this point is just 0.022%.

The spectrum of a 50Hz sine wave at 2V RMS into 10k is shown in Fig. 3, from zero to 1.3kHz. The THD+N measured 0.029%, and the few harmonics present are all below –80dB.

I viewed the response of the AE-3 to three square wave test frequencies on an analog scope using a 10k load. The response at 40Hz showed a moderate and acceptable amount of tilt. The 1kHz square wave was just about perfect. The 10kHz square wave had slight rounding on the leading edge, with no hint of peaking or ringing.

(*mfg. response on page 69*)

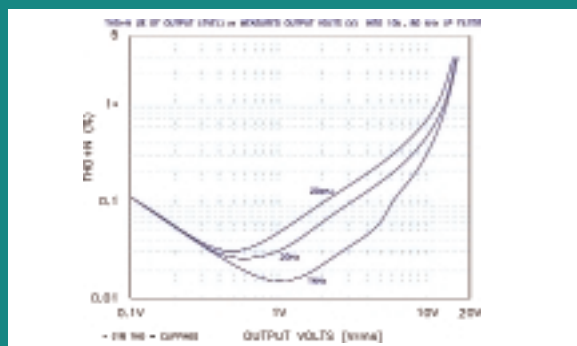


FIGURE 1: THD+N versus output voltage.

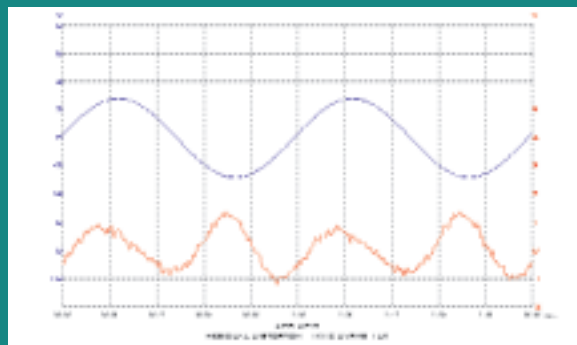


FIGURE 2: Residual distortion.

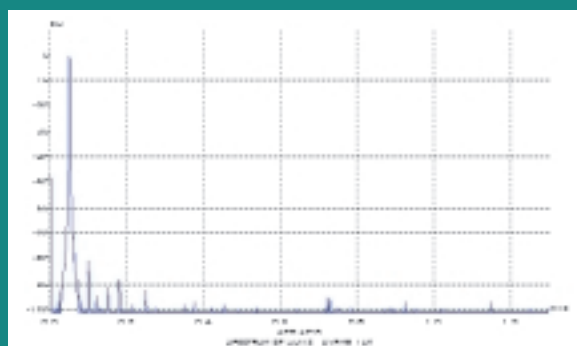


FIGURE 3: Spectrum of 50Hz sine wave.

TABLE 1: MEASURED PERFORMANCE

PARAMETER	MANUFACTURER'S RATING	MEASURED RESULTS
Frequency response	10Hz–20kHz	7Hz–92kHz ±3dB
Total harmonic distortion	N/S	0.022%, 2V RMS 1kHz
IMD-CCIF (19 + 20kHz)	N/S	0.019%
MIM (9 + 10.05 + 20kHz)	N/S	0.008%
Input impedance	100kΩ	76k–87k
Signal to noise ratio	–88dB	
Noise	0.8mV	
Gain	20dB	21dB
Output impedance	560Ω	660Ω
Crosstalk, 100Hz (L-R)	N/S	–73dB
1kHz		–66dB
10kHz		–47dB
20kHz		–42dB
Power requirements	25W	

Reviewed by Ken and Julie Ketler

Audio Electronic Supply (AES) was founded in 1993 as a branch of Cary Audio Design (that's right, "you know who") due to a large number of requests for electronics parts/components from customers and dealers. AES now offers its own line of kits, which are all designed by Cary founder Dennis Had, including tube and solid-state amps/preamps and even a loud-speaker. AES also sells a healthy supply of connectors, cables, tubes, and all of the other electronic components a do-it-yourselfer needs to build his/her own equipment. But, for an extra fee (about 200 clams), AES will also build its kits for you. So, you have two options:

1. Build yourself some excellent audio components.
2. Purchase their equipment only as serious pieces of audio gear and not PC board games (Julie's vote).

AES also has a service department that will diagnose and service any of your other audio equipment (homemade or commercial) for a flat service charge of \$95 plus parts and shipping.

SOUND EVALUATION

The review unit that we received included a pair of Philips 6SN7 tubes (which are considered upgrades from AES) and a pair of Chinese no-brand equivalents. Changing hot tubes back and forth in the middle of a listening test brought visions of a Three Stooges routine to mind! Since our time with the AE-3 was very short, we decided to conduct our evaluation with only the Philips tubes.

Before conducting any critical listening sessions, we needed to ensure that the tubes were sufficiently broken in, so we left the AE-3 powered up for 72 consecutive hours and listened to music through it whenever our house needed some musical background (i.e., many hours each day). Prior to any detailed listening, we made sure to leave the unit on for a minimum of eight hours.

Using the following selections from *Hi-Fi News & Record Review's* CD Test Disk III, we took our time listening and comparing it to our own preamp, a Creek OBH-12 passive volume control, which is very transparent, passing the signal without leaving a footprint of its own. We noted the following results:

TEST 1

TRACK 2—Jerusalem/Parry

JK: In this piece, the voices are very crisp as though I am sitting in the first row at the production on opening night. The sound of the violins is brighter and clearer than with our preamp. I hear exactly where they are placed in the symphony.

KK: There is a nice air around the voices and violins with a wide soundstage.

TEST 2

TRACK 4—Trumpet Concerto in C/Vivaldi

JK: This is a beautiful presentation. I can almost see the placement of the instruments as they play their parts. Although at times, the horns overpower my ears and sound slightly brash.

KK: The Creek OBH-12 has a slight high-frequency rolloff that manifests itself as a midrange boost. This cluttered the trumpets tone a bit. I never heard this

until I tried the AE-3! Thanks, Mr. Had! Excellent imaging of solo trumpets and string sections, particularly the detailed clicks of fingers on the cello strings.

TEST 3

TRACKS 5/6—Peter & the Wolf (narr)/Prokofiev

JK: I remember hearing this same story on LP, which brings me back to when I was seven years old. The violins sound crisp, sharp, and very defined; I hear where the musicians are seated. The whole piece surrounds the listener and gives a full stereo sound.

KK: Easy to hear that Sir John Gielgud's voice was recorded in a booth and an almost monaural reverb effect was later added to his voice. The room acoustics of the symphony are much wider, often seeming to come from outside the boundary of the loudspeakers. The instruments all have nice detail. Not "bright," but "well focused."

TEST 4

TRACK 7—Welcome, Welcome/Purcell

JK: I hear every breath the singers make between notes. I picture the chorus in the front and the oboes slightly behind them. It sounds beautiful when the recorders play in unison with the oboes.

KK: The upper vocal registers of the chorus are smooth and unatiring. Each harpsichord note is clearly defined.

TEST 5

TRACK 10—Corkhill (piece 2)

JK: This piece details the contrasting sounds that percussion instruments can make in a mere 60 seconds. The sound is so clearly defined that I can hear when the drumstick actually attacks the drum skin. The feeling in the room becomes almost peaceful when the drums play softly, and slightly violent when they play louder and faster.

KK: Louder drum sections smack me in the face with both preamps, excellent transient response. But it is during the very quiet sections that I am most impressed. These drums do seem to be farther away, somewhat behind the speakers. Excellent low-level detail.

TEST 6

TRACK 14—Rio Napo RSS Demo

JK: The preamp does a spectacular job of making the listening area come alive with this piece. In one section, the music sounds like a snake that slithers from left to right and back again. It seems as though I am actually in the jungle with activities happening all around me.

KK: This track is fun. It is made with a system called RSS, which I believe manipulates phase information between stereo channels to present a widened and somewhat 3D image. With both preamps, the effects and instruments that pan left-to-right are similar. There is an apparent front-to-back panorama that the AE-3 reproduces very well. Vocal sibilance (s and t sounds) is heavy and slightly bothersome, but I believe that this is part of the recording and not the fault of the playback system.

FINAL THOUGHTS

Dennis Had, with his less-is-more design approach, has produced an extremely fine piece of gear for not a huge amount of money (all things being relative). If you'd like to save a few extra dollars, by all means try the kit version of this product.

Overall, the Audio Electronic Supply AE-3 preamp yields an excellent level of detail, an upper bass/lower midrange sweetness, and a front-to-back soundstage that is hard to match. Whether you are a new *Glass Audio* reader or a veteran tuber, rest assured, fellow potato heads, the AE-3 is an excellent choice.

But What If I Wanted To Build It?

Although the scope of this evaluation is the final product and not the kit, the operation manual also contains the instructions for kit assembly. If you are considering the kit version of this unit, perhaps we can give you at least some brief information.

First and foremost, this kit looks as though it's moderately difficult to build, probably not for the first-timer. Some diagrams are computer drawn, but all of the layout/wiring diagrams are hand drawn and appear somewhat last-minute-looking. This is fine for engineers and technicians; however, a novice builder might find this a bit distracting and hard to follow. All in all, this is a very minor defect. If you have experience with assembling and soldering electronics, this shouldn't pose any real difficulty.

Overall, the assembly steps appear to be quite complete and comfortable to follow. The manual includes a detailed parts list with convenient check spaces to fill in as you progress. There are also useful testing and troubleshooting pages to help guarantee proper operation after you have connected all parts. One nice touch that gives this project a high-end flavor is the tweak sheet, which lists a few optional part substitutions that you can make to "elevate your new AE-3 to an even greater performance level...."

SONIC CHARACTERISTICS RATINGS

AE-3 Preamp

		0	1	2	3	4	5	6	7	8	9	10
Presence	JK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	KK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Stereophonic Effect	JK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	KK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Soundstaging	JK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	KK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ambiance	JK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	KK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>