Low Down Power, Part 2

Reviewed by Thomas Perazella

I measured all amps for frequency response, maximum power output into both 4 and 8Ω at 20Hz and 150Hz, and distortion into 4Ω at power levels from 2W to maximum power. For distortion measurements, I chose a reference frequency of 50Hz to determine the power level. Since not all frequency responses were flat, you may see some strange humps in the distortion curves at some power levels because boosts in the frequency response cause the output power to go above the reference value.

In addition, I measured maximum gain and noise relative to both 1W and maximum voltage into 8Ω. I determined noise figures with shorted RCA plugs inserted into both RCA input jacks, and took results at three volume-control settings—minimum, 20dB gain, and maximum. *Table 2* lists the maximum power output, gain, and noise figures of the four sub amps.

APEX JUNIOR

The Junior turned out to be the junior of this group as related to power output. It fell short of its claimed 130W by 16 at 150Hz and 35 at 20Hz.

Looking at the 8Ω figures reveals the source of the problem is a weak power supply. The stiffer the power supply, the closer to double will be the 4Ω output compared to the 8Ω output. If this supply were stiff, the claimed 130W would have been reached. However, in terms of dollars/W, the junior was the king at just over 77.5 cents/W. Noise was respectably low and gain was sufficient.

Frequency response was very good as shown in *Fig. 1*. The top curve indicates the response at the 125Hz crossover setting, with the bottom representing the 60Hz crossover setting. Below 20Hz, there is a rolloff at 12dB/octave. This will help prevent excessive cone excursion, especially in vented enclosures where the driver is unloaded below port tuning. Above 20Hz, the response is relatively flat until the crossover frequency is reached.

I made three distortion measurements into a 4Ω load, one each at 2W (*Fig. 2*), 50W (*Fig. 3*), and 100W (*Fig. 4*). The distortion was very low at all measurements except for a slight rise below 35Hz at 100W. Overall, the measurements were quite good, especially in light of the modest price tag.

MARCHAND PM31

This amp was a good performer. It was rated at 150W into 4Ω and produced that level at 150Hz. At 20Hz, the maximum power dropped only slightly to 144W, showing the strength of the power supply. This power did not come cheaply. At $1.97/W, it was the most expensive in terms of dollars per watt. However, subs do not live by power alone, and the other performance measurements were quite good as well. Frequency response was almost ruler flat, being down only slightly over 1dB at 10Hz (*Fig. 5*).

Distortion results at 2W, 50W, and 150W are shown in *Figs. 6*, *7*, and *8*, respectively. Distortion never goes above 0.1% at 2W, remains below 0.9% at 50W, and hovers around 2–3% at 150W.

The PM31 also came in with the lowest noise figures for any of the sub amps when in the operating mode. However, it also had the lowest gain, at 26dB, which could present a matching problem in

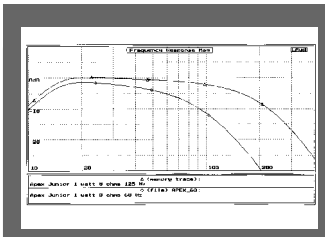

FIGURE 1: Apex Junior frequency response.

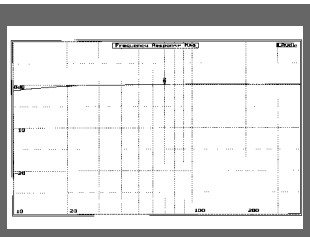

FIGURE 5: Marchand PM31 frequency response.

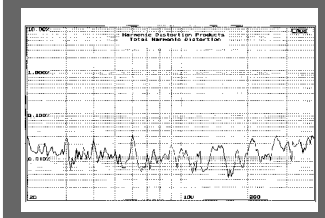

FIGURE 2: Apex Junior distortion—2W.

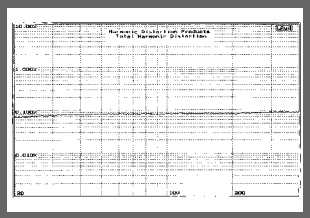

FIGURE 6: Marchand PM31 distortion—2W.

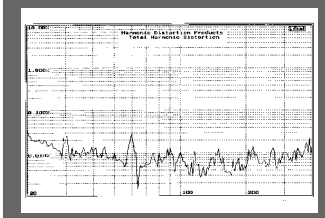

FIGURE 3: Apex Junior distortion—50W.

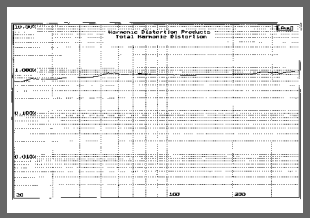

FIGURE 7: Marchand PM31 distortion—50W.

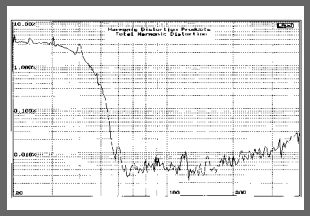

FIGURE 4: Apex Junior distortion—100W.

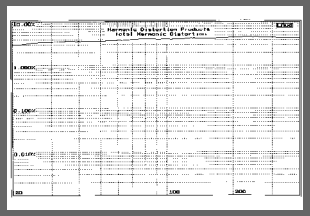

FIGURE 8: Marchand PM31 distortion—150W.

some situations. Overall, it provided a good showing, but was somewhat on the expensive side. All those heavy-duty parts do not come cheaply.

PARTS EXPRESS SW250A

This amp originally threw me for a loop when I measured it. My first test was for noise. If I had not tested other amps with the same setup immediately before, I would have thought my test setup was bad. My first reading showed a noise level only 33dB below 2.83V (1W into 8Ω). With the volume control set to maximum, it dropped to –15dB below 1W. I had never seen what appeared to be such a noisy amp.

To determine what was actually happening, I put a scope probe on the output and saw very little of the traditional 120Hz ripple you get from most power supplies. Instead, there was a lot of very high frequency hash. When I say high frequency, I mean in the range of 12MHz. That's even above dog-hearing country.

My true RMS AC voltmeters have very good high frequency response and were picking up this "noise." As I found out later, however, in real operation with a woofer, the amp was very quiet. The woofer could obviously not reproduce into the MHz range, so this hash was of no audible consequence.

The frequency response of this amp was far from flat, always exhibiting a rise in the 30Hz range. This is not uncommon for sub amps, as most drivers, especially very compliant ones, when placed in a small box exhibit a substantial rise in their resonant frequency. This boost helps restore some of the bass that would be lost due to the rolloff below resonance.

In theory it's not a bad idea, but I prefer a switch to defeat the boost if so desired. This amp had no such provision. Instead, it had an 18dB/octave rolloff below 30Hz to limit excessive excursion. Again, with a corner frequency that high, I would have preferred a method to either defeat the high-pass function or else lower the corner frequency.

Figure 9 shows the frequency-response curves with the crossover set for 160Hz and 40Hz. Both turnover points are actually a bit lower than indicated, but there are no real surprises here.

Because of the higher power rating of this amp, I actually made five distortion measurements. Power levels were 2W, 50W, 150W, 200W, and 250W. Results are shown in *Figs. 10*, *11*, *12*, *13*, and *14*, respectively.

Distortion at the 2 and 50W levels remains well below 1% at most frequencies except for a bump at 30Hz. At these power levels that bump does not appear to be excessive drive from the 30Hz frequency rise that was evident in the response curves. However, at 150W and above, the effect of the boost becomes clear. The distortion goes over 5% at 30Hz at 150W, over 8% at 30Hz at 200W, and over 14% at 30Hz at 250W.

Note that the scale has been shifted on the 250W graph to keep the results from exceeding the range. Looking at the 50Hz reference points on both the 200W and 250W graphs, it is clear that the amp is already into clipping at this point. The 30Hz boost only drives the amp further into clipping. In fact, maximum power at clipping was 186W.

Overall, this amp was the most controversial of the amps tested. The 250W rating was not met, but it still was quite powerful. The dollars-per-watt figure was $1.34, about in the middle of the pack. The amp stayed cool during operation and seemed to be more efficient than the others. The high measured noise did not translate to audible noise. It had the highest gain of any of the amps, providing the greatest range of matching with other parts of the system, but also the greatest difficulty in setting levels at the lower end of the volume range.

PARTS EXPRESS 300-794

This relatively new product from Parts Express is advertised as having an output capability of 250W into 4Ω, but the product sheet supplied with it states that the power is 272W into 4Ω. Who to believe? Actually, neither.

This amp had the highest output of any of the dedicated sub amps tested. It topped out at 286W into 4Ω at 150Hz, dropping to 237W at 20Hz. The price-per-watt figure was 79 cents/W, just slightly more expensive than the Apex Junior, but substantially more powerful.

Looking at the frequency-response curves revealed a smooth response, always peaking around 30Hz as with the previous PE amp. The most revealing characteristic of the response curves was the apparent lack of a defined plateau when higher crossover points were used. This amp has a continuous phase control, but that introduced some interesting results as can be seen in *Fig. 15*.

The top curve marked with a triangle represents the crossover set at 0° and 160Hz. The second curve marked with an X is with the crossover set at 0° and 40Hz. As you can see, there is a continuous drop in the output of the first curve from the turnover point of the 30Hz boost until around 160Hz, and then a very slight increase in the slope of the curve from that point forward. This is not your classic 160Hz crossover. The second curve looks more like a 30Hz bandpass filter.

The third and fourth curves are with the crossover set to 90° and 160Hz and 90° and 40Hz, respectively. The most immediate visible difference between these curves and the 0° curves is the substantial drop in amplitude as you rotate the phase control to produce a 90° difference.

By the way, the actual 90° point was not at the indicated 90° position on the rotary control. I determined the actual 90° point by using an oscilloscope. In fact, the phase change was quite nonlinear, with most of it occurring within about a 20° rotation of the phase control. This amplitude change will most likely produce a far greater effect on the perceived output of the sub than the actual phase shift of the signal. If you use this control, you must be careful to re-adjust levels with every phase adjustment; otherwise, you will be chasing two variables at one time.

The second most noticeable characteristic of the phase-adjusted curves is the apparent rotation of the curves around the corner frequency. It appears as though the two 90° curves have been rotated about 30° clockwise in relation to the 0° curves. As a result, the low-frequency rolloff of the 90° curves is shallower than the 0° curves, while the high-frequency rolloff is steeper. Again, I guess that the change in the slopes of the resulting frequency-response curves will have a greater impact on the perceived sound than the phase difference.

Also noticeable is the surprising similarity of the 90° 160Hz curve and the 0° 40Hz curve. This is not the result I would expect of two such varied crossover points. This means that you must be very careful when making these adjustments, as they interact to a substantial degree with the effects of each other. If you make multiple changes at a time, you may run around chasing your tail for quite a while.

Because of the power output of this amp, I again planned to make five measurements as with the previous PE amp. It actually turned out to be six measurements because as I was halfway into the measurement at 150W, the protective thermal switch on the amp tripped. This was the first time in this series of tests that a protective circuit activated. I waited a few minutes for the amp to cool down and repeated the test with no problems.

During these tests, taken with the LAUD measurement system, a series of sine waves at various frequencies is introduced into the amp and distortion measurements are taken. The duty cycle is about 50%; that is, the signal is on for 50% of the time and off 50% of the time. In between tests, I saved the results to a computer file, printed out the data, set a new power level for 50Hz, and began the test again. The duty cycle during the interim time is much below 50%.

To make sure there were no further interruptions in the testing of the 300-794, I allowed it to cool a few minutes before performing a subsequent test. I had no further interruptions and there appeared to be no lasting problems due to the thermal overload. I would not expect this to be a problem in normal use.

The distortion measurements

were quite good with this amp. The results are shown in *Figs. 16–20*. At any frequency, the distortion remained below 1% and below 0.1% above 20Hz, as long as the output was below clipping.

Starting with the 150W curve, the distortion begins to rise at 30Hz. This is because the bass boost centered near that frequency begins to drive the amp into clipping. The effect is more pronounced in the 200W curve and actually pushes the distortion over 10% on the 250W curve as the amp is driven heavily into clipping. Note again that the 250W graph has the scale changed to keep the curve from going off scale.

The results were good with the only caveats being the unorthodox operation of the phase control and the poor action of the crossover when set to higher frequencies.

AUDIOSOURCE AMP THREE

I saved this amp for last because it is really a different animal and not a direct comparison to any of the previous. However, it is a very real, although more complicated, alternate. The measurements are typical of a modern "perfect" amp.

For example, looking at the frequency-response curve of *Fig. 21*, you'll notice immediately that it is nearly a straight line. You might not notice, however, that the scale has been changed from 10dB per major division to 1dB. With the scale set the same as for all the other amps, the frequency-response curve disappeared into the 0dB line. Even with the greatly expanded scale shown here, there is only a slight droop of about 0.05dB at 10Hz. Enough said about frequency response.

With one channel driven, power output reached clipping at 319W into 4Ω. With both channels driven, clipping occurred at 267W. In bridged mono mode into 8Ω, the clipping point was 536W. The dollar-per-watt figure is about 65.5 cents/W. Remember, however, this cost does not include any electronic functions other than level control. An external active crossover will add considerably to the price.

Because of the high power output of this amp, I ran six distortion measurements. The last was at 300W with one channel driven. The results are shown in *Figs. 22–27*.

The curves from 2W to 150W are essentially in the residual noise of the measuring system, being below 0.01%. Up to 250W, the distortion remains below about 0.5%. At 300W, the distortion breaks 1% at 20Hz, but is below 0.5% from 30Hz up. Very good results, indeed.

LISTENING

Before describing the listening tests I performed with these amps, a disclaimer is in order. The sub I use in my system is an excellent reference but has spoiled me for most commercial subs. It consists of eight DV12 12" woofers using a 450ft^3 loft as an enclosure. For details, refer to the article "True Bass" in *SB* 5/96.

In a nutshell, the f_3 is 12.5Hz and the sub can produce 122dB at 16Hz at the listening position before reaching 10% distortion. I did not think that I should use that woofer to test these sub amps, since it certainly would not be representative of most applications.

Instead, I chose two excellent 12" woofers, the Audio Concepts SV12 and HSU Research ASW1201 and used both in the same 2.7ft^3 sealed enclosure. Since that enclosure was normally used for other purposes, I did not make cutouts to directly mount the amps in the enclosure, but rather connected the lead wires to the terminals on the enclosure.

The SV12 is the spiffier-looking of the two, with a cast frame, gold-plated terminals, and gold lettering on the dust cap. It also has an X_{MAX} of 12.8mm and nominal impedance of 4Ω. I've used this woofer before in other tests with good results. The last time I checked, price on this driver was $129.

The ASW1201 is a little more pedestrian in the looks department, with a stamped frame and solder terminal connections. The looks are very deceiving, however, as this is also a very competent woofer with an X_{MAX} around 13mm and a nominal impedance of 8Ω. I've used this driver for several years in the range between my sub and midrange drivers. The last time I checked price it was $109.

The SV12 has an f_S of 19Hz and the ASW1201 has an f_S of 29Hz. However, the SV12 has a relatively high V_{AS} and the HSU a relatively low V_{AS}. When mounted in the sealed box, the f_B of the SV12 combo was 40.4Hz, and the f_B of the HSU combo was 43.1. That provided a pretty close match for testing purposes.

The subs in this test covered the range up to 80Hz. Above that, I used two Sequerra Met 7 monitors. High-pass filtering for the Met 7s was provided by the high-pass section of a pair of Orban model 672A parametric equalizers. They provided a 12dB/octave slope at 80Hz. I positioned them on stands 4' out from the front wall and 6' apart. I positioned the sub in use in the front-right corner of the room.

To get a rough estimate of the sound-pressure levels produced during the tests, I used my Radio Shack sound level meter set to C weighting and fast response. Power for the Met 7s came from a second AudioSource Amp Three that I own. All source material was from CDs delivered by a Sony 707ESD player. The preamp used is a custom-built unit.

I chose the following source material to cover various types of bass, including piano, bass guitar, drums of different sizes, and very low frequency special effects:

Columbia C2K68519
Pink Floyd—*The Wall*

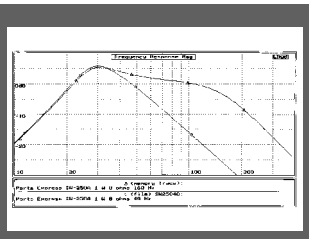

FIGURE 9: Parts Express SW250A frequency response.

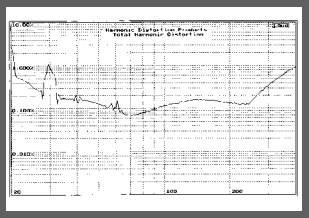

FIGURE 10: Parts Express SW250A distortion—2W.

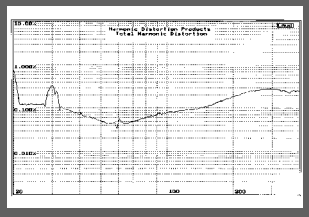

FIGURE 11: Parts Express SW250A distortion—50W.

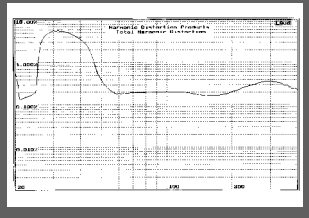

FIGURE 12: Parts Express SW250A distortion—150W.

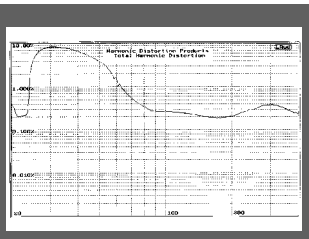

FIGURE 13: Parts Express SW250A distortion—200W.

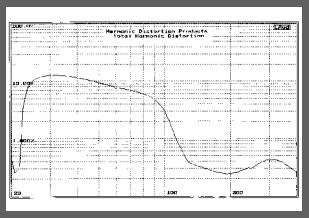

FIGURE 14: Parts Express SW250A distortion—250W.

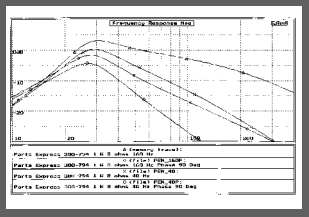

FIGURE 15: Parts Express 300-794 frequency response.

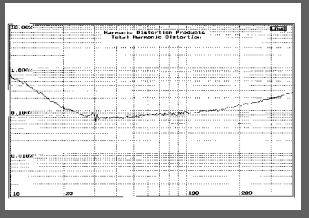

FIGURE 16: Parts Express 300-794 distortion—2W.

Telarc CD-80342
The Great Fantasy-Adventure Album—"Jurassic Lunch"
Elektra 9 61315-2
Sergio Mendes—*Brasileiro*
Tristar Music WK36852
Kodo—*Ibuki*
Columbia CK57424
Tony Bennett—*Steppin' Out*

I performed two complete sets of tests. The first used the ACI woofer in conjunction with all the amps and source material. The second repeated the test procedure with the HSU woofer. Before playing music with each amp, I listened for any audible noise at the listening position. Note that because of its late arrival on the scene, I did not perform any listening tests of the Parts Express 300-794.

A. PHASE ONE—THE ACI WOOFER

1. Apex Junior. There was no noticeable noise at the listening position.

- *The Wall*. This CD has a good balance of complex sounds including percussion and bass guitar. The bass was balanced with some limitation of the kick bass when levels went above around 98dB. In the mid-90s, the results were quite good overall.

- "Jurassic Lunch." This cut represents the scene in Jurassic Park where the lawyer gets eaten by the T-Rex. There are some 12Hz simulated foot steps that are low in intensity with other higher-level bass as well. With the Apex, there was some foot stomp. The overall bass was good, but there was not much floor shake.

- *Brasileiro*. The first cut, "Fanfarra," has really good percussion that becomes almost explosive. The result here was very good. The sound was clean with good transients. The second cut, "What Is This," has some very high-level low bass just past two minutes in. It was reproduced very well into the high 90s to 100dB.

- *Ibuki*. The drum work on the track, "The Hunted," is very dynamic and clean. The dynamics will crush a bad system. Here the drums sounded very good up to around 103dB, where they started to sound a little harsh.

- *Steppin' Out*. The Bosendorfer piano in this CD provides a good test of bass smoothness. Too much and it sounds bloated. Too little and it loses its warm character. In addition, the string bass is almost a little heavy to start with. Play it over a woofer with a lack of control and you have bass mush. The reference track was "Who Cares." The Apex/ACI combination did very well on the piano and Tony Bennett's voice. The bass was good, but just a little fatter than with my reference.

2. Parts Express SW250. There was just a very slight amount of noise at the listening position. It represented itself as a slight hum. Setting the level balance with this amp was a little difficult because of the high gain. I was working in the lower region of the volume control, and a slight change made a large volume change.

- *The Wall*. When the mid-bass level was brought to where it should be, the overall bass seemed a little heavy. The kick bass was good with not too much mid to upper bass.

- "Jurassic Lunch." There was not much foot stomp and not much floor shake.

- *Brasileiro*. "Fanfarra" had good initial percussion. The lowest notes were a little heavy but very clean. "What Is This" had good initial percussion, and the very low bass notes two minutes in were very strong and well defined up to around 105dB. Above that the sound became a little wooly. The very lowest bass was a little shy.

- *Ibuki*. The bass drum was very good. It limited around 105dB.

- *Steppin' Out*. The piano, bass, and voice all sounded good with this combination. It sounded better with a little more gain on the bass than with the other pieces.

3. Marchand PM31. This amp produced no audible noise at the listening position. Gain was a bit on the low side, requiring me to lower the drive to the monitors to get a proper balance even with its gain set to maximum.

- *The Wall*. Very natural bass, not at all bloated. Good transients on the kick bass. A little lighter on the deep bass, making it sound a little "faster." Clean at 105dB peaks.
- "Jurassic Lunch." Some 12Hz foot stomp, but not much floor shake.
- *Brasileiro*. "Fanfarra" had very tight and clean percussion. The peaks were clean to 108dB. Definition was very good. "What Is This" had good lead in percussion, but just a tad on the thin side. The low notes about two minutes in were very clean and tight, but not quite as deep. Output was good up to 105dB.
- *Ibuki*. This was very clean and dynamic up to 105dB.
- *Steppin' Out*. The piano had a warm and detailed sound. The voice was also very good, but the string bass was a little boomy.

4. AudioSource Amp Three. This amp produced no noise at the listening position.

- *The Wall*. The bass was very detailed. The kick bass was tight to around 105dB. A little thinner than the others.
- "Jurassic Lunch." Some 12Hz foot stomp, but not much floor shake.
- *Brasileiro*. "Fanfarra" had very clean, tight percussion to around 106dB. "What Is This" had very detailed bass in the introduction, but a little thinner than the others. Deep bass was clean and detailed to 106dB, but not quite as deep.
- *Ibuki*. Good, tight drum sounds to around 105dB.
- *Steppin' Out*. The piano and voices were very well defined, but a tad light. Strong bass, but a tad boomy.

B. PHASE TWO—HSU WOOFER

1. Apex Junior

- *The Wall*. Bass with kick drum good to around 102dB. Tight and punchy.
- "Jurassic Lunch." Not much floor shake, but good overall impact.
- *Brasileiro*. "Fanfarra" had good intro and follow on percussion to 106dB. "What Is This" had good opening percussion to 106dB. The later bass notes were tight and reached 106dB.
- *Ibuki*. The lead-in drum part was tight and punchy. The main part of the piece was good to around 105dB, getting a little harsh above that.
- *Steppin' Out*. The piano and voice were very good. The string bass was a little heavy.

2. Marchand PM31

- *The Wall*. The bass was very clean and natural sounding. The kick drum was clean to around 105dB.
- "Jurassic Lunch." Not much floor shake, but well defined.
- *Brasileiro*. "Fanfarra" had good opening percussion to 106dB. "What Is This" had both good opening percussion and deep bass to 106dB.
- *Ibuki*. Good impact on the drum to 106dB levels.
- *Steppin' Out*. The piano was very good with just a slight touch of leanness. The bass was very good with just a touch of fat.

3. Parts Express SW250

- *The Wall*. Good, full bass. The kick bass was good to about 103dB.

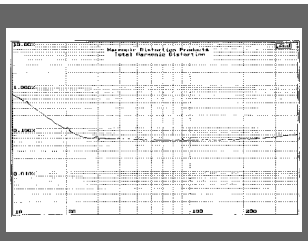

FIGURE 17: Parts Express 300-794 distortion—50W.

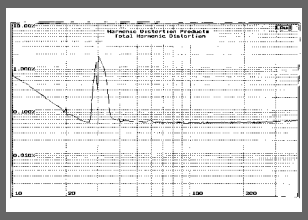

FIGURE 18: Parts Express 300-794 distortion—150W.

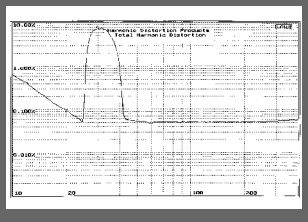

FIGURE 19: Parts Express 300-794 distortion—200W.

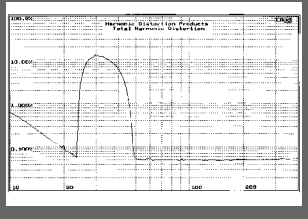

FIGURE 20: Parts Express 300-794 distortion—250W.

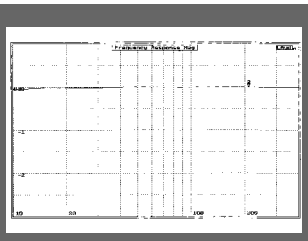

FIGURE 21: AudioSource Amp Three frequency response.

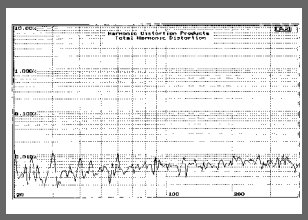

FIGURE 22: AudioSource Amp Three distortion—2W.

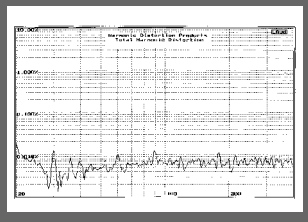

FIGURE 23: AudioSource Amp Three distortion—50W.

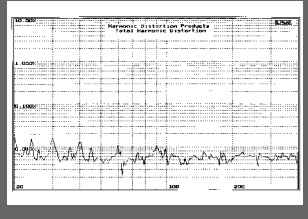

FIGURE 24: AudioSource Amp Three distortion—150W.

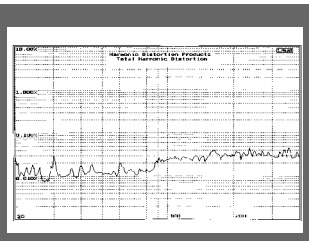

FIGURE 25: AudioSource Amp Three distortion—200W.

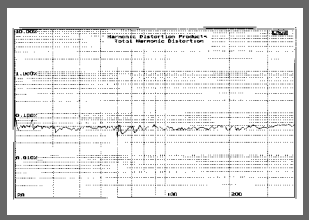

FIGURE 26: AudioSource Amp Three distortion—250W.

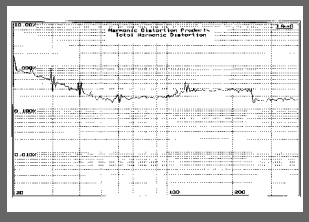

FIGURE 27: AudioSource Amp Three distortion—300W.

- "Jurassic Lunch." Almost no floor shake, but otherwise strong bass.

- *Brasileiro*. "Fanfarra's" opening percussion was good to 106dB. "What Is This" had good opening percussion to 106dB. The output on the low bass was good to around 105dB.

- *Ibuki*. The lead-in drum was full, but not hard. The main part of the cut was good until around 106dB.

4. AudioSource Amp Three

- *The Wall*. The bass was tight and clean. The kick drum sounded clean to around 105dB.

- "Jurassic Lunch." Some 12Hz foot stomps but not much floor shake.

- *Brasileiro*. "Fanfarra" had tight and detailed percussion in the intro to around 108dB. "What Is This" had very tight and detailed intro bass to around 107dB. The deep bass around two minutes in was clean and detailed to around 107dB, but not quite as deep as with the ACI woofer.

- *Ibuki*. The intro was very tight and detailed with the main section reaching levels in the range of 106dB while still clean.

- *Steppin' Out*. The piano and voice were very detailed, but a little light. The string bass was good, but a little on the fat side.

DECISIONS, DECISIONS, DECISIONS

What's the bottom line on these amps? Probably the most pertinent impression I can give is that the first piece I listened to with the first amp and woofer elicited the response: "This sounds much better than it has any right to." That impression was carried through the balance of the tests. The results were slightly different with the different amps and woofers. However, the overall impression of very good sound for not a lot of money survived all the listening tests.

I'm writing this conclusion right after coming home from a Gershwin concert at our local symphony orchestra. It was one of the recurring aural reality checks I perform to help me separate the wheat from the chaff. Did these amps produce the same kind of experience I had at the concert? You must be kidding me.

If anyone tells you that you can spend less than $1,000 and have an experience that is just like being at a live concert, button down your wallet. In fact, if anyone tells you that you can spend any amount of money and have the same experience as at a live concert, still button down your wallet. The simple fact is that sound is just part of the total experience. However, given the limitations of most listening rooms, it is amazing how good the sound can be today if you make the right choices.

A good subwoofer makes it much easier for any well-designed speaker to reach new heights of realism. The foundation that the subwoofer provides is essential to a sense of realism. Unloading the most demanding part of the volume-displacement equation from the main speakers allows for a cleaner, more defined sound.

INDIVIDUAL AMPS

The Apex Junior is probably the best value of the group. It doesn't have as much continuous power as some of the others, but in music tests that are transient in nature, the power supply was probably not stressed as much, helping to explain why it held its own in many of the tests. The response was fairly flat, leading to a balanced sound except for the very lowest notes.

The fact that it did not have a large boost in the bass allowed it to actually produce cleaner low bass than some of the others, although at relatively low levels. However, the lack of the boost made the balance a little light when used with woofers with an f_B above 40Hz. In my mind, that's not a problem as you can use external eq if needed.

What about the power level? Well, my preference in subwoofer design is to use, where possible, at least two drivers on opposite sides of the enclosure. That configuration, with cross enclosure bracing, can eliminate the majority of problem vibrations. In this case, I would simply use two Apex Juniors. That's right, if you build your sub this way you would have two—two—two amps in one. The price is certainly right and the amp has good performance.

The Marchand is a good example of a well-designed, broadband amp that would do well in almost any application. Words that come to mind when describing the construction include solid, heavy-duty, professional, and clean. This type of construction does not come cheaply, but it tends to pay off in consistent performance and durability. The performance was, in fact, very good, and this was the only amp that had a balanced input.

The flat response of this amp gives you the maximum flexibility to control the ultimate response of the sub by using your choice of external signal-level control. It costs more, but it also frees you from someone else's idea of what frequency contour should be used. If you prefer the performance usually associated with a stand-alone amp but with the convenience of a built-in, this is the one to look at.

The Parts Express SWS250 has lots of power and efficiency. The price was moderate. It did not meet its published power rating, but performed well in actual tests. The fixed boost at 30Hz worked to the advantage of these subs, which are typical of what you might expect in a home-built. However, on some material the low boost tended to make the sound a little slow.

This was a good amp, but its main claim to fame—high efficiency—does not seem to be a major factor when power levels of this magnitude are in play. Picking up efficiency in a multi-kilowatt amp that will be playing continuously in professional sound-reinforcement applications is very different than a home environment at lower power levels with occasional use.

The Parts Express 300-794 has lots going for it. The power output is high, the highest in this group. The price is right, build quality is good, and the distortion is low. Although I prefer to have frequency contouring controllable by the user, the fixed boost in this amp worked well in most situations with the subwoofers tested.

The caveats are a phase-control circuit that was tricky to use and a rather strange crossover contour. Both of these are more a problem with set-up and balancing, and I would not expect them to be a problem once things are settled.

How do I compare these to the separate amp and crossover such as the AudioSource and a custom-built crossover I used? For the majority of applications, I would say one of the sub amps on the market today would be a great choice for the novice or intermediate sub builder. Even if you are going to build a monster sub with multiple drivers, it might be cheaper to buy several of these amps rather than a multi-kilobuck, multi-kilowatt separate amp.

If ultimate control of frequency contouring and power are your goal, a separate amp and crossover may be your solution. Be aware though, that this type of power and control may not be the best value. Would I buy an integrated for my own designs? You bet! ❖

Manufacturer's Response:
I would like to thank Tom Perazella for including the Apex "Junior" in his review and for his favorable testing results. Apex Jr. is a Surplus Electronic company specializing in affordable electronics for both industry and do-it-yourselfers, offering both new and new surplus items.

For a limited time, Apex Jr. will offer a special price to readers of audioXpress. *The offer will end Friday, August 31st, 2001. Mention Perazella's review of the Apex "Junior," and the price for one piece will be $85, two for $165. You can view more info and other items on my website at www.apexjr.com.*

Steve Slater
Owner