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Hsu Research Ventriloquist VT-12 System/ STF-1 Subwoofer

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"...Sound was terrific...\$499...
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a \$10,000 speaker with a passive crossover today and see its value drop to three figures on ebay in three years. If you want to be the first on the block with the first real advance in speaker design since wide scale use of computer analysis and optimization then this is your speaker. A full scale review of the speaker in TSS is needed to confirm that now is the time to get a new pair of loudspeakers if you can afford the entry price. The rest of you may well want to wait until the cost track of the Active DSP based speaker moves down to what you can afford and more manufacturers offering different variations on the new technology enter the field.

-DAR

About a year and a half ago I had the chance to listen to the Legacy Audio Helix speakers, which also feature digital crossovers and all kinds of DSP magic. The results were amazing, and the flexibility of the speakers (not to mention their enormous dynamic capability and extended frequency range) was mind-boggling. The DSP system could be controlled from a computer screen, giving the owner the power to fiddle with crossover frequencies, slopes, phase angles, equalization, Q, and so on and so forth. At that time the system sold for around \$40K, which is certainly not small beans, but it was by far the most impressive loudspeaker demo I have ever heard, bar none.

The point, though, is that DSP is here, and as more manufacturers begin to exploit its potential, we may be in for some really exciting breakthroughs in speaker design. And that will mean, my friends, some exciting breakthroughs in the enjoyment of music in our homes.

-KWN

TSS

Hsu Research Ventriloquist VT-12 System/ STF-1 subwoofer

Manufacturer: Hsu Research, 3160 E. La Palma Avenue, #D, Anaheim, CA 92806; 800/554-0150; hsuresearch.com

Price: \$498 (includes four VT254 front/rear satellites, one VT641 center-front satellite, one VT251 center-back satellite, and STF-1 subwoofer)

Source: Manufacturer loan

Reviewer: Howard Ferstler

As I have stated in the past, I see a lot of advantages in subwoofer/satellite speaker

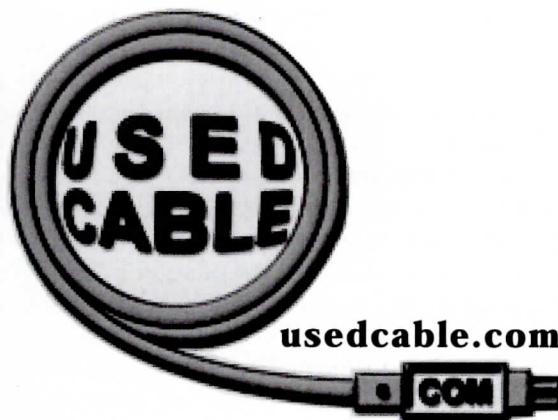
ensembles. Indeed, I like them a lot, particularly those that are affordable. All three of my somewhat more expensive than "affordable" systems are sub/sat arrangements, even though the main-channel speakers in each are big enough to operate decently running full range. Ultra-low bass extension being a given, one of the reasons I opted for sub/sat configurations with each is because they allow me to place the low-bass systems for the smoothest input to the room. This ability then allows me to locate the speakers that handle the middle-bass frequencies on up in locations that foster the best imaging and the fewest suckout artifacts.

While room-décor considerations have little to do with my own reasons for going the sub/sat route, they can be very important. Indeed, they will have much to do with what many other individuals do when it comes to obtaining a decent audio or audio/video system. Smallish (but not too small) satellites, working in combination with a good subwoofer, have the potential let the listener have their cake and eat it too, so to speak.

The Hsu VT-12 satellite array is one of those "eat it too" configurations, and in combination even with Hsu's smallest subwoofer, the STF-1, the package reviewed here offers up really good performance at a genuine budget price.

First, let's go over why it is that sub/sat systems

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can work full-range decently into the low bass. There have to be reasons why a subwoofer is location-invisible.

One reason involves the nondirectional character of the low bass. If audio wavelengths are long enough, directional clues are nearly impossible to pinpoint, because the widely spread-out waves hit the listener directly and from room boundaries almost in phase. The room essentially is pressurized by low-bass signals, and directional clues simply cannot form. Since proper subwoofer crossovers filter out shorter-wavelength frequencies, the low bass in a typical listening room seems to come from everywhere.

A second reason involves what is commonly called the "precedence effect." In most cases, the subwoofer will be located further away from the listener than the satellites. The nature of the first-arrival signal (the initial edge of a drum whack or movie-soundtrack explosion that would be reproduced by one of more satellite speakers) will insure that the brain locates the source at the satellite or between satellites if a phantom image is involved. The power of the precedence effect will mainly depend upon the crossover frequency - and the lower that frequency, the less important the phenomenon will be.

A third reason involves what is known as the "Franssen Effect," named for Nico Franssen (1926-1979), a researcher in hearing (particularly directional characteristics), architectural acoustics,

electro-acoustics, and musical instruments. Imagine a bass tone of moderately long duration with an abrupt starting point that is substantially steeper in rise time than the frequency of the tone itself. (Think of your typical bass-drum thwack.) The tone is sent to the crossover network and it routes the abrupt beginning to the satellites - and sends the steady-state, lower frequencies to the subwoofer. A listener sitting at roughly equal distances from the subwoofer and satellites, or even closer to the subwoofer than to the satellites, will perceive that the entire signal sequence is coming from

the satellite or satellites handling only the abrupt beginning part of the signal.

Although this is related to the precedence effect, it is not quite the same, and involves the nature of the human hearing mechanism. The neat thing about the Franssen Effect is that it works up into the fairly high bass range, which is why sub/sat systems with crossovers even as high up as 150 Hz can get away with what they do. This leads us to the Hsu Ventriloquist satellite array, which is somewhat different from the sub/sat norm.

Subwoofer/satellite systems that have a bunch of very tiny satellites (usually, these have midrange drivers that are four or less inches across) are nearly always plagued with power-output dips in the middle bass. (For an example of this, look at the Velodyne Deco system response curve illustrated in issue 97.) In order to have the low bass properly delocalized, it is necessary to have the crossover point so low that the satellite midrange drivers cannot smoothly reach down to neatly dovetail with the subwoofer. This may be the case even if the satellites and subwoofer are optimally located to smooth boundary artifacts. The result is a dip at just the frequency where instruments like the cello are working.

David Rich pointed out the problems with typical sub/sat packages in issue 97, and he is quite right. Most sub/sat packages with smallish satellites simply cannot deal with the middle bass properly. Because of this, classical-music reproduction with

such systems... Thin... First off, small satellite speakers for left- and right- surround channels (combined with a low-pass crossover) can be optimized for the system.

The subwoofer driver then comes on up. The crossover (cosmetic) is on the left and right dual-voice channel midrange frequencies. The subwoofer is important for crossover to work properly in the center channel.

When you connect the processor in the usual processor/subwoofer and right channel, they have their own receiver connections. Connect the hookups to the binding posts on the main-channel speakers.

Center channel crossover... center-channel satellites operating above 250 Hz. The left- and right- subwoofers are by the left- and right- channel speakers.

is a rather unusual arrangement... the Franssen Effect... While... what this

such systems is usually compromised.

Things are different with the VT-12 package. First off, rather than have a group of moderately small satellites, the Ventriloquist array has five *very* small satellites (each a tad more than 6 x 4 x 3 inches) for left-front, right-front, left-surround, right-surround, and center-back use. These work in combination with a fairly large (roughly 5 x 17 x 8 inches) center-front speaker. (Hsu plans on offering a low-profile version of the center speaker soon, to be optimally used with wall-mounted plasma TV sets.)

The small satellites each have a single 2.5-inch driver that handles frequencies from about 250 Hz on up. The center-front speaker has one such driver (cosmetically a tad different), but it is flanked on the left and right by two 4 x 6-inch drivers. These dual-voice-coil drivers handle not only the center-channel mid bass but also the *left- and right-channel* frequencies from 250 Hz on down to whatever subwoofer crossover frequency one chooses. The important thing to remember is that the 250-Hz crossover network in the center speaker is designed to work with the main channels and not just the center channel.

When hooking up the system, the user will connect the center-channel output of his receiver or processor/amp combination to the center speaker in the usual manner - and of course configure the processor to send the center bass to an outboard subwoofer (the "small" setting). However, the left and right main-channel outputs (which should also have their low bass shunted to the subwoofer by the receiver or processor/amp) should *also* be connected to the center speaker via dedicated connectors. (As with all the other Ventriloquist hookups, these are premium-grade, five-way binding posts.) There are also two left and right main-channel *outputs* on the center speaker, and one connects those to the small left and right satellite speakers with appropriate speaker wire.

Center-channel frequencies from the subwoofer crossover point on up are handled as usual by the center-channel speaker, with all three center drivers in operation. However, with the left and right satellites only the left- and right-channel frequencies above 250 Hz are reproduced by the 2.5-inch drivers. The left- and right-channel frequencies *between* the subwoofer crossover point and 250 Hz are handled by the left and right 4 x 6-inch drivers in the center-channel speaker. Needless to say, what we have here is a rather complex crossover design and hookup arrangement that, up front at least, capitalizes on the Franssen Effect.

While certain test-tone signals can reveal just what this system is doing, most of the "attack"

signals from music and movie sources are reproduced strongly enough by the left and right satellites for the soundstage to be focused properly across the front. The system solves many of the problems that plague sub/sat packages that feature pint-sized satellites. Best, it does this while not costing an arm and a leg.

Hsu offers several subwoofer options with this package. The unit that came with the one under review, the STF-1, contains an 8-inch driver in a ported enclosure, is powered by a 150-watt "BASH" amp, has dimensions of 19" (h), 10" (w), and 16" (d), and weighs 43 pounds. It includes an adjustable and bypassable, 30-90 Hz low-pass filter that one would not ordinarily need to use when hooking the unit to a standard AV receiver, and has the usual 0/180 phase switch. The power connection is via a detachable cord. The sub is rated by Hsu for solid response to 32 Hz.

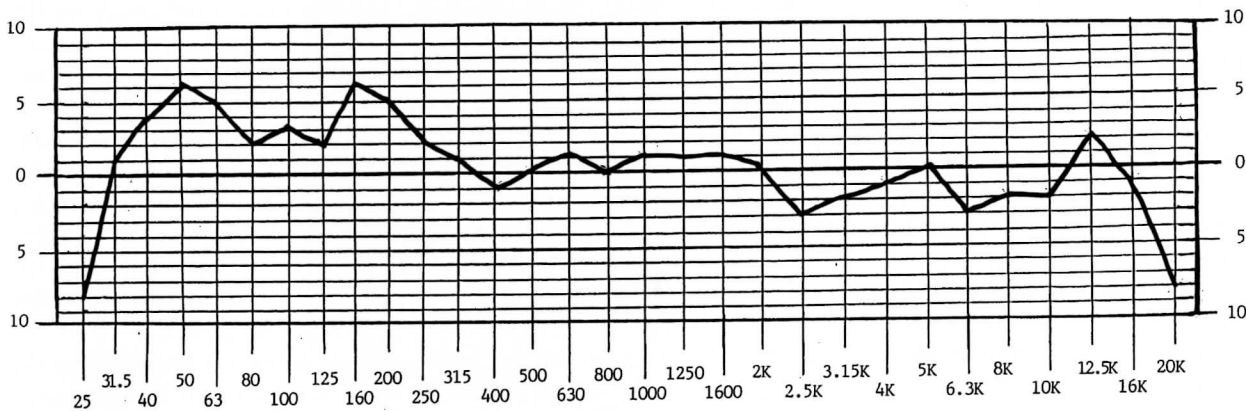
Hookups are fairly standard, with a speaker level in/out hookup being one option. With this hookup there is no high-pass filtering, meaning that the 4 x 6-inch drivers in the center-front speaker will get full-bandwidth bass signals and roll off naturally below 80 Hz. The subwoofer "augments" the bass in this case and you would engage its low-pass filter and adjust it for the best blend between the natural rolloff of the mid-bass drivers and the subwoofer's

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Hsu Ventriloquist VT254 pair, with VT641 center and STF-1 subwoofer



own driver. A second hookup option is a single low-level input that would be connected to the sub-out jack on a receiver or processor. This is the preferred hookup (certainly it is the one I prefer), because it takes advantage of current receiver and surround-processor technology and also high-pass filters the signals to the satellites.

The two other compatible subs, the STF-2 and STF-3, contain 10- and 12-inch drivers, and are rated by Hsu to effectively reach 25 Hz. (It can be assumed that the larger of the two can reach that frequency at louder levels.) The subs are also available separately, with each costing \$299 (STF-1), \$399 (STF-2), and \$599 (STF-3). The VT-12 satellite-only package is normally \$299 without a sub, but if you order it with a sub it costs only \$199.

The sub/sat package reviewed here includes more than the sub, the nifty three-channel arrangement up front, and the two surround satellites. The additional VT251 center-back speaker is unusual in that it allows one to get a *faux* center-back-channel effect with receivers and processors that do not incorporate a 6.1-channel center-back output.

The speaker can be hooked to a standard 6.1 receiver or processor/amp combo and it works just fine that way. Indeed, it performs just like the other small satellites. However, because it has a dual voice coil driver and dual 5-way binding post hookups, you can also daisy chain it with the left-right surround speakers so that the left-surround and right-surround outputs sent to the satellites are also sent to it, where they are blended.

The result is a non-steered center-back feed that can fill in the rear area nicely if the listener is sitting off the preferred axis. The downside is that the back soundstage is at times somewhat narrowed, because the wider left and right images are pulled together

in a phantom zone between the left and right satellites and the center-back speaker. For best results, the regular surrounds should be located out to the sides and not toward the rear.

One problem with the tiny size of the three surround-channel satellites is that, unlike with the left and right main-channel satellites, their middle-bass frequencies are not handled by the 4 x 6-inch drivers in the center-front speaker. The surround satellites must operate down to the receiver-determined sub/sat crossover frequency. Normally, this is no big deal, but it can be a reasonably sized deal under some movie-soundtrack conditions.

In the fall of 2004, Hsu will be offering a \$100 add-on option to correct this: a floor-standing, mid-bass speaker that sports a 6 x 9-inch *triple* voice-coil woofer. This woofer will handle middle bass from all three of the surround channels, while leaving the three satellite speakers in place. Once this option is available, the surround channels should be able to deliver more than enough theater and hall-ambiance middle bass to satisfy most listeners.

So, how does the current package perform? Well, I ran some response curves in my 3,400 cubic foot main room and was really taken aback by the smoothness of the stereo room-power curve. This measurement was done with my AudioControl SA-3051 in its 20-second, cumulative-averaging mode, and with the measurement microphone slowly moved in the usual manner over a 1 x 1 x 5 foot area at the listening couch. The three speakers were each about 12 feet away, with the left and right satellites on 30-inch stands and the center on a 38-incher about a foot from the front wall. The signal source was stereo pink noise from the Delos Surround Spectacular test disc (DE3179).

As the Hsu hookup mandates, the left and right satellites were operating from 250 Hz on up, the

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frequencies between 250 and 90 Hz were handled by the center speaker's 4 x 6-inch midbass drivers, and the low bass (as controlled by my Yamaha RX-Z1 receiver) was handled by the STF-1 subwoofer. The sub was located in the usual place where I put subs, in the left-front corner of the listening room.

As you can see from the room curve, the response from 250 Hz on up was surprisingly good. Yes, these drivers are going to be more directional in the treble than your typical 1-inch dome tweeter, and at closer measurement distances the response above 2 kHz got somewhat rougher. However, their midrange performance is superior to what we get with a lot of bigger midrange drivers, and with proper toe-in aiming the treble balances out quite well.

Between 80 and 250 Hz we get some boundary-related artifacts (these varied, depending upon placement), and the only real glitch is the rise at 160-200 Hz. This anomaly may not show up at all with some placements, but in this case it adds a degree of middle-bass weight to the sound that stands in contrast to the eviscerating dip we sometimes get with other sub/sat packages.

I also ran a curve for the center channel operating alone above 90 Hz. It was a bit less flat than the stereo measurement between 250 Hz and 1 kHz, but the peak at 160-200 Hz was considerably

less pronounced. Again, variations below 250 Hz are going to be strongly impacted by placement with virtually any speakers. There is no way to get the frequencies below 250 Hz to work perfectly in all situations, of course, which again makes the case for decent outboard equalizers.

Incidentally, Hsu has indicated to me that while the VT-12 ensemble is now in full production the mid-bass output of the center speaker may be adjusted downward a tad in the future, mainly to accommodate placement situations like the ones I encountered.

To test the importance of the ventriloquist circuit with the stereo satellites, I temporarily switched off the 4 x 6-inch center-system midbass drivers and let the left and right satellites work alone - with the subwoofer still working below 90 Hz. (The center speaker has a switch on the back that allows this to be done for comparison purposes.) The result was a power-response notch between 100 and 200 Hz. Clearly, by themselves the 2.5-inch mid/treble drivers in the satellites are not able to get down low enough in frequency to prevent a gap if they are dovetailed to a subwoofer in the usual way. The 4 x 6-inch drivers in the center speaker *must* be in operation for the Ventriloquist package to deliver decent mid bass to the listening room. Of course, serious enthusiasts have to ask themselves just how



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much will having the left and right channel signals between 90 and 250 Hz reproduced by the center-channel speaker impact the stereo soundstage - particularly with music.

As noted previously, certain test-tone signals will bring out artifacts that reveal the center fill in operation. Music was another matter, and with good stereo program sources (either played in stereo only or given the DSP surround treatment by either my main system's RX-Z1 or middle system's DSP-A1) the Ventriloquist package worked quite well. For example, after setting up the speakers in my middle system's room I listened to a release by Rosa Passos and Ron Carter, *Entre Amigos* (Chesky JD247), and the sound was terrific. The centered vocalist was nicely reproduced and the very well recorded accompanying performers flanking Ms. Passos were right where they were supposed to be.

I also did a single-presentation audition of an impressive sounding, new DVD-A recording of Prokofiev's *Alexander Nevsky* (Naxos 5.110015) and the six satellites and subwoofer did a resounding job of presenting the material. Interestingly, the unique center-back speaker allowed the system to do something unusual: present a speaker-generated, center-back fill with DVD-A source material. The result was not as solid as what one would get with a true discrete center-back channel, but it was definitely more workable at times than what one would get with only a pair of side/back surrounds.

I then arranged to do some level-matched A/B comparisons. The Dunlavy Cantatas in my middle system cost 11 times what the entire Hsu package lists for, so in order to be fair, I pulled a pair of Atlantic Technology T-70 satellites away from surround-channel duty in my living-room system. (Each of these has a one-inch dome tweeter and a

4.5-inch midrange, and when I reviewed it the full 5.1-channel T-70 package listed for double the current cost of the Hsu package.) I set the T-70 and VT254 satellites up together on a pair of 30-inch stands, with the Hsu center augmenting the Hsu satellites and the SFT-1 subwoofer doing all the low-bass work for both sets of satellites.

In a series of level-matched face-offs, I found that I could favor either system. My original measurements of the T-70 and its sub, with the satellites positioned on their factory-supplied stands, revealed a typical response notch at roughly the same frequency where the VT254/VT641 and Hsu sub combination exhibited the above-noted moderate peak. This difference accounted for much of what passed for audible differences.

With a recording of Johann Strauss works on the Marco Polo label (8.225213), I felt that it was a dead heat, particularly in terms of string tone reproduction. The Hsu arrangement was more focused, with the T-70s sounding a bit more spacious, no doubt because the 1-inch dome tweeter in the T-70 satellites dispersed better in the top two octaves.

With a new and very well recorded Bob Florence cool-jazz recording, *Whatever Bubbles Up* (Summit 360), the results were similar, even though the ensemble and recording environment was smaller. While the Hsu package was tighter up front, the soundstage was only slightly impacted by the center speaker handling the middle-bass frequencies. There was no tendency for the imaging to defocus or shift.

Another recording, the American Brass Quintet's *American Visions* (Summit 365), contains mostly midrange frequencies, and here the two speaker packages sounded almost identical. The T-

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70s sounded a bit more close-up, but overall the choice between the two would boil down to a matter of taste and not anything hard and fast.

I also tried out my trusty reference disc, John Eargle's very handy *Engineer's Choice II* grab-bag compendium (Delos DE3512), and felt that for the most part the two speaker packages were again roughly equal. With the guitar transcriptions the T-70 pair sounded a bit thin (due to the stand-height related mid-bass suckout), whereas the Hsu trio sounded richer and more robust. The female solo vocalist material also favored the Hsu package, with the overall sound having a fuller and more vibrant tonality. With the Mozart quartet material the two systems were pretty much equal. They did not sound identical, but there were more similarities than differences.

On the other hand, with the larger ensemble material on the Delos disc the T-70s sounded more spacious and open, although in some cases the violins sounded more realistic with the Hsu systems and the cello parts were richer. Interestingly, at times the T-70s sounded almost out of phase compared to the Hsu trio. I had been listening to the Hsu package quite a bit and had grown used to their focused soundstaging.

After these listening experiences I would have to conclude that as a stereo-only system the Hsu Ventriloquist package was easily able to hold its own with the Atlantic Technology T-70 pair. Ditto if we are talking about a surround-sound speaker package. Of course, what Hsu *really* specializes in is subwoofers. So what about the STF-1? As you can see from the curve, response down to 40 Hz was solid, but even at 31.5 Hz there is plenty of subwoofer output. With musical program material the unit easily was musical and rich right down to 30 Hz.

When I did my max-output testing (measuring the subwoofer in the corner, 17 feet away from my standard microphone location), the STF-1 could hit 103 dB cleanly at 31.5 Hz, and could get to 106 dB with only minor doubling. Sensational behavior for a sub this size (and price) working into a 3,400 cubic foot room. Indeed, its maximum clean output at this frequency falls only slightly short of the more expensive Hsu VTF-2 I reviewed in issue 88, and surpasses that of the pair of \$3,000, powered-sub, full-range Polk LSi systems I reviewed in issue 95. At 31.5 Hz it also easily surpassed the \$500 NHT SW10 I reviewed in issue 90, as well as the \$600 Velodyne CT-120 I reviewed in issue 85, and was superior to a \$500 Axiom EP-175 that I reviewed in issue 100. This is an impressive little subwoofer that had no trouble eclipsing the performance of the pint-sized, \$995 Sunfire True Sub Super Junior I reviewed

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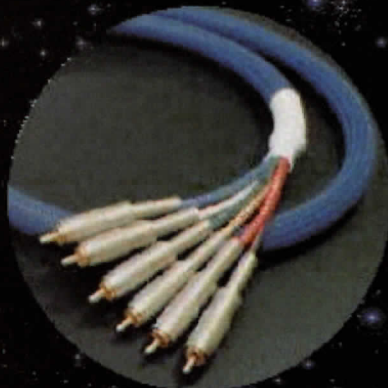
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in issue 94.

At 20 Hz (the sub is not rated to go down this low), it could hit 80-84 dB (again, holding its own with the paired-up Polks, and equaling or beating both the NHT and the Axiom, and leaving the Sunfire in the dust). Still, if one is a super-serious pipe-organ freak, the larger STF-2 or STF-3 models, or the VTF-2 I reviewed in issue 88 might be a better choice.

For 99% of all music the STF-1 is more than adequate, and then some. I also gave it and the satellite package a try with a couple of potent movie soundtracks and was impressed with the system's abilities. Most movie sound does not dip below 30 Hz (little music does, either), and so the sub is more than capable with such material, at least in a modestly sized room, and capable of pretty much matching the VTF-2. The satellites were fully at home with typical movie soundstaging.

So, what do I conclude regarding the Hsu Ventriloquist system? Well, I think it is pretty neat. I really cannot think of how one could get better performance in a similar-sized package, and get that kind of performance in any similarly priced system, no matter what its size. An enthusiast with a limited budget, a modest-sized room, and a taste for well-recorded music would be hard pressed to get a more sensible system for the money.

-HF

TSS

M&K Model B1600 Loudspeakers

Manufacturer: Miller & Kreisel Sound, Inc., 9351 Deering Ave., Chatsworth, CA 91311-5858

Price: \$998/pair

Source: Manufacturer Loan

Reviewer: James T. Frane

Big sound from a mighty midget speaker: That begins to describe the M&K model B1600 speakers that are the subject of this review. These small (11.5H x 7.5W x 10.25D) units weigh in at 12 lb. each. The enclosures of the review pair were painted a light metallic gray with removable cloth-covered grilles of medium gray. Both black and white finishes are also available. Overall fit and finish were very good. The cabinet front baffle seemed, from a knuckle rap, to be thicker than the side walls - compensation for the speaker cutouts. Mounted on the front baffle was a 1" diameter fabric dome tweeter above a 6.5" midrange-woofer (nominal size; the actual cone diameter measured 4-7/8-inches inside the elastomer surround). Both were centered on the

baffle.

With the 25 to 200 watts recommended amplifier power (minimum is 10 watts), these M&K speakers should fit well into a great many solid state and some tube systems. Rated frequency response is a very low 30 Hz to 20 kHz, ± 2 dB, with an impedance of 4 ohms. The B1600 is a recent addition to the extensive M&K lineup of a wide variety of speakers and mounting hardware.

Setup: M&K recommends using the heaviest-gauge speaker wire you can manage, with 14-gauge listed as the minimum for lengths up to 30 feet, and heavier gauge for longer runs. Speaker connection is via unique, vertically oriented five-way binding posts with plastic hex nuts. Directly below the binding posts is a 1-7/8 inch diameter port (M&K calls this the backfire port) with a removable, two-inch long foam plug. The port is left open to extend the bass output, and plugged when the B1600s will be used with a subwoofer to permit better integration.

M&K intends the speakers to be mounted on stands, shelves or walls, and provides mounting hardware. The eight-page owner manual describes the B1600 speakers and the similar, but smaller Model B1500. It covers connection, placement, the rear port, home theater use, phasing, avoiding damage, obtaining assistance, maintenance, and specifications. There are five diagrams to aid the user in speaker installation. Extensive speaker placement guidance, as well as phone and email contact information is provided. Maximum bass with open ports occurs when the speakers are within a "few



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