

Meridian D600

Digital Speaker System

Realism & musicality with sharply focused
imaging from a handsomely
produced tri-amped design

By Bruce Bartlett

Is this the world's first digital loudspeaker? Believe it or not, the Meridian Digital Active Loudspeaker System D600 accepts digital signals directly from CD players or DAT machines (standard analog, line-level signals can be used too). Each D600 is a floor-standing, 3-way ported speaker system with built-in power amplifiers. These speakers are tri-amped—each driver on the front panel has its own amp. A computer built into each speaker accepts commands from an infrared remote-control unit, and an LED display at the top of the speaker shows various system conditions. With all of these unusual features, you might suspect that the D600 is a high-tech, complicated system, and it is. But it's also very sophisticated and flexible. And it sounds superb.

Meridian components are produced by Boothroyd Stuart Ltd. in Cambridge, England, which developed the acclaimed MCD compact disc player. They also offer a line of active (powered) speakers, a tuner, and a preamplifier. The D600 integrates with

Meridian's 200 Series of components and can be configured to operate in multiple-room setups. With Meridian's Multiroom System, you can use a dual-output preamp to send two different programs simultaneously to different rooms, if they each contain a pair (or more) of D600 speakers. Unlike most systems, the D600s have a built-in capability to be custom configured. A normal installation uses two D600s, one called the "master" and one called the "slave." But you also can interconnect four or six units for surround sound.

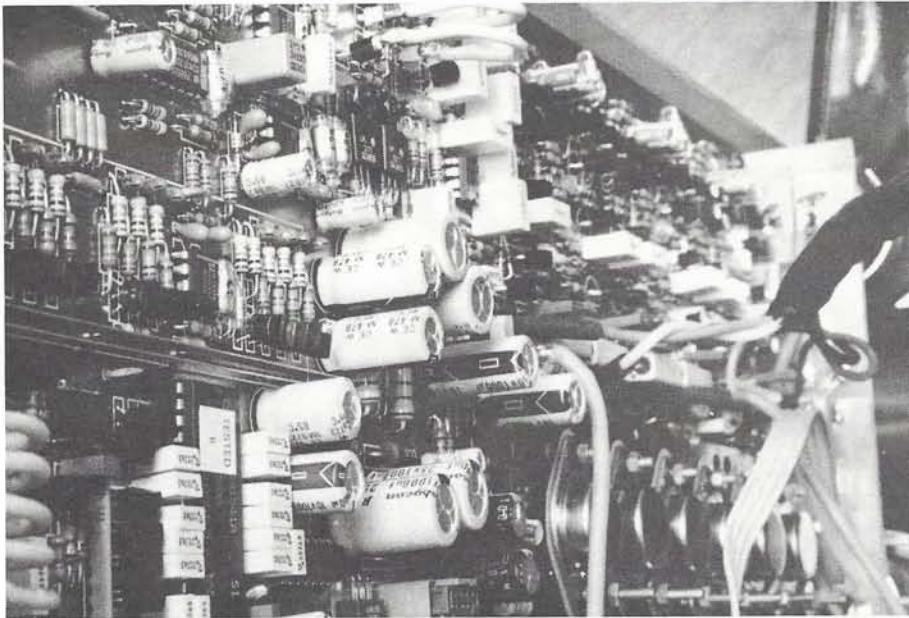
Tri-Amp Benefits

What are the advantages of a system like the D600? Biamping or tri-amping has several benefits. First of all, in a normal installation, one amp powers the two or three drivers in a speaker system. Most of the amplifier's energy is used by the woofer. On musical peaks, the amp can distort or clip. This woofer-caused clipping can result in serious distortion or even burnout of the voice coil of the tweeter, because the tweeter is

powered by the same amp as the woofer. But in a tri-amped systems, both the woofer and tweeter have their own amplifiers, so distortion components caused by clipping the woofer power amplifier cannot affect the tweeter, so there's less likelihood of tweeter burnout, and the clipping distortion in the woofer amplifier is made less audible because the tweeter doesn't misbehave in response to the woofer.

Further benefits are that audible intermodulation distortion is reduced. Peak power output is greater than that of a single amplifier of equivalent power. Direct coupling of amplifiers to the speakers improves the transient response, especially at low frequencies. Tri-amping reduces the inductive and capacitive loading of the power amplifier. Full power is available at all times to the tweeter because it has its own amp, regardless of the power needs of that moment for the woofer. Frequency response and gain of each amplifier can be tailored specifically for each driver.

Thanks in part to the tri-amping, Meridian claims that the system can produce more than 115 dB SPL at 1 meter! Another



Three 65 watt amps (one for each of the drivers), crossover network to route the proper part of the input signal to each speaker, digital processing components and switching logic of the Meridian D600 digital speaker system are mounted on a board that's mounted to the inside rear cabinet panel—HPR Studio photo

advantage of the D600 system is that you can add multiple speakers without worrying about loading down your power amplifier. A drawback is that if any part of the system fails—power amp, computer, or speaker—your entire system is down.

The advantages of digital inputs are less clear. You need a digital-to-analog (D/A) converter in the system somewhere before the power amplifier. This converter can be either in the speaker (as in the D600), in your CD/DAT player or preamp. Dave Smith, the acoustic engineer of the D600 and Meridian's Technical Marketing Manager, told me that the D/A converter in the D600 is superior to that in most CD players or DATs. Inside the D600 is a dual converter with a phase-locked loop to reduce jitter, which has been the focus of many of the latest developments in CD design. The converter uses 4-times oversampling with 16-bit resolution, plus a passive DAC filter for highest quality sound. The D600 system design obsoletes the preamp,

and its digital signal is relatively immune to interference.

Each powered speaker (left and right) has its own analog input, so you must run long analog audio cables to each speaker if you want to bypass the Meridian CD player/preamp. Extra-long cables can be susceptible to hum pickup and high-frequency loss, but generally this isn't a problem.

Woofer and Woofer/Midrange

The D600 is a ported 3-way system. You might think on a first look that the D600 is a two-way unit, but the two "woofers" you can see on the front cabinet are operated differently. Actually, there's a 6-1/4 inch polypropylene woofer, a 6-1/4 inch polypropylene bass/midrange driver, and a 1-inch aluminum-dome tweeter that is ferro-fluid damped. On the rear of the cabinet is a bass-reflex port. The bass unit, bass/mid unit, and tweeter each are driven by separate 65-watt continuous power amplifiers that are mounted on a common circuit board that's attached inside the the back

panel of the speaker cabinet. A temperature-sensing circuit prevents overheating of the electronics that operate the speaker.

Dave Smith says that the woofer's lower limit is tuned 6th-order Butterworth, which acts as an infrasonic rolloff filter to prevent excessive cone excursions. Both 6-1/4 inch drivers operate in parallel up to 500 Hz, then the lower one rolls off with a first-order slope. At 2.5 kHz the upper woofer crosses over with a 5th-order slope to the tweeter. Dave used computer-assisted design at KEF labs to obtain the desired crossover network, acoustic performance, and electronic compensation of the drivers.

The D600's sleek-looking cabinet is handsomely constructed of 3/4-inch Finnish plywood with a wood veneer finish. A black grillecloth and glass display window enhance the attractive, futuristic appearance. Dimensions are 8-1/4 (W) x 35-1/2 (H) x 11-1/2 (D) inches (210 x 900 x 295 mm), and each speaker weighs 70.5 pounds. Spike feet are included to improve cabinet stability, and thereby, output definition. Gold-plated inputs include two unbalanced or balanced analog phono jacks, two digital phono jacks, one optical digital connector, and one DIN-type communications connector (for wiring between master and slave) Outputs include one digital-audio phono jack and one communications connector.

One word of warning about the design of the D600: It's easy to dent the tweeter dome because its wiremesh cover offers little protection. It's quite vulnerable when unpacking or repacking the speaker—pay close attention to Meridian's instructions. And once the speaker is set up, you'll need to keep children and pets

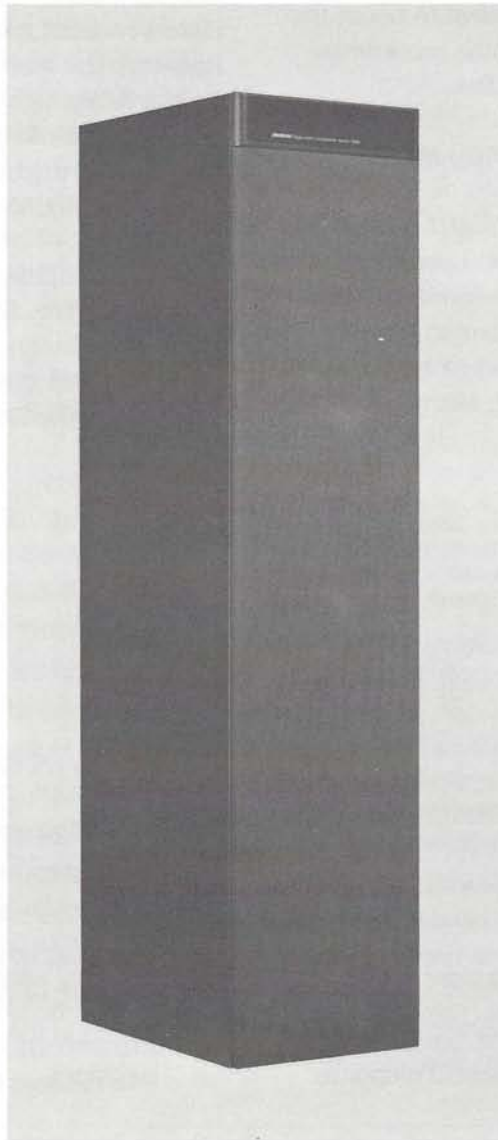
away. Meridian would do well to develop a stronger tweeter-dome protector that's still acoustically transparent.

Front Display Panel

The D600 displays information to aid in its operation. Its front-panel display indicates such things as standby mode, source type, selected input connection, volume setting, mute, CD track and time information, Meridian 204 FM

tuner information, and error messages. An infrared remote control lets you select the sound source: CD, tuner, record, tape 1 or 2, and video. You can also control channel balance, volume, muting, bass and treble, low-frequency rolloff, memory presets, and CD-player operation. Tone settings can be stored and recalled. You can easily designate which D600 unit is the master and which is the slave as well.

Meridian's D600 speakers give a slim, tall appearance when viewed from the front. They are distinguished by their display panel at the top of the front cabinet, and grille cloth frame with rounded corners to reduce diffraction. The D600's cabinet is supplied with spiked feet, which are needed to provide adequate stability on carpeted floors—HPR Studio photograph



Meridian 207 CD Player

For this review, I used a Meridian 207 compact disc player, which has digital outputs that can feed the D600s directly. The 207 also includes a preamp which accepts phono, tuner and tape inputs; and has variable and fixed analog outputs. Although the 207's preamp has no tone controls, the D600 powered speakers do (you can alter the sound ± 2 dB at 10 kHz and 100 Hz). The 207 CD provides numerous displays, and it allows the usual replay, repeat, programming, scanning, and index-point access. To these it adds an unusual absolute-polarity switching. This CD design uses 4-times oversampling with 16-bit resolution. I am not reviewing the 207 here, but I did use it in the listening tests, and it's obviously an integral part of the overall Meridian system design.

Hour-Long Setup

As you might imagine, setup is unusual and takes about an hour. You'll need still more time to learn all the display codes. Meridian cautions that you do not make or break connections while the unit is powered on. As for placement, they recommend that each speaker be at least 20 inches from a corner and at least 8 inches from the wall behind them. Although the system is highly sophisticated, the setup and user manuals do a thorough job of explaining how to get the most out of the system. Included is a helpful troubleshooting guide, as well as instructions for five different configurations. A one-page setup sheet gets you started quickly. Price: \$5490/pair (including remote control, excluding CD player). Meridian America Inc., 14120-K Sullyfield Circle, Chantilly VA 22021. Telephone: (800) 331-3855.



A display panel at the top of the D600's cabinet signals its system status. The D600's remote control can command the system to change the input from CD to tuner, for example, when the entire Meridian system is used—HPR Studio

Impressively Natural and Uncolored Sound

In my listening room, Meridian's D600 speakers produced really remarkable performance—impressively natural and uncolored sound. They were best when positioned 2-1/2 feet from the side walls, 3 feet from the back wall, and angled inward toward the listener. On most recordings, I set the bass control to cut -2 dB, and

used the tilt control to boost the highs +1 dB. Some recordings sounded better flat.

Light House, Billy Barber DMP CD455

Using Meridian's 207 CD player/preamp, the D600 produced some of the most uncolored solo piano I've heard on *Heaven Help Us*. The sound is full-bodied and natural. Very impressive. Many people use

solo piano as their primary criterion of good sound. If you do, you will be in Heaven with the D600s.

Rumours, Fleetwood Mac Warner Bros. WB-03010-2

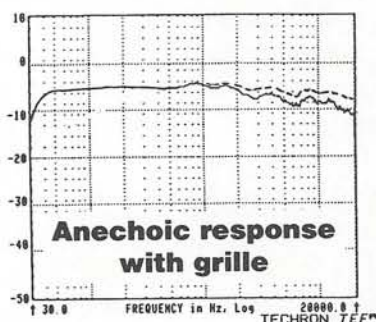
Acoustic guitars on *Never Go Home Again* sound pleasant and delicate, not twangy, even with the treble tilted up. On *Songbird*, the D600 treats the human voice with great respect. Its sound is believable and not too sibilant. There's a fluid, effortless quality, much like I heard from the Martin Logan Sequel. Although the voice sounds just a bit nasal, the lyrics are articulate and easy to understand.

'Round Midnight (movie soundtrack), Columbia CK 40464

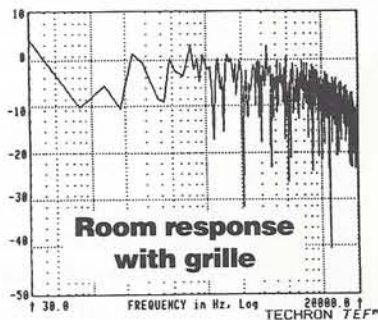
Here's realistic, natural reproduction with the Meridian D600s. Cymbals are clean but not tizzy; bass is full and round but not boomy. The digital D600's sound is relaxing to the ears.

Still Life Talking, Pat Metheny Group, Geffen 24145-2

You'll hear weighty bass with true fundamentals on *Minuano (Six Eight)* from the D600s. Voices



Anechoic response is best with a treble boost +2dB (dashed line), flat response (solid line)



Room response shows a slightly rolled off high end, in agreement with the anechoic response

There is some rolloff (beginning at about 2kHz) in the upper end response of the Meridian D600. But a slight +2 dB treble boost (switched in by the remote control) gives a remarkably flat response overall. This result agrees well with the smooth, uncolored sound heard in the listening sessions

sound remarkably fluid and human; you can believe they're singing in front of you. The bell tree is sweet and cymbal hits are clearly defined. You'll love the honey-smooth midrange. Like the Martin Logan Sequel, the D600 has such low aural fatigue that I can't stop listening! This is first-rate reproduction.

Haydn, Trumpet Concerto
Nimbus Natural Sound Vol 2
NIM 5015

Although the strings on this recording have sounded strident on some other speakers (such as the Pioneer TZ-7), they have no such edge or harshness with the D600s on the Third Movement of Haydn's *Trumpet Concerto*. These Meridian speakers have a delicate upper register. Bass is full and ambience is lushly reproduced. The trumpet is just remarkable: you actually can sense there's a human blowing air through a brass instrument. I've never heard this effect so clearly before. Very realistic.

Mozart, Serenata Notturna
Telarc Sampler 5 Plus, Telarc
CD 80005

Here's a lovely, velvety string tone with the D600s on the Second Movement of the *Serenata Notturna*. Bass is full, and there's a wonderful sense of space with these speakers. It's a lush effect, sweet and airy.

Stravinsky, The Firebird
Telarc CD 80039

The bass-drum roll is awesomely deep and potent here with the Meridian D600s—this is another impressive performance. You can hear tiny variations in the strings' timbre depending on how they are played. All instrumental timbres are natural and uncolored.

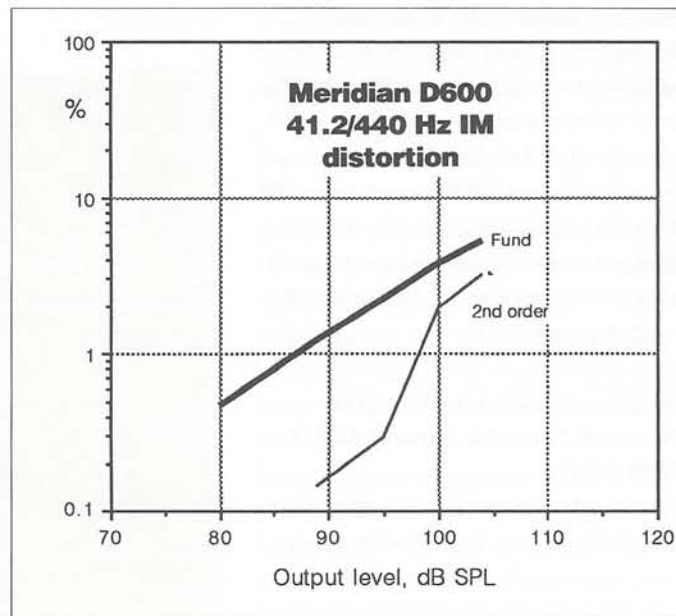
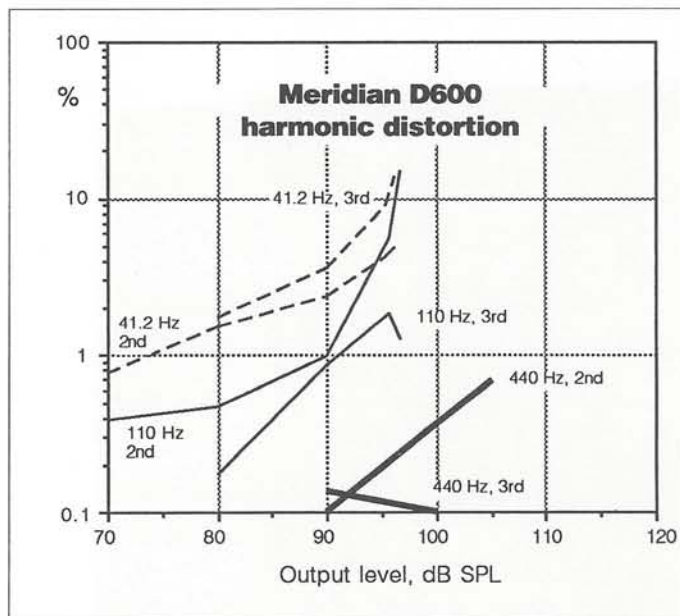


Without the grille, you can see the relatively small 6-1/4 inch polypropylene woofer and identically sized woofer/midrange above it. At the top is the 1-inch aluminum domed tweeter. The clean appearance of the cabinet, and the simple-looking drivers belie the complexity of the electronics within the D600s—HPR Studio photograph

Although the sound is never edgy or too close, you can still hear such details as the bows stuttering on the strings and the breathiness of the flutes. The dynamics are fantastic, as the D600 can play very loudly without a sense of strain. It's amazing to hear these relatively small 6-1/4 inch bass speakers put out such loud, clean sound. Tri-amping obviously works very well here.

Chorus, Eberhard Weber
ECM 1288

Again, the bass is deep but clean with the Meridian D600s. Timbres seem to be all of one piece—seamless, smooth and liquid. The sound is musical rather than electronic. Center images are sharply focused, and the ambience seems to be reproduced more spaciously than with most other speakers. Although the extreme highs are less bright than those you hear



through the Altec 505, Theil CS1.2 and 3.5, this isn't a deficiency. There's very low listening fatigue. This characteristic reminds me of the Martin Logan Sequel and Quad ESL-63.

Smooth Response

All measurements and listening tests were done with the D600's grilles in place, since the frame of the grille provides rounded corners which smooth the response. The anechoic response of the D600 was measured at 1 meter, with the microphone at tweeter height. The solid line is the response with the tone controls set flat. It's very smooth, measuring +1, -2.5 dB from 35 Hz to 5 kHz. Then it rolls off uniformly, down -5.5 dB at 20 kHz.

The dashed line is the response when the high frequencies are given a maximum boost of +2 dB. These measurements correlate well with the smooth tonality and uncolored sound I heard from the D600. The true deep bass heard in the listening tests is proven by the response measurement, which shows a flat output down to nearly 35 Hz.

The maximum output of the speaker is at around 900 Hz. A peak in the 700-1000 Hz region normally causes a nasal, canned, or honky tonality, and the D600 did sound slightly nasal at times. But this isn't a significant problem for the Meridian.

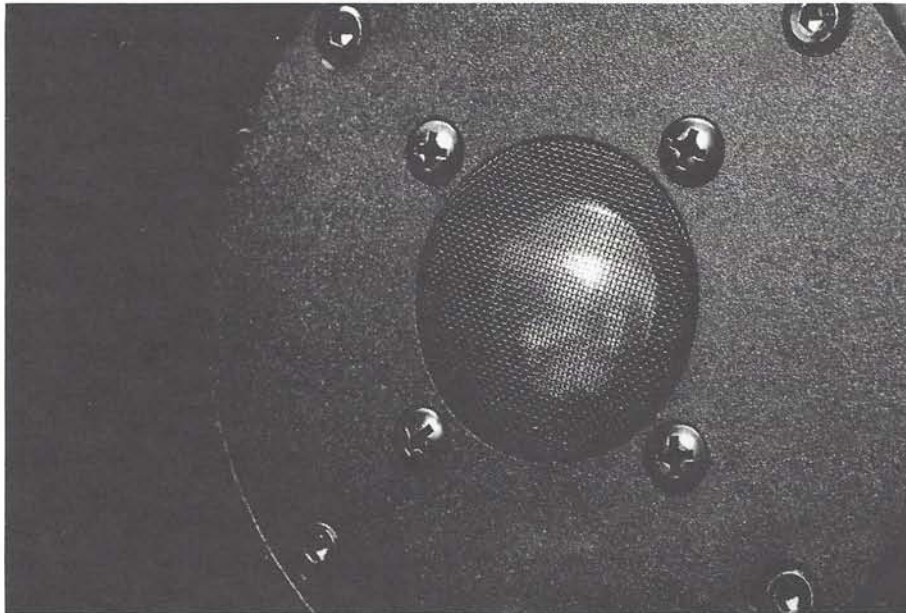
When the D600 speaker was measured 1.5 feet away, the response was an excellent ± 2 dB up to 14 kHz. This shows that the D600's high-frequency rolloff that was obvious when the measuring microphone is located at 1 meter (about 3 feet) is an artifact of the room. (This rolloff seems to be an interaction between the D600 and the floor, rather than a characteristic of the direct sound of the speaker itself.)

Apparently, the floor reflections from the D600 speaker combine with its direct sound to give a boost to the bass and midrange energy, which gives the impression of a high-frequency rolloff. In any case, the high-frequency response could be brought up by the tilt control if desired. But the Meridian speaker often sounded best when set flat in my listening.

At 30 degrees off-axis, there were minor losses of -2.5 dB around 5 kHz, 12 kHz, and 17 kHz, but generally, the response was still uniform. This means that the D600 has excellent dispersion and should sound the same almost anywhere you sit.

The overall trend of the room response shows a rolled-off high end, as shown in the anechoic measurement. Still, the speaker never sounded dull or muffled during my listening.

The D600 has an outstanding group-delay characteristic, which hovers near 0 milliseconds (msec) above 3 kHz, and varies only up to 0.65 msec at 420 Hz. (Group delay is the rate of change of phase with frequency. If an audio component has uniform group delay, high-frequency and low-frequency components of the sound wave arrive at the ear at the same time, which results in improved transient response and potentially smoother frequency response near the crossover frequency.) Energy Time Curve performance is also very good. The direct-sound spike (from the tweeter) is quite sharp, and another



A 25-mm aluminum dome tweeter tops off the Meridian D600 digital speaker system. This driver provides very good dispersion as measured by HPR Lab, and this makes overall imaging consistent over a wide listening area—HPR Studio

er spike (from the woofer) arrives 0.25 msec (3.4") after the D600's direct sound.

Harmonic distortion at 41.2 Hz reaches the 3 percent level at 92 dB SPL for the 2nd-order distortion and at 87 dB SPL for 3rd-order distortion. These results are among the best of the speakers HPR Lab has tested. At 110 Hz, the 3 percent level is reached at 94 dB SPL (for 2nd order) and

at more than 100 dB SPL (for 3rd order). As expected the 440 Hz harmonic distortion is low. This is very good performance.

Intermodulation (IM) distortion performance is impressive also. With the 41.2/440 Hz mix, the Meridian D600 reaches 3 percent IM distortion at 98 dB SPL (fundamental) and 103 dB SPL (2nd order). On HPR Lab's 2-tone IM test with 41.2 Hz and the sec-

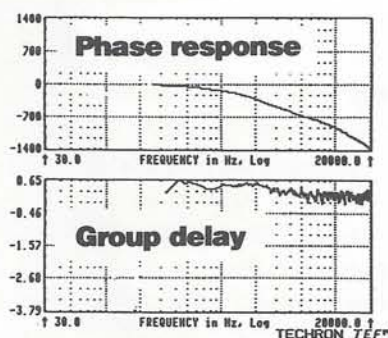
ond tone between 262 and 1046 Hz, the average distortion level hovers around 1.5 percent at the 89 dB SPL output level, which is very good. Importantly, the IM distortion doesn't jump significantly when the output level moves up to 95 dB SPL.

Output compression does jump above 95 dB SPL for both 41.2 and 110 Hz (perhaps this is due to amplifier clipping). But compression at 440 Hz is outstanding—there's virtually none up to 105 dB SPL. That's why the D600 can play really loudly without strain (at least in the mid-range).

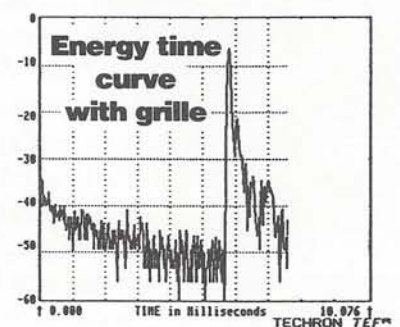
Musical Realism!

Without a doubt, the Meridian D600 is one of the finest speaker systems you can buy. Its uncolored and natural reproduction contributes to a high degree of realism and musicality. You'll love its seamlessness, sense of ease and spaciousness. Imaging is quite sharply focused and dispersion is excellent. The authoritative deep bass and very high SPL capability of this Meridian belie its sleek, compact appearance.

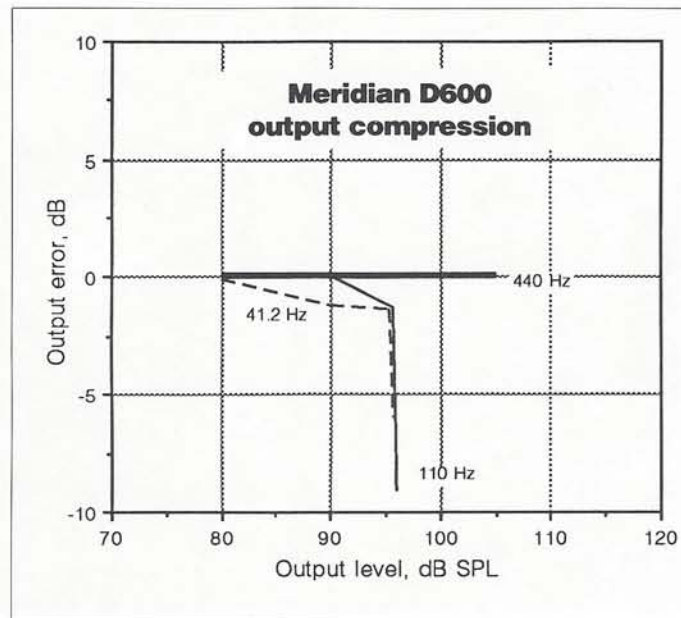
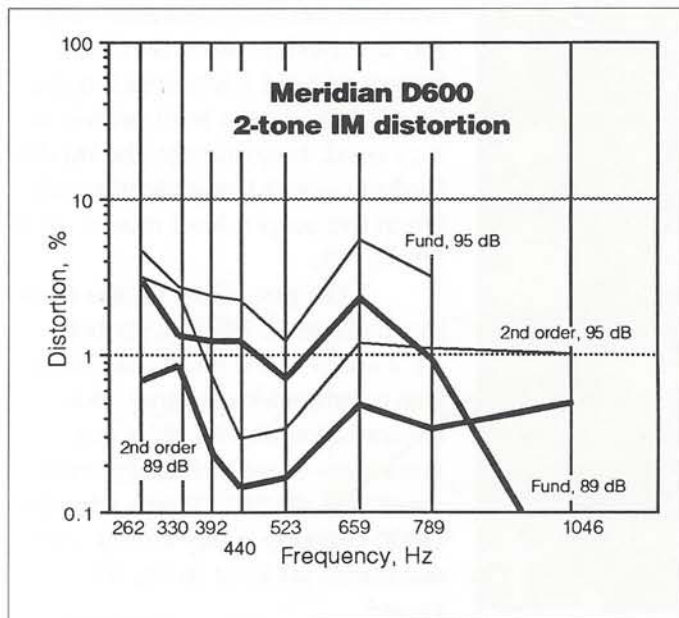
Group delay results for the Meridian D600 are outstanding. This agrees well with the natural sound and consistent imaging across the full audio range heard in listening. The Energy Time Curve shows some reflections, but only one is -15 dB below the main spike



Group delay hovers near 0 msec above 3kHz, and only hits 0.65 msec at 420 Hz



The main spike is quite sharp, but there are secondary spikes (one is 0.25 msec after the primary)



As for drawbacks, the D600 speaker does have a touch of nasality on some material, but it's subtle. The added complexity of D600's digital circuitry reduces reliability (if only theoretically), adds cost, and may intimidate less technically inclined listeners (even though the system was not difficult to set up). Meridian does offer a simpler model with compa-

table performance, the M60 active loudspeaker (\$3900), which omits the D600's computer, display, and digital inputs.

Especially for lovers of high-tech equipment, however, the Meridian D600 digital speaker has all the functions you could want, and it sounds just wonderful. And if that's thanks to digital sound, you'll have yet another

reason to be happy for the advent of CD. The Meridian D600 is a first-class product that makes listening to music more enjoyable than ever. □

Associated equipment

Meridian 207 compact disc player/preamp. All signal cables supplied by Meridian. Listening room: 15 by 30 feet, with carpeted floor, plaster ceiling, and drywall walls.

Test equipment

Techron TEF System 12 Audio Analyzer/Computer
 Bruel & Kjaer 2209 Sound Level Meter, 4133 1/4-inch Laboratory Calibrated Condenser Microphone
 Crown PL-4 power amplifier

Harmonic, IM, Compression Tests:
 Tektronix: AA501A distortion analyzer, two SG505 audio oscillators, 7603 oscilloscope, C59P oscilloscope camera
 Hewlett-Packard: 3582A FFT spectrum analyzer, 3468A digital multimeter
 Fluke: 8050A digital multimeter
 Bruel & Kjaer: 2203 sound level meter, 4133 microphone, 4230 sound level calibrator

The D600's remote control is a relatively large, square-shaped metal box that can control the components of the Meridian 200 series. For HPR's review, it was set up to control the two D600 speakers and the Meridian 207 CD player/preamplifier combination—HPR Studio photo

