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QUART 490MCS SPEAKER

Manufacturer's Specifications
System Type: Two-way, bass-reflex bookshelf system.
Drivers: 8-in. (20.3-cm) cone woofer and 1-in. (2.54-cm) titanium-dome tweeter.
Frequency Range: 37 Hz to 32 kHz.
Sensitivity: 89 dB at 1 meter with 2.83 V rms applied.
Crossover: 2.1 kHz; 12-dB/octave low-pass on woofer, 18-dB/octave high-pass on tweeter.
Impedance: 4 ohms nominal.
Continuous Input Power: 100 watts.
Dimensions: 17⁵⁄₁₆ in. H × 10⅞ in. W × 11¼ in. D (44 cm × 27.6 cm × 28.5 cm).
Weight: 24.3 lbs. (11 kg) each.
Price: $849 per pair in oak, raw oak, walnut, matte black lacquer, or matte white lacquer; in pine or cherry, $976.35 per pair.
Company Address: MB Quart Electronics, 25 Walpole Park South, Walpole, Mass. 02081.
For literature, circle No. 91

MB Quart Electronics of Germany has been in the audio business for more than 20 years. Previously known as Peerless MB, the company manufactures microphones, headphones, OEM speaker components, and complete loudspeaker systems.

The Quart 490MCS system is one of nine speakers marketed by MB Quart in America. The line consists of four bookshelf-sized systems, of which the 490MCS is the largest, and five floor-standing systems. The seven small systems are all two-way, while the two largest are three-way designs.

The 490MCS incorporates an 8-inch long-throw woofer with a large magnet and high-temperature voice-coil along with a Ferrofluid-cooled, titanium metal-dome tweeter. The tweeter has an integral covering screen that incorporates a built-in reflector disc to smooth the response and widen the high-frequency coverage. Several design features minimize diffraction, including rounded cabinet corners and edges, flush-mounted drivers, and a flock-coated front baffle. The cabinet corner moldings and edge strips are in solid hardwood, while all sides of the cabinet, excluding the front baffle, are fully veneered and finished. The system is avail-

From 65 Hz to 10 kHz, on-axis frequency response fits within a relatively tight envelope of +1, −3 dB.

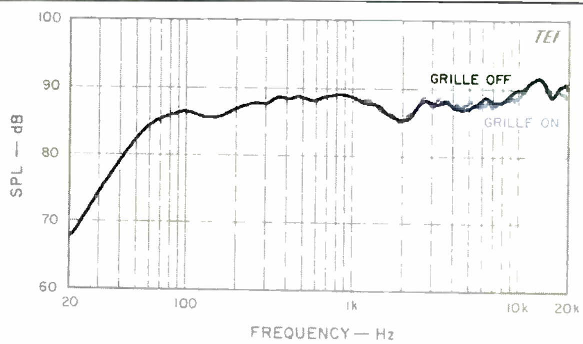


Fig. 1—One-meter, on-axis, anechoic frequency response, for an input of 2 watts into 4 ohms (2.83 V).

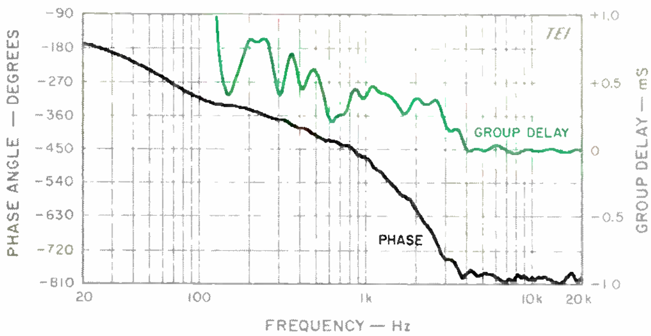


Fig. 2—On-axis phase response and group delay, corrected for tweeter arrival time.

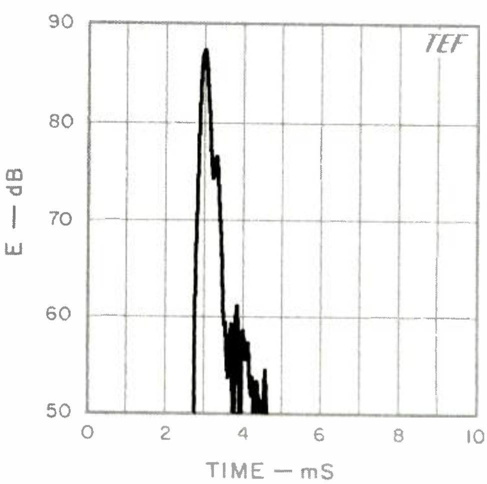


Fig. 3—One-meter, on-axis energy/time curve.

able in several high-quality, furniture-grade hardwood finishes plus matte lacquer.

The grille of the 490MCS, which Quart calls a Transcover, comprises a metal-grid frame covered with an acoustically transparent, highly porous woven material. The grille frame fits into vertical grooves along the sides of the front baffle and thus presents a minimum of front-panel protrusions for sound diffraction.

A common theme of the company's six largest systems is a low-frequency enclosure design that MB Quart calls the Motion Control System, or MCS. This consists of a cabinet-mounted, molded plastic assembly containing two vent tubes of different diameter that are partially filled with acoustic resistance material. A six-page MB Quart white paper states that MCS:

> . . . greatly improves on textbook acoustic-suspension and bass-reflex design by combining the advantages of both while minimizing the drawbacks. . . . The principle . . . is that the speaker is neither open as in a bass-reflex design nor closed as in an acoustic-suspension design. If an MCS speaker is examined via traditional loudspeaker measurement techniques it behaves exactly as a closed-box design should. If you look at its front panel, however, you will see what clearly seems to be a system of ports. . . . The larger tube, or main tuning port, is designed to make the speaker act like a bass-reflex design by producing faster cone movement in the woofer. The smaller tube provides ventilation to the larger one to eliminate distortion. . . . The damping of the large port is so high that no acoustic energy can be found at its opening. The tuned frequency of the small port is too low to produce any acoustic energy. They serve simply to correct the speaker's impedance characteristics. . . . Therefore, the effect of MCS is not directly measurable.

This is just a small quote from the white paper, and MB Quart goes on for three pages to describe the MCS concept in detail. Frankly, although some of the copy describing MCS in this white paper was weak technically, I was quite interested to see how the concept worked from a practical standpoint. Quart was kind enough to provide me with a copy of the German patent, which consists of 24 pages of text, including 22 claims, along with 42 figures! (The whole thing was in German, of course, so I couldn't read a word of it, but I did understand the equations!)

Measurements

The first pair of 490MCS systems I received, which were first auditioned at *Audio*'s New York offices, exhibited woofer voice-coil rubs at high excursions. The measurements and listening tests discussed here were done on a second pair, received directly from the American distributor. The replacement pair operated properly.

The system's 1-meter on-axis frequency response is shown in Fig. 1. Also shown is the effect of the grille. Though there is a modest high-frequency peak at 13 kHz, the response fits within a relatively tight envelope of +1, −3 dB from 65 Hz to 10 kHz. A moderate dip in the 2-kHz crossover region is evident. The low-frequency response rolls off at 12 dB/octave below 60 Hz and is down about 10 dB at 35 Hz. The grille mainly affects the response from 6 to 13 kHz,

The off-axis curves are generally well behaved and indicate that vertical and horizontal high-frequency coverage are excellent.

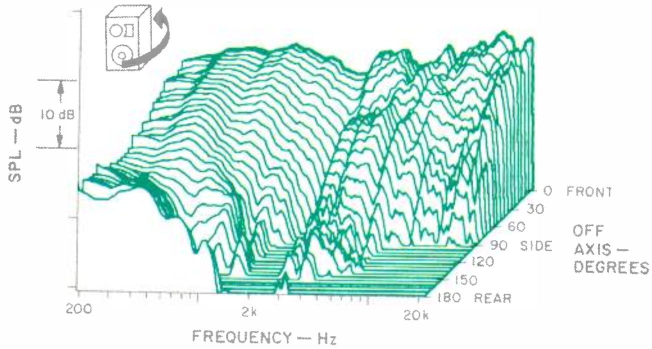


Fig. 4—Horizontal off-axis frequency responses, taken from the front, around the side farthest from the tweeter, and to the rear of the speaker.

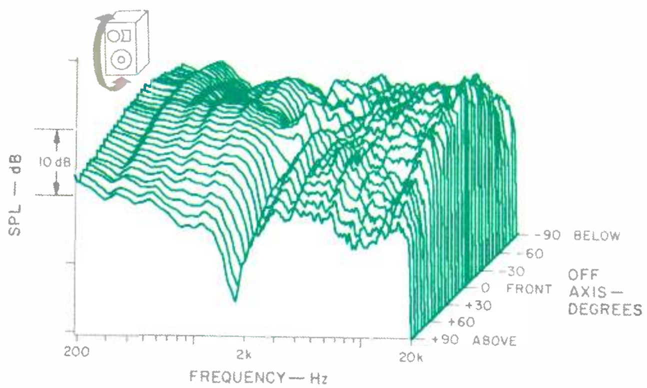


Fig. 5—Vertical off-axis responses, taken from below, up the front, and to the top of the speaker.

where the level is reduced by a modest 1 dB. The response above 20 kHz (not shown) exhibited a peak with a high Q (about 26) at 25.2 kHz, presumably due to the tweeter's metal-dome resonance, and then fell off rapidly at higher frequencies.

Figure 2 shows the system's phase and group-delay responses referenced to the tweeter's arrival time. Both curves are typical for a small two-way system. The group delay indicates that the upper range of the woofer lags the tweeter by about 0.3 to 0.4 mS, which corresponds to about 0.6 to 0.8 wavelength at the 2.1-kHz crossover. This delay is partly due to the offset between the drivers' physical positions and partly to electrical delays inherent in the crossover filter.

Figure 3 shows the energy/time response, swept from 200 Hz to 10 kHz. The main arrival, at 3 mS, is fairly compact but broadens at lower levels and is accompanied by a few minor later returns that are down some 25 dB. The delayed woofer contribution is just visible as a slight perturbation at about 75 dB SPL.

Figure 4 shows the "3-D" horizontal off-axis curves of the system. For a system with perfect off-axis response, all the off-axis curves would have the same shape as the on-axis curve (including any axial aberrations). The on-axis response curve is shown at the rear of the graph in bold. Because the Quart's tweeter is slightly offset from the center of the box, the horizontal off-axis response is slightly asymmetrical. The asymmetries were only evident, however, at extreme angles off axis, where there was more of a dip in the crossover region on one side as compared to the other. In the primary listening range of about ±30°, the system's off-axis response was very symmetrical. The figure shows the horizontal off-axis responses for one side only, in the direction which exhibited the deeper crossover dip (the MCS port side). The curves are generally well behaved and indicate excellent high-frequency horizontal coverage.

The vertical off-axis curves are shown in Fig. 5. In the center of the graph (front to rear), the on-axis response curve is shown in bold, and the above-axis responses are in the front of the display. Except for the 2-kHz crossover region, these curves are also very well behaved. The similarity of the response curves above 3 kHz again indicates the system's excellent high-frequency coverage. Not clearly shown in the graph is the Quart's asymmetrical up/down crossover response behavior, which indicates some lobing. Fortunately, the response through the crossover region was much smoother for angles at and above the tweeter axis than for angles below the tweeter axis.

Figures 6 and 7 show, respectively, the NRC-style mean horizontal and vertical on- and off-axis response curves. The mean axial (+15° to −15°) horizontal response curve in Fig. 6 is quite similar to the on-axis response, which indicates very good off-axis coverage in the primary listening angles if the speakers are toed in. The 30° to 45° response is surprisingly similar to the axial curve but with some added roughness. The lack of high-frequency roll-off above 10 kHz is notable. Notwithstanding the dip in the crossover region, and a downward trend above 5 kHz, the 60° to 75° off-axis response holds up well as compared to some other systems. Evident in both off-axis average curves is a high-frequency peak at 17 kHz, which indicates some localized broadening of the coverage in this range.

Figure 7, the mean vertical responses of the 490MCS, exhibits a depression and response roughness between 1.5 and 4 kHz, a result of the vertical lobing mentioned previously, which creates below-axis crossover dips in the response. The 30° to 45° response is very similar to the corresponding horizontal response except for a much sharper dip at crossover. The 60° to 75° response is also

MB Quart said the 490MCS should measure just like a closed-box design, and it did—like a very good one!

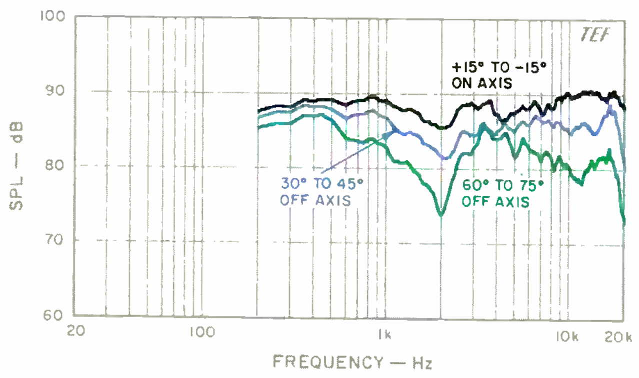


Fig. 6—Mean horizontal responses derived from data of Fig. 4.

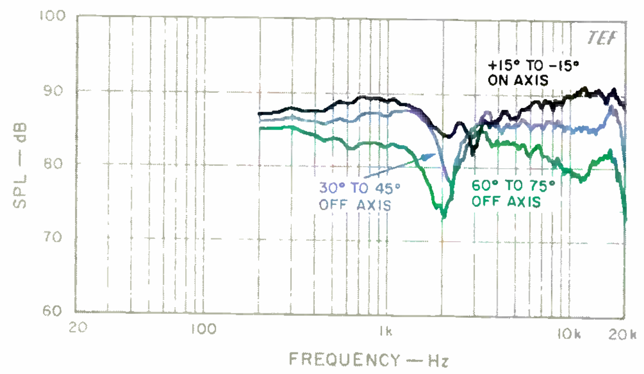


Fig. 7—Mean vertical responses derived from data of Fig. 5.

surprisingly similar to the corresponding horizontal response. Evident in these curves as well is the absence of any severe high-frequency roll-off and the same broadening of coverage at 17 kHz seen in Fig. 6.

An examination of the inside of the enclosure, with the woofer removed, revealed a well-constructed, tight-fitting cabinet made of ¾-inch-thick, medium-density fiberboard. No internal braces were evident in this inspection. All inside surfaces of the enclosure were covered with a 2-inch-thick white batting-like, sound-absorbing material. Two small rolls of the same absorbing material were also placed in the box.

With the woofer reinstalled, a high-level low-frequency sine-wave sweep revealed one significant wall resonance in the vicinity of 280 Hz. At this frequency, an internal buzzing was also evident. The woofer's excursion as a function of frequency essentially was that of a closed-box system with a corner frequency of about 50 Hz. No reduction of excursion was visible due to the MCS ports of the enclosure. Commendably, the woofer did not exhibit any dynamic offset.

The woofer's linear excursion capability was about 0.25 inch, peak to peak, with a limit excursion of about 0.5 inch, peak to peak (average values for an 8-inch woofer). The woofer overloaded gracefully at high levels. Its effective piston diameter was 6½ inches, measured from the middle of the surround on one side to the middle of the surround on the other; the outside frame diameter was 8¾ inches.

The crossover consists of two inductors, three capacitors, three resistors, and a series tweeter-protection device called a Poly/Safety Switch. The crossover is wired on a 3½ × 2½-inch p.c. board that is attached to the rear of the input-terminal mounting panel. Parts quality is high. A medium sized iron-core inductor is used in the woofer's path and an air-core inductor in the tweeter's portion of the crossover. The crossover consists of a second-order low-pass filter (one capacitor, one inductor, and two resistors) connected to the woofer and a third-order high-pass (two capacitors and one inductor) driving the midrange. All connections to the drivers are made with stranded 14- or 15-gauge hookup wire, which is soldered to the driver terminals rather than fastened by clips.

Now we come to the most interesting part of the review: How well does the Moving Control System work? I conducted every test I could dream up, including near-field low-frequency response, impedance, pulse, and listening assessments and came to the conclusion that the system, for all intents and purposes, is a closed-box design—a good one! Before you and the folks at MB Quart cry foul, let me describe the tests and the results.

Removing the molded-plastic MCS assembly revealed a two-port arrangement consisting of a large tube, with an inside diameter of about 1¾ inches, and a small tube with an inside diameter of about ⅜ inch. Both tubes are covered at their outer ends with an acoustical-resistance material that restricts the flow of air in and out of the tubes. I informally tested the flow resistance of each tube by blowing into its open inside end. The large tube presented a very high resistance, which approached a closed condition. The small tube was easier to blow through but still had significantly high resistance. I judged that the larger tube was effectively closed and thus would have no effect on the system's response.

With the port assembly installed, and using a low-frequency swept sine wave, I could only detect air flow in the MCS port assembly through the smaller tube, and then only at frequencies below about 30 Hz and levels above 5 to 10 V rms. To check the effect of the ports, I replaced the MCS assembly with a piece of ¼-inch-thick hardboard cut exactly to the assembly's outside shape. After checking to make sure this arrangement had caused no air leaks, I made a

From the first, the 490MCS gave uncolored response, with first-rate imaging and soundstaging.

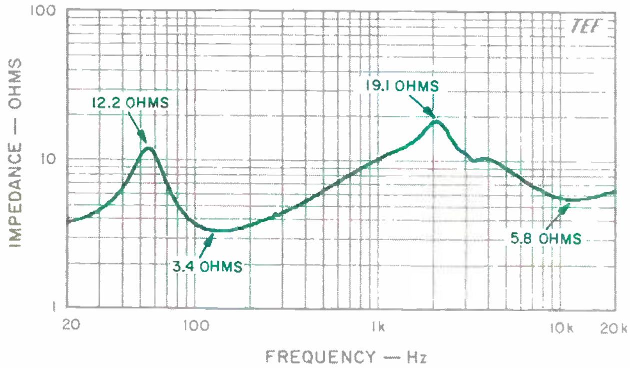


Fig. 8—Impedance.

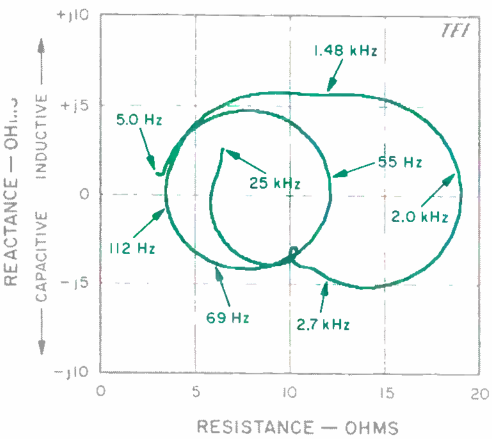


Fig. 9—Complex impedance, showing reactance and resistance vs. frequency.

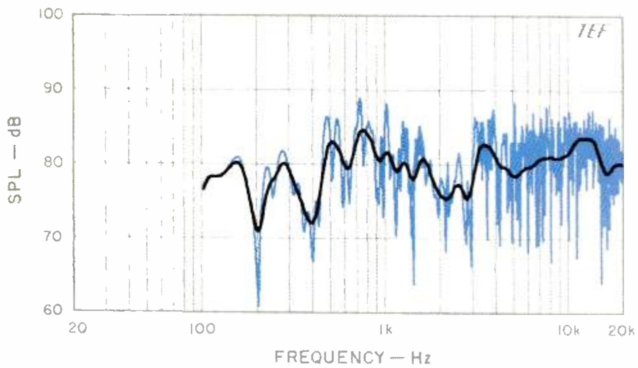


Fig. 10—Three-meter room response, showing both raw and smoothed data.

series of measurements comparing the speaker's performance both with and without MCS.

Traditional measurements revealed no differences in near-field woofer response except for very small effects (±0.3 dB) below 20 Hz, and there were no visible differences in cone excursion on high-level displacement using shaped, peak-power tone bursts. The impedance did decrease by 5% below 20 Hz with the covering plate in place, insignificant compared to the unit-to-unit impedance variations among the four systems. I could detect no audible differences on A/B comparison of a system with MCS and a system with my cover plate when the two were placed side by side and fed identical mono signals.

The 490MCS's impedance magnitude, plotted over the range from 20 Hz to 20 kHz, is shown in Fig. 8. No surprises here; the minimum impedance is only 3.4 ohms, a reasonable value for a 4-ohm rated system. The Quarts will still be quite sensitive to cable voltage drop because of the impedance's relatively high, 5.6-to-1 variation (from 19.1 to 3.4 ohms). Cable series resistance should be limited to a (low) maximum of about 50 milliohms to keep cable-drop effects from causing response peaks and dips greater than 0.1 dB.

Figure 9 is a polar plot of the system's complex impedance. The smoothly changing spirals indicate no resonance problems. The phase angle of the impedance (not shown) reached a maximum of +40° (inductive) at the midrange frequency of 575 Hz and a minimum of −32° (capacitive) at the bass frequency of 72 Hz.

The 3-meter room curve, with both raw and sixth-octave smoothed responses, is shown in Fig. 10. The 490MCS was in the right-hand stereo position, mounted on a stand (which raised the tweeter to a height of 36 inches) and aimed at the listening location. The direct sound plus 13 mS of the room's reverberation were included. A main feature of the curve is a dip in the 2-kHz crossover region. This depression corresponds to the level decreases in the same frequency range that the rest of the response curves exhibit. Above 800 Hz, although somewhat rough, the smoothed curve fits within a resonable ±4 dB envelope. Below 800 Hz, the expected effects from room peaks and dips are evident.

Figures 11, 12, and 13, respectively, show spectra of single-frequency harmonic distortion versus power level for the musical notes of E_1 (41.2 Hz), A_2 (110 Hz), and A_4 (440 Hz). The power levels were computed using the rated system impedance of 4 ohms.

Figure 11 shows the E_1 (41.2-Hz) harmonic distortion data. At this frequency, the maximum power was limited to 50 watts (14.14 V rms), because my usual 100 watts generated excessive distortion and was clearly overloading the woofer. At full power, the second and third harmonics reached a significant 14.5% and 25.7%, respectively. The higher order harmonics were only significant above 2.5 watts. At 50 watts, the system generates a fairly loud 100 dB SPL at 1 meter at 41.2 Hz.

The A_2 (110-Hz) harmonic data is shown in Fig. 12. The second harmonic reached only 6.8% at full power, with the fourth rising rapidly above 40 watts to 2.3% at 100 watts. Interestingly, the third harmonic reached an intermediate high of 0.65% and actually fell at higher power levels. At 110 Hz, the system generates a loud 107 dB SPL at 1 meter for

On organ, the speakers' sound was so involving and well balanced that I just let the CD play and enjoyed the music.

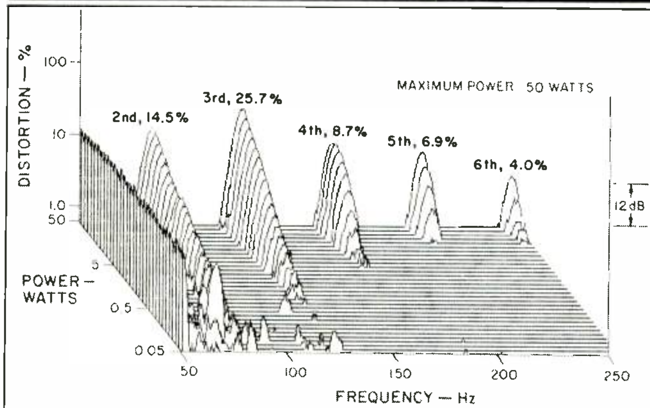


Fig. 11—Harmonic distortion products for the musical tone E_1 (41.2 Hz).

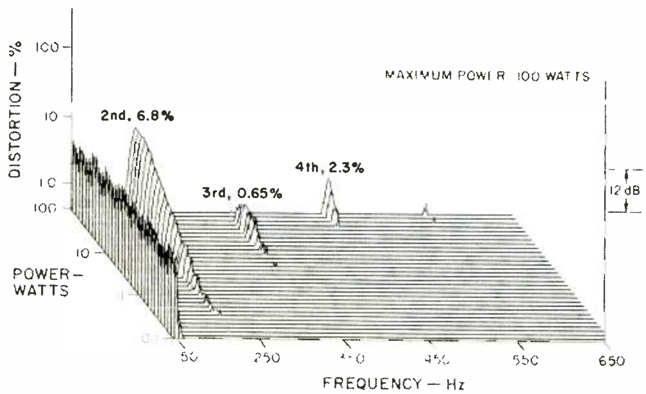


Fig. 12—Harmonic distortion products for the musical tone A_2 (110 Hz).

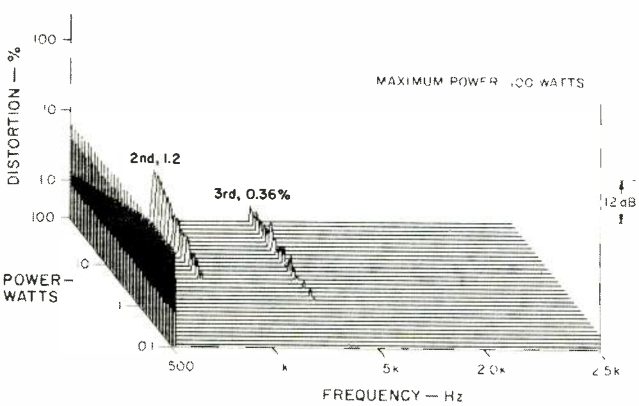


Fig. 13—Harmonic distortion products for the musical tone A_4 (440 Hz).

100 watts input. The A_4 (440-Hz) harmonic measurements, shown in Fig. 13, are quite low, with the second harmonic reaching only 1.2% at 100 watts.

The IM on a 440-Hz tone (A_4) created by a 41.2-Hz (E_1) tone of equal level is shown in Fig. 14. At 50 watts, the IM distortion reaches a moderate 14%, primarily consisting of only first- and second-order IM products.

Figure 15 shows the Quart's short-term peak-power input and output abilities. The peak input power was calculated by assuming a 4-ohm impedance; the maximum input power-handling capacity is shown in the lower curve.

The input power rises with frequency, reaching a level of about 400 watts at 100 Hz. Above this frequency, however, the maximum power actually decreases, due to severe distortion which changes the waveform to a triangular shape above 400 watts. As I had run into this effect before (see review of the B & W 801 Matrix Series 2 in the November 1990 issue), I suspected inductor overload in the woofer's leg of the crossover. A rerun of the test, with direct connection to the woofer, confirmed this hypothesis (see Fig. 15). The input power handling between 250 and 500 Hz increased by nearly 10 dB with the direct connection. At 315 Hz, the peak input power jumped from 245 watts up to 2.4 kW! The subjective audible effect of this increase was very dramatic. The maximum burst output in this range, with normal connection, sounded quite anemic. With direct connection, however, the output levels generated were quite impressive. In the tweeter range, above 3 kHz, the peak input power rose to nearly 7,000 watts (165 peak V) in the normal connection.

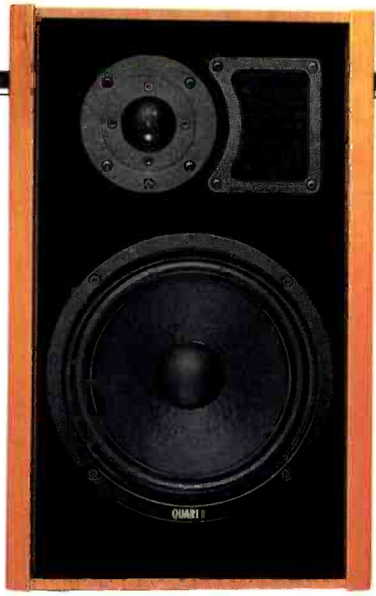
The upper curve in Fig. 15 shows the maximum peak sound pressure levels the system can generate for the input levels shown in the lower curve (normal connection only). Also shown on the upper curve is the "room gain" of a typical listening room at low frequencies. This adds about 3 dB to the response at 80 Hz and 9 dB at 20 Hz. A pair of the 490MCS speakers in a standard stereo setup, operating with common-channel bass, will be able to generate higher bass levels. The peak acoustic output rises very rapidly with frequency up to 100 Hz, where a maximum of about 110 dB is reached. After a moderate decrease, the output level continues to increase, attaining levels of about 125 dB SPL above 3 kHz. If not for crossover problems, the level in the range from 125 Hz to 2 kHz would be much higher.

Use and Listening Tests

Curiously, MB Quart provides no owner's manual or other information on the setup and use of the 490MCS. The only user information is a small guarantee booklet outlining the company's warranty (which is quite good, incidentally—a limited warranty for 5 years from date of purchase). The second set of systems I received allowed me the luxury of seeing both the oak and walnut cabinet finishes. Both sets were quite gorgeous, and the workmanship and cabinetry were top-notch.

Connection to the systems is through a pair of very accessible five-way binding posts on the bottom rear of the 490MCS, spaced about 1⅛ inches apart. Unfortunately, due to the posts' wide spacing, double banana plugs with standard ¾-inch spacing will not fit. Large, finger-twist

On live jazz tracks, the Quarts demonstrated very good presence as well as a sense of "being there."



knobs and connection holes of 0.11 inch diameter easily allow connecting large wire, up to #10 AWG. No provision is made for bi-wiring or biamping.

Listening was done from my sofa, about 10 feet from the speakers, with the speakers 8 feet apart. To keep them well away from nearby reflecting surfaces, I set them up about 6 feet from the rear wall and 4 feet from the side walls. The systems were mounted on 22-inch-high stands, which placed the tweeter 36 inches above the floor, ear height. I drove the Quarts with my usual Rowland preamp and power amplifiers and connected them with Straight Wire cables. All listening was done with Compact Discs, mostly before the measurements were made.

First listening impressions of the 490MCS revealed a relatively uncolored presentation, with a moderate amount of high-frequency emphasis and an adequate but not overpowering low end. Imaging and soundstaging were first-rate, but a bit of upper midrange roughness was evident.

On track 1 of *Take Me to the Sun*, a jazz-fusion CD by Gil Evans (recorded live at the 1983 Montreux Jazz Festival, Last Chance Music LCM 002), the systems demonstrated very good presence and a sense of "being there." The bass line was rendered quite smoothly, and the Quarts did an excellent job of re-creating the high-level, sharp-transient sounds of the percussion instruments.

The voice of baritone Daniel Lichti on *Songs of Hugo Wolf* (Dorian DOR-90131) was re-created with much sonority and minimal strain. The low-level decaying piano and room reverberation sounds were dealt with very compellingly by the 490MCS.

The systems passed the pink-noise stand-up/sit-down test with only minimal tonal changes in the upper midrange. The noise test also clearly demonstrated that the systems were definitely brighter than my reference B & W 801 systems and had a somewhat rougher midrange. On third-octave band-limited noise, the Quarts became clearly audible at 32 Hz and came on strong at 40 Hz and higher; at 20 and 25 Hz, only low-order distortion products could be heard. Moving the systems toward the rear wall did improve performance at very low frequencies but at the expense of performance in the upper bass and midrange, which is highly room-dependent.

The emphasized high-frequency response of the 490MCS did create some vocal sibilance problems on some pop/rock material. And, yes, the systems can do justice to loud rock 'n' roll. To demonstrate this I played track 11, "Bad Girl," of ZZ Top's *Eliminator* (Warner 23774-2).

On Jean Guillou's *Vivaldi for Organ* (Dorian DOR-90118), the speakers exhibited a full, quite involving sound, with good balance, and did such a good job I let the CD play on for a while and just enjoyed the music.

The Quart 490MCS, although at the upper end of the price range for two-way, 8-inch systems, has demonstrated excellent performance value for the money and has stellar good looks with its fine hardwood cabinetry. Even though the MCS low-frequency technology did not quite live up to its billing, the system's bass response is still quite good for its class. If you're in the market for a bookshelf-sized or stand-mounted system, the 490MCS requires your thoughtful consideration.

D. B. Keele, Jr.

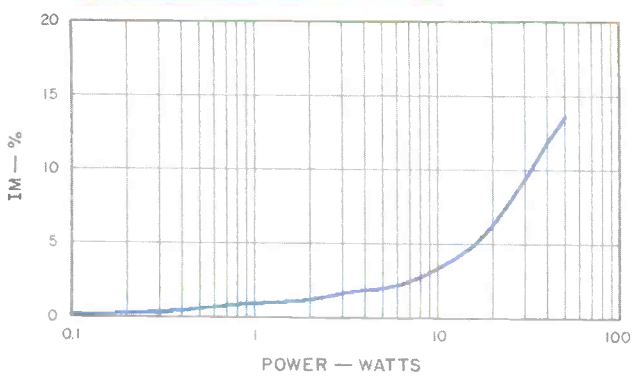


Fig. 14—IM distortion on 440 Hz (A_4) produced by 41.2 Hz (E_1) mixed in one-to-one proportion.

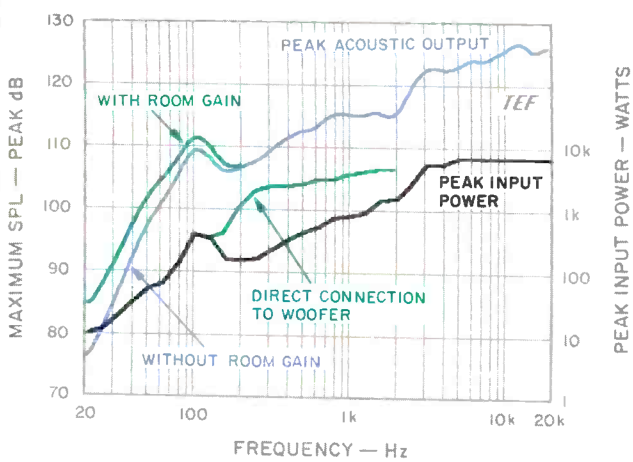


Fig. 15—Maximum input power and maximum peak sound output vs. frequency at 1 meter on axis; see text.