Arcam AVR350

Surround Sound Receiver

Peter Moncrieff

Holy Guacamole!

Arcam's headline claims that their new AVR350 is the "Best ever sounding receiver from Arcam," thereby implying that it sounds even better than Arcam's own widely praised AVR300 (reviewed in Issue 95, April 2005). But the AV350 looks exactly the same as the AVR300 (except for HDMI version 1.2 throughput jacks). And Arcam's own specs for the new AVR350 are exactly the same as for the AVR300. So one can be forgiven for casting a jaundiced eye upon manufacturer claims of superiority, in an industry where "new" and "improved, better, best" are so overused and abused. And you, the consumer, might well ask why you should spend an extra $500 for the AVR350 receiver that offers no more power and no more features (save HDMI throughput) than the AVR300. Besides, the AVR300 already offers excellent—indeed, world-leading—surround receiver sonics, so it doesn't seem likely that Arcam (or anyone) could improve significantly upon the AVR300's sonics. Yet better sonics are precisely what Arcam is touting as the principal advantage of the AVR350, as the principal reason why you'd want to spend $500 more than for the AVR300.

Thus, my reviewing task was clear. I had to directly compare the new AVR350 to the AVR300 (plus other surround processors), and see if I could hear any differences, then ruthlessly analyze whether these differences are truly sonic improvements, and finally assess whether the sonic improvements (if any) in the new AVR350 are worth the extra $500.

I've just completed all my testing, comparisons, and analyses. My scientific, coldly objective, ruthlessly analytical judgment of the AVR350's sonics, and its margin of sonic superiority over the AVR300 (and other brands of surround processors), can be summed up in two words:

Holy guacamole!!!

I have such high regard for the AVR300's sonics that I wasn't expecting such a significant sonic improvement to be possible, but there it was, plain as day. The sonic superiority of the AVR350 over the AVR300 (and other brands of surround processors) is obvious in degree, and is important in its nature, and yields many felicitous benefits for both music and film. I'll discuss these aspects in detail below. For now, note that Arcam's headline claim, for the AVR350's sonic superiority, has proven to actually be fully justified, indeed to be a modest understatement (typically British), and it is not at all the typical advertising hype one sees elsewhere.

This also means that the AVR350 is easily worth the extra $500 over the AVR300. Look at it this way, the AVR350 costs merely 25 percent more than the AVR300 ($2,499 versus $1,999 in the USA). And the AVR350 offers Holy Guacamole sonics, which are twice as good as the already excellent AVR300 in many key aspects. When you get sound that's twice as good by paying merely 25 percent more, that's a bargain in anybody's book.

Usually, as you near the pinnacle of equipment performance, the law of diminishing returns sets in and you have to pay twice as much to get just a 10 percent performance improvement. But here Arcam has triumphed over even the law of diminishing returns, by giving you spectacularly better sonics for just 25 percent more. And Arcam is indeed working at or near the pinnacle, since the sonics of the AVR350 far outclass the sonics of all other brands of surround processors or receivers I have tested to date, regardless of price.

Thus, if you're in the market for a surround receiver, the new Arcam AVR350 is your obvious first choice. If you already have a surround receiver, regardless of its price, you should consider sonically upgrading to the Arcam AVR350. Even if you already own the excellent AVR300, you'll be richly rewarded by upgrading to the AVR350's sonics.

And Arcam is to be thanked and congratulated for having pursued and brought to market a new product whose chief benefit is better sound—no added watts, significant new features, or gimmicks—just better sound for us all. Much better sound.

Arcam AVR350

SPECIFICATIONS

General
Analog audio inputs: two-channel (7); 7.1-channel (1, RCA-type)
Analog audio outputs: Two-channel (4, including Zone 2); 7.1-channel (1, RCA-type)
Digital audio: coaxial (3 in, 1 out); TOSLink (3 in, 1 out)
Input impedance: >22 kilohms
Signal/noise ratio (analogue input): 100 dB
Signal/noise ratio (digital input): 100 dB
Frequency response: 20 Hz - 20 kHz (±0.25 dB)
Any 2 channels driven: 120 watts (20 Hz - 20 kHz @ 0.2 percent total harmonic distortion)
All 7 channels driven: 100 watts (1 kHz @ 0.2 percent total harmonic distortion)
Total harmonic distortion at 80 percent rated power output: 0.02 percent (at 1 kHz)
Video inputs and outputs: composite video (5 in, 4 out); S-video (5 in, 3 out); component video (3 in, 1 out); HDMI (2 in, 1 out)
Trigger outputs: 12-volt (6)
Control: RS232C

Dimensions (WHD In Inches): 17 x 5.7 x 16.5
Weight (In Pounds) 35.7

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review. But it temporarily allowed the sonics of the entry-level AVR300 to outshine the sonics of even Arcam's own flagship, the AV8.

Of course, after the AVR300's introduction, Arcam engineers quickly set to work adding this new Mask of Silence technology to their higher end products, first the new AVP700 and then the new AV9 flagship. Trickle-up instead of trickle-down benefits, generously donated by the first kid on the block with this new technology, the AVR300, and sent 'round the circle of other Arcam surround products.

As the Arcam engineers successively applied the new Mask of Silence technology to their higher end products, they inevitably learned some new tricks about optimizing this new technology for best sonics. And in Arcam's higher end products, these engineers also had a larger parts budget for implementing these new, better-sounding tricks. These new tricks included new Mask of Silence parts, including the Stealth Mat (used, heretofore, only in Arcam's FMJ top line products). And this new Mask of Silence technology also made more aurally obvious, the sonic benefits of using a more expensive op amp, the OP2134 (used, until now, only in Arcam's more expensive products, such as the AVP700).

Since the AVR300 had generously sent its new technology 'round the circle, it was only fair that what the AVR300 sent to go around the circle should come back around the circle to benefit the AVR300. So the Arcam engineers tried these new, more expensive tricks, learned from the higher priced AVP700 and AV9, on the AVR300 to find out what sonic improvements these new tricks might bring to it. When they heard the same dramatic, Holy Guacamole improvements, they decided to make them available to you, the public. Since these higher performance trick parts make the whole unit cost modestly more, Arcam decided to bring it out as a new product, the AVR350, while keeping the AVR300 in the lineup for those customers who simply could not go above its $1,999 (USA) price point.

By borrowing just those trick parts from their high-end products, which gave the best sonic bang for the buck, Arcam's engineers have given you, in the AVR350, a souped up hot rod that, sonically, performs like those high-end Arcam products, and sounds significantly better than the stock product (the AVR300), but at a modest price increase over the base AVR300. They have achieved and fulfilled the ideal fantasy of everyone who's ever lusted after a souped-up hot rod: start with an inexpensive base chassis and add just enough of the right trick parts, at modest cost, to turn it into a high-performance overachiever that can wipe out competitors that cost far more money.

"The Arcam AVR350 is easily the best-sounding surround receiver or processor I have ever tested, regardless of price."

Souped-Up Hot Rod

If the AVR350 is a kissing sibling of the AVR300, with identical specs, how could its sound have been improved so spectacularly?

As you know, many automobiles can be turned into souped-up hot rods by the judicious substitution of higher performance trick parts here and there. If the modifier knows what he's doing, he can achieve dramatic performance gains at a merely modest increase in cost. That's just what Arcam's engineers did here, bestowing a Holy Guacamole sonic improvement upon the already excellent AVR300 by the addition and substitution of a few key "trick parts" that raise the cost only modestly, thereby, morphing it into the souped-up hot rod performance version called the AVR350. Think of the AVR350 as being to the AVR300 what the M series is to the standard BMW, and the AMG version is to the standard Mercedes.

Why did the AVR300 deserve the attention of Arcam's engineers for hot rodding? Probably karma. As they say, what goes around, comes around. Arcam first developed their Mask of Silence technology at a time that happened to coincide with the design gestation of their AVR300. Arcam then took the bold step of introducing this new Mask of Silence technology in their new entry-level receiver (the AVR300), rather than in their flagship products (such as the AV8 Surround Processor). This enormously benefited the AVR300's sonic performance, triumphing over the competition, as I recognized in my

In my judgment, the original AVR300 already achieved world-leading sonics, so with the AVR350, Arcam has stepped even farther ahead, even before the competition had a chance to catch up to the AVR300. Arcam clearly has a highly self-motivated *esprit de corps*, which does not rest on its laurels, and does not wait for the competition to catch up, before they go back to work to develop yet better sound for your sake.

Incidentally, the AVR350 does offer one *au courant* new feature lacking in the AVR300: HDMI input and output jacks, with switching between two HDMI inputs for the one output. But, this new feature is of limited advantage. It offers merely passive throughput switching, without any active buffering or HDMI input receivers in the AVR350. This lack of active buffering means that the HDMI cable run from your source to the AVR350, plus the cable run from the AVR350 to the display, both add up together, toward the maximum length allowable for HDMI (whilst a cable run directly from your source to the display

might well be much shorter). And this lack of an onboard HDMI receiver means that the AVR350, ironically, cannot tap into the audio portion of the very HDMI signal it is switching, in order to play it back through your system. Of course, Arcam is probably (like many manufacturers) wisely waiting for next year's arrival of HDMI 1.3 receivers, which will allow the input of more advanced audio (and video) signal formats.

Note that bringing HDMI signals into any chassis also brings in far greater (worse) electromagnetic noise, which, in other brands of processors, typically make them sound worse, as this added noise corrupts all their on-board digital processing (see discussion below). Thus, it's a testament to the efficaciousness of Arcam's Stealth Mat that the AVR350, with its HDMI signal throughput, is quieter than the AVR300 without this HDMI feature. This also suggests that you would be wise to eschew utilizing the AVR350's HDMI throughput feature, in order to prevent this added HDMI noise from even entering the AVR350 chassis in the first place, so the Stealth Mat does not even have to fight it.

Analysis Of Sonic Improvements

I directly compared the new AVR350 to the AVR300, and to other brands of competing surround processors and receivers. I employed my high-resolution lab reference system, which is mercilessly revealing of the strengths and weaknesses of all products under test. This system includes the McCormack UDP-1 universal player, the Cary CD 303/300 CD player, the Arcam DV29 as a reference video source, Nordost Valhalla loudspeaker cables, Nordost Optix video cables, VonGaylord interconnect cables, power cord sets by VonGaylord and Wan Lung, and a surround array of Von Schweikert VR4 Jr loudspeakers.

The Arcam AVR350 proved to be very consistent in all its operating modes. Its sonic superiorities over the competition (and over the AVR300) were already triumphantly evident in the simplest operating mode with the shortest signal path, the direct analog throughput multichannel mode. And, these same sonic superiorities were then also equally evident in most other operating modes, even as the signal path became more complex.

The most immediately striking sonic superiority I heard was the AVR350's utterly black, silent background. All other units seemed to have a kind of modulation noise accompanying the music (or other sounds). This modulation noise in the background makes music (and other sounds) seem slightly veiled and confused, and it actually obscures subtle details of the recording that make a musical instrument, voice, etc., sound more convincingly real. We all have accepted this background modulation noise as a given of artificially reproduced sound. Indeed, many of us don't even hear it or notice it. But you will instantly notice it when it's suddenly gone in a new product like the AVR350, and, when you hear how much blacker the AVR350 sounds, the noise and veiling confusion will be obvious when you switch back to other units.

It's easy to hear that the AVR350 has a quieter, blacker background, and does not have this modulation noise. Then, this absence of noise, in turn, produces several ancillary sonic benefits that you'll also notice in the AVR350. First, the blacker, quieter background directly produces the result that transients emerge more dynamically and with better articulation, from this lower noise floor. Second, the absence of modulation noise, with its veiling and confusing sonic effects, indirectly produces a further whole slew of sonic benefits. The AVR350 sounds more revealingly transparent and clearer without this noise, since the veiling and confusion caused by noise is gone. The AVR350's superior intertransient silence lets you hear more clearly the subtle timbral and textural noises that every musical instrument naturally makes immediately after each transient, so all music (as well as voices and sound effects) sounds more natural and more like the live event. The AVR350 also sounds cleaner and more pristine without this noise because even subtle levels of modulation noise actually distort music and sounds (adding distortion by-products and sidebands). Additionally, the AVR350 sounds more articulate and faster without this noise, since noise smears transients over time, effectively defocusing them and slowing them down. And the AVR350 has better spatial imaging without this noise, since the subtle sonic cue's defining space and location are no longer obscured by noise.

Which trick parts in this AVR350 hot rod should take credit for these many sonic improvements? Since these sonic improvements are already evident in the direct analog mode (listening through the AVR350 power amplifier section as well), we should look to the AVR350's trick parts already in play here. The analog output buffer, through which all signals flow on their way to the power amplifier section, has been upgraded with the more expensive (and clearly better-sounding) OP2134 op amp (borrowed from the more expensive Arcam AVP700 processor). Furthermore, this op amp has been reconfigured for 6 dB extra gain in the AVR350, which means 6 dB less loop feedback in this buffer application, and less loop feedback can produce sonic benefits, such as less modulation noise and distortion, and cleaner, more open sound. Additionally, the Stealth Mat (borrowed from Arcam's high-end FMJ series), which absorbs noise radiated by the many digital circuits within the AVR350, might conceivably also be helping the analog buffer stage and power amplifier section to have the quieter black background that I hear.

Digital Operating Modes

In all surround processors, most operating modes involve digital circuitry handling the signal (the exception being straight-channel throughput of analog signals, without any alteration other than volume level). The AVR350's sonic superiority, already so clearly evident in straight-analog throughput, becomes even more dramatic as soon as any digital circuitry becomes involved. Here, the AVR350 proves to be sonically superior to the AVR300 and to other competing brands, in all the many aspects described above, but its margin of sonic superiority is even greater in degree.

Most of the credit for this extra margin of sonic superiority, in all digital modes, should go to the Stealth Mat. Why does the Stealth Mat improve sonics so dramatically, in all digital modes? The Stealth Mat is made from chopped carbon and nickel fibers and was originally developed to reduce the radar image of aircraft, by absorbing that electromagnetic radiation we call radar. This Stealth Mat, positioned underneath the top lid of the AVR350, absorbs and acts as a dead-end sink for all the electromagnetic noise that is generated within and radiated by the copious digital circuitry within the AVR350. Without the absorbent Stealth Mat, this electromagnetic noise would bounce off the large lid area, reflect back down into the digital circuitry, and continue to echo throughout the inside of the unit. This electromagnetic noise, generated and radiated by the digital circuitry, can easily degrade the sound if it gets back into this same digital circuitry, as it does with all other surround processors that do not use this Stealth Mat.

How and why does this radiated digital noise degrade the sound when it re-enters the digital circuitry? Any kind of noise added to a digital signal produces an ever-changing amplitude indeterminacy, when that digital signal is later converted to analog for listening. This amplitude indeterminacy causes temporal indeterminacy for the exact instant that the digital signal crosses the zero axis (or any threshold) when converted to analog, so it produces the same sonic degradations as temporal indeterminacy does. Temporal indeterminacy is a well-recognized evil under its other name, jitter. Jitter, and temporal and amplitude indeterminacies all cause the same sonic degradations when a digital signal is finally converted to analog. Distortion sidebands are produced, which smear and distort the sound, create modulation noise, degrade intertransient silence, veil and obscure the sound (both via this noise and via the temporal smearing), defocus transients and degrade articulation, add phony artifacts (which can sound like hashy brightness or hard glare) degrade spatial imaging (thanks to the veiling and smearing of subtle imaging cue information), etc., etc. That's a huge pile of sonic degradation.

All these sonic degradations can be caused by amplitude indeterminacy, and therefore, can be caused by any electromagnetic noise impinging upon digital circuitry and thus being added to the digital signal. The Stealth Mat in the AVR350 does not stop the digital circuitry from radiating electromagnetic noise outward, but it does largely prevent that outwardly radiating noise from bouncing back and impinging upon that same digital circuitry. And, by so doing, the Stealth Mat creates huge sonic advantages for the AVR350 over all other surround processors, which suffer the many sonic degradations just described.

The AVR350's sonic superiority, thanks to the Stealth Mat, is evident in every digital mode, including simple A/D conversion with straight-channel playback, the various Dolby® and DTS® decoding modes, and reverb effects modes. Even the built-in digital FM tuner seems to sonically benefit from the Stealth Mat, with better quieting and a richer tonal balance than heard before in the AVR300.

In its various digital modes, the AVR350 clearly reveals more about music, voices, sound effects, and space itself, than any other surround processor I have ever tested. Its quieter, blacker background simply lets more information through than I have ever heard before from a surround processor. And the sonic improvements extend across the board, to cover virtually all sonic aspects (which is natural, much as a disc transport with much lower jitter, likewise, can provide across-the-board sonic improvements). The AVR350, in its various digital modes, is not only quieter and more transparently revealing but also cleaner (with lower distortion), faster, more articulate, more natural, and with better spatial imaging (including an even more believable portrayal of surround space than the already superb AVR300).

Dolby Pro Logic IIx

If the AVR350 sounds twice as good as in various digital modes, then it sounds ten times as better in one particular mode, Dolby Pro Logic® IIx (as applied both to a two-channel input and also to a Dolby Digital multichannel input). The AVR350's sonic transformation of Pro Logic IIx is so radical that it sounds like a whole new decoding algorithm, so amazing that it merits its own special discussion, which appears in the expanded review of the AVR350 on www.WidescreenReview.com.

We saw above that the Stealth Mat reduces the electromagnetic noise impinging on all digital circuits in the AVR350. That includes the digital circuits used to perform the Dolby matrix extraction modes. Thus, it stands to reason that the AVR350 is drastically reducing the noise level in the Dolby matrix extraction circuitry, and is thereby allowing this circuitry, for the first time in any processor, to get close to the ideal mathematical algorithm that the Dolby engineers intended. And that's why I heard such a huge difference, such a huge improvement, in Dolby Digital Pro Logic IIx reproduction in the AVR350 over any and every other processor.

For the first time, Dolby Pro Logic IIx, as heard in the AVR350, need make no apologies for its sonic quality. It sounds admirably articulate, direct, and fast. It still sounds gentler than DTS Neo:6, but its error on the side of softness is now less than Neo:6's error on the side of hard glare, so Pro Logic IIx is now overall the more sonically accurate mode.

Dolby surround enhancement modes always featured much richer enhancement of surround ambience than DTS surround enhancement modes, which is why I favored the Dolby modes for film soundtrack playback. Now, with Pro Logic IIx also becoming more sonically accurate than the DTS surround enhancement modes (ES and Neo:6), thanks to the AVR350, I would recommend Dolby Pro Logic IIx (music mode) over DTS Neo:6 for surround enhancement of music also.

As I wrote before, one of the chief uses and joys of a surround processor with true high fidelity, like the Arcam series, is that they can bring enormous pleasure not just for film soundtrack playback, but also as the anchor in your main music system, for surround enhancement of your vast library of two-channel recordings (as well as FM). Using the AVR350, I was able to re-create the surround soundfield of attending a live music concert, even from two-channel recordings. The effect is so convincing with the AVR350 that you'd swear you were listening to a full surround multichannel recording, especially when the recording is an excellent one actually made at a live concert.

Because the AVR350's implementation of Dolby Pro Logic IIx cures the fuzzy defocus and is far more articulate, all direct sounds have much more precise localization all around the surround circle, for both film soundtracks and music recordings. And the same is true for indirect sounds from a recording, such as reflected ambience from the walls of the concert hall or other recording venue. These indirect, subtle imaging cues are reproduced more articulately and revealed more clearly by the AVR350, without being hidden by the veiling and obscuring from the fuzzy defocus of information that occurs in the Dolby Pro Logic IIx of all other surround processors I have heard. So, with the AVR350, the surround space becomes even more believable than ever before, since you can hear the boundaries of the large hall or other venue as never before. Arcam's AV8 made a big advance in the reproduction of space itself, as I discussed in its review (Issue 80, January 2004), and the AVR300 subsequently advanced this rare achievement even further, and now the AVR350 advances this reproduction of space itself yet further, for the most believably convincing portrayal of surround space that I have ever heard.

Output Impedance Switch

In my AVR300 review, I had recommended setting the rear panel impedance selector switch to 8 ohms, in order to obtain the maximum voltage swing for the power amplifier output stage. However, the new performance strengths in the AVR350 provide cause for reversing this advice.

The AVR350 is so dramatically superior in quieting background noise, and provides such important ancillary sonic advantages therefrom (as noted above), that it becomes important to optimize and maximize these new sonic virtues. I found by experimentation that the 4-ohm setting of the rear panel impedance switch improves quieting even further, and improves all the other sonic advantages of the AVR350 as well (even curing a slight artificial solid-state glare that is evident in the 8-ohm setting).

This is probably because the 4-ohm switch setting draws from a lower voltage secondary tap on the power transformer, which would provide a lower source impedance for your loudspeaker from the output stage (via its rails voltage), and also would provide a lower source impedance for refilling the capacitor reservoir of the power supply. A lower source impedance provides sonic benefits because it can supply energy at higher currents more quickly, hence more accurately.

A lower source impedance is also important because the model we all use, for obtaining accurate reproduction via a universal amplifier to loudspeaker interface, assumes that the power amplifier can act as an ideal voltage source, which means having as low a source impedance as possible (at all frequencies). A higher source impedance from the power amplifier means that the signal reproduction will not be as accurate through this interface, perhaps more veiled and distorted. It's a subtle effect, not obviously audible with most audio equipment. But the AVR350 is so amazingly revealing that it does clearly reveal even this subtle effect, making the 4-ohm tap, with its lower source impedance, clearly sonically superior to the 8-ohm tap, with its higher source impedance. It's a testament to the superior sonics of the AVR350 that it is so revealing of even subtle effects like this.

Speaking of low source impedance naturally also raises the subject of power cord sets. With the AVR350 obviously deriving some of its sonic superiority from its virtue of having a very low internal throughput source impedance (especially in the 4-ohm mode), it makes obvious sense to make sure that the external connections fulfill this potential by giving the AVR350 the lowest possible source impedance connection to the mother of all low-impedance sources, the powerline. The AVR350 is so revealing of sonic information on recordings that it is naturally also very revealing of the sonic quality of all other associated links in your system, so it is intrinsically more revealing of power cord set quality than lesser processors and receivers would be, and thus more sonically rewarding of your investment in the best power cord set. In addition, the fact that the AVR350 has such an admirably low internal throughput source impedance means that it is more revealing of the difference that a low source impedance energy source (hence a low impedance connection to the powerline) makes, more revealing than another processor or receiver with poorer (higher) internal source impedance would be.

The best-sounding power cord set I have yet found, at moderate cost, for the Arcam products is the 12-gauge Wan Lung black (available in the USA from the service department at Parasound in San Francisco). It provides a low source impedance connection to the powerline and allows the AVR350 to sing at its full glory.

Because the AVR350 is modest in price, yet sonically outperforms far more expensive surround processors and receivers, you'll get the very best sound that money can buy, and you'll save a lot of money buying the AVR350 instead of the more expensive competition. Here's some advice, put this money you save to good use by investing in the finest associated components you can afford for the rest of your system chain. The AVR350 is so extraordinary, sonically speaking, it will happily reveal the better sound of all associated system links, and will thereby reward you with even better system sound. For example, if you want to partner the AV350 with an Arcam disc player, you might be wise to invest in the premium, new DV139, which is part of Arcam's top FMJ line and includes a Stealth Mat (just like the AVR350), rather than the less expensive DV137. Likewise, you'll be sonically rewarded by partnering the AVR350 with the very best, most revealing cables and loudspeakers you can manage.

Conclusion

The Arcam AVR350 is easily the best-sounding surround receiver or processor I have ever tested, regardless of price. The AVR350 marks a stunning sonic advance over the already excellent AVR300, and over all other brands of competing units that I have tested, even those costing far more money. The margin of the AVR350's sonic superiority over other units is dramatic. And the breadth of its sonic superiority is breathtaking, encompassing virtually every important sonic aspect (transparency, clean purity, intertransient silence, spatial imaging, etc.). The AVR350's trump card is its implementation of Dolby Pro Logic IIx, which substantially cures the sonic weaknesses found in all other surround processors, opening a whole new sonic world for this surround mode that is so widely applicable to both music and soundtracks and is so impressive in creating a believable surround spatial image. And the icing on the cake is the AVR350's modest price, only a slight premium over the AVR300, for a souped-up hot rod that dusts everyone else in sonic performance. WSR