



MOON EVOLUTION 700i INTEGRATED AMPLIFIER

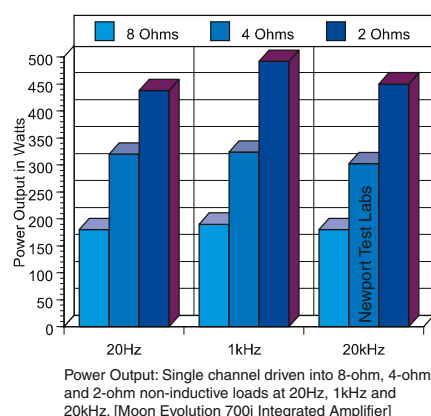
Canada has earned itself a superb reputation for producing some of the world's best audio gear. The country has quite a small population but, it would seem, a disproportionate ratio of outstanding audio manufacturers per capita. The country can also claim to be home to one of the most respected research facilities in the world—the National Research Council of Canada. One of Canada's most highly-regarded audio companies is Simaudio, which offers a wide range of high-end electronics that are sold under the brand 'Moon Audio'. Simaudio recently released its 'Evolution Series' of which the Moon 700i integrated amplifier is a part.

THE EQUIPMENT

The 700i is a stunner. It's built like a Sherman Tank too. In line with the rest of the Evolution Series, it's available in two finishes and features beautiful curved solid brushed aluminium side panels, triangular corner posts that house the chromed machined cones (including surface-protecting dishes), a large bright red central display and a solid chassis.

As usual with Moon Evolution products, the 700i features comprehensive connecting options. For starters, there are good quality gold-plated WBT speaker binding posts

on opposing sides of the rear panel; the connecting options are also mirror-imaged. There are four sets of RCA inputs, a single XLR balanced input, tape monitor in/out and a single RCA pre-out, along with a now almost-ubiquitous 12-volt trigger connection and a set of SimLink in/out connections



for activation of—and two-way communication with—other Moon components. An RS232 D-sub connection allows external PC control and the updating of internal firmware. Last, but not least, there's a standard fused IEC 240V mains socket with its own power switch.

The front panel of the 700i is reasonably minimalist in terms of controls as almost

everything is controllable via the milled-from-solid aluminium remote (with a multitude of small buttons that are identical). Having said that, Moon trademark notwithstanding, the front fascia is dominated by a large red dot-matrix display which provides the user with comprehensive system information. Small circular chrome buttons operate the standby status, display functions and dimming, input selection, menu set-up and function activation, monitor and mute. A large machined aluminium rotary knob controls volume.

Moon states that it uses twin massive custom proprietary toroidal transformers in conjunction with an over-sized dual mono power supply for driving speakers featuring difficult impedances. The company's 'Lynx' circuitry uses 'no overall feedback' and features virtually zero inter-modulation distortion. Proprietary bipolar output transistors are said to yield improved bass performance over previous designs and a more 'accurate' sonic reproduction. Large heatsinks run along the sides of the 700i, although the amplifier runs very cool.

The 700i is specified as being capable of continuously delivering 175-watts per channel into 8Ω loads and 350-watts per channel into 4Ω loads. Input impedance is 23.7kΩ, output impedance a low 0.02Ω

and the signal-to-noise ratio is quoted as 105dB referenced to full power. THD is quoted as 0.015 per cent at 1-watt and 0.04 per cent at full power.

The volume control works in 0.5dB steps from numerical values 0–30 and then jumps to 1.0dB steps from 30–80 allowing fine and quick adjustments to listening levels from the precisely-weighted rotary knob.

Styling is a subjective thing but I found the look rather cool, in a hip kind of way, and you'll certainly not have any issues in terms of fit and finish and overall build quality—everything has been meticulously designed and painstakingly engineered.

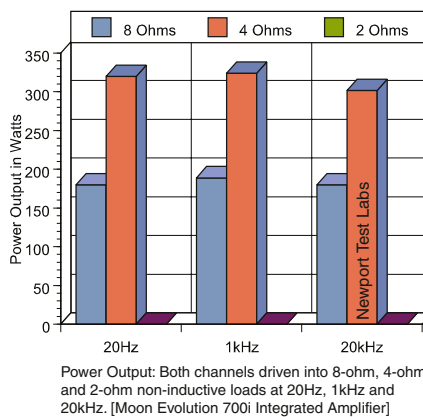
LISTENING SESSIONS

The 700i operated faultlessly, precisely, and in a way that I found rather enjoyable throughout the review period, so I'd say that all Simaudio's efforts in the 700i's circuitry have paid off. The Moon 700i is a smooth, powerful and dynamic integrated amplifier that may, in time, be considered a North American classic. Hooked-up to a suitable-quality source and speakers—even somewhat difficult-to-drive models such as my reference speakers—the 700i tightly controls the sound throughout the frequency range and, of course, especially in the lower registers.

Cat Power's Chan Marshall is a favourite songstress. The CD Jukebox is a wonderful mix of covers and originals recorded competently and in a way that shows off Marshall's delicate, yet earthy voice and its interaction with Cat Power's adept band. The opening track, a cover of Sinatra's signature tune *New York, New York*, opens with a massive drum intro followed by a flowing keyboard riff. The 700i slammed

hard on the drums while controlling their bloom and reproduced their attack accurately and forcefully while offering faithful detail and decay. The keyboard riffs and Marshall's voice followed with impressive separation and integration... without being overwhelmed by the musical wall of sound. Tonally I found the 700i to be just about neutral; it errs just subtly to the warm (Yin) side. This is a balance that, all things being equal, any astute listener would appreciate and prefer over the opposing side (Yang) which can result in fatigue from an unnaturally hyper-detailed or bright sound.

The Los Angeles Guitar Quartet (LAGQ) on track one of their self-titled CD spread across a massive soundstage with a wealth of ambient information, making for lateral and depth cues that portrayed a large soundstage with a perspective that was slightly forward of the plane of the speakers. As a trademark of most well-designed solid-state components, images within the soundstage were pin-sharp in their focus and placement. But what really impressed was the 700i's ability to re-create realistic

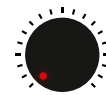


MOON EVOLUTION 700i INTEGRATED AMPLIFIER

Brand: Simaudio Moon
Model: 700i
Category: Integrated Amplifier
RRP: \$14,000
Warranty: Three Years
Distributor: Valhalla Audio Pty Ltd
Address: PO Box 403
Pymble NSW 2073
T: (02) 9983 1828
F: (02) 9983 0394
E: sales@valhallaaudio.com.au
W: www.valhallaaudio.com.au




Up there with the best of solid state sound
 Superb build quality externally and internally
 Immaculate fit and finish



All remote control buttons are identical

timbres from the complex mix of different instruments played by musicians with disparate techniques.

CONCLUSION

There's little to compete against the Moon Audio 700i's chassis solidity, visual statement and fit and finish. 'But isn't it all about the sound?' I hear you ask. Well with the 700i you have all bases covered; it's a battleship-solid looker that can handle even the toughest loudspeaker loads in its stride while at the same time producing some of the best solid-state sound I've heard. Now, doesn't that sound like the makings of a classic?  **Edgar Kramer**



TEST RESULTS

If you're a regular reader of this test result section, you may have noticed the inclusion in the tabulated results of a column that tracks the 240V mains voltage during the duration of the test. This is because whereas the mains voltage in Europe is now 230V, and this is the voltage most hi-fi designers design their equipment for, the 'standard' mains voltage in Australia remains at 240V, but in almost all cases, unless you're out in the suburbs, the mains voltage runs closer to 250V. Indeed, as you can see in the tabulated results for the Moon 700i, the mains voltage varied from a minimum of 245-volts to around 252-volts while the amplifier was being tested. One side-effect of this was that an internal fuse decided to protect the amplifier every time it was switched on—something that didn't occur when Edgar Kramer was auditioning the amplifier, so presumably the mains voltage in his area was closer to 240V than 250V. After consulting with Moon's Austral-

ian distributor, Absolute Audio Vision, it transpired that because of the Australian mains voltage being higher than it should be, AAV routinely replaces the 100mA fuse with one that has a slightly higher rating (160mA). Because AAV had supplied our review amplifier at very short notice, our test sample had been supplied with the standard 100mA fuse. Replacing this with a 160mA fuse fixed the issue immediately.

Tested into standard 8Ω loads, the Moon Evolution 700i delivered exactly its rated output (175-watts, or 22.4dBw) with both channels driven at 20kHz, and a little more than its rated output at all other frequencies, returning a best figure of 189-watts (22.8dBw) at 1kHz. Output power increased across the board when only a single channel was driven, with the Moon 700i delivering 180-watts (22.5dBw) per channel at the frequency extremes, and 190-watts (22.8dBw) at 1kHz.

When it came to measuring the power output of the Moon 700i into 4Ω loads,

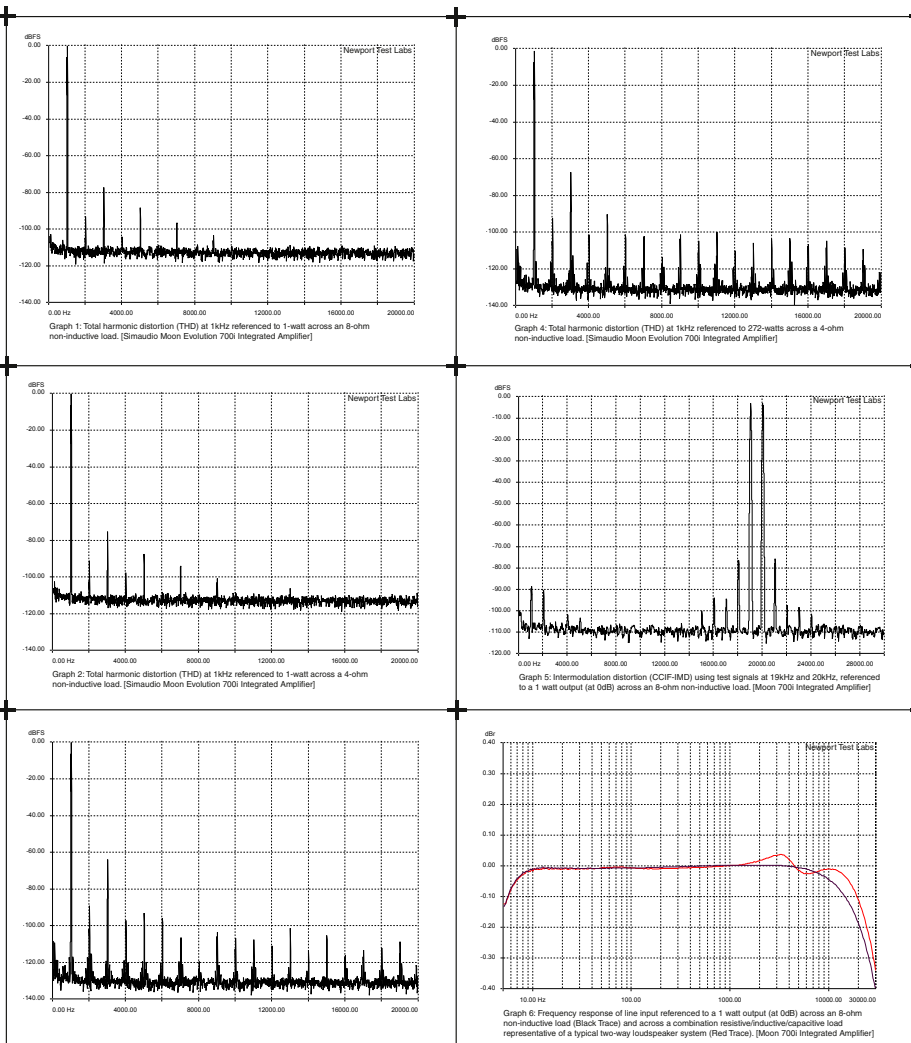
a different fuse (this time the far more accessible 3A fuse on the rear-panel) decided that it was now its turn to protect the amplifier. This standard 3A fuse would quite happily allow the amplifier to drive a single channel into 4Ω right up to clipping, but when both channels were operating at close to full power (a tad over 300-watts), it would go open-circuit after only a second or so, just prior to the onset of clipping. After consulting with Absolute Audio Vision's technicians again, *Newport Test Labs* got their OK to increase the fuse value to 4A. With the higher-current fuse fitted, the lab was able to make both 'single-channel' and 'both channels driven' measurements into 4Ω loads at all frequencies. At 1kHz with a single-channel driven into 4Ω, the lab measured an output of 324-watts (24.8dBw) at the onset of clipping, 0.9dB short of Moon's claim of 375-watts (25.7dBw). The lab measured the same power output when both channels were driven. At 20Hz, the Moon 700i delivered a maximum of 320-watts, with one or both channels driven, into 4Ω. At a test frequency of 20kHz, the output of the Moon 700i was again the same irrespective of how many channels were driven, but at this high frequency, the maximum power available before clipping was 302-watts.

Driven into 2Ω loads (for which the Moon 700i is not rated), the power output increased to more than 400-watts per channel, when only a single channel was driven, with a best result of 492-watts at 1kHz.

When both channels were driven into 2Ω loads at 1kHz, the 4A mains fuse decided it was time to protect the amplifier by going open-circuit, so the power output testing into 2Ω was suspended at this juncture.

When the tests were suspended, the heat sinks on the sides of the amplifier seemed very hot, so a measurement of the heat sink temperature was made and a result of 62°C recorded. This is rather high, but would never be experienced under normal running conditions. To check the ability of the heat sinks to dissipate heat under normal operating conditions, the lab ran the amplifier non-stop for a period of ten hours, with both channels delivering one-watt of power into 8Ω loads. At the end of this test, the heat sink temperature was a more moderate 43.3°C.

Frequency response was not overly extended, with *Newport Test Labs* measuring its 1dB downpoints at 4Hz and 58kHz,

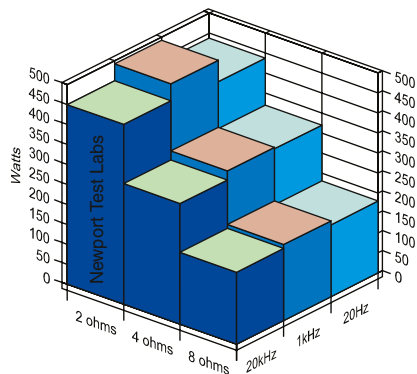


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and the -3dB points at 2Hz and 99kHz. However, across the audio band, it was almost completely linear, as you can see from Graph 6, which shows that into a standard non-inductive laboratory load, the response is 0.02dB down at 20Hz and 0.18dB down at 20kHz. The other trace on this graph shows the Moon 700i's frequency response into a complex load that mimics that of a typical two-way loudspeaker. (Essentially, it's a circuit originally developed by Ken Kantor, but modified by John Atkinson with a Zobel network, the schematic for which can be found here: www.stereophile.com/reference/60/.) The Moon's response into this load is excellent, as you can see for yourself, with the only significant deviations being at 3kHz and 10–20kHz, and in fact the response improves into this simulated loudspeaker load, due to the increase in output between 10kHz and 20kHz. Overall, the response into a loudspeaker is 20Hz to 20kHz ± 0.07 dB. This is in part due to the amplifier's very low output impedance, which measured 0.055 Ω at 1kHz, and this low output impedance also means a very high damping factor, which in turn means very good control over even the largest-diameter and 'heaviest' bass drivers.

Channel separation was slightly better than 100dB right across the audio band, which is excellent, as well as being a particularly good result at 20kHz, where many amplifiers 'sag' appreciably. Not the Moon 700i. Channel balance was also outstanding, particularly considering the 'dual mono' approach. Inter-channel phase was also excellent, with the difference at 1kHz being barely measurable, and certainly completely inaudible.

Signal-to-noise ratios were good, with the A-weighted result coming in at 83dB referred to an output of 1-watt, increasing to 105dB referred to rated output. Note that although the 105dB figure looks very good indeed, this is at least partly a result of the very high power output of the Moon 700i... because this result is, literally, a ratio of signal to noise. So if the signal part of the ratio is higher because an amplifier is very powerful, then the signal-to-noise ratio will be higher, even if it has the same intrinsic noise level as a lower-powered amplifier. It's for this reason that Newport Test Labs (and all other reputable test authorities) always includes a measurement of the signal-to-noise ratio referred to an output of 1-watt, because this allows you to easily compare



Power Output: Single channel driven into 8-ohm, 4-ohm and 2-ohm non-inductive loads at 20kHz, 1kHz and 20kHz. [Moon 700i]

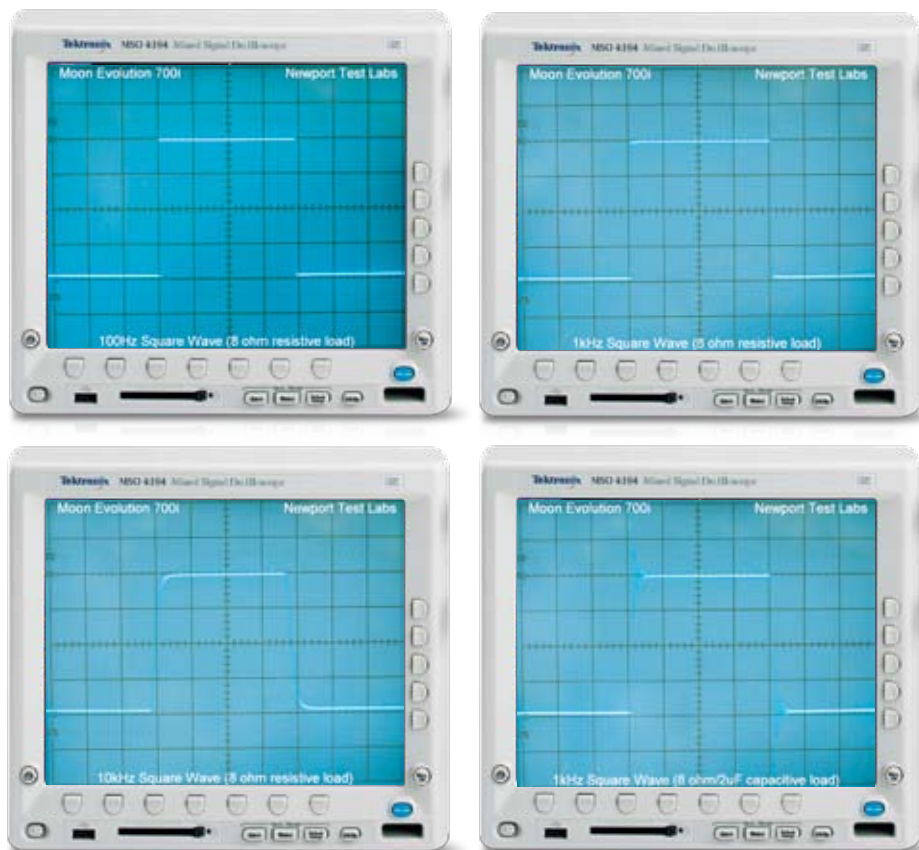
one amplifier against another on a level playing field, even if the two amplifiers have different power outputs.

The Moon 700i was a touch less sensitive than I might have imagined, requiring 41mV of signal at an unbalanced input in order to deliver 1-watt of power, and 530mV of signal to reach rated output. Power consumption is a little higher than claimed, too, with the Moon pulling 73-watts from the mains when running at 1-watt, and 562-watts when running at rated output. Interestingly, the amplifier draws almost exactly the same power (61–62-watts) no matter whether it's switched on, or in its standby mode, so my guess is that

switching it to 'standby' merely turns the display off, and nothing else, which is a curious approach to 'stand-by'. Newport Test Labs noted another curiosity of this amplifier, which is that when the volume control is turned to its minimum position, the 'mute' circuit activates, but does so in the background, so that the word 'MUTE' does not appear in the front panel display as it does when you intentionally activate the mute button.

Distortion at an output of one watt is shown in Graph 1, and you can see a second harmonic at -92dB (0.002% THD) and a third harmonic at -78dB (0.012%). Above this, the even-order (good-sounding) harmonics are all more than 100dB down, while the odd-order harmonics are at -90dB (0.003), -97dB (0.001%) and -108dB (0.0003%). The harmonic distortion 'signature' didn't change significantly when the amplifier was driving a 4 Ω load (Graph 2), with the only appreciable difference being a slight increase in the level of fourth-order harmonic distortion, to about -97dB (0.001%).

At rated output (175-watts), distortion into 8 Ω was still relatively low, though if you look at the graph, it appears to be higher because of the difference between the noise floor at 1-watt, which hovers around



-110dB and the noise floor at 175-watts, which hovers around -130dB. The main differences are the increase in the level of third harmonic distortion (to -65dB/0.056%), the appearance of higher-order harmonic distortion components (albeit at very low levels—they're all more than 100dB down), and the addition of some mains-related distortion components clustered around the harmonic distortion components, which indicate that the 700i's power supply is being pushed to the limit.

Distortion into 4Ω has been graphed at 272-watts, because distortion levels increased dramatically at levels above this output power level when the amplifier was driving 4-ohm loads. Newport Test Labs decided on this particular level because the harmonic distortion 'signature' was a close match with the amplifier's signature when it was delivering its rated output into 8Ω. The overall THD+N figures were very low, as you can see from the tabulated figures, at 0.009% referenced to one watt, and 0.09% referenced to rated output. Both figures are better than Simaudio's specification for the Moon 700i.

CCIF-IMD was very low indeed, with the two high-frequency test signals producing the expected difference signal at 1kHz, but it was almost 90dB down (0.003%). What was a bit unusual was the level of the signal at 2kHz, which was unexpectedly high, particularly since the high-frequency sidebands at 18kHz and 21kHz, which would have produced this signal, are themselves relatively low at -77dB.

The oscillograms showing square wave performance reflect the 700i's measured

Moon 700i Integrated Amplifier

Channel	Load (Ω)	20Hz (watts)	20Hz (dBW)	1kHz (watts)	1kHz (dBW)	20kHz (watts)	20kHz (dBW)
1	8 Ω	180	22.5	190	22.8	180	22.5
2	8 Ω	180	22.5	189	22.8	175	22.4
1	4 Ω	320	25.0	324	25.1	302	24.8
2	4 Ω	320*	25.0	324*	25.1	302*	24.8
1	2 Ω	438*	26.4	492*	26.9	450*	26.5
2	2 Ω	NT	N/A	NT	N/A	NT	N/A


Note: Figures in the dBW column represent output level in decibels referred to one watt output.

*Measured with 4-amp fuse in rear panel socket in place of standard 3-amp fuse

Moon 700i Integrated Amplifier

Test	Measured Result	Units/Comment
Frequency Response @ 1 watt o/p	4Hz - 58kHz	-1dB
Frequency Response @ 1 watt o/p	2Hz - 99kHz	-3dB
Channel Separation (dB)	101dB / 104dB / 102dB	(20Hz / 1kHz / 20kHz)
Channel Balance	0.01	dB @ 1kHz
Interchannel Phase	0.06 / 0.01 / 0.51	degrees (20Hz / 1kHz / 20kHz)
THD+N	0.009% / 0.09%	@ 1-watt / @ rated output
Signal-to-Noise (unwghted/wghted)	77dB / 83dB	dB referred to 1-watt output
Signal-to-Noise (unwghted/wghted)	100dB / 105dB	dB referred to rated output
Input Sensitivity (CD Input)	41mV / 530mV	(1-watt / rated output)
Output Impedance	0.055Ω	
Damping Factor	1,439	@1kHz
Power Consumption	61 / 62	watts (Standby / On)
Power Consumption	73 / 562	watts at 1-watt / at rated output
Mains Voltage Variation during Test	245 - 252	Minimum - Maximum
Heatsink Temperature (Degrees C)	43	1-watt continuous output

frequency response. The 100Hz wave shows the amplifier's excellent low-frequency extension, but also shows there's no low-frequency phase shift. The 10kHz square wave shows the rounding that reflects the -3dB downpoint of 99kHz, but is otherwise excellent.

The square wave showing performance into a capacitive load exhibits a considerable initial overshoot, but the ringing is then damped quickly, so the Moon 700i will be completely stable into the types of loads typically presented by electrostatic loudspeakers.  Steve Holding

