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TEST RESULTS

Looking first at power output, it was higher than specification for all frequencies and load conditions tested by *Newport Test Labs*. Although the Yamaha is rated with an output of 85-watts per channel, the lowest power output figure it returned was 91-watts (at 20Hz, both channels driven into 8Ω). Its best result into 8Ω loads was 123-watts (single channel driven) and its best result into 4Ω loads was 190-watts (single channel driven). When both channels were driven into 8Ω, the Yamaha A-S500 delivered 101-watts per channel at 1kHz. Under the same conditions but into 4Ω loads, the Yamaha delivered 146-watts per channel. Self-evidently, this is excellent performance! The difference between the single-channel and both-channels-driven results suggests both an unregulated power supply, and that the amplifier will have excellent dynamic headroom, so although it can deliver 101-watts continuously, far more power will be available on a short-term basis (transients), so you're not likely to experience even momentary clipping.

The Yamaha A-S500's bandwidth is exceptionally wide, with the measured frequency response extending from 1.8Hz to 300kHz –3dB! Even with a tighter limit *Newport Test Labs* measured a frequency response of 1.8Hz to 160kHz ±0.5dB.

Frequency response across the audio band was even better, as you can see from Graph 5, which shows two versions of that response: one into a standard laboratory 'dummy' load (an 8Ω non-inductive resistor) and into a load that simulates a typical two-way bass reflex loudspeaker system. You can see that into the dummy load the response is for the most part ruler-flat, rolling off only at the frequency extremes. And when I say 'rolling off' you can see the response is just 0.2dB down at 8Hz and just 0.07dB down at 30kHz. The response into the simulated load (the red trace on the graph) is not as flat as into an 8Ω resistor, but it's one of the best responses into this load that I've seen for some time. As you can see, it's still 20Hz to 30kHz ±0.5dB. The excellent performance into the simulated speaker load indicates the amplifier has a low output impedance (and *Newport Test Labs* measured it at just 0.05Ω) which in turn means a very high damping factor. And it was high. Yamaha specifies damping factor at 240, but *Newport Test Labs* measured it at 160. Even at 160, it's far higher than necessary, so it's a good result for the A-S500.

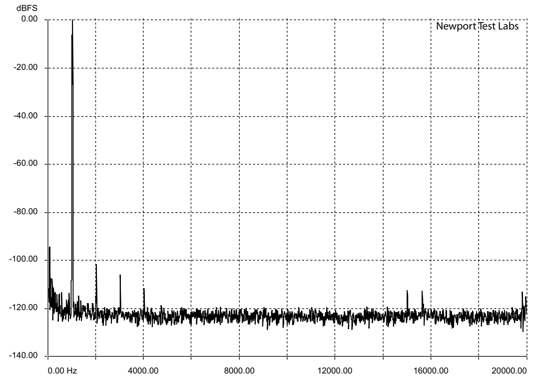
Channel separation (Graph 6, and as tabulated) was good, being more than 80dB down below 800Hz, 79dB at 1kHz and 55dB at 20kHz. That 55dB result is not the best I've seen at this frequency, but this is only academic, since it's far more than required to give superior channel separation and stereo imaging. Channel balance was very good, with only a 0.11dB difference in gain between the left and right channels at 1kHz. Inter-channel phase error was also very low, as you can see from the results tabulated in the accompanying test result table: 0.28° at 20Hz and 0.14° at 20kHz.

The frequency response results referred to so far were all measured with the loudness and tone controls out of circuit. Turning the defeat button off, so that the signal runs through the extra circuitry, results in a slight (0.2dB) drop in overall volume level but also a more notable reduction in volume at low frequencies. The effect is shown in Graph 7. The red trace on this graph (Direct Off) indicated to me that the bass tone control, although in its 'defeat' position, was actually rolling off the bass a little. This could be typical, or just a minor misalignment on the review sample. Either way, the difference is very small, but if you can hear it, you could 're-align' the response simply by turning the bass tone control a smidgeon to the right!

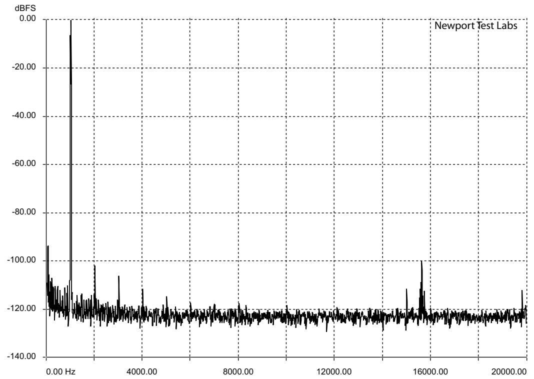
As for the tone controls themselves, they offer a very wide range of action, which is depicted in Graph 9. You can see that around 12dB of boost and cut is available (so a total of 24dB!). When you use the controls, you will also affect the midrange volume very slightly, but less than 2dB. The tone controls' boost action is not shelved, so I would suggest not using maximum settings, perhaps limiting yourself to the '3'o'clock' positions. The loudness contour circuit's taper is shown in Graph 8 for its maximum setting. At this position it offers around 18dB of boost at low frequencies, and 8dB at high frequencies. The graph also shows that if you're using the loudness contour at maximum then disable it by operating the Pure Direct switch, the volume will increase by around 20dB, which is the same difference as switching the muting on and off and means you'll need to be careful to avoid damaging your speakers.

Total harmonic distortion was very low… very low! At output levels of one watt, the spectral signature was almost identical irrespective of whether the Yamaha A-S700 was driving 8Ω or 4Ω loads. You can see (Graphs 1 and 2) that there's a second harmonic at –102dB (0.0007%), a third harmonic at –107dB (0.0004%), a fourth at –112dB (0.0002%) at both loads. Into 4Ω, there's a fifth harmonic component at –115dB (0.0001%) and you can just see sixth, seventh and eighth-order components buried in the noise floor at –120dB. (Ignore the signals at the right of the graphs.) This is truly excellent performance, such that the overall THD+N figure came in at 0.003%.

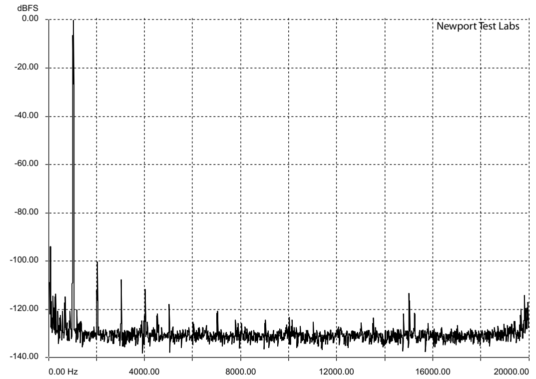
THD at 85-watts into 8Ω loads was also spectacularly good, with a second harmonic at –100dB (0.001%), a third at –108dB (0.0003%), a fourth at –113dB (0.0002%) and a fifth at –118dB (0.0001%). As you can see, higher-order harmonic components are present (and visible on the graph) but they're all more than 120dB down and as such would be completely and absolutely inaudible. Decreasing load impedance to 4Ω and using an output power of 169-watts per channel saw distortion increase, as you'd expect, and the spectral signature altered to favour the odd harmonic distortion components, but of these, only the third harmonic pushed 100dB (it came in at –95dB, or 0.001%). As you can see, all other components were at or more than 110dB down. Note, too, that the noise floor, which was already very low at one watt output level, is now down at around –130dB above 500Hz. You can see at the extreme left of the graph that the 50Hz component of the inevitable low-frequency noise from the power supply is sitting at around –95dB, which is excellent.



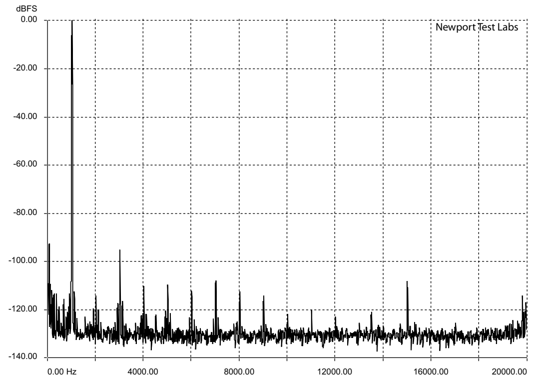
Graph 1: Total harmonic distortion (THD) at 1kHz at an output of 1-watt into an 8-ohm non-inductive load, referenced to 0dB. [Yamaha A-S500 Integrated Amplifier]



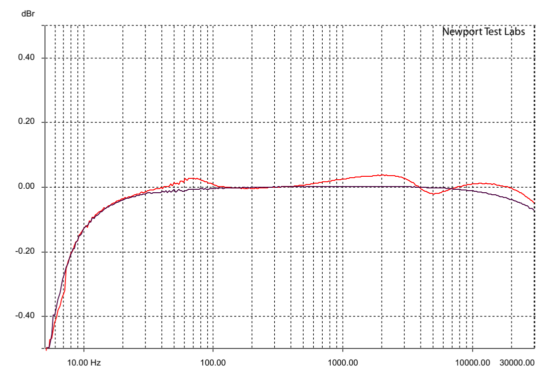
Graph 2: Total harmonic distortion (THD) at 1kHz at an output of 1-watt into a 4-ohm non-inductive load, referenced to 0dB. [Yamaha A-S500 Integrated Amplifier]



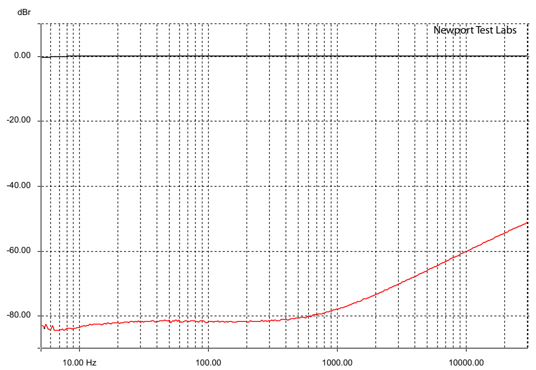
Graph 3: Total harmonic distortion (THD) at 1kHz at rated output (85-watts) into an 8-ohm non-inductive load, referenced to 0dB. [Yamaha A-S500 Integrated Amplifier]



Graph 4: Total harmonic distortion (THD) at 1kHz at an output of 169-watts into a 4-ohm non-inductive load, referenced to 0dB. [Yamaha A-S500 Integrated Amplifier]



Graph 5: Frequency response of line input at an output of 1-watt into an 8-ohm non-inductive load (black trace) and into a combination resistive/inductive/capacitive load representative of a typical two-way loudspeaker system (red trace). [Yamaha A-S500 Integrated Amplifier]



Graph 6: Channel separation referenced to a 1-watt output (at 0dB) across an 8-ohm non-inductive load. [Yamaha A-S500 Integrated Amplifier]

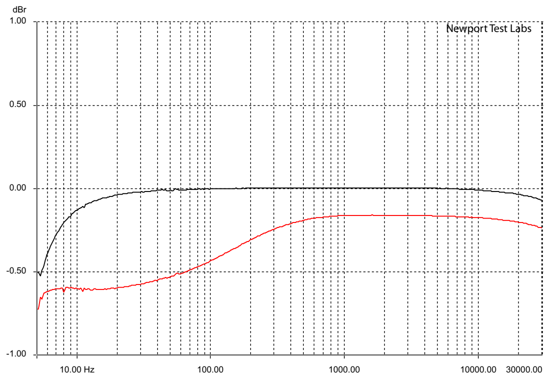
Yamaha A-S500 Integrated Amplifier — Power Output Test

Channel	Load (Ω)	20Hz (watts)	20Hz (dBW)	1kHz (watts)	1kHz (dBW)	20kHz (watts)	20kHz (dBW)
1	8 Ω	105	20.2	123	20.9	122	20.8
2	8 Ω	91	19.5	101	20.0	101	20.0
1	4 Ω	182	22.6	190	22.7	190	22.7
2	4 Ω	125	20.9	146	21.6	142	21.5

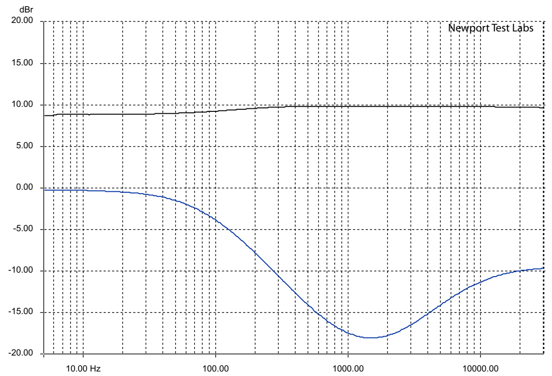
Note: Figures in the dBW column represent output level in decibels referred to one watt output.

Yamaha A-S500 Integrated Amplifier — Test Results

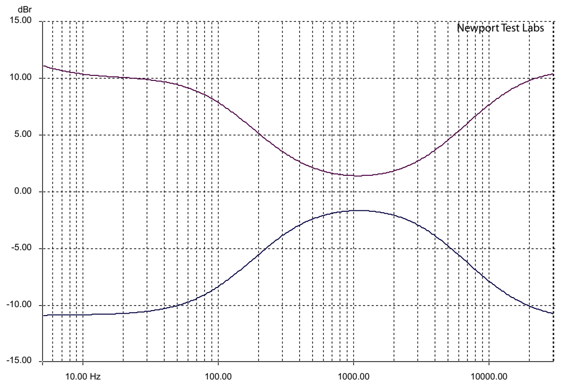
Test	Measured Result	Units/Comment
Frequency Response @ 1 watt o/p	3.2Hz – 160kHz	–1dB
Frequency Response @ 1 watt o/p	1.8Hz – 300kHz	–3dB
Channel Separation (dB)	84dB / 79dB / 55dB	(20Hz / 1kHz / 20kHz)
Channel Balance	0.11	dB @ 1kHz
Interchannel Phase	0.28 / 0.13 / 0.14	degrees (20Hz / 1kHz / 20kHz)
THD+N	0.003% / 0.003%	@ 1-watt / @ rated output
Signal-to-Noise (unwghted/wghted)	87dB / 93dB	dB referred to 1-watt output
Signal-to-Noise (unwghted/wghted)	90dB / 103dB	dB referred to rated output
Input Sensitivity (CD Input)	36mV / 180mV	(1-watt / rated output)
Output Impedance	0.05Ω	@1kHz
Damping Factor	160	@1kHz
Power Consumption	0.44 / 26	watts (Standby / On)
Power Consumption	58 / 353	watts at 1-watt / at rated output
Mains Voltage Variation during Test	241 – 254	Minimum – Maximum



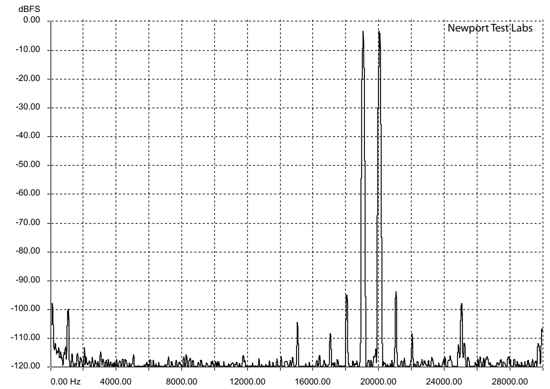
Graph 7: Frequency response of line input showing difference between 'Line Direct On' (black trace), and 'Line Direct Off' (red trace) with tone and loudness controls set flat. [Yamaha A-S500 Amplifier]



Graph 8: Frequency response of line input showing Loudness Contour 'off' (black trace) vs. Loudness Contour 'on' (at a 'maximum' position). [Yamaha A-S500 Amplifier]



Graph 9: Tone control action referenced to 0dB at 1kHz. [Yamaha A-S500 Amplifier]



Graph 10: Intermodulation distortion (CCIF-IMD) using test signals at 19kHz and 20kHz, at an output of 1-watt into an 8-ohm non-inductive load, referenced to 0dB. [Yamaha A-S500 Amplifier]

Indeed the overall signal-to-noise ratios were also excellent, with *Newport Test Labs* measuring the Yamaha A-S500 at 87dB (unweighted) and 93dB (A-weighted) referenced to one-watt output, and 90dB (unweighted) and 103dB (A-weighted) referenced to rated output.

Also excellent was the Yamaha A-S500's result in the intermodulation distortion (CCIF-IMD) testing, as you can see from Graph 10. The test signals at 19kHz and 20kHz are just to right of the graph and there are only two h.f. sidebands, both of which are at –95dB and although there is some unwanted difference signal regenerated down at 1kHz, it's 100dB below reference.

Square wave performance was good. The 100Hz result shows that the Yamaha's low-frequency performance doesn't extend to d.c., but there's no phase shift evident on the waveform. The 1kHz square wave is almost perfect. The 10kHz square wave shows a very fast rise-time, and is one of the best waveforms I've seen for some time at this frequency.

Performance into a capacitive load is outstandingly good, with very little overshoot and a small amount of quickly damped ringing, indicating this amplifier would be unconditionally stable into any reactive load, including electrostatic loudspeakers.

Power consumption was moderately low, so this amplifier will draw current from your mains power supply only when you're driving it very hard. Mostly, it will draw less than 100-watts when operated normally. In standby mode, it falls well within the Australian standard, drawing less than 0.44-watts,

I found the Yamaha A-S500 to be an exceptionally well-designed amplifier with an extremely high standard of construction. It's powerful, electrically well-behaved, with very low levels of noise and distortion and a very flat and extended frequency response. Truly an outstanding amplifier, in every aspect of its performance. ***Steve Holding***