All Power Amplifiers are not created equal!

Pragmatic offers unique, compact, high-efficiency, high-performance audio amplifiers based on its own proprietary design. These compact mono-block amplifiers, stereo amplifiers (two mono-blocks in one enclosure) and multi-channel amplifiers (6 to 12 mono-blocks in one chassis) rival in performance to many industry acclaimed large, super-expensive, high-powered, highly inefficient, heavy Class A or Class AB and even some Class D amplifiers.

In order to understand the difference in design philosophy between the Pragmatic amplifiers and others, one needs to review the requirements for the power output and how the THD+Noise and Frequency response relate to the performance of the amplifiers. Figure 1 below shows a typical listening area for a 2-channel audio setup, similar to a family room, bedroom, den or office area in the home. The speakers could be in-ceiling, in-walls, bookshelf or floor standing type. Most speakers of these type have a typical sensitivity in the range of 87-89dBspl@1W/1meter. Higher efficiency and better quality speakers may have sensitivity of 90-91dBspl@1W/1meter. More efficient speakers will demand less power from the amplifier to produce the same level of sound pressure at a given distance. The amplifier needs to reproduce clean sound with minimal distortion and loud enough to reach the listener without clipping the signal or creating unnatural sounds.

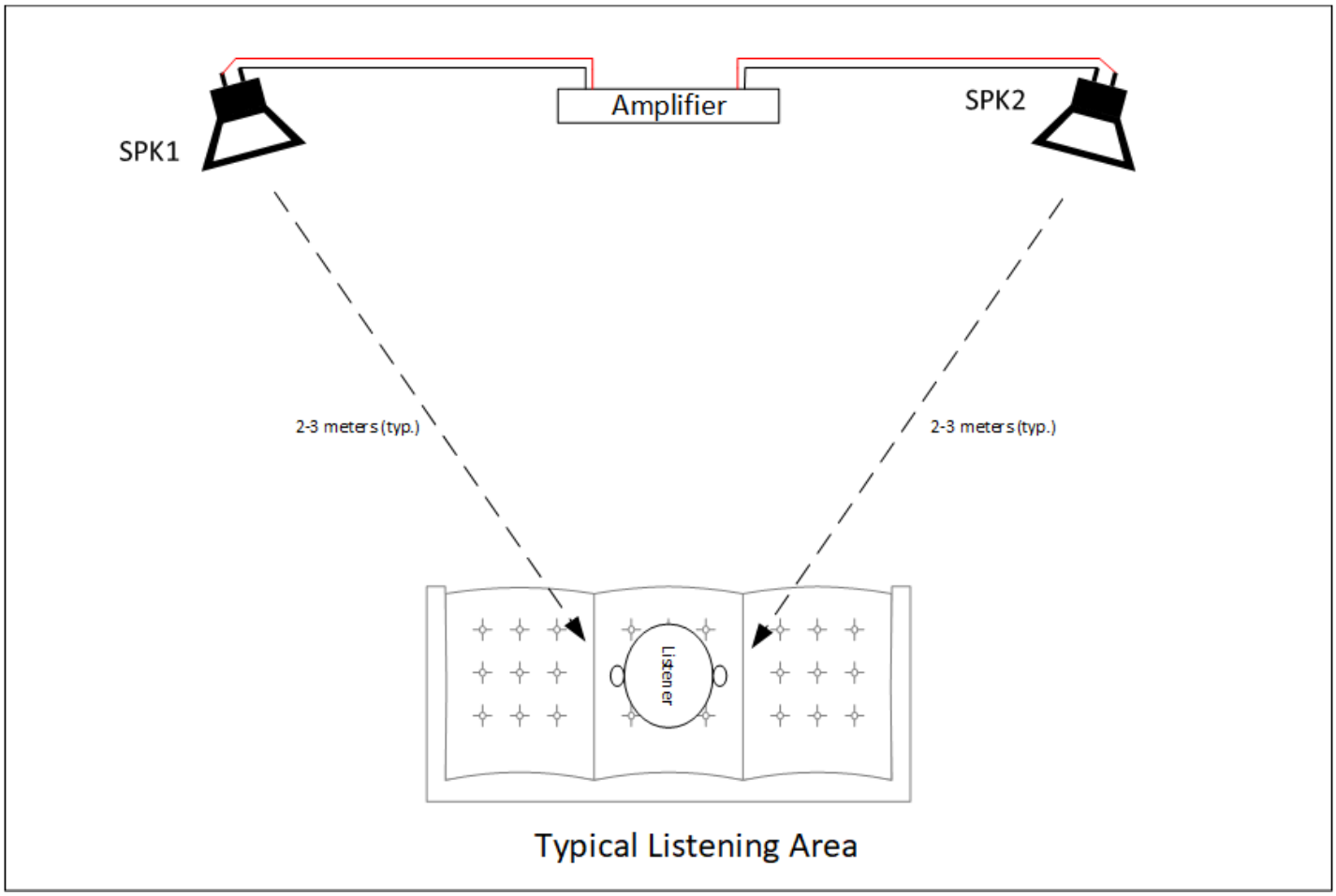

Figure 1

Typical sound levels needed to reproduce music are listed below in Table 1. The amplifier should be able to reproduce these sound levels both for the sustained levels of sound and music as well as all the transients to accurately reproduce the music and recreate the ambiance. Table 2 shows the various amplifier power levels required to reproduce the dBspl @ the listener location in the room with an average sensitivity speaker pair. Higher sensitivity speakers will require less power than shown.

Table 1:

Sounds and Music	**dBspl @ listener**
Threshold of hearing	0dB
Quiet natural area with no wind	20dB
Whisper	25dB
Normal Conversation and Dialogues	60-70dB
Level at which sustained exposure may result in hearing loss	*80-90dB*
Chamber Music in a small auditorium	75-85dB
Normal Piano practice	60-70dB
Fortissimo Singer	70dB
Violin	82-92dB
Piano Fortissimo	84-103dB
Flute	92-103dB
Piccolo	90-106dB
French Horn	90-106dB
Tympani & bass drums	106dB
Pain Threshold	125dB
Permanent Hearing Damage even at short term exposure	140dB

Sustained levels of sounds & music
Short duration of transients in music

Table 2:

dBSpl @ listener	**Power (Watts)**
62	0.001953125
65	0.00390625
68	0.0078125
71	0.015625
74	0.03125
77	0.0625
80	0.125
83	0.25
86	0.5
89	1
92	2
95	4
98	8
101	16
104	32
106	48
109	96
112	192
115	384
118	768
121	1536

It can be seen from Table 2 that most listening requirements can be adequately met by an amplifier with less than 50 Watts of power if designed properly. A good amplifier will generate 106 dBspl with under 50 Watts of power. Many manufacturers design higher power amplifiers in the range of 100 Watts to 1000 Watts so that they have a lower distortion in the listening range. No one plays these amplifiers at full rated power as it could cause permanent hearing loss. Even though they have these huge power stages, the listener still uses them in the sub 50 Watts range.

Traditionally Class A and Class AB amplifiers were used in the past to reproduce the desired sound levels with low distortion and full spectrum frequency response. These specifications were achieved at a great cost of efficiency, size, heat dissipation, weight, cost, etc. With the advent of digital Class D amplifiers, efficiency improved with smaller size, lesser heat dissipation, lighter weight and lower costs. Although as a trade-off, Class D amplifiers brought in their own set of issues in sound reproduction, tonal quality, frequency response, THD+Noise versus output power, etc. Pragmatic uses its own proprietary digital amplifier designs to mitigate the issues associated with both the traditional Class A, Class AB and also Class D amplifiers.

The frequency response of Pragmatic MBA-148 (mono-block amplifier) is shown below in Figure 2. It can be seen from the plot that the frequency response is very flat from 20 Hz to 50Khz with a very minimum drop of only -0.07 dB at 20Khz. This performance rivals many expensive large amplifiers that have an order of magnitude higher power, larger size, more heat dissipation and greater costs!

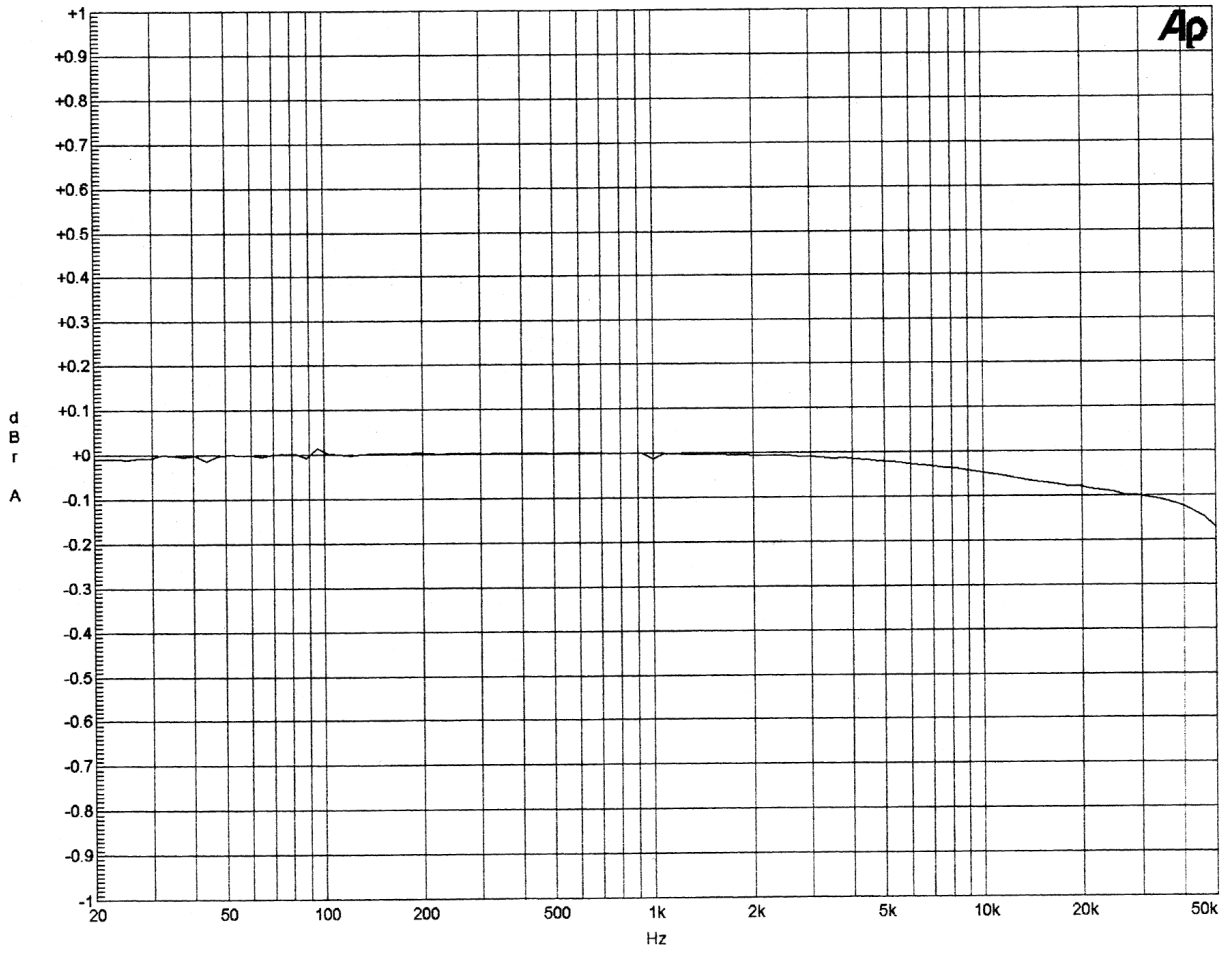

Figure 2

The THD+Noise % versus Power output curve for Pragmatic MBA-148 (mono-block amplifier) is shown below in Figure 3. It can be seen from the curve that the THD+Noise % is as low as 0.015% even at its lowest level. The THD+Noise % from minimal power output of 250mW to 12 Watts is under 0.03%. Even at an output of 20 Watts the THD+Noise is an impressive 1.5%. The curve does not extend to the full 48 Watts here but the THD+Noise barely approaches 10% at full power levels.

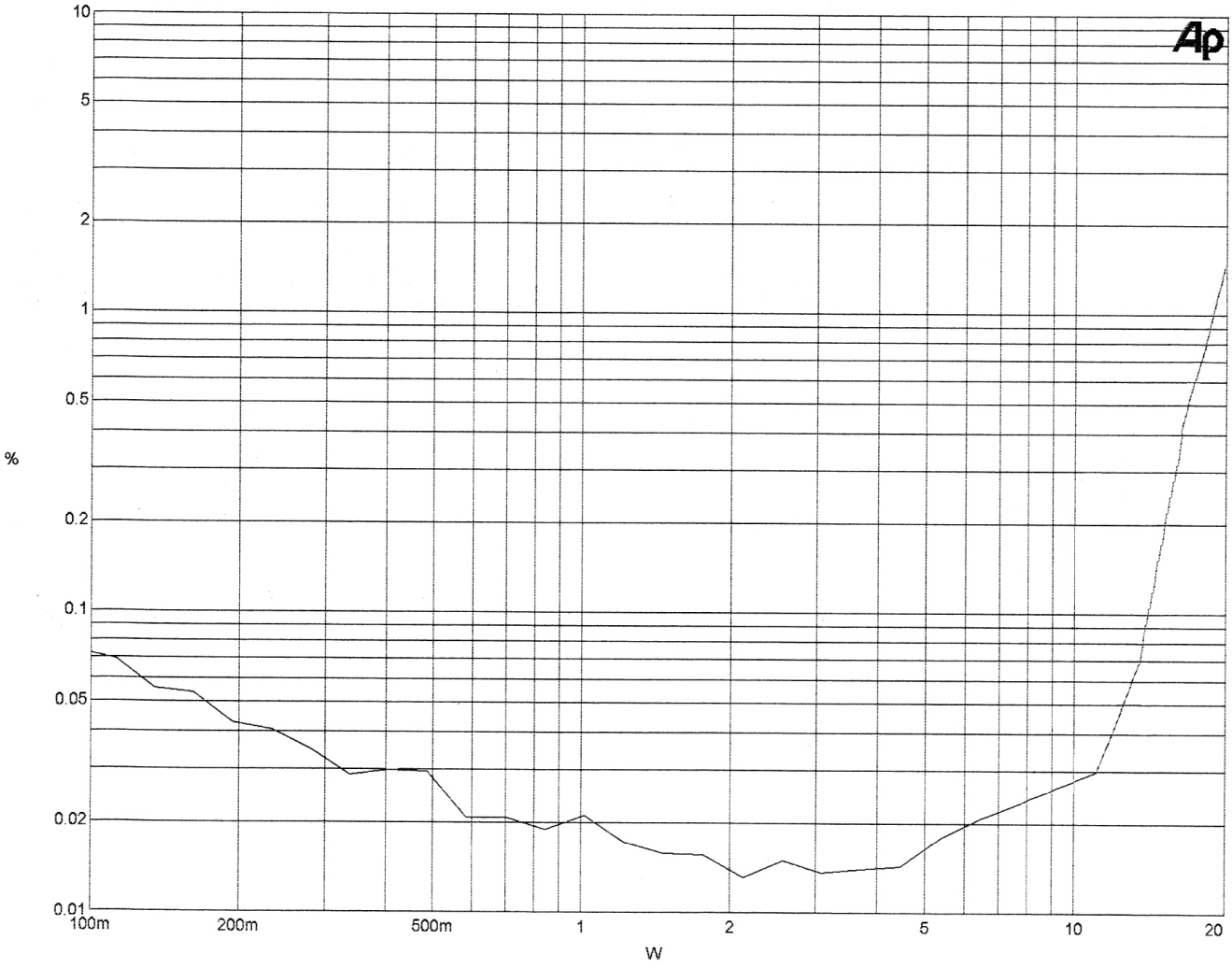

Figure 3

Table 4 below shows the THD+Noise % versus output power at different levels as related to earlier Table 2 showing the dBspl @ the listener, THD+Noise %, Power level output of the Pragmatic high-performance, high-efficiency mono-block amplifier MBA-148. It can be seen that most of the listening range up to about 100 dBspl is easily accomplished by less than 16 Watts of power and a very low THD+Noise % of 0.3%. With such low distortion, full frequency spectrum and dynamic range, the Pragmatic amplifiers produces a very clean, dynamic and precise sound reproduction with an excellent soundstage. High level music is reproduced with great authority and ease, with great rhythm and excellent pace. There are no distortion artifacts within the listening range of the amplifier. With the very low THD+Noise % playing at low and moderate levels, all the music can be felt by the listener. The amplifier has excellent slew rate and damping factor to reproduce an excellent dynamic behavior. A combination of all these parameters working together in tandem produce excellent tonal balance and great atmosphere/ambiance. The Pragmatic amplifiers offer high-resolution sound with impact and

great dynamics. It can also be seen from the frequency response plots that the higher frequencies do not show any roll-offs, and add body to the full spectrum of the soundstage.

Table 4:

dBSpl @ listener	Power (Watts)	THD+Noise%
62	0.001953125	0.0725
65	0.00390625	0.0725
68	0.0078125	0.0725
71	0.015625	0.0725
74	0.03125	0.0725
77	0.0625	0.07
80	0.125	0.05
83	0.25	0.04
86	0.5	0.03
89	1	0.02
92	2	0.015
95	4	0.015
98	8	0.025
101	16	0.3
104	32	5
106	48	9

In conclusion, Pragmatic digital amplifiers are unique and offer more in a smaller size, higher efficiency, higher performance, better frequency response and dynamic range, lower noise and distortion versus output power, and at a lower cost than most amplifiers that are an order of magnitude more expensive, weigh 100X more and dissipate tremendous amount of heat energy in the room! All digital audio amplifiers are not created equal. Pragmatic amplifiers are carefully crafted to deliver the best performance to the audience using our unique pragmatic approach!