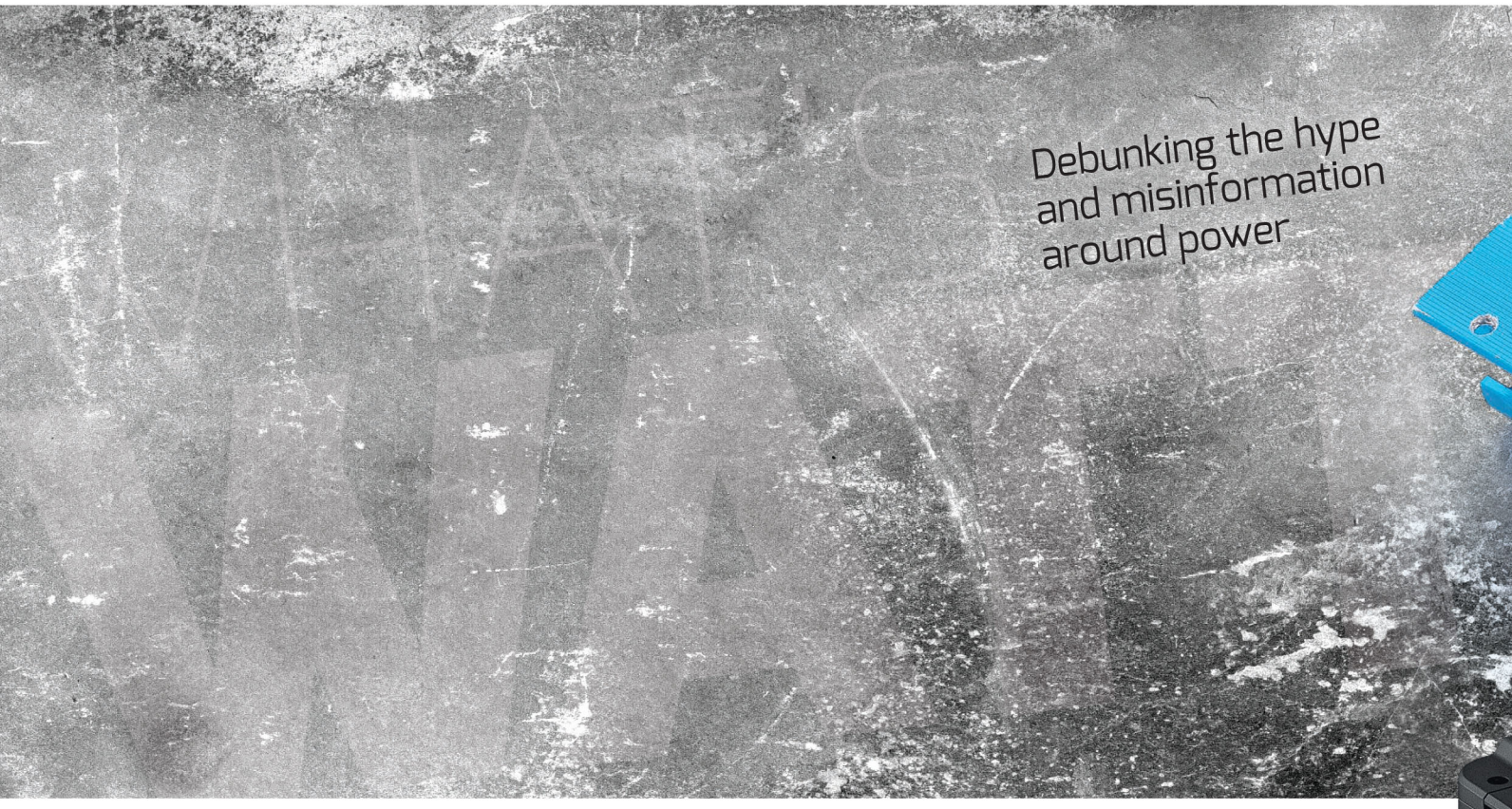


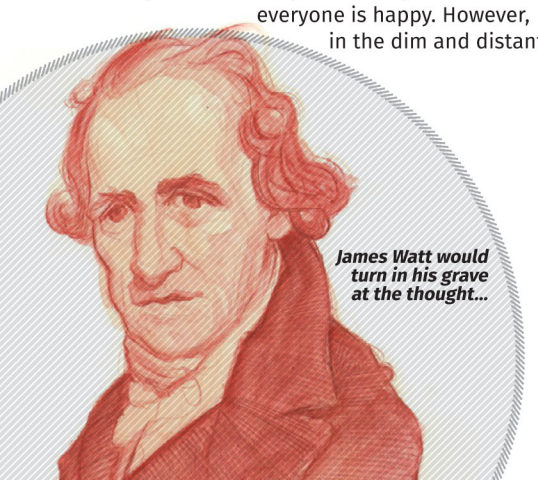
Debunking the hype and misinformation around power

In this article we attempt to demystify the ubiquitous unit of power, the Watt. Named after James Watt, this is probably the most misused unit of measurement from any of the sciences. In this explanation, we try to avoid overly complicated scientific concepts. We will let you judge whether or not we have succeeded!

The power output of car amplifiers and power handling capability of car speakers are rated in Watts just like home audio. However, the world of home hi-fi has enjoyed far more discipline than car audio when it comes to technical specifications. Power rating is very important when matching an amplifier to a set of speakers - if the amplifier pumps out more power than the speakers can use then the speakers won't last very long. Conversely, if you drive powerful speakers with a light-weight amplifier you will never get them to work to their full potential – A bit like buying a Ferrari with a 50 MPH limiter fitted.

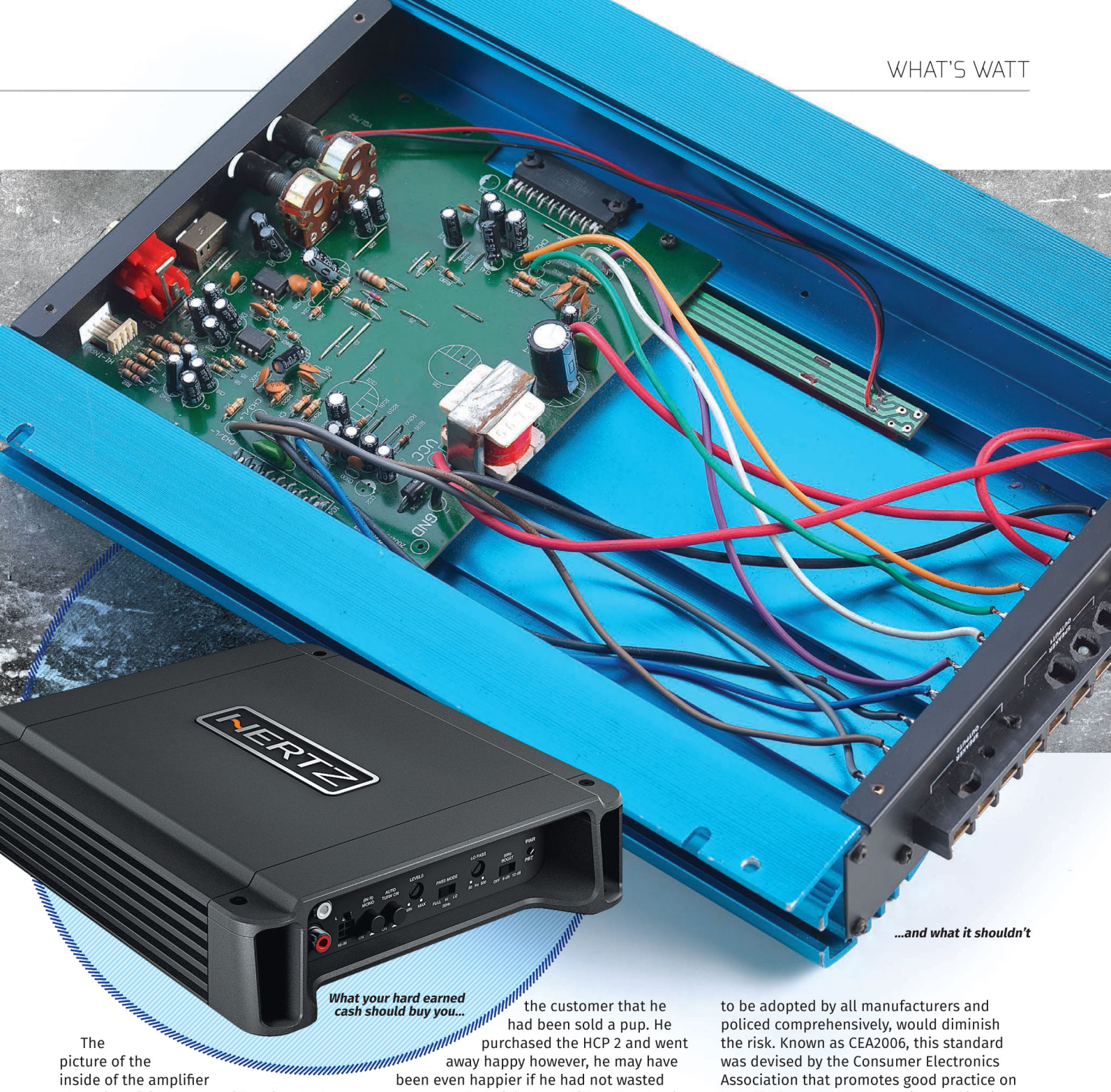
One would think that this is all very simple stuff. Simply match the output of the amplifier to the input of the speaker and everyone is happy. However, in the dim and distant past, due to a very crowded marketplace, bright sparks of marketing decided to create a power ratings war by finding different ways of expressing the perceived loudness of amplifiers and speakers under the premise that a bigger number is always more attractive to a consumer. This has been taken to dangerous extremes and certain far eastern manufacturers we know of express the rating of their speakers as the maximum amount of power which can be sustained for no longer than 400 microseconds. This rating is pretty unhelpful at best and the fact that they keep the details of the rating a secret, make it potentially dangerous. Any excess power delivered to a speaker is turned into heat and in extreme cases, light, which is how electric fires and incandescent light bulbs work! These peddlers of high numbers refer to their quoted ratings as "Maximum Power" but even this term is extremely loose and does not necessarily allow any compatibility conclusions to be made without an exact definition being stated.

> "Match the output of the amplifier and everyone is happy"



James Watt would turn in his grave at the thought...

However, help is at hand by way of RMS power ratings, or is it? The problem is that even RMS ratings can be manipulated and you need to be quite a scientist to be absolutely certain that you are not comparing apples with bicycles. RMS stands for Root Mean Squared, which in itself is quite a scary mathematical concept. Once you start to think about the rest of the measurement parameters though it gets even scarier. For instance, an amplifier will need to use more power to produce a low frequency at the same level (or volume) as a high frequency and so when comparing RMS ratings they need to be stated at a certain frequency. The same is true of speakers, which will reproduce certain frequencies more efficiently than others (tiny speakers don't handle bass very well!) Then, there is distortion to take into account. A speaker may be able to "survive" a 100 Watt RMS signal but if this makes it distort horribly then it is not a very desirable or meaningful measurement. An amplifier that produces huge amounts of distortion in order to reach an output power figure is also undesirable as distortion damages speakers and ears. So, once again when comparing ratings, distortion has to be quoted – Usually stated as THD (Total Harmonic Distortion) but again, not always. Returning to the example of the aforementioned Far Eastern manufacturer, its quoted "Maximum Power" rating needs to be divided by seven to get close to the continuous RMS rating of its speakers. This seems totally outrageous to us but we have seen worse.



What your hard earned cash should buy you...

...and what it shouldn't

The picture of the inside of the amplifier above is striking as you will notice the huge disparity between the size of the case and the space taken up by the actual electronics. The amplifier was advertised on ebay as brand new and sported a power rating of 1800 Watts. Fortunately, the customer who bought it took it to FOUR MASTER Highdown Car Audio and Security in Worthing to be installed. Proprietor Jeremy Owen told us; "The customer wanted his amplifier matched up with a Hertz Energy subwoofer that has a continuous power rating of 200 Watts. This was dutifully done but surprise, surprise the output of the amplifier even at full chat failed to move the cone of the subwoofer much at all. We hooked up a Hertz HCP 2 two-channel amplifier in bridged mode instead and with its quoted RMS power rating from 20Hz – 20 KHz of 170 Watts at 1% THD, suddenly there was thumping bass all over the place. Unfortunately, I had to inform the customer that he had been sold a pup. He purchased the HCP 2 and went away happy however, he may have been even happier if he had not wasted money on the original amplifier plus the time taken to realise his mistake in the first place."

Alas, the above example is not an isolated one. FOUR MASTERS regularly come across "victims" who have purchased (usually online) a 1000 Watt amplifier only to find that only 10 of those Watts is of any use and the rest are strangled out of the circuitry by a non-scientific approach to power measurement. They see just as many "victims" who have fallen for a pair of speakers because they boast a huge power rating but who do not have the vital piece of knowledge; you can only ever get out what you put in minus some inevitable inefficiency. If a 1000 Watt subwoofer is matched with a 1 Watt amplifier for instance, then not much sound (if any) will come from it.

However, a standard of measurement for amplifiers does exist which, if it was to be adopted by all manufacturers and policed comprehensively, would diminish the risk. Known as CEA2006, this standard was devised by the Consumer Electronics Association that promotes good practice on behalf of over 2000 companies working in the Consumer Electronics industry. The standard itself is fairly rigorous and CEA member companies displaying the logo have all gone to the trouble of ensuring that quoted figures comply with this standard.

We hope that taking the above into account enables those with little or no knowledge to make slightly better informed decisions but there is never any substitute for taking the advice of an expert. This is why we always advise you to visit your local specialist who works with product every day and is a trained expert in this area. A specialist will be able to recommend product matches based on their own experience and has no interest in simply taking your money and running away. They all run permanent businesses and your happiness is key to their survival. Your local FOUR MASTER would be a very good place to start! □