with the 2 x 12V windings in series, giving about 28VAC. (B. C., Dungog, NSW)

● We suggest that you change the following resistors: R5 to 12kΩ, R7 to 1.2kΩ and R8 to 68Ω 5W. Note that we cannot guarantee that these mods will work; they might need tweaking.

SC200 Amplifier questions

I have been reading the article on building the SC200 Amplifier which was re-published in the January 2018 issue of EPE Magazine. The power output transistor FJA4313 appears to be unobtainable. I can't find a supplier that stocks this transistor.

Also, there is also a mistake in the article. ±56.6V is derived from 40-0-40 AC secondary transformer, not 45-0-45 AC; this would give ±63.6V.

LED1 is specified as SMD 3216/1206 blue and there are different version of this with 20mA or 30mA forward current.

The typical forward voltage ranges from 3.2V to 3.6V. Which one is the correct LED and does it matter? (A. W., Wimborne, UK)

● FJA4313OTA is available from Digi-Key (Catalog code FJA4313OTU-ND) or as part of a set of hard-to-get parts from our SILICON CHIP Online Shop (Cat SC4140). You are right, the transformer should have been specified as 40-0-40V; not 45-0-45V.

LED1 is supplied with around 2mA so any blue LED of that size should be fine. The forward voltage is not important as it's supplied from a constant current source.

High Energy Ignition systems with points

I have a 1978 Datsun 200B with points. Will the High-Energy Ignition System you published in the November and December 2012 issues (siliconchip.com.au/Series/18) work with points? (W. O'D., Cartwright, NSW)

● All of our High Energy Ignition systems can be used with points as well as reluctor, Hall effect and optical triggers.

Will SC200 transformer be overloaded at 200W into a 4Ω load?

I am an EPE subscriber emailing from England. I have recently thoroughly enjoyed the brilliant SILICON CHIP SC200 amplifier constructional project published in EPE over the last three months. Congratulations to both Nicholas Vinen and Leo Simpson for yet another job well done.

However, I have a technical query which has been troubling me concerning the power supply for this project. My calculations imply that the transformers specified for this project are underpowered. If there is an error in my calculations below, I would be pleased if you could correct me.

A 300VA, 80V transformer is capable of supplying a maximum current of 300 ÷ 80 = 3.75A RMS. When the SC200 is supplying the maximum stipulated 135W into an 8-ohm load, $135W = 8 \times I^2$ and therefore I = 4.1A.

However, in the push-pull amplifier output stage, 4.1A is only drawn from each secondary for half the time. Therefore, the average DC current drawn by each half of the output stage is 2.05A.

Now, there is a 1.7 multiplication scaling factor from the DC load current to the transformer AC RMS current for this configuration of power supply.

Therefore $I_{RMS} = 2.05 \times 1.7 = 3.5A$ which is less than the 3.75A RMS available from a 300VA transformer. All appears well for an 8-ohm load. However, going through the same calculations for the rated 200W, 4-ohm load,

$200W = 4 \times I^2$ gives I = 7A, which is on for only half the time in each half of the transformer secondary. Therefore average DC current in each half of the output stage is 3.5A. Multiply by the 1.7 scaling factor, 3.5A × 1.7 = 6A RMS, which is much more than the 3.75A RMS available from a 300VA transformer.

It appears to me that a 500VA (80V @ 6.25A) transformer is required to supply 200W into 4-ohms.

If the 1.7 scaling factor is omitted then the transformers specified in EPE appear to be powerful enough. Has Nicholas omitted to include the 1.7 scaling factor in his calculations?

Likewise, by similar calculations, for the low-power version of the PSU/amplifier, it appears to me that a larger transformer is required to supply the rated power into four ohms, ie, larger than the specified 160VA transformer.

I would be very thankful if you could consider my theory and point out to me if and where I have made an error in my calculations. This has been puzzling me! I suspect that I'm missing something. (C. H., London, UK)

● Strictly speaking, you are correct. When delivering 200W into a resistive load, the amplifier will draw more than 300W. But even though we state that the amplifier can do this (and it can), the assumption is that the normal load will be a loudspeaker and therefore partly inductive rather than purely resistive.

Second, unless you intend using the amplifier with a constant sinewave signal (perhaps driving a vibration table), the actual power delivered to the load will be substantially less.

Third, normal program signals are complex and typically have a dynamic range of more than, say, 30dB.

Putting it another way, the full power duty cycle will be quite low and the average power drawn by the amplifier, even when driven to the point of clipping on audio programs, will be quite small; perhaps only a few watts. So in practice, for normal domestic audio use, the 300VA transformer is quite adequate. In fact, a 300VA transformer would be quite adequate for a stereo pair of these modules.

On the other hand, if you intend using the amplifier module with a 4-ohm loudspeaker load for music instrument applications, particularly for bass guitar or electronic organ, we would recommend going for a 500VA transformer.

As a final comment, if you did intend to drive the amplifier for a long-term continuous output of 200W, we'd be more concerned about the ratings of the main filter capacitor, the output power transistors and their heatsinks and the risks of overheating than the transformer. SC