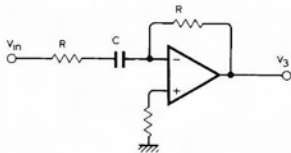


HIGH FREQUENCY DIFFERENTIATOR

In Mr S. Cussons's "High frequency differentiator", Circuit Ideas, August issue, the proposed circuit is, of course, not a true differentiator, having the transfer function

$$\frac{sRC}{1 + sRC}$$

instead of the true differentiator's sRC . Mr



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Cussons's circuit approximates the true differentiator at low frequencies, $f \ll 1/2\pi RC$, i.e. $f \ll 807\text{kHz}$, not the claimed 5MHz, with the component values shown. It will run out of loop gain at 5MHz anyway, the second stage will have only $\times 1.67$ typically left.

Rules of nature cannot be altered: a true differentiator has to have gain proportional to frequency with all the associated noise and stability problems.

Incidentally, an identical (except polarity) transfer function can be obtained in a simpler circuit, shown here, with less output offset.

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