Re: 3 Isolated AC Outputs from 1 AC Source

Source: http://sci.tech−archive.net/Archive/sci.electronics.design/2007−01/msg02116.html

- *From*: "whit3rd" <whit3rd@xxxxxxxxx>

- *Date*: 14 Jan 2007 12:47:04 −0800

jeff1981@xxxxxxxxxxxxxx wrote:

> I have a single power supply creating between 0 and 90V AC (Adjustable
> in roughly 1V increments). I need to 'split' this current source into
> THREE completely isolated AC Power Sources which are of equal voltage
>
> My thought is three simple transformers with 1:1 windings.

[starting at 4.5V with 35 kHz modulation, need up to 25 mA output]

Lots of folk have mentioned that '60 Hz' power transformers won't work; that
isn't quite right, they work but they heat up and waste power. The ferrite cores
like in a switchmode power supply (and this design IS a SMPS by any reckoning) are a more suitable magnetic material.

Custom−winding your transformer is the best way to accomplish this, and it
isn't terribly hard. Amidon, Stant, Ferroxcube, TDK all supply the parts.
You might use a voltage−doubler rectifier, or tripler, if the turns ratio is
inconveniently high.

Don't wind the wire too tight, and put a final tape wrap on the completed windings
so they don't come loose. Use a spool with separate sections for the input
and the three output windings, to minimize capacitance between them.
Regular lacquered magnet wire is good for 500V or so, I kind of prefer
Beldsol type because a hot soldering iron burns through the insulation (no
need to strip the varnish).

For input drive, a center−tapped winding with your program voltage on the center tap
and alternate grounding of the two legs is a good approach. The outputs can be
rectified with a blocking capacitor and two diodes, clamp one to GND and the other
to a filter capacitor− this is a 'voltage doubler' because the output is equal to the
peak/peak excursion instead of the peak−to−common voltage. The 'GND' is, of course, only the reference for the filter capacitor and this ONE section,
the other two outputs have isolated 'GND' points, none is really Earth ground.

Many SMPS designs close the loop, by having feedback from one of multiple
outputs, and you can add a fifth winding if that is desirable.

Not knowing the situation, it MIGHT be a good solution to make a simple one−output design
and just build three of 'em after debugging the first.

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