Re: Eliminating DC on an AC line

Source: http://sci.tech−archive.net/Archive/sci.electronics.basics/2005−12/msg00985.html

- *From*: Jasen Betts <jasen@xxxxxxxxxxxxxxxxx>
- *Date*: Sun, 25 Dec 2005 20:39:33 −0000

On 2005−12−25, kell <kellrobinson@xxxxxxxxxxx> wrote:
>
> Harry Houdini wrote:
>> Hi there,
>>
>> I was wondering if anyone could point me in the direction of
>> instructions on how to rig up a filter to remove DC from an AC line
>> (120V, 15A, 60Hz). I've got 0.3 Vrms to get rid of. I understand it
>> can be done with zeners.
>>
>> Thanks a bunch!
>
> I'd want to know the impedance of the source of that 0.3 volts...
> assuming it's coming in on the line and not the result of some load as
> John Fields suggested.
>
> All I can think of is shunt the mains with a massive inductor.
> You could just use a transformer and leave the secondary open
> (tape the wires off).
> Put it right before whatever sensitive load concerns you.
> That would shunt any dc, right?
> The series resistance of the transformer primary would have to be
> significantly less than the impedance of your 0.3 volts.

Please check my reasoning below, I don't claim to be an expert here.

The impedance of the 0.3 will be that of the mains supply
which is essentially that of the transformer at the other
end of the supply in series with the wiring but in parallel
with all the loads.

I measured the DC resistance (or rather attempted to) of a 1500VA transformer
(this being the largest I possess) I was unable to see and difference from 0
ohms on my analogue VOM (so I'll call it less than 0.1 ohms) (and I don't
trust my Digital meter with inductors))

Success... I measures a 12VA transformer at 4ohms. (this is for 240V 50Hz
supply) for 120V 60Hz typical resistance will be lower.

hmm, into 4ohms, 0.3V is 750mA
but at 240V 12VA is only 50mA RMS (so 71mA peak),
so a small inductor like that 12VA transformer is going to saturate,

with a physically large inductor (like my surplus 1500VA isolating transformer) − assuming resistance is inversely propirtionall to the VA rating − I get approx 0.03 ohms fir its DC resistance. if the wiring before the transformer has enough resistance to keep the DC current below the transformer's 8.8A saturation limit it'd work... so for 6A at 0.3V a resistamce of atleast .04 ohms is needed, for the shunt inductor (transformer) to operate as an inductor.

This is total resistance so 0.01 ohm in the supply and 0.03 in the shunt inductor, the inductor would be under no extraordinary stress, but with a setup like that the measured 0.3V woun't be reduced much...

you need a supply resistance significantly larger than the inductors's resistance. EG 0.3 Ohms − that'd get you approx 10:1 reduction down to 0.03V

through my 4 Ohm 12VA modem transformer that's 75mA, still above the peak current but not by much, it'd probably survive with no load, but what use is a transformer that can't drive any load...

OTOH if I plug the modem transformer into the isolating transformer's output there'll be no DC there :)

of−cource with the DC present I can't get the full 1500VA from te isolating transformer's output. but it should be able to spare 12VA for the modem and a few for the alarm clock etc...

Bye.
Jasen
.

- ***References***:
  - ♦ ***Eliminating DC on an AC line***
    - ◊ *From:* Harry Houdini
  - ♦ ***Re: Eliminating DC on an AC line***
    - ◊ *From:* kell

- Prev by Date: ***Re: why resistor***
- Next by Date: ***Re: Power transistor overheating***
- Previous by thread: ***Re: Eliminating DC on an AC line***
- Next by thread: ***Does this look right?***
- Index(es):
  - ♦ ***Date***
  - ♦ ***Thread***