SCR Drill Speed Controller

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To : TECH@WW

By G8MNY                                            (Updated Feb 05)

Here is a simple circuit I use for an electric drill. Unlike many speed control
circuits in modern drills, this one gives reasonably constant speed under high
torque. But it does suffer from speed variation due to mains fluctuations.

It is only suited for AC/DC (e.g. brush) motors, & must not be used on AC
Induction motors!

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PARTS
D1 is 1N5403 (50A peak), D2 is 1N4003
C is a 0.1uF (63v)
DIAC any 20v device (higher voltage = less control at low RPM.)
220R is optional depending on the sensitivity of the SCR.
SCR is a 3A 400V device (50A peak) it can be a Triac as D1 inhibits wrong
way conduction. (mine used to blow up until I added the diode.)
The switch shorts out controller for full AC Power.
Multi turn low speed control is a preset pot in my design, but can be a
properly insulated control (slider etc).
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Triggering

The DIAC is a 20–30v (20v on 110v) device, when the 0.1uF cap charges up over
its' strike voltage, the 0.1uF charge is dumped into the SCR gate. I have seen
low voltage transistors used as instead of a diac, when they avalanche they
produce a similar action, provided the current is not excessive.

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HOW IT WORKS
This circuit attempts to put DC out to the motor 50 times a second, every other
half cycle (variable up to half power mode). How much DC depends on the preset
setting & the motor back e.m.f. Hence the power/torque has some speed feedback
feature unlike the normal phase control type, & it enables variable torque
loads to be handled much better, without dramatic R.P.M. changes.

With heavy torque loads, always cool off a drill at high speed occasionally to
get the cooling fan to do it's job, otherwise you will cook the motor.

Why don't U send an interesting bulletin?

73 De John, G8MNY @ GB7CIP
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