

Add a Bright/Dim Switch to Your Lights

Here is a useful idea for those people who wish to dim their room lights on occasion, but do not want to go to the trouble of installing a fully variable light dimmer. All that is required is a standard dual wall switch and a silicon power diode. Substitute them for the normal switch, and you can have the lights either bright or dimmed at will.

There are many occasions in the home when the full brilliance of the room lamps is not required: when watching television, listening to music, dining in an intimate setting, or during parties. Perhaps the most versatile answer to this problem is a wall-mounted variable light dimmer such as the Varilight, which was published in the December 1969 issue of "Electronics Australia".

Fully variable dimming is not always needed, however. There may also be a problem of radio interference with such dimmers, due to the voltage pulses or "spikes" generated by the phase-controlled Triac circuitry. Operation is usually quite satisfactory in metropolitan areas where the signal from broadcast stations is strong, but real problems can arise in outlying country areas.

The idea presented here represents a different approach to light dimmers. In principle, a switch is used to connect a semiconductor diode in series with the mains input, so that in the "dim" position, the lamp is fed only with alternative AC half-cycles. This has the effect of considerably reducing the lamp brilliance.

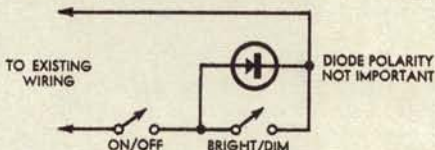
Assuming an AC mains supply of 240 volts, the RMS value of a half-wave rectified sine wave is 170 volts. With typical incandescent lamps which have a very non-linear V-I characteristic, the power input under these conditions is reduced by 25 to 30%, and the brilliance reduced to less than half normal.

Besides simplicity, this arrangement has the advantage that it generates no radio interference. With a conventional dimmer, the Triac switches considerable amounts of power in very short time intervals and it is this which generates the interference spikes. Typically, the Triac switching time is of the order of one microsecond. By contrast, a silicon diode is virtually a "zero-voltage switch" because it begins to conduct heavily with a mere 0.6 volts forward bias. As a result, virtually no interference is generated by this simple dimmer circuit.

On the debit side, there is a tendency for the lamp to flicker. Under normal

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conditions with a sinusoidal mains input voltage, incandescent lamps are pulsed at 100Hz. The persistence of vision of the human eye and the thermal inertia of the lamp filament conspire to make any flicker unnoticeable. However, when half-wave rectified AC is applied to incandescent lamps, the flicker is at 50Hz and tends to become more noticeable. Just how noticeable the flicker becomes depends on a number of factors. If the lighting is indirect, generally no flicker is apparent. If the observer looks directly at the lamp, flicker may or may not be noticeable, depending on the filament temperature. However, some flicker is usually



apparent if the observer looks at the lamp "out of the corner of his eye".

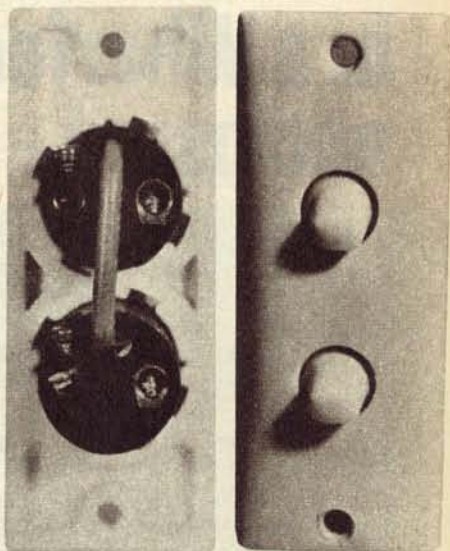
Having installed one of these dimmers in his home, the author has found that the flicker is not irritating and that he is generally quite unaware of it.

The diode used should have a peak inverse voltage (PIV) rating of at least 400 volts. It would be wise, however, to select a diode with a rating of 600 or 800 volts to ensure that it is not damaged by occasional "spikes" and surges which may be superimposed on the mains supply.

Listed below are the maximum wattage incandescent lamp loads which can be used with diodes having typical current ratings. We recommend that readers use silicon diodes of recent vintage, such as BY100, BY127 or EM406/408. These generally have more generous surge current ratings than earlier types.

500mA	140 watts
800mA	225 watts
1.0A	280 watts
3.0A	850 watts

Note that fluorescent lamps should not be used.



Front and rear views of the switch. The circuit is at left.

The most convenient way of installing the dimmer is to purchase a dual wall switch, as illustrated. The diode is shunted across the lower switch. A link of insulated wire is connected between the two switches, and the whole assembly is installed in place of the existing light switch. The upper switch is then the main ON/OFF control, and the lower switch BRIGHT/DIM. This arrangement is quite effective and one to which one can easily become accustomed. Our dual switch was an HPM type.

CORRECTION

A typographical error occurred in the Dynaco advertisement in August, 1970, January and February, 1971. The Dynaco Stereo 80-Kit price was incorrectly given as \$558. The correct Kit price is \$297.

GRD Instruments