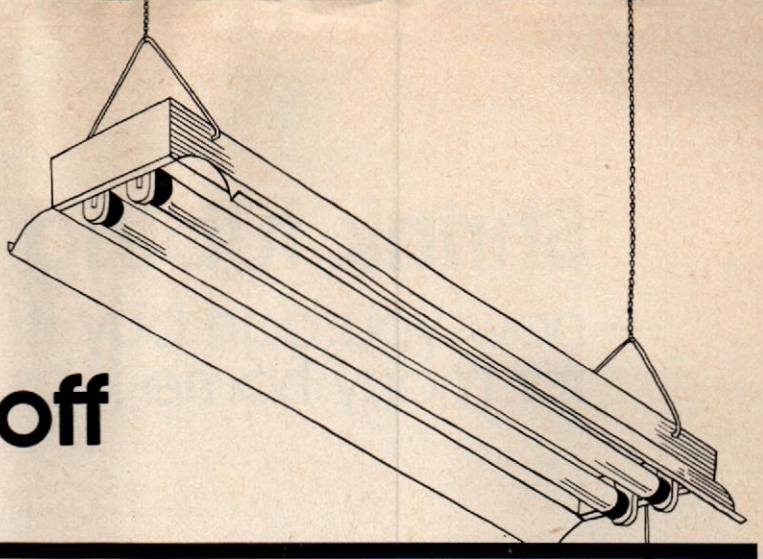
# Cheaper to leave fluorescents on? Forget that myth and switch 'em off



Modern lamps are thrifty starters; no need to light up that vacant room

**By DANIEL RUBY**

Granted, a fluorescent lamp does use more current starting up than it does in steady-state use, but how much more? How long need the light be off before it compensates for that surge of starting current? The surprising answer from the Naval Civil Engineering Laboratory: one second.

That's not the whole story, of course, because frequent switching will reduce lamp life. But it does explode the common belief that a fluorescent should be left on even if you're leaving the room for as long as a half-hour.

The oscilloscope tracing below shows the starting current draw and the steady-state draw of a two-tube, rapid-start fluorescent luminaire. The total starting current draw lasts for about one second (the dots on the tracing indicate that the waveform continues in this pattern), but the initial surge lasts for only half a cycle, or 1/120 second. Therefore, say the Navy engineers, the starting current does not represent a significant amount of electrical power. In fact, turning the lamps off for only one second would save the energy expended when they are switched back on.

Saving electricity isn't the only reason to turn off the light. Power consumption is just one of the costs in lighting; the other is lamp replacement. Fluorescent lamp life is dependent on the filament's electron-emissive coating. This coating evaporates slowly during lamp operation, and it erodes more rapidly during lamp start-up.

## Replacement costs

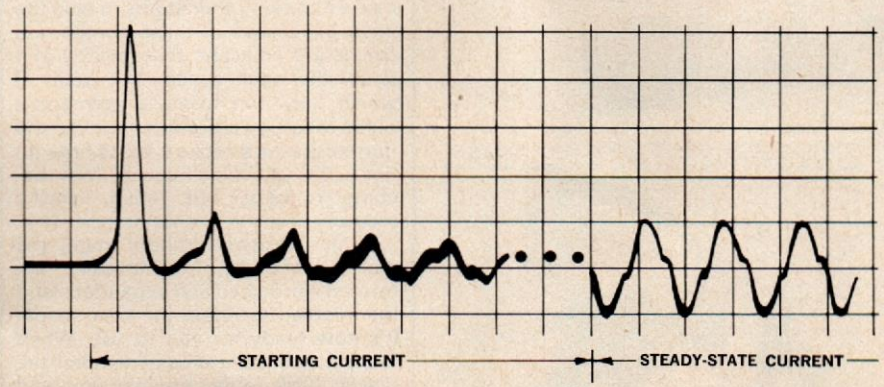
When fluorescents first became popular in the 1940's, lamp life was drastically reduced by frequent on–off switching. Throughout the next decades, it was common practice in many office buildings to leave lights on continuously—24 hours a day—because, it was calculated, the added cost of electricity was less than the cost of more frequent lamp replacement.

With modern fluorescent lamps, however, the effect of frequent switching on lamp life is not so dramatic. And even if life is reduced somewhat, so is operating time. For example, consider three standard F40 rapid-start fluorescent lamps. The first one operates continuously. The second runs nonstop 12 hours a day, but is switched off for the other 12 hours. The third runs eight hours a day but is switched on and off every three hours. (Since the third test approximates likely use patterns in an office, it is the standard method for determining lamp life.)

As might be expected, the lamp operating continuously has the longest life: 38,000 hours. The second lamp burns out after 30,000 hours; the third, after 22,000 hours. However, in terms of replacement time, the order reverses. The continuously running lamp would have to be replaced in 4.3 years; the second, since it operated only half as long each day, would last 6.8 years. And the third, based on a 40-hour work week, would last more than 10½ years.

Therefore, not only was power consumption cut by turning lamps off, but replacement costs were reduced by 37 and 59 percent, respectively. Moral: Switch off a fluorescent lamp anytime you're leaving a room for more than a couple of minutes.

Is this true for other types of lamps, too? Since short operating periods have little effect on the life of incandescent lamps, they should *always* be turned off when a room is vacated. Not so, however, with high-intensity discharge (HID) lamps, such as mercury vapor, sodium vapor, and metal halide. These require time to warm up and to restart after being switched off (see table below), so they should not be turned off unless the shut-off period will exceed the recovery time for that lamp. PS




**Initial inrush current** has a peak value about five times larger than the steady-state peak, but it lasts only half a cycle, so extra power consumption is negligible.

### HID-lamp recovery times (min.)

| Lamp type | Warm-up | Restart | Total recovery |
|---|---|---|---|
| Mercury | 5-7 | 3-6 | 8-13 |
| Metal halide | 3-5 | 10-15 | 13-20 |
| High-pressure sodium | 3-4 | 1 | 4-5 |
| Low-pressure sodium | 7-12 | 0 | 7-12 |