AC and DC Current

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I have had an Astron RS-35M linear power supply[1] for years. I find it to be a completely reliable workhorse and a "gold standard" among power supplies for ham radio operators. Like any other piece of equipment, it can have problems.[2] But in the rare event of a failure it is easily repaired.[3]

Rated to deliver 25 Amperes of current continuously at 12.8 volts DC, it can deliver up to 35 Amps ICS.[4] But it is plugged into an AC outlet protected by a 15 Ampere circuit breaker. So why doesn't the circuit breaker pop every time I key my transceiver? After all, isn't "35" much greater than "15"? Sure is, but remember that the basic power formula applies to both AC and DC circuits equally.[5] So we have P = I x E = 15 A x 120 VAC or about 1,800 watts maximum output before the AC circuit breaker pops.

The Astron supply delivers 35 A x 12.8 VDC or about 450 watts maximum output but let's assume the Astron is only 70 percent efficient. Then it needs to produce 450 divided by .70 or about 643 watts to get to maximum output. Thus, the most we would ever draw from the AC outlet is 643 watts divided by 120 VAC or about 5.4 A, much less than 15 A and thus a very safe margin.

[1] https://www.astroncorp.com/power-supplies.
[2] http://www.repeater-builder.com/astron/astron-intro-stuff.html.
[3] http://www.repeater-builder.com/astron/astron-index.html.
[4] Interestingly, Astron defines ICS as "Intermittent *Communications* Service," not the industry standard "Intermittent *Commercial* Service."
[5] Sort of – AC power is affected by frequency and impedance but the discussion is a close approximation for ham radio purposes.