assumption calculates to be 10.5 watts per square foot of heat removal, which is slightly better than the "rule-of-thumb" method.

The above calculations should be made before considering other means of heat transfer. If our actual load is a device providing 500 watts of heat, the BTU/Hr load will be 500 watts × 3.414 = 1706 BTU/Hr. Since we calculated that our enclosure can only handle 918 BTU/Hr of heat, we need to provide an additional 788 BTU/Hr of cooling from some other source to stay in the same size enclosure.

The installation of a fan in a totally enclosed panel will only move the air and prevent hot spots. It cannot be assumed that an internal fan will remove any additional heat, since the heat is still totally confined in the box, and must rely on radiation from the surfaces to escape.

Forced air

If the installation allows for NEMA 1, drip-proof installation, we can add vents to the enclosure and fans to provide continuous air change. This blows the heat out of the space so it does not accumulate.

It is important that the inlet and outlet vents should be the same size, and arranged so that the air is forced across or through the unit we are trying to cool. It is preferred that the fan be installed at the inlet to pressurize the enclosure slightly, and thus help keep dust and dirt out. The inlet position also produces more turbulence which more effectively picks up heat. This also places the fan motor in the incoming cool air, for longer life expectancy. A plenum ahead of the fan will increase air velocity and make it more efficient. Most enclosure manufacturers provide guide lines for selecting their specific fans (blowers), and their information should be followed for best results.

Most catalogues recommend filters on the ventilation system, sometimes at both intake and outlet vents (Figure 22-2). Usually, filters are seldom serviced, and soon block the air flow. It is often better to omit filters, and plan to periodically blow dust out of the enclosures. Piping clean air to the fan inlet is the best arrangement.

The standard formula for determining the Cubic Feet per Minute (CFM) follows:

$$\text{CFM} = (3160 \times \text{kW})/\text{allowable temperature rise (F)}$$