

## Saving energy with rocks

The peak electrical power used for comfort air-conditioning in South Australia has trebled over the past 5 years, and now represents approximately 25% of total peak-power usage. These figures, published by the South Australian Department of Economic Development, clearly indicate that there would be considerable advantage in reducing the power loads of air-conditioners.

In this light, a novel air-conditioning system that uses virtually no more energy to cool than to ventilate looks like having an assured future. The system, designed at the CSIRO Division of Mechanical Engineering,

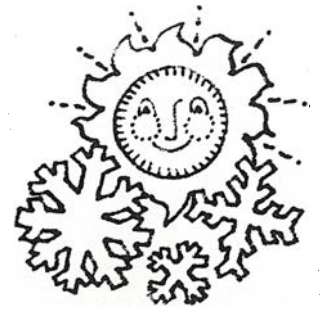
operates on the indirect evaporative cooling principle. Here, an evaporative cooler is combined with an effective heat exchanger of rock screenings in such a way that the cooling effect can be exploited without burdening the conditioned air with an unwelcome high humidity.

Cooling is effected by spraying a layer of 10-mm rock screenings with water and drawing exhaust room air through it. The cooled, moistened air is then passed through one of two other beds of screenings that serve as heat exchangers, and finally to the outside. While that first bed is being cooled, fresh air is being drawn through the second, previously cooled, heat

exchanger before being ducted into the room.

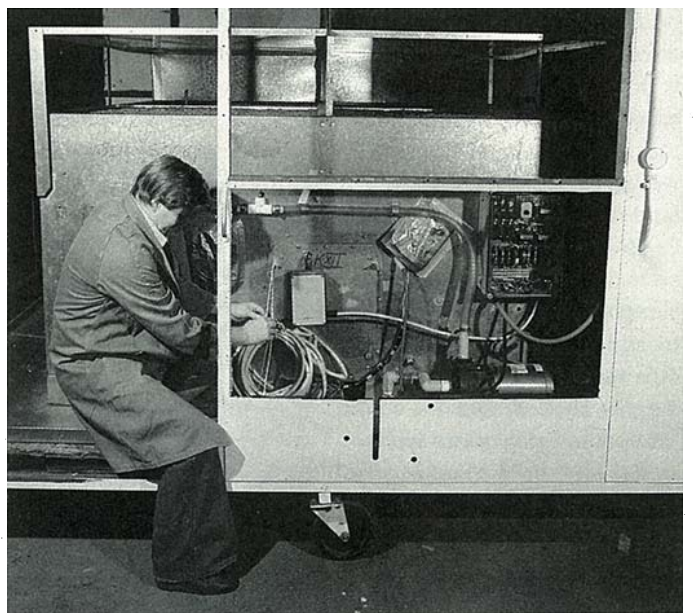
Every 5 minutes a motor-driven vane alternates the functions of the two beds. Thus, unlike conventional air-conditioners, the rock-bed regenerative (RBR) unit does not recirculate stale air, but provides a continuous supply of cool fresh air free from dust and pollen.

In a similar way, the rock-bed conditioner can also be used for heating. The regenerative beds extract heat from room air before exhausting the air from a building. The heat retained in the bed is used to warm fresh air drawn in on the next cycle. If extra heating is required to bring the air up to the desired temperature, it can be supplied by an electric element.



manufacturer, allows a large room to be heated for little more than the cost of running a small radiator.

RBR air-conditioners installed in some 70 South Australian schools a number of years ago did not live up to expectations, mainly due to lack of provision for maintenance. Now, however, an improved redesigned version is on the market, which doesn't require specialized installation and servicing. It is being made by SID Pty Ltd under licence to CSIRO for



A CSIRO engineer prepares to put the new air-conditioner through its paces.

The heating element can be small, since the heat lost by the bodies of the occupants can be retained to provide something like 15% of the heat needed in a building. Electric lights, plant, and machinery can also supply a large proportion of the heat needed. This simple method of heating, says the

air-conditioning buildings ranging in size from 110 to 150 square metres.

An RBR unit installed at Mt Isa is performing well after nearly 2 years' operation under extremely hot and dusty conditions. Three units in use in hostels run by the Public Transport Commission of New South Wales at Werris Creek, in

the north-east of the State, are also working efficiently and cheaply.

Not surprisingly, the rock beds make the units fairly heavy (2.6 tonnes), so they are normally positioned under or alongside a building. The manufacturer rates the unit as supplying

1200 litres of fresh air per second at an average heating and cooling efficiency of more than 85%. For a cost of about \$3500, this makes the unit more expensive than similarly rated conventional units, but the RBR's low running cost soon offsets the extra expense, it is claimed.