

Cradle of life – National Research Council develops new incubator

A new portable incubator featuring better heat and oxygen control and better humidity has been developed by the Medical Engineering Section of the National Research Council in collaboration with the Children's Hospital of Eastern Ontario.

NRC's recently developed apparatus uses an infrared or radiant heat system to replace the hot-air system. Consequently, all the walls are warm. The heat supplied by radiation is independent of the presence of air and the amount of heat is controlled automatically from the body temperature of the child by a sensor placed on the baby's skin. There is therefore no time lag in warmth reaching the baby.

The blower with its power consumption is eliminated since the only air movement is that required for respiration, a very much smaller quantity. Conventional incubators may use close to 300 watts for heat and air motion, but consumption in the new one is 100 watts. "The infrared system," says Mr. Durie, "is more immediate and definitely more efficient."

Conventional type

The conventional incubator is heated by hot air. A large fan blows air across a heater, up through a filter, along the length of the incubator, then back to the fan. The thermostat is far away from the baby and therefore is not very responsive to the infant's needs.

Should a transfer be necessary, from one hospital to another, requiring that the incubator be taken outdoors into sudden cold, or should it be placed in an unheated ambulance, the incubator exterior quickly cools off and the baby soon becomes cool too. When the infant starts to cool, the call for heat travels through to the thermostat; the thermostat turns up the heater; the fan heats up the air gradually, and finally, the heat is transferred from the air to the infant. In this system, there is an insulating layer of still air next to the infant's skin which also retards heat input. "The heat supply to these incubators is just not adequate and consequently they do not keep the baby warm enough," says Nelson Durie of NRC. "The whole process is slow and inefficient."

Dr. Alan Murdock, an Ottawa doctor, found that the humidity control in conventional portables (and stationary models too) was usually not adequate. Once it was raised, the incubator steamed up and nurses and doctors could not see the child. Because the walls in the new incubator are warm, the humidity can be raised as high as required without steaming up the inside.

Oxygen supply

In addition to heat and humidity, oxygen supply is an integral part of the environment within the incubator – so

much so that cases of vision damage were reported in the United States in the early 1950s when babies were removed from the high oxygen milieu inside the incubator and exposed to the lower oxygen supply outside.

"Doctors just couldn't get all the variations necessary in conventional units," explains Mr. Durie. "Our system depends upon the use of an oxygen meter. We have a fixed flow of air and a variable flow of oxygen, somewhat like the conventional system, but with a wider range of oxygen (25-95 per cent) and with better control." Doctors now have a wide and accurate control on the oxygen-air mixture and can regulate it as low as need be, thus avoiding any possible damage to an infant's eyesight. (High oxygen concentrations are now used only momentarily and in extreme emergencies.)

Before the team had completed their research, they came up with an unexpected additional advantage. Noise levels of up to 80 decibels have been measured in conventional incubators which use a large fan to circulate the air. This high noise level from the fan has caused loss of hearing in some infants. The NRC-developed incubator uses a small pump, and although it is not completely noiseless, the noise level inside the incubator is less than it is in the room. (The walls on the NRC incubator are double – whereas the conventional ones are single – providing not only heat insulation but sound insulation as well.)

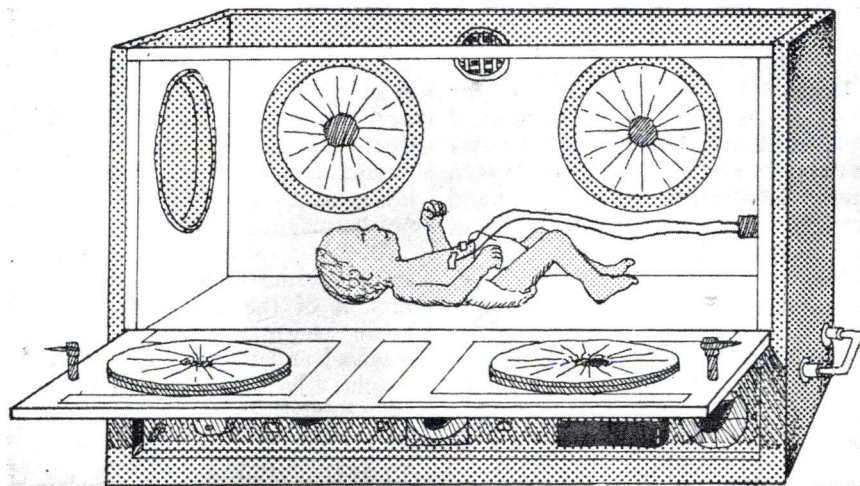
The completed unit will be used in an ambulance and in the Children's Hospital of Eastern Ontario.

Both Dr. Murdock and Mr. Durie are interested in seeing a commercial version of the unit into production. Some enquiries have already been received and other contacts are being sought.

Energy policy (Contd. from P. 2)

available, on a selective basis, from time to time, for oil and gas exploration and development. In addition, applicants for leases on 31 million acres of lands have been given three land-tenure options.

Petro-Canada has been given first option for exploration agreements in frontier and offshore oil and gas areas over the next seven years to build up its holdings. In addition, the Canadian



Artist's conception of the new incubator. A radiant heat system keeps all the walls warm and thus humidity can be raised as high as required without steaming up the interior. In addition, doctors now have a wide and accurate control on the oxygen-air mixture. The new incubator is less noisy than the conventional one.