



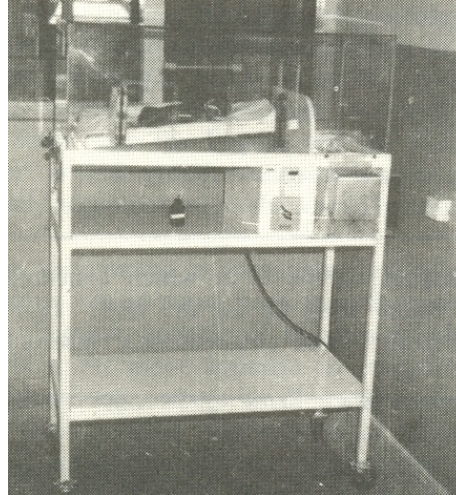
DESIGN FOR A SIMPLE EFFECTIVE BABY INCUBATOR

This baby incubator is the result of a search for a cheap, simple, safe device for nursing premature and sick babies. In areas of many developing countries air temperature and humidity are low, conditions which may be fatal to small babies. In addition the risks of infection are lowered if an incubator is properly used.

Five of the incubators described here have been in use at Mvumi Hospital in Tanzania for over three years and have proved satisfactory.

The central feature of the incubator is a group of four standard electric light bulbs which control temperature, humidity, and circulation of the air.

1. *Temperature* - Two bulbs are each 40 watts and are alight constantly. The other two are each 100 watts and switched on and off by a thermostat. (In our models a Gallenkamp Compenstat type TM 500).
2. In this way up to three bulbs can burn out and there will still be at least 40 watts of heat - sufficient to maintain an adequate temperature for a short period.
3. *Humidity* - is provided by a tray containing water, mounted over the light bulbs and heated by them. It is designed to minimise the risk of water spilling over the bulbs and can be filled while the incubator is operating, by lifting a cover at the front.



Circulation of air is by simple convection. Air enters through an insect-wire screen beneath the light bulbs, rises as it is warmed and escapes through screened holes in the top of the canopy. No circulating fan is necessary.

Points in Construction: The canopy is made of ¼" Perspex which can be cut with a fine saw and can be bent to shape as follows:

The Perspex is placed on a wooden bench, the edge of the bench under the line along which the Perspex is to be bent, and a weight (e.g. bricks) holding it down on the bench. It is then slowly heated by moving a gas burner back and forth along the line until it softens and can be bent to 90°. It must be held in this position until it cools, e.g. by packing a heavy cupboard against it. The ends of the canopy are cut to shape and can be attached with a glue made by dissolving pieces of Perspex in enough chloroform or acetone to make a very thick solution - best applied with an old hypodermic syringe. Corner brackets of aluminium or brass are necessary. The best hinges for the canopy and its doors are brass piano hinges, but any available type will do.

Babay incubator

Practical Action

The light bulb sockets are preferably of the brass and ceramic type as plastic ones do not stand the heat well.

Thin gauge aluminium is best for the inner and outer linings of the heating box, and for the frame angle iron and square section steel rod is ideal. Our models had the horizontal surfaces made of plywood covered with white laminate.

The whole construction can be simplified and made cheaper if painted wood is used and the canopy can be of heavy clear plastic sheeting on a wooden frame.

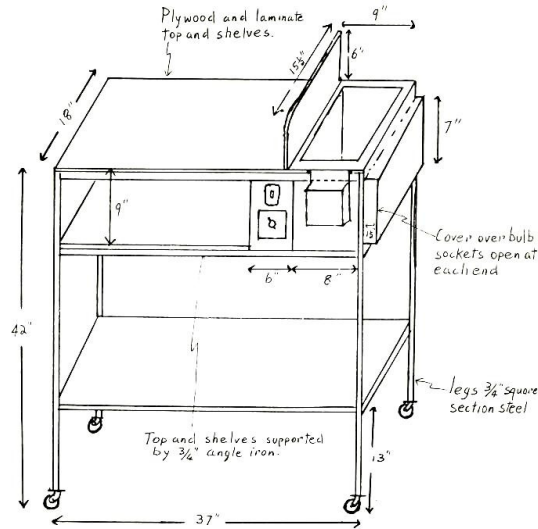
The humidifier tray is most easily made from a sheet of light gauge aluminium or copper bent to shape over a block of wood the exact size of the tray. A better method is to use heavier gauge copper or brass, soldered or brazed. A spare tray is advisable so one can be boiled and cleaned each day to maintain sterility.

The baby tray is made of a sheet of plywood or hardwood, 14" x 24" with a wooden edging 1" high by W' wide. The baby lies on a 1" thick foam mattress covered with plastic sheeting. Hooks on the tray fit into loops on the partition so that one end of the tray can be elevated as necessary.

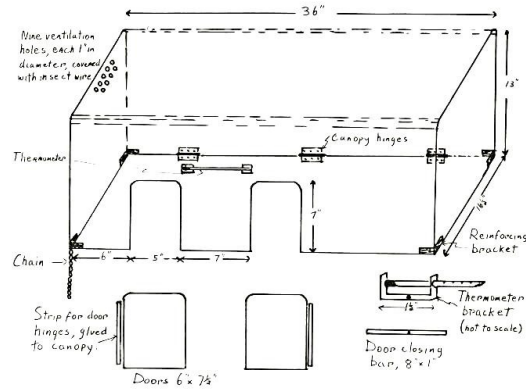
In the original models the thermostat bulb was situated over the partition so that the temperature of the incoming air activates the thermostat switch. This was found to give stable temperatures.

Operation: The incubator is switched on and allowed to stabilise for about half an hour, then the thermostat dial is set to the temperature shown by the thermometer. Then it is set to the required operating temperature, usually 36°.

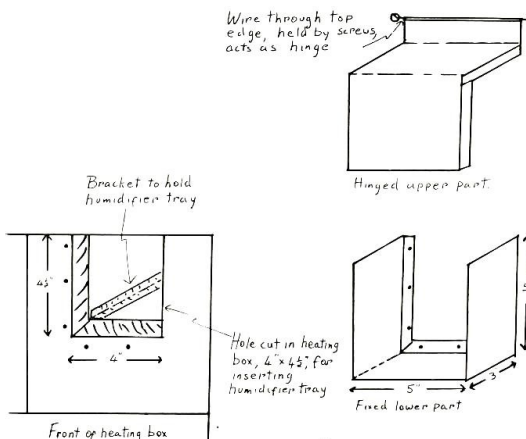
The humidifier tray should be emptied, cleaned and preferably boiled at least once per week, preferably daily. Only soft, clean water or rain water should be used in the humidifier. A depth of about one inch is adequate and the level should be checked along with the light bulbs and temperature, at regular intervals. This is most easily done by making these three items part of the regular infant care routine, along with feeding, turning, observations etc.



1. Front view without canopy.



2. Perspex canopy.



3. Humidifier cover.

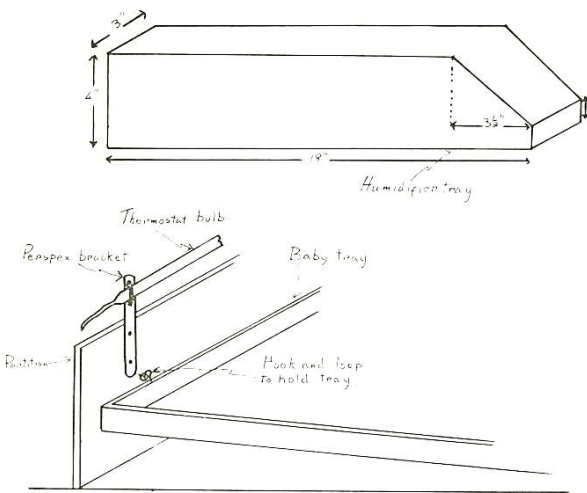
technical brief

Babay incubator

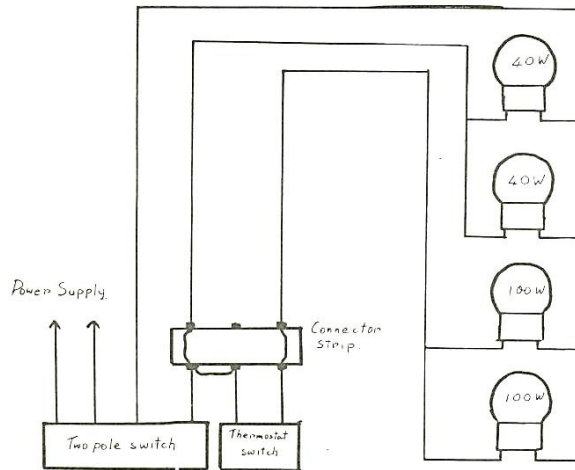
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Burnt out light bulbs should be replaced as soon as possible. The incubator should be switched off while this is being done. Access to bulbs is by undoing the insect screen underneath.

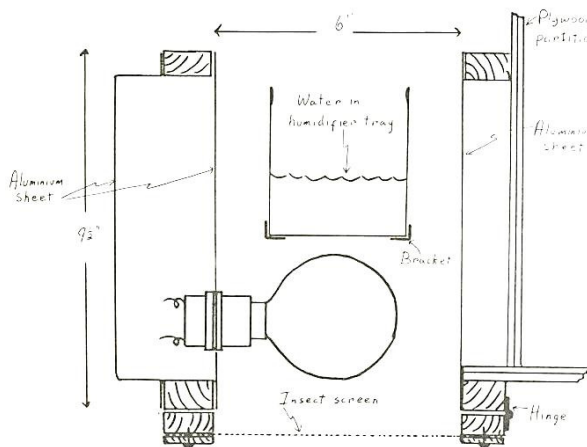
An additional piece of equipment which can be used with the incubator is a phototherapy unit. Ours was constructed from four 20 watt fluorescent tubes, mounted on a base made from sheet aluminium. The starters were mounted with the tubes while the ballasts were mounted separately in a ventilated box, to lessen the weight on the canopy. The base with the tubes and starters can be bolted on to the canopy.



4. Humidifier tray – detail of partition.



5. Wiring diagram.



6. Cross-section of heating/humidifying box.

technical brief

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