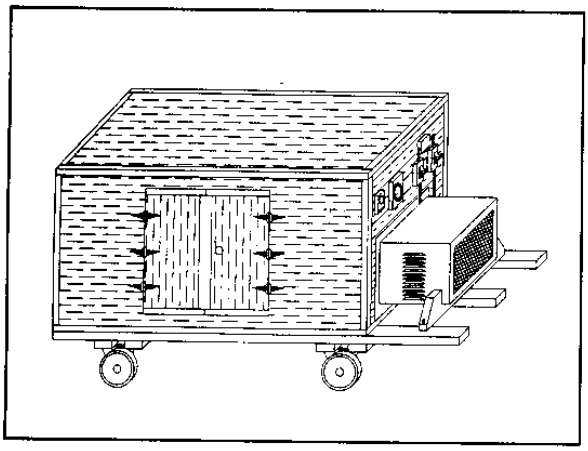
United States Department of Agriculture

Transportation Tip

The Portacooler



A Portable, Inexpensive, Farm-Built, Precooler

From the time of harvest, fruits and vegetables begin a natural decline in quality. When a product is harvested, field heat—the heat that the product holds from the sun and outside temperature—is usually high, which results in an increased rate of respiration and greater deterioration, This decrease in quality cannot be prevented, but can be slowed by rapid temperature reduction or precooling soon after harvesting.

Farmers and marketers can protect their harvested fruits and vegetables, such as berries and other high-value crops, by building and using their own portable precooler. The Portacooler can easily be utilized by small farmers and roadside marketers.

The design of the Portacooler is simple. It can be built with tools commonly found in most workshops. A hammer, drill, screwdriver, circular saw, and a few other construction essentials are the only tools needed for the project. Most of the materials can be found around the farm, bought from a local hardware store, or purchased from an equipment catalog. A general list of the materials is on page 4.

The material cost for construction should be around $1,200 (July 1993 prices). Since an air conditioner is the most expensive component, a used air conditioner will greatly decrease the $1,200 initial investment. The initial cost can be expected to be recovered through increased sales and profits from a higher quality product that has a longer shelf life.

The structure of the Portacooler is a basic wood frame and plywood panel construction (see diagram on inside pages). The outside dimensions of the cooler are 4 feet high by 4 feet wide by 8 feet long. The frame is made of 2 by 3's spaced 2 feet on center, excluding the doorway and the air conditioner space. The frames are sheathed with 1/4-inch plywood. The frame and sheathing are fastened using 2 1/2-inch and 1-inch dry wall screws, respectively. Insulate the precooler with 2-inch-thick plastic foam that fits firmly between the frame studs.

After the frame and sheathing steps are completed, install the electrical components (see diagram on page 4). The standard junction box, power switches, daily cycle timer, and industrial thermostat control box should be mounted on the outside of the front wall near the air conditioner, An adjustable, industrial thermostat must be connected to the air conditioner to replace the existing thermostat. Mount strip heaters using copper wire so that they contact the cooling coils of the air conditioner. Mount the blower on the front inside wall, centered above the air conditioner so that the blower discharge is 12 inches below the inside ceiling.

The design, construction, and research was conducted by Joseph Anthony, Gerald Berney, William Craig, and Daniel P. Schofer. For further information, contact USDA-Agricultural Marketing Service-TMD, Distribution Service Branch, P.O. Box 96456, Washington, D.C. 20090-6456 or call (202) 720-8357 or (307) 504-8084.

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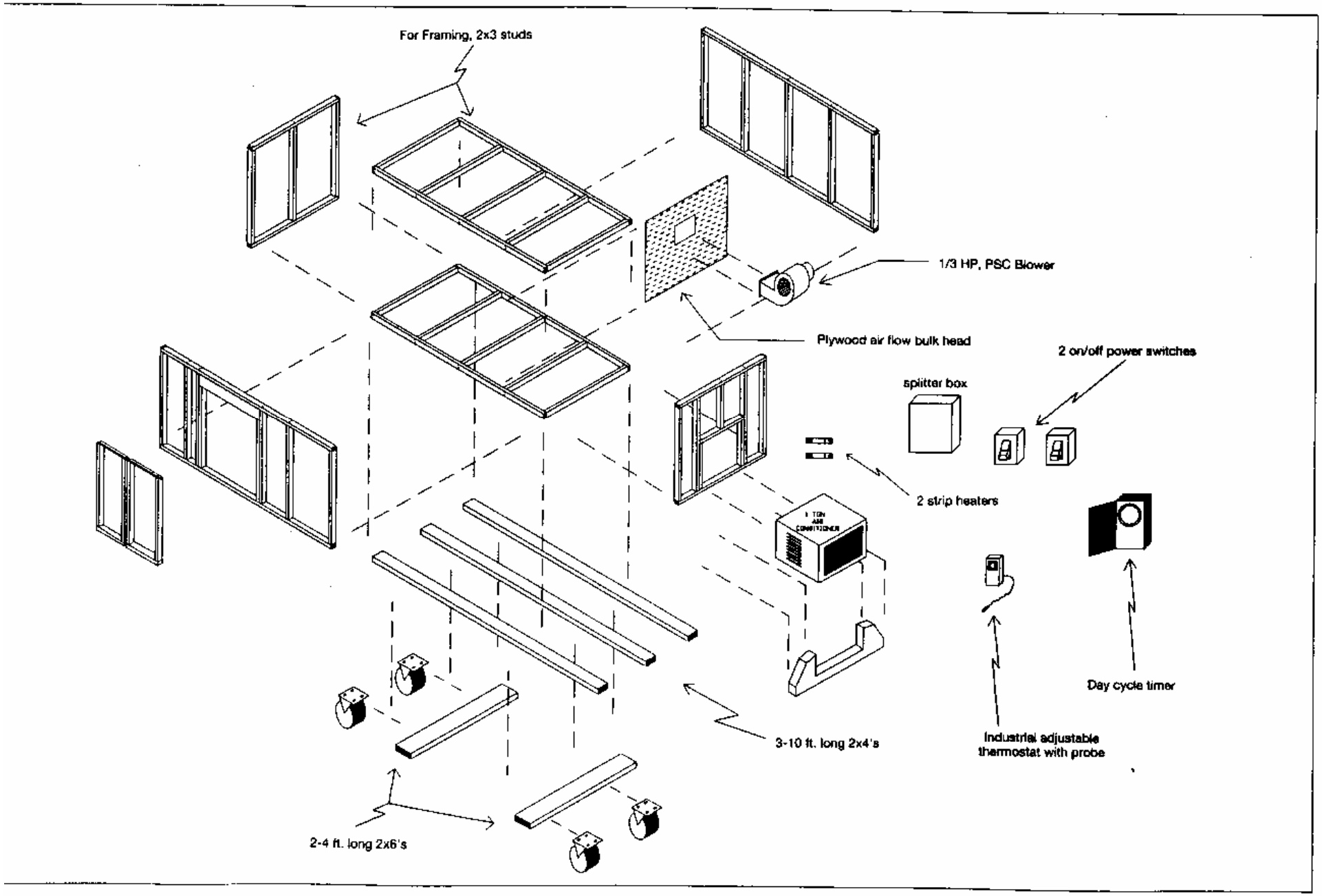
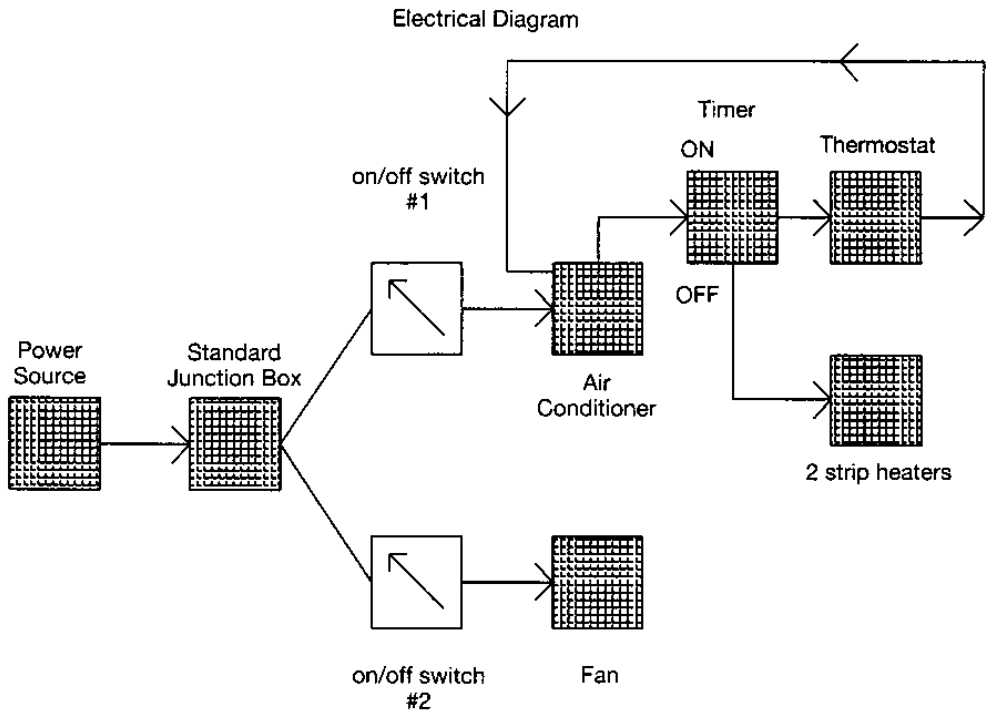

For Framing, 2x3 studs
1/3 HP, PSC Blower
Plywood air flow bulk head
2 on/off power switches
splitter box
2 strip heaters
Day cycle timer
Industrial adjustable thermostat with probe
3-10 ft. long 2x4's
2-4 ft. long 2x6's



All electrical components should be properly grounded, and wiring should comply with national and local electrical codes. Consult a licensed electrician for more information about how to install any components of the electrical system.

The Portacooler can be powered from either an electrical wall outlet or a gasoline-powered generator. The main electrical connection from the power source is split to the individual switches. From the switches, the power travels to the blower and to the air conditioner. The strip heaters and the thermostat are wired from the timer. The timer creates a defrost cycle by alternating power from the compressor to the strip heaters. (An interval of compressor shutdown time should be approximately 2.5 minutes during every 10 minutes.)

Once the cooler is assembled, and the electrical components hooked up, mount the air flow bulkhead. Mount the bulkhead with blower discharge hole flush with the edge of the blower discharge, allowing a 6-inch-high return-air gap along the floor.

All wood surfaces should be coated with polyurethane and an all-weather sealer to prolong the useful equipment life.

When completed, the Portacooler will provide farmers and small marketers with an inexpensive way to remove field heat and prolong the shelf life of their fruits and vegetables.

General Material List

❒ air conditioner, 12,000 Btu, 115V	1
❒ centrifugal blower, 1/3 hp, 1210 c.f.m.	1
❒ 20-amp wall switch, with boxes and covers	2
❒ 4 by 8 ft, exterior AC, 1/4-in plywood	11
❒ lumber, 2 by 3 in, 8 ft long	30
❒ lumber, 2 by 4 in, 12 ft long	3
❒ lumber, 2 by 6 in, 8 ft long	1
❒ industrial wheels, 5-in diameter	2
❒ industrial wheels, 5-in diameter, swivel	2
❒ dry wall screws. 2 1/2-in long	5 lb
❒ dry wall screws. 1-in long	1 lb
❒ water sealer	1 gal
❒ polyurethane coating	1 gal
❒ weather stripping, 1-in wide roll	1
❒ insulation, 2 in, 4 by 8 ft sheets	5
❒ 1/4-in plywood, 4-in wide strips	12 ft
❒ door latch, sliding bolt	2
❒ thermostat, 115 V, 16 amp, remote bulb	1
❒ strap hinges, screw fastened. 3-in long	4
❒ lumber, 2 by 10 in, 4 ft long	1
❒ standard junction box	1
❒ strip heaters. 150 watt, 8 in, 115 V	2
❒ insulated wire	30 ft
❒ cycle timer, SPDT, 115 V, 20 amp. 1 hour	1