

Do-It-Yourself Walk-In Cooler

Why spend \$2,500 or more on an 8 by 8-ft. walk-in cooler when a room air conditioner will do? Until market gardener Ron Khosla developed what he calls the CoolBot, people often used an air conditioner to keep produce fresh, but the units were hard to control.

"A room air conditioner can produce enough btu's to cool a room down, but the fans will start to freeze up when you get below 65 degrees," explains Khosla. "A room air conditioner doesn't have the fans and surface area needed, but if you modify it, you void the warranty."

With more than 200 customers to supply weekly, plus sales to restaurants, Khosla and his wife Kathryn needed reliability and ease of control. The problem was, as a small farmer, he also needed a low cost system. Commercial grade walk-in coolers were expensive to start with and notoriously expensive to repair.

Khosla found out he could make an A/C cooling system work if he constantly monitored it to prevent freeze-up. His challenge was to find an automatic way to do so. The solution was the CoolBot, a micro-controller that constantly monitors the walk-in cooler temperature as well as the A/C unit. It checks for frost or freeze up and adjusts the A/C fan and compressor as needed.

"We tried doing it with analog components, but they weren't much cheaper, and they only worked 90 percent of the time," says Khosla. "Of course the one time it would go bad would be when the coolers were full, and we would suffer huge losses. Our micro controller is able to make decisions at a more complex level, and we haven't had any problems since we got it set right for different air conditioners."

Installation is easy. Simply plug in the CoolBot to a wall outlet. It takes about as



Coolbot micro-controller checks for frost or freeze-up and adjusts the A/C fan and compressor as needed.

much energy as a cell phone charger. Let the wire labeled room temperature sensor hang freely. Stick the wire labeled frost sensor into the cooling vents of the A/C unit. Attach the third wire to the temperature sensor on the A/C unit with a piece of aluminum foil for thermal connection.

Khosla says the \$299 CoolBot will cut cooling costs by close to 50 percent compared to a commercial walk-in cooler. He points out that a single visit from a commercial repairman can cost as much as a CoolBot.

Khosla keeps costs down by assembling units on his farm. This also gives him complete quality control. "We put the boards together, solder the contacts and assemble the finished product," he says.

The CoolBot works with any size, brand and age A/C unit going back to 1970's. Khosla recommends properly insulating a walk-in cooler with at least 4 in. of Styrofoam in walls, ceiling and floor. A/C units also need to be sized to the room for efficient cooling.

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Quick Way To Measure Field Size, Job Sites

If you need to measure distances accurately and quickly, Ernie Kaplan has a simple way to do it. His FastMeasure system can be installed on any type of vehicle - or anything that rolls - and is accurate to 1 ft. in a mile. It's more accurate than all but the most expensive GPS systems, and easier to use over distances than lasers, says Kaplan.

"We use magnetic inductive sensing to measure speed and distance," he says.

In plain terms, Kaplan's device consists of magnets that can be mounted to drive shafts, wheels, axle hubs or anything on a vehicle that moves at ground speed. A sensor mounted just above the rotating magnets monitors revolutions and transmits the information by hard-wire to a terminal readout.

"Once the unit has been calibrated, the display will show distance in feet or meters and speeds in feet per minute, miles per hour or kilometers per hour," says Kaplan.

To calibrate the device, simply identify an established distance between points A and B. At point A, the operator presses the reset button and drives to point B where he presses and holds both buttons on the terminal for 10 seconds. He then enters 400 ft. at the prompt, and calibration is complete.

"Once calibrated, you can drive at highway speeds and still be as accurate as if driving slowly," says Kaplan. "Farmers put it on their tractors to measure fields for calculating application rates. Contractors can install it on a piece of equipment and accurately measure how much work was done for billing purposes or measure out jobs for bidding



FastMeasure system can be installed on anything that rolls. Display shows distance in feet or meters and speeds in feet per minute, mph or kilometers per hour.

estimates. They can even put it on an asphalt grinder or concrete saw, anything that needs accurate job accounting."

For all-purpose measuring and marking, Kaplan sells a high-power electric scooter equipped with the FastMeasure system, paint wand and clipboard.

"It makes measuring and laying out jobsites a breeze at 15 mph," says Kaplan. "When you're done, you can fold it easily to fit in a car or pickup."

The FastMeasure costs \$399, while the FastMeasure Scooter package totals \$1,450. The dashboard-mounted instrument measures only 3 in. wide by 1 1/2 in. high and 1 3/4 in. deep.

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Turbos Really Pay Off In The Mountains

When selling tractors for use at 5,000-ft. elevations and above, turbo chargers can help keep customers satisfied. At Penrose Manufacturing, Penrose, Colo., Joe Kahnke calls it the "grin factor".

"Turbos put smiles on customers' faces," he says.

Kahnke explains that for each 1,000 ft. increase in elevation a tractor can lose 3 percent of its horsepower.

"Power loss seems to escalate after about 5,000 ft.," he says. "When you go from 6,000 to 7,000, you lose about 6 to 7 percent. A turbocharger takes the power back to sea level."

Kahnke's son Dan builds turbocharger kits for the Kioti CK and DK series tractors that Penrose sells. He also custom-builds turbochargers for 800 cc or larger diesels of other makes.

They first got the idea working with ATV's.

"Guys come out here to the mountains with their four-wheelers, and by the time they get up to 10,000 ft., they don't work very well," says Joe.

"After developing an ATV kit we started offering it for tractors too. Running them at higher elevations can cause them to smoke and overheat because they can't burn all the fuel. The turbocharger eliminates the smoke, and the engine runs cooler."



Turbocharger kits are available for Kioti tractors as well as other brands. "A turbocharger takes the power back to sea level," says Joe Kahnke.

The only modification Dan makes to the engine is to drill and tap the valve cover for a drain back from the turbo. The rest of the kit is bolted on. The whole process only takes about three hours and is equally easy to reverse.

"We take the muffler out, and there's usually room for the turbocharger," says Dan. "They are very quiet, and the effect is comparable to having a muffler."

The Kahnkes say prices for installed kits run from \$1,500 and up.

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He "Tractorized" A Jeep Wagoneer

Here's how you make a tractor out of a Jeep Wagoneer: shorten the Jeep by 40 in., add wheels from a center pivot, and install a transfer case from a motorized ammo carrier. Then slip in a 3:1 chain reduction drive and you'll have a handy tractor with plenty of clearance for mid-season cultivating.

"I have a 3/4-acre garden to provide vegetables for my neighbors, ourselves, and for church outreach," says Jesse James, Goldendale, Wash. "I started out with a little garden tractor, but it took me three weeks to till the garden. With my modified Jeep, I can do it all in an afternoon."

The price on the rig was right too. A neighbor gave him the 1967 Jeep Wagoneer after he helped her with some house repairs. Another friend had a 6-wheel drive ammo carrier.

"The Jeep had a cracked block, so I first had to rebuild the engine," says James. "After I shortened the frame, I mounted the axles solid so it wouldn't bounce when pulling an implement."

James also added a cross beam on the frame to support the transfer case. The transfer case allowed him to direct power to both the front and rear axles as well as a rear pto shaft. Initially he used a double chain sprocket to drive the transfer case, but the small chain on it kept breaking so James made a 3:1 gear reduction drive between the Jeep's three-speed transmission and the transfer case. For added strength, he fabricated a bearing case out of steel and used a Timkin double bearing to hold the input shaft that goes into the transfer case.

"I haven't had any problems with it since," says James. "With the gear reduction and the 120-hp motor, it has no lack of power. I can pull a two bottom trip plow and a 10-ft. tandem disc."

To mount the center pivot wheels on the pickup and Jeep axles, James cut out the centers of both sets of wheels. He then welded the 42-in. pivot wheels to the centers of the Jeep's original 24-in. wheels. The larger wheels required added spacers on the front axles to facilitate turning.



Jesse James uses his "tractorized" Jeep Wagoneer for heavy-duty garden work.



The Jeep tractor's cab consists of 2 1/2-in. galvanized pipe with a sunshade top made from the shell of a clothes dryer. The windshield was salvaged from a 1974 motor home, as was the operator's seat. The hood over the motor is the shell of an old refrigerator, hinging forward over the radiator. The large radiator was salvaged from a Dodge pickup truck. With the help of a 24-in. fan from a big diesel engine, the radiator has kept the rig cool even when plowing in 100 degree temperatures.

For added traction, James has two wheel weights filled with concrete mounted over the rear end. He also mounted half a 55-gal. barrel over the rear end and filled it with rock. Even the gas tank is a simple 5-gal. can that sets inside an old milk jug case.

"The exhaust is the only thing that looks impressive," jokes James. "I ran a chrome pipe up from the muffler."

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