



Frank Smith used a pair of vintage Cub Cadet garden tractors to build this 13-ft. long motor grader. It's powered by a 12 hp., Kohler air-cooled engine.

## Custom-Built Cub Cadet Motor Grader

By Jim Ruen, Contributing Editor

Hartley "Frank" Smith's Cub Cadet motor grader looks like it came from a factory. A 12 hp., Kohler K301 air-cooled engine powers the 2,000-lb, 13-ft. long motor grader. The all hydraulic, 5-ft. blade does everything a full-size grader can do and just as smoothly.

"I used a pair of 1970's vintage, IH Cub Cadet garden tractors to build it," says Smith.

He used hydrostatic rear ends from the 109 and 149 Cub Cadets, extending the one Cub frame by 3 ft. to allow for the second axle. He mounted the seat over the front drive axle with a Cub Cadet dash and dash tower ahead of it. A custom wheel well with a removable cover to access the hydraulics sits between the footrests.

The engine was mounted between the 2 rear axles after modifying the frame. Smith used 2 by 4-in. steel tubing to raise the engine above the axles. He ran a double belt pulley with toothed belts from the Kohler's shaft to

a driveshaft that runs between the hydrostats on the axles.

A trunnion activates forward and reverse action, activating the swash plates inside the 2 hydrostats. To synchronize the 2 axles, an adjustable length rod runs from the front hydrostat's swash plate to the one on the rear hydrostat.

"I can jack the 2 axles off the ground and adjust the length of the rod until the 2 axles are in sync," says Smith. "I found in a previous project that they don't have to be in perfect sync, just close. If one slips, the other picks up the load."

The only change made to the dash assembly was to add power steering from a later model Cub Cadet. He also mounted 5 spool valves on the dash. A pair on the right side control the blade's vertical movement and left/right movement. A pair of spool valves on the left control the blade's skew or pitch and its

rotation. A fifth spool under the dash has a lever on the right side to insert and retract a locking pin on the blade's turntable.

"All 5 spools are plumbed in series from the charge pump through the spools and back to the pump," says Smith.

The dash is also home to throttle, choke, charging meter, speed control (forward/reverse), ignition switch and light switch, as well as a switch for a cooling fan for the transmission.

A 1/4-in. steel plate is the connection point between the lengthened tractor frame and the grader's main frame. It is welded to both sides of the tractor frame. It is also welded to the rear end of the main frame's 4 by 6-in., 1/4-in. thick, structural steel tubing that projects about 18 in. into and between the tractor frame.

"All the joints of the main frame were miter-cut and beveled to achieve full welding penetration," says Smith. "I welded patch plates to the frame for extra strength where the highest load would take place."

The triangular traction frame with the blade, turntable and hydraulic motor for

adjusting the blade angle is suspended from the main frame by the vertical movement cylinders. At the front end of the grader, the traction frame attaches to the main frame with a ball hitch. The 1 7/8-in. ball hitch provides full freedom of movement as the various hydraulic cylinders adjust blade position.

A 3-in. dia. post is welded to a bracket on the blade. It comes up through the large, round, gear drive plate that adjusts the blade direction left or right. It also passes through an upper plate that is fastened to the traction frame. The post is held in place by a castle nut. Undo the castle nut, lift the frame up and the post and blade drop out.

Smith has decked the Cub Cadet motor grader out with a full set of lights for visibility and safety. "The lighting switch turns on headlights ahead of and behind the blades and lights to the rear," he says. "If the motor grader is going forward, the rear lights are in red. If the grader is put in reverse, the rear lights turn white for greater visibility."

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Hydraulic-operated, 5-ft. wide blade does everything a full-size grader can do.

## Fire Pit Made From Tractor Wheel Rim

"I made a low-cost outdoor propane fire pit using a propane burner ring and a big wheel rim off an old Deere tractor. My total cost was less than \$100," says Danny Bostick, Waco, Texas.

The 28-in. dia. rim, which came off a Deere 4230, is set into a circle of concrete pavers.

"I came up with the idea because we're converting a pair of old grain bins into a bed and breakfast, and we wanted something rustic for our future customers that reflects our farming background," says Bostick. "The fire pit rests on an octagon-shaped concrete patio between both bins.

"The burner is covered with lava rock so flames come up through it that resemble a natural wood-burning fire," says Bostick. "I mounted a 3-in. long key valve on one side of the fire pit, which is used to turn the burner on or off. I use a barbecue lighter to light it."

He sandblasted the rim and painted it "high temperature" black so the paint wouldn't peel from the heat. He made a circular plate out of 11-ga. steel that rests about 6 in. below the top of the rim. The fire ring is placed on top of that. He used 1/2-in. dia. stainless steel pipe to make the fire ring and drilled small holes in it spaced 4 in. apart, then set the ring on the plate with the holes facing up. A burner port on the ring is attached to the ball valve on a commercial gas burner that's located under the plate.

Copper tubing attached to the ball valve on the burner runs underground to a propane bottle located a few feet away.

The last step was to build a concrete paver enclosure around the wheel rim. Bostick cut a pair of 4-in. dia. holes through the pavers and wheel rim on opposite sides of the fire pit, to provide cross ventilation needed for the fire to burn properly.

"I like how it turned out," says Bostick. "The only components I bought were the



Fire pit was made using a propane burner ring and a big rear wheel rim off an old Deere tractor. Wheel rim is set into a circle of concrete pavers, with the burner ring covered by lava rock.



steel plate, gas ball valve, a propane air mixer, copper tubing, and regulator. The pavers were left over from my wife's previous flowerbed.

"I keep the propane tank inside a metal firebox so that it's out of the weather. It's important to always be careful when working with propane," he notes.

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## Woodworker Turns Your Trees Into Family Heirlooms

J.R. Manske markets every bit of the trees he cuts down, including the stump. He mills the lumber and dries it, selling boards, beams, and big slabs with live edges, as well as fine furniture. He even sells the story behind each tree.

"People like to know the story behind things," says Manske. "It may be cheaper to buy your lumber in town, but you don't get the story. When someone needs to take down a couple of trees to build a house, I can mill, dry and prepare the lumber for use in their home. Then they have the story behind the wood used."

Manske has done woodworking for 22 years, nearly 9 of those years as a finish carpenter for a builder. About 5 years ago, he took the plunge and bought a sawmill and set up his own shop. Since then he has added a kiln as well as a 16-in. jointer, 20-in. planer, wide belt sander, and other tools. There isn't much he can't do to wood.

Sometimes it isn't the size of the woodworking that counts. When a customer was planning a wedding, Manske cut a large cookie from a tree and milled it with the help of the groom. He then dried it in his vacuum kiln and filled the cracks with epoxy, applied vinyl lettering, and poured a clear coat over everything to accept signatures.

"I took it to the wedding, and friends and family all signed it," says Manske. "After the wedding, I poured a few more coats over the signatures and made a custom metal, powder-coated base for it."

Buyers can select from an inventory of kiln-dried slabs and boards. He also builds tables, cabinets and crown molding to order.

"I know where every slab I work with



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While he doesn't sell the bark from the trees he cuts, he is looking for a way to sell the water.

"My vacuum kiln collects the water as condensate on the ceiling," says Manske. "At this point, it falls on the floor and drains away. I have to think someone would want to buy this tree water."

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