Kentucky AgrAbility

Farm Equipment Modification Instructional Module

By John Hancock, Carla Sanders, and Kathy Sheppard-Jones

Farm Tractor Lifts
Design and Installation

- Materials List
  - Measured lengths of four-inch square steel tubing
  - Measured lengths of two ½ -inch square tubing
  - UHMW (Synthetic polymer); approximately 12 inch by 36 inch by ½ inch sheet
  - One heavy duty 12 volt electric winch with corded remote control
  - Heavy duty minimum 500 lb capacity 2-3 inch pulley
  - One piece of 1/4-1/2 inch angle iron or steel cut to size of winch base (for potential mounting plate)
  - Small box of one inch metal screws or longer
  - Commercial attachable lift seat or …..
  - Sheet of expanded metal for creating platform-24 inch square (Platform type only)
  - Spray paint
  - Heavy duty barrel hinge with bearing (if necessary to hinge seat attachment arm only)
  - Two feet of one inch outside diameter cold roll steel
  - Two feet of one inch inside diameter 3/16 gauge steel pipe

Farm Tractor Lifts

Tools Required

- ARC or MIG welder
- Steel bandsaw or portable metal saw*
- Screwdrivers
- Pliers
- Wrenches/socket set
- Measuring tape
- Plasma cutter * or drill press
- Table saw*
- Minimum 4 inch angle grinder
- Heavy duty power drill with bits

**May be provided off-site*

Measure

- Determine where the lift upright may be attached to tractor. This will vary depending on the model and/or presence of a loader attachment.
- The upright component will be connected to the tractor via the base arm. The upright should be positioned so that it extends well below the level of the base arm for stability.

Measure

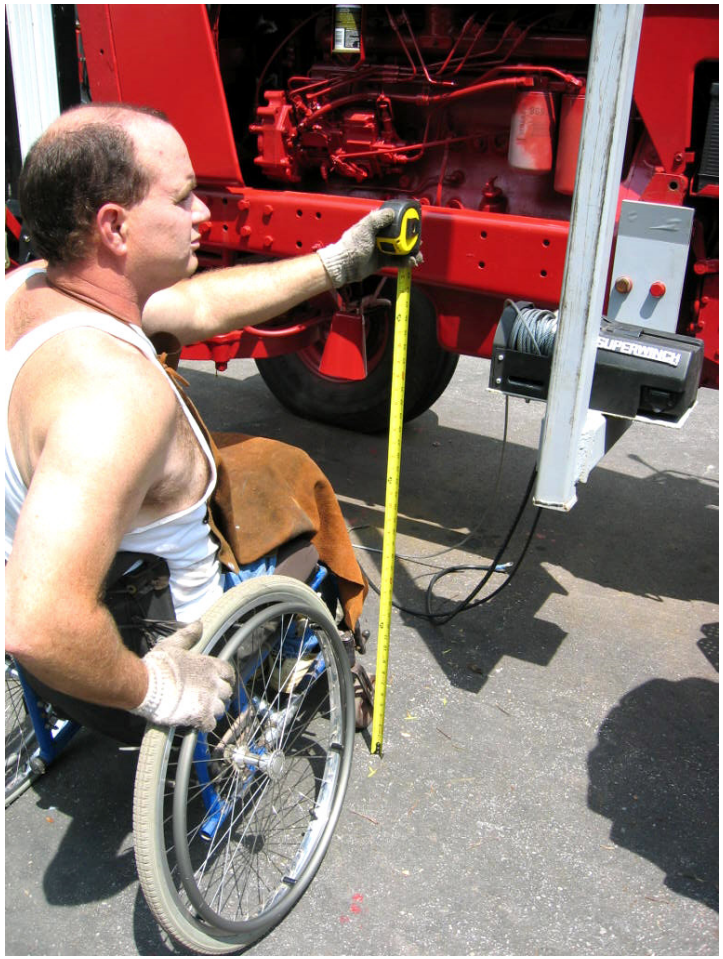
Tractors with a bucket loader in place will require that the lift base be attached to the loader arm itself.

Measure

Determining the lift upright length

For a seated type lift, first determine the distance from the ground which will allow the user to transfer safely into the lift seat itself.

For a platform lift, determine the level at which the user will be able to safely step onto the platform. (Usually about 4 inches above ground level)



Measure

- Next, the lift upright will need to extend a minimum of two feet above the level of the existing tractor seat to accommodate the sliding sleeve component of the lift.
- For the chair lift, the upright length will be measured from the lowest level required for safe transfer, to a point one sleeve length plus four inches above the existing tractor seat.
- Estimate the sliding sleeve length to be two feet.

NOTE: The upright should never extend higher than the cab roof or exhaust pipe.

Measure

On tractors without a front-end loader in place, a four inch square piece of metal tubing must be cut to serve as the point of attachment for the lift as well as the mounting support for the electric winch. This piece of square tubing will then be welded to a mounting plate and bolted to the tractor-or welded directly to the tractor where feasible.

The four inch square tubing length will be determined by both the clearance required for optimum lift function and size of the winch housing. However, the square tubing arm should not extend horizontally past the outside of the rear wheel.

On tractors with a front-end loader in place, the four inch square tubing must be welded directly to the loader arm.

Measure

Seat/Platform Arm Lengths

- The last measurements must be conducted on site-after attachment of lift base, upright and sleeve are in place. The lengths will depend on the specific tractor size and model as well as whether the lift will require a seat or platform attachment.
- These measurements will be used to cut an attachment arm for the seat or platform which will later be welded to the sliding sleeve component of the lift.
- For seated lifts, measure horizontally from the attached lift upright to the mounting bracket of the lift seat while it is held in a position which would allow safe and easy transfer into the existing tractor seat.
- For platform lifts, the attachment arm will be attached vertically. The length of the vertical arm will equal the measured distance from the ground to the floor of the tractor cab.

Cut Components

- Steel tubing must be cut using an appropriate steel saw. If you do not have access to a cutter, measured lengths may be cut offsite and provided for you.
- Lift base arm- cut from four inch OD square tubing
- Lift arm upright –cut from 2 ½ inch OD square tubing
- Lift sleeve-cut from four inch OD square tubing
- Lift seat/platform arm-cut from two ½ inch OD square tubing

Cut Components

- UHMW is a very tough, plastic-like polymer used here to in effect “lubricate” the inner surface of the steel lift sleeve as it moves up and down the lift upright. (see last page for vendors)

- Measure the inside of the lift sleeve. Cut four pieces of UHMW to place inside the lift sleeve, creating an inner lining which will fill the four inch square steel tube.

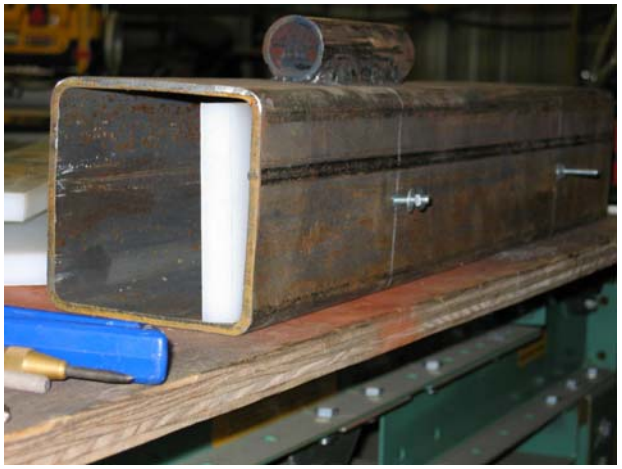
Cut Components

- If necessary, cut a mounting plate from angle iron or steel to fit base of electric winch.

- Mark and cut bolt holes in mounting bracket to fit winch using a drill press or plasma cutter.

Assembly

- Attach UHMW to the inside surface of the square steel lift sleeve using metal screws, creating an inside lining for the tube.



- Make sure to countersink the screw heads to create a slick inner surface for the sleeve.

Assembly

- Complete lining of square lift sleeve using UHMW as outlined above.
- Weld pre-cut lift base arm (minimum 4 inch square tubing) to left loader arm of tractor or weld mounting plate to base arm and bolt plate to tractor. **Make sure to level base arm before welding.** Where feasible base arm may be welded directly to tractor without a mounting plate.
- Adjust position of lift upright and weld upright to base arm. **Make sure lift upright is plumb.**

Assembly

- Slide the lined piece of four inch steel tubing (sleeve) over the two 1/2 inch lift upright. Make sure it slides easily without exposed interior screws or burrs.

- Bolt electric winch either directly to lift base arm or attach via mounting plate.

Fabricating the Hinge Pin Assembly

- Cut a piece of 1” inside diameter round steel pipe (with a minimum gauge of 3/16th inch) into three equal sections-a minimum of five inches each.

- Cut a piece of 1” outside diameter cold roll steel two inches longer than the total of the three pipe sections.(e.g. 17 inches)

- This will serve as the hinge pin.

Fabricating the Hinge Pin Assembly

- Next cut a small piece of ½ square steel stock (approximately 4 inches long) and weld to one end of the hinge pin to form a handle/stop.

- Slide pipe sections over pin to check fit.

Fabricating Hinge Pin Assembly

- Weld one of the equal pipe sections to the lift sleeve a minimum of one pipe section length from one end. This will form the lower edge of the lift sleeve. Make sure to remove lining before welding.

- Weld remaining two pipe sections to the centerline of the vertical seat arm spaced one pipe section apart per photo. This will create the hinge sleeve. Situate the sections toward one end of the arm.

Fabricating Hinge Pin Assembly

- Connect the vertical seat arm to the lift sleeve by placing the pin through the attached pipe sections.
- Check fit and pivot. Lubricate pin.
- Disassemble in order to place on tractor upright more easily.

Fabricating Hinge Pin Assembly

- After the vertical seat arm has been attached to the lift sleeve component using the hinge pin method, a second tubing section must be connected. This is the horizontal seat arm.

- The horizontal seat arm is welded to the vertical seat arm approximately six inches above the lower end. This will allow for a lower brace or gusset plate to be added beneath the horizontal seat arm.

Assembly

- Weld a metal ring or apply a threaded heavy duty eye bolt to top edge of lift sleeve. Here a bent section of ½ inch rebar has been used (top) or a cut section of 1 inch square metal tubing to create a “ring.” (bottom)

- This will serve as the point of attachment for the winch cable hook.

Various Pulleys and Hooks for Winch Attachment

Assembly

- Thread winch cable through attached sleeve ring and pulley.

- Next hot-wire winch into tractor battery and ground per manufacturers instructions.

Test/Adjust Function

- Perform test run of lift without user to check for defects- being aware of any pinch points.
- Place remote control for winch per users request.
- Have user demonstrate safe lift use. Make needed adjustments.

Farm!