

# ASK MECHANIC MIKE!

## Protecting Machinery in Rocky Fields



**D**ear Mike,  
We've needed extensive mechanical repairs, including transmission rebuilds, due to the rocks in our fields. What practices or protection do you recommend to protect equipment working in fields with rocks?

- On The Rocks in Auburn, WA

Dear Rocks,

**M**inimizing the damage of the shock load created when you hit a rock with a tiller is doable, but first we need a small tractor anatomy review.

Implements are attached to the tractor with a "three point hitch." On the tractor immediately behind the seat is the rock shaft housing and the rock shaft which lifts and lowers the implement. The rock shaft is attached right and left to the *lift links*, which are in turn attached to the *draft links*, which are the two arms right and left to which you attach the implement. The top link attaches at top center and is adjustable for length. The attachments of the right and left draft links plus the top link are the three points which constitute a three point hitch.

A floating top link is an alternative to the rigid attachment on most implements. It utilizes two pieces of plate steel and creates a "floating" attachment desirable for implements that follow the contour of the ground like brush hogs and flail mowers (see photo, right). A floating attachment relieves the impact of an implement that is jostling or hopping, like when you go over uneven ground or hit a rock. If your mower or tiller does not have one already, they are easy to fabricate and install.

**Y**ou can also reduce the transfer of impact from implement to tractor at the attachment of the lift links to the draft links. Manufacturers typically provide a simple means by which this can be adjusted to either a rigid or floating attachment. On my John Deere there is a small plate held in place by a pin. By removing the pin and rotating the plate 90 degrees you can change from floating to rigid. Rigid attachments are good for seeders and transplanter and will keep the implement level; floating attachments reduce the transfer of energy and are preferable for mowers and tillers.

The most important place to buffer potential shock is in the transfer of energy through the power takeoff (PTO) shaft. In most cases the tractor and PTO shaft are protected from damage by either a shear pin or slip clutch. A shear pin is simply a pin that passes through the PTO shaft somewhere, usually at the u-joint on the implement end of things. This pin is designed to shear on impact. If the pin is over-sized or has been replaced with a grade 8 or other hardened steel it may not be failing early enough to protect your tractor. Check the pin and refer to the operator's or owner's manual of the implement to select and install the proper grade and diameter.

Another option for protecting your equipment is a "slip clutch." Slip

### OUR NEW COLUMNIST

Our new columnist Mike Peroni is here to answer all of your farm machinery and tool questions! A longtime Washington state farmer, he has learned a thing or two about repair and maintenance. He's rooting for you to do repairs and machinery work yourself; however, he is not responsible for outcomes. Please take caution, be safe out there and do additional research as needed.

Send your questions to [mechanicmike@seattletilth.org](mailto:mechanicmike@seattletilth.org).

clutches are a sandwich of friction and pressure plates compressed by a series of springs that are assembled in a housing and typically attached to the implement. They are also available as a stand-alone adapter that can be fixed to the PTO where it leaves the tractor's transmission. Larger implements that are not belt driven will have a slip clutch but at the 35-70 HP range they may still use a shear pin. In rocky ground, a slip clutch can really save your bacon.

**T**he idea is simple. PTO horsepower is transferred through the clutches to the implement. If the implement encounters an obstacle, the clutch slips and deflects the shock—preventing it from damaging the shaft or tractor transmission.

It's easy and effective if the clutches are adjusted correctly and not allowed to rust or stick together. If purchased new, the slip clutch—whether an adapter or part of a PTO shaft—should come with a table that lists the correct spring length for the horsepower delivered. If not, you can find instructions online on how to adjust these clutches.



**Easy to install, a floating attachment relieves the impact of an implement travelling over uneven ground or rocky fields.**

Slip clutches are great protection, but only if they are functioning properly. If they get wet, or sit for extended periods in compression, the plates will fuse together and will not spin. To prevent this, back them off every winter and pry the plates apart then readjust in spring. You may even want to remove the PTO shaft to store it inside out of the elements.

Keep in mind that if you are replacing your PTO shaft with one that includes a slip clutch or adding a slip clutch adapter to the PTO shaft of the tractor you will have to correctly size the PTO shaft itself. Follow the manufacturers' instruction on how to do this and for Pete's sake be careful! There's a lot of torque involved.

*Mike Peroni has been operating certified organic row crops farms in Western WA for 30 years. He is a farmer, a father, and a motorcycle enthusiast; not necessarily in that order. [mechanicmike@seattletilth.org](mailto:mechanicmike@seattletilth.org)*