



Farm Safety Association

PTO Safety

A PTO shaft revolving at 540 rpm travels more than two metres in less than a second. Little wonder that PTO entanglement nearly always results in devastating injury or death!

Missing or damaged shielding is the main reason for driveline entanglement. Manufacturers have made tremendous strides in developing safer PTO shielding. However, it is impossible to make protection fool proof. All shielding components must be correctly installed and properly maintained to prevent injury in case of accidental contact.

Operator awareness and constant vigilance are also crucial if PTO entanglement is to be avoided. Making repairs while equipment is operating, stepping over or onto revolving shafts, wearing loose or frayed clothing are actions that set the stage for carnage.

Clear safety rules must be established for everyone who works with farm machinery. Even the most experienced operator will benefit by reviewing the PTO safety information summarized in this fact sheet. The guidelines will prove especially valuable for training novice equipment operators -- new employees and children who are excited about the prospect of operating farm machinery must be made aware of the importance of sticking to these rules!



Shielding must be 100%

A tractor's master shield prevents accidental contact

with the tractor stub shaft and the front universal joint of the attached machine's driveline. Never operate a tractor with a missing or damaged master shield.

Integral-journal shields completely enclose the power shafts of PTO-operated machines. Manufacturers have made great strides in the design of these tubular shields, most of which are now made of durable plastic. The "cones" that cover the universal joints at each end of a plastic power shaft shield have also been improved - their flexible design makes hook-up easier and provides greater protective cover.

Integral shields rotate on bearings, independently of the power shaft. They revolve with the shaft while it is turning, but the shield will stop spinning if it is contacted. These shields must be kept in place and maintained in good condition to provide protection against the grabbing action of shafts and universal joints.

The power shaft must also be shielded at the point of attachment of the driven machine. Both the universal joint and the machine's stub shaft must be well covered. If this shielding is missing or damaged, or if you feel it doesn't provide adequate protection, talk to your dealer about a replacement.

There are still some older machines in operation that have tunnel shields over their power shafts. This design offered only limited protection. Because tunnel shielding is still open at the bottom, clothing, shoelaces, hair, etc. can be caught by the shaft or universal joints. There is a case to be made for "retiring" such equipment. If it must be used, power shafts and shielding should be replaced with safer, modern components.

Proper installation

A PTO shaft may break or separate during operation if improperly used or adjusted. If it does, the tractor-driven end can swing violently, with the potential for severe equipment damage and operator injury.

New equipment is fitted with the driveline recommended for that particular machine. Make very sure that all replacement driveline components conform to the same specifications.

The tractor drawbar should be adjusted to the length specified in the driven machine's manual. This ensures that the telescoping power shaft and shield will stay together when they lengthen in operation. It also prevents driveline "bottoming out" when making a sharp turn, or when the rear tractor wheels enter a depression. This puts considerable strain on shaft and bearing supports, and the entire driveline may be damaged or bent.

Use your safety sense

To perform its intended function, farm machinery has to operate in a very powerful, aggressive fashion. Operators must adopt good safety habits to prevent injury, even with well-shielded equipment.

Following are key considerations for preventing PTO entanglement.

1. **Always disengage the PTO, shut off the engine and remove the keys before leaving the tractor seat.** You can't be injured by the PTO or other machine parts if the driveline isn't rotating! Taking the keys prevents unexpected start-up by another

person while you are cleaning, lubricating, adjusting, or making repairs.

2. **Keep the tractor's master shield in place at all times.**
3. **Check frequently to confirm that integral shields are in good condition.** With the powershaft stopped, you should be able to rotate the shield freely by hand. Look for nicks, dents or bends that could catch clothing. Damaged shields or bearings must be repaired immediately. Don't operate the machine until damaged parts are fixed or replaced.
4. **Never step across a rotating powershaft.** Some equipment must be operated in a stationary location where you are working (e.g. forage wagons and blowers, grinder-mixers, etc.) When such machines are running, always walk around the revolving shaft. Safety devices are usually reliable, but could malfunction.
5. **Dress for safety.** Wear close fitting clothes and keep long hair covered. Raggy old coats and long boot laces can easily be grabbed by rotating parts.

Make safety a habit

Broken bones, severed limbs, crushed skulls--such horrendous injuries are typical of PTO entanglement accidents. The only sure way to prevent such tragedy is to avoid all contact with moving machine parts. Good shielding is vital, but all equipment operators must be aware of hazards and make safety a part of their habitual behaviour.

The information and recommendations contained in this publication are believed to be reliable and representative of contemporary expert opinion on the subject material. The Farm Safety Association does not guarantee absolute accuracy or sufficiency of subject material, nor can it accept responsibility for health and safety recommendations that may have been omitted due to particular and exceptional conditions and circumstances.

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