

## Power Take-Off Chart: Lapsed Time vs Distance Travelled (Feet of string wound around the shaft)

With tractor PTO turning at 540 and 1000 rpm and shaft/shield diameter of 3 inches.

Lapsed Time	540 RPM		1000 RPM	
	Revolutions Turned	Distance Travelled (ft of string)	Revolutions Turned	Distance Travelled (ft of string)
0.15	1.40	1.10	2.50	2.00
0.25	2.30	1.80	4.20	3.30
0.33	3.00	2.40	5.50	4.40
0.40	3.60	2.80	6.70	5.20
0.50	4.50	3.50	8.30	6.50
0.60	5.40	4.20	10.00	7.90
0.70	6.30	4.90	11.70	9.20
0.80	7.20	5.70	13.30	10.50
1.00	9.00	7.10	16.70	13.10
1.50	13.50	10.60	25.00	19.60
3.00	27.00	21.20	50.00	39.30
5.00	45.00	35.30	83.30	65.50
10.00	90.00	70.70	166.70	130.90
60.00	540.00	424.10	1000.00	785.40

There is no charge to borrow CASA's PTO banner pull-up to draw attention to the PTO teaching resource.  
Call (204) 452-2272 or email [info@casa-acsa.ca](mailto:info@casa-acsa.ca).

# Power Take-Off

## INSTRUCTIONS

**CAUTION:** This Power Take-Off (PTO) is real. It can strangle and maim. Read all of the instructions carefully and follow ALL the safety precautions.

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This PTO teaching tool is made from an actual PTO shaft complete with all the required guards. The PTO powered by the drill simulates an actual PTO operating at 540 RPM.

**Objective:** To raise awareness of working safely with a PTO.

**Concept:** To demonstrate that “you can’t win a fight with a PTO.”

**Target Age:** Grade 4 – Adult

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## Equipment and Materials Included

- PTO frame and shaft assembly complete with carrying/shipping case.
- 18 volt cordless drill with two batteries, charger and socket to drive PTO shaft.
- Chart to compare human vs PTO speed.
- Operating instructions.
- String.

## Set-Up

### PTO Shaft Assembly

Carefully remove the PTO assembly from the shipping case.

### Cordless Drill

Remove the drill and socket attachment from the case and securely attach the socket to the drill. Place the drill on a flat surface at the drive end of the PTO shaft and fit onto the stub shaft end of the PTO through the opening in the assembly end plate.

**CAUTION: Make sure the drill and PTO shaft are in a straight line to allow a smoother operation of the PTO. When the drill has been connected, test it to make sure everything is operating properly.**

## Operation

When the PTO is in place and the drill is connected, tie a strong piece of string approximately 10 feet long to the actual shaft (knuckle area) and extend the string fully away from the shaft.

## Important Safety Requirements

- Only the instructor operates the drill.
- Do not allow anyone to touch any moving parts including the PTO guards during the demonstration, or while operating.
- If you must leave the demonstration unattended, remove and hide the drill to prevent inadvertent operation.
- Always mark off a one metre safety barrier between the PTO shaft and the audience.

## Lessons – Engage your audience

Choose either lesson.

- 1 • Ask the audience how fast they think their reactions are.
  - Give several members of the audience a 10-foot piece of string.
  - Challenge them to wrap the string around their hand faster than the PTO.
  - Start the PTO at the same time as the volunteers begin wrapping their strings.
    - Once the audience has seen that the PTO is much faster, discuss how quickly someone could become seriously injured. Explain why loose clothing, long or untied shoe laces, untied long hair or hanging drawstrings are extremely dangerous around an operating PTO.
  - Conclude by discussing PTO guarding by referring to the guarding on the demo shaft.

**CAUTION: Before pulling the string out of the PTO for the next demonstration, disconnect the drill socket from the PTO stub.**

- 2 • Ask for three volunteers.
  - Ask one volunteer to time how quickly the second volunteer can wrap a piece of string around his/her hand.
  - Ask the third volunteer to time how quickly the PTO wraps the same length of string around the shaft.
  - Then compare the volunteer's recorded wrap time to the numbers on the Lapsed Time vs Distance Traveled Chart (see reverse page).
  - Explain:
    - For instance—the demo simulates a 540 RPM PTO shaft.
    - During the time it took the volunteer to wrap the string (insert time), the shaft turned—for instance—5.4 times and the string travelled 4.2 feet.
    - According to the chart, it took the 10-foot piece of string 1.50 seconds to become completely entangled and the shaft turned 13.5 times.
    - Relate the same example to a shaft turning at 1000 RPM.
    - Discuss how quickly someone could become seriously injured. Explain why loose clothing, long or untied shoe laces, untied long hair or hanging drawstrings are dangerous around an operating PTO.
    - Conclude by discussing PTO guarding by referring to the guarding on the demonstration's shaft.

**CAUTION: Before pulling the string out of the PTO for the next demonstration, disconnect the drill from the PTO stub.**