

NAME _____
CLUB _____
BIRTHDATE _____
YEARS IN PROJECT _____
YEARS IN 4-H _____

PETROLEUM POWER PROGRAM

LIAC FORM 4-61

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THE 4-H TRACTOR CARE AND SAFETY PROJECTS

FIRST YEAR — TRACTOR PROJECT

Units

1. Learning How to Be Safe
2. What Makes an Engine Run
3. Nuts, Bolts, Screws and Rivets
4. The Instrument Panel
5. Controls for Your Tractor
6. Daily Maintenance and Safety Check
7. Starting and Stopping Your Tractor
8. Clean Air for Your Engine
9. Periodic Lubrication and Maintenance

THIRD YEAR — TRACTOR PROJECT

Units

1. Tractor Safety on the Highway
2. Engine Ignition Systems
3. Hitches, PTO and Hydraulic Controls
4. Steering, Brakes and Front Wheels
5. Valves and Valve Service
6. Power Transmissions
7. Winter Care and Troubleshooting
8. Tractor Records and Ownership Costs

SECOND YEAR — TRACTOR PROJECT

Units

1. Tractor Safety on the Farm
2. Oil for the Engine
3. Mixing Fuel and Air
4. Battery Service and Spark Plugs
5. Cooling Systems for Engines
6. Care of Tires
7. General Lubrication
8. Tractor Records and Operating Costs

FOURTH AND ADVANCED YEARS — MACHINERY PROJECTS

Units

1. Safe Use of Farm Machinery
2. Transmitting Power
3. Tools For Breaking The Soil
4. Applicators For Chemicals
5. Servicing Seed Planters
6. Cutters for Crops
7. Grain Harvesting
8. Farm Machinery Management

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4-H TRACTOR PROGRAM

FOURTH AND ADVANCED YEARS

FARM MACHINERY CARE AND SAFETY PROJECT

This is the fourth and last book in the 4-H tractor project. In the first three projects you learned about tractor care and safety. Now you can continue your enrollment in the project by learning about the care, operation and safe use of the machinery on your farm.

It is not intended for you to try to complete the entire Fourth Book in one project year. Divide it into two or more years of activity according to the machines on your farm. Take your time and do the jobs thoroughly.

You will find some challenging jobs waiting for you in this phase of the program. At the same time, you can continue keeping records on your tractor.

It is expected that you will select one or more machines on your farm when you do each job outlined in the lessons. For instance, if you do the unit on transmitting power, you may need several different implements to represent all of the ways that power is transmitted. If you learn how to adjust and take care of chains, belts, gears, slip clutches, etc. on one machine, you will then know how to take care of these parts on other machines. If you learn how to check the rate of planting on one machine, you should then be able to apply what you learned to other seed planters on your farm. If you have several implements to work on, you may want to repeat a lesson and work on more machines.

Equally important with care and safety of your equipment is the 4-H goal of helping you to become a better citizen in your community. Your 4-H training will be beneficial throughout your life.

WHAT TO DO

Take time to read the information in this unit. Go through the work sheets and complete the demonstrations and jobs outlined. The greater your interest and effort, the more you will learn. Remember, safety is always important!

Ask your leader about Unit 8 on record keeping and farm machinery management. He may want you to start on this unit right away.

Read each paragraph carefully. Study your Operator's Manual and put into practice what you learn by actually working with a tractor.

At the end of each unit, record the jobs that you have finished. There are also some questions to answer. Answer only those that apply to your tractor. Use the check-up sheets to see how much you have learned. All you have to do is put the letter for the correct answer at the right of the page.

Your keys to success are: Keep records up to date as you complete each work unit . . . Give demonstrations and talks on tractor care and safety . . . Take part in local and county tractor operators' contests . . . Encourage other boys to enroll in the club . . . Become a junior leader and help your leader to assist other young members . . . Practice what you learn on your tractor at home. Remember, you should know the "why" as well as "how" . . . Submit records needed for project completion . . . Ask your leader for information about the opportunities for awards and recognition.



MEMBER'S SUMMARY

FOURTH AND ADVANCED YEARS

FARM MACHINERY CARE AND SAFETY PROJECT



Name _____ Age _____ Years in 4-H _____

Address _____ County _____ State _____

Name of Club _____ Name of Leader _____

Date and Place of Meetings	<i>1. Safe Use of Farm Machinery</i>	<i>2. Transmitting Power</i>	<i>3. Tools for Breaking the Soil</i>	<i>4. Applicators for Chemicals</i>	<i>5. Servicing Seed Planters</i>	<i>6. Cutters for Crops</i>	<i>7. Seed Separation</i>	<i>8. Farm Machinery Management</i>
1. _____								
2. _____								
3. _____								
4. _____								
5. _____								
6. _____								
Date meeting held								
Did you attend?								
Date work unit completed								
Date check-up sheet completed								

DEMONSTRATIONS: Where? When? Topic? _____

TRACTOR OPERATING CONTESTS: Date? Where? Placing? _____

OTHER EVENTS: Exhibits, Tours, etc. _____

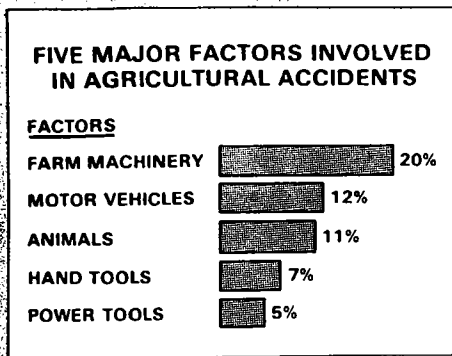


Fig. 1 Farm machinery is the single greatest factor involved in farm accidents.



Fig. 2 Alibis don't excuse accidents.

TRACTOR ACCIDENT RATE
(Michigan and Ohio)

OPERATOR AGE	FREQUENCY (Accidents Per Million Hours of Use)
10 - 14	43.0
15 - 24	9.6
25 - 44	4.5
45 - 64	5.6
65	29.7

Fig. 3 Operators under 15 and over 64 have the highest accident rates.



Fig. 4 Following this one rule would eliminate most farm machinery accidents.

Farming is considered a dangerous occupation. In fact, agriculture has the third highest worker death rate of all industries in the United States. This may seem strange when some of the machines used in factories are more dangerous than farm machines. It is the condition under which they are used that makes the difference. A factory worker uses the same machine every day and follows a standard routine that includes all necessary precautions. Farming methods and machines are constantly changing. Other than the tractor, each of the machines may be used only a few days a year. The operator never gets a chance to establish a routine that lets him work with his machine with complete safety. As an operator of farm machines, you have to make up for these shortcomings with your ability to reason. You will have to establish some hard and fast rules for being safe - and then follow them completely at all times.

THE FACTS

A report by the United States Department of Agriculture tells us that each year about 1 out of every 5 of our farm population has an accident serious enough to cause time loss from the job. One person in 33 suffers a serious accident resulting in a disabling injury. One in 1,600 ends up a fatality. In each of these groups, accidents with farm machinery account for about one-third of the total, making this the most frequent cause of accidents involving our farm population.

WHAT CAUSES ACCIDENTS?

Many different surveys have been made to find out why accidents happen. In nearly every case, the results are similar to the following summary:

Cause of accident	Percent of total
Unavoidable (lightning, or other forces of nature)	2-4
Use of faulty equipment	10
Carelessness (includes all human factors)	86-88

As you can see, there really isn't much excuse for an accident.

YOU ARE NO MATCH FOR A MACHINE

Any moving part of any machine, whether it be a pulley, blade, sprocket, belt, shaft, gear, chain, knife or hammer, is faster and more powerful than you are. The high-speed blade of a power lawn mower is capable of cutting off your toes even though it is powered by a very small engine. And a shaft that appears to be turning slowly can grab your clothes and wrap you up before you can make a simple move to avoid the accident.

SHUT IT OFF!

This is the most important rule of all. Whether a machine is simple or complex, and regardless of its size, speed or power - always shut it off before working on it. It is the only sure way you can avoid trouble with a machine.



With a PTO driven machine you need to be alert to the possibility that the machine will coast for a while after you have disengaged the power shaft. This is particularly true with a baler or forage chopper. Always allow time for the machine to come to a complete stop before you open a cover or attempt to work on it.

KEEP SHIELDS IN PLACE

Shields are intended to be used on moving parts of machines to protect the operator. Sometimes it is tempting to leave off a shield to make it easier to adjust or repair the machine. But this is a dangerous practice that can lead to an accident. Give your machine a careful inspection and see where shields are missing. Replace all missing shields if they are available. If you don't have the shield or can't get one from your dealer, perhaps you can make one.

DRESS PROPERLY

An almost unbelievable number of accidents happen because of loose or improperly fitted clothing. It only takes a small string caught in a gear or shaft to cause a serious accident. Be especially careful of gloves, sleeves and pant legs.

AVOID FATIGUE

If you work when you are overly tired, you are inviting an accident. You will do things that you would normally never do if you were properly rested. There are a few things that can be done to avoid fatigue even when you know that you will have to work long hours. Eat a balanced diet. Take along, or have someone bring you, a snack to eat between meals, in the middle of the morning and afternoon. If possible, let someone else operate the machine, even for a short time, to give you a rest. Fatigue is listed as a major cause of accidents.

OTHER GOOD SAFETY RULES

Here are some good safety rules that apply to many different machines. As you read this list, think of others that apply to your machines at home. There is a place in the work sheet to add to this list.

1. Set tractor wheels out - this is important in helping to prevent tipping accidents.
2. Always set the brakes - before leaving the tractor seat. This may prevent an implement from running over you.
3. Don't use a stick or other object to unclog a machine - unless you have first shut off the machine.
4. Keep equipment adjusted - well-adjusted equipment will cool hot tempers and prevent accidents.
5. Watch out for others - always make sure other people, especially children, are kept away from the area where machinery is working.

NOW IT'S UP TO YOU

Throughout your 4-H tractor projects, you have had a chance to learn how accidents are caused and how to prevent them. Remember that an accident can happen: When you commit an unsafe act, or when you allow an unsafe condition to exist. Your farm is only as safe as you make it - as safe as you think and act. Put what you know into practice. Start right now - pledge yourself to safe operation on your farm machinery.

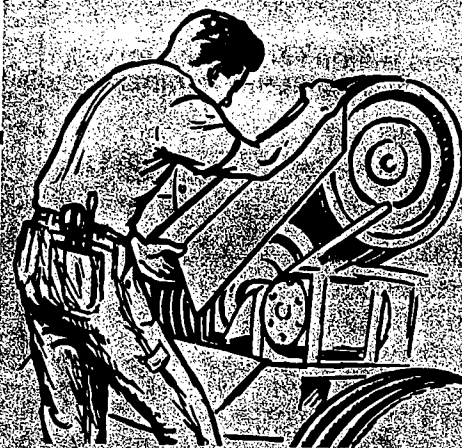


Fig. 5 Always use the shields provided with your equipment.



Fig. 6 Loose-fitting clothes are a hazard.



Fig. 7 Take a break!



4-H PLEDGE FOR SAFE OPERATION OF EQUIPMENT



SAFE USE OF FARM MACHINERY

Select one of the larger power driven machines on your farm for this unit. A cotton picker, beet harvester, potato digger, corn picker, combine, forage chopper or baler would be a good one to use. You will need your Operator's Manual to help you with this unit. Eliminate all hazards.

1. Check all shafts that require a shield. How many are needed? _____

How many were missing? _____ which ones? _____

Could any of the missing shields have caused an accident? _____

Why? _____

2. Now check all places where guards are needed to cover gears, sprockets, pulleys, belts, chains, etc. How many are needed? _____ How many missing? _____

Which ones? _____

Could any of the missing guards have caused an accident? _____

Why? _____

3. List any places on the machine that are not normally covered with a shield or guard but might cause an accident (the cutter bar of a combine, for example) _____

How can you make sure none of these places will cause an accident? _____

4. Is it necessary to wear close-fitting clothes when operating this machine? _____

Why? _____

5. Make a list of accidents that you think can happen while operating this machine. How can such an accident be prevented?

Possible accident

How it can be prevented

6. If this machine becomes plugged during operation, how could you safely correct the trouble? _____

Note: Fill out this work unit, using your own machinery at home. Be ready to discuss your experiences with other 4-H members at your next club meeting.



FOURTH BOOK UNIT 1

SAFE USE OF FARM MACHINERY

Place the letter for the correct answer at the right of the page.

1. Farm machinery is involved in (A—10) (B—20) (C—35) percent of the accidents involving the _____ farm population.
2. It has been estimated that (A—50) (B—30) (C—over 80) percent of accidents are due to plain _____ carelessness.
3. Your first reaction in the case of an emergency (A—may require as long as 1 second or more) _____ (B—is usually less than 1/2 second) (C—is to do nothing).
4. On the basis of the accident rate per man-hour, it is safer to (A—work in a factory) (B—work on _____ a farm).
5. A tractor with a wide front end is (A—more) (B—less) likely to tip than a tricycle type tractor. _____
6. Accidents happen to approximately (A—20) (B—10) (C—40) percent of our farm population each _____ year.
7. Many accidents with farm machinery happen when (A—the machine reaches out and grabs the _____ operator) (B—the operator starts tinkering with the machine while it is running.)
8. It is estimated that faulty equipment is a factor in (A—2) (B—24) (C—10) percent of the _____ accidents with farm machinery.
9. When getting ready to operate power-driven equipment, the first step is to (A—start it up and _____ see if it still runs) (B—be sure all of the shields and guards are in place) (C—check the speed of the PTO).
10. Safe operation of farm machinery is (A—impossible) (B—a matter of pure chance) (C—a matter _____ of making up your mind to be a safe operator).

Note: This Check-Up Sheet is intended to test what you have learned and to stimulate discussion with the other members. The more you discuss these questions with your leader and the other members, the more you learn.

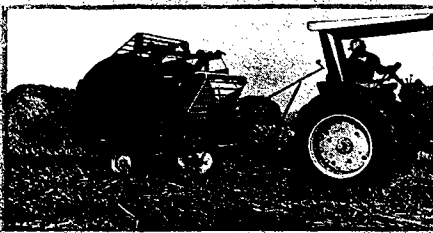


Fig. 1 Tractors often transmit their power through PTO shafts.

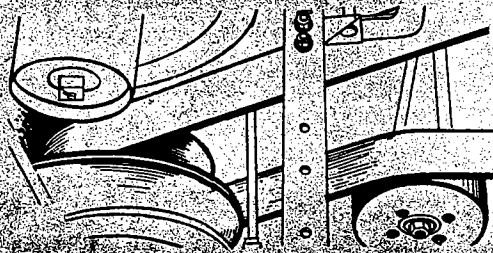


Fig. 2 Flat belts

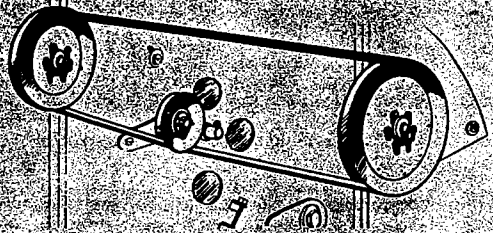


Fig. 3 V-belts

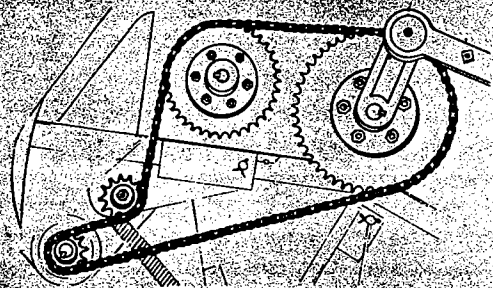


Fig. 4 Chains

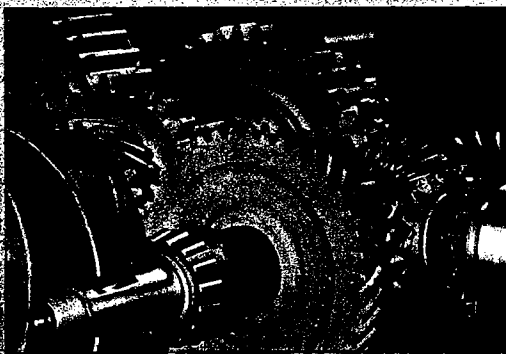


Fig. 5 Gears are all used to transmit power.

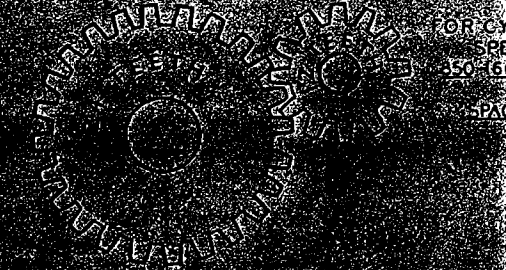


Fig. 6 Speeds of gears can be figured by counting teeth.

Machines need power to turn shafts, fans, cylinders and many other moving parts. We get power to operate machines from the tractor power-takeoff and from the belt pulley. We get power from engines mounted on implements. We may also get power from drive wheels that run on the ground.

Power is transmitted by flat belts, V-belts, chains, gears, clutches, shafts and also by hydraulic pressure. If we need a great deal of turning force (or torque), we don't change the power - we cut down on the speed of the driven part. We do so by using small gears, sprockets or pulleys. If we want less torque at higher speeds we use larger gears, sprockets or pulleys to drive smaller ones. There is always some friction loss when power is transmitted through gears and belts.

PROPER SPEED FOR EFFICIENCY

One of the first things to understand when working with a machine is how to make sure that it is running at the proper speed. You will sometimes want to change the size of sprocket wheels or gears. If you do, remember to count the number of driving teeth and compare this figure with the number of driven teeth.

When power is transmitted by belts it is often necessary to change pulleys to obtain the proper speed. Some pulleys for V-belts are adjustable for speed changes. You can change the diameter of the pulley by moving one half of the sheave in or out with respect to the other. This is done by inserting or removing spacer disks between the two halves, or by special levers, or by moving one half of the sheave toward or away from the other half.

MEASURING A PULLEY

Working with pulleys for flat belts, you can determine the speed by measuring either the diameter of the pulley or the distance around it. Because pulley size usually is given in diameter, we measure the diameter of a pulley when checking the speed of the machine. To measure the diameter of a pulley, lay two straight pieces of wood or metal across the highest part or crown of the pulley, measuring the distance between the pieces. The speed of the driving pulley times its diameter is equal to the speed of the driven pulley times its diameter. Here is an example: The speed of a pulley 14 inches in diameter is 800 rpm. This pulley is driving another pulley 8 inches in diameter. How fast will the smaller pulley turn?

$$800 \times 14 = ? \times 8$$

$$\frac{800 \times 14}{8} = 1,400 \text{ rpm}$$

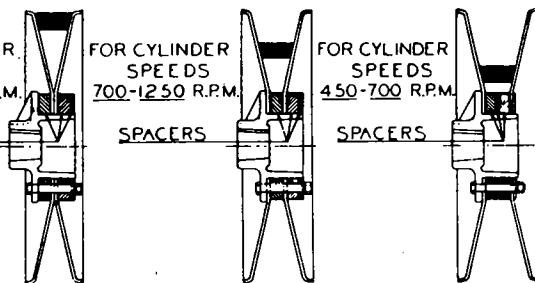


Fig. 7 This V-belt pulley can be adjusted.

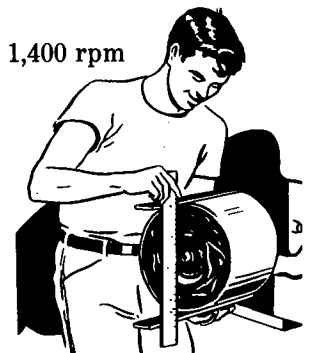


Fig. 8 Measuring a pulley.

