



Combine Operation: Safety

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The key to safe and efficient combine operation is an operator who is concerned about safety and is constantly alert for situations which may cause injury to himself and co-workers, or damage to his machine. By remaining alert and safety conscious the operator can have a significant effect on harvesting efficiency.

Accidents caused by unsafe operation or carelessness can result in personal injury, unnecessary downtime, or costly machine repair. Accidents also contribute to higher costs, both in terms of dollars and lost opportunities.

This publication identifies the hazards involved in combine operation and suggests ways to avoid these hazards.

Preharvest Machine Preparation

Safe operation during harvest depends partially on preharvest preparation of the combine. Preharvest preparation should begin several weeks before harvest to allow necessary lead time to secure needed replacement parts and to efficiently prepare the combine for harvest. Preharvest preparation is also an effective way to reduce possible breakdowns during harvest.

One of the most important parts of your preharvest preparation is a review of your operator's manual. A quick review will help experienced operators refresh their memories about correct operating procedures and appropriate safety precautions. New or inexperienced operators should take time to carefully read the manual and become thoroughly familiar with the operating instructions and safety precautions for the machine.

Preharvest preparation should also include a number of other important operations which can help detect potential safety hazards and improve combine efficiency.

- Thoroughly clean the combine to remove any field trash, rodent nests, and oil or grease buildup. This will not only help improve combine efficiency by preventing unnecessary wear which could result in lost time in the field for repairs, but may also improve safety.
- Carefully check for loose or missing nuts, screws, shields, and sheet metal. Missing shields should be promptly replaced to prevent accidental contact with the components they are designed to guard. Other loose or missing

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hardware should be tightened or replaced to prevent machine breakdown which could result in accidents and increase harvest time and costs.

- Inspect all belts, chains, and other drive components. Look for evidence of wear such as frayed belts, worn or loose chains and sprockets, or sloppy bearings. Replace any components which you do not feel will last through the harvesting season. It is much easier and safer to replace worn or broken parts while your combine is setting in a well-lighted, well-equipped shop than it is to try to replace parts under the hot sun in the middle of a wheat or soybean field.

Field Preparation

Field preparation for safe and efficient harvesting begins during tillage and planting. During this time it is much easier to locate potential hazards such as stumps or large stones. Whenever possible, these hazards should be removed. When removal is not possible you should locate them before harvest and mark them with a readily visible flag. Locating them with the cutter bar or wheel of the combine can be very expensive and dangerous.

Ditches also pose a hazard to the combine operator. A safe distance from the ditch edge at planting time may not be safe at harvest because of the difference in size and weight of planting and harvesting equipment (Figure 1). Heavy rains during the growing season can result in undercut banks or the formation of new ditches. Before harvest, double check your fields for such occurrences. During harvest keep your combine far enough away from ditch or bank edges to prevent soil from giving way. A good rule of thumb is to stay as far from the edge of the ditch or bank as it is deep.

While planting, allow extra turning space on row ends where there are ditches, power lines, or other such hazards. In general, allow at least one-fourth more turning area than is required by the largest piece of equipment you will be using.

Good weed control is also an important factor in safe combine operation. Heavy weed infestations in the crop at harvest can result in machine plugging and weeds wrapping around rotating drives. Plugging problems increase operator fatigue which may result in careless operation such as dismounting to unplug the combine without first shutting off the power. A good weed control program can make harvest safer and help produce higher yields.

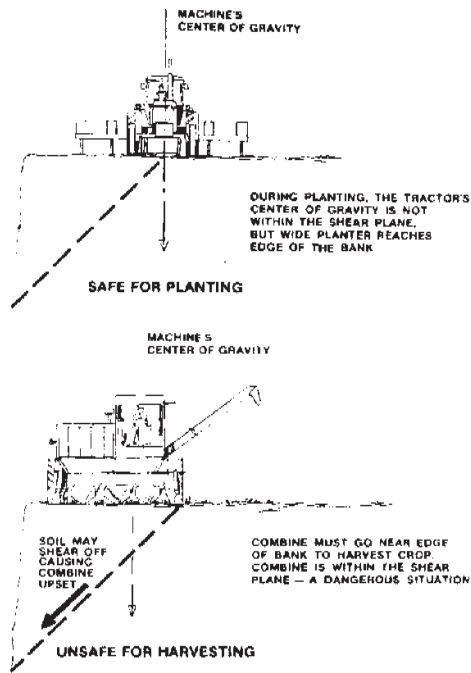


Figure 1. Be alert when operating along ditch banks.

Service and Maintenance

Proper daily service and maintenance can play an important role in safe and efficient combine operation. An established daily routine which includes a careful inspection for faulty or worn parts can be very effective in detecting potential problems before they result in time consuming breakdowns or accidents. The owner's manual contains a service or maintenance checklist or guide to keep machines well maintained.

When refueling the combine, take proper safety precautions to prevent a possible fire or explosion. Allow the combine engine to cool 8 to 10 minutes before refueling to prevent the possibility of igniting gasoline vapors. Keep a suitable class B fire extinguisher (a class B extinguisher is one that is designed to be used on fires involving grease, oil, gasoline, or other petroleum products) available in case of fire. If you spill fuel, wait a few minutes for it to evaporate before starting the engine.

Whenever you work on the header or parts beneath it or behind it, be sure to block it securely. Never rely solely on the hydraulic system, as it may fail. Properly secure the header latch, safety stand, or another suitable block before crawling under the header to do service work.

Periodically check the hydraulic system for leaks. Repair leaky hoses or connections as soon as you discover them. Do not use your hand to check for leaks. Many hydraulic systems on modern combines operate at pressures at or above 2,000 psi which is three times the pressure required for oil to penetrate your skin. Pinhole leaks are often visible but are especially dangerous because of the ability to easily penetrate the skin. Locate them with a magnifying glass or piece of cardboard, never with your hands (Figure 2). If you get hydraulic fluid or

other high pressure oil under your skin, see a doctor at once. Serious infection or reaction can develop if medical attention is not administered immediately.

Whenever you are performing service or maintenance on your combine, your first step should be to shut off all power. This is especially important for self-propelled combines which have main belt drives that turn whenever the engine is running. If you are working on the inside of the machine, remove the ignition key and post a sign saying the machine is being serviced. Keep everyone away from the controls unless you need their help.

The only service operation that should be done while the machine is running is the adjustment of the variable speed cylinder or fan, which are adjusted with safety shields in place. Follow the instructions in the operator's manual. Don't be tempted to make other adjustments with the engine running, even if it is convenient.

Driving the Combine

Combine operators must be comfortable and within easy reach of combine controls to drive safely. Discomfort is not only distracting but it also contributes to fatigue, which is a common cause of accidents. Before operating the combine, adjust the seat and steering column so you can reach all controls easily.

The wheels that steer self-propelled combines are rear mounted, just the opposite of tractors. Steering requires practice since rear steering causes the rear end of the combine to swing around rapidly. You must stay alert to avoid hitting fences, posts, trees, or other obstructions, even when the header has had plenty of turning room (Figure 3).

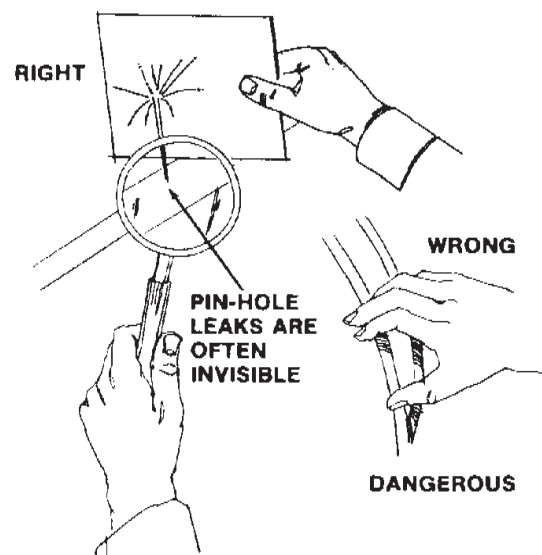


Figure 2. Never use your hand to detect pinhole hydraulic leaks.

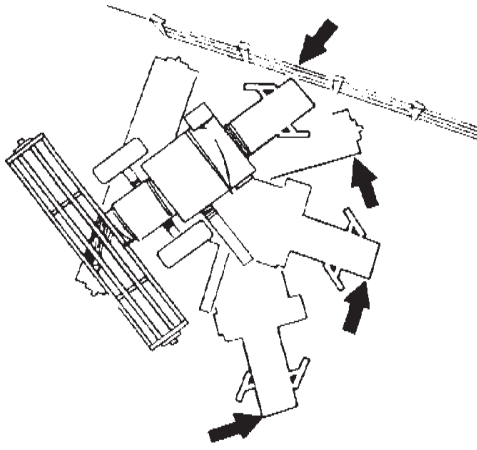


Figure 3. Do not turn too close to a fence. Remember, the rear of the machine swings around quickly during turns.

Self-propelled combines are equipped with two brake pedals, one for each drive wheel. The brakes are used to stop the combine or to assist in turning. When stopping the combine, both brakes should press simultaneously with equal pressure. Uneven brake application can cause the combine to swerve and possibly result in an accident. When using the brakes to assist in turning, slow down to a safe speed, then turn the steering wheel before applying the brakes. Otherwise, the rear wheels may skid sideways, making turning more difficult.

Ladders and platforms provide access to the operator's station and service areas of the combine. In order to prevent falls while mounting or dismounting, these areas should be kept clear of loose tools or other items. Use the handrails when getting on or off the combine to prevent falls.

Know your combine and its projections in all directions (Figure 4). Since the header is in front of you, it is the easiest part to watch. Also identify parts on the sides of the combine which extend beyond the header. Knowing the position of the unloading auger, the ladder to the operator's platform and other protruding parts will help you avoid striking fences, buildings, machinery, or other obstacles when operating the combine.

Because of its size, rear visibility is limited. Make sure the area behind the combine is clear before backing. Position someone behind the combine to help guide. Be especially alert for small children. Keep them and other unnecessary people away from the combine at all times.

Field Operation

Safe and efficient operation of the combine during the actual harvesting operations involves a number of important areas.

The crop should be in good condition and ready to harvest. Trying to harvest a crop which is not dry enough or which is heavily infested with weeds can result in plugging problems. Plugging increases the possibility of machine breakdown or accidental injury due to operator carelessness brought on by the stress of continually unplugging the combine. If the cylinder or other parts of the combine plug, stop the combine immediately. Before attempting to unplug the combine be sure the engine is shut off and all moving parts have stopped.

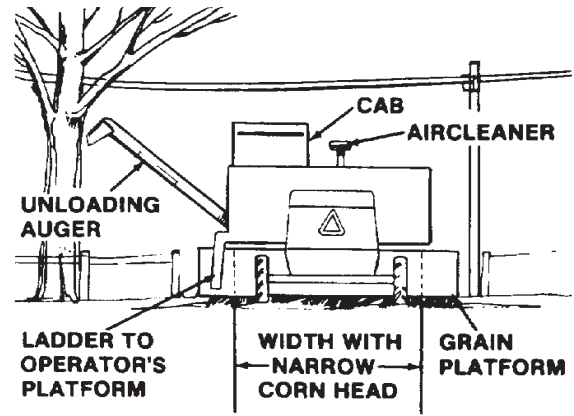


Figure 4. Know how big your combine is.

When checking your combine performance, watch for moving parts which can cause injury. Reaching into the grain bin to get a grain sample while the machine is running could result in your hand contacting leveling augers running below the surface of the grain.

To safely check tailings, use the inspection ports where you can safely and conveniently observe material being returned from the shoe to the threshing cylinder. Never try to collect tailing samples by opening the door at the bottom of the tailings elevator; your hand could get caught in the elevator.

To safely check grain losses behind the machine, disconnect the straw spreader and use a container such as a grain shovel to catch samples (Figure 5). Walk behind and to the side of the rear wheels and be sure the operator knows where you are. Checks should be made only on smooth ground with the combine moving in a straight line.

During periods of extremely dry crop conditions and high temperatures, be especially alert for the fires. Periodically check for overheated bearings that could burn out or start a fire in dry chaff. Keep engine and external bearings clean by regularly removing excess dirt and chaff. Be particularly careful to keep the exhaust manifold and other parts of the exhaust system free of dirt and chaff. Be alert for slipping belts which could heat up and catch fire. Keep a fully charged, 5-pound (or larger) dry chemical fire extinguisher mounted on the operator's platform in case of fire.

During unloading operations, certain precautions should be taken to prevent accidents. If possible, position the auger for unloading before beginning to harvest. When moving the auger, be sure that both the swing path for the end of it and the connector joint are free of obstructions. Keep your fingers away from pinch points in the connector during positioning. If grain bridges during unloading, stop the auger before trying to break grain loose. Use a small shovel or pole to break the bridging. Using your hands or feet to remove trash or to push the last bit of grain into the unloading auger is extremely hazardous.

If the grain bin is emptied on-the-go, the combine operator and hauler must work carefully to avoid accidents. The hauler is primarily responsible for positioning the truck or wagon for unloading without getting too close to the combine. He must be prepared for unexpected stops by the combine and leave plenty of room for the combine to turn at the ends of the field.

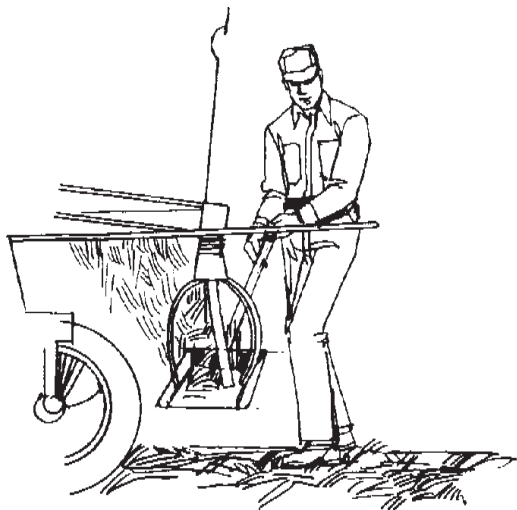


Figure 5. Disconnect straw spreader before checking combine performance to avoid being struck by flails.

The combine operator must stop unloading in time for the hauler to turn corners and drive around obstacles safely. If possible, all unloading should take place along straight, level portions of the field.

Straw, stalks, and other flying material thrown from choppers can injure nearby people. Make sure everyone is away from the discharge area of the machine before and during operation. Be especially sure that children are safely away before starting up.

Never allow extra riders on the combine except for instructional or service purposes. Combines are designed to accommodate only the operator. Allowing additional people on the combine during operation is hazardous.

Moving Combines on Public Roads

Moving a self-propelled or pull-type combine on roads or highways requires special care, especially for large machines. Anytime a combine is to be moved on roads, whether driven, lowed, or hauled, it should be properly prepared. To prepare your combine for highway travel, or crossing ditches, follow these safety precautions:

- * Empty the grain tank to reduce weight and lower the center of gravity.
- * Move the unloading auger to the transport position.
- * When practical, remove the header if it is wider than the basic machine, and transport it on a truck or implement carrier.
- * Be sure SMV emblem, reflectors, and lights are in proper working order and that they comply with state laws. Check with local police or sheriff's office if you have any questions.
- * Measure the height and width of your machine and place or secure this information near the operator's platform for quick reference.
- * Use guide vehicles with flashers and wide load signs ahead of and behind the combine when roading with the header attached.

Summary

The most important thing to remember about combine safety is that the safe and efficient use of these machines depends largely on the operator. The best way to prevent accidents is to operate your machine in a safe and efficient manner. Ninety percent of all combine accidents can be blamed on human error or carelessness. The combine operator can do the most to make grain harvesting a safe operation.

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