



Overview

Fandrich shears are designed to rapidly collect large volumes of cone-laden tree-tops with helicopters that stay above the forest canopy. The shear hangs on the cargo hook of the helicopter and can be released in an emergency.

Fandrich shears use technology patented in Canada and the United States. They should not be used with helicopters having a net lift in excess of 1800 pounds. The pilot controls the cutting action through switches on his control stick. After 10 to 15 trees have been cut, the helicopter carries the tops to an unloading site.



Caution: Stay clear of the cutting arm and knife at all times.

Available Models

Fandrich shears can be grouped as self-dumping shears, manual unload shears, or lodgepole (manual unload) shears. Unloading is fastest with the self-dumping shear but the manual unloading shear is lightest. The cone-laden tops in the self-dumping model fall out when the pilot opens the pipe-lined basket. The tops in the manual unloading model are pulled out of the net-lined basket by one or two people on the ground while the helicopter hovers overhead.

Dead trees have considerably different properties to live trees. The Fandrich lodgepole shear has been built with the capability of cutting dead trees. Other Fandrich shears should only be used on live trees.

Instructions for Ground Crew

Caution: If the arm is not completely open, shut off the machine engine before clearing debris as the arm may unexpectedly open by itself.

Local safety regulations must be respected at all times and take precedence over the following practices. The ground crew should wear suitable shatterproof eye protection, ear protection, safety headgear with chin straps, gloves and reflective vests. The ground supervisor should be easily identifiable and should stay on the pilot's side of the helicopter so the pilot can see him at all times. All ground crew should understand any signals arranged between the supervisor and the pilot.

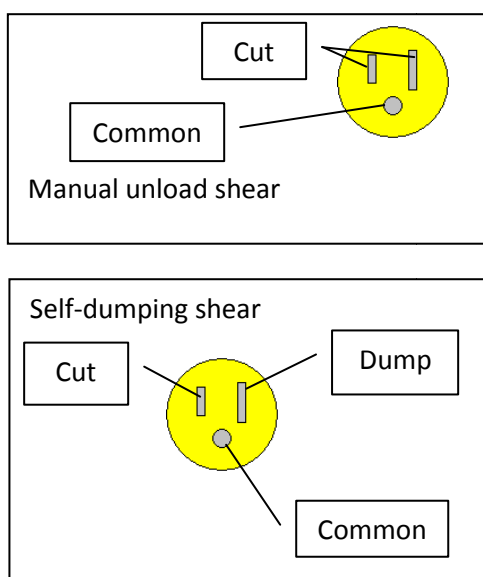
Top up 4-stroke Honda engine fuel tank with gas whenever helicopter is being refuelled.

In very cold weather, the following procedures may be used:

- Switch to AW22 hydraulic oil
- Prior to starting the engine cold, place the engine and pump under a blanket and heat the engine with a portable heater. (Ensure the heater does not cause any localised danger of fire or melting. No blowtorch should be used on the engine or other equipment.)
- Prior to starting the engine cold, remove the pump from the mounting bracket and start the engine unloaded. When the engine is warm, stop the engine and re-attach the pump. (The mounting bracket should not be removed from the engine.)
- Shut fuel off and let the engine stop by itself at the end of the working day.

Wiring Details

Fandrich shears are controlled by a three-wire electrical cable ending in a household electrical plug that is to be connected to the helicopter. The manual unload requires only one switch to 24 volt power and a return wire. The self-dumper requires two switches and a return, or only one switch and a return if the load is to be tripped by hand.



The cutting arm closes to cut when the cutting switch is on and automatically returns to the fully open position when the switch is released. The second switch for the self-dumping shear releases the basket latch to dump the tree tops.

Power between the cut switch and return closes the cutting arm until it contacts a built-in limit switch. When the cut switch is open the cutting arm opens until it contacts another built-in limit switch. The wires connect to a solenoid valve that switches the flow of hydraulic oil pumped by a Honda engine. A light on the solenoid indicates when the circuit is complete and the solenoid is activated.

The self-dumping shear also has wires to the unloading latch. Power between the dump switch and the return activates the unloading latch on

the basket. The ground crew can also open the latch by pulling a cord attached to the latch.

Troubleshooting

If the arm stops moving or has sluggish movement, check that there is no build-up of debris or snow on the limit switch that triggers as the arm closes and check that there is no debris on the arm trigger that contacts the limit switch. This debris may cause the switch to stick.

Servicing Instructions

Servicing instructions for the Honda engines are provided separately in Service Bulletin #1/4.

Continually (at least daily): Inspect cables for damage or wear. Replace frayed or damaged cables immediately. Remove any debris from the closed arm limit switch and the arm trigger for this limit switch.

Daily: Grease cutting arm guide and bushings. The basket hinges on self-dumping shears should be oiled.

Every 10 hours (or when a leak is observed): The hydraulic oil level should be checked. The level should be 2" below the top of the oil tank cap when the machine is level. On observing an oil leak from a loose fitting, the fitting should be tightened. On observing oil leaks from other sources, contact Fandrich Cone Harvesters. AW32 hydraulic oil should be used in the machine or AW22 hydraulic oil in very cold weather.

Every 50 hours: The load release latch on self-dumping shears should be oiled.

Proper operation of the Fandrich shear depends on careful alignment of the blade with the anvil. For this reason the blade should not be sharpened in the field.



Preflight Checks

Ensure that the three wire rope support cables are securely fastened to the kevlar body. Check cables continually for damage and wear. Replace frayed or damaged cables immediately. It is extremely important that the cables cannot separate from the kevlar body and fly into the helicopter rotors.

1. Lay the cables out to their full length, approximately 30 feet. If necessary, untangle the cables and place the cables parallel to each other.
2. Hang cable teardrop on the helicopter cargo hook or have the ground crew attach it once the helicopter is airborne. Ensure that the front of the spreader bar faces forward to give a more steady flight. Attach the electrical connector to the helicopter.
3. Ensure that the cargo hook unlocking mechanism on the helicopter is working satisfactorily.
4. Remove the pilot's door and unnecessary articles to reduce the helicopter weight. Take only enough fuel for an hour's flight plus an adequate reserve.
5. Top up 4-stroke Honda engine fuel tank with gasoline. Check crankcase oil level of the engine.
6. Start Honda engine. Once engine is warm, open throttle fully.
7. Check operation of shear by having the pilot open and close the cutting arm.
8. Ensure that the equipment used to communicate to the ground crew is fully operational.

Instructions for the Pilot

Local safety regulations must be respected at all times and take precedence over the following practices. Cone collecting is strenuous flying and can lead to pilot fatigue. Take 15 minute rest

breaks after each hour of flying. A good plan is to double pilot and alternate during refuelling stops. Fly no more than 4 hours per day harvesting cones.

1. Ensure that the cables do not tangle as the helicopter lifts off.
2. Lower the Fandrich shear over the tree to 2 to 3 feet below the desired cutting height. Ensure that no other tree or snag interferes with the helicopter operation.
3. Raise the shear to the cutting height and close the shear arm. Keep a slight upward pull on the shear to keep the cables taut; the cables should not slacken while cutting.
4. Move to the next tree and repeat.
5. When the basket is full, fly to the unloading site and lower the shear while the ground crew stands clear. As there is an inherent risk of dropped payload, the equipment should not be flown directly over the ground crew. Activate the dumping mechanism while the shear is in the air if a self-dumping shear is used (or wait for the supervisor to pull the latch cord). If a manual unload shear is used, the helicopter can hover with the shear sitting on the ground while the ground crew unloads the tops by hand. Wait for the signal from the ground supervisor that all is clear for liftoff.

Should the engine stall during a cut, the cut switch should be turned off to open all hydraulic lines so that the shear arm can be wiggled free more easily.

Suggestions for Faster Collections

1. Fly paths that minimize distances between cuts. Generally fly out empty and collect tops on the way back so that the longest flight is with an empty basket.

2. Select unloading sites that are below the stand being harvested. It is easier to fly upward with the basket empty than upward with the basket full.
3. When possible, transport shears to the collecting site by truck or trailer. Aerial ferrying of shears reduces helicopter air speed to about 80-90 mph.

The main factors affecting collecting rates are the number and size of the cones on the tree-tops, the density of collectable trees in the stand and the flying distances. The speed of collections also depends on the species being collected, the shape of the treetops, the size of the helicopter, the efficiency of the ground crew and the skill of the pilot. Pilots with vertical reference skills require only two to three hours to become proficient with the Fandrich shear.

The self-dumping shear can dump tops directly into trucks or trailers for transport to more convenient sacking sites.

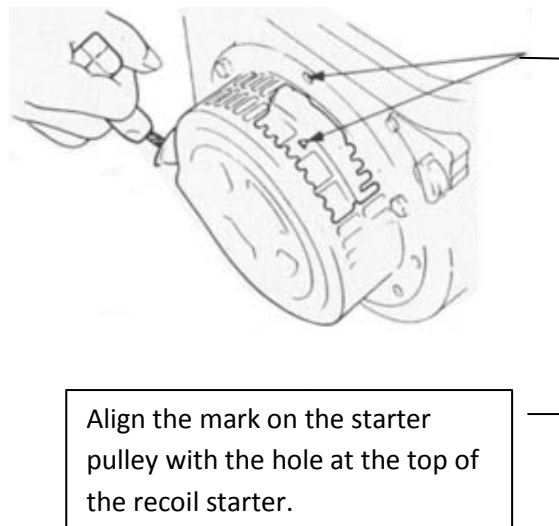
Transporting Shears

The length of manual shears can be reduced for transport and ease of stacking. To reduce the length of a fold-up manual unloading shear, remove the two pins at the end of the semi-circular fold-up section and turn the end of the basket up. The basket should be held to the shear with a bungee cord to prevent it from dropping down.

To fold up a rigid manual unloading shear, take out the two bolts on the U clamp holding the end portion to the main frame and turn the basket up.

In securing a shear to a truck or trailer, ensure that the main body of the shear is held tightly and cannot move vertically or transversely. Keep in mind that a shear has an uneven distribution of mass.

Prior to transport, shut off the fuel valve on the Honda engine and pull the starter rope slowly until a resistance is felt. Continue pulling the rope until the notch on the starter pulley is on top. At this point, all valves are closed so that water and dirt will not enter the engine through the exhaust or carburettor during transport. The engine should be covered with a plastic garbage bag.



Dimensions and Weight

	Approximate dimensions	Approximate weight
Self-dumping shears	7.1'x11.8' x4' high	425 lb
Manual unload shears	7.1'x8.1' x4' high	350 lb
Lodgepole (manual unload) shears	7.1'x8.1' x4' high	370 lb