CT RC&D - USDA NRCS CIG NO-TILL/COVER CROP EQUIPMENT HUB MANUAL

2019/2020

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

CONNECTICUT RC&D

patagonia

CT RC&D No-Till/Cover Crop Equipment Hubs

BACKGROUND & INFORMATION

CT RC&D has received a USDA NRCS CIG Grant (Conservation Innovation Grant) along with a Patagonia Environmental Grant to implement a No-Till and Cover Crop Equipment Exchange Pilot Program in Connecticut. The purpose of the project is to introduce no-till equipment to aid in the implementation of soil health principles such as cover crop and no-till planting on Connecticut farms. The program will foster collaborative education and use of the no-till equipment among producers in two geographically diverse areas of Connecticut.

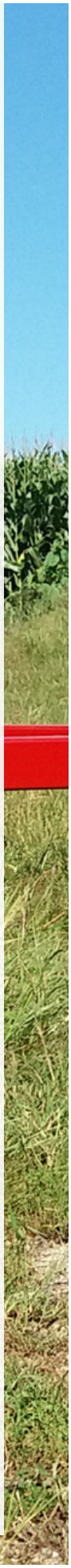
After an application process to secure two farm host hubs and surrounding area farm users, CT RC&D has selected Sub Edge Farm in Farmington, CT as the Western CT CIG Equipment Hub Host Farm and Mountain Dairy in Mansfield, CT as the Eastern CT CIG Equipment Hub Host Farm. Each equipment hub is expected to able to support up to four additional surrounding area farm users. In total this project will serve up to 10 Connecticut farms during the pilot program period. The Conservation Innovation Grant No-Till and Cover Crop Equipment Exchange Pilot Program is a three-year growing season pilot project, which commenced during the Summer of 2018, and will conclude by November 30, 2020.

Farms participating in this pilot project have undergone an application process and have signed a contract with CT RC&D for rules of usage. All participating farms agree to monitor the use of each piece of equipment, data collection related to usage, and the effects on the farm's crops as a result of participating.

Surrounding farm users are responsible for all transport to and from the CIG Equipment Hub Host Farm. All farms are expected to work with CT RC&D staff to ensure the proper use and maintenance of the equipment at each of the CIG Equipment Hubs while under use. CT RC&D will maintain equipment insurance throughout the duration of the pilot project. Participating farms assume any and all damage to its own property or crops resulting from the use of the equipment. Farms are expected to report any equipment malfunctions immediately to CT RC&D staff.

In an effort to broaden the educational effort of this project all participating farms are expected to make every effort to participate in the field day to by hosted by Sub Edge Farm demonstrating the CIG Hub no-till equipment in the Fall of 2019 and again in 2020 at Mountain Dairy. This educational field day & tour will provide an opportunity to share the results and recommendations to other interested CT farms as well as local, state and federal staff interested in learning more about the pilot project results.

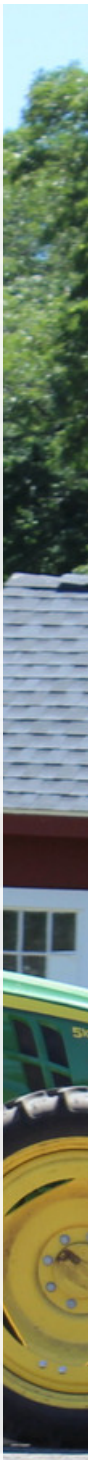
If at anytime a farm decides to no longer participate in this pilot project they are to notify CT RC&D staff immediately. CT RC&D reserves the right to promote this project through use of results pictures of equipment being used on it's websites, social media pages and reports as needed.



Information provided by CT RC&D Staff

No-Till/Cover Crop Equipment Hub Protocols

EQUIPMENT HANDLING



Reserving Equipment
All approved farms have been given their own individual link to the CT RC&D online calendar "Team Up" to reserve equipment within the Equipment Hubs. All farms are expected to use their own personalized link to reserve the No-Till Seed Drill or the Roller Crimper within their respective Equipment Hub. All farms are asked to be mindful of other farm users within the hub and return the equipment promptly after each use.

Recording Usage
All farms are expected to complete usage data logs for each time of use on each piece of equipment. Log sheets are provided within in the tubes mounted on each piece of equipment at each Hub. Data usage logging is a requirement of this Equipment Hub for grant reporting that CT RC&D is required to submit to USDA NRCS. Should you require additional log sheets they are attached within this manual.

Safety Chains
CT RC&D has purchased safety chains that have been provided for each piece of equipment at each Equipment Hub, and are expected to be used during each time of transport to and from the Host Equipment Hub Farm.

Safety Lights
CT RC&D has purchased safety lights that have been installed on each piece of equipment at each Equipment Hub, and are expected to be used during each time of transport to and from the Host Equipment Hub Farm. Refer to specific lighting instructions contained within this manual.

Grease Fittings
CT RC&D has purchased grease guns for each Equipment Hub location and participating farms should check and grease fittings after each use.

Documenting Usage
All farms are expected to document the results of their usage of both the Roller Crimper and No-Till Seed Drill by pictures and notes & updates to CT RC&D. These results will be used in grant reporting to USDA NRCS for this CIG project.

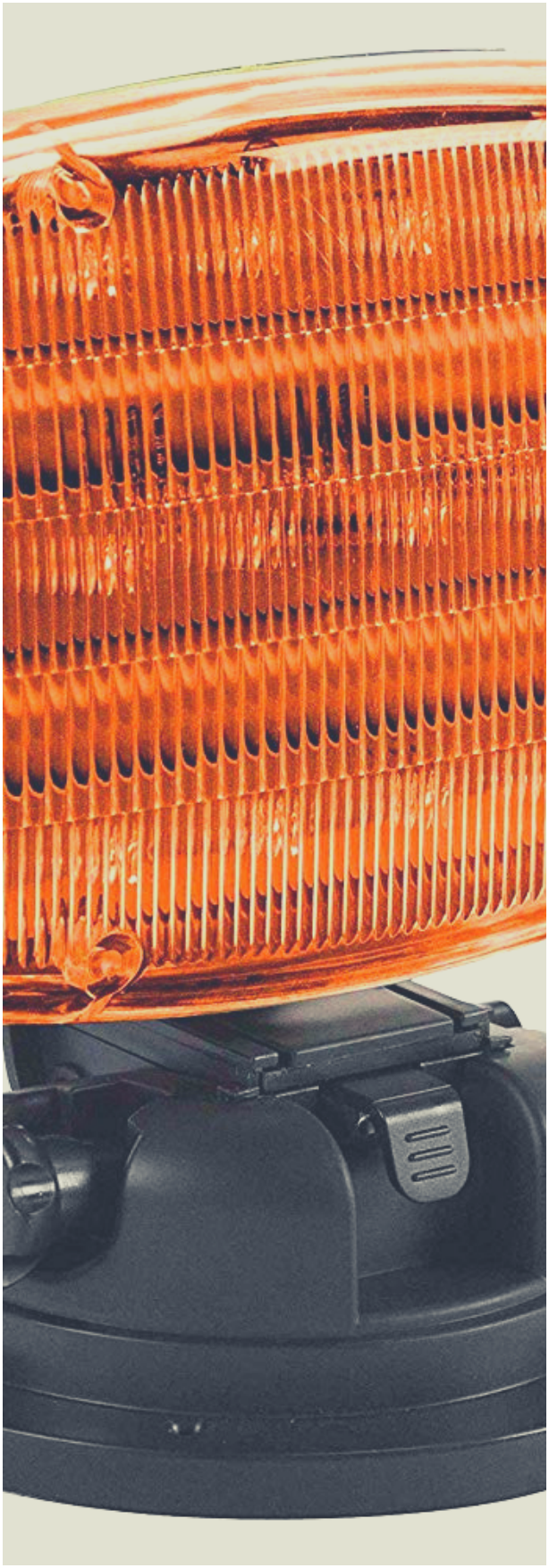
Roller Crimping
All farms are to notify CT RC&D at least one week prior to their use of the Roller Crimper. This will allow CT RC&D staff to make plans to visit the farm to conduct a dry matter test on the fields prior to being crimped. Data collected by CT RC&D will be used in CIG grant reporting to USDA NRCS. Specific testing protocol is contained within this manual. Farms with prior training and permission can conduct the dry matter testing on their own and report out results to CT RC&D.

USDA NRCS staff Jim Hyde or your local NRCS planner is available to advise on roller crimping and/or seed selection for cover crops. Please be advised that roller-crimping works best with large biomass (3-4 tons dry matter/acre) and when the plant stem is mature enough to snap (not bend), typically around seed head development or pollination. If these conditions are not present please be prepared with an alternative cover crop termination methods (shredding, cutting, chemical, or other means).

Information provided by CT RC&D Staff

Lighting Instructions

ROLLER CRIMPER



Switch to turn lights on is located underneath the light, towards the center of the machine, there is a hole on the mounting plate and the switch is up inside of the hole,

To replace batteries, the orange shell of the light unscrews from the light itself and inside the light there is a battery compartment that sits down inside, install batteries in their respective slots in the direction shown. Slide battery compartment back inside light into holder at bottom of light then snugly replace light shell. I would recommend coating battery ends with Dielectric grease to help prevent corrosion, and only use lights as necessary to help increase battery life. Each light uses 4 "AA" batteries. Estimated battery life of 94 hours cold weather could lower the battery life.

SEED DRILL

Switch to turn on lights is a yellow button on back plate of the light if you push the button once it turns on the lights steady, if you push them a second time the lights flash, this is the recommended setting for more visibility and extended battery life, to turn them off push the button a third time.

To replace batteries, remove 2 screws from the back plate and separate back plate from the light, replace batteries into their respective spots in the direction shown and replace light onto back plate and re install screws. I would recommend coating battery ends with Dielectric grease to help prevent corrosion, and only use lights as necessary to help increase battery life. Each light uses 4 "AA" batteries. Estimated battery life of 120 Hours cold weather could lower the battery life.

Information provided by Stula Electric

Dry Matter Testing Prior To Roller Crimping

ESTIMATE DRY MATTER IN A PRODUCTION FIELD

Recommended Tools

Hand clippers (pruning shears)
Hedge clippers (manual or electric, long blades)
3-sided square (instructions below)
Box/Container (cardboard/plastic, lightweight)
Paper or cloth bags (bag size = dependent on plant height/quantity)
Kitchen Scale (measures ounces (oz.) or grams (g), either is fine)
Bathroom Scale – if large volumes (pounds, rather than ounces)

3-sided square: Use any material strong enough to hold a shape. Bend or make a square, with one side missing (3-sided square) equal to 1 square foot (12 inches + 12 inches + 12 inches; 3 sides = 36 inches in length). The open end (missing side) will allow you to slide the square into the plants, along the ground.

Instructions:

Biomass
Take three samples from random areas in the field.
Do avoid clearly different areas of the field (water-logged or missing areas).
Of the remaining, representative areas - do not be selective about where you cut.
The objective of getting samples is to obtain a representative sample of the field – don't just go for the highest or the greenest, get a honest sample of the field.

1. Slide the square along the ground and into the plants.
2. Cut all the stems at ground height within the perimeter of the square (all four sides – 1 square foot). Note: If the stems & leaves come out easily/cleanly, use this stem method. If the stems/leaves are badly crossed, difficult to remove, then cut both the stems and the leaves straight up, as if the column were extended from the ground up to the sky – cut and collect all material within this column.
3. Weigh or tare the box/measuring container. A 'TARE' button will zero out the weight.
4. Put all the cut plants into the box/measuring container. Fold or cut the plants as needed to allow the wet weight of all plants within the 1 foot square to be weighed.
5. Write down the weight of the plants (subtract the weight of the box if not tared or zeroed)
6. Record the weight as pounds. If you record ounces (oz): 1 oz x (0.0625 lb/oz) = lbs
   If you record grams (g): 1 g x (0.0022 lb/g) = lbs; or Google: convert oz to lb

This is your wet weight of the field sample.
Measure three spots (or more) for a representative sample of each field to equal one dry sample per field location.

Information provided by CT USDA NRCS Staff

Dry Matter Testing Prior To Roller Crimping

ESTIMATE DRY MATTER IN A PRODUCTION FIELD

Dry Matter

1. Chop the whole plants into 2-3 inch pieces. Easy to use the manual hedge sheers and quickly chop the bundled plants from head to toe into a box or a bucket.
2. Chop all three (or more) field samples (from the one field) into the same box or bucket.
3. Mix the chopped plants thoroughly in the bucket.
4. With your hand, grab small, random samples from the bucket/box and place into a small paper plate or weigh boat. Only grab enough to weigh up to 140 grams (g) or 5 ounces (oz). The unit (g or oz) is not essential – only that you measure the same unit each time (g = g, or oz = oz).
5. Put the paper plate in the microwave.
6. Do NOT take your eyes off the paper plate once the microwave has started.
7. Start the drying process with microwave on high for 1 min or less.
8. Stir the plants with a stick or utensil (they will be HOT).
9. Continue microwaving the plants for 40 seconds.
10. Weigh the paper plate.
11. Continue microwaving the plants for 30 seconds.
12. Weigh the paper plate.
13. Continue this process of drying and weighing until the weight does not change any more.

This is the weight of your dry matter sample.

Do Not let the plants burn or spark.

You Do Not want black ash or a fiery microwave.

Some plants may spark if the micro-waves get stuck in the plant cells – some plants do this, most plants do not (which is why this process is used).

But if your plant sample does spark – you will need to use a low heat oven or food dehydrator (140 degrees F or so, for 2-3 hours, or until the weight does not decrease any more) to dry the plant sample.

Calculate the moisture content of your dry matter sample

(Dry weight / wet weight) = moisture ratio

Calculate Biomass of Field Sample

Wet weight Field Sample x (moisture ratio) x (43,560 sq ft/acre)
/ (2,000 lbs/ton)= Field biomass tons/acre.

Penn State Video: How to determine Dry Matter

Video is intended for dairy cow rations/explanations, but good example from timeline 3:45 – 6:45 min. *https://extension.psu.edu/determining-forage-dry-matter*

Extension Publication: How to calculate Dry Matter

Very general description of how to dry the material, but very clear step by step instructions how to calculate the dry matter.

https://articles.extension.org/pages/11315/dry-matter-determination

Information provided by CT USDA NRCS Staff

Educational Videos

NO-TILL/ COVER CROP

Videos from the 2019 No-Till/Cover Crop Conference:
UVM Extension - Crops & Soils
https://www.youtube.com/channel/UCGXPGwjQT9wIt47fVAXFC-Q/featured?disable_polymer=1

2019 National No-Till Conference:
Adam Dahmer, Experienced farmer which tries different things, including no-till and roller/crimping.
https://drive.google.com/file/d/17KWVk2jSm6GRBPbgqkjJ3BEX9XLXWVq0/view?ts=5cab4b95

2019 National No-Till Conference:
Erin Silva, University of Wisconsin
Rolling Cover Crops Successfully in No-Till Systems
https://drive.google.com/file/d/1fIe9SQBsDiIRVxRE-5DAKikWIvkasenm/view?ts=5c93e12a

No-Tilling Vegetables with No-Till Pioneer Allan Brooks (Podcast) In this episode of the “No-Till Farmer Influencers & Innovations” podcast, brought to you by Ingersoll & Agrisolutions, Frank Lessiter sits down at the 2019 National No-Tillage Conference with Allan Brooks, a pioneering no-till vegetable farmer from Wisconsin.
https://www.no-tillfarmer.com/articles/8624-podcast-no-tilling-vegetables-with-no-till-pioneer-allen-brooks?utm_source=omail&utm_medium=email&utm_campaign=podcast&utm_content=ntf&oly_enc_id=8797J7395467D3S

No-Till Seed Drill Manual - Esch 5505

Model 5505 Specifications	
Number of Openers	12
Row Spacing	5.5"
Planting Width	5' 6"
Transport Width	8'
Weight	3900lb

No-Till Seed Drill Manual - Esch 5505

Seed Calibrations and Settings

- Remove plastic from frame (see Fig. A).
- Place plastic under drill to collect seeds for calibration (see Fig. B).
- See seed chart on lid for further instructions. Note: Be sure to turn drive wheel the correct direction. **WARNING: turning drive wheel too fast will result in wrong calibration. Turn wheel at ground speed.**
- When placing seed in hopper, keep seed baffles down (see Fig.C).
- Keep baffles in up position when seeding fluffy seed.

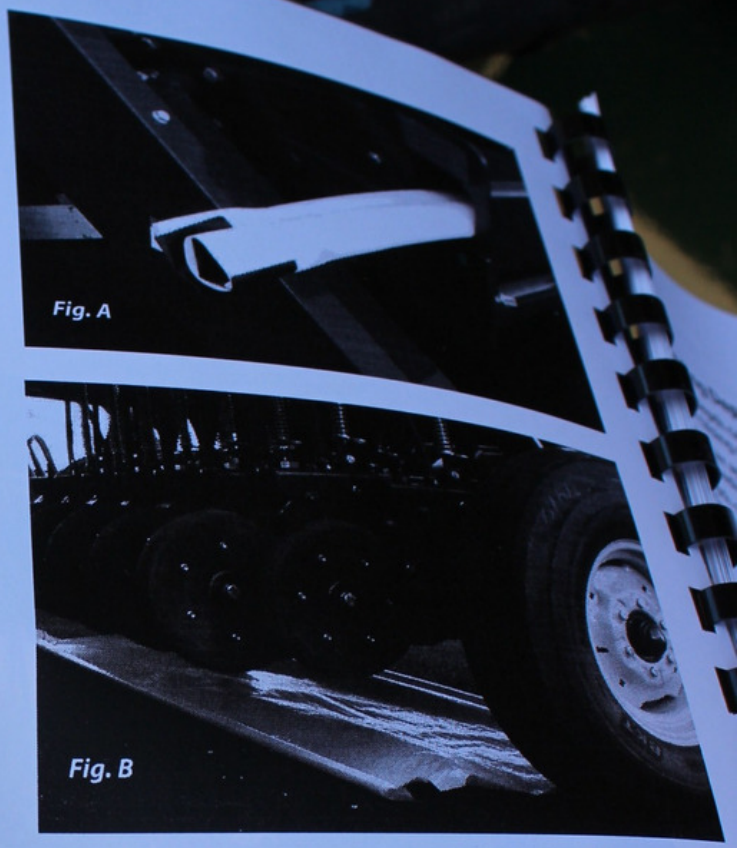


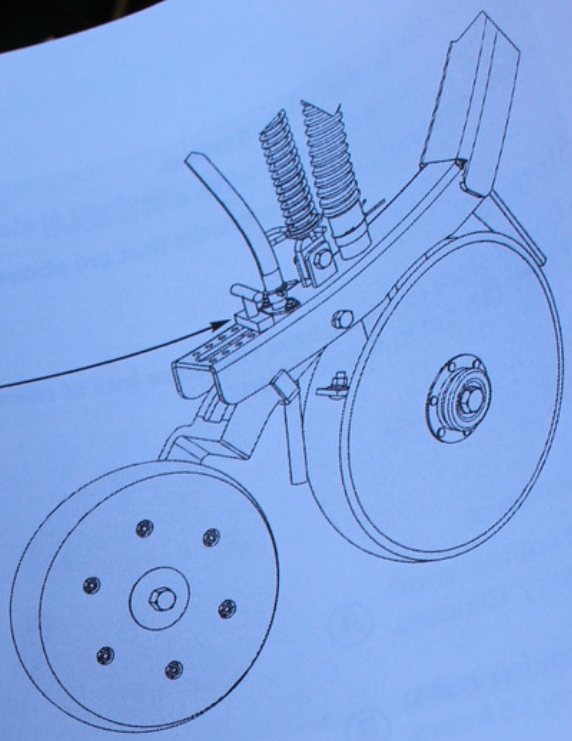
Fig. A

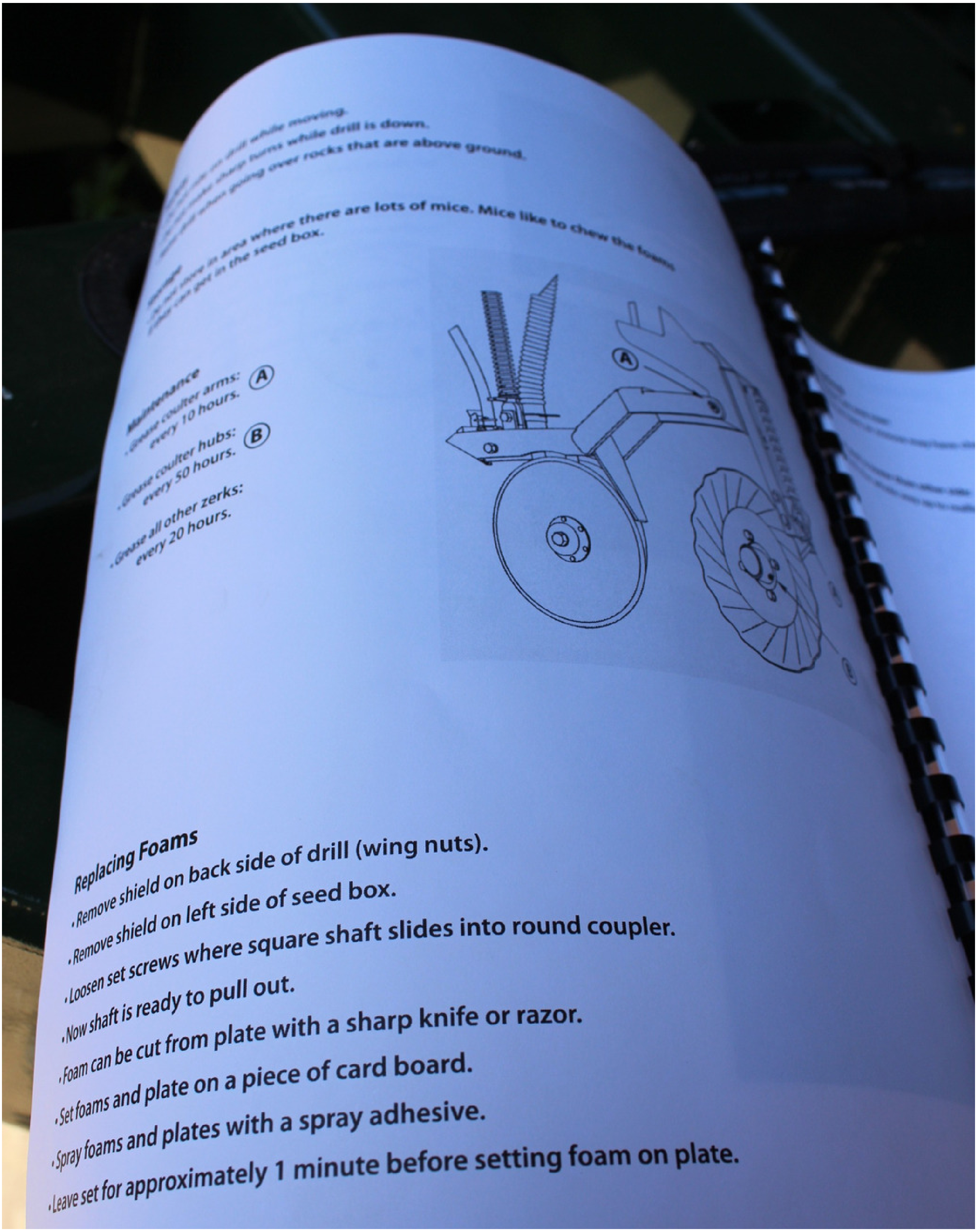
Fig. B


Fig. C

Setting Seeding Depth

- No-till coulter depth can only be set by lowering and raising drill.
- Set no-till coulter approximately 1/2" to 1" deeper than seeding depth.
- Seeding depth can be adjusted by sliding T-handle forward for shallow and backward for deeper.





drill while moving.
sharp turns while drill is down.
going over rocks that are above ground.

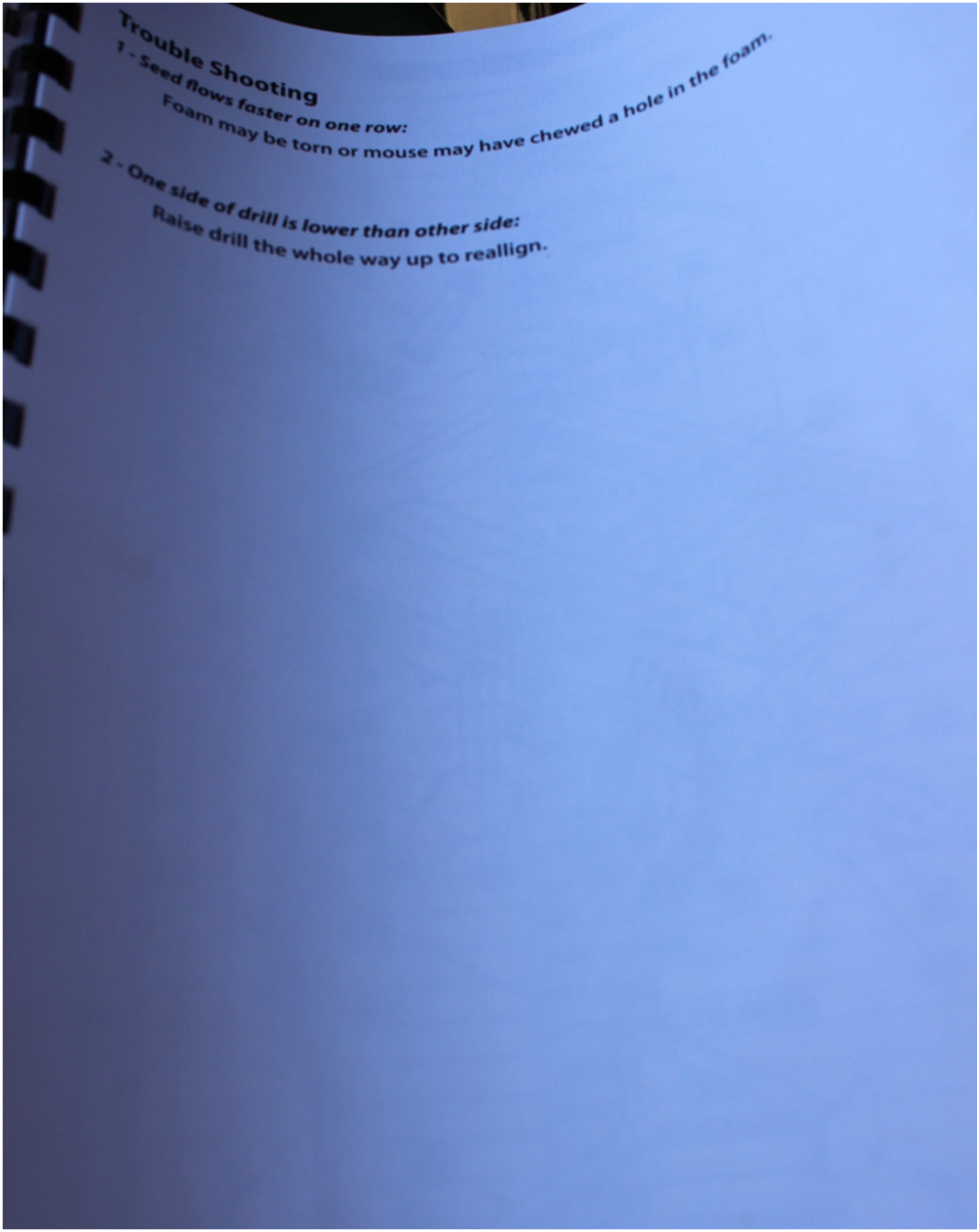
in area where there are lots of mice. Mice like to chew the foams.
in the seed box.

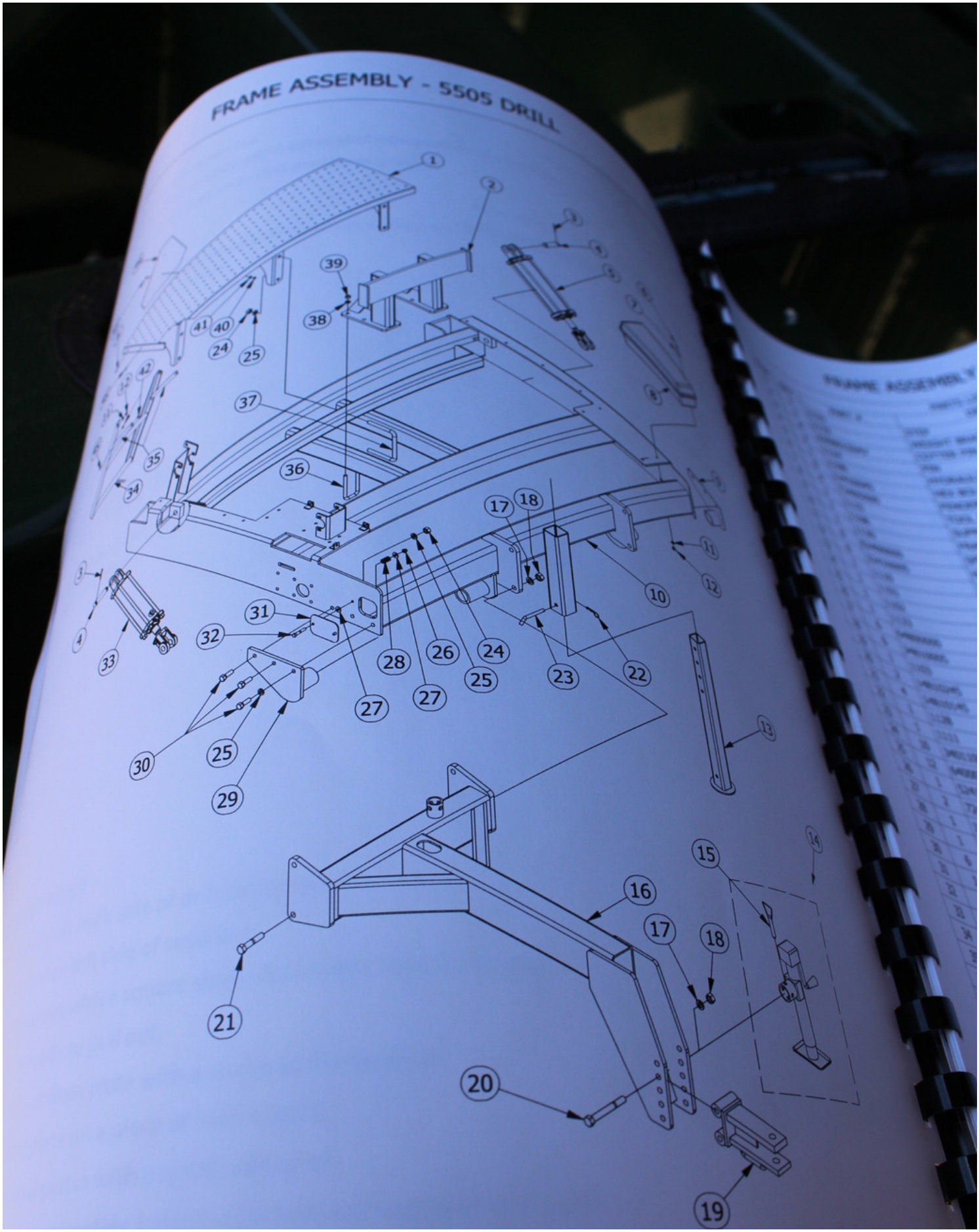
Maintenance

- Grease coulter arms: (A) every 10 hours.
- Grease coulter hubs: (B) every 50 hours.
- Grease all other zerks: every 20 hours.

Replacing Foams

- Remove shield on back side of drill (wing nuts).
- Remove shield on left side of seed box.
- Loosen set screws where square shaft slides into round coupler.
- Now shaft is ready to pull out.
- Foam can be cut from plate with a sharp knife or razor.
- Set foams and plate on a piece of card board.
- Spray foams and plates with a spray adhesive.
- Leave set for approximately 1 minute before setting foam on plate.


Trouble Shooting
1 - Seed flows faster on one row:
Foam may be torn or mouse may have chewed a hole in the foam.
2 - One side of drill is lower than other side:
Raise drill the whole way up to reallign.

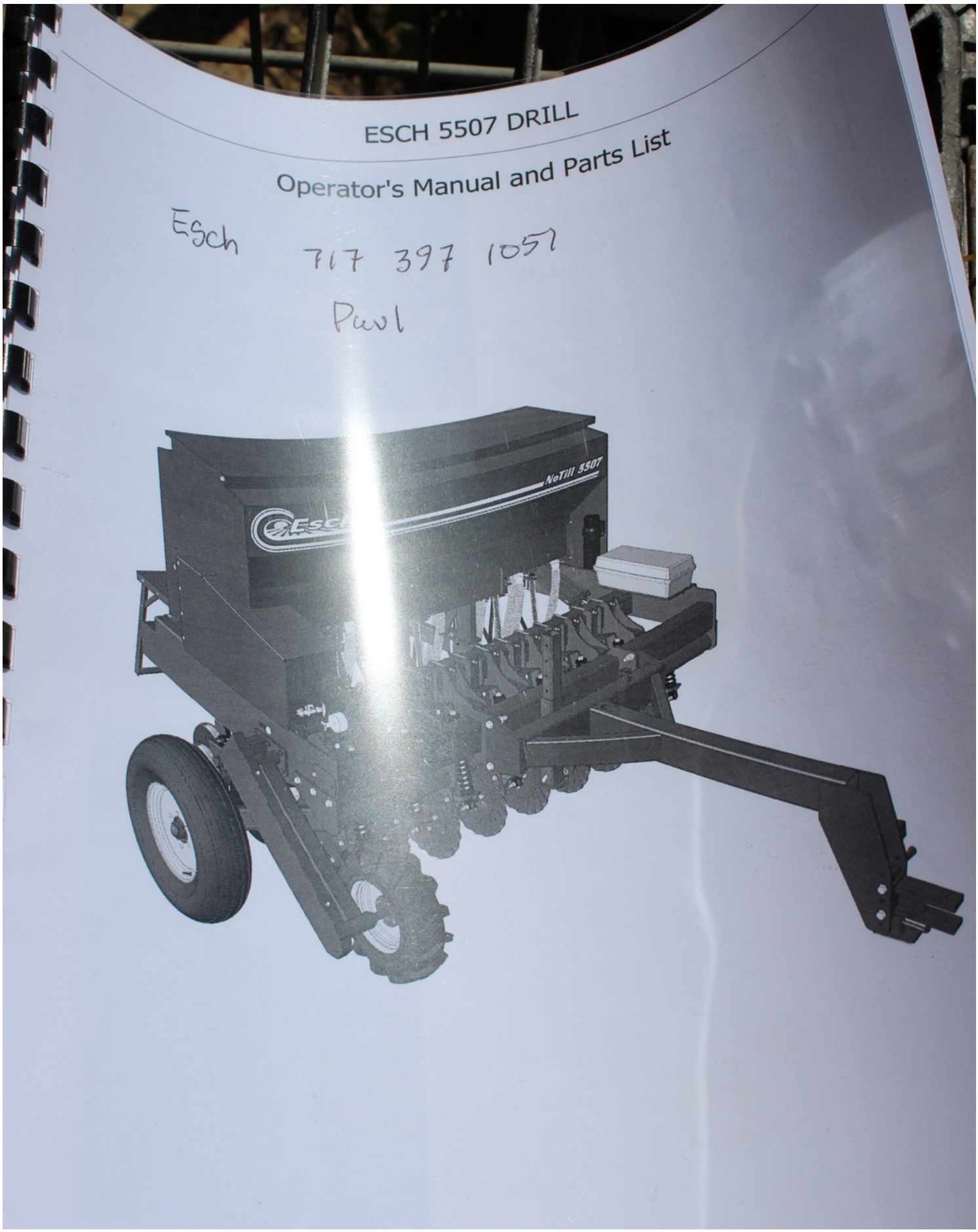

FRAME ASSEMBLY - 5505 DRILL

No-Till Seed Drill Manual - Esch 5507

Model 5507 Specifications

Number of Openers	15
Row Spacing	5’5”
Planting Width	6-10”
Transport Width	9’4”

No-Till Seed Drill Manual - Esch 5507

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Safety
- Do not ride on drill while moving.
- Do not make sharp turns while drill is down.
- Raise drill when going over rocks that are above ground.

Storage
- Do not store in area where there are lots of mice. Mice like to chew the foams if they can get in the seed box.

Maintenance
- Grease coulter arms: every 10 hours. (A)
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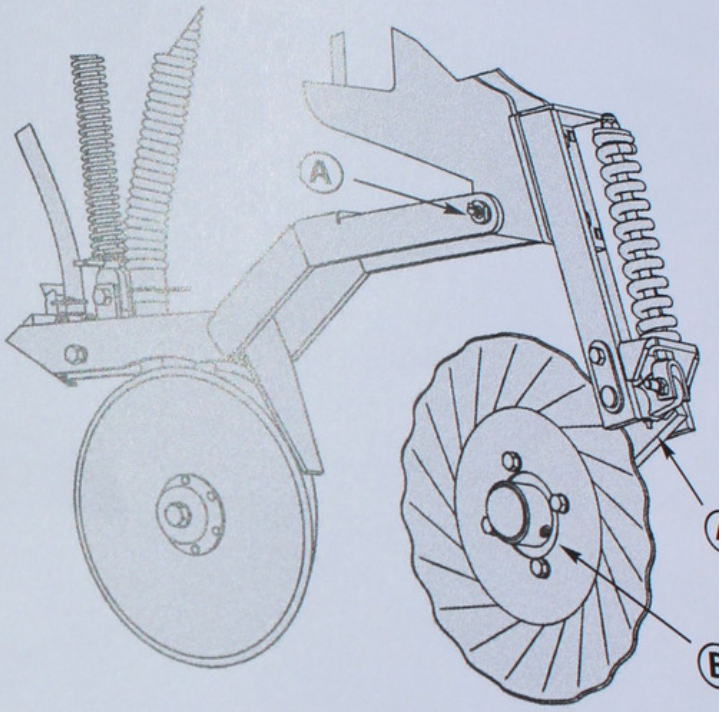

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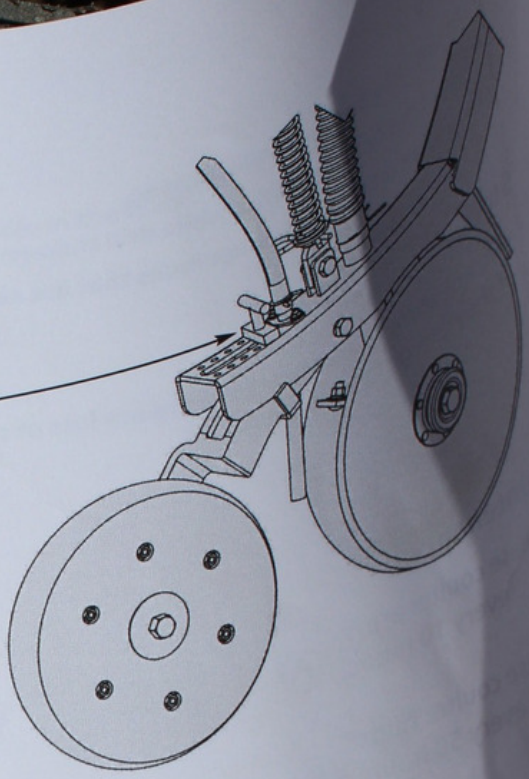

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- When placing seed in hopper, keep seed baffles down (see Fig.C).
- Keep baffles in up position when seeding fluffy seed.


Fig. A


Fig. B

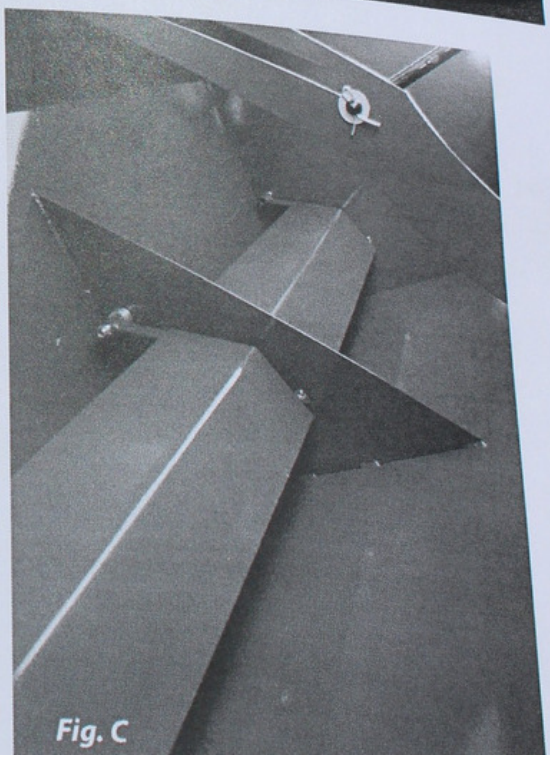
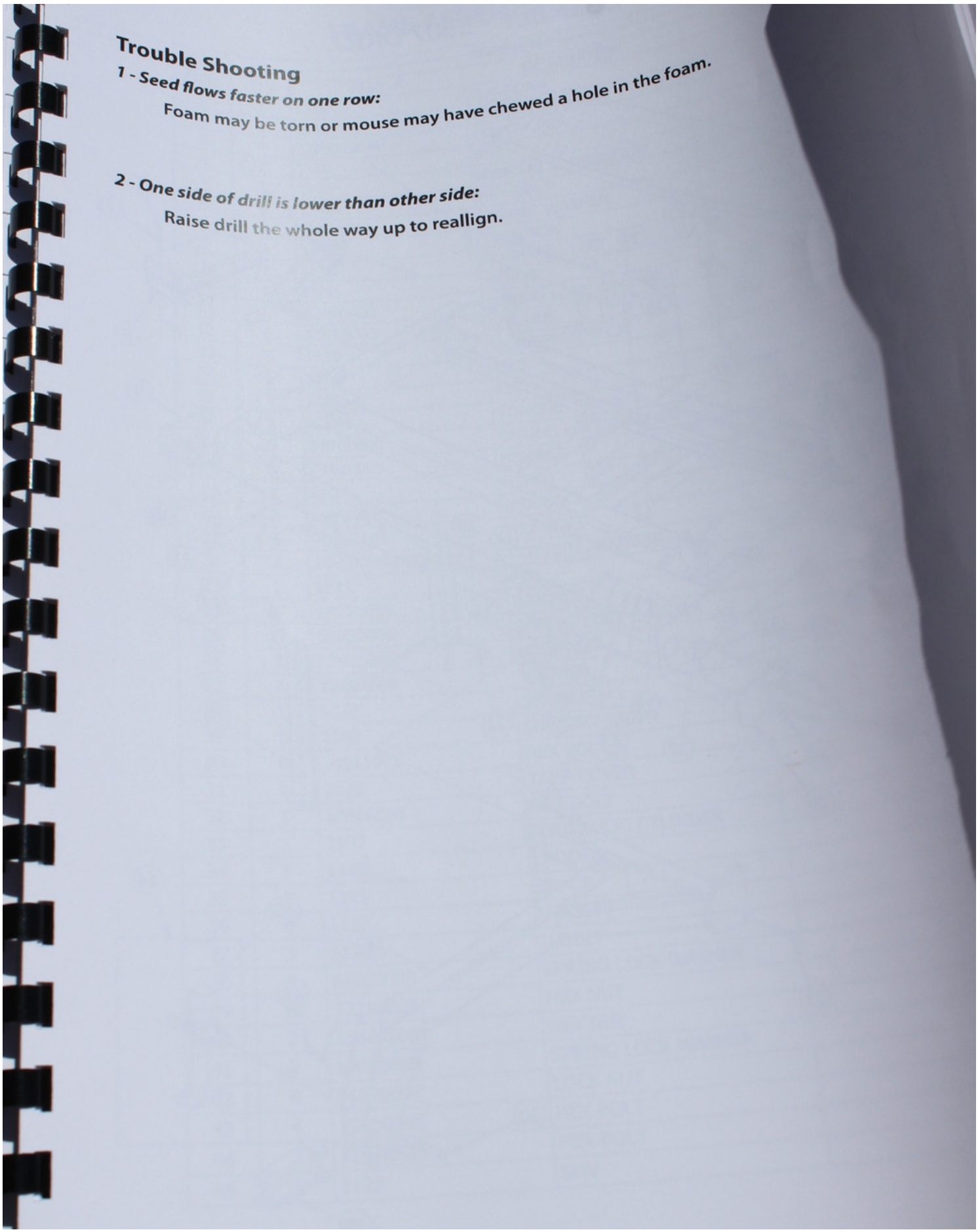


Fig. C



Trouble Shooting

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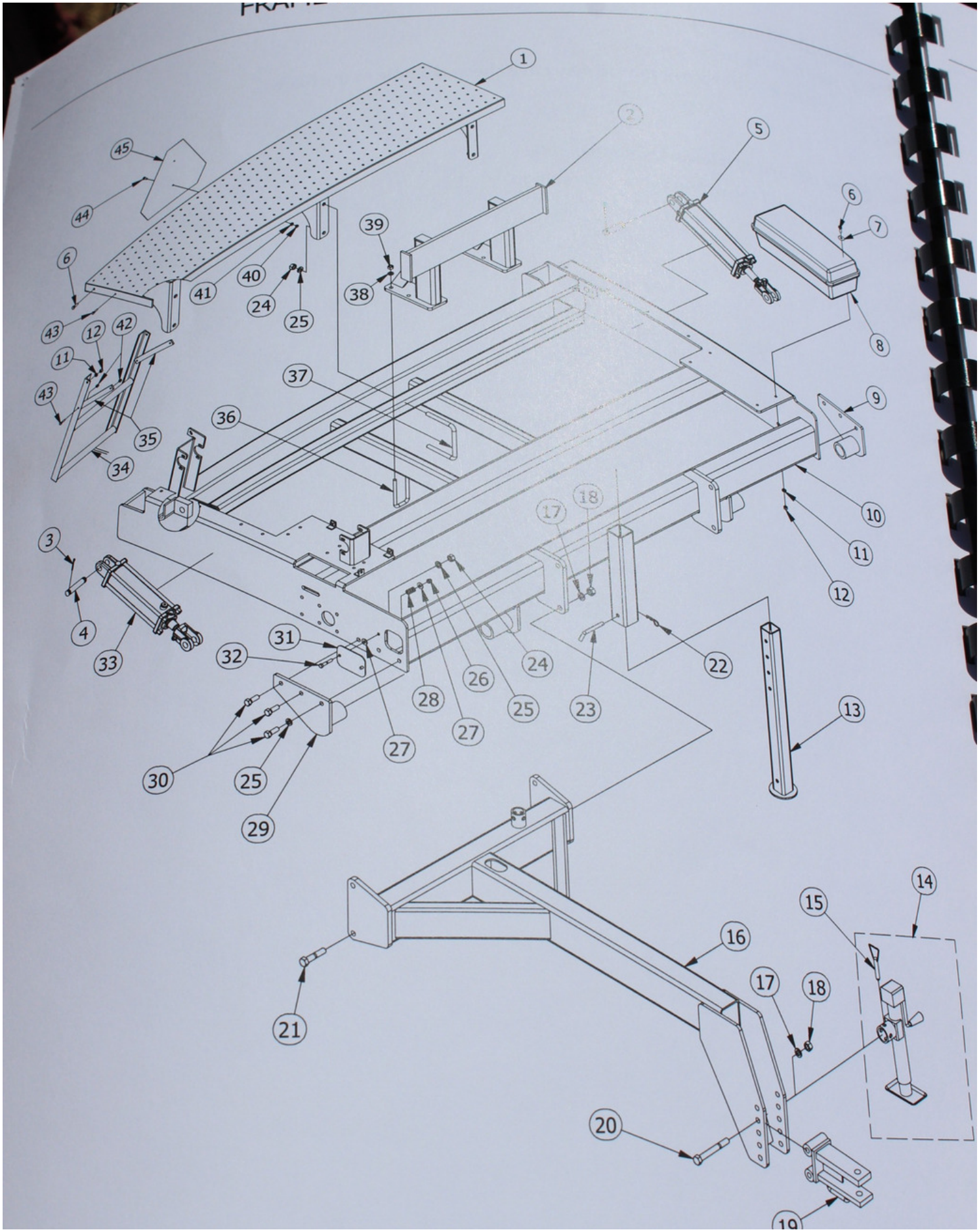
Raise drill the whole way up to reallign.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Roller Crimpers - I&J

Model Specifications	
I&J 10CROT	10.5' trailed roller crimper
I&J 15RROL	15.5' trailed roller crimper

Hub:	Mountain Dairy No-Till Seed Drill							
Date	Farm Name	Starting Maintenance Check (Initial)	Acreage Start	Acreage End	Seed type planted	Post Use Maintenance Check (Initial)	Grease Zerk Fittings (Pivot Points, Etc) (Initial)	Total Time (in hours) the Farm took to Transport & Use the Equipment (Used as a grant match)

Hub:	Mountain Dairy Roller Crimper						
Date	Farm Name	Starting Maintenance Check (Initial)	Total Acreage Use	Crop Types Roller Crimped	Post Use Maintenance Check (Initial)	Grease Zerk Fittings (Pivot Points, Etc) (Initial)	Total Time (in hours) the Farm took to Transport & Use the Equipment (Used as a grant match)

Hub:	Sub Edge Farm No-Till Seed Drill							
Date	Farm Name	Starting Maintenance Check (Initial)	Acreage Start	Acreage End	Seed type planted	Post Use Maintenance Check (Initial)	Grease Zerk Fittings (Pivot Points, Etc) (Initial)	Total Time (in hours) the Farm took to Transport & Use the Equipment (Used as a grant match)

Hub:	SubEdge Farm Roller Crimper						
Date	Farm Name	Starting Maintenance Check (Initial)	Total Acreage Use	Crop Types Roller Crimped	Post Use Maintenance Check (Initial)	Grease Zerk Fittings (Pivot Points, Etc) (Initial)	Total Time (in hours) the Farm took to Transport & Use the Equipment (Used as a grant match)