



MARLISS

Soybean & Grain Drill Owner's Manual

Our Tradition is Quality Driven and Field Proven

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DRILL & MARKERS SAFETY SECTION

RECOGNIZE SAFETY ALERT SYMBOL



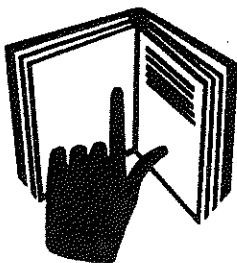
The above safety-alert symbol means "Attention! Be Alert! Your personal safety is involved!" This symbol draws your attention to important instructions concerning your personal safety. Read the message carefully to avoid personal injury or death.

FOLLOW MACHINE SAFETY SIGNS & MESSAGES

Observe safe operating practices. Carefully read this manual and all safety signs on your equipment. Safety signs must be kept in good condition. Replace missing or damaged safety decals or shields; available from **Sukup Manufacturing Company, Box 677, Sheffield, Iowa 50475** at no charge. Phone 515-892-4222.

Learn how to use controls and operate machine. Do not let anyone operate unit (especially youth) without thorough training of basic operating and safety procedures.

Make no unauthorized modifications to machine. Modifications may endanger function and/or safety of unit. Keep unit in good working condition.



EMERGENCIES -- KNOW WHAT TO DO

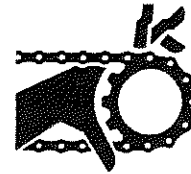
Have emergency numbers near your telephone:

For doctors:
Emergency medical squad:
Ambulance service:
Hospital:
Fire department:

Have written directions to your location:

OPERATE SAFELY

- Lower unit when not in use.
- When leaving tractor always shut off engine, shift to "park," and remove key.
- Slow down when turning.
- Drive slowly over rough terrain.
- Do NOT operate close to ditch or creek.
- Keep SMV emblem and reflectors clean and visible.



KEEP CLEAR OF ALL MOVING PARTS

Keep people (Especially Youth) away from equipment, particularly during operation.



**KEEP
OFF**

Riding on any agricultural equipment is very dangerous. People can be killed or seriously injured when accidentally falling off of unit, or by thrown objects.



Caution:

! Walkboard may be slippery when wet.



WARNING: TRANSPORT SAFETY

Transporting this equipment on public roads may result in serious injury or death.

If road travel is required it is essential that all the following procedures are followed:

1. Read and understand -- operator's manual.
2. Check & comply with state & local regulations.
3. Be sure tractor has slow moving vehicle emblem and that all required warning lights are in working order.
4. Use tractor warning lights during transportation.
5. Use required warning flags, emblems or lights.
6. Check that red reflectors are on back of unit (at outer edges) and clearly visible.
7. Check that amber reflectors are on front of unit (at outer edges) and clearly visible.
8. Travel at a reasonable and safe speed. **"Never exceed maximum speed, 25MPH"**. Reduce speed and/or use lower gear on rough ground or slopes.
9. Transport unit in its narrowest configuration. Wings must be completely folded.
10. Stop slowly.
11. Have extended rear angle mirrors on vehicles.
12. Signal & check behind you when turning.



WARNING: Check for other vehicles when turning. (2/3 of roadway farm accidents occur when turning.)

- Use mirrors,
- Be sure to have clear visibility,
- Use signal lights



WARNING: Do not transport unit in areas of poor visibility --

- Especially on hills,
- During poor weather conditions,
- or at night

Failure to do so may cause serious injury or death.

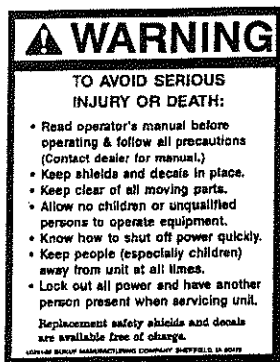
Use good judgment when transporting. Maintain complete control of machine at all times. Comply with state and local laws governing. Read safety regulations when moving machinery. Always strive to prevent accidents! Watch out for other vehicles.

Mount safety decals when Drill is assembled. Please check that all decals are in place according to this drawing and in good legible condition.

IMPORTANT: If suggested locations are not clearly visible, place safety decals in more suitable area. Never cover up any existing safety decals.

Make sure location for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position. To order replacement decals or shields (no charge) contact your dealer or Sukup Manufacturing Company, Box 677, Sheffield, Iowa 50475 at no charge. Phone 515-892-4222

1. Warning -Safe Operation Decal - #L0281



2. Warning - No Riders Decal - #L0274



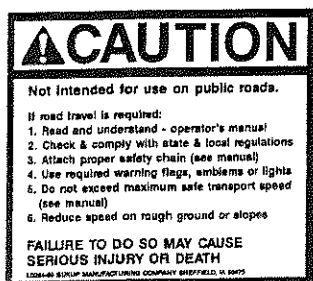
3. Danger -Prevent Being Crushed Decal - L0282



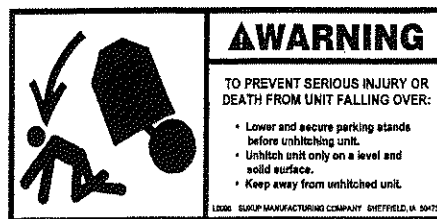
4. Amber Reflector Tape Decal - L0276 2"x 4-1/2"

5. Red Reflector Tape Decal-L0277 2"x4-1/2"

6. Caution - Not intended for use on public roads - Decal - L0285



7. Warning - Prevent serious injury or death from unit falling over. Decal - L0090



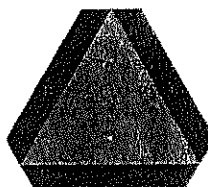
8.Warning - Beware of Pinch Points - Decal - L02841



9. Danger -Decal - L0271 - Shield missing Do not operate.

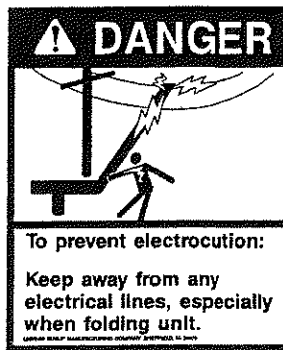


10.SMV Sign- #J2250



11. Light Kit Provided 10' and larger -M5248 Whole Assembly

12. Danger - Keep away from electrical lines when folding unit. Decal L0272

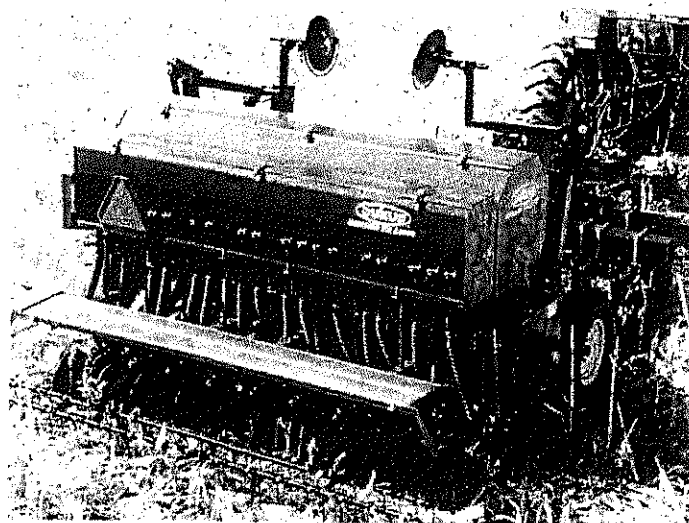
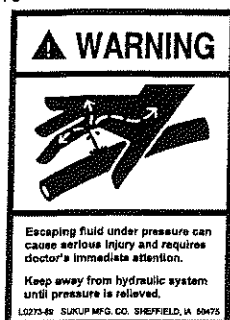


13. Orange Reflector Tape Decal - L02765 (2"x9")

14. Warning -

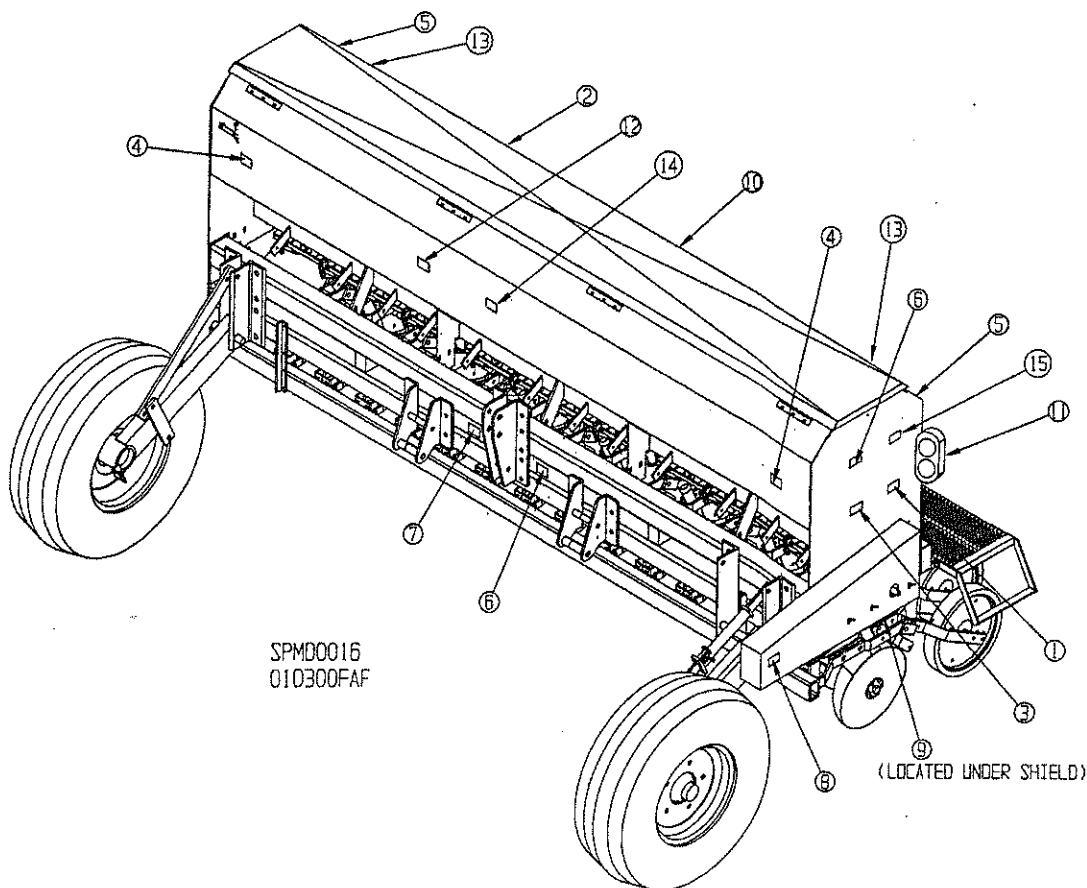
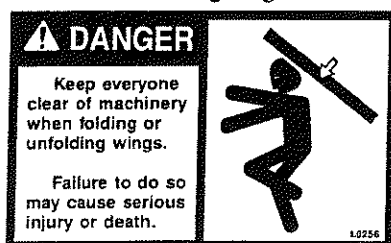
Keep away from hydraulic system until pressure relieved.

Decal -L0273



15. Danger- L0256-

Keep away from unit when folding wings.



THE MARLISS GRAIN DRILL

Your new MARLISS grain drill will plant a wide variety of seed, including soybeans, milo and all feed grains. It can be used as a solid seeder or row crop planter. The drill is adaptable to any row spacing from 6" to as wide as you choose. In this manual the front of the drill is the drawbar end. The left and right side of the machine are those as viewed when standing behind the drill facing the tractor's direction of travel.



SAFETY TIPS

The symbol above is used throughout this manual in an effort to call attention to a particular hazard, warning or note of importance. When you see this symbol, please read and heed the warning. A careful operator is the best insurance against an accident. Use "common sense" precautions when hitching to the drill, transporting and drilling in the field.

1. Keep all nuts, bolts, screws and connections tight. Check after the first two hours of drilling. **CHECK FOR TIGHTNESS DAILY.**
2. **DO NOT** exceed recommended operating speeds.
3. When using markers avoid low hanging wires or limbs.
4. **DO NOT** attempt to clean or adjust the drill while it is in motion.
5. **DO NOT** walk near any unshielded chains or sprocket while the drill is in motion.
6. **DO NOT** allow any person to ride on the drill.
7. Always use chain guards while operating the drill.
8. When using a 3-point hitch drill, be sure the tractor front end is properly weighted to handle the drill when it is fully loaded with seed.

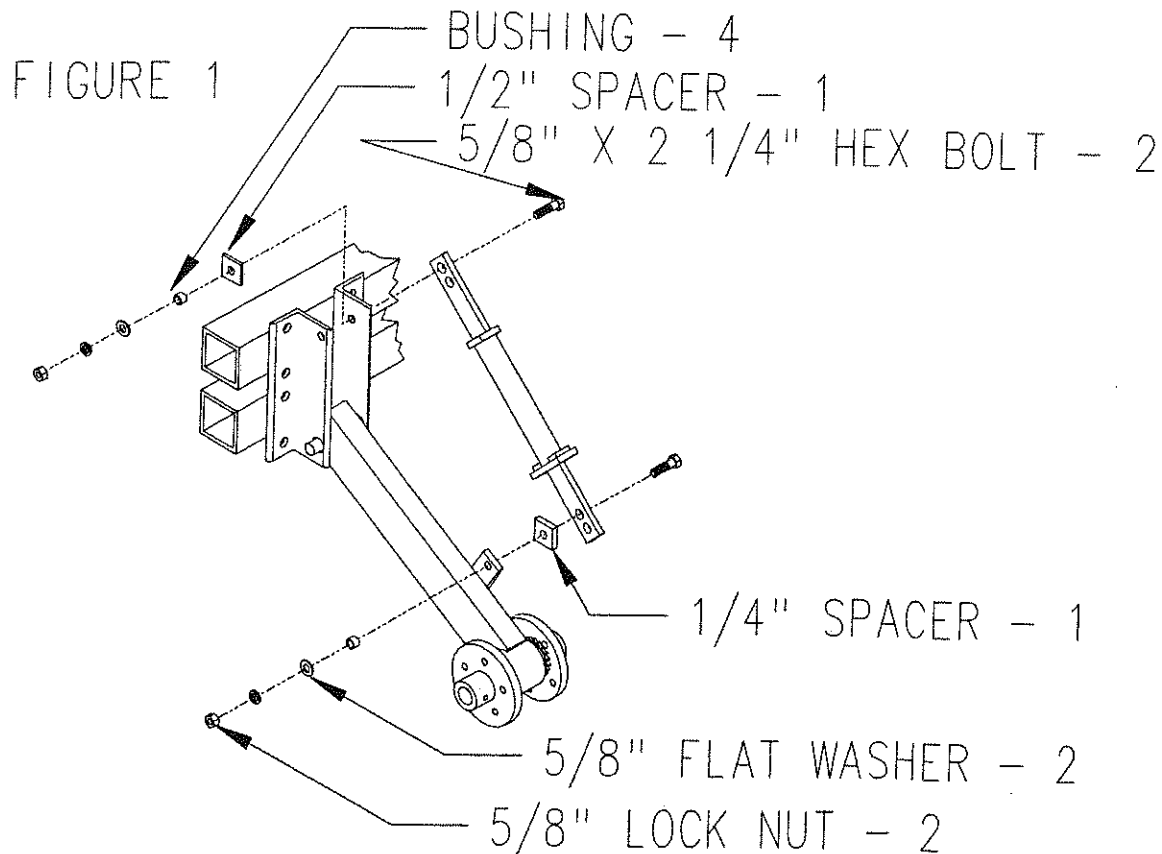
SET UP AND ASSEMBLY

MARLISS Drills are pre-assembled at the factory

FLOATING DRIVE WHEELS

Sometimes conditions, especially in no-till situations, becomes rather rough. For this reason MARLISS offers a floating drive wheel strap to take the place of the rigid drive wheel strap. This floating drive wheel strap will allow the drive wheel to move down if the ground contour requires such movement. The floating drive wheel strap is equipped with a positive stop to prevent the drill from lowering to a position which might damage the row units.

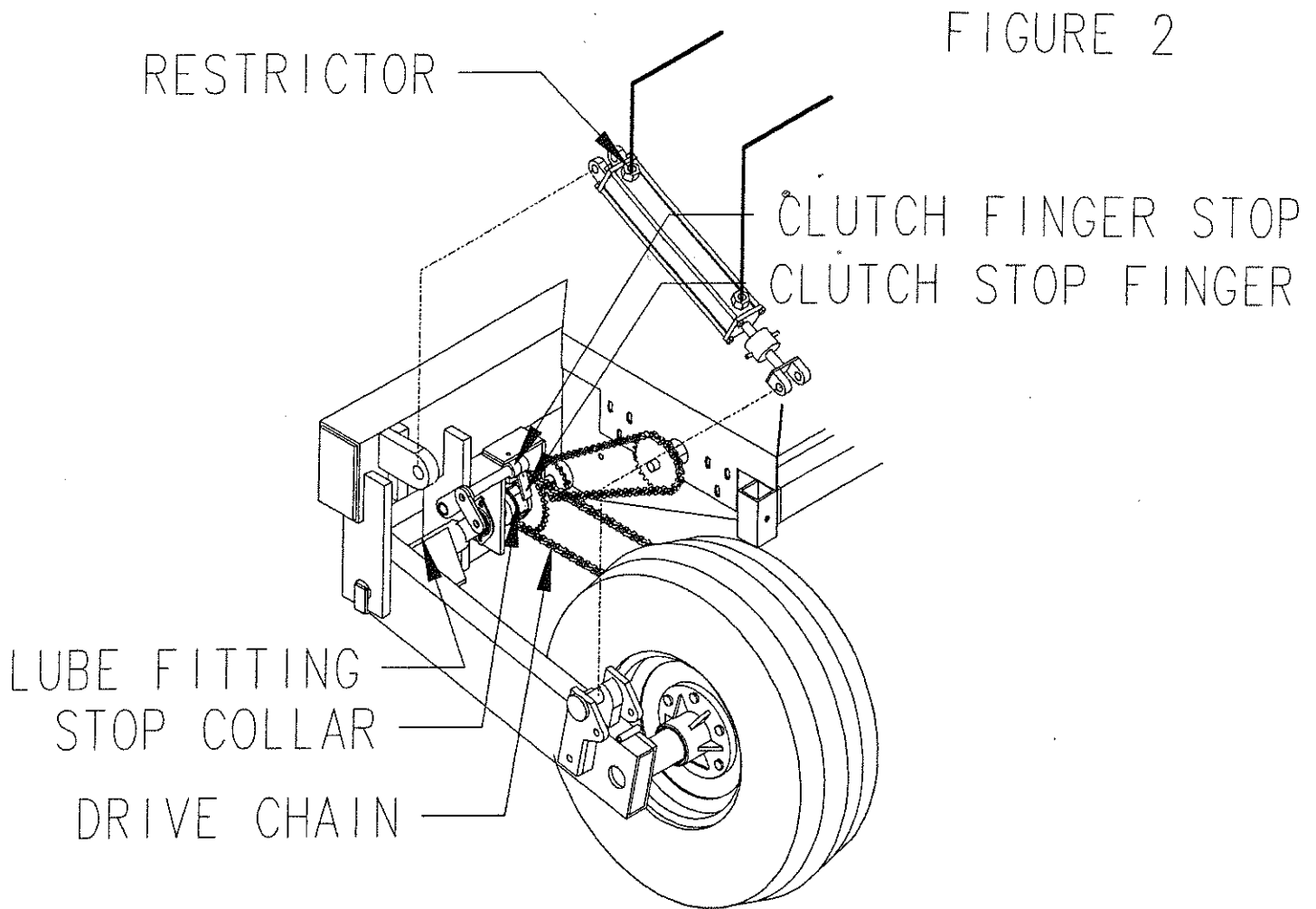
MOUNTING THE FLOATING DRIVE WHEEL STRAP



(Figure 1)

1. Remove the rigid drive wheel strap, if machine is equipped with one.
2. Replace the strap with the floating drive wheel strap. Figure 1 shows the floating drive wheel strap properly mounted. Add washers and spacers as shown.
3. Mount the strap in its center position. Do this by mounting one end in the last hole and the other end in the opposite hole.
4. The floating drive wheel strap should have two 7/16" X 5" bolts in it to prevent the two halves from separating. When the drill is lowered on level ground the spring should compress until the two halves come together. Do not remove the 7/16" X 5" bolts. Also, do not mount the straps upside down, since doing so would allow the spring barrel to hold water.
All positions of the floating drive wheel strap will be about the same length as the corresponding position of the rigid strap. The only difference is that the wheel will now be able to follow sudden ground depressions without leaving the ground and causing a skip in the planting rate.

SETTING CLUTCH



(Figure 2)

1. Hook the tractor to the drill tongue. Raise the drill to the highest possible position and remove shipping and parking stands.
2. Lower the drill and check to be sure the clutch finger stop finger is not touching the clutch stop collar. If it is touching, raise the drill and adjust as follows:
 - A. Adjust (Loosen set screw and turn the clutch finger stop) (Figure 2) so that it is touching the clutch stop collar.
 - B. Preload the spring by continuing to turn the clutch finger stop approximately 1/8 of a turn.
 - C. Tighten the set screw.

PRE-USE AND PERIODIC MACHINE CHECK LIST

RETIGHTEN ALL NUTS AND BOLTS

Shipping vibrations may cause loosening of nuts and bolts on the drill and should be tightened before using the drill.

CHECK THE NUMBER OF SEED OPENINGS

It may be necessary to ("plug or unplug") some of the seed openings inside the seed hoppers, depending on the number of opener units being used. Raise the hopper lid to be sure that no opening is "plugged" where an opener unit is attached for use, and that any opening not attached to an opener unit is plugged. To remove un-needed meter plugs, use small flat head screw driver. To install a plug, apply enough pressure to snap the plug into the hopper bottom so that it is securely locked in place. With reasonable care the seed meter plugs can be reused.

CHECK ALL DRIVE CHAINS, SPROCKET AND KEYS.

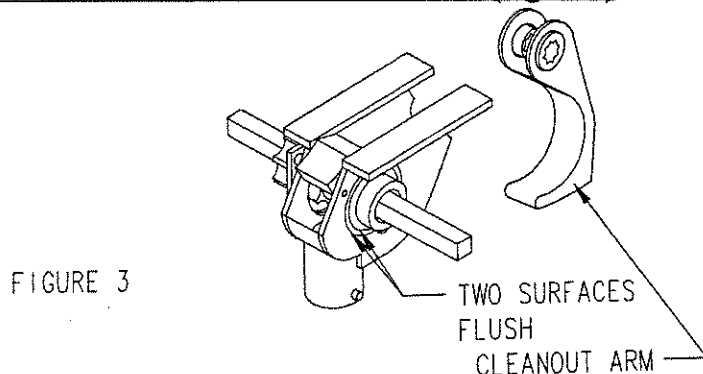
Check every sprocket to be sure all have keys in the keyways. Check all drive chains and sprockets to insure that they are properly aligned and that chains are of the proper length.



IMPORTANT

The sprocket on the hopper drive shaft should have a key in the keyway but should not have set screw in them. This sprocket must be free to slide on the threaded drive shaft when adjusting the seed meter opening.

CHECK THE SEED METER ADJUSTMENT (Figure 3)



Check all seed meters to be sure all the meters are in the fully closed position. If necessary, loosen the set screws in the locking collars of the seed meter and adjust all meters to the fully closed position. See Figure 3.

NOTE: Setting seed rates is explained under "MACHINE OPERATIONS" (Setting Seed Rates).

CHECK THE SPRING LOADED CLEAN-OUT ARMS ON THE METER (Figure 3)

The MARLISS seed meter is equipped with a spring loaded clean-out arm which serves three purposes:

1. It protects the seed being planted from damage by serving as a cushion while the seed passes through the meter.
2. It protects the meter from damage if a foreign object should pass through the meter by compressing the spring and allowing the foreign object to pass through.
3. It allows you to open all seed meters for cleaning.

CHECK THE PRESSURE ON THE CLEAN-OUT ARM

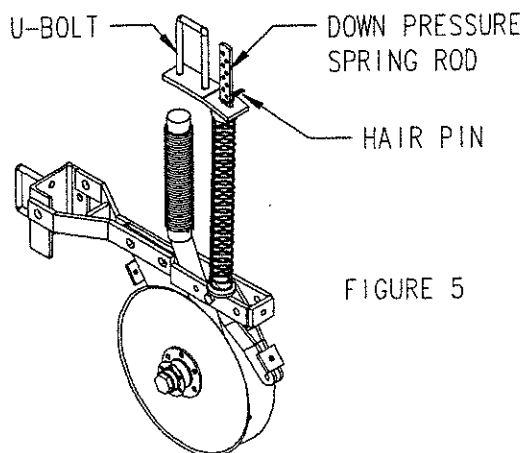
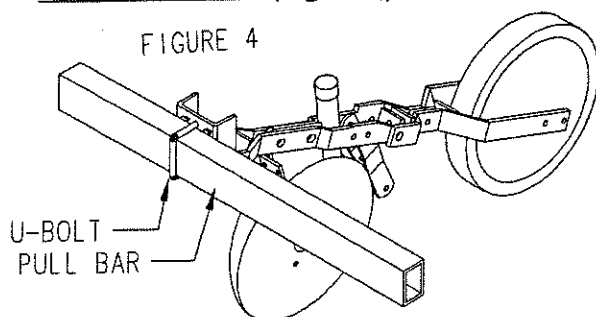
This is preset at the factory. It is set with the use of a 3/8" driven torque wrench. This torque wrench fits into a special punched hole in the clean-out lever and a torque of a 20 in.-lbs. per meter is applied. For example, a clean-out shaft on a 10' drill on 8" spacing would probably have 5 meters per clean-out shaft for a total of 15 meters. Therefore, each shaft should have an applied torque of 100 in.-lbs. in the center of the shaft. This torque is recommended to give adequate clean-out arm pressure for flat seeds such as rice, but it should be adequate for most seeds. If on larger seeds you have any seeds being thrown out the back of the meter, the pressure should be decreased slightly. The clean-out lever must still return to its closed position as discussed in step 3.

1. Check the spring pressure before placing seed in the hopper.
2. Look through the opening in the back of the seed meter to see the tip of the spring loaded arm. Using the eraser end of a pencil, push down on the spring loaded arm shown in Figure 3.
3. If the arm does not return firmly against the stop, adjustment will be necessary.

ADJUSTING THE SPRING LOADED CLEANOUT ARM (only if needed)

1. Locate the square shaft to which the spring loaded clean-out arms are attached.
2. Locate the lever near the center of each clean-out shaft.
3. Loosen the 3/8" bolt and nut that holds the lever in position, and adjust the lever until the spring loaded arms are firmly seated against the stop on the roller bushing. See Figure 3.
4. While holding down on the lever, retighten the 3/8" bolt and nut.
5. Recheck the spring tension, as in step 2 above in "Check the pressure on the clean-out arm".

ROW SPACING (Figure 4)



Row spacing can be changed easily from 6 2/3" to any row width you desire, within the limits of the over-all width.

NOTE: The exception to this is 2" X 13" double press wheels which can be narrowed to 8" row spacing. Conventional drills on which you are not using press wheels can be narrowed to 6" row spacing.

Determine the row width desired. Each opener unit may be easily moved right or left on the pull bar by simply loosening two U-bolts. See Figures 4 & 5.

If you do not wish to use all attached opener units, "plug" the unneeded meters with the metal meter plugs. By leaving the units attached, you insure uniform wear of all units.

3 POINT HITCHES

3 point hitch drills are equipped with a bolt-on hitch, adjustable to handle either CAT. II or III tractor lift links including CAT. II or III quick hitches. The 7' conventional drill is equipped with a CAT. I or II hitch.



CAUTION

Before hitching the tractor to a 3- point hitch drill be certain the tractor front end is properly weighted to handle the weight of the drill when it is fully loaded with seed.

PARKING STANDS

1. After hitching the tractor to the drill, raise the drill to take the weight off the parking stands located at each end of the drill.
2. Raise the stands and secure with the pins, in the bottom hole of the stand .



WARNING

If drill is moved with its weight on the stands, they will bend.

MACHINE OPERATION

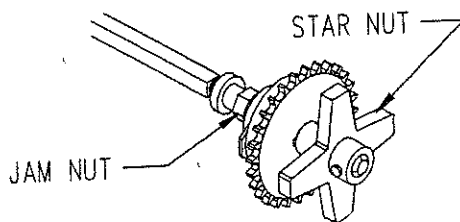
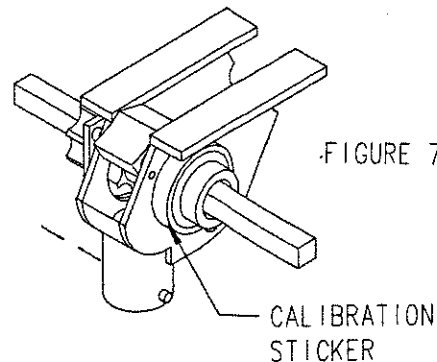


FIGURE 6



SETTING SEED RATE (Figures 6 & 7)

1. Refer to seed charts in this book or the seed chart inside the hopper lid to determine sprocket setting and to find meter opening required for pounds per acre to be planted, for your specific seed type.
NOTE: All drills are shipped set up on sprocket setting #2.
2. Check all sprockets and make necessary changes to set drill for sprocket setting required.
NOTE: If the sprocket on the meter drive shaft needs to be changed, be sure that the set screw is removed and used on the jack shaft sprocket. There is no set screw provided with the sprocket on the meter shaft.
3. Locate the jam nut on the meter drive shaft inside the drill frame end plate and loosen it. See Figure 6.
4. Locate the star nut on the end of the meter drive shaft and turn it to open the seed meter (Figure 6). The star nut on the right end of the drill, looking from the rear is turned clockwise to open the seed meter. The star nut on the left end of the drill is turned counter- clockwise to open the seed meter.
5. Determine the proper amount of opening of the seed meters by reading the calibration sticker which measures the protrusion of the plastic shoulder of the seed meter. See Figure 7.
6. When the correct setting has been made, tighten the jam nut and the star nut securely.

7. All seed meters should be checked to be sure they are all open the same amount.

NOTE: The meter shaft on MARLISS grain drill is designed with a two-way stop system. The welded stop shown just to the left of the jam nut in Figure 6 limits the movement of the shaft in one direction. While the pinned collar limits the movement in the other direction. When adjusted properly, one of these stops will prevent the meter shaft from being able to move past the point at which the meters are closed. If the meter shaft were to move past the point at which the meters are closed one side of the meters could be broken. Therefore, adjust the meters so that they are closed or about closed and, at this point the meter shaft should be "plugged" by one of the stop mechanisms to prevent the meters from accidental damage. To adjust the meters to correspond to the stop (only if needed), loosen all individual locking collars on each meter and move the shaft against one stop. (In the case of the welded stop, make sure the jam nut is against the welded collar.) Then retighten each locking collar. Each meter should now be closed when the meter shaft is against one stop and each meter should be open about 1" when the meter shaft is against the other stop. The meter drive shaft has a 1" spacer on it which is removed and replaced with another sprocket when certain options are added to the machine, i.e. a Grass Seeding Attachment. The spacer and all washers shown in Figure 6 should be left in place so that the two-way stop system works properly.

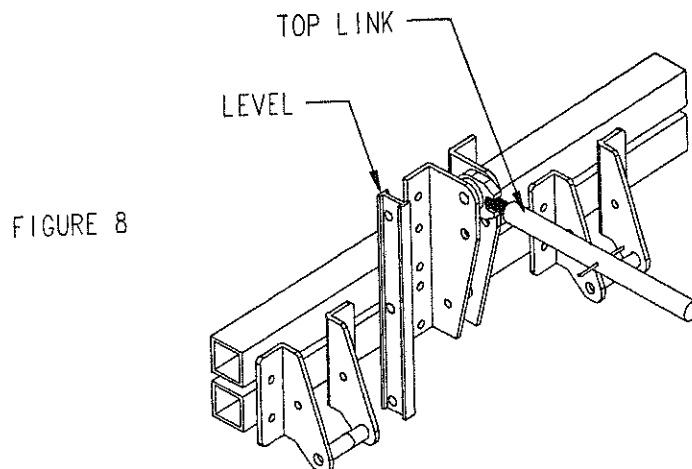


WARNING

Do not attempt to close the meters while there is seed in them as this may damage the meters. If the meters need to be closed, do so by removing the chain from the meter drive shaft sprocket and turning the meter. This will expel the seed from the meter and avoid damage to the meters.

8. Fill hoppers with seed.

LEVELING THE DRILL (Figure 8)



This can be done with a carpenter's level (Figure 8). With the drill on a level surface, lower the drill completely.

- A. 3 Point Hitch Drills: Adjust the top link of the tractor until the drill is level.
- B. Pull Type Drills: Adjust the turnbuckle or hydraulic cylinder from the tongue to the center mast until the drill is level.

ADJUSTING HEIGHT OF THE DRILL (Figures 1, & 9)

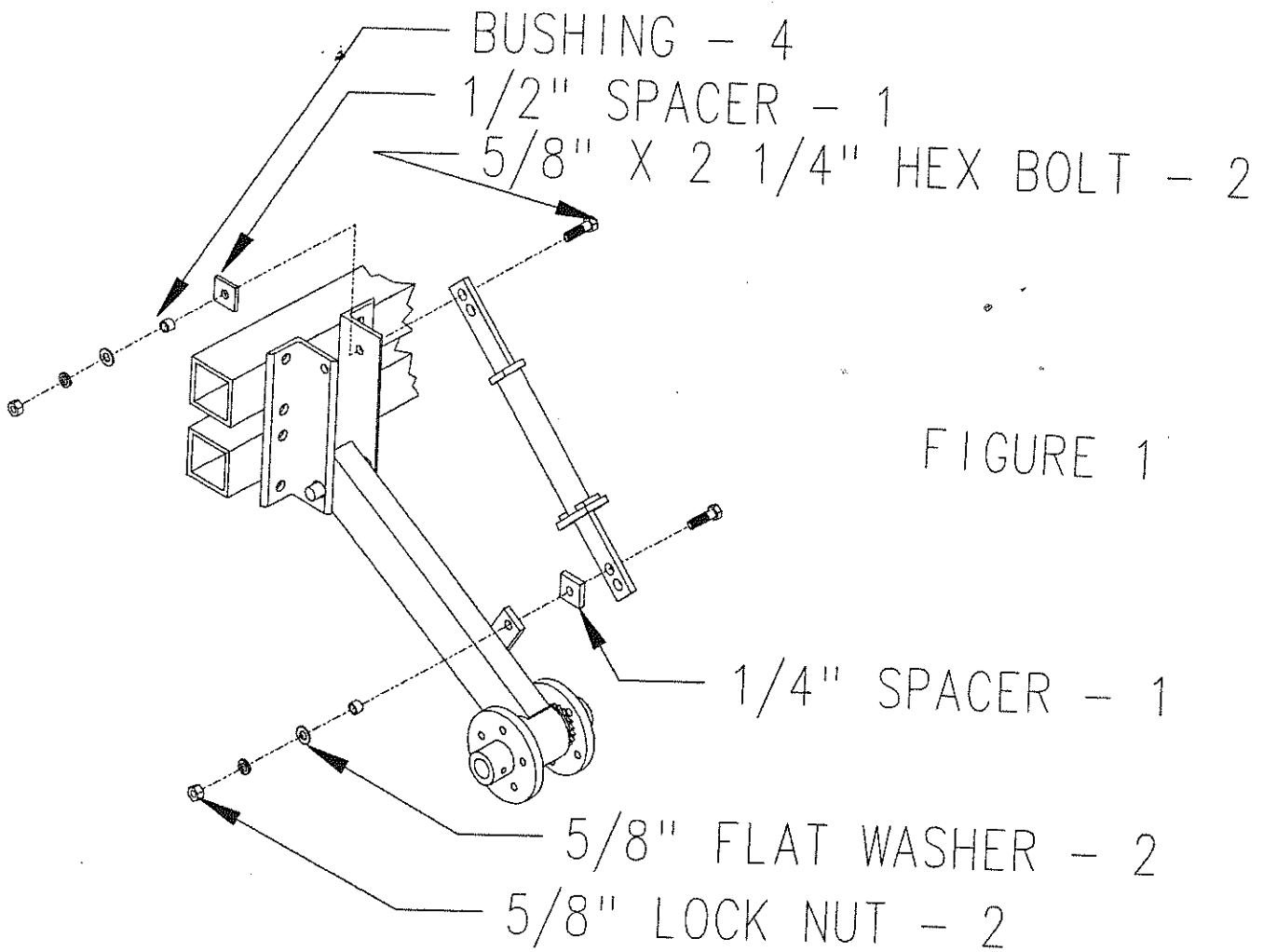


FIGURE 1

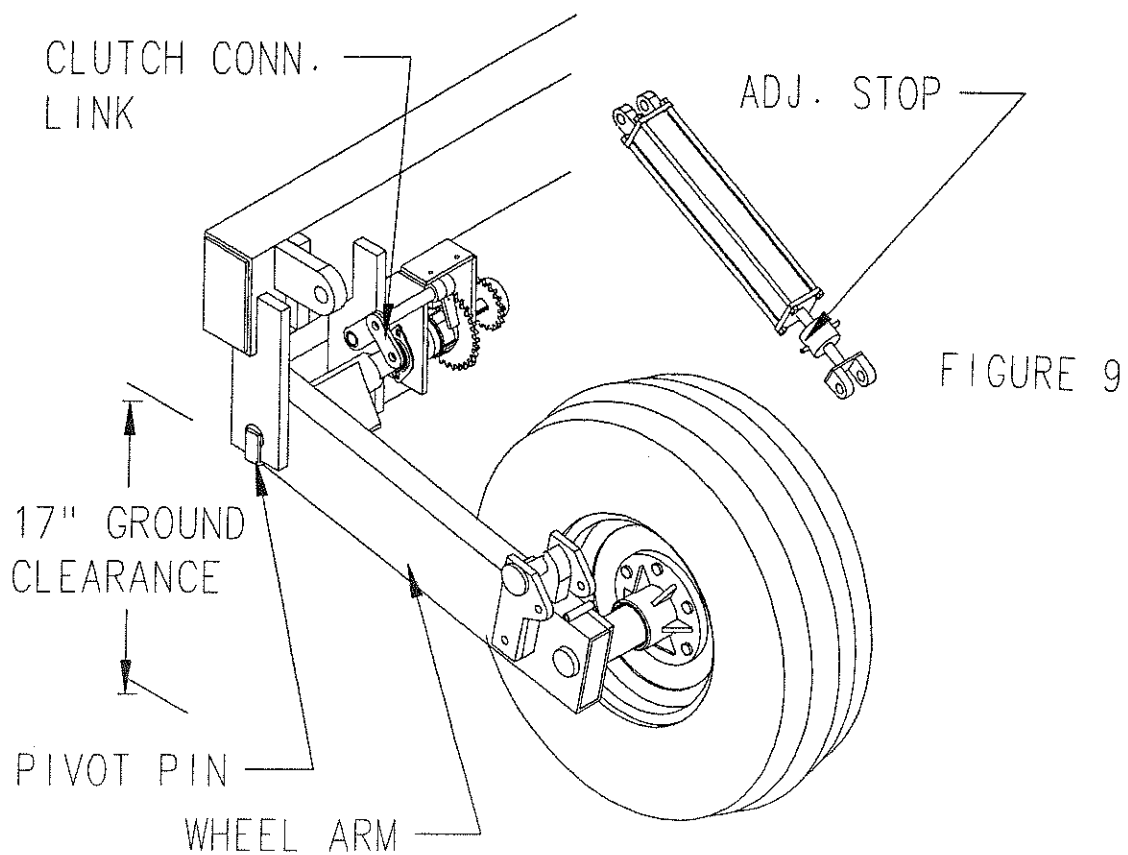


FIGURE 9

- A. 3-Point Hitch Drills: Should be adjusted with the drive wheels in the center height position as shown in figure 1. This should be the proper height for most soil conditions. However, the drill can be lowered 2" for extremely tough soil conditions by moving the drive wheel strap to the inside set of holes. Or the drill can be raised 2" for extremely soft soil conditions by moving the drive wheel strap to the outside set of holes.
- B. Pull Type Drills: Should be adjusted with the cylinder stops on the end wheel cylinders.
 1. Lower the drill and check the 17" dimension as shown in Figure 9. Measure from the ground up to the bottom of the plate where the end wheel arm is attached.
 2. Adjust the cylinder stop until 17" dimension is obtained. This should be the proper height for most soil conditions. However, the height of the drill can be adjusted up or down depending on the soil conditions.

SETTING OPENER DEPTH FOR NO PRESS WHEEL (Figure 5)

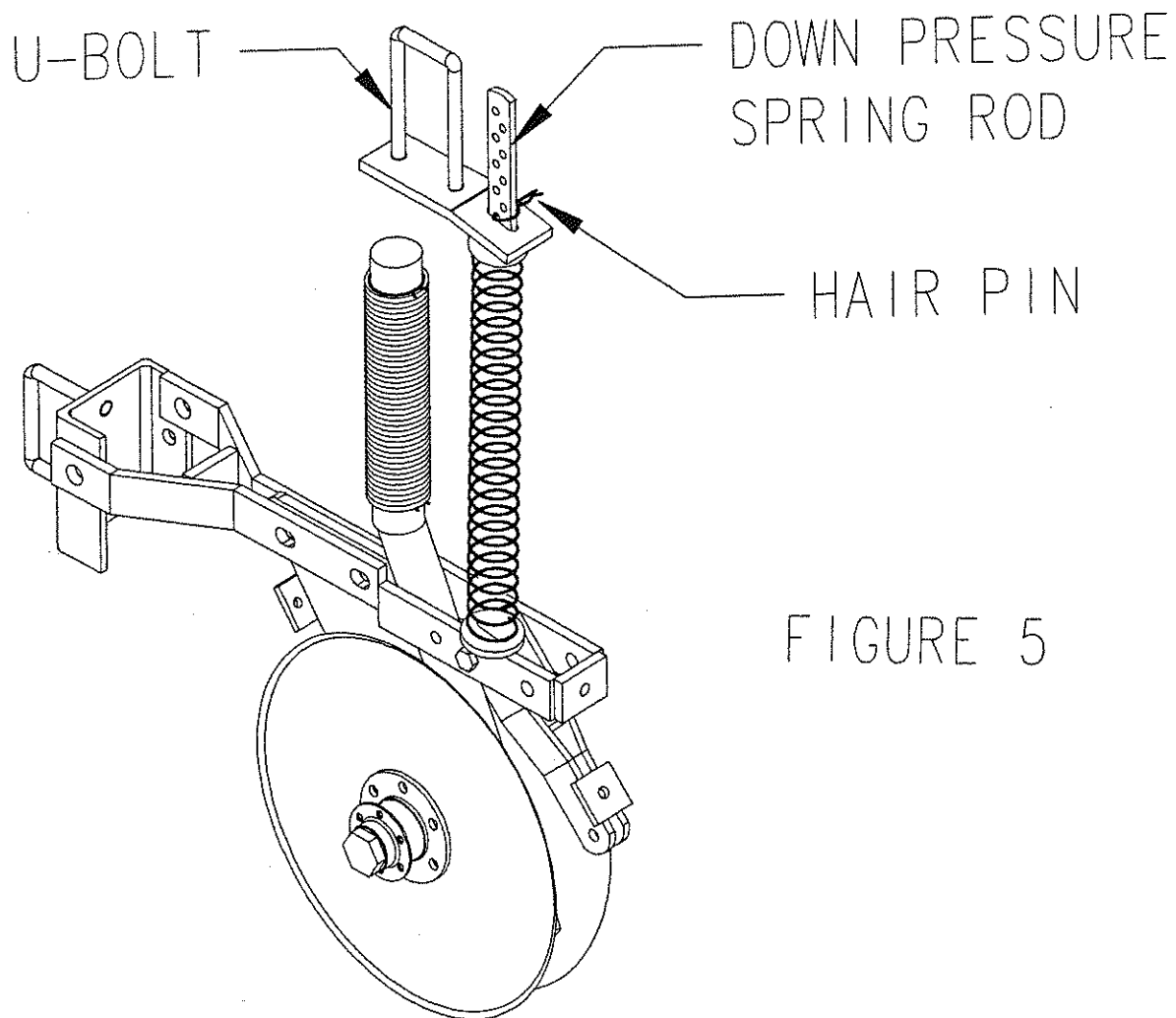
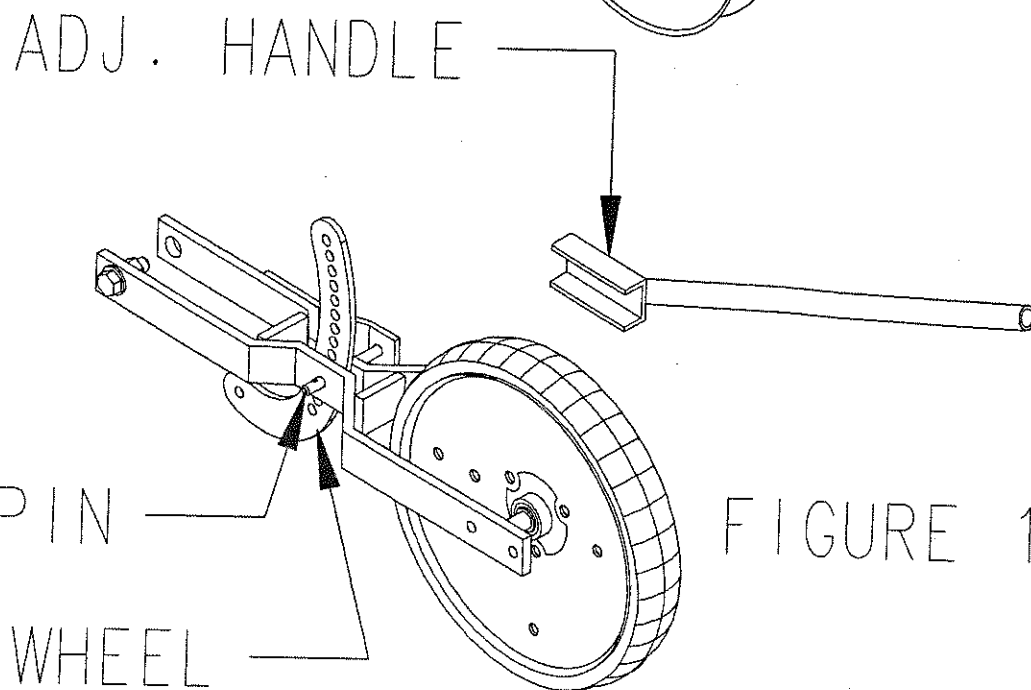
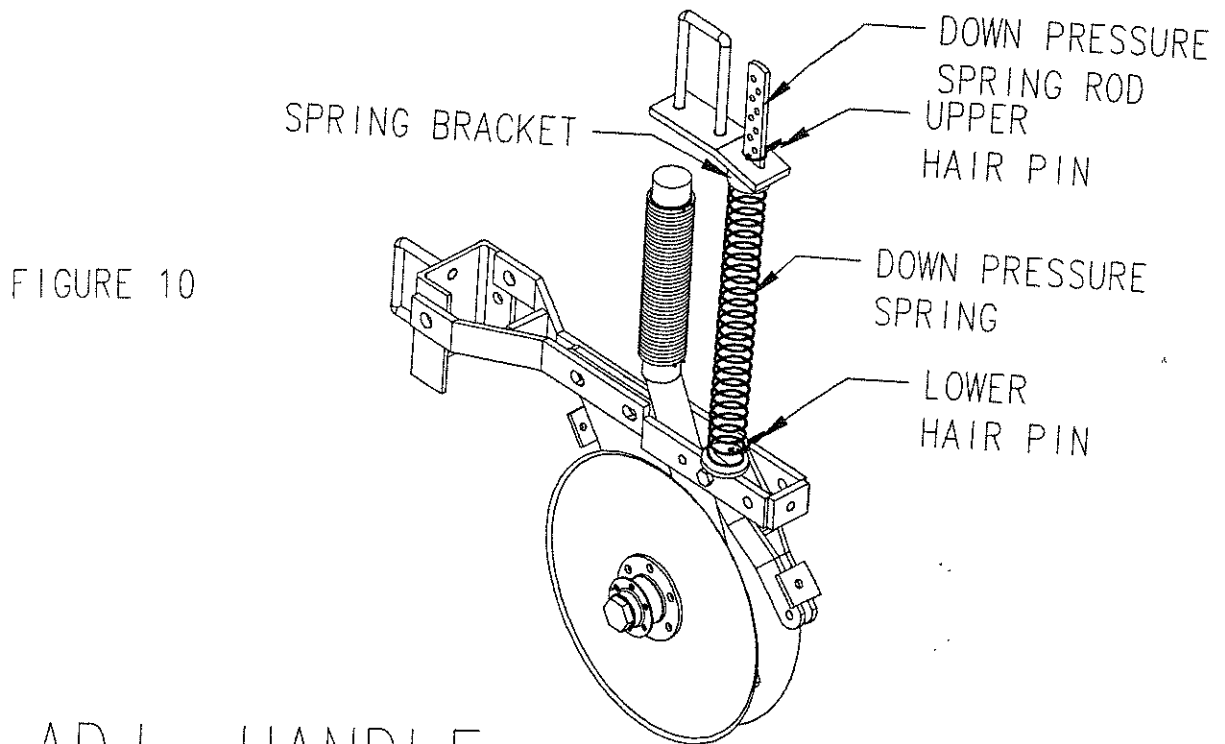


FIGURE 5

1. Locate the down pressure spring rod at the rear of the drill (Figure 5). This rod has a number of holes toward the top which control the opener depth when planting without any type of press / gauge wheel.
 2. Place the hair pin in the hole that produces the desired depth.
- NOTE:** In setting the seed depth work with one outside opener unit. Once it has been set correctly, set all other units the same. When planting in a tractor track, you may wish to set that particular opener a little deeper to obtain good coverage.

SETTING OPENER DEPTH FOR PRESS WHEELS (Figure 10-11)



ADJ. PIN

PRESS WHEEL STRAP

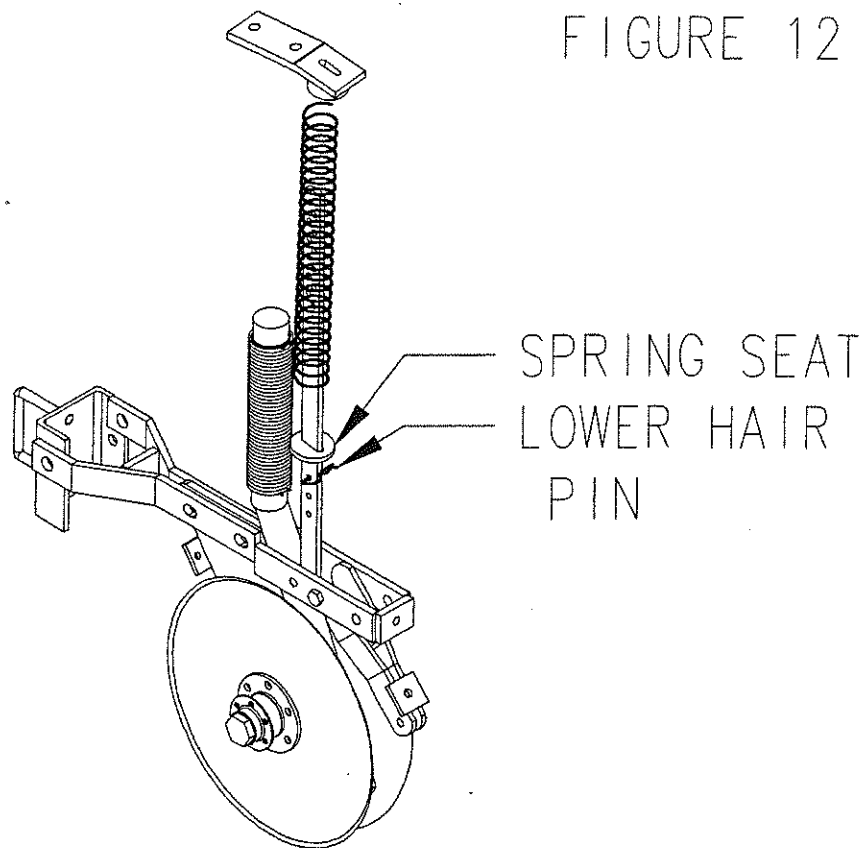
FIGURE 11

(4" X 12", 4" X 16", 2" X 13", 1" X 12" 2" X 13")

1. Set the hair pin in the top hole of the down pressure rod so that the opener can float up and down on uneven terrain (Figure 10). The press wheel will control the depth.
2. Move the pin up and down in the holes on the press wheel strap to adjust for the desired seed depth (Figure 11). Each hole represents $\frac{3}{8}$ " in depth. Moving the pin upward increases the depth and moving it down decreases the depth.

NOTE: In setting the seed depth work with one outside opener unit. Once it has been set to the desired depth, set all the other units the same.

ADJUSTING DOWN PRESSURE (Figure 12)



1. Raise the drill. Holding the press wheel in your hand, lift the unit and remove the hair pin from the top hole of the down pressure spring rod as shown in Figure 10.
2. Lower the unit to release the spring pressure. Move the hair pin in the bottom of the strap up to the desired hole to create enough pressure to force the opener into the ground (Figure 12). Each hole up the strap represents an additional 40 pounds of pressure on the opener. (80 pounds for NO-TILL drills)
3. Raise the unit back into position. Reinsert the hair pin into the top hole of the down pressure spring rod (Figure 10).
4. Lower the drill and pull it forward in the field a few feet. Be sure the parking stands are in the transport position.

STOP AND CHECK:

1. Seed depth.
2. Disc opener penetration.
3. Closing and firming action by the press wheels and the gauge wheels (down pressure).

To check disc opener penetration, the press wheel should be resting firmly on the ground. The opening made by the disc opener should be closed by the gauge and press wheels. To check the down pressure, walk behind the drill while it is in motion. The press wheels should stay firmly on the ground. If the press wheels are bouncing off the ground, more down pressure is needed.

SETTING NO-TILL COULTERS (Figure 13)

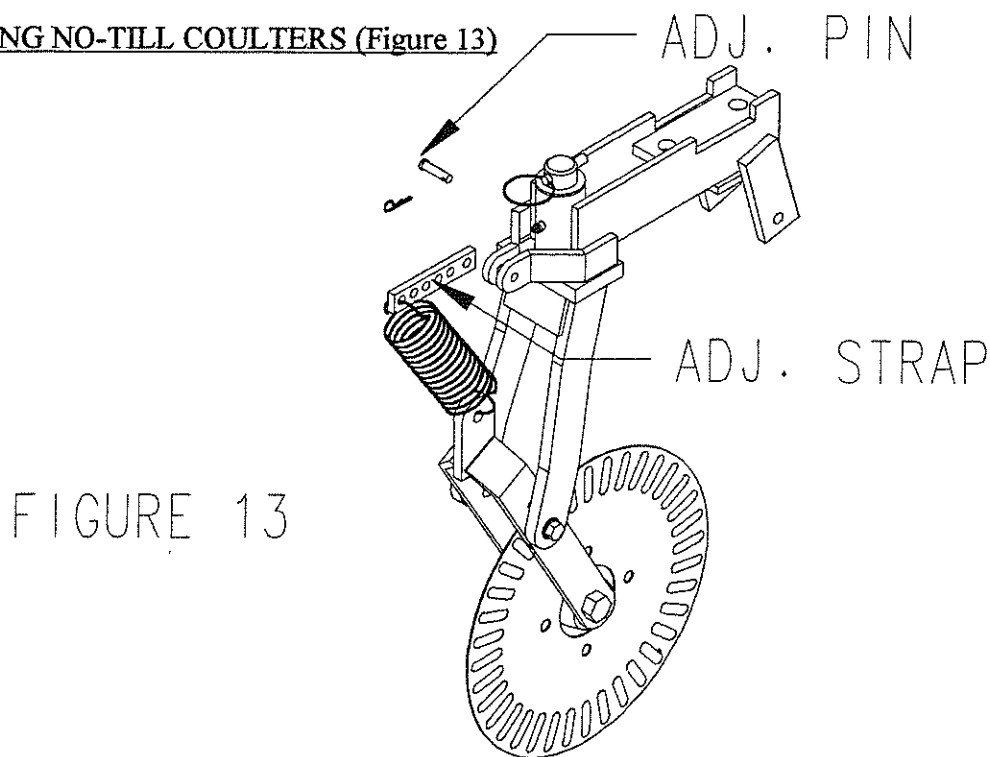


FIGURE 13

1. Drill should be level and height properly adjusted as previously explained.
2. Place the adjusting pin in the second hole from the end of the adjustment strap as shown in Figure 13. This should be suitable for most conditions.
3. Lower the drill and pull forward. If coulters are not going to the desired depth, move the adjusting pin to the third hole in the strap for more depth or move the adjusting pin to the first hole in the strap for less depth.



IMPORTANT

Drill must be properly weighted to insure that the coulters will penetrate the soil to the desired depth. See "Weight Brackets", page 20.

When No- Till drilling, the fluted coulters should never go deeper than the double disc openers or the desired seed depth

NO-TILL DRILLING

The success of No-Till drilling is often dependent on the proper machine set up in the field. In many cases, the weight of the drill is critical to the proper operation of the drill and since the weight of the drill is the ground penetrating force, the proper distribution of this weight is absolutely essential. The weight must be distributed to three main areas: The coulters, the openers, and the press wheels. If too much of the weight is placed on the coulters, for example, it is possible that there won't be sufficient weight left to create proper opener penetration and press wheel pressure. There may be some situations where the ground / trash conditions are so tough that the weight of the machine is not adequate to obtain proper penetration even when the allowable added weight is added to the machine. The following guide is supplied in an effort to increase your success with NO-TILL drilling.

FIELD OPERATION GUIDE FOR NO-TILL DRILLS

GROUND PREPARATION

The effective use of a NO-TILL drill is dependent upon proper field preparation. Consideration should be made long before the ground is to be planted about insuring a properly prepared field that will be suitable for NO-TILL drilling. In the case of wheat or rice ground tread ruts and poor straw distribution should be avoided. For best results, the straw should be chopped and spread evenly as the straw is harvested. Trash problems can be avoided by cutting the crop higher off the ground and herbicide application is not blocked by lying straw. The ground should be relatively smooth in contour and free of large clods or ruts. A MARLISS Drill will handle about 4" - 8" in ground height variation across its width but will perform best on relatively smooth ground. With smooth ground, the spring pressures will be consistent across the width of the machine.

Whenever possible, plant in soils with plenty of moisture (not muddy). Soils with higher moisture contents have considerably less shear strengths than the same soils at a lower moisture content. Therefore many penetration problems can be avoided by simply planting at the proper moisture content. Experience will teach each operator the proper moisture content for his particular soil.

GROUND SPEED

The recommended ground speed for NO-TILL drilling is 4mph. In smooth, well prepared soils, speeds in excess of 8 mph have been successful. The main concern is to allow the springs an opportunity to successfully maintain contact between the ground and the coulters, openers, and press wheels. Excessive bouncing causes inconsistent seed rates and seed depth, and unnecessary wear to the machine. Ground speeds can be tailored to each individual situation. Rough terrain, ground hardness and trash are the main consideration in adjusting ground speeds.

SETTING THE NO-TILL PULL-TYPE DRILL (Figures 9,10,13 & 14)

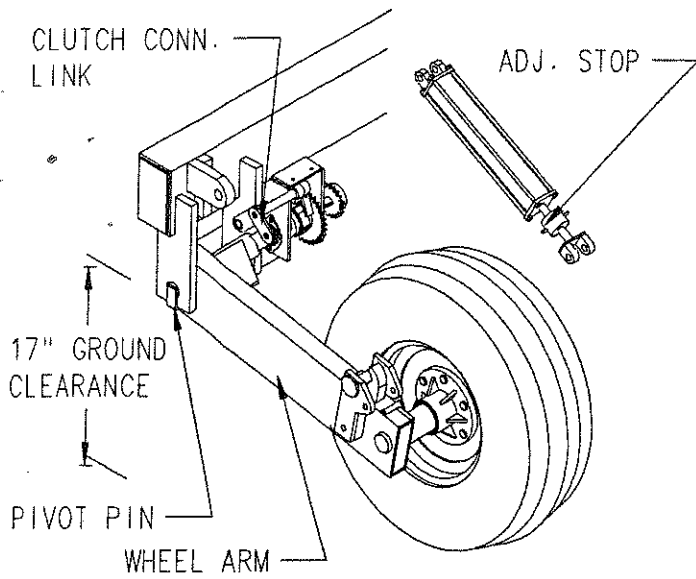


FIGURE 9

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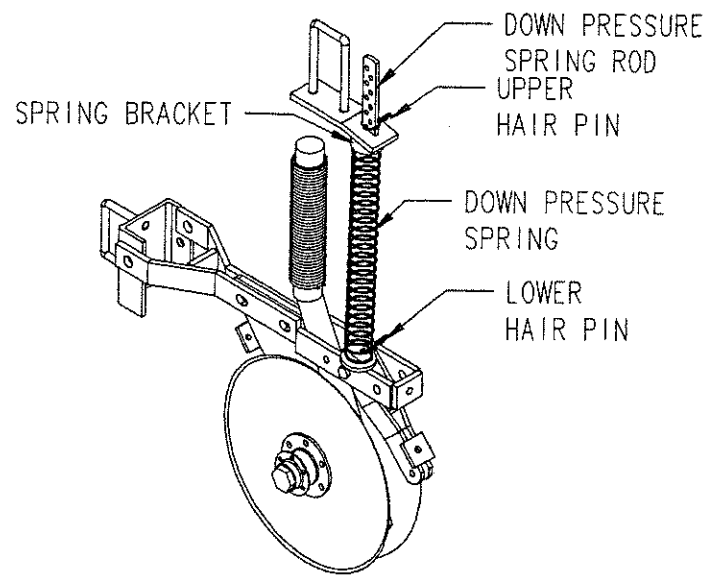


FIGURE 10

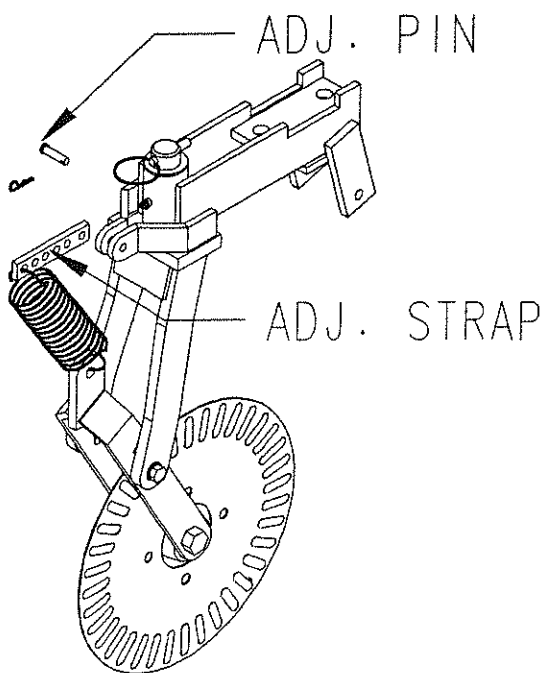


FIGURE 13

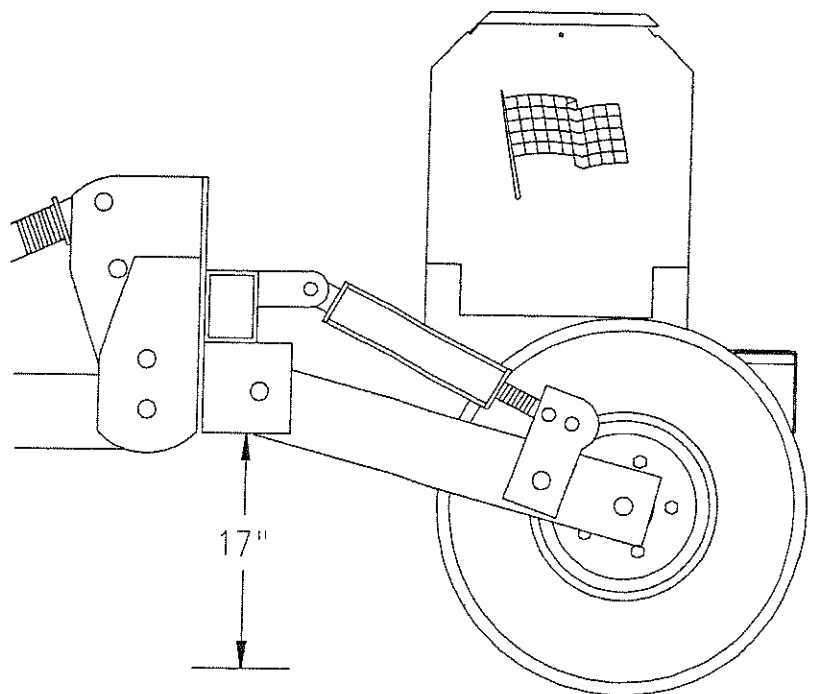


FIGURE 14

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Release all spring pressures from the coulters and from the double disc openers. This is done by placing the pin in the coulters adjustment strap in the last hole in the free end of the strap. Figure 13 shows the coulters and the adjustment strap. Relieve the openers by moving the lower pin in the spring rod to the bottom hole. Figure 10 shows the spring rod and pin. Seed rate can be set according to page 10.

1. Setting Frame Height:

Lower the machine to the ground and pull forward a few feet to allow the discs to penetrate the ground. Adjust the adjustable cylinder stops and aluminum segments on the end wheel cylinders to maintain a frame to ground measurement of 17" when the drill is in the planting position. See Figure 9. Be sure that the 1/2" X 5" bolt is removed from the rear of the cylinder guide so that the drive wheel will be able to float over uneven ground. Figure 9 shows the wheel arm and cylinder guide. The turnbuckle or cylinder connecting the tongue to the center of the machine should be adjusted so that the drill is level when planting. In case of a cylinder, use the adjustable cylinder stop and aluminum segments to maintain a level drill. See page 11, "Leveling the Drill". With the drill leveled and the 17" dimension mentioned earlier. The frame is now set to obtain the full range of the double disc opener's travel. Any change in draw bar height, top link or lifting cylinder could affect the overall operating performance of the machine.

2. Setting Spring Pressure:

With the machine empty and all pressure removed from the coulters and openers, set the outside coulters on each end of the machine in the 2nd hole from the free end of the adjustment strap. Set only the outside two openers. See page 13, "Setting No-Till Coulters". Set the spring down pressure on the openers behind these two outside coulters only to the second hole (one hole down from their present relieved position). See page 14 "Setting Opener Depth for Press Wheels", for proper adjustments information. Pull the drill forward a few feet to check the adjustments that have been made. If the seed depth is not as desired, adjust as needed. The coulters should only be cutting through the trash. The coulters should not be running deeper than the double disc opener. (This can cause erratic and / or excessive seed depth). Check to be sure that the press wheel remains in contact with the ground. It should make the soil over the seed firm but not too firm. Over-packing the seed bed can result in poor stands as the plant may have trouble pushing out of the packed soil. If the press wheel doesn't remain in contact with the ground, more down pressure will be needed. Once the three mechanisms (coulters, opener and press wheel), on the two outside rows are set, the other row units can be set exactly like them.

ADDITION OF WEIGHT

Pull the machine forward with all openers and coulters set as described in the previous section. If the coulters and openers do not penetrate the soil as the two outside openers did in the setting procedure, more weight will be needed. See page 19 "Weight Brackets" to get more information about adding weights. It may be necessary to maintain plenty of seed in the hopper in order to acquire extra weight.

SETTING THE NO-TILL 3-POINT DRILL

A. Setting Frame Height

The frame height on the no-till 3 point drill is set by adjustment of the floating drive arm. The starting position should be with the Drive Wheel strap set in the center position as a start and the drill should be leveled with the top link. See page 11, "Leveling the Drill" and page 5, "Floating Drive Wheel".

B. Setting Spring Pressure

The 3 point drill is set exactly like the pull-type drill. Weight will probably need to be added. See previous section, "Addition of Weight".

OPTIONS

LIFT ASSIST WHEELS

Many times a drill that would normally be too heavy for a certain tractor's hitch lifting capacity, can be used on the same tractor with the addition of lift assist wheels. These lift assist wheels are designed to be used in conjunction with the tractor's 3-point hitch and are to be used without a top link on the 3 point hitch. The lift assist wheels have a built in parallel linkage system that ensures that the pivot shaft of the castor wheel is maintained in a vertical position.



WARNING

The MARLISS lift assist wheels are designed to be used without a top link on the tractor's 3 point hitch. The use of a top link on the 3 point hitch can cause severe loads on both the top link and lift assist. Damage to the top link and lift assist assemblies can result.

The lift assist wheels will usually carry about 1/4 to 1/6 of the total weight of the machine. The tractor's 3 point hitch should carry the rest of the weight. Check your tractor's lifting capacity to determine whether you will need lift assist wheels. To make your decision, figure the weight of grain and in the case of no-till drills, added weight along with your drill's empty weight. Each lift assist wheel has a maximum load allowance of about 1500 pounds. Except for 27' No-Till drills and larger, one pair of lift assist wheels are usually adequate.

MOUNTING THE LIFT ASSIST WHEELS (Figure 15)

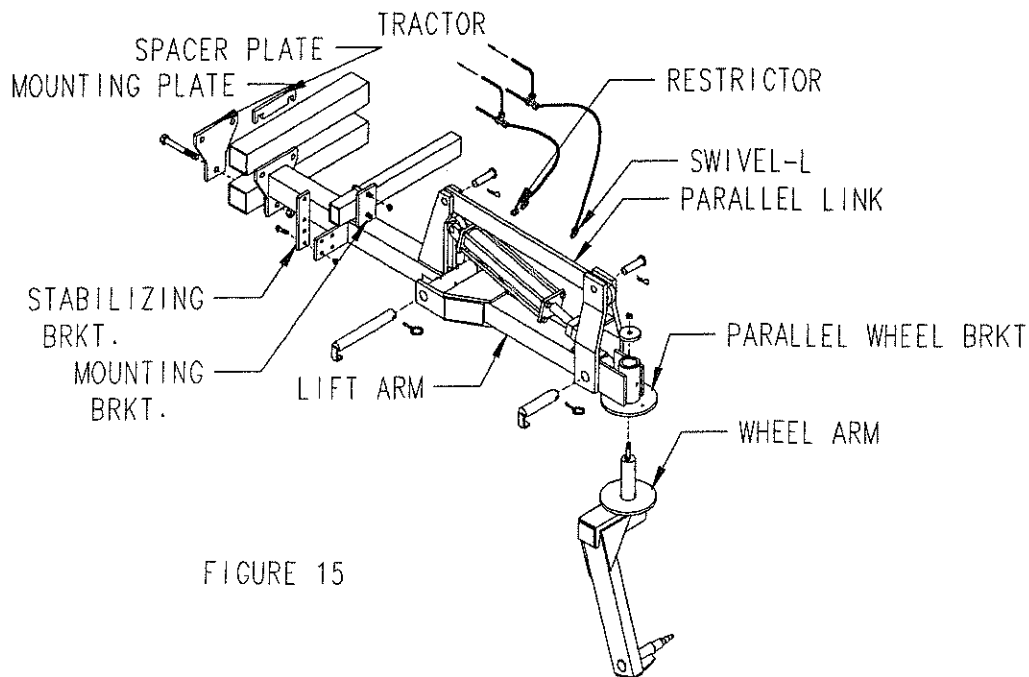


FIGURE 15

The lift assist assembly should be mounted in a balanced fashion. This means that the pair of assists should be centered on the frame. Since secondary bar brackets, walkboard mounts and other assemblies vary from one drill to the next, the placement of lift assists will vary also. Determine the location for mounting each lift assist. Remember to check the front bars of the machine since each lift assist attaches to the front bars. As a general rule, the lift assist assembly

will be mounted somewhere between the fourth and eighth opener from each end, but this can also vary with row spacing and the addition of other options. Remember to keep the wheels close enough together to cross narrow bridges, yet wide enough apart to allow each wheel to swivel completely around without hitting one another. Also leave room for end transport assemblies, if applicable.

The front bars of different size grain drills vary due to structural requirements. For this reason, some upper front bars are 4" X 7" and some upper front bars are 3 1/2" X 3 1/2". All lower bars are 3 1/2" X 3 1/2" tubing.

1. Determine whether the upper front main frame bar is 4" X 7" or 3 1/2" X 3 1/2".
You will need the spacer plate provided only if your machine has an upper front main frame bar which is 3 1/2" X 3 1/2".
2. Determine the place on the drill that the lift assists will be mounted. Be sure that both ends of the drill are clear at this spot so that the lift assists can be mounted the same distance from their corresponding ends. Also, watch for clearance problems with end transport assemblies (ETA's) to make sure that the lift assist wheel can turn a complete circle without hitting the ETA frame.
3. Carefully insert the lift assist mounting bracket over the walkboard between the openers. The small 2" X 2" tube welded to the end of the bracket will sit on top of the lower, front main frame bar. If the top, front main frame bar is 3 1/2" X 3 1/2" add the 1/2" spacer plate which will sit on top of the same 2" X 2" tube. It may be necessary to lower some of the openers to give ample working room. See Figure 15.
4. Bolt the mounting bracket to the back main frame bar with the 7/16" X 3" X 3" U-bolt provided.
5. Place the mounting plate on the front of the main frame bars and attach with the 3/4" X 6" bolts provided. Be sure that the upper two bolts go through the notches in the spacer plate if a spacer plate is required for your machine.
6. Now attach the stabilizing bracket to the mounting bracket with the 2 bolts, nuts and lockwashers provided.
7. Attach the stabilizing bracket to the rear main frame bar with the 7/16" X 3" X 3" U-bolt.
8. Install the lift arm to the mounting bracket with the 1 1/2" X 11 1/4" pin provided.
Put the linch pin in the end of the 1 1/2" pin.
9. Install the 2 1/2" hydraulic cylinder as shown in Figure 15.
10. Attach the parallel wheel bracket with the 1 1/2" X 6 3/8" pin and corresponding linch pin.
11. Attach the parallel link in the center position. This is done by pinning the single hole of the link to the mounting bracket lugs and the center hole of the opposite end of the link to the parallel wheel bracket lugs.
12. Tee the lines to corresponding parts of each cylinder and run hoses to the tractor. See Figure 15.
13. Attach hoses to the tractor's hydraulics and work the assist up and down to rid the lines of air. Leave it in the up position and attach the wheel arm to the parallel wheel bracket with the collar and 3/8" X 3 1/2" bolt provided.
14. Mount wheel and tire.
15. Hook tractor to machine. Do not use a top link.
16. While on smooth, level ground, raise the 3 point hitch as you activate the lift assist. Both the hitch and lift assist should lift together. It is possible to tap into the tractor's 3-point hitch so that the lift assist will work along with the tractor's 3 point hitch. Due to variations in tractors, we will leave this information to each tractor's owners manual. The parallel link should be adjusted so that when the machine is fully lifted, the parallel wheel bracket will be level with the ground. It may be necessary to refrain from lifting the 3 point hitch to its highest position.



WARNING

It is very important that the parallel wheel bracket is level with the ground when the machine is lifted. If it is not level at this point, the swiveling action of the wheel arm will be severely hampered and a bent wheel arm could result. The angle of the parallel wheel bracket can be adjusted with the parallel link when fully lifted. If, when lifted, the link needs to be moved to a position shorter than the shortest position, it will be necessary to lower the front of the machine by not lifting it to the highest position.

ADJUSTING THE LIFT ASSIST WHEELS IN THE FIELD

Since the machine that is equipped with lift assists has no top link, the level of the machine is adjusted with the lift assists. The lift assist assembly is equipped with an adjustable cylinder stop for small adjustments and also dough-nut style aluminum segments for larger adjustment. Add or remove segments until the level of the drill is correct. Check the level by lowering the machine and planting forward a few feet. The machine should be level and the lift assist wheels should be rolling. Adjust further if needed. The machine should now raise to position for turning and lower to a planting position. Be sure the raised position is properly adjusted. See page 17 above "Mounting The Lift Assist".

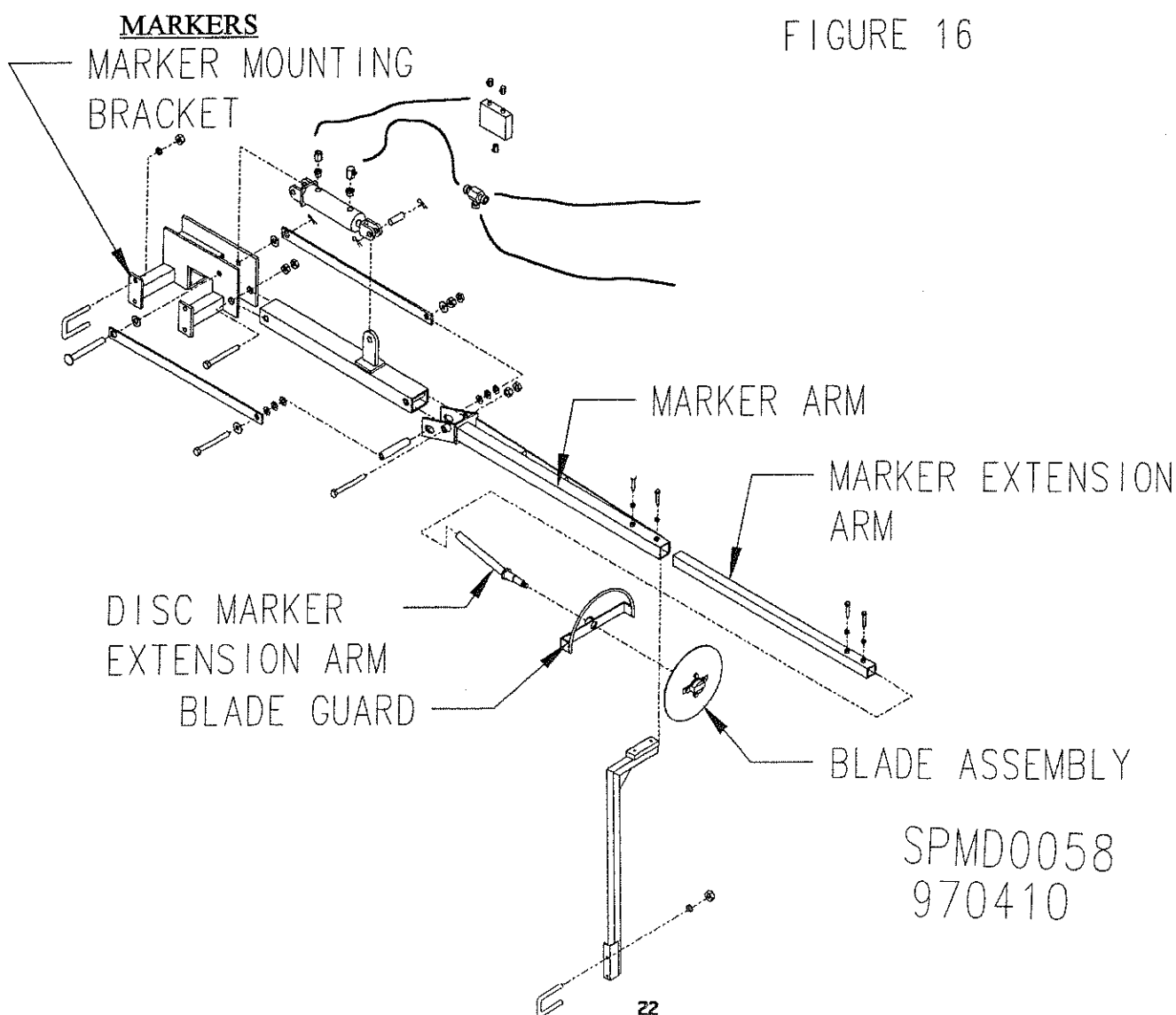


FIGURE 16

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Marliss Drills have optional markers available

1. A. 3 point conventional drills up to 15': Attach the marker mounting bracket to the 3 1/2" square bar main frame as shown in Figure (16). The square area in the center of the bracket should mount directly over the floating drive arm .
B. 20' conventional, all Pull-Type & No-Till: The mounting bracket attaches to the 4" X 7" bar.
C. The marker stand attaches to the same bar as the mounting bracket and is positioned to allow the Flat Fold Marker to set on the stand. Figure (16).
2. The hydraulic sequence valve is attached to the center mast and hoses are routed to the cylinders as shown in Figure (16).
3. Flat Fold Marker extension arms can be adjusted in or out as needed to line the furrow with the center line of the tractor. The blade and arm assembly can be rotated to change the pitch of the blade for making wider or narrower marker furrows.

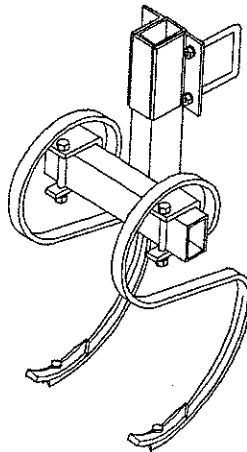


CAUTION

Keep marker blade guard and all other safety guards in place at all times.

WHEEL TRACK PLOWS (Figure 17)

Figure 17



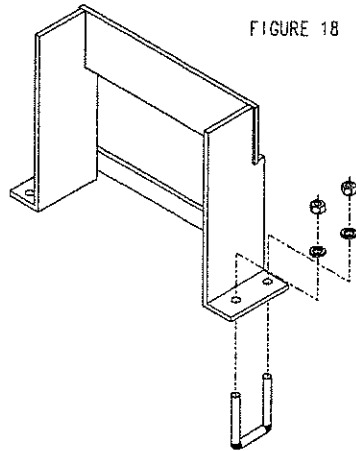
This plow is used to alleviate the track left by the tractor. To use wheel track plows, the clearance between the tractor tires and the grain drill main frame must be a minimum of 10".

1. Bolt the attaching bracket to the lower bar of the main frame with the U-bolt provided. See Figure 17.
2. Slip the plow shank into the bracket.
3. Slide the shank up or down to attain plow penetration, and tighten the U-bolt.

DRAG CHAINS

Sometimes drag chains rather than press wheels are used to cover seed. The MARLISS seed opener unit has a special hole in the rear of each frame for the attachment of the drag chains.

WEIGHT BRACKETS (Figure 18)

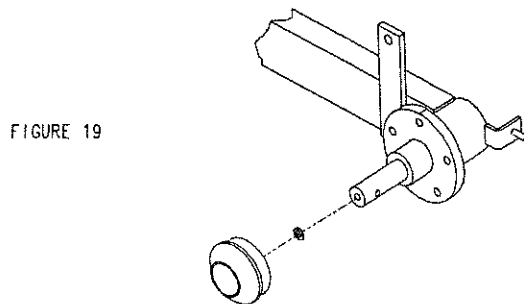


In No-Till situations, extra weight is usually needed to ensure proper ground penetration. When using suitcase type weights, mount the weight brackets as shown in Figure 18. As a general rule, about 100 pounds of weight per row will give good results in most conditions. Therefore, a 10' drill on 8" spacing (15 openers) would probably need as much as 1500 pounds of added weight in some conditions. Ground conditions vary and less weight may be used with good results. If suitcase weights are used, the total added weight could reach 2000 pounds per brackets. The structural strength of the machine should not be exceeded. To protect your machine, limit the added weight to 100 pounds per row.

ACRE METERS

Marliss drills are equipped with an acre meter. The 5' and 7' 3 point drills have an electronic acre meter which mounts on the meter drive shaft. All other models are equipped with a mechanical meter driven by the drive wheel. The mechanical acre meter is calibrated for a tire which has an effective circumference of 91". Most 15" farm implement tires will give good results. A slightly smaller tire will make the meter read high and a larger tire will make the meter read low.

MOUNTING THE ACRE METER TO 3-POINT MACHINES (Figure 19)



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On all 3-point machines, except 5' & 7' the acre meter mounts to the threaded end of the drive wheel spindle.

MOUNTING THE ACRE METER TO PULL-TYPE DRILLS (Figure 20 & 21)

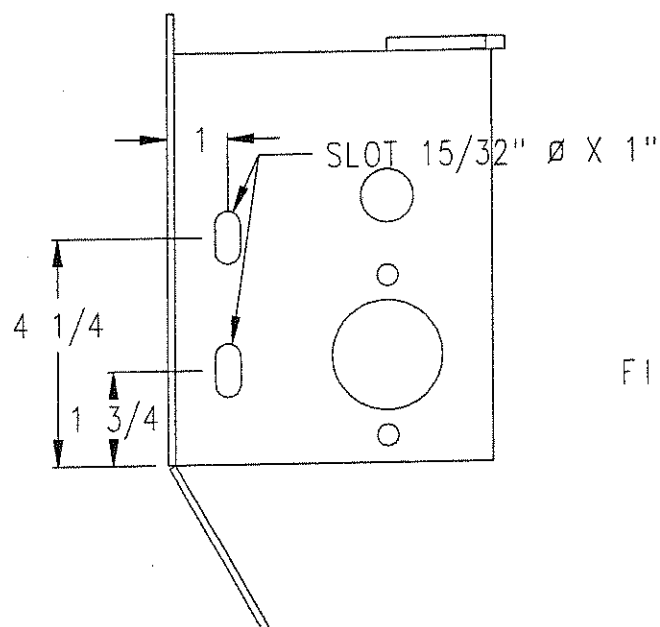


FIGURE 20

Since the drive wheels of pull-type machines are also used to transport the machine, the acre meter can not be mounted directly to the drive wheel, as was done with the 3 point drills. (If the acre meter was attached to the wheel, the meter would count acres even when transporting the machine down the road).

1. Check the side plates of the clutch housing to be sure there are two 15/32" holes on each plate. Some drills may not have these holes. If not, the first hole should be bored 1 3/4" below the 4" X 7" bar and 1 1/8" from the extreme outside of the front of the clutch housing. Drill one hole in each of the two side plates of the clutch housing. If your drill has a clutch housing on each end, you will only need to drill one end. Then drill another 15/32" hole 2 1/2" below the first hole. These holes will be used to mount bearing holders. See Figure 20.

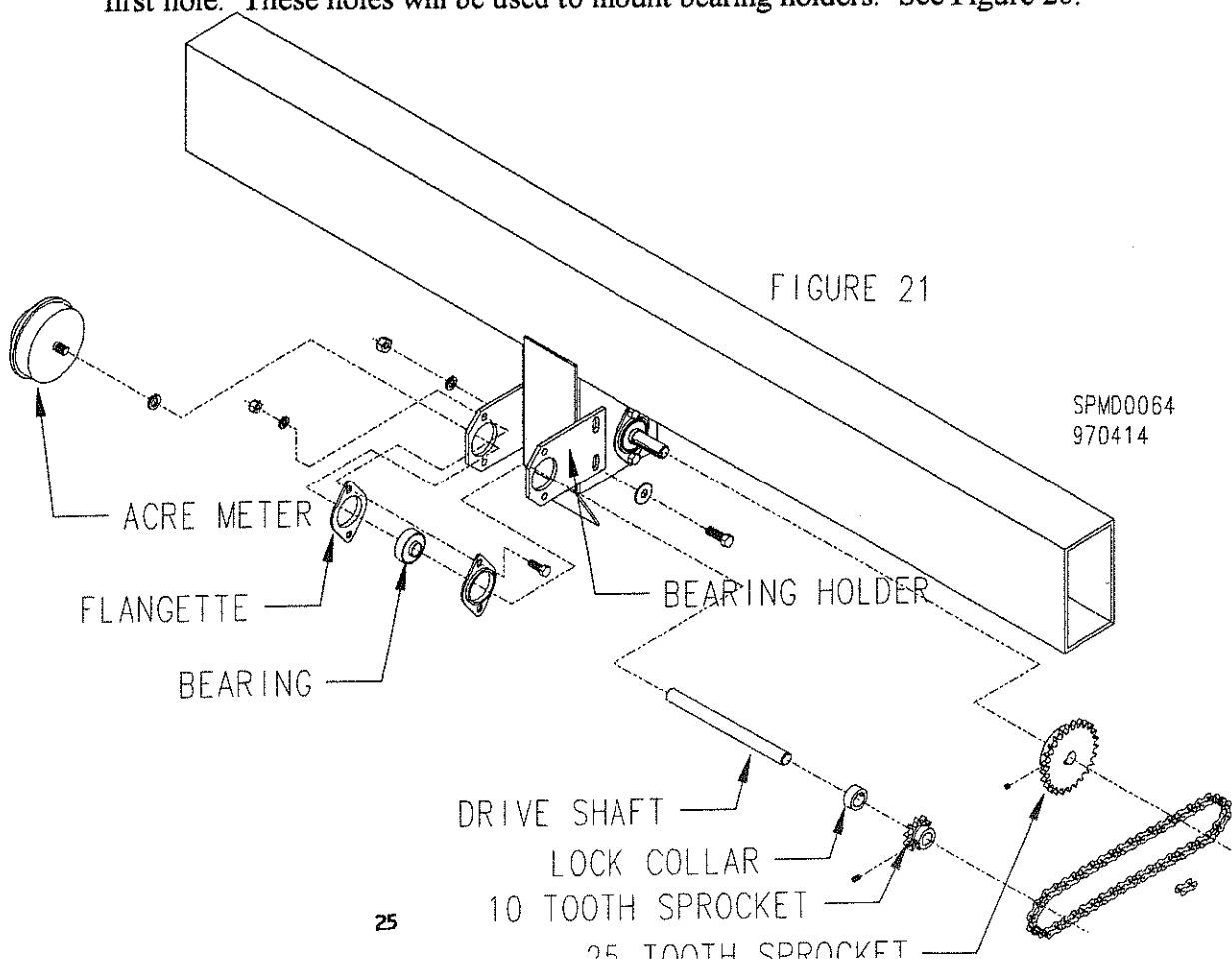
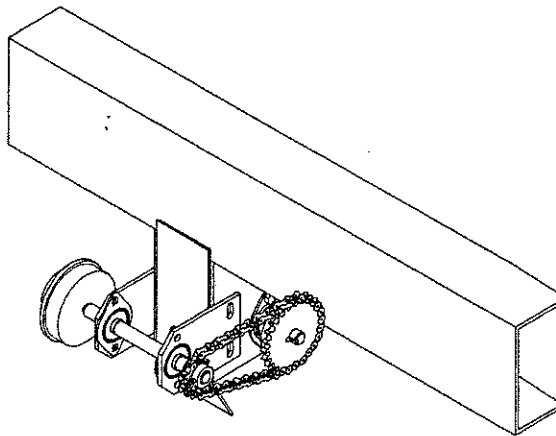


FIGURE 21

2. Bolt the bearing plates to the side plates of the clutch shaft housing with the four 7/16" X 1 1/4" bolts, flat washers and lock nuts provided. See Figure 21
3. Remove the locking collar on the end of the clutch shaft adjacent to the drive wheel arm.
4. Insert the 25 tooth sprocket on the end the clutch shaft and slide the hub side of the sprocket up against the clutch shaft bearing. Tighten the set screw in the sprocket. Then add another set screw in the same hole of the 25 tooth sprocket to serve as a jam screw. This should keep the sprocket tight. See Figure 21. Note that there is no key in the clutch shaft to aid in holding the 24 tooth sprocket. Be sure the set screw is tight.
5. Put each bearing between two flangettes and bolt the flangettes to the bearing holders mounted in step 2. Be sure that the bearing on the side which will be sprocket driven is mounted so that the locking collar is located in the hole of the bearing holder. See Figure 21. This will allow room for a small 10 tooth sprocket to align with the 25 tooth sprocket. The bearing on the other bearing holder can be mounted either way.
6. Insert the 9" shaft through the bearings. The bearing holders will probably have to be somewhat aligned in order to insert the shaft. Mount the shaft so that the acre meter will mount as shown in Figure 21. Set and tighten locking collars.
7. Place the 10 tooth sprocket on the shaft and align with the 25 tooth sprocket mounted in step 4. Tighten the set screw. It will only have one set screw.
8. Install the acre meter on the other end of the shaft. Be sure to add the 1/2" lock washer to keep the acre meter tight. Check the tightness of all sprockets after the first few acres.

FIGURE 22



9. Install the chain to the 10 tooth and 25 tooth sprockets. The chain should not be too tight since a tight chain would cause the sprocket to get loose. Figure 22 shows the mounted acre meter.



WARNING

Keep loose clothing, hands, and other parts of the body away from chains and other moving parts. Keep all safety shields in place.

10. Do not attempt to tighten the acre meter without holding the 9" jack shaft with vise grip type pliers or regular pliers. If it were to be tightened using only the chain connecting the sprockets, the force rotation of the acre meter could cause the sprockets to slip on the shafts.
11. If a problem should develop with the sprockets getting loose, a flat spot may be ground on each shaft under the set screw. An alternate method would be to bore a small shallow hole (1/8" deep) in the shaft under the set screw. These methods should only be used if a problem should develop. If the sprockets are checked for tightness periodically, a problem should not develop. The problem usually occurs when the sprockets become loose and turn on the shaft.

END TRANSPORT ASSEMBLIES

For most MARLISS drills, 14' and larger, end transport assemblies are offered as optional equipment in order to minimize the transport width of your drill.

MOUNTING END TRANSPORT ASSEMBLY TO 20' & 27' CONVENTIONAL 3-PT DRILLS

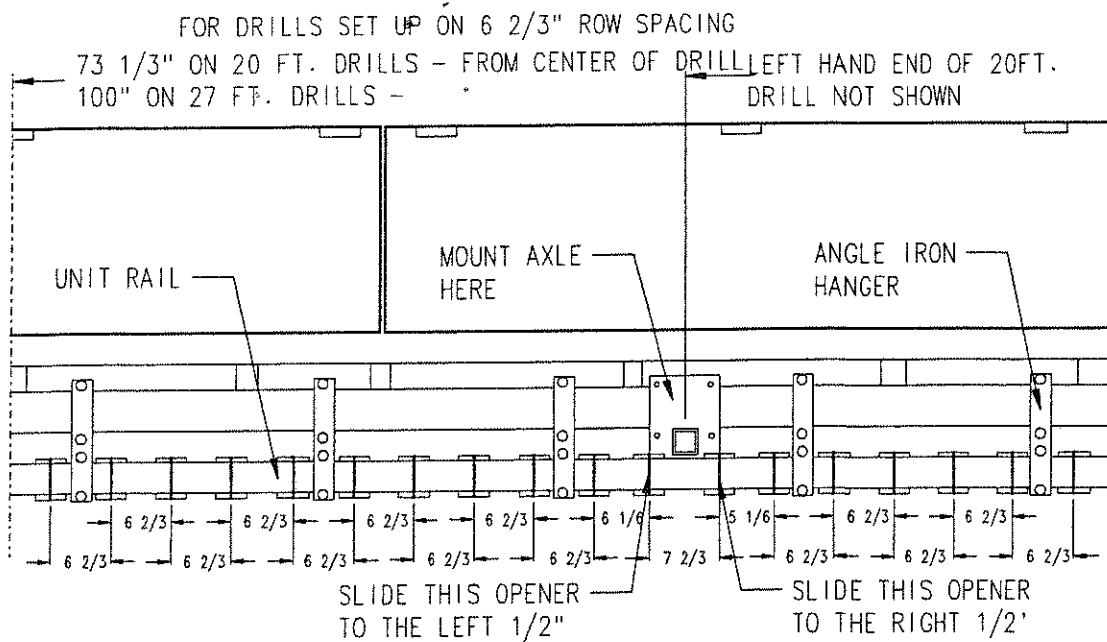


FIGURE 23

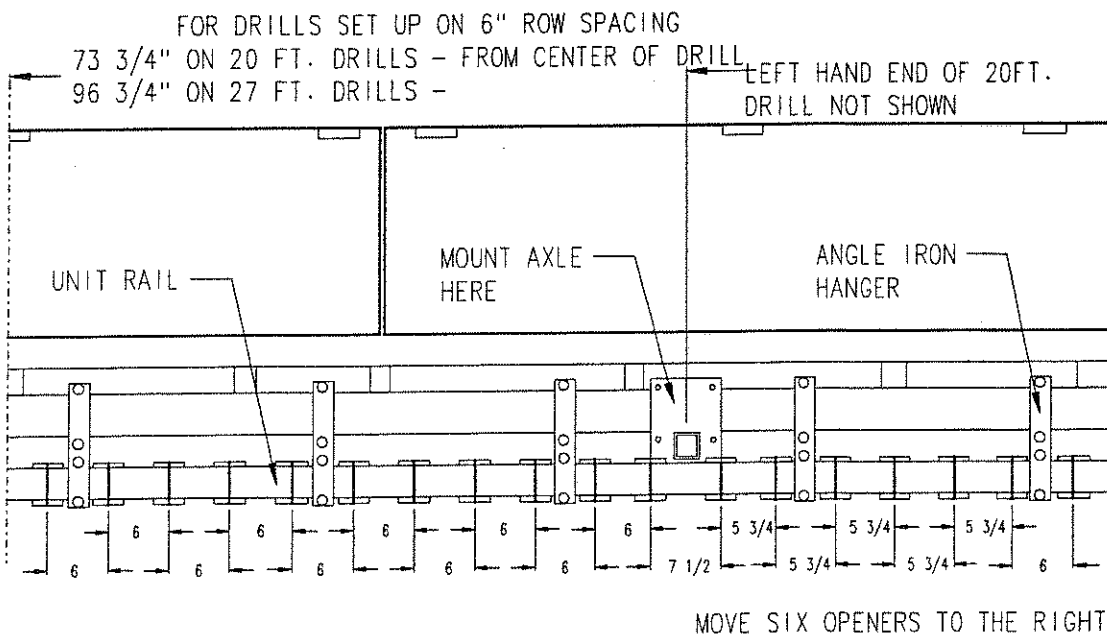


FIGURE 24

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Standing in front of the drill, measure from the center of the 3 point hitch center mast:
72" to 73" to the right on a 20' drill (Figure 23 & 24)

96" to 100" to the right on a 27' drill (Figure 23 & 24)

Put a mark on the bottom 3 1/2" square bar of the main frame. The axle will have to be mounted in this area beneath the bottom 3 1/2" square bar of the main frame and above the 2" X 3" unit rail (Figure 23 or 24). The axle will have to be mounted between 2 opener units; therefore, a 7 1/2" row spacing will be required in this one area. If the drill is set up on a 6" or 6 2/3" row spacing adjustment of the opener units will be necessary. For drills set up on 6" row spacing, adjust the adjacent 6 openers on the right hand side of this area 5 3/4" spacing as follows: Fig. 24

1. Move the 6th opener on the right hand side of this area by loosening the U-bolt that holds the opener to the 2" X 3" unit rail and sliding it 1/4" to the right.
2. Move the 5th opener on the right hand side of this area 1/2" to the right, leaving a 5 3/4" row spacing between the 5th and 6th openers.
3. Move the 4th opener on the right hand side of this area 3/4" to the right, etc. until the first opener on the right hand side of this area has been moved 1 1/2", leaving a 7 1/2" row spacing in this area to mount the axle.
4. After adjusting the openers on the 2" X 3" unit rail, move to the rear of the drill and adjust the down pressure spring brackets mounted on the 2" X 3" rear bar exactly the same way.
5. Retighten all U-bolts.

For drills set up on 6 2/3" row spacing, adjust 1 opener on each side of the area by loosening the U-bolt that holds the opener to the 2" X 3" unit rail and sliding the one on the right hand side approximately 1/2" to the right and sliding the one on the left hand side approximately 1/2" to the left. (Figure 23). After adjusting the 2 openers on the 2" X 3" unit rail, move to the rear of the drill and adjust the down pressure spring brackets mounted on the 2" X 3" rear bar exactly the same way. Retighten all U-bolts.

MOUNTING TRANSPORT AXLE ON ALL CONVENTIONAL 3-PT DRILLS

1. Before installing the axle, loosen the U-bolts that mount the angle iron hangers to the main frame and the unit rail (Figure 23 or 24). This will allow the axle to be installed between the bars more freely.
2. Install the axle between the 2 bars until the flange on the axle is against the 3 1/2" square bar of the main frame. Fasten with two 3/4" X 3 1/2" U-bolts 5" long around the 3 1/2" square bar of the main frame (Figure 25). Do not tighten the U-bolts.

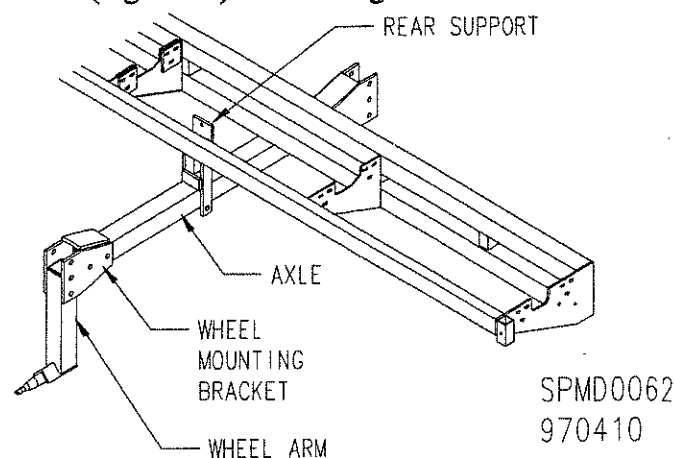
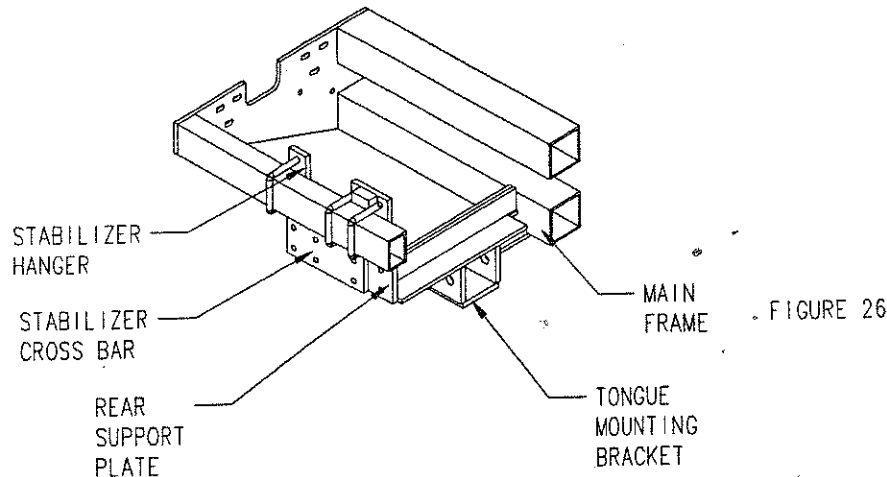


FIGURE 25

3. Go to the rear of the drill and install the rear support bracket (Figure 25) by placing the legs of the bracket on each side of the axle and under the 2" X 3" rear bar of the drills. Fasten the bracket to the 2" X 3" rear bar of the drill with 7/16" X 3" U-bolts 3" long. Fasten the bracket to the axle with the 3/4" X 5 1/2" bolt through the legs of the bracket and under the axle.

4. Install the stabilizer cross bar (1/2" X 1/4" plate - 10" long with 4 holes) behind the bracket and fasten through the holes in the bracket with two 1/2" X 1 1/2" bolts (Figure 25). Figure 26 shows another stabilizing bracket which mounts like the bracket being referenced.



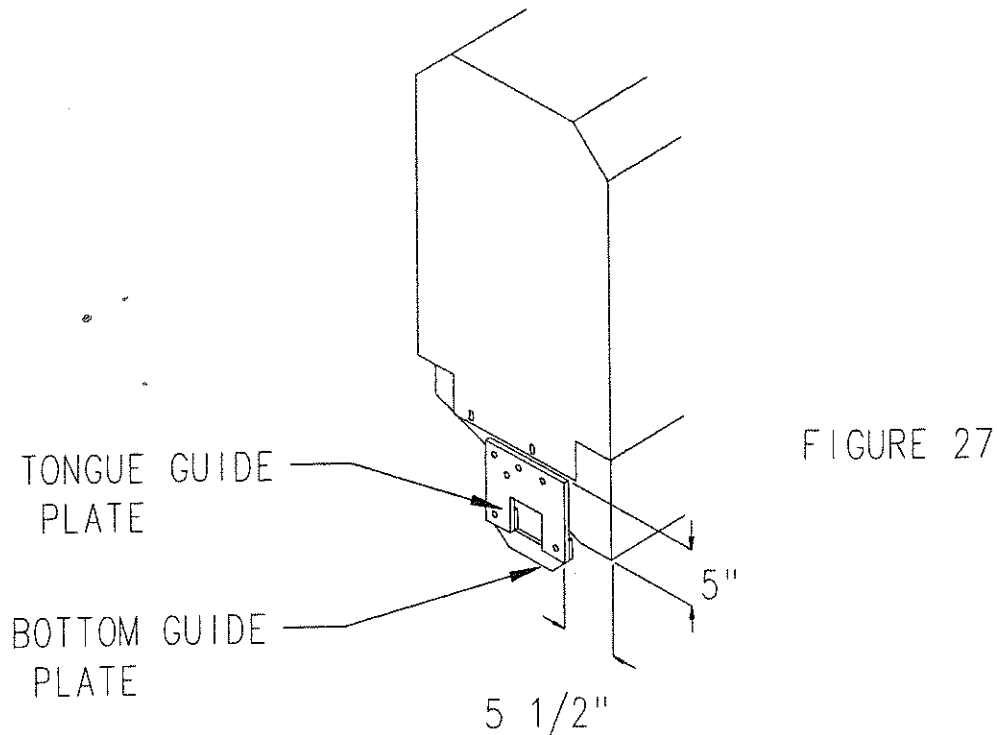
5. Install the stabilizer hanger (1/2" X 4" plate, 11" long with 4 holes) to the opposite end of the stabilizer cross bar and to the 2" X 3" rear bar of the drill using the 1/2" X 1 1/2" bolts & 7/16" X 3" U-bolts 3" long.
6. Install the wheel mounting bracket to the end of the axle and fasten with two 3/4" X 5 1/2" bolts (Figure 25).
7. Adjust the axle until it is directly between the 2 openers. Tighten all bolts and nuts.
8. Install the tires to the wheels.
9. Install the wheels and tires to the wheel arms.
10. Install the wheel arm to the axle by inserting the 3/4" X 5 1/2" bolt through the center hole of the wheel mounting bracket and through the top hole of the wheel arm (Figure 25).
11. Raise the wheel until it is all the way up and install the 3/4" X 7" hitch pin through the top hole of the wheel arm bracket and through the 2nd hole of the wheel arm.

MOUNTING THE TONGUE MOUNTING BRKT. FOR 20' & 27' CONVENTIONAL 3-PT DRILLS

Standing behind the drill, measure approximately 52" - 54" from the right-hand end of the drill (the opposite end from where the axle was mounted). For drills set up on 6" row spacing, this will be between the 9th and 10th opener from the right-hand end. For drills set up on 6 2/3" row spacing, this will be between the 8th and 9th opener from the right-hand end. For drills set up on 8" row spacing, this will be between the 7th and 8th openers, etc.

1. Position the tongue mounting bracket between the openers (as stated above) and between the lower 3 1/2" square bar of the main frame and the 2" X 3" unit rail.
2. Fasten the tongue mounting bracket to the lower 3 1/2" square bar of the main frame with the two 3/4" X 3 1/2" U-bolts 5" long (Figure 26). Do not tighten U-bolts.
3. Install the rear support plate behind the 2" X 3" rear bar of the drill with 1" square block resting on top of the 2" X 3" rear bar and fasten with two 7/16" X 3" U-bolts 3" long around the 2" X 3" rear bar. Do not tighten U-bolts.
4. Install the stabilizer cross bar (1/2" X 3 1/2" plate 8" long with 6 holes) and fasten to the rear support plate and the tongue mounting bracket with two 7/16" X 2 1/2" bolts.
5. Install two 7/16" X 2" bolts to fasten the rear support plate to the tongue mounting bracket. Do not tighten bolts.
6. Install the stabilizer hanger (1/2" X 3 1/2" bar, 10" long with 4 holes) and fasten to the stabilizer cross bar with two 7/16" X 2" bolts and to the 2" X 3" rear bar of the drill with the 7/16" X 3" U-bolts 3" long.
7. Adjust the tongue mounting bracket until it is directly between the 2 openers. Tighten all bolts and nuts.

MOUNTING THE TONGUE GUIDE PLATES FOR 20' & 27' CONVENTIONAL 3-PT DRILLS



Standing behind the drill, move to the right-hand end of the drill, (refer to Figure 27) and install the plates as follows:

1. Position one of the tongue guide plates on the outside of the main frame to the dimension (shown in Figure 27) and clamp in position with a suitable clamp.
2. Using a $17/32$ " drill bit, drill through the existing holes in the tongue guide plate and through the main frame of the drill. After drilling one hole, it is recommended that a $1/2$ " X 2" bolt be installed and tightened to help hold the guide plate in position while drilling the other three holes.
3. After the four holes have been drilled in the main frame, install a tongue guide plate on each side of the end plate of the main frame and fasten with four $1/2$ " X 2" bolts. Do not tighten bolts.
4. Install the bottom guide plate between the 2 larger guide plates and fasten with two $1/2$ " X 2" bolts.
5. Tighten all 6 of the bolts and nuts.

MOUNTING THE TONGUE FOR 20' & 27' CONVENTIONAL 3-PT DRILLS

1. Insert the tongue through the guide plate previously mounted to the drill and slide the tongue under the drill and into the tongue mounting bracket.
2. Fasten the tongue to the tongue mounting bracket using the $3/4$ " X 7" hitch pin.
3. Place the $3/4$ " X 7" hitch pin through the holes in the tongue mounting bracket and through the hole in the end of the tongue.
4. The tongue can be stored under the drill by removing the $3/4$ " X 7" hitch pin from the tongue mounting bracket and sliding the tongue under the drill. The tongue can be secured under the drill by placing a $3/8$ " bolt in the hole in the top of the tongue tube immediately behind the tongue guide plate.

FOR DRILLS SET UP ON 6 2/3" ROW

73 1/3" ON 20 FT. DRILLS - FROM CENTER OF DRILL
100" ON 27 FT. DRILLS

LEFT HAND END OF 20FT N.T. DRILL NOT SHOWN

SECONDARY BAR

UNIT OPENER

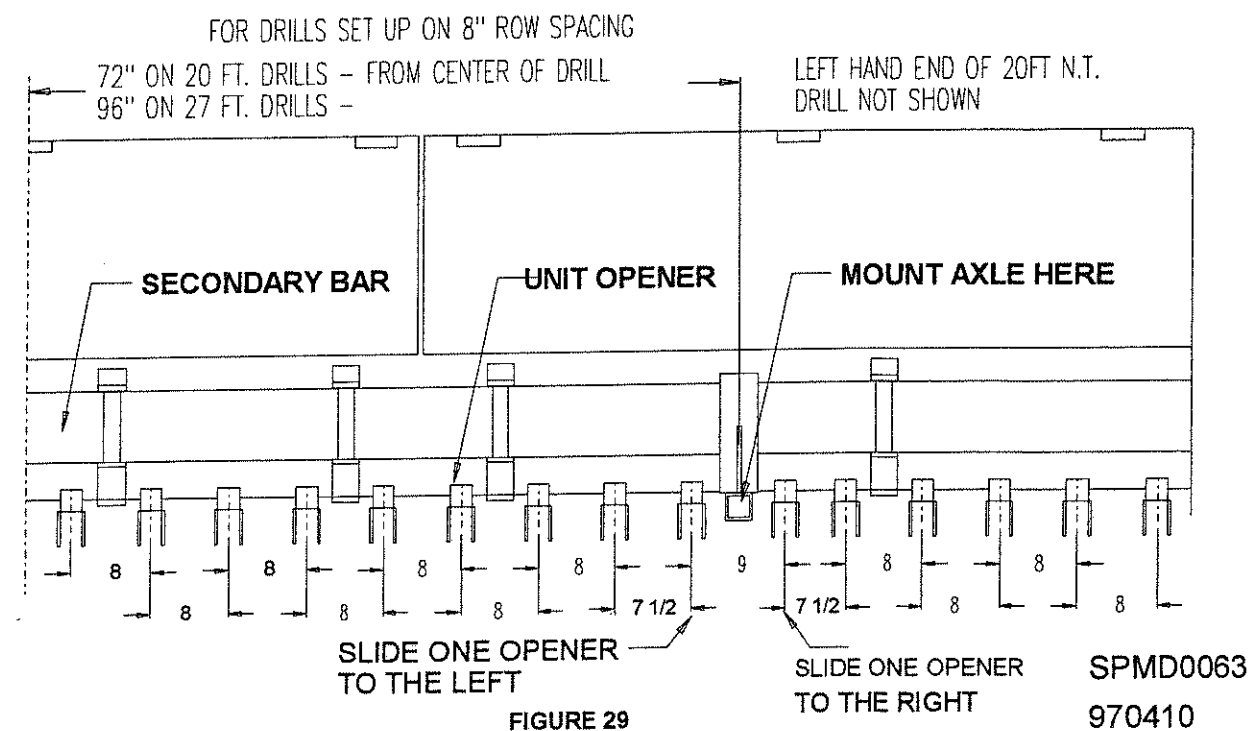
MOUNT AXLE HERE

6 2/3 6 2/3 6 2/3 6 2/3 6 6 6 6 6 2/3 6 2/3

9 1/3

SLIDE ONE OPENER TO THE LEFT.

SLIDE THREE OPENERS TO THE RIGHT



Standing in front of the drill, measure from center of the 3 pt hitch center mast:

72" to 74" to the right on a 20' drill (Figures 28 & 29)

96" to 100 2/3" to the right on a 27" drill (Figures 28 & 29)

Put a mark on the bottom 3 1/2" square bar of the main frame to show the point at which the axle will be mounted. The axle will have to be mounted at this point beneath the 3 1/2" square bar of the main frame. The axle will have to be mounted between 2 opener units; therefore, a 9" row spacing will be required at this one point. If the drill is set up on 6 2/3" or 8" row spacing, adjustment of the opener units will be necessary. For drills set up on 6 2/3" row spacing, adjust the one opener on the left-hand side of the mark made above and the 3 openers on the right-hand side of the mark to 6" spacing as follows: (See Figure 28)

1. Move the first opener on the left-hand side of this mark by loosening the U-bolt that holds the opener to the 3 1/2" square bar of the main frame. Slide it 2/3" to the left leaving a 6" row spacing between the 1st and 2nd openers to the left-hand side of this mark.
2. Move the 3rd opener on the right-hand side of this mark 2/3" to the right, leaving a 6" row spacing between the 3rd and 4th openers
3. Move the 2nd opener on the right-hand side of this mark 1 1/3" to the right, leaving a 6" row spacing between the 2nd and 3rd openers.
4. Move the 1st opener on the right-hand side of this 2" mark to the right, leaving a 6" row spacing between the 1st and 2nd opener.
5. This leaves 9 1/3" row spacing in this area to mount the end transport axle.
6. After adjusting the 4 openers on the 3 1/2" square bar of the main frame, move to the rear of the drill and adjust the down pressure spring brackets mounted on the 2" X 3" rear bar exactly the same way.
7. Retighten all U-bolts.

For drills set up on 8" row spacing, adjust one opener on each side of this by loosening the U-bolt that holds the opener to the 3 1/2" square bar of the main frame. Slide the one on the right-hand side 1/2" to the right and slide the one on the left-hand side 1/2" to the left (Figure 28). After adjusting the two openers on the 3 1/2" square bar of the main frame, move to the rear of the drill and adjust the down pressure spring brackets mounted on the 2" X 3" rear bar exactly the same way. Retighten all U-bolts.

MOUNTING END TRANSPORT AXLE TO NO-TILL AND ALL PULL-TYPE DRILLS

1. Install the axle under the 3 1/2" square bar of the main frame at the position previously described and fasten the flange of the axle to the 4" X 7" bar in front of the drill with two 3/4" X 7" U-bolts 5 1/2" long.
2. Do not tighten the U-bolts.

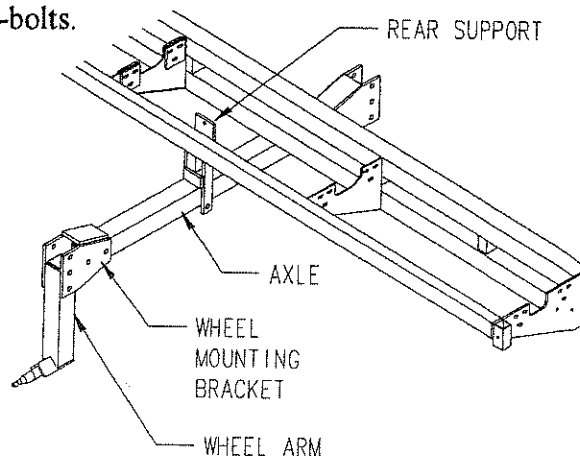


FIGURE 25

3. Go to the rear of the drill and install the rear support (Figure 25) by placing the legs of the bracket on each side of the axle and under the 2" X 3" rear bar of the drills. Fasten the bracket to the 2" X 3" rear bar of the drill with the 7/16" X 3" U-bolts 3" long. Fasten the bracket to the axle with the 3/4" X 5 1/2" bolt through the legs of the bracket and under the axle.
4. Install the stabilizer cross bar (1/2" X 4" plate-10" long with 4 holes) behind the bracket and fasten through the holes in the bracket with 1/2" X 1 1/2" bolts (Figure 25).
5. Install the stabilizer hanger (1/2" X 2" plate-11" long with 4 holes) to the opposite end of the stabilizer cross bar and to the 2" X 3" rear bar of the drill using the 1/2" X 1 1/2" bolts and the 7/16" X 3" U-bolts 3" long.
6. Install the wheel mounting bracket to the end of the axle and fasten with two 3/4" X 5 1/2" bolts (Figure 25).
7. Adjust the axle until it is directly between the 2 openers. Tighten all bolts and nuts.
8. Install the tires to the wheels.
9. Install the wheels and tires to the wheel arms.
10. Install the wheel arms to the axle by inserting the 3/4" X 5 1/2" bolt through the center hole of the wheel mounting bracket and through the top hole of the wheel arm (Figure 25).
11. Raise the wheel until it is all the way up and install the 3/4" X 7" hitch pin through the top hole of the wheel arm bracket and through the 2nd hole of the wheel arm.

MOUNTING END TRANSPORT TONGUE ON NO-TILL 3-PT DRILL

The tongue should be mounted inside the 4" X 7" secondary bar of NO-TILL 3 point drills.

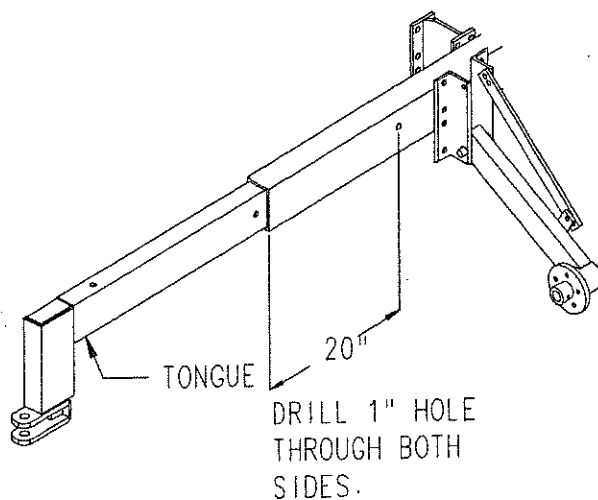
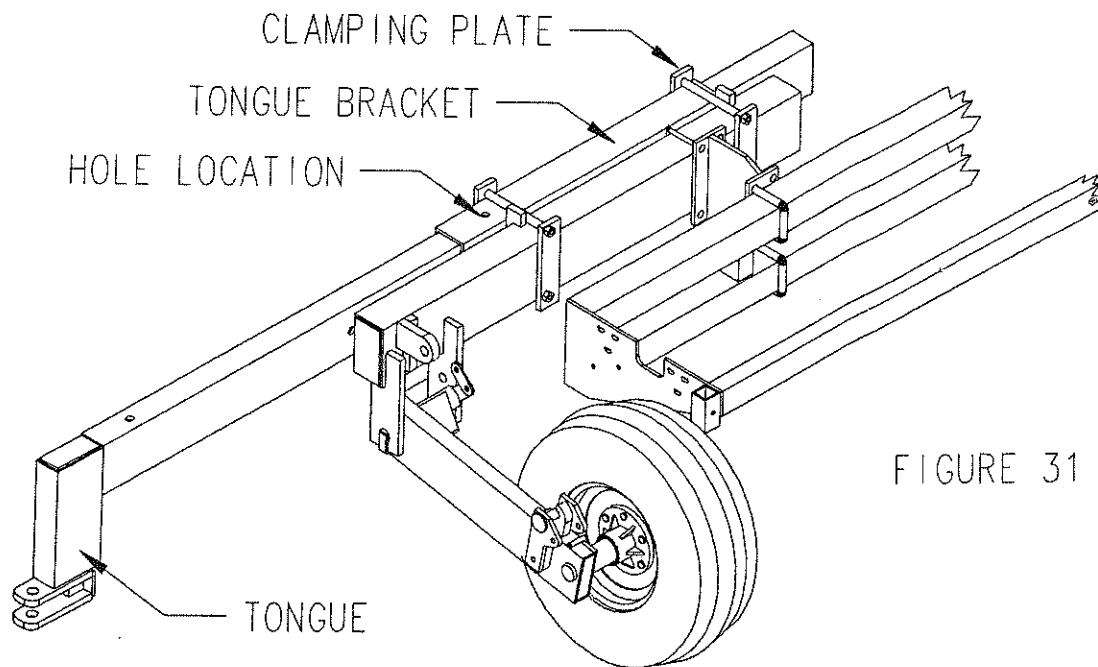


FIGURE 30

1. Measure 20" from the end of the 4" X 7" secondary bar (Figure 30).
2. Drill a 1" hole directly in the center of the 4" X 7" secondary bar, through both sides.
3. Insert the tongue inside the 4" X 7" bar and secure with 3/4" X 5" bolt.

MOUNTING END TRANSPORT TONGUE ON ALL PULL-TYPE DRILLS



1. Mount the telescoping tongue bracket to the front of the 4" X 7" end wheel Figure 31. The telescoping tongue bracket is equipped with 2 notched plates bar welded to one side of the bracket. These notched plates should be positioned on the 4" X 7" end wheel bar with one of the notched plates going between the clutch housing and the end wheel housing.

▲ WARNING!!

When mounting the tongue bracket on 14', 15', and 20' pull-type and 14' and 15' pull-type, No-Till drills, the hole in the end of the bracket should be mounted toward the end of the drill. On 20' pull-type No-Till drills, the bracket will not be mounted towards the end of the drill. Figure 31 shows the hole location for all but 20' pull-type No-Till drills.

2. Fasten the telescoping tongue bracket to the 4" X 7" end wheel bar with four 3/4" X 12" bolts and 2 clamping plates.
3. Slide the tongue inside the telescoping tongue bracket and secure with the 3/4" X 8" bolt.

TRANSPORTING THE 20' & 27' CONVENTIONAL 3-PT DRILL (Figure 32)

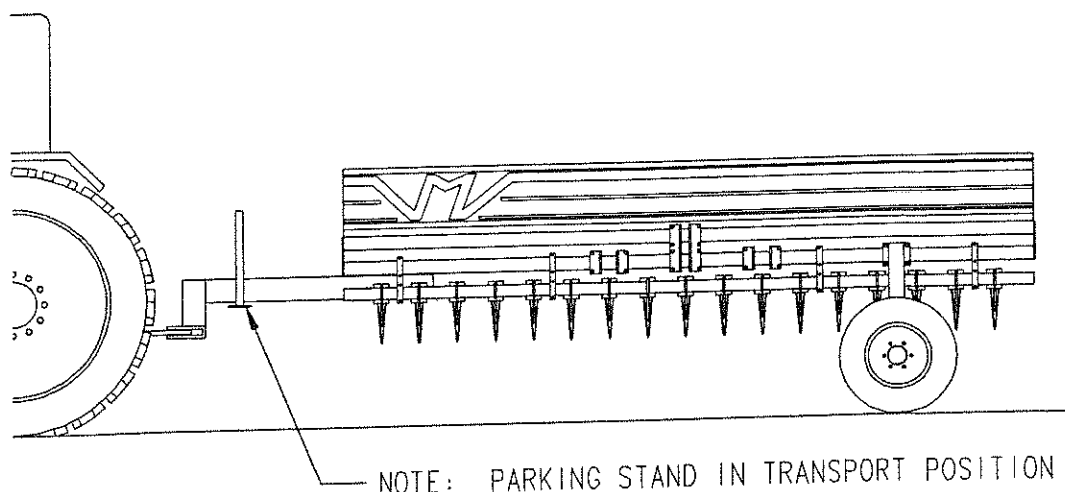


FIGURE 32

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970410

1. Hook the tractor to the 3 point hitch of the drill. **WARNING:** Be sure the front end of the tractor is properly weighted to handle the weight of the drill and it's accessories when fully loaded with seed.
2. Raise the drill as high as possible.
3. Lower the transport wheels by removing the 3/4" X 7" hitch pin from the top hole of the wheel mounting bracket and swinging the wheels down. Install 3/4" X 7" hitch pin in the bottom hole of the wheel mounting brackets.
4. Extend the tongue under the drill by removing the 3/8" bolt in the top of the tongue and sliding the tongue out until the 3/4" X 7" hitch pin can be installed in the tongue mounting bracket.
5. Install the 3/4" X 7" hitch pin through the hole in the tongue mounting bracket and the hole in the end of the tongue.
6. Install the parking stand to the end of the tongue and fasten with the 3/4" X 7" hitch pin through the holes in top of the parking stand and over the top of the tongue.
7. Lower the drill and unhook from the 3 point hitch.
8. Install a drawbar to the lift arms of the tractor (not provided).
9. Back the tractor up to the end of the tongue and connect the tongue to the drawbar that is mounted to the lift arms of the tractor.
10. Raise the drawbar until the parking stand is clear of the ground. Remove the parking stand and place it upside down on the tongue and fasten with the 3/4" X 7" hitch pin under the bottom of the tongue.
11. The drill is now ready for transport.

TRANSPORTING THE 20' & 27' NO-TILL 3-PT DRILL

1. Hook the tractor to the 3 point hitch of the drill.



WARNING

Be sure the front end of the tractor is properly weighted to handle the weight of the drill and it's accessories when fully loaded with seed.

2. Raise the drill as high as possible.
3. Lower the transport wheels by removing the 3/4" X 7" hitch pin from the top hole of the wheel mounting bracket and swinging the wheel down. Install the 3/4" X 7" hitch pin in the bottom hole of the wheel mounting brackets.
4. Lower the parking stand on the end of the drill.
5. Lower the drill and unhook from the 3 point hitch.
6. Remove the 3/4" X 5" bolt that holds the tongue inside the 3/4" X 7" secondary bar.
7. Slide the tongue out of the 4" X 7" bar until the hole in the end of the tongue lines up with the hole in the 4" X 7" bar (Figure 31).
8. Install the 3/4" X 5" bolt in this hole and through the tongue.
9. Install a drawbar to lift arms of the tractor (not provided).
10. Back the tractor up to the end of the tongue and connect the tongue to the drawbar that is mounted to the lift arms of the tractor.
11. Raise the drawbar until the parking stand is clear of the ground and raise the parking stand to the transport position.
12. Drill is now ready for transport.

TRANSPORTING THE PULL-TYPE DRILL

1. Hook the tractor to the tongue of the drill.
2. Raise the drill as high as possible
3. Lower the rear transport wheel by removing the 3/4" X 7" hitch pin from the top hole of the wheel mounting bracket and swinging the wheel down.
4. Extend the hydraulic cylinder that is mounted to the tongue and the center mast of the drill by connecting the hydraulic hose to the tractor and activating the cylinder. This will raise the front of the drill and allow the front transport wheel to be lowered.
5. Lower the front transport wheel as in step 3 above.
6. Lower the parking stand on the end of the drill.
7. Remove the 1" X 10" bolt that holds the tongue support bracket to the tongue (Figure 31).
8. Lower the drill until the end wheels are retracted as far as possible.
9. Unhook the tractor from the drill.
10. Remove the cylinder pin that holds the cylinder to the tongue and fold the tongue (Figure 31).
11. Reinstall the cylinder pin in the loop welded to the end of the tongue.
12. Remove the 3/4" X 8" bolt that holds the tongue inside the 4" X 7" mounting bracket.
13. Slide the tongue out of the mounting bracket until the hole in the end of the tongue lines up the hole in the mounting bracket
14. Install the 3/4" X 8" bolt in this hole and through the tongue.
15. Install a drawbar to the lift arms of the tractor (drawbar not provided).
16. Back the tractor up to the end of the tongue and connect the tongue to the drawbar that is mounted to the lift arm of the tractor.
17. Raise the drawbar until the parking stand is clear of the ground and raise the parking stand to the transport position.
18. Drill is now ready to transport.

TROUBLE SHOOTING

Problem	Possible Cause	Correction
Uneven seed depth or failure of disc opener to penetrate soil	-Too little down pressure on disc openers	-Set spring for more pressure (page 13)
	-Ground too hard (conventional)	Prepare deeper seed bed (page 14)
	-Ground too hard (No-Till)	-Add weight-within recommended specifications (page 2)
		-Wait for necessary moisture (page 14)
	-Excessive ground speed (causes drill to ride out of the ground)	-Reduce tractor speed (page 15)
Seed flow uneven to individual openers	-Press wheels set to low	-Raise press wheel (page 13)
	-Drill unlevel (front to rear)	-Reset drill level (fig 8 page 12)
	-Spring pressure on cleanout arm improperly set	-Reset spring pressure (page 10)
	-Seed meters opened unevenly	-Check each meter unit for proper opening and readjust if necessary (page 11)
	-Too much trash in seed	-Clean the seed
Coulter penetration to shallow or too deep	-Not enough seed in hoppers	-Add more seed to hoppers
	-Seed tube or opener stopped up	-Clear obstruction
	-Drill riding too high or too low on drive wheels	-Adjust drive wheel height (pages 12 & 16)
	-Improper coulter spring pressure	-Adjust coulter spring pressure (page 15)
	-Drill not level	-Level drill front to rear (page 12)
Drive wheel not staying on ground while planting	-More or less weight needed	-Add/Remove weight within recommended specifications (page 20)
	-Ground too hard	-Wait for necessary moisture
	-Ground too rough	-Change planting directions or use a floating drive wheel arm (page 5)
	-Drill not level	-Level drill front to rear (page 12)
	-Drill height adjusted too low	-Adjust drive wheel height (pages 12 & 16)
Drill riding out of the ground	-Excessive spring pressure on openers and/or coulters	-Decrease amount of spring pressure (page 13)
	-Inadequate weight (NO-TILL)	-Add weight-within recommended specifications (page 20)
	-Tractor draft control engaged	-Disengage tractor draft control
	-Excessive speed (pulls drill out of the ground)	-Reduce tractor speed (page 15)
	-Press wheels bouncing	-Add more pressure (page 13)
Excessive wear on holes in press wheel straps	-Line of chain travel not straight	-Re-align to straighten chain travel from sprocket to sprocket (page 3)
Drive chain runs off sprocket	-Object caught in sprocket	-Remove object
	-Chain too loose	-Adjust idlers or remove links as necessary (page 2)

STORAGE

Proper cleaning and storage of your MARLISS Grain Drill will prolong its life and usefulness, and reduce maintenance cost.

1. Thoroughly clean the seed hoppers and seed metering units. Open the seed meter clean out levers located in the front and center of each clean-out shaft. Remove the 3/8" bolt in the lever and lift the lever. This opens all meters on that cleanout shaft.
2. Use a vacuum or compressed air to clean the inside of each hopper and each meter.
3. Wash the outside parts of the drill such as openers and press wheels.
4. Lightly oil or grease the double disc openers to prevent rust.
5. Lightly oil or grease any exposed cylinder shafts.
6. If possible, store the machine in a dry protected shed.
7. Check tire pressure on lift wheels.
8. Place the drill on its parking stands.
9. Relieve the spring pressure on the double disc openers.

OPERATING TIPS & PREVENTIVE MAINTENANCE

The old adage "an ounce of preventive is worth a pound of cure" applies to any piece of fine farm equipment, and can save the owner both time and money. The following items are highly recommended for "preventive maintenance".

1. Closely follow manual instructions for preparing, operating, and storing the MARLISS grain drill.
2. When using the drill, check daily for tightness of all nuts and bolts, especially at any point where pivoting or vibration occurs.
3. During field operation always be sure the drill units are lifted high enough for the press wheel to clear the ground before starting an abrupt turn. This will prevent bending unit frames and other possible damage to the planter units.
4. Never move the drill backward with the disc seed openers in the ground. Doing so may stop up one or more of the seed drop tubes.
5. Check tire inflation pressures regularly.
6. Maintain proper lubrication and check wheel bearings regularly.
7. Avoid throwing bags of seed on the hopper as the hopper sides will bend.
8. Make sure all hydraulic hoses are secured to prevent damage to the hoses.
9. Bleed the air out of all hoses & cylinders prior to planting.

USE OF SEED CHARTS

The seed charts in this manual are relatively self-explanatory. The sprockets on the Live Axle Drive wheel and the 32 tooth sprocket on the corresponding end of the jack shaft are not changed. Only the hopper meter shaft sprocket and the corresponding jack shaft sprocket are changed in order to change sprocket ratios.

To use the chart, simply determine the appropriate seed and spacing that you will be planting. Follow the line of numbers across (left to right) the page until you find the seed rate that you wish to plant. Follow the seed rate up the page to determine the meter opening that will be required at that sprocket setting and spacing to plant the proper amount of seed. You will usually have a choice of two sprocket settings to use. For example, for soybeans at 8" spacing, you can plant 90 pounds per acre at 1" opening in sprocket setting 2 or you can plant 90 pounds per acre at 1/2" opening in sprocket setting 3. As a general rule (especially on large seeds such as soybeans) use the sprocket setting that will give you the larger meter opening. This will allow the meter to turn slower, which will cause a decrease in the amount of popping and jamming of the seed. In some cases, a person may want to check his seed rate or may wish to plant a seed which is not listed in the seed charts. For this reason a simple formula is provided to allow a means to check the meter at a certain setting to find out how much it would plant at that setting.

To use the formula follow the steps listed below:

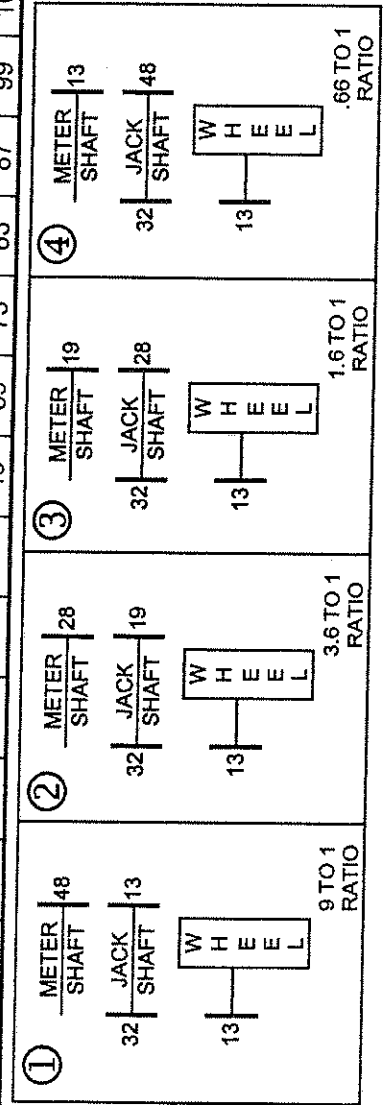
1. Set the meter opening at any setting (choose a setting that you believe will give you proper seed rate). See page 11.
2. Remove the chain guard and chain from one end of the hopper.
3. Mark a spot on the star nut and with a 9/16" open-end wrench, turn the meter shaft 30 revolutions and catch all of the seed from three meters. Be sure that you turn the shaft in the same directions that it would be turning if it were planting. Also, if you are working with a hopper driven from the right-hand end, you can turn the star nut itself rather than using a wrench.
4. Weigh the total amount of seed taken from the three meters (all three together). Be sure the weight is measured in ounces.
5. Pick the proper factor from the following chart by finding the intersection of the row spacing and sprocket setting at which your machine is set.
6. Multiply the ounces caught from the three meters after 30 revolutions by the proper factor obtained from the chart. This will give you the planting rate in pounds per acre that you would be planting at this setting.
7. Adjust the meter and / or sprocket settings for more or less seed as needed. Go through steps 1-6 again to check the seed rate.

Example: A farmer caught 56.6 ounces of seed from three meters after 30 revolutions. His drill is set on sprocket setting 2 and has 8" spacing. 56.6 ounces of seed X 1.59 factor from the chart (8" spacing and sprocket setting 2) = 90 pounds per acre.

Row Spacing	Sprocket Setting #1=9:1	#2=3.6:1	#3=1.6:1	#4=.66:1
6"	.85	2.12	4.62	11.6
6 7/16"	.79	1.98	4.31	10.8
6 2/3"	.76	1.91	4.16	10.4
6 15/16"	.74	1.83	4.00	10.0
7.5"	.68	1.71	3.72	9.32
8"	.64	1.59	3.46	8.68
8 3/16"	.62	1.55	3.39	8.51
10"	.51	1.27	2.77	6.94
12"	.42	1.06	2.31	5.79

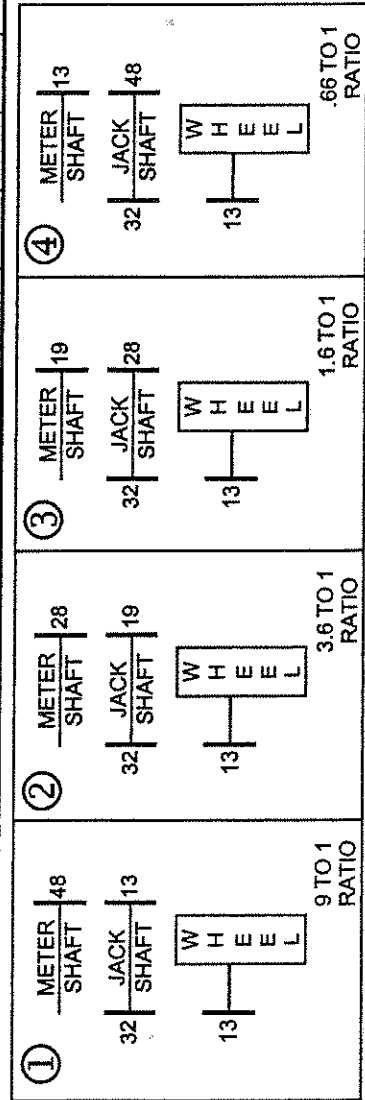
**CRIMSON, KENLAND RED & NAVY BEANS SEED CHART in POUNDS PER ACRE
FOR 7'-3 PT. MOUNTED DRILLS**

METER OPENINGS																	
SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	15" / 16	1"
CRIMSON 6" ROWS	1			14	21	27	32	44	47	51	59						
	2			36	51	68	82	110	120	129	148						
CRIMSON 6-2/3" ROWS	1			13	18	25	28	40	44	47	53						
	2			32	46	63	72	101	110	120	133						
CRIMSON 8" ROWS	1			11	15	21	25	32	36	40	44						
	2			27	38	53	63	82	91	101	110						
CRIMSON 10" ROWS	1			8.6	12	17	21	25	28	32	36						
	2			21	30	42	53	63	72	82	91						
KENLAND RED 6" ROWS	1	13	17	23	28	32	38	44	47	53	59	63					
	2	32	44	57	72	82	95	110	120	133	148	158					
KENLAND RED 6-2/3" ROWS	1	11	18	21	27	32	36	40	46	49	55	59					
	2	28	46	53	66	82	91	101	114	123	139	148					
KENLAND RED 8" ROWS	1	10	14	17	21	25	28	32	36	40	44	47					
	2	25	34	42	53	63	72	82	91	101	110	120					
KENLAND RED 10" ROWS	1	7.6	11	14	17	19	23	27	30	32	36	38					
	2	19	28	34	42	47	57	66	76	82	91	95					
NAVY BEANS 6" ROWS	1							30	39	48	55	58	66	69	80	85	92
	2							76	98	121	138	145	166	173	200	212	230
NAVY BEANS 6-2/3" ROWS	1							27	35	43	50	52	60	62	72	76	83
	2							69	88	109	124	131	149	155	180	190	207
NAVY BEANS 8 " ROWS	1							23	29	36	41	44	50	52	60	63	69
	2							57	73	91	104	109	124	129	150	159	173
NAVY BEANS 10" ROWS	1							18	23	29	33	35	40	42	48	51	55
	2							46	59	73	83	87	99	104	120	127	138



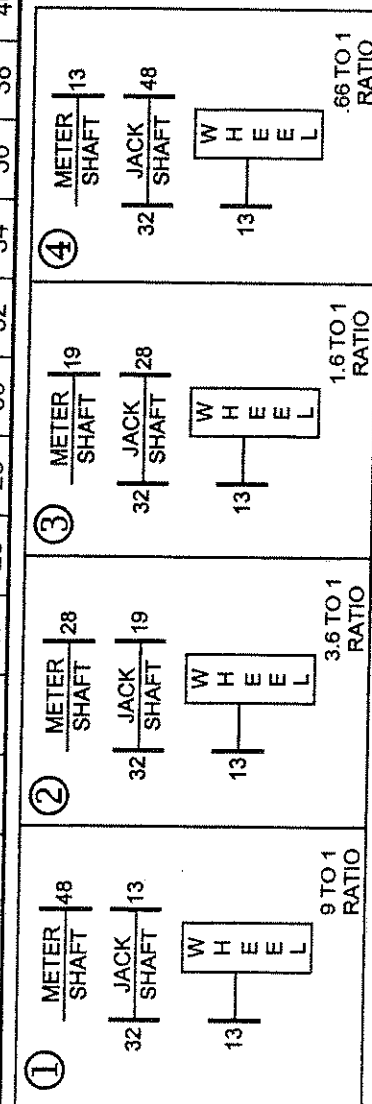
**OATS, ANNUAL RYE & #3 SUNFLOWER SEED CHART in POUNDS PER ACRE
FOR 7' - 3 PT. MOUNTED DRILLS**

METER OPENINGS																	
SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	15" / 16	1"
OATS	3					66	74	89	103	114	118	123	133	137	141	160	184
6" ROWS	4					167	188	222	258	285	293	308	336	342	350	399	462
OATS	3					59	66	80	91	103	106	112	120	123	125	142	167
6- 2/3" ROWS	4					148	167	201	230	262	264	279	298	308	313	355	418
OATS	3					49	55	66	78	85	89	93	101	104	106	120	141
8" ROWS	4					125	139	167	196	217	224	230	253	258	264	302	350
OATS	3					40	46	53	61	70	72	76	82	84	87	95	112
10" ROWS	4					97	110	133	154	177	182	188	201	211	217	239	279
ANNUAL RYE	2				11	17	30	38	46	53	61	65	72	78			
6" ROWS	3				25	40	65	84	101	118	133	146	163	177			
ANNUAL RYE	2				10	15	27	34	42	47	55	59	65	70			
6- 2/3" ROWS	3				23	34	61	76	93	108	123	131	146	158			
ANNUAL RYE	2				8.6	13	23	28	34	40	46	49	55	59			
8" ROWS	3				19	30	49	63	76	89	101	110	123	133			
ANNUAL RYE	2				6.8	11	18	23	27	32	36	40	44	47			
10" ROWS	3				15	25	40	49	61	70	80	87	99	106			
#3 SUNFLOWER	2						38	44	51	57	63	68	78	82	89	99	104
6" ROWS	3						82	95	112	123	137	148	169	177	194	215	226
#3 SUNFLOWER	2						34	40	46	51	57	61	70	74	80	89	93
6- 2/3" ROWS	3						74	85	101	110	122	133	152	160	175	194	203
#3 SUNFLOWER	2						28	32	38	42	47	51	59	61	66	74	78
8 " ROWS	3						61	70	84	93	103	112	127	133	144	161	169
#3 SUNFLOWER	2						23	27	30	34	38	42	47	49	53	59	63
10" ROWS	3						49	57	66	74	82	89	101	106	116	129	135



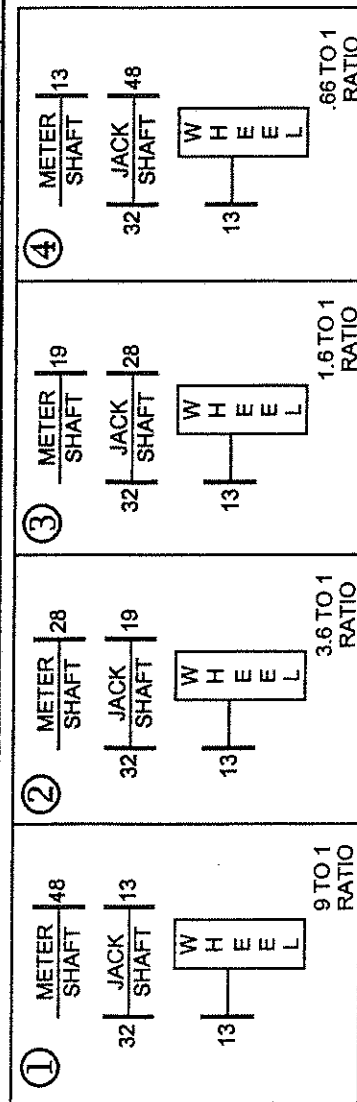
**MILO, ALFALFA & FESCUE SEED CHART in POUNDS PER ACRE
FOR 7' - 3 PT. MOUNTED DRILLS**

		METER OPENINGS															
SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	15" / 16	1"
MILO	1			14	20	25	31	37	42	48							
6" ROWS	2			35	48	63	77	92	105	120							
MILO	1			13	18	22	28	33	37	42							
6-2/3" ROWS	2			31	42	57	70	83	94	108							
MILO	1			11	15	19	24	28	31	37							
8" ROWS	2			26	35	46	57	68	79	90							
MILO	1			8.3	12	15	19	22	26	29							
10" ROWS	2			20	28	37	46	55	63	72							
ALFALFA	1	14	21	25	28	34	40	46	49	55	59	65					
6" ROWS	2	36	49	61	74	87	101	114	125	137	150	163					
ALFALFA	1	13	18	21	27	32	36	40	46	51	55	59					
6-2/3" ROWS	2	32	44	55	66	80	91	103	114	125	137	148					
ALFALFA	1	11	14	18	21	27	30	34	38	42	46	49					
8" ROWS	2	27	36	46	55	66	76	85	95	104	114	123					
ALFALFA	1	8.9	11	14	18	21	25	27	30	32	36	40					
10" ROWS	2	23	30	36	46	53	61	68	76	84	91	99					
FESCUE	1				7.6	11	15	19	21	23	24	25	26	27			
6" ROWS	2				19	28	38	47	53	57	59	61	63	66			
FESCUE	1				6.8	10	14	17	19	20	21	22	23	24			
6-2/3" ROWS	2				23	36	46	57	65	68	72	74	78	82			
FESCUE	1				5.9	8.9	11	14	15	17	18	18	19	20			
8" ROWS	2				15	23	28	36	40	42	44	46	47	49			
FESCUE	1				4.6	7	9.3	11	13	14	14	15	15	16			
10" ROWS	2				11	17	23	28	30	32	34	36	38	40			



SOYBEAN, RICE & WHEAT SEED CHART in POUNDS PER ACRE FOR 7' - 3 PT. MOUNTED DRILLS

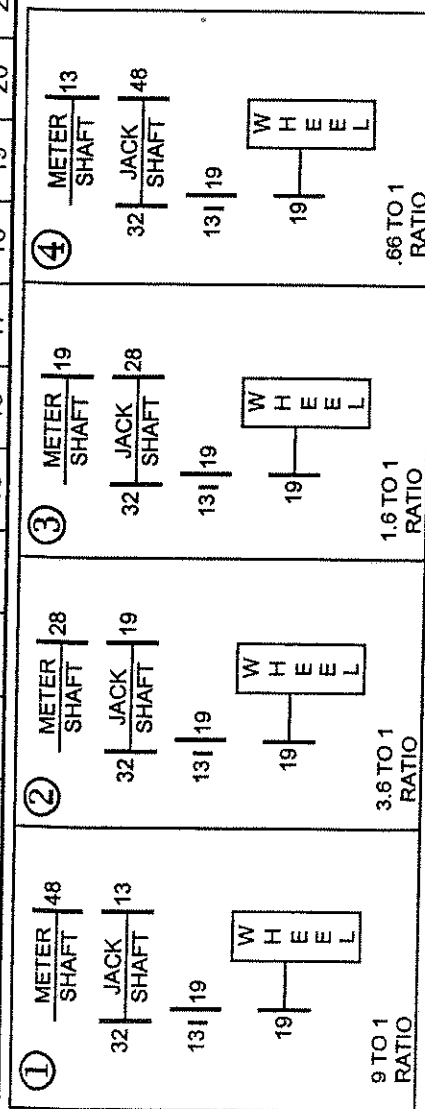
		METER OPENINGS															
SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	15" / 16	1"
SOYBEANS	2					46	74	88	103	118	133	140	155	162	177	192	221
6" ROWS	3					103	157	192	221	252	288	302	333	348	383	413	479
SOYBEANS	2					41	66	79	92	107	120	125	140	145	158	173	199
6-2/3" ROWS	3					92	140	173	199	227	258	273	300	313	345	370	431
SOYBEANS	2					35	55	66	77	88	99	105	116	122	133	144	166
8" ROWS	3					77	118	144	166	190	216	227	251	262	288	310	359
SOYBEANS	2					28	44	52	61	70	79	83	92	96	105	114	133
10" ROWS	3					61	94	114	133	151	171	181	199	208	228	247	288
RICE	2					48	61	68	81	92	105	114	127	133	142	149	173
6" ROWS	3					109	136	153	182	208	236	256	286	299	319	335	391
RICE	2					42	55	61	74	83	94	103	114	120	127	134	156
6-2/3" ROWS	3					98	123	138	164	186	212	232	258	269	288	302	350
RICE	2					35	46	52	61	70	79	86	96	100	107	112	131
8" ROWS	3					81	103	114	136	155	177	193	214	225	240	252	293
RICE	2					29	37	41	48	55	63	68	76	79	85	90	103
10" ROWS	3					65	81	92	109	125	142	155	171	179	192	201	234
WHEAT	2					59	70	81	92	102	127	133	136	147	164	181	195
6" ROWS	3					133	158	184	206	267	288	299	308	332	369	405	440
WHEAT	2					53	63	74	83	109	114	120	123	133	147	162	175
6-2/3" ROWS	3					120	142	164	186	243	258	269	276	299	332	365	396
WHEAT	2					44	53	61	70	90	96	100	103	111	123	136	147
8" ROWS	3					99	118	136	155	203	214	225	230	249	276	304	330
WHEAT	2					35	42	48	55	72	76	79	83	88	98	109	118
10" ROWS	3					79	94	108	125	162	171	179	184	199	221	243	263



**MILO, ALFALFA & FESCUE SEED CHART in POUNDS PER ACRE
FOR ALL DRILLS WITH 15" TIRES**

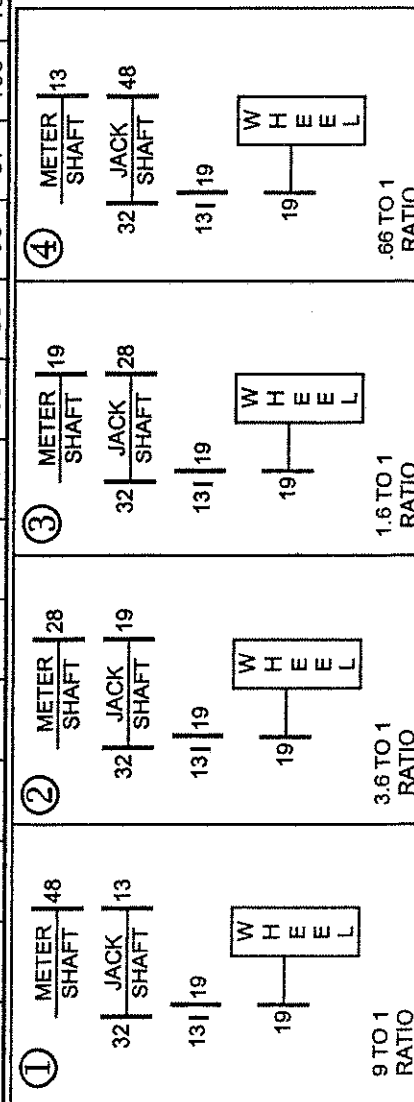
METER OPENINGS

SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	15" / 16	1"
MILO	1			7.6	11	14	17	20	23	26							
6" ROWS	2			19	26	34	42	50	57	65							
MILO	1			6.8	9.5	12	15	18	20	23							
6-2/3" ROWS	2			17	23	31	38	45	51	59							
MILO	1			5.7	8	10	13	15	17	20							
8" ROWS	2			14	19	25	31	37	43	49							
MILO	1			4.5	6.4	8.2	10	12	14	16							
10" ROWS	2			11	15	20	25	30	34	39							
ALFALFA	1	7.3	11	13	15	18	21	24	26	29	31	34					
6" ROWS	2	19	26	32	39	46	53	60	66	72	79	86					
ALFALFA	1	6.7	9.3	11	14	17	19	21	24	27	29	31					
6-2/3" ROWS	2	17	23	29	35	42	48	54	60	66	72	78					
ALFALFA	1	6	7.3	9.3	11	14	16	18	20	22	24	26					
8" ROWS	2	14	19	24	29	35	40	45	50	55	60	65					
ALFALFA	1	4.7	6	7.3	9.3	11	13	14	16	17	19	21					
10" ROWS	2	12	16	19	24	28	32	36	40	44	48	52					
FESCUE	1				4	6	8	10	11.3	12	12.7	13	13.3	14			
6" ROWS	2				10	15	20	25	28	30	31	32	33	35			
FESCUE	1				3.6	5.4	7.3	9	10	10.7	11.1	11.4	12	12.7			
6-2/3" ROWS	2				12	19	24	30	34	36	38	39	41	43			
FESCUE	1				3.1	4.7	6	7.3	8	8.7	9.3	9.3	10	10.7			
8" ROWS	2				7.7	12	15	19	21	22	23	24	25	26			
FESCUE	1				2.4	3.7	4.9	6	6.7	7.3	7.5	7.6	8	8.3			
10" ROWS	2				6	9	12	15	16	17	18	19	20	21			



SOYBEAN, RICE & WHEAT SEED CHART in POUNDS PER ACRE **FOR ALL DRILLS WITH 15" TIRES**

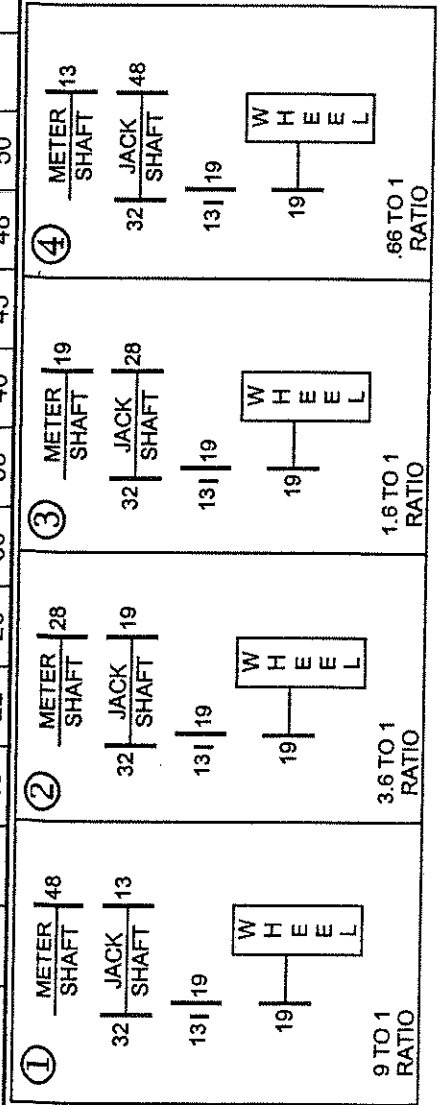
METER OPENINGS																	
SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	15" / 16	1"
SOYBEANS 6" ROWS	2					25	40	48	56	64	72	76	84	88	96	104	120
	3					56	85	104	120	137	156	164	181	189	208	224	260
SOYBEANS 6-2/3" ROWS	2					22	36	43	50	58	65	68	76	79	86	94	108
	3					50	76	94	108	123	140	148	163	170	187	201	234
SOYBEANS 8" ROWS	2					19	30	36	42	48	54	57	63	66	72	78	90
	3					42	64	78	90	103	117	123	136	142	156	168	195
SOYBEANS 10" ROWS	2					15	24	28	33	38	43	45	50	52	57	62	72
	3					33	51	62	72	82	93	98	108	113	124	134	156
RICE 6" ROWS	2					26	33	37	44	50	57	62	69	72	77	81	94
	3					59	74	83	99	113	128	139	155	162	173	182	212
RICE 6-2/3" ROWS	2					23	30	33	40	45	51	56	62	65	69	73	85
	3					53	67	75	89	101	115	126	140	146	156	164	190
RICE 8" ROWS	2					19	25	28	33	38	43	47	52	54	58	61	71
	3					44	56	62	74	84	96	105	116	122	130	137	159
RICE 10" ROWS	2					16	20	22	26	30	34	37	41	43	46	49	56
	3					35	44	50	59	68	77	84	93	97	104	109	127
WHEAT 6" ROWS	2					32	38	44	50	55	69	72	74	80	89	98	106
	3					72	86	100	112	145	156	162	167	180	200	220	239
WHEAT 6-2/3" ROWS	2					29	34	40	45	59	62	65	67	72	80	88	95
	3					65	77	89	101	132	140	146	150	162	180	198	215
WHEAT 8" ROWS	2					24	29	33	38	49	52	54	56	60	67	74	80
	3					54	64	74	84	110	116	122	125	135	150	165	179
WHEAT 10" ROWS	2					19	23	26	30	39	41	43	45	48	53	59	64
	3					43	51	59	68	88	93	97	100	108	120	132	143



OATS, CRIMSON & KENLAND RED SEED CHART in POUNDS PER ACRE FOR ALL DRILLS WITH 15" TIRES

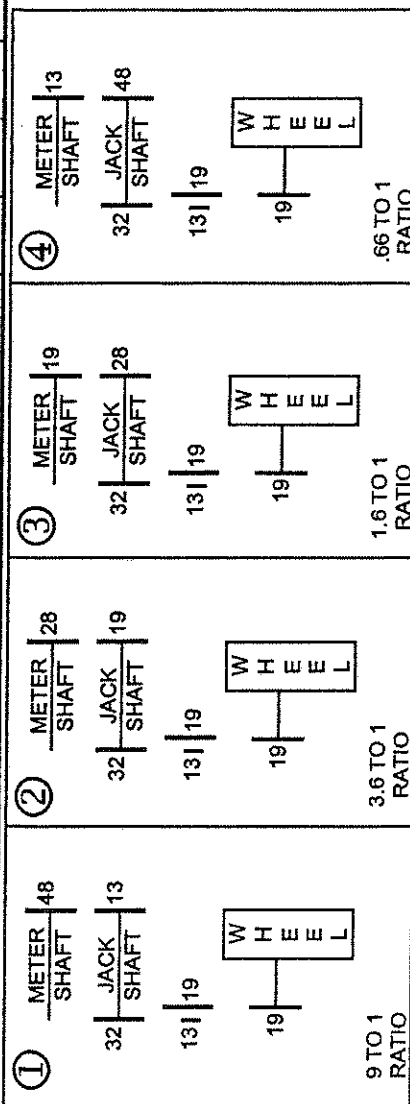
METER OPENINGS

SEED TYPE	SPROCKET SETTING	1" 16	1" 8	3" 16	1" 4	5" 16	3" 8	7" 16	1" 2	9" 16	5" 8	11" 16	3" 4	13" 16	7" 8	15" 16	1"
OATS	3				42	57	71	80	88	101	113	124	134	147	159	170	180
6" ROWS	4				105	142	178	199	220	252	283	309	336	367	399	425	451
OATS	3				38	51	64	72	79	91	102	111	121	132	143	153	162
6-2/3" ROWS	4				94	127	160	179	198	227	255	279	302	330	359	382	406
OATS	3				31	42	53	60	66	75	85	93	101	110	119	127	135
8" ROWS	4				79	106	134	149	165	189	212	232	252	275	299	319	338
OATS	3				25	34	43	48	53	60	68	74	80	88	96	102	108
10" ROWS	4				63	85	107	120	132	151	170	186	201	220	239	255	271
CRIMSON	1			7.6	11	14	17	23	25	27	31						
6" ROWS	2			19	27	36	43	58	63	68	78						
CRIMSON	1			6.9	9.6	13	15	21	23	25	28						
6-2/3" ROWS	2			17	24	33	38	53	58	63	70						
CRIMSON	1			5.7	8	11	13	17	19	21	23						
8" ROWS	2			14	20	28	33	43	48	53	58						
CRIMSON	1			4.5	6.5	8.7	11	13	15	17	19						
10" ROWS	2			11	16	22	28	33	38	43	48						
KENLAND RED	1	6.7	9.2	12	15	17	20	23	25	28	31	33					
6" ROWS	2	17	23	30	38	43	50	58	63	70	78	83					
KENLAND RED	1	6	9.4	11	14	17	19	21	24	26	29	31					
6-2/3" ROWS	2	15	24	28	35	43	48	53	60	65	73	78					
KENLAND RED	1	5.3	7.3	8.7	11	13	15	17	19	21	23	25					
8" ROWS	2	13	18	22	28	33	38	43	48	53	58	63					
KENLAND RED	1	4	6	7.3	8.7	10	12	14	16	17	19	20					
10" ROWS	2	10	15	18	22	25	30	35	40	43	48	50					



ANNUAL RYE, #3 SUNFLOWER & NAVY BEANS SEED CHART in POUNDS PER ACRE FOR ALL DRILLS WITH 15" TIRES

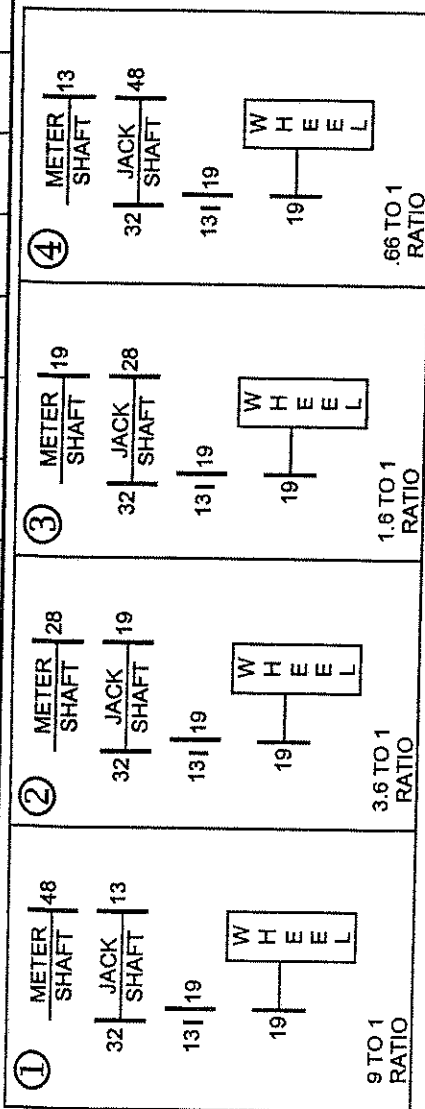
METER OPENINGS																
SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	1" / 16
ANNUAL RYE	2				6	9	16	20	24	28	32	34	38	41		
6" ROWS	3				13	21	34	44	53	62	70	77	86	93		
ANNUAL RYE	2				5.4	8	14	18	22	25	29	31	34	37		
6 -2/3" ROWS	3				12	18	32	40	49	57	65	69	77	83		
ANNUAL RYE	2				4.5	7	12	15	18	21	24	26	29	31		
8" ROWS	3				10	16	26	33	40	47	53	58	65	70		
ANNUAL RYE	2				3.6	5.6	9.6	12	14	17	19	21	23	25		
10" ROWS	3				8	13	21	26	32	37	42	46	52	56		
#3 SUNFLOWER	2						20	23	27	30	33	36	41	43	47	55
6" ROWS	3						43	50	59	65	72	78	89	93	102	119
#3 SUNFLOWER	2						18	21	24	27	30	32	37	39	42	49
6 -2/3" ROWS	3						39	45	53	58	64	70	80	84	92	107
#3 SUNFLOWER	2						15	17	20	22	25	27	31	32	35	41
8" ROWS	3						32	37	44	49	54	59	67	70	76	89
#3 SUNFLOWER	2						12	14	16	18	20	22	25	26	28	33
10" ROWS	3						26	30	35	39	43	47	53	56	61	71
NAVY BEANS	2						40	52	64	73	83	77	87	91	105	121
6" ROWS	3						87	112	138	158	166	166	189	198	229	264
NAVY BEANS	2						36	46	57	65	69	69	78	82	95	109
6 -2/3" ROWS	3						79	101	125	142	150	150	171	178	206	237
NAVY BEANS	2						30	39	48	55	57	57	65	68	79	91
8" ROWS	3						65	84	104	119	125	125	142	148	172	198
NAVY BEANS	2						24	31	38	44	46	46	52	55	63	73
10" ROWS	3						52	67	83	95	100	100	114	119	137	158



ALFALFA, FESCUE & MILO SEED CHART in POUNDS PER ACRE FOR ALL DRILLS WITH 15" TIRES

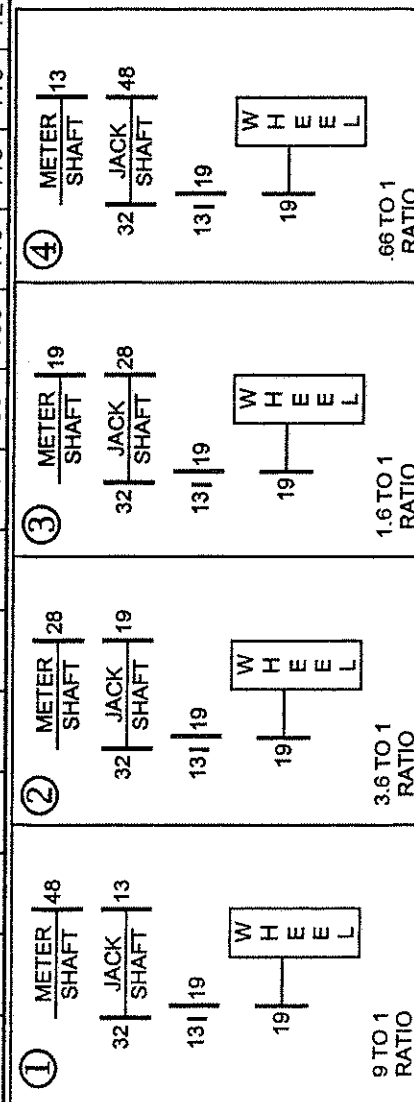
METER OPENINGS

SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	15" / 16	1"
ALFALFA 6-7/16"	1	6.8	10	12	14	17	20	22	24	27	29	32					
	2	17	26	30	35	42	49	56	61	68	72	79					
ALFALFA 6-15/16"	1	6.3	9.5	11	13	16	18	21	23	25	27	29					
	2	16	24	28	33	39	46	52	56	63	67	74					
ALFALFA 7-1/2"	1	5.8	8.8	10	12	14	17	19	21	23	25	27					
	2	15	22	26	30	36	42	48	52	58	62	68					
ALFALFA 8-3/16"	1	5.4	8.1	9.5	11	13	15	18	19	21	23	25					
	2	13	20	24	28	33	39	44	48	53	57	62					
FESCUE 6-7/16"	1				3.8	5.6	7.5	9.3	10.5	11.2	11.9	12.1	12.4	13			
	2				9.3	14	19	23	26	28	29	30	31	33			
FESCUE 6-15/16"	1				3.5	5.2	6.9	8.7	9.8	10	11	11.5	12	12.5			
	2				8.7	13	17	22	25	26	27	28	29	30			
FESCUE 7-1/2"	1				3.2	4.8	6.4	8	9	9.6	10	10.4	10.6	11.2			
	2				8	12	16	20	23	24	25	26	27	28			
FESCUE 8-3/16"	1				2.9	4.4	5.9	7.3	8.3	8.8	9.3	9.5	9.8	10.3			
	2				7.3	11	15	18	21	22	23	24	25	26			
MILO 6-7/16"	1			8.1	12	14	16										
	2			20	30	35	40										
MILO 6-15/16"	1			7.5	11	13	15										
	2			19	28	33	37										
MILO 7-1/2"	1			7	10	12	14										
	2			17	26	30	34										
MILO 8-3/16"	1			6.4	9.5	11	12										
	2			16	24	28	31										



**SOYBEANS, RICE & WHEAT SEED CHART in POUNDS PER ACRE
FOR ALL DRILLS WITH 15" TIRES**

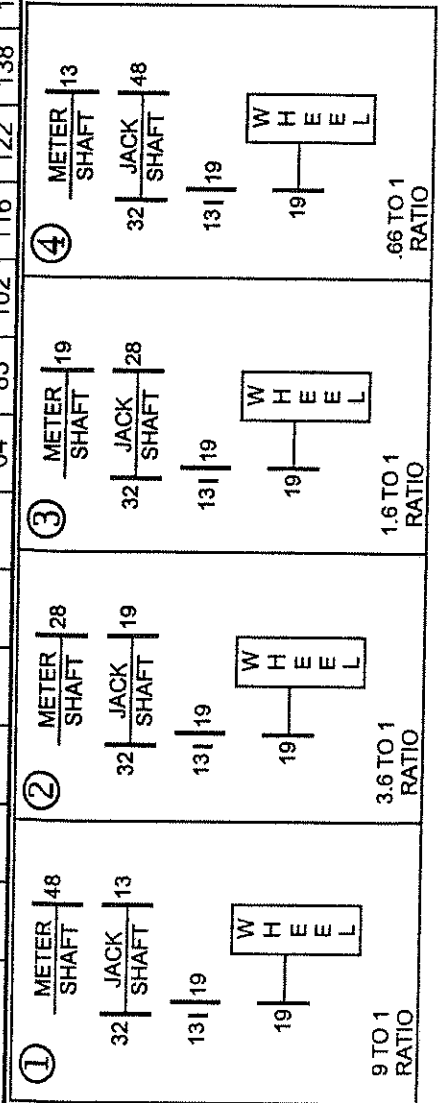
		METER OPENINGS															
SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	15" / 16	1"
SOYBEANS 6 - 7/16"	2					23	37	45	52	60	67	71	78	82	90	97	112
	3					51	81	97	113	130	146	154	170	178	194	211	243
SOYBEANS 6 - 15/16"	2					22	35	42	49	55	62	66	73	76	83	90	104
	3					47	75	90	105	120	135	143	158	165	180	196	225
SOYBEANS 7 - 1/2"	2					20	32	38	45	51	58	61	67	70	77	83	96
	3					43	69	83	97	111	125	132	146	153	167	181	208
SOYBEANS 8 - 3/16"	2					18	29	35	41	47	53	56	62	65	70	76	88
	3					40	64	76	89	102	115	121	134	140	153	166	191
RICE 6 - 7/16"	2					24	31	35	41	47	53	58	64	67	72	76	88
	3					53	67	75	89	101	115	126	140	146	156	164	190
RICE 6 - 15/16"	2					23	29	32	38	43	49	54	60	62	67	70	81
	3					49	62	70	83	94	107	117	130	135	145	152	177
RICE 7 - 1/2"	2					21	26	30	35	40	46	50	55	58	62	65	75
	3					45	57	64	76	87	99	108	120	125	134	141	163
RICE 8 - 3/16"	2					19	24	27	32	37	42	45	51	53	56	59	69
	3					41	52	59	70	79	91	99	110	114	122	129	150
WHEAT 6 - 7/16"	2					30	35	41	47	61	64	67	69	75	83	91	99
	3					65	77	89	101	132	140	146	150	162	*180	198	215
WHEAT 6 - 15/16"	2					28	33	38	43	56	60	62	64	69	77	85	92
	3					60	71	83	94	122	130	135	139	150	167	184	199
WHEAT 7 - 1/2"	2					26	30	35	40	52	55	58	59	64	71	78	85
	3					56	66	76	87	112	120	125	128	140	154	170	184
WHEAT 8 - 3/16"	2					23	28	32	37	48	51	53	54	59	65	72	78
	3					51	60	70	80	103	110	115	118	127	142	156	169



KENLAND RED, #3 SUNFLOWER & NAVY BEANS SEED CHART in POUNDS PER ACRE FOR ALL DRILLS WITH 15" TIRES

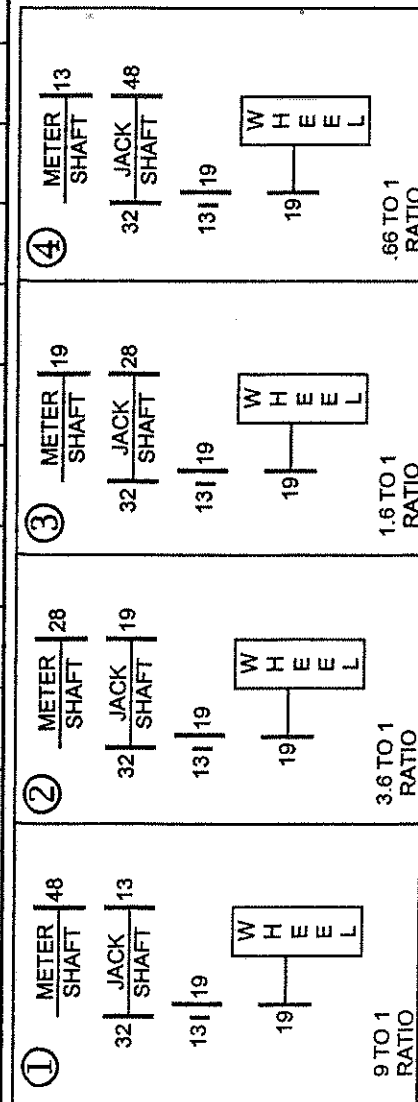
METER OPENINGS

SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	15" / 16	1"
KENLAND RED	1	6.3	8.6	11	14	16	19	21	23	26	29	31					
6 - 7/16"	2	16	21	28	35	40	47	54	58	65	72	77					
KENLAND RED	1	5.8	8	10	13	15	17	20	22	24	27	29					
6 - 15/16"	2	15	20	26	32	37	43	50	54	61	67	72					
KENLAND RED	1	5.3	7.3	9.6	12	14	16	18	20	22	25	26					
7 - 1/2"	2	13	18	24	30	34	40	46	50	56	62	66					
KENLAND RED	1	4.9	6.7	8.8	11	12	15	17	18	20	23	24					
8 - 3/16"	2	12	17	22	27	31	37	42	46	51	57	61					
#3 SUNFLOWER	2																
6 - 7/16"	3																
#3 SUNFLOWER	1																
6 - 15/16"	2																
#3 SUNFLOWER	1																
7 - 1/2"	2																
#3 SUNFLOWER	1																
8 - 3/16"	2																
NAVY BEANS	1																
6 - 7/16"	2																
NAVY BEANS	1																
6 - 15/16"	2																
NAVY BEANS	1																
7 - 1/2"	2																
NAVY BEANS	1																
8 - 3/16"	2																



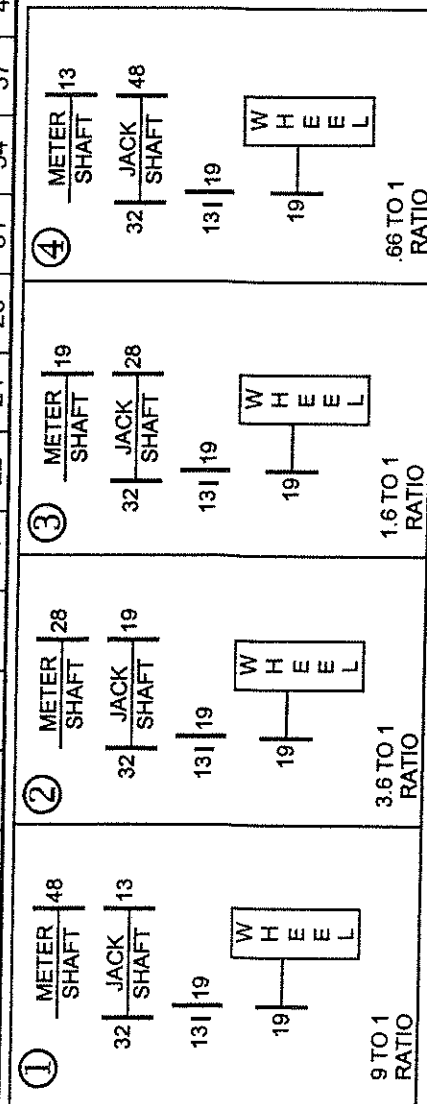
OATS, ANNUAL RYE & CRIMSON SEED CHART in POUNDS PER ACRE FOR ALL DRILLS WITH 15" TIRES

		METER OPENINGS															
SEED TYPE	SPROCKET SETTING	1" / 16	1" / 8	3" / 16	1" / 4	5" / 16	3" / 8	7" / 16	1" / 2	9" / 16	5" / 8	11" / 16	3" / 4	13" / 16	7" / 8	15" / 16	1"
OATS	3				39	53	66	74	82	94	105	115	125	137	148	158	168
6 - 7/16"	4				98	132	166	186	205	235	264	288	313	342	372	396	420
OATS	3				36	49	62	69	76	87	98	107	116	127	138	147	156
6 - 15/16"	4				91	122	154	172	191	218	245	268	290	318	345	367	390
OATS	3				34	45	57	64	70	80	91	99	107	117	127	136	144
7 - 1/2"	4				84	113	143	159	176	201	227	248	269	294	319	340	361
OATS	3				31	41	52	58	64	74	83	91	98	107	117	124	132
8 - 3/16"	4				77	104	131	146	161	185	208	227	246	269	292	311	331
ANNUAL RYE	2				5.6	8.4	15	19	22	26	30	32	35	38			
6 - 7/16"	3				12	18	32	40	49	57	65	69	77	83			
ANNUAL RYE	2				5.2	7.8	14	17	21	24	28	29	33	35			
6 - 15/16"	3				11	17	30	38	45	53	60	64	71	77			
ANNUAL RYE	2				4.8	7.2	13	16	19	22	26	27	30	33			
7 - 1/2"	3				10	16	28	35	42	49	56	59	66	71			
ANNUAL RYE	2				4.4	6.6	12	15	18	21	23	25	28	30			
8 - 3/16"	3				9.5	14	25	32	38	45	51	54	60	65			
CRIMSON	1			7.1	10	13	16	21	23	25	29						
6 - 7/16"	2			18	26	33	40	54	58	63	72						
CRIMSON	1			6.6	9.5	12	15	20	22	23	27						
6 - 15/16"	2			16	24	30	37	50	54	59	67						
CRIMSON	1			6.1	8.8	11	14	18	20	22	25						
7 - 1/2"	2			15	22	28	34	46	50	54	62						
CRIMSON	1			5.6	8.1	10	12	17	18	20	23						
8 - 3/16"	2			14	20	26	31	42	46	50	57						



OATS SEED CHART in POUNDS PER ACRE FOR ALL DRILLS WITH 15" TIRES

METER OPENINGS																	
SEED TYPE	SPROCKET SETTING	1" 16	1" 8	3" 16	1" 4	5" 16	3" 8	7" 16	1" 2	9" 16	5" 8	11" 16	3" 4	13" 16	7" 8	15" 16	1"
OATS	1				7.7	10	13	15	16	19	21	23	25	27	29	31	33
6" ROWS	2				19	26	33	37	41	46	52	57	62	68	73	78	83
OATS	1				7.2	9.7	12	14	15	17	19	21	23	25	27	29	31
6-7/16" ROWS	2				18	24	31	34	38	43	49	53	58	63	68	73	77
OATS	1				6.9	9.4	12	13	15	17	19	20	22	24	26	28	30
6-2/3" ROWS	2				17	23	30	33	36	42	47	51	56	61	66	70	75
OATS	1				6.7	9	11	13	14	16	18	20	21	23	25	27	29
6-15/16" ROWS	2				17	23	28	32	35	40	45	49	53	58	63	68	72
OATS	1				6.2	8.3	10	12	13	15	17	18	20	22	23	25	27
7-1/2" ROWS	2				15	21	26	29	32	37	42	46	49	54	59	63	66
OATS	1				5.8	7.8	9.8	11	12	14	16	17	19	20	22	23	25
8" ROWS	2				14	20	25	28	30	35	39	43	46	51	55	59	62
OATS	1				5.7	7.6	9.6	11	12	14	15	17	18	20	21	23	24
8-3/16" ROWS	2				14	19	24	27	30	34	38	42	45	50	54	57	61
OATS	1				4.6	6.2	7.9	8.8	9.7	11	12	14	15	16	18	19	20
10" ROWS	2				12	16	20	22	24	28	31	34	37	41	44	47	50



MACHINE IMPROVEMENTS

MARLISS is constantly searching for ways to improve their products. From time to time, changes and improvements will be incorporated into the product line. MARLISS is not responsible for making such changes or improvements to machines previously sold.

TWELVE MONTH LIMITED WARRANTY

MARLISS INDUSTRIES warranty is limited to repair or replacement of parts found and be defective in workmanship or materials, under normal use and service, within 12 months from date of retail sale. Warranty does not include labor. Defective parts to be returned to the factory, freight prepaid, and replacement parts to be shipped freight collect. MARLISS INDUSTRIES reserves the right to make changes or improvements with the understanding that there is no obligation of MARLISS to install such changes or improvements on previously manufactured products.

The sale of MARLISS Drills under any other warranty expressed or implied is not authorized.

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