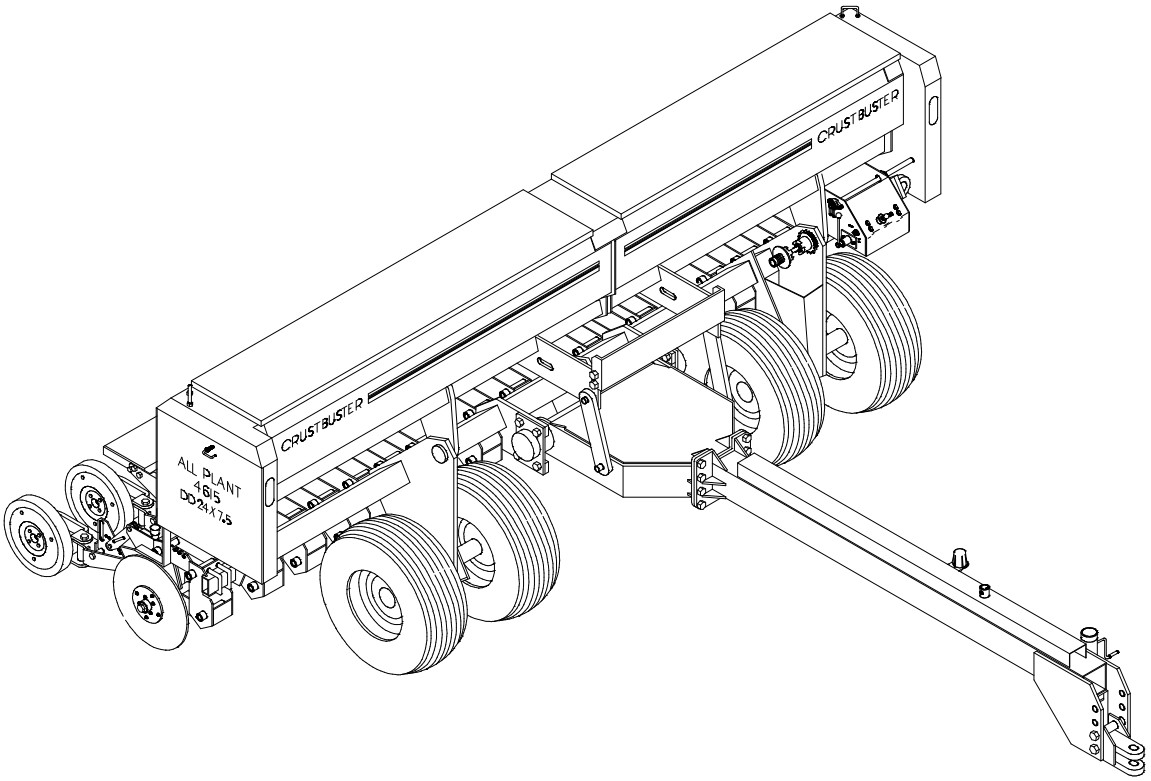
CrustBuster
SPEED KING INC.

4600 SERIES

ALL PLANT DRILL



OPERATION • MAINTENANCE • REPAIR PARTS

(09-03) # 605717

Identification

Your CrustBuster® drill is identified by a Serial Number and Model Number. Record these numbers in the spaces provided in this manual and refer to them when ordering parts or requesting service.

Serial Number	Model Number

Warranty

WARRANTY: In addition to the implied warranties of fitness and of merchantability, CrustBuster®/Speed King, Inc. warrants new products sold by it to be free from defects in workmanship and material for a period of 12 months, from the date of delivery to the first user customer. Warranty on purchased parts (cylinder, blades, bearings, shanks, etc.) will be the same as that offered by the appropriate manufacturer of these parts.

EXCLUSIONS: No warranty of any kind is made by CrustBuster®/Speed King, Inc. with regard to new products which have been subject to operation in excess of recommended capacities, misuse, abuse, negligence, or accident, or have been altered or repaired in any manner not authorized by CrustBuster®/Speed King, Inc. CrustBuster®/Speed King, Inc. is constantly striving to improve its products. Changes in design and improvement will be made whenever CrustBuster®/Speed King, Inc. believes the efficiency of its products will be improved thereby, but without incurring any obligation to incorporate such improvements in any products which have been shipped or are in service. No obligation exists for compensation of unauthorized repairs or modifications without prior approval. And in no event will CrustBuster®/Speed King, Inc. be liable for consequential damages, such as but not limited to: downtime, delayed or late tillage or planting, etc.

WARRANTY REGISTRATION: This warranty is not valid unless registered with CrustBuster®/Speed King, Inc. within 10 days from the date of purchase. It is the sole responsibility of the selling retail dealer to fill out the registration forms and see that they are properly filed with CrustBuster®/Speed King, Inc.

WARRANTY PROCEDURE: Should any part fail to conform with this warranty, CrustBuster®/Speed King, Inc. will repair or replace the part or parts which do not conform. If a part is defective, take it to your authorized CrustBuster® Farm Equipment Dealer immediately, along with your warranty registration, and complete the proper forms requesting a warranty adjustment. Our representative will pick up the part to be returned to the factory for examination. If the customer (first user) requests that a new part be substituted for the old part, a new part will be charged to the dealer who will in turn charge the customer. If the part is found by us to be defective, a credit for the part will be given to the dealer to be passed on to the customer. If the dealer or customer wishes to repair the part, this will be done only if authorized by CrustBuster®/Speed King, Inc. This warranty procedure is in addition to all remedies authorized by law.

CRUSTBUSTER®/SPEED KING, INC.
Box 1438
Dodge City, KS 67801

Specifications are subject to change without notice. CrustBuster ® is a registered trademark of CrustBuster/Speed King, Inc.

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BE A SAFE OPERATOR
BY THINKING BEFORE ACTING
AND
BY READING
YOUR OWNER'S MANUAL

Avoid Accidents

Most accidents, whether they occur in industry, on the farm, at home, or on the highway, are caused by the failure of some individual to follow simple and fundamental safety rules or precautions. For this reason most accidents can be prevented by recognizing the real cause and doing something about it before the accident occurs.

Regardless of the care used in the design and construction of any type of equipment, there are many conditions that cannot be completely safeguarded against without interfering with reasonable accessibility and efficient operation.

A CAREFUL OPERATOR
is the Best Insurance Against an Accident.
The complete observance of one simple rule would prevent many thousands of serious injuries each year.

That rule is:

Never Attempt to
Clean, Oil, or Adjust
A Machine While It Is In Motion.

To Our Customers

The following pages and illustrations are printed to help supply you with the knowledge to better operate and service your new CrustBuster equipment.

We are proud to have you as a customer and feel you will be proud to be a CrustBuster owner.

Any piece of equipment needs, and must have, a certain amount of service and maintenance to keep it in top running condition. We have attempted to cover all the adjustments required to fit most conditions; however, there may be times when special care must be taken to fit a condition.

Study this owner's manual carefully and become acquainted with all the adjustments and operating procedures before attempting to operate your new equipment. Remember, it is a machine and has been designed and tested to do an efficient job in most operating conditions and will perform in relation to the services it receives.

If special attention is required for some condition, ask your CrustBuster dealer; he will be glad to help and answer any questions on operations and service of your new machine.

TAKE TIME FOR SAFETY

Before Operating This Equipment

Read and understand this owner's manual.



Safety & Set-Up Instructions



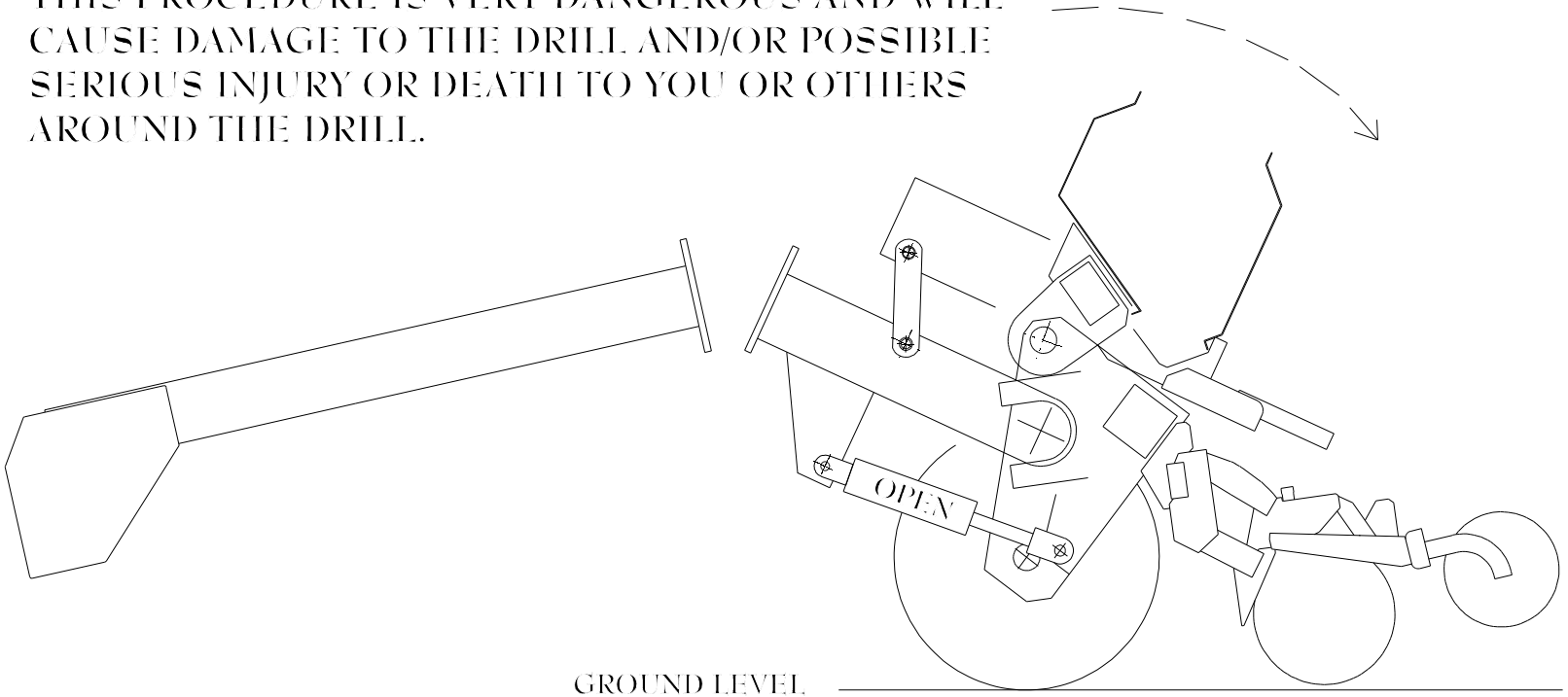
- If your drill is delivered with a shipping bracket, DO NOT install hitch or operate hydraulics until bracket is completely removed. Damage to drill will result.
- Dealer Installation of Hitch - Be sure hitch bolts are **torqued equally.** DO NOT tighten one side completely before the other. Failure to follow these instructions could cause hitch to be off center and drill will not run straight.
- Secure implement to tractor drawbar using as large a hitch pin as will allow. A large bolt with locking nut or castle nut is recommended. DO NOT use a hairpin or wire to secure hitch pin. Residue may catch and remove these devices. ALWAYS SECURE DRILL TO TRACTOR USING THE SUPPLIED SAFETY CHAIN.
- Make sure 3-point linkages are raised completely to clear hitch.
- **DO NOT attempt to remove the hydraulic cylinder unless you have taken the precautions described on page 4 of this manual. Serious injury or death could occur if the correct procedure is not followed!**
- If your tractor does not already have a lighting receptacle, install one. Always plug in the drill lighting system to a correctly wired tractor and USE for transport safety.
- Your drill may weigh more than the towing vehicle. The drill is not equipped with brakes. **EXERCISE EXTREME CAUTION !** Maximum allowable speed - **25 mph.**
- If your drill is equipped with hydraulic markers, always attach safety chains before transporting.
- Always install transport lock to hydraulic cylinder before transporting.
- Remove transport lock from lift cylinder before attempting field operation.
- Never have more than **391 lbs.** per section on the walkboards without drill securely attached to tractor or towing vehicle.
- Check lug nuts or bolts. Torque to 100 ft. lbs. after approximately one mile and periodically after.
- After approximately 10 hours, make sure tool bar bolts, wheel bolts, presswheel bolts, etc. are tight. Check tool bar bolts every 10 to 15 hours. **Tool bar bolts must stay tight.** Failure to comply could cause damage to tool bar and main frame in the form of egg shaped holes.
- **NEVER ALLOW ANYONE TO RIDE THE DRILL!**

Safety Instructions

⚠ WARNING

DRILL WILL FALL BACK.

DO NOT REMOVE HITCH WITHOUT OPENERS LOWERED TO THE GROUND AND THE LIFT CYLINDER INSTALLED AND CHARGED WITH OIL. FAILURE TO COMPLY WITH THIS PROCEDURE IS VERY DANGEROUS AND WILL CAUSE DAMAGE TO THE DRILL AND/OR POSSIBLE SERIOUS INJURY OR DEATH TO YOU OR OTHERS AROUND THE DRILL.



Field Operating Checklist

____ Inflate tires to recommended air pressure.

____ Lubrication as required.

____ Seed shafts turned manually to check for obstructions and improper chain alignment on drive sprockets.

____ Correct sprocket selection and slot width for seed type and size.

____ Calibration as required for accuracy.

____ Drill adjusted at hitch for level field operation.

____ Cylinder stop set for proper toolbar rotation.

____ Down pressure set for soil conditions.

____ Acre meter reset.

____ Lower drill while moving forward to avoid plugging openers.

____ Check seed depth and adjust accordingly.

____ Allow no riders.

____ After approximately 10 hours, check tool bar bolts, wheel bolts, presswheel swivel bolts, etc.. Make sure they are tight.

Transport Instructions

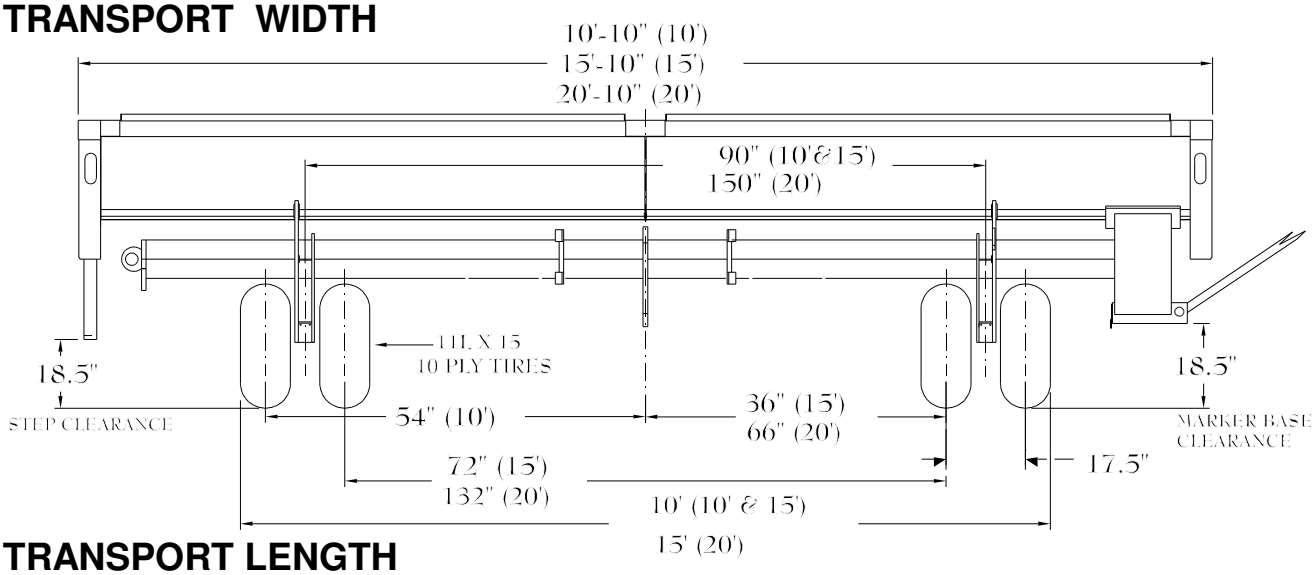
- Before attempting to operate the lift cylinder, remove transport lock. Store cylinder lock on the holder attached to the front of the weight bar bracket. When traveling long distances, it is recommended that the transport lock be installed, pressure relieved from the hydraulic hoses and hoses hooked to the tractor. If trailing behind a towing vehicle, the hydraulic hoses should be stored in the slotted storage in the tongue cover.
- **NEVER** use an unsecured pin in draw bar.
- **DO NOT** attempt to remove the cylinder at any time for transport or field operations.
- Stow the adjustable jack on top of the tongue mounting stub to avoid interference with main tractor wheels in tight turns and make sure 3-pt linkages are fully raised.
- Connect the 7 pin lighting plug to the tractor receptacle and use at all times. Confirm the correct lights are operating if your tractor is not wired by industry standard code. Standard 7 pin receptacles are available through your dealer, local truck supply stores, and auto parts facilities.
- Always attach the safety chain to the tractor drawbar system.
- Disconnect drive chain and store on the "dummy" sprocket when traveling long distances.
- If your drill is equipped with hydraulic markers, the safety chains should be attached to the marker to avoid catastrophic injury to oncoming vehicles.
- Maximum allowable speed; **25 mph**.



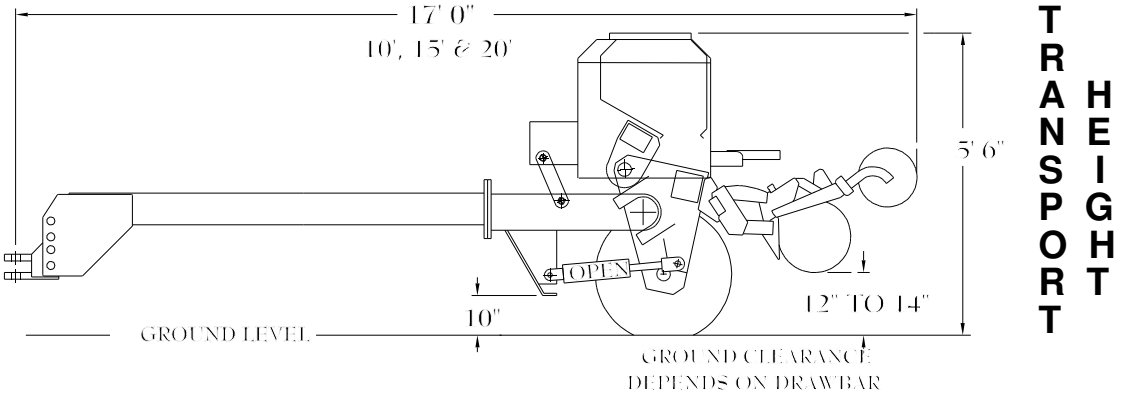
CAUTION! Your drill may weigh more than the towing vehicle. The drill is NOT equipped with brakes. Exercise extreme caution!

Dimensions & Specifications

TRANSPORT WIDTH



TRANSPORT LENGTH



10', 15' & 20' Drill Weights

Size & Spacing	Number of Openers	Presswheels				
		Single 2 x 13 Flat	Single 2 x 13 Peaked	Single 3 x 13	Single 3 x 13 Center Rib	Single 3 x 14 V-Type
10' x 7½"	16	NA		NA		NA
10' x 10"	12	NA		NA		NA
15' x 7½"	24	7600		7672		7936
15' x 8"	22	7420		7486		7728
15' x 10"	18	6890		6950		7144
20' x 7½"	32	8690		8784		9200
20' x 8"	30	8515		8574		8964
20' x 10"	24	7920		7943		8255

Field Operation

Recommended Operating Speed

Operating speeds of **4-7** mph will provide optimum results from your All Plant drill. Conventional field conditions can warrant speeds in the upper end of the range. High levels of "tough" residue due to morning dew or recent moisture, rough field conditions, rocky fields, or hard ground may require lower speeds for adequate performance.

Recommended Adjustment Procedure

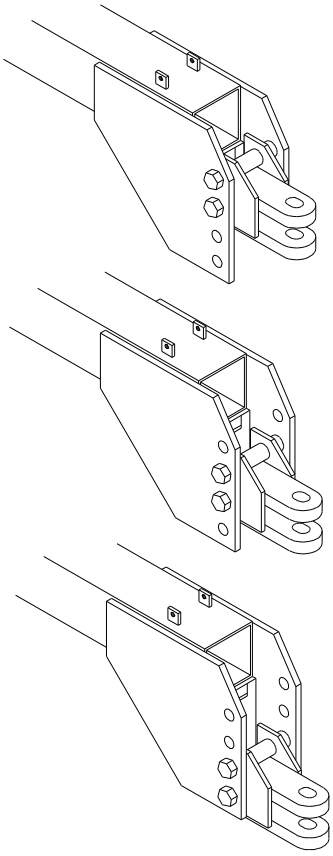
Setting your All Plant drill requires adjustments be made in a particular order to ensure the opener will work properly. You will find it much easier to set the drill if adjustments are made in the following order:

1. **Level the drill**
2. **Set toolbar rotation**
3. **Set down pressure**
4. **Set seed depth**

Leveling the Drill

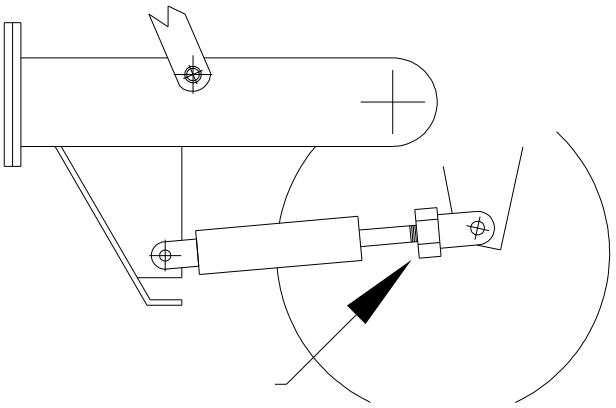
It is important to level the drill from front to back first. The tongue and box should be as close to level as you can get it by changing the drawbar height on the tractor (on offset drawbars), or by repositioning the clevis or mono hitch mounting. Any time a different tractor is hooked to the drill you should recheck level.

Clevis Positions



Toolbar Adjustment

After the drill is leveled, rotation of the toolbar must be set. Using the screw adjustable stop on the lift cylinder, adjust rotation of the toolbar until the 2" x 4" tubing the openers are mounted on is perpendicular to the ground. Adjustment range of the presswheel depth quadrant will be affected if the toolbar does not rotate far enough or goes beyond perpendicular. If the toolbar is not set correctly, the opener travel range will not allow for penetration into low areas or provide clearance when meeting obstructions.



Setting Down Pressure

The parallel linkage opener design assures the operator the opener blades and presswheel operate on the same level throughout the range of up and down travel. Due to the location of the down pressure spring, the pressure applied to the opener remains relatively constant in the entire range of travel. Changing the spring position from the first (top) notch to the last (bottom) notch provides 4 different levels of force. Each notch represents approximately these amounts of down pressure:

Notch 1 (top)	140#
Notch 2	275#
Notch 3	400#
Notch 4	525#

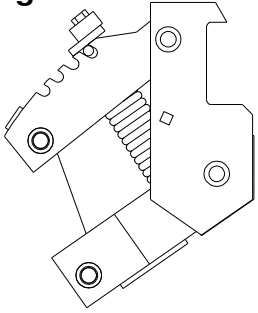
It may be necessary to add ballast to the drill in the third or fourth notch. In order that all the opener springs are able to achieve the down pressure selected, the total weight of the drill must equal that amount of pressure times the number of row units on the drill. The parallel linkage arms should have a "live working action" during field operation. Setting the drill for too much down pressure without adequate weight will reduce the ability of the opener to flex and give good performance.

Field Operation

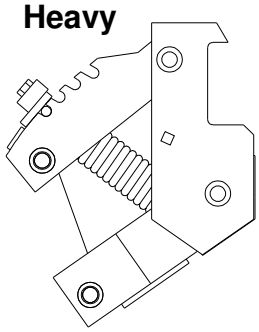
Setting Down Pressure - *(cont.*)

To determine the correct amount of down pressure, begin with the unit set in the lightest setting and the presswheel adjusted all the way up (or deepest setting). Put the openers in the ground and pull forward 50-100 feet. Stop and check opener penetration. If the opener is not penetrating to the depth you wish to plant, rotate toolbar upwards until clear of the ground, and add one more notch of down pressure. Repeat the process until the opener will penetrate to at least the depth you wish to plant.

Light



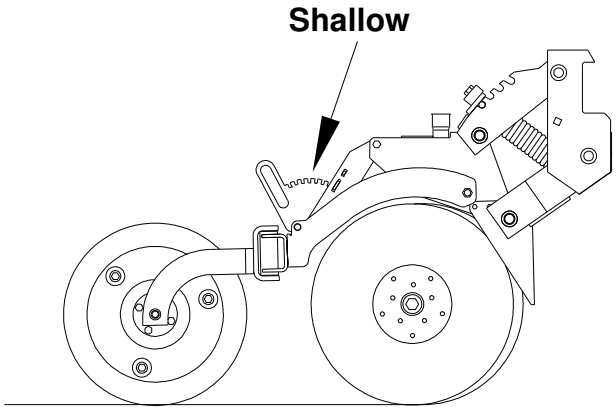
Heavy



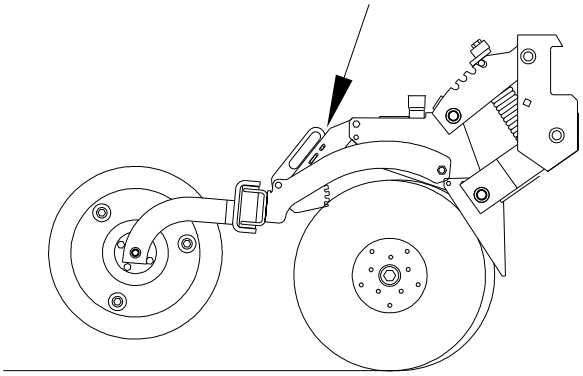
Setting Seed Depth

Depth settings are achieved by moving the depth quadrant to effect the presswheel relationship to the opener. Changes are made by pulling the spring-loaded pin handle and moving the quadrant up or down with the hand slot. **LOWERING** the quadrant will set seed depth **shallow** --**RAISING** the quadrant will set seed depth **deeper**. Irregular seed placement can be caused by excessive field speed, residue hairpinning, rocky conditions, and cloddy or wet soil conditions.

Shallow



Deep



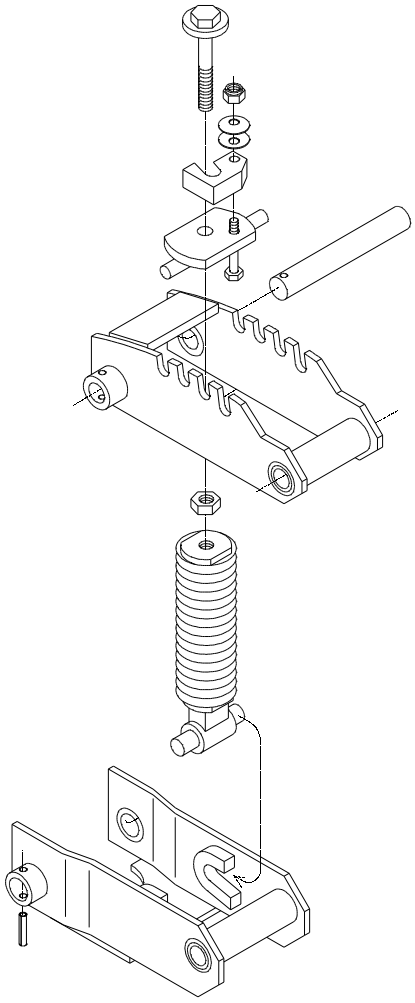
Field Operation

Conventional Field Conditions

For tilled field conditions, the lightest spring setting (top notch) is recommended. More weight will be transferred to the carrying wheels of the drill when the toolbar is rotated. Behind tractor and drill tires it may be necessary to adjust individual row units for extra down pressure or different depth setting. **Setting the drill in conventional tillage will be easier if the tillage trips are kept shallow (2" - 4").**

If the first notch presents too much down pressure, the down pressure spring assembly can be removed. With the spring assembly removed, the effective down pressure of the opener is approximately 60#.

With the openers rotated clear of the ground, release the latches on the spring top assemblies. With the spring top ears between the parallel arms, raise the opener halfway and push the bottom of the spring and spring pin forward out of the cradles.



Minimum Tillage Conditions

The most challenging condition is often presented when a high level of residue is present in a "loose" soil environment. The opener blades will not cut residue cleanly and can often have a tendency to push or "bulldoze" residue ahead of the opener discs.

For minimum tillage operations, the lightest spring (top notch) is recommended. Firming the ground using a culti-packer or similar tool can aid in packing the residue for better cutting and blade penetration with less hairpinning.

The All Plant drill will work well in minimum tillage conditions if a "stale seedbed" is created. Soil worked at an earlier date, and allowed to firm and crust over can give the opener more resistance, allow for better cutting action, and create a firmer seed furrow. The first or second notch will usually provide enough down pressure to penetrate the soil.

No-Till Conditions

No-till presents many different conditions. Residue level and condition, previous tillage strips (ridges, plow dead furrows), soil type, soil moisture and rocky conditions all increase the demands on the no-till drill. Many variables and conditions not removed by tillage trips require greater attention to settings and speed. In some circumstances, it may be desirable to drill at a slight angle to existing rows. This will also randomize the opener disc wear and extend the maintenance interval for new blades.

As a general rule, less than ideal conditions will require slower speeds, to reduce hairpinning, improve opener penetration and residue cutting, reduce rock damage, and maintain good furrow formation and seed placement.

It is recommended you set the drill beginning with light down pressures and work your way up to heavier settings. If the presswheel presses firmly on the seed slot and control depth evenly, it is unnecessary to add more pressure. When increased down pressure does not improve penetration, or carrying wheels lose ground contact (and seed drive shaft stops), begin adding ballast with weight bars and/or suitcase weights.

Calibration, Seed Rates and Sprocket Box

Calibration/Drilling Rates

Planting the right rate can be frustrating. Sometimes the end result is not what the rate chart indicates. Seeding rate is affected by seed size, seed treatments, foreign material, test weight, and tire air pressure.

1. Always plant clean seed.
2. Check tire air pressure.
3. Seed treatments vary by type and time of application.

Some seeds are treated at the processor. Drill box treatments are common methods of application. Each of these can "gum" up the wobble slot cup halves and reduce final seeding rate. Treated seed often flows differently than non-treated seed.

A general method for checking quantities drilled is as follows:

1. Set drill for desired seeding rate.
2. Fill the box level; then pull drill for a short distance to settle seed. Refill box exactly level full.
3. Drill a calculated one acre.
4. Carefully weigh the seed required to refill the box level full.
5. Compare the amount used versus that stated on the rate chart.
6. Adjust seeding rate by changing the sprocket combination or wobble slot width.

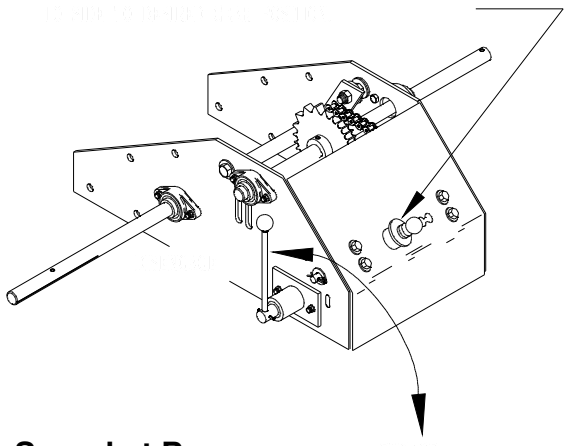
One method involves catching seed from one or more seed cups and utilizing a density scale to determine actual rates. These scales are commercially available, inexpensive and very easy to use. Information can be obtained from CrustBuster®/Speed King, Inc.

Sprocket Box Operation

The sprocket box design will enable the operator to set a wobble slot width once for a given seed size and change rates by changing the speed of the seed shaft. Choose a range of seeding rates that you wish to operate in, set the slot width as indicated by the chart and simply change knob position with the slide handle to effect seed rate. A narrow slot width will produce more even distribution and spacing in the row.

When changing derailleur, be sure openers are rotated out of ground.

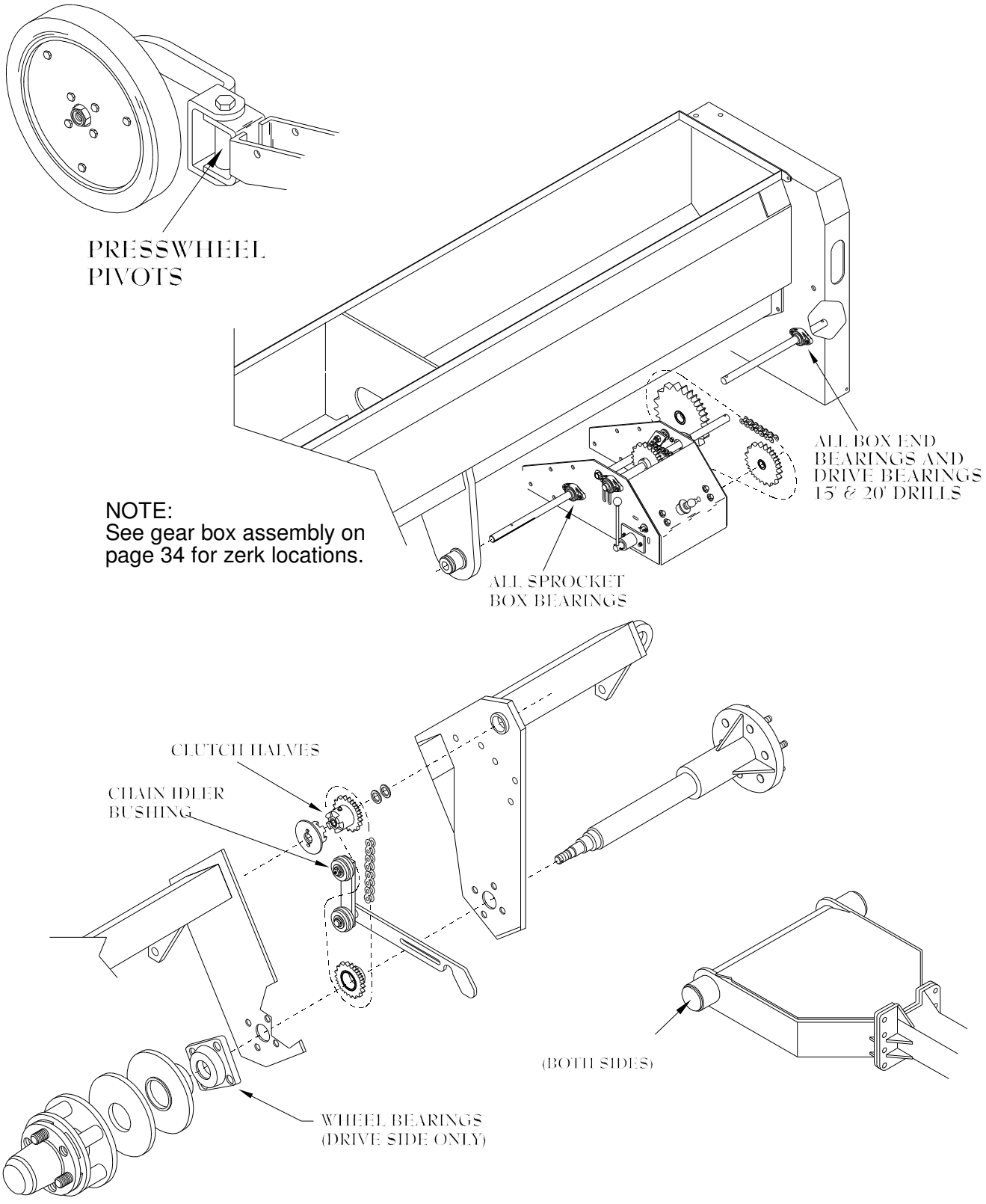
To change position, move throw-out lever toward the rear to disengage the chain from the lower sprocket. Pull the spring loaded collar outward with two fingers and slide side to side to the desired gear position. Pull throw-out lever forward to re-engage the chain.



Sprocket Box

Lubrication and Service

Proper maintenance will extend the life of your drill. Refer to the drawings below for lubrication requirements. Use a high quality grease in bearings and pivot points. On greaseable sealed bearings, be careful not to over grease and destroy the dirt seal. Oil chains with a chain lube. A light penetrating oil or liquid graphite should be used on seed cups initially and at the end of each season.

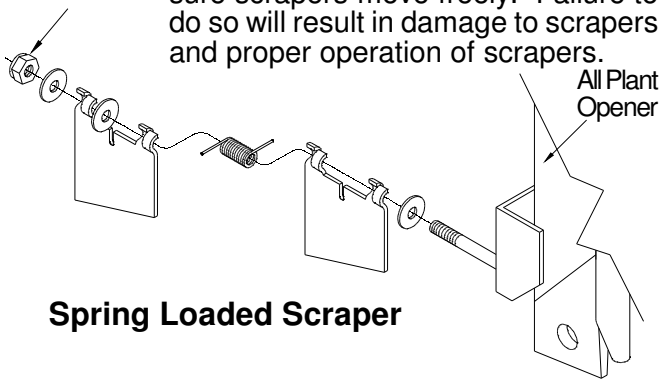


Lubrication and Service

Scraper Adjustment

Opener blade inside scrapers are spring loaded and require no adjustment. To replace the scraper blades, remove the rear lock nut and slide both blades from the stem. Assemble with new blades and replace onto stem being careful no to overtighten lock nut.

NOTE: Do not over tighten lock nut. Be sure scrapers move freely. Failure to do so will result in damage to scrapers and proper operation of scrapers.

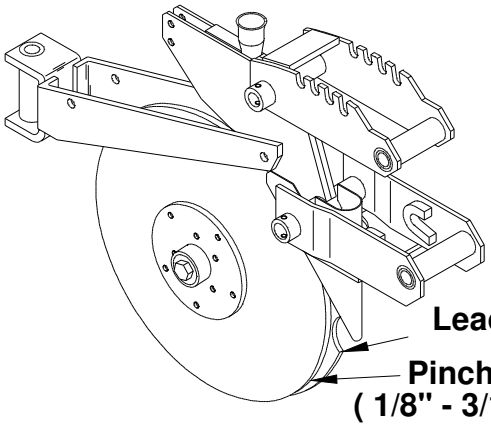


Spring Loaded Scraper

Blade Gap Adjustment

Offset blade designs form better seed furrows and penetrate and cut in tougher planting conditions. As the blades wear, the gap between blades will increase. Removing each blade from the opener bracket allows the operator to take shim washers from behind the bearing and re-adjust the blade gap for better performance. Maintain a 1/8" - 3/16" clearance between blades, measuring at the pinch point. Inadequate clearance will increase wear on the inside of the lead blade and mean quicker replacement.

NOTE: The right blade is installed with a right hand threaded bolt. The left blade is installed with a left hand threaded bolt. The lead blade is reversed on each half of the drill.



Lead Blade

Pinch Point
(1/8" - 3/16" Gap)

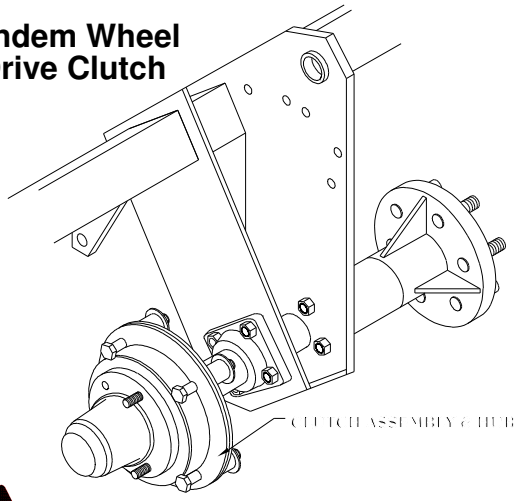
Tandem Wheel Drive Clutch

Tandem wheels that drive a seed shaft are manufactured with a friction disc type clutch. If the drive wheel encounters a hole, ridge, or other situation that may cause a delay in adequate ground contact, the other wheel will "take over" driving the seed shaft. During turns, or in the folding operation, it is necessary that the non-drive wheel can free wheel. This clutch should require no adjustment.

The tire is bolted to the hub using four stud bolts and four through bolts with tapered nuts for thread protection. If the wheel must be removed for service, tighten the four lock nuts on the rubber springs to snug. Remove the tapered nuts on the stud bolts coming through the hub, and remove all eight stud bolts to remove tire. The wheel hub may now be removed by removing dust cap and castellated nut on spindle.

After replacing wheel hub and tightening onto spindle for proper bearing drag, install longer stud bolts in hole aligning clutch and replace tapered nuts. Release spring pressure by loosening the four lock nuts, leaving two threads on the outer end of the spring bolt.

Tandem Wheel Drive Clutch



CAUTION!

At the start of a new drilling season, or anytime the drill is going to be used, especially if the drill has been stored out in the weather all winter long, make sure the clutch drive is not frozen up. Failure to do this will result in damage to clutch assembly.

To make sure the clutch is not frozen up, tighten up the clutch bolts. This should free the disc torque limiter. If not, use a knife to free the torque limiter from one or the other. Reset clutch back to where it was. **DO NOT** use any oil or penetrating oil of any kind.

Wobble Slot Seed Cup Adjustments and Service

The wobble slot seed cups should be checked against the slot gauge initially and anytime service has been performed on the seed shaft or individual seed cups. Refer to the drawing below for proper adjustment if repairs have been made.

To verify that all seed cups are set the same on the shaft, start with all cups fully closed. A slight crack between the cup halves would be considered normal tolerance. If any individual cup is not "zeroed out," open the slot width using the adjusting handle, loosen allen set screws and adjust to equal others on shaft.

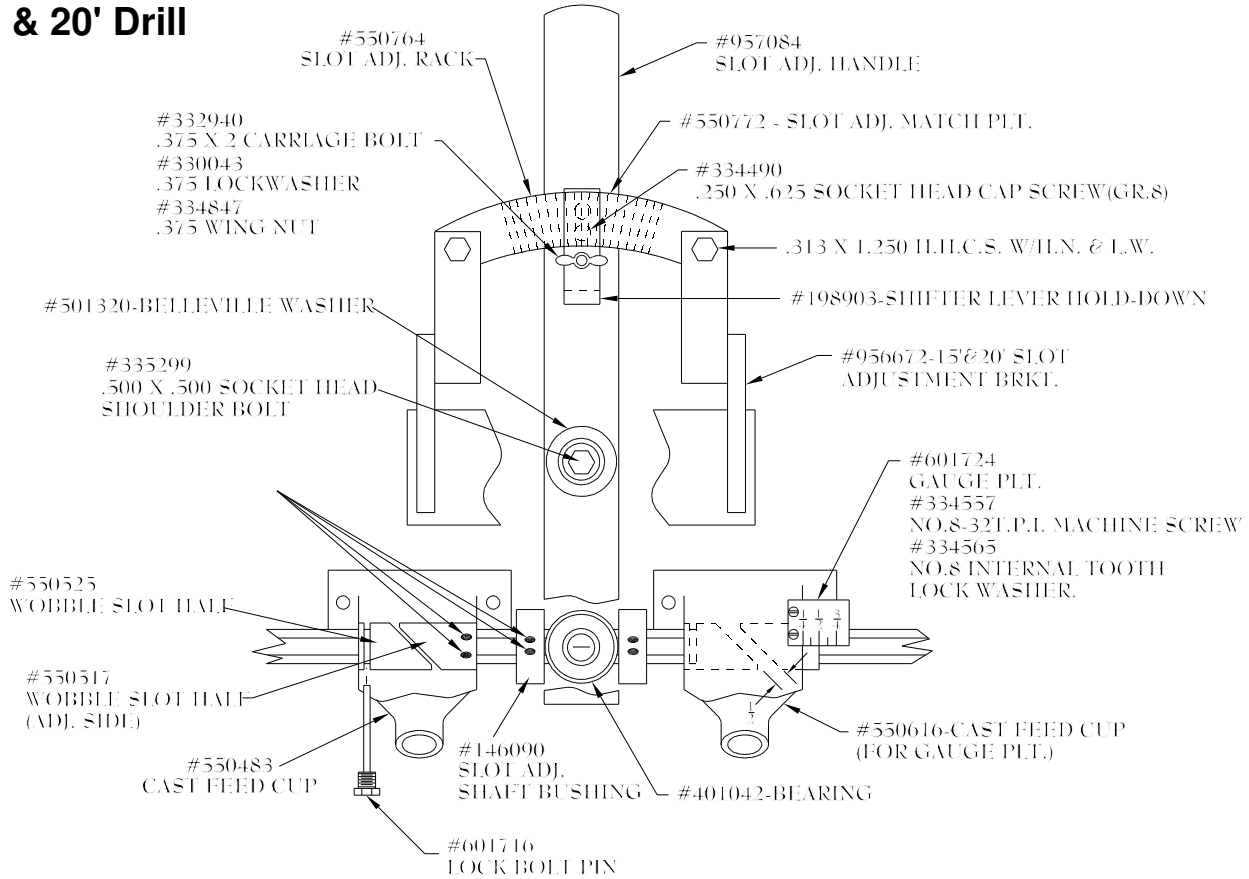
o determine if the gauge is reflecting the correct seed cup slot width, open the seed cups using the adjusting handle. Notice that wobble slot halves are positioned differently on the hex shaft. Identify a cup that will accept a piece of ½" keystock or other measuring device comfortably and give solid contact against each half. It may be necessary to turn the hex shaft slightly to position the particular seed cup correctly. Close the slot width firmly against the measuring device. At the cup next to the wobble slot adjusting handle, position the gauge to equal the slot width you have just measured with the keystock by loosening with a screwdriver and sliding in or out.

Before removing the keystock, make certain the bearing located on the adjustment lever is securely running between the shaft bushings. Adjusting bushings must be set screwed tightly to shaft with zero to 1/64" tolerance between the bushing and bearing. Excess tolerance in this area will allow the seed shaft to float from right to left, thus opening and closing wobble slot and varying seed rate.

Small changes in rate can be made by opening or closing slot width. To close the slot width with grain in the box, close the slot down a maximum of 1/8" and then rotate the shaft on turn to clear the slot. Repeat this process until the desired slot width is selected.

Seeding rate is affected by seed size, seed treatments, foreign material, and test weight. Refer to seed rate charts as guidelines for desired seeding rates.

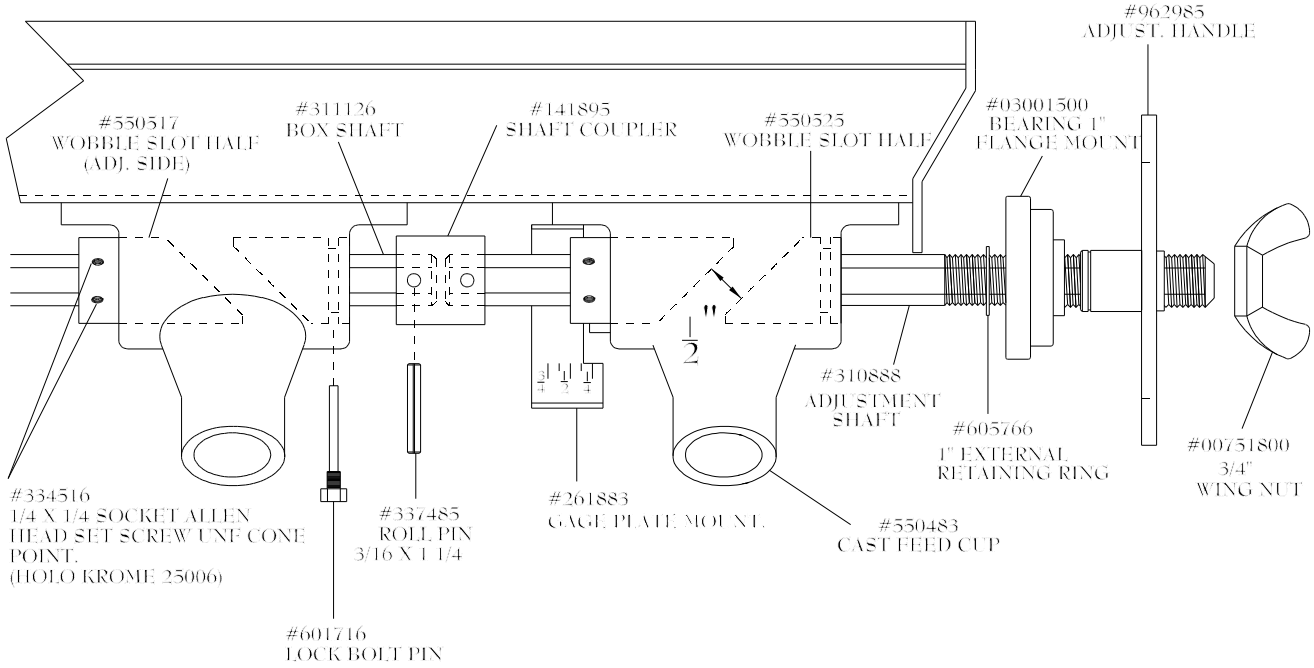
15' & 20' Drill



Wobble Slot Seed Cup Adjustments and Service

Chain Tension on Drive Shaft
When making sprocket changes to the seed shaft, tighten chain to leave approximately 1/2" of flex. The final sprocket must be allowed to slide on the shaft when the adjusting lever is moved. If the chain is too tight, the spring will not keep the sprocket in the proper location and chain misalignment will occur. Lightly lubricate the shaft where the sprocket will slide. **DO NOT OVERTIGHTEN CHAIN.**

10' Drill



Meter Man Acreage Counter
(Option)

Calibration

Use the formulas below to determine your implement calibration factor or refer to the predetermined factors listed when using CrustBuster drills.

DT = Distance traveled with one counter shaft rotation (when using two magnets, divide DT by 2).

WW = Working Width of implement (in inches).

$$\frac{WW \times DT/2}{6272640} = \text{Calibration factor}$$

NOTE: Whenever a gear change is made on the shaft being monitored, you will need to enter a new calibration factor.

Entering Calibration Factor

1. Depress ON/C
2. Round off factor to 5 digits
3. Enter factor (remember decimal point)
4. Depress **+** key
5. Depress **=** key
6. Depress decimal point (screen display 0)

CrustBuster Drill
Meter Man Factors by Model

4600 Drill

Spacing	10'	15'	20'
7 ½"	.00096	.00143	.00246
8"		.00126	.00224
10"	.00069	.00103	.00177

For round seeds, the ideal slot width can be determined by measuring seed size. To attain singular file flow of seeds from the wobble slot seed cup, the slot width should be greater than one and one half (1 ½) times the average seed size, but less than two (2) times the average size.

Ideal Slot Width =
Greater than (>) 1½ times seed size
Less than (<) 2 times seed size

To determine average seed size, lay out 20-30 seeds in single file, each seed touching each other. A short piece of angle iron can help align the seeds evenly. Measure distance from end to end with a ruler. Divide that measurement by the number of seeds to equal the average seed size. Multiply average seed size times 1½ to find the minimum width. Multiply average seed size times 2 to find the maximum width. The slot width should be ideal when set between these values.

Example: 30 seeds measure 9 inches.
9 " divided by 30 seeds = .30"
.30" times 1.5 = .45"
.30 times 2 = .60"

Ideal slot width is greater than .45",less than .60"
Ideal slot width = ½"

Refer to seed chart ½" column as a starting point for setting final seed rate.

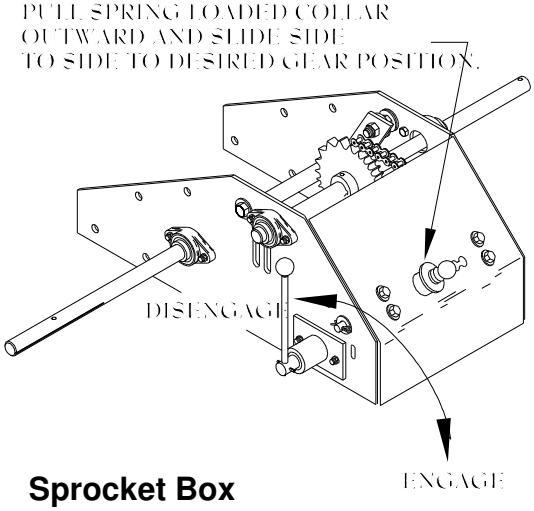
To change position, move throw-out lever toward the rear to disengage the chain from the lower sprocket. Pull the spring loaded collar outward with two fingers and slide side to side to the desired gear position. Pull throw-out lever forward to re-engage the chain.

Sprocket Box Adjustment

The sprocket box design will enable the operator to set a wobble slot width once for a given seed size and change rates by changing the speed of the seed shaft.

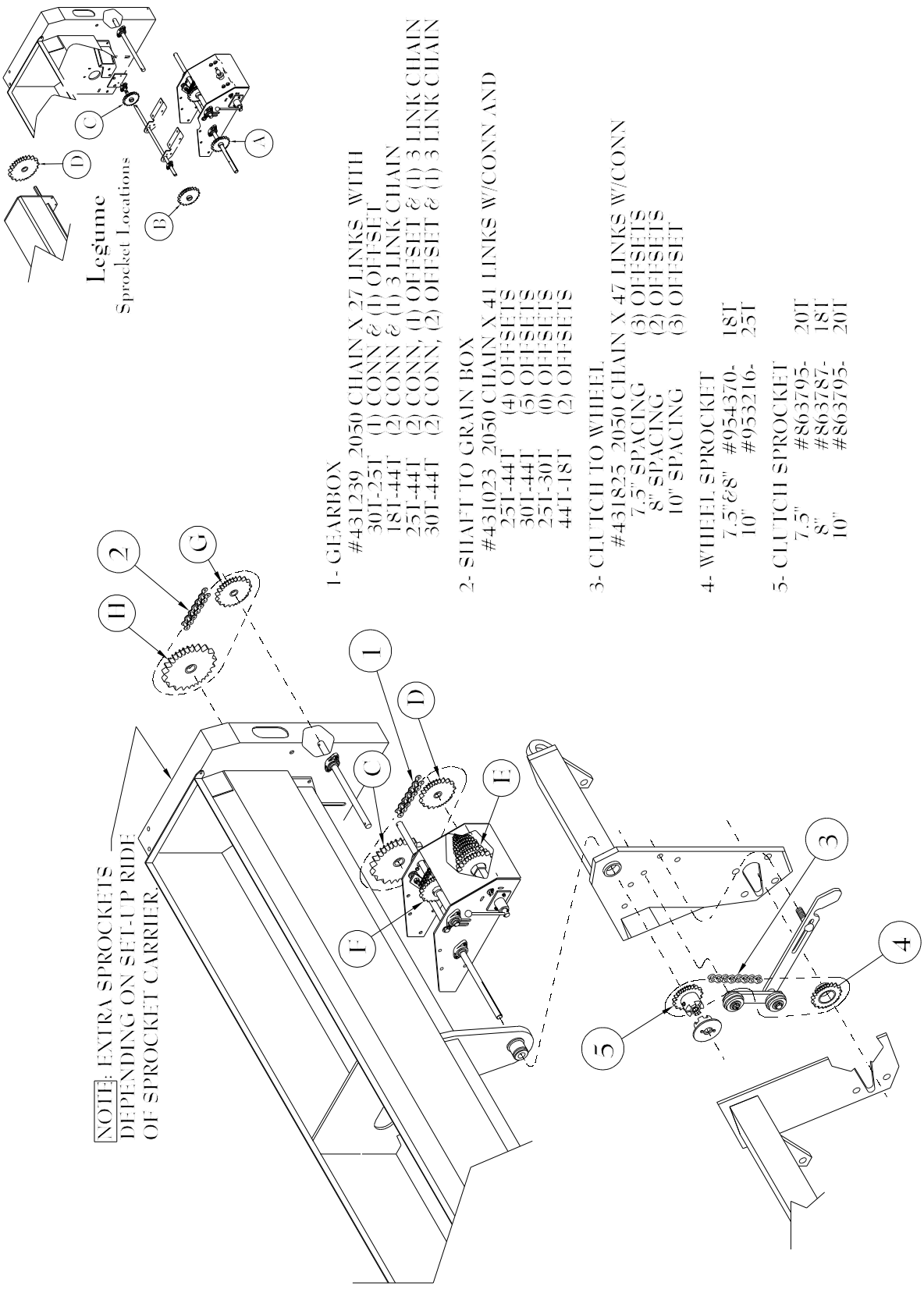
Choose a range of seeding rates that you wish to operate in, set the slot width as indicated by the chart and simply change knob position with the slide handle to select seed rate.

A narrow slot width will produce more even distribution and spacing in the row.



Sprocket Box

Sprocket Locations



Seed Rate Charts

ALFALFA

Sprockets						Slot Width	
		Derailleur		Box End		Pounds/Acre	
C	D	E	F	G	H	1/8"	1/4"
18	44	16	30	25	44	5	8
18	44	17	30	25	44	5	9
18	44	18	30	25	44	5	9
18	44	19	30	25	44	6	10
18	44	20	30	25	44	6	11
18	44	21	30	25	44	6	11
18	44	22	30	25	44	7	12
18	44	23	30	25	44	7	12
25	44	16	30	25	44	7	12
25	44	17	30	25	44	7	12
25	44	18	30	25	44	8	13
25	44	19	30	25	44	8	14
25	44	20	30	25	44	8	15
25	44	21	30	25	44	9	15
25	44	22	30	25	44	9	16
25	44	23	30	25	44	10	17
30	44	16	30	30	44	10	17
30	44	17	30	30	44	10	18
30	44	18	30	30	44	11	19
30	44	19	30	30	44	12	20
30	44	20	30	30	44	12	21
30	44	21	30	30	44	13	22
30	44	22	30	30	44	13	23
30	44	23	30	30	44	14	24
30	25	16	30	25	44	14	25
30	25	17	30	25	44	15	26
30	25	18	30	25	44	16	28
30	25	19	30	25	44	17	29
30	25	20	30	25	44	18	31
30	25	21	30	25	44	19	32
30	25	22	30	25	44	20	34
30	25	23	30	25	44	21	35
30	25	16	30	25	30	21	36
30	25	17	30	25	30	22	38
30	25	18	30	25	30	24	41
30	25	19	30	25	30	25	43
30	25	20	30	25	30	26	45
30	25	21	30	25	30	28	48
30	25	22	30	25	30	29	50
30	25	23	30	25	30	30	52

BARLEY

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	1/2"	5/8"	3/4"
30	25	16	30	25	44	31	38	45
30	25	17	30	25	44	33	40	48
30	25	18	30	25	44	34	43	51
30	25	19	30	25	44	36	45	54
30	25	20	30	25	44	38	47	57
30	25	21	30	25	44	40	50	60
30	25	22	30	25	44	42	52	63
30	25	23	30	25	44	44	54	65
30	25	16	30	25	30	45	56	67
30	25	17	30	25	30	48	59	71
30	25	18	30	25	30	51	63	75
30	25	19	30	25	30	53	66	79
30	25	20	30	25	30	56	69	83
30	25	21	30	25	30	59	73	88
30	25	22	30	25	30	62	76	92
30	25	23	30	25	30	65	80	96
30	25	16	30	30	25	65	80	96
30	25	17	30	30	25	69	85	102
30	25	18	30	30	25	73	90	108
30	25	19	30	30	25	77	95	114
30	25	20	30	30	25	81	100	120
30	25	21	30	30	25	85	105	126
30	25	22	30	30	25	89	110	132
30	25	23	30	30	25	93	115	138
25	30	16	30	44	18	92	113	136
25	30	17	30	44	18	97	120	144
25	30	18	30	44	18	103	127	153
25	30	19	30	44	18	109	134	161
25	30	20	30	44	18	114	141	170
25	30	21	30	44	18	120	149	178
25	30	22	30	44	18	126	156	187
25	30	23	30	44	18	132	163	195

Seed Rate Charts

CANOLA

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	3/16"	1/4"	3/8"
18	44	16	30	25	44	5	7	10
18	44	17	30	25	44	5	8	11
18	44	18	30	25	44	5	8	11
18	44	19	30	25	44	6	8	12
18	44	20	30	25	44	6	9	13
18	44	21	30	25	44	6	9	13
18	44	22	30	25	44	7	10	14
18	44	23	30	25	44	7	10	14
25	44	16	30	25	44	7	10	14
25	44	17	30	25	44	7	10	15
25	44	18	30	25	44	8	11	16
25	44	19	30	25	44	8	12	17
25	44	20	30	25	44	8	12	17
25	44	21	30	25	44	9	13	18
25	44	22	30	25	44	9	13	19
25	44	23	30	25	44	10	14	20
30	44	16	30	30	44	10	14	20
30	44	17	30	30	44	10	15	21
30	44	18	30	30	44	11	16	23
30	44	19	30	30	44	12	17	24
30	44	20	30	30	44	12	18	25
30	44	21	30	30	44	13	19	26
30	44	22	30	30	44	13	19	28
30	44	23	30	30	44	14	20	29
30	25	16	30	25	44	14	21	29
30	25	17	30	25	44	15	22	31
30	25	18	30	25	44	16	23	33
30	25	19	30	25	44	17	25	35
30	25	20	30	25	44	18	26	37
30	25	21	30	25	44	19	27	39
30	25	22	30	25	44	20	28	41
30	25	23	30	25	44	21	30	42
30	25	16	30	25	30	21	30	43
30	25	17	30	25	30	22	32	46
30	25	18	30	25	30	24	34	49
30	25	19	30	25	30	25	36	51
30	25	20	30	25	30	26	38	54
30	25	21	30	25	30	28	40	57
30	25	22	30	25	30	29	42	59
30	25	23	30	25	30	30	44	62
30	25	16	30	30	25	30	44	62
30	25	17	30	30	25	32	46	66
30	25	18	30	30	25	34	49	70
30	25	19	30	30	25	36	52	74
30	25	20	30	30	25	38	55	78
30	25	21	30	30	25	40	57	82
30	25	22	30	30	25	42	60	86
30	25	23	30	30	25	44	63	89

CORN

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	1/2"	5/8"	3/4"
18	44	16	30	25	44	6	8	10
18	44	17	30	25	44	6	8	10
18	44	18	30	25	44	6	9	11
18	44	19	30	25	44	7	9	11
18	44	20	30	25	44	7	10	12
18	44	21	30	25	44	7	10	13
18	44	22	30	25	44	8	11	13
18	44	23	30	25	44	8	11	14
25	44	16	30	25	44	8	11	13
25	44	17	30	25	44	8	12	14
25	44	18	30	25	44	9	12	15
25	44	19	30	25	44	9	13	16
25	44	20	30	25	44	10	14	17
25	44	21	30	25	44	10	14	18
25	44	22	30	25	44	11	15	18
25	44	23	30	25	44	11	16	19
30	44	16	30	30	44	11	16	19
30	44	17	30	30	44	12	17	20
30	44	18	30	30	44	13	18	22
30	44	19	30	30	44	13	19	23
30	44	20	30	30	44	14	20	24
30	44	21	30	30	44	15	21	25
30	44	22	30	30	44	15	22	26
30	44	23	30	30	44	16	23	28
30	25	16	30	25	44	17	23	28
30	25	17	30	25	44	18	25	30
30	25	18	30	25	44	19	26	32
30	25	19	30	25	44	20	27	34
30	25	20	30	25	44	21	29	35
30	25	21	30	25	44	22	30	37
30	25	22	30	25	44	23	32	39
30	25	23	30	25	44	24	33	41
30	25	16	30	25	30	26	34	42
30	25	17	30	25	30	27	36	44
30	25	18	30	25	30	28	38	47
30	25	19	30	25	30	29	40	50
30	25	20	30	25	30	31	42	52
30	25	21	30	25	30	32	44	55
30	25	22	30	25	30	34	46	58
30	25	23	30	25	30	35	48	60
30	25	16	30	30	25	35	48	60
30	25	17	30	30	25	37	52	64
30	25	18	30	30	25	40	55	68
30	25	19	30	30	25	42	58	72
30	25	20	30	30	25	44	61	75
30	25	21	30	30	25	46	64	79
30	25	22	30	30	25	48	67	83
30	25	23	30	30	25	51	70	87

Seed Rate Charts

COTTON

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	1/2"	5/8"	3/4"
18	44	16	30	25	44	8	9	12
18	44	17	30	25	44	8	10	12
18	44	18	30	25	44	9	10	13
18	44	19	30	25	44	9	11	14
18	44	20	30	25	44	10	12	14
18	44	21	30	25	44	10	12	15
18	44	22	30	25	44	11	13	16
18	44	23	30	25	44	11	13	17
25	44	16	30	25	44	11	13	16
25	44	17	30	25	44	11	14	17
25	44	18	30	25	44	12	14	18
25	44	19	30	25	44	13	15	19
25	44	20	30	25	44	13	16	20
25	44	21	30	25	44	14	17	21
25	44	22	30	25	44	15	18	22
25	44	23	30	25	44	15	19	23
30	44	16	30	30	44	15	19	23
30	44	17	30	30	44	16	20	24
30	44	18	30	30	44	17	21	26
30	44	19	30	30	44	18	22	27
30	44	20	30	30	44	19	23	29
30	44	21	30	30	44	20	24	30
30	44	22	30	30	44	21	26	32
30	44	23	30	30	44	22	27	33
30	25	16	30	25	44	23	27	34
30	25	17	30	25	44	24	29	36
30	25	18	30	25	44	26	31	38
30	25	19	30	25	44	27	32	40
30	25	20	30	25	44	28	34	42
30	25	21	30	25	44	30	36	44
30	25	22	30	25	44	31	37	46
30	25	23	30	25	44	33	39	49

FESCUE

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	3/8"	1/2"	5/8"
18	44	16	30	25	44	4	6	7
18	44	17	30	25	44	5	6	8
18	44	18	30	25	44	5	6	8
18	44	19	30	25	44	5	7	9
18	44	20	30	25	44	5	7	9
18	44	21	30	25	44	6	7	10
18	44	22	30	25	44	6	8	10
18	44	23	30	25	44	6	8	11
25	44	16	30	25	44	6	8	10
25	44	17	30	25	44	6	8	11
25	44	18	30	25	44	7	9	11
25	44	19	30	25	44	7	9	12
25	44	20	30	25	44	8	10	13
25	44	21	30	25	44	8	10	13
25	44	22	30	25	44	8	11	14
25	44	23	30	25	44	9	11	15
30	44	16	30	30	44	9	11	15
30	44	17	30	30	44	9	12	16
30	44	18	30	30	44	10	13	16
30	44	19	30	30	44	10	14	17
30	44	20	30	30	44	11	14	18
30	44	21	30	30	44	11	15	19
30	44	22	30	30	44	12	16	20
30	44	23	30	30	44	12	16	21
30	25	16	30	25	44	13	17	22
30	25	17	30	25	44	14	18	23
30	25	18	30	25	44	14	19	24
30	25	19	30	25	44	15	20	26
30	25	20	30	25	44	16	21	27
30	25	21	30	25	44	17	22	28
30	25	22	30	25	44	18	23	30
30	25	23	30	25	44	18	24	31
30	25	16	30	25	30	19	25	32
30	25	17	30	25	30	20	26	34
30	25	18	30	25	30	21	28	35
30	25	19	30	25	30	22	29	37
30	25	20	30	25	30	23	31	39
30	25	21	30	25	30	25	32	41
30	25	22	30	25	30	26	34	43
30	25	23	30	25	30	27	35	45
30	25	16	30	30	25	27	35	45
30	25	17	30	30	25	29	38	48
30	25	18	30	30	25	30	40	51
30	25	19	30	30	25	32	42	54
30	25	20	30	30	25	34	44	57
30	25	21	30	30	25	35	46	60
30	25	22	30	30	25	37	49	62
30	25	23	30	30	25	39	51	65

Seed Rate Charts

MILLET

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	3/16"	1/4"	3/8"
18	44	16	30	25	44	4	6	8
18	44	17	30	25	44	4	6	8
18	44	18	30	25	44	4	7	9
18	44	19	30	25	44	4	7	9
18	44	20	30	25	44	5	7	10
18	44	21	30	25	44	5	8	10
18	44	22	30	25	44	5	8	11
18	44	23	30	25	44	5	8	11
25	44	16	30	25	44	5	8	11
25	44	17	30	25	44	5	9	12
25	44	18	30	25	44	6	9	12
25	44	19	30	25	44	6	10	13
25	44	20	30	25	44	6	10	14
25	44	21	30	25	44	7	11	15
25	44	22	30	25	44	7	11	15
25	44	23	30	25	44	7	12	16
30	44	16	30	30	44	7	12	16
30	44	17	30	30	44	8	12	17
30	44	18	30	30	44	8	13	18
30	44	19	30	30	44	9	14	19
30	44	20	30	30	44	9	14	20
30	44	21	30	30	44	10	15	21
30	44	22	30	30	44	10	16	22
30	44	23	30	30	44	11	17	23
30	25	16	30	25	44	11	17	23
30	25	17	30	25	44	11	18	25
30	25	18	30	25	44	12	19	26
30	25	19	30	25	44	13	20	28
30	25	20	30	25	44	13	21	29
30	25	21	30	25	44	14	22	31
30	25	22	30	25	44	15	23	32
30	25	23	30	25	44	15	24	34
30	25	16	30	25	30	16	25	34
30	25	17	30	25	30	17	26	36
30	25	18	30	25	30	18	28	39
30	25	19	30	25	30	19	30	41
30	25	20	30	25	30	20	31	43
30	25	21	30	25	30	21	33	45
30	25	22	30	25	30	22	34	47
30	25	23	30	25	30	23	36	49
30	25	16	30	30	25	23	36	49
30	25	17	30	30	25	24	38	53
30	25	18	30	30	25	26	40	56
30	25	19	30	30	25	27	43	59
30	25	20	30	30	25	28	45	62
30	25	21	30	30	25	30	47	65
30	25	22	30	30	25	31	49	68
30	25	23	30	30	25	33	52	71

MILO

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	3/16"	1/4"	3/8"
18	44	16	30	25	44	4	6	11
18	44	17	30	25	44	5	6	12
18	44	18	30	25	44	5	7	13
18	44	19	30	25	44	5	7	14
18	44	20	30	25	44	5	8	14
18	44	21	30	25	44	6	8	15
18	44	22	30	25	44	6	8	16
18	44	23	30	25	44	6	9	16
25	44	16	30	25	44	6	8	16
25	44	17	30	25	44	6	9	17
25	44	18	30	25	44	7	10	18
25	44	19	30	25	44	7	10	19
25	44	20	30	25	44	8	11	20
25	44	21	30	25	44	8	11	21
25	44	22	30	25	44	8	12	22
25	44	23	30	25	44	9	12	23
30	44	16	30	30	44	9	12	23
30	44	17	30	30	44	9	13	24
30	44	18	30	30	44	10	14	26
30	44	19	30	30	44	10	14	27
30	44	20	30	30	44	11	15	29
30	44	21	30	30	44	11	16	30
30	44	22	30	30	44	12	17	32
30	44	23	30	30	44	12	18	33
30	25	16	30	25	44	13	18	34
30	25	17	30	25	44	13	19	36
30	25	18	30	25	44	14	20	38
30	25	19	30	25	44	15	21	40
30	25	20	30	25	44	16	22	42
30	25	21	30	25	44	17	23	44
30	25	22	30	25	44	17	25	46
30	25	23	30	25	44	18	26	48

Seed Rate Charts

OATS

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	1/2"	5/8"	3/4"
30	25	16	30	25	44	15	20	27
30	25	17	30	25	44	16	21	28
30	25	18	30	25	44	17	23	30
30	25	19	30	25	44	18	24	32
30	25	20	30	25	44	19	25	33
30	25	21	30	25	44	20	26	35
30	25	22	30	25	44	21	28	37
30	25	23	30	25	44	22	29	38
30	25	16	30	25	30	22	29	39
30	25	17	30	25	30	23	31	42
30	25	18	30	25	30	25	33	44
30	25	19	30	25	30	26	35	47
30	25	20	30	25	30	28	37	49
30	25	21	30	25	30	29	39	51
30	25	22	30	25	30	30	40	54
30	25	23	30	25	30	32	42	56
30	25	16	30	30	25	32	42	56
30	25	17	30	30	25	34	45	60
30	25	18	30	30	25	36	48	64
30	25	19	30	30	25	38	50	67
30	25	20	30	30	25	40	53	71
30	25	21	30	30	25	42	56	74
30	25	22	30	30	25	44	58	78
30	25	23	30	30	25	46	61	81
25	30	16	30	44	18	45	60	80
25	30	17	30	44	18	48	64	85
25	30	18	30	44	18	51	67	90
25	30	19	30	44	18	53	71	95
25	30	20	30	44	18	56	75	100
25	30	21	30	44	18	59	79	105
25	30	22	30	44	18	62	82	110
25	30	23	30	44	18	65	86	115
30	25	16	30	44	18	65	86	115
30	25	17	30	44	18	69	92	122
30	25	18	30	44	18	73	97	129
30	25	19	30	44	18	77	102	137
30	25	20	30	44	18	81	108	144
30	25	21	30	44	18	85	113	151
30	25	22	30	44	18	89	119	158
30	25	23	30	44	18	93	124	165

PINTO BEANS

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	1/2"	5/8"	3/4"
30	25	16	30	25	44	20	27	32
30	25	17	30	25	44	21	28	34
30	25	18	30	25	44	22	30	36
30	25	19	30	25	44	24	31	38
30	25	20	30	25	44	25	33	40
30	25	21	30	25	44	26	35	42
30	25	22	30	25	44	27	36	44
30	25	23	30	25	44	29	38	46
30	25	16	30	25	30	29	39	46
30	25	17	30	25	30	31	41	49
30	25	18	30	25	30	33	44	52
30	25	19	30	25	30	35	46	55
30	25	20	30	25	30	37	49	58
30	25	21	30	25	30	38	51	61
30	25	22	30	25	30	40	53	64
30	25	23	30	25	30	42	56	67
30	25	16	30	30	25	42	56	67
30	25	17	30	30	25	45	60	71
30	25	18	30	30	25	47	63	75
30	25	19	30	30	25	50	67	79
30	25	20	30	30	25	53	70	84
30	25	21	30	30	25	55	74	88
30	25	22	30	30	25	58	77	92
30	25	23	30	30	25	61	81	96
25	30	16	30	44	18	60	79	95
25	30	17	30	44	18	63	84	101
25	30	18	30	44	18	67	89	107
25	30	19	30	44	18	71	94	112
25	30	20	30	44	18	75	99	118
25	30	21	30	44	18	78	104	124
25	30	22	30	44	18	82	109	130
25	30	23	30	44	18	86	114	136
30	25	16	30	44	18	86	114	136
30	25	17	30	44	18	91	121	145
30	25	18	30	44	18	97	128	153
30	25	19	30	44	18	102	135	162
30	25	20	30	44	18	107	143	170
30	25	21	30	44	18	113	150	179
30	25	22	30	44	18	118	157	187
30	25	23	30	44	18	124	164	196
44	25	16	30	44	18	126	167	200
44	25	17	30	44	18	134	178	212
44	25	18	30	44	18	142	188	225
44	25	19	30	44	18	150	199	237
44	25	20	30	44	18	158	209	250
44	25	21	30	44	18	165	220	262
44	25	22	30	44	18	173	230	275
44	25	23	30	44	18	181	241	287

Seed Rate Charts

RICE

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	1/2"	5/8"	3/4"
30	25	16	30	25	44	27	34	40
30	25	17	30	25	44	29	36	42
30	25	18	30	25	44	31	38	45
30	25	19	30	25	44	32	40	47
30	25	20	30	25	44	34	43	50
30	25	21	30	25	44	36	45	52
30	25	22	30	25	44	37	47	54
30	25	23	30	25	44	39	49	57
30	25	16	30	25	30	40	50	58
30	25	17	30	25	30	42	53	62
30	25	18	30	25	30	45	56	65
30	25	19	30	25	30	47	59	69
30	25	20	30	25	30	50	63	73
30	25	21	30	25	30	52	66	76
30	25	22	30	25	30	55	69	80
30	25	23	30	25	30	57	72	84
30	25	16	30	30	25	57	72	84
30	25	17	30	30	25	61	77	89
30	25	18	30	30	25	65	81	94
30	25	19	30	30	25	68	86	99
30	25	20	30	30	25	72	90	105
30	25	21	30	30	25	75	95	110
30	25	22	30	30	25	79	99	115
30	25	23	30	30	25	83	104	120
25	30	16	30	44	18	81	102	118
25	30	17	30	44	18	86	108	126
25	30	18	30	44	18	91	115	133
25	30	19	30	44	18	97	121	141
25	30	20	30	44	18	102	127	148
25	30	21	30	44	18	107	134	155
25	30	22	30	44	18	112	140	163
25	30	23	30	44	18	117	146	170
30	25	16	30	44	18	117	146	170
30	25	17	30	44	18	125	155	181
30	25	18	30	44	18	131	164	191
30	25	19	30	44	18	139	174	202
30	25	20	30	44	18	147	183	213
30	25	21	30	44	18	154	192	224
30	25	22	30	44	18	161	201	234
30	25	23	30	44	18	168	210	245

RYE

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	1/2"	5/8"	3/4"
30	44	16	30	30	44	27	34	44
30	44	17	30	30	44	28	36	46
30	44	18	30	30	44	30	38	49
30	44	19	30	30	44	32	40	52
30	44	20	30	30	44	33	43	55
30	44	21	30	30	44	35	45	57
30	44	22	30	30	44	36	47	60
30	44	23	30	30	44	38	49	63
30	25	16	30	25	44	39	50	64
30	25	17	30	25	44	41	53	68
30	25	18	30	25	44	44	56	72
30	25	19	30	25	44	46	59	76
30	25	20	30	25	44	49	62	80
30	25	21	30	25	44	51	66	84
30	25	22	30	25	44	54	69	88
30	25	23	30	25	44	56	72	92
30	25	16	30	25	30	57	73	94
30	25	17	30	25	30	61	78	100
30	25	18	30	25	30	64	82	106
30	25	19	30	25	30	68	87	112
30	25	20	30	25	30	71	92	117
30	25	21	30	25	30	75	96	123
30	25	22	30	25	30	78	101	129
30	25	23	30	25	30	82	105	135
30	30	16	30	30	25	82	105	135
30	30	17	30	30	25	87	112	144
30	30	18	30	30	25	92	119	152
30	30	19	30	30	25	98	125	161
30	30	20	30	30	25	103	132	169
30	30	21	30	30	25	108	138	178
30	30	22	30	30	25	113	145	186
30	30	23	30	30	25	118	152	195

Seed Rate Charts

SOYBEANS

Sprockets						Slot Width			
		Derailleur		Box End		Pounds/Acre			
C	**D**	**E**	**F**	**G**	**H**	**3/8"**	**1/2"**	**5/8"**	**3/4"**
30	25	16	30	25	44	18	26	34	43
30	25	17	30	25	44	19	27	37	45
30	25	18	30	25	44	20	29	39	48
30	25	19	30	25	44	21	31	41	51
30	25	20	30	25	44	22	32	43	53
30	25	21	30	25	44	23	34	45	56
30	25	22	30	25	44	24	36	47	59
30	25	23	30	25	44	25	37	50	61
30	25	16	30	25	30	26	38	51	63
30	25	17	30	25	30	27	40	54	67
30	25	18	30	25	30	29	43	57	71
30	25	19	30	25	30	31	45	60	75
30	25	20	30	25	30	32	47	63	78
30	25	21	30	25	30	34	50	66	82
30	25	22	30	25	30	35	52	70	86
30	25	23	30	25	30	37	55	73	90
30	25	16	30	30	25	37	55	73	90
30	25	17	30	30	25	39	58	77	96
30	25	18	30	30	25	42	61	82	102
30	25	19	30	30	25	44	65	87	107
30	25	20	30	30	25	46	68	91	113
30	25	21	30	30	25	49	72	96	119
30	25	22	30	30	25	51	75	100	124
30	25	23	30	30	25	53	79	105	130
25	30	16	30	44	18	52	77	103	128
25	30	17	30	44	18	56	82	109	136
25	30	18	30	44	18	59	87	116	144
25	30	19	30	44	18	62	92	122	152
25	30	20	30	44	18	65	97	129	160
25	30	21	30	44	18	69	101	135	168
25	30	22	30	44	18	72	106	142	176
25	30	23	30	44	18	75	111	148	184
30	25	16	30	44	18	75	111	148	184
30	25	17	30	44	18	80	118	158	196
30	25	18	30	44	18	84	124	166	206
30	25	19	30	44	18	89	132	176	219
30	25	20	30	44	18	94	139	185	230
30	25	21	30	44	18	99	146	195	242
30	25	22	30	44	18	103	153	204	253
30	25	23	30	44	18	108	160	213	265

SUNFLOWERS

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	**D**	**E**	**F**	**G**	**H**	**1/2"**	**5/8"**	**3/4"**
18	44	16	30	25	44	5	7	8
18	44	17	30	25	44	5	7	9
18	44	18	30	25	44	6	8	9
18	44	19	30	25	44	6	8	10
18	44	20	30	25	44	6	8	10
18	44	21	30	25	44	7	9	11
18	44	22	30	25	44	7	9	11
18	44	23	30	25	44	7	10	12
25	44	16	30	25	44	7	9	11
25	44	17	30	25	44	8	10	12
25	44	18	30	25	44	8	11	13
25	44	19	30	25	44	9	11	13
25	44	20	30	25	44	9	12	14
25	44	21	30	25	44	9	12	15
25	44	22	30	25	44	10	13	16
25	44	23	30	25	44	10	14	16
30	44	16	30	30	44	10	14	16
30	44	17	30	30	44	11	14	17
30	44	18	30	30	44	12	15	18
30	44	19	30	30	44	12	16	19
30	44	20	30	30	44	13	17	20
30	44	21	30	30	44	14	18	21
30	44	22	30	30	44	14	19	22
30	44	23	30	30	44	15	20	23
30	25	16	30	25	44	15	20	24
30	25	17	30	25	44	16	21	25
30	25	18	30	25	44	17	22	27
30	25	19	30	25	44	18	24	28
30	25	20	30	25	44	19	25	30
30	25	21	30	25	44	20	26	31
30	25	22	30	25	44	21	27	33
30	25	23	30	25	44	22	29	34
30	25	16	30	25	30	22	29	35
30	25	17	30	25	30	24	31	37
30	25	18	30	25	30	25	33	39
30	25	19	30	25	30	26	35	42
30	25	20	30	25	30	28	37	44
30	25	21	30	25	30	29	38	46
30	25	22	30	25	30	31	40	48
30	25	23	30	25	30	32	42	50

Seed Rate Charts

WHEAT

Sprockets						Slot Width		
		Derailleur		Box End		Pounds/Acre		
C	D	E	F	G	H	1/2"	5/8"	3/4"
25	44	16	30	25	44	21	26	31
25	44	17	30	25	44	22	27	33
25	44	18	30	25	44	23	29	35
25	44	19	30	25	44	25	31	37
25	44	20	30	25	44	26	32	39
25	44	21	30	25	44	27	34	41
25	44	22	30	25	44	28	36	43
25	44	23	30	25	44	30	37	45
30	44	16	30	30	44	30	37	45
30	44	17	30	30	44	32	40	47
30	44	18	30	30	44	33	42	50
30	44	19	30	30	44	35	44	53
30	44	20	30	30	44	37	47	56
30	44	21	30	30	44	39	49	59
30	44	22	30	30	44	41	51	61
30	44	23	30	30	44	43	53	64
30	25	16	30	25	44	44	55	65
30	25	17	30	25	44	46	58	70
30	25	18	30	25	44	49	61	74
30	25	19	30	25	44	52	65	78
30	25	20	30	25	44	55	68	82
30	25	21	30	25	44	57	72	86
30	25	22	30	25	44	60	75	90
30	25	23	30	25	44	63	78	94
30	25	16	30	25	30	64	80	96
30	25	17	30	25	30	68	85	102
30	25	18	30	25	30	72	90	108
30	25	19	30	25	30	76	95	114
30	25	20	30	25	30	80	100	120
30	25	21	30	25	30	84	105	126
30	25	22	30	25	30	88	110	132
30	25	23	30	25	30	92	115	138
30	25	16	30	30	25	92	115	138
30	25	17	30	30	25	98	122	147
30	25	18	30	30	25	104	130	156
30	25	19	30	30	25	109	137	164
30	25	20	30	30	25	115	144	173
30	25	21	30	30	25	121	151	182
30	25	22	30	30	25	127	158	190
30	25	23	30	30	25	133	166	199

Legume Box Charts

ALFALFA

Sprockets				Slot Width	
Gear Box		Box End		Pounds/Acre	
A	B	C	D	1/8"	1/4"
16	30	18	44	8	15
16	25	18	44	10	18
16	20	18	44	13	22
16	18	18	44	14	25

CANOLA

Sprockets				Slot Width		
Gear Box		Box End		Pounds/Acre		
A	B	C	D	3/16"	1/4"	3/8"
16	30	18	44	8	12	17
16	25	18	44	10	15	21
16	20	18	44	13	19	26
16	18	18	44	14	21	29

FESCUE

Sprockets				Slot Width		
Gear Box		Box End		Pounds/Acre		
A	B	C	D	3/8"	1/2"	5/8"
16	30	18	44	8	10	13
16	25	18	44	9	12	16
16	20	18	44	11	15	19
16	18	18	44	13	17	22

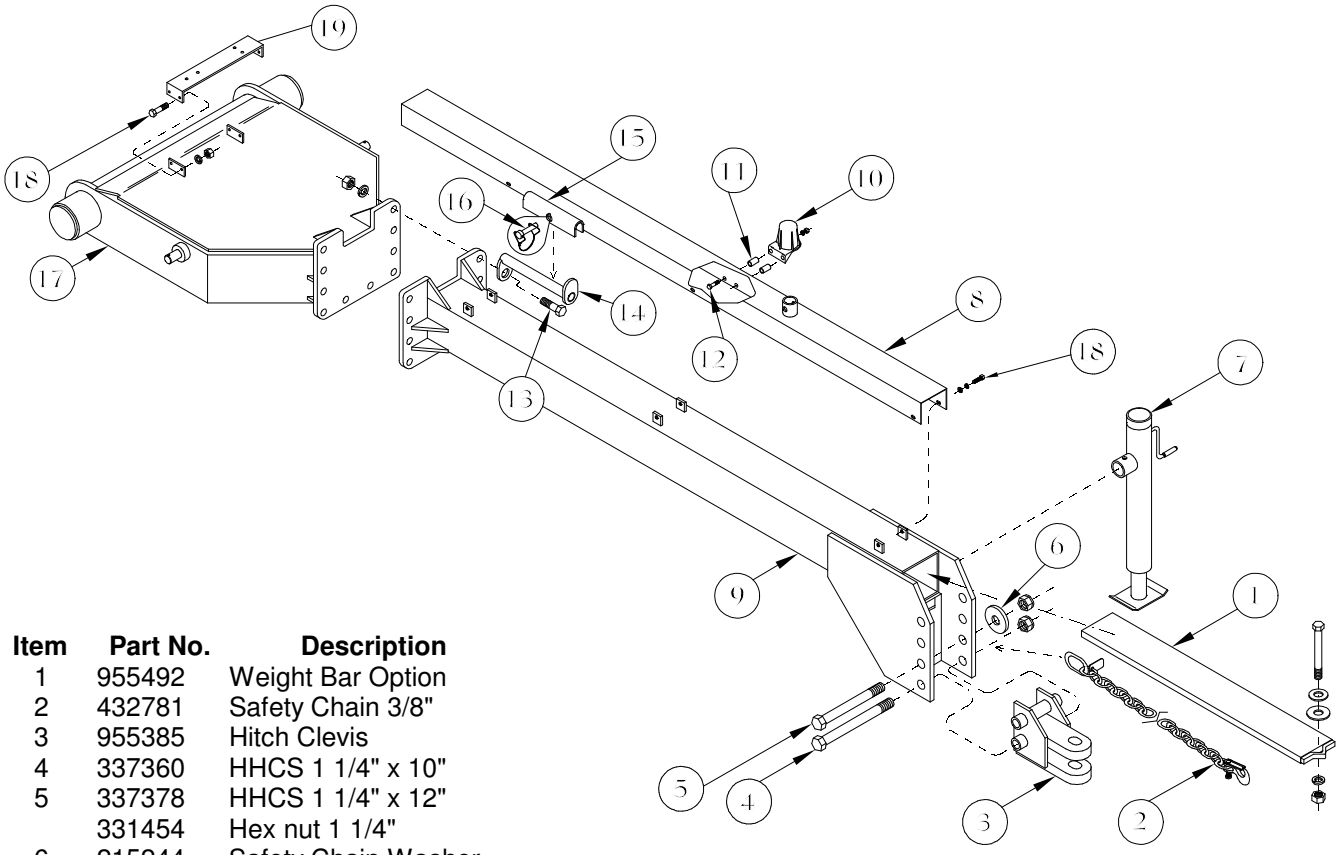
MILLET

Sprockets				Slot Width		
Gear Box		Box End		Pounds/Acre		
A	B	C	D	3/16"	1/4"	3/8"
16	30	18	44	6	10	14
16	25	18	44	8	12	17
16	20	18	44	10	15	21
16	18	18	44	11	17	23

MILO

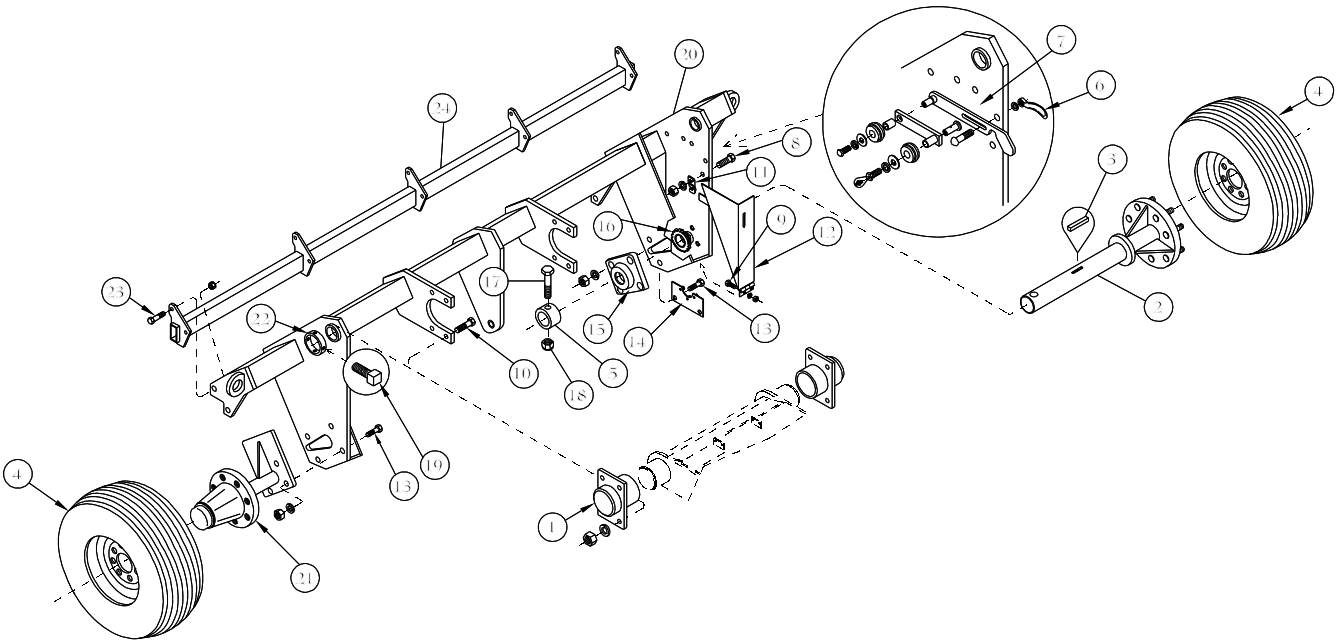
Sprockets				Slot Width		
Gear Box		Box End		Pounds/Acre		
A	B	C	D	3/16"	1/4"	3/8"
16	30	18	44	8	11	20
16	25	18	44	9	13	24
16	20	18	44	11	16	30
16	18	18	44	13	18	34

Hitch



Item	Part No.	Description
1	955492	Weight Bar Option
2	432781	Safety Chain 3/8"
3	955385	Hitch Clevis
4	337360	HHCS 1 1/4" x 10"
5	337378	HHCS 1 1/4" x 12"
	331454	Hex nut 1 1/4"
6	215244	Safety Chain Washer
7	530733	Jack Side Crank 2000#
8	956516	Cover Shield
9	955443	Front Hitch
10	605501	Plug Holder
11	145144	Lid Latch Spool
12	335133	HHCS 1/4" x 1 3/4"
	330050	Lock washer 1/4"
	332205	Hex nut 1/4"
13	334987	HHCS 1" x 3"
	330399	Lock washer 1"
	330381	Hex nut 1"
14	957183	Transport Lock Carrier
15	262899	Cylinder Lockout Bracket
16	00233700	Wire Lock Pin 5/16" x 2 3/4" Sq
17	956508	Rear Hitch
18	01010800	HHCS 5/16" x 1"
	330845	Lock washer 5/16"
	330811	Hex nut 5/16"
	330852	Flat washer 5/16"
19	214981	Valve Bracket Plate

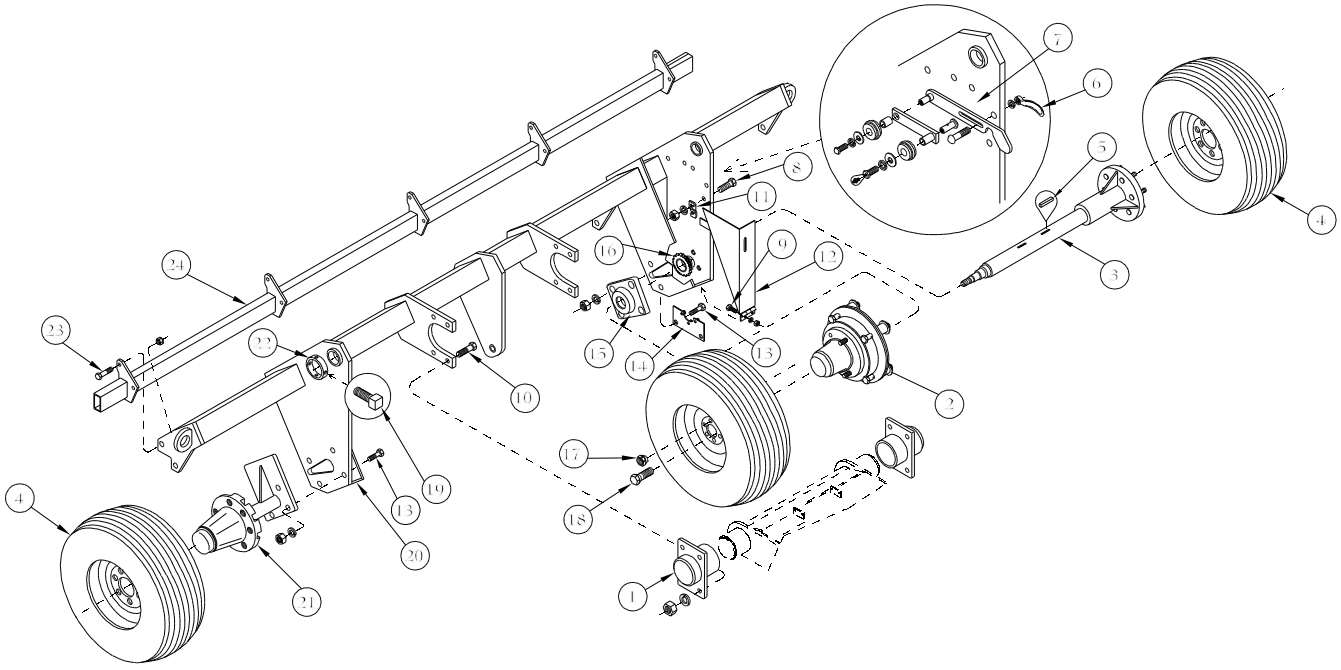
Main Frame
10'



Item	Part No.	Description
1	955377	Rocker Cap
2	964288	Wheel Spindle
3	605576	Key 3/16" x 1 1/4"
4	032862	Tire 12.5L x 15" F
	Includes:	
	02990000	Decal Check Wheel Lugs
	530584	Wheel 8 Bolt 15x10
	530287	Tire Valve Stem
	530931	Tire 12.5L x 15 “F”
5	145623	Spindle Bushing
6	337352	Handle Nut ½-13 x 4½
7	864157	Wheel Idler Assembly
8	331926	HHCS ½ x 2
	330142	Lock Washer ½
	330134	Hex Nut ½
9	01010800	HHCS 5/16 x 1
	330845	Lock Washer 5/16
	330811	Hex Nut 5/16
10	334987	HHCS 1" x 3"
	330399	Lock washer 1"
	330381	Hex Nut 1"

Item	Part No.	Description
11	216200	Latch Plate
12	956722	Shield Plate
13	336321	HHCS 5/8" x 2 1/4"
	330878	Lock washer 5/8"
	330571	Hex nut 5/8"
14	961557	Chain Holder
15	403279	Bearing 2" 4B (5 1/8"center)
	403287	Insert for #403279
16	954370	Drive Sprocket 2050 18T
		7 ½" & 10" Spacing
17	330092	HHCS ½" x 4"
18	1363	Hex Nylock Nut ½"
19	334748	Set Screw 5/16" x ½"
		Sq Head Cup
20	964189	4610 Main Frame
21	870576	Spindle & Hub Assembly
22	149765	Lock Collar
23	335174	HHCS 3/4" x 2 ½"
	330316	Hex Nylock Nut 3/4"
24	964221	4610 Tool Bar

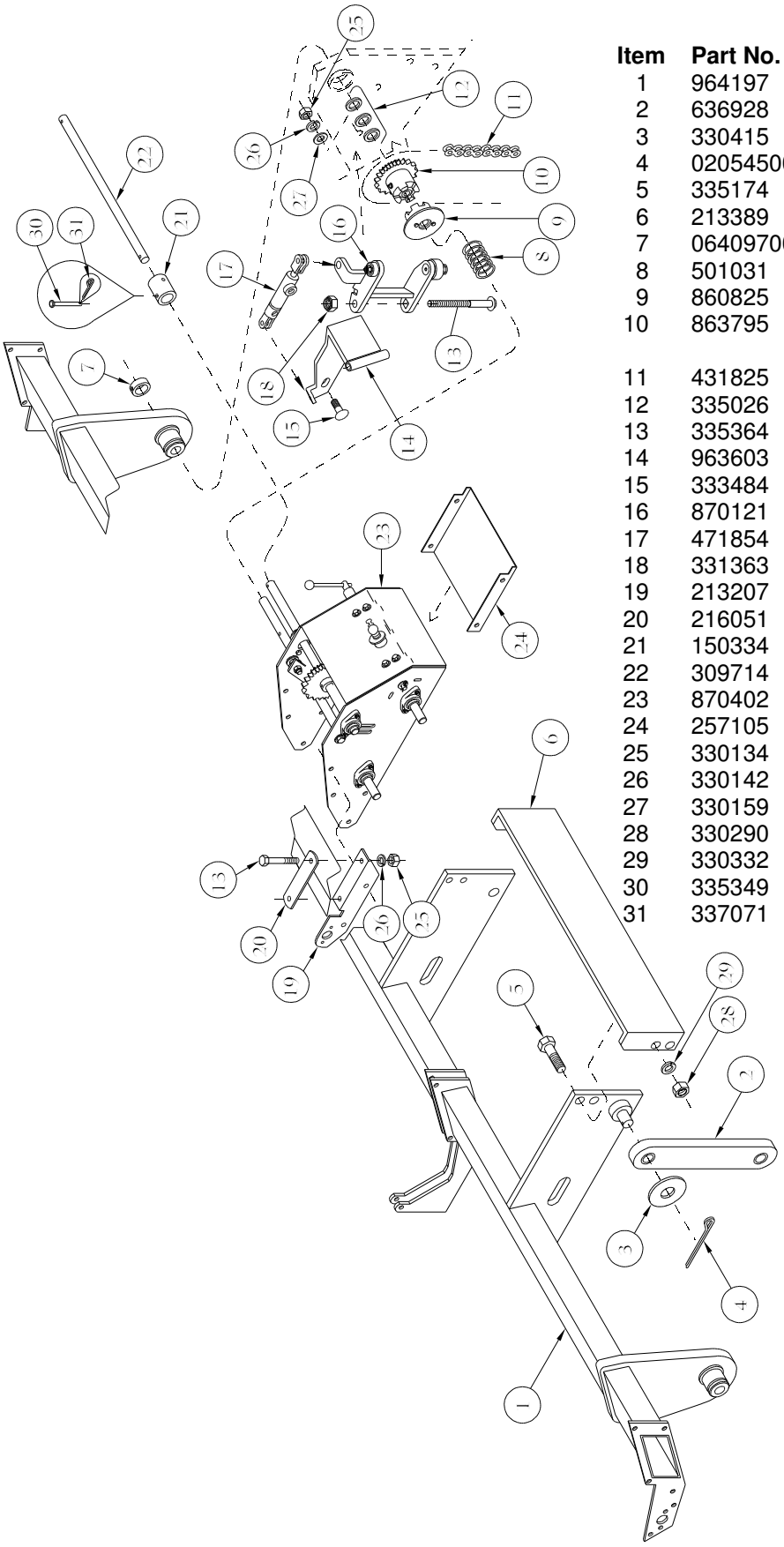
Main Frame
15' & 20'



Item	Part No.	Description
1	955377	Rocker Cap
2	870196	Clutch Assembly
3	961532	Wheel Spindle
4	815175	Tire 11L 8 Ply Mounted
	Includes:	
	02990000	Decal Check Wheel Lugs
	530147	Wheel 6 Bolt 15x10
	530287	Tire Valve Stem
	530329	Tire 11L x 15 8Ply
5	605576	Key 3/16 x 1 1/4
6	337352	Handle Nut ½-13 x 4½
7	864157	Wheel Idler Assembly
8	331926	HHCS ½ x 2
	330142	Lock Washer ½
	330134	Hex Nut ½
9	01010800	HHCS 5/16 x 1
	330845	Lock Washer 5/16
	330811	Hex Nut 5/16
10	334987	HHCS 1" x 3"
	330399	Lock washer 1"
	330381	Hex Nut 1"
11	216200	Latch Plate
12	956722	Shield Plate
13	336321	HHCS 5/8" x 2 1/4"
	330878	Lock washer 5/8"
	330571	Hex nut 5/8"

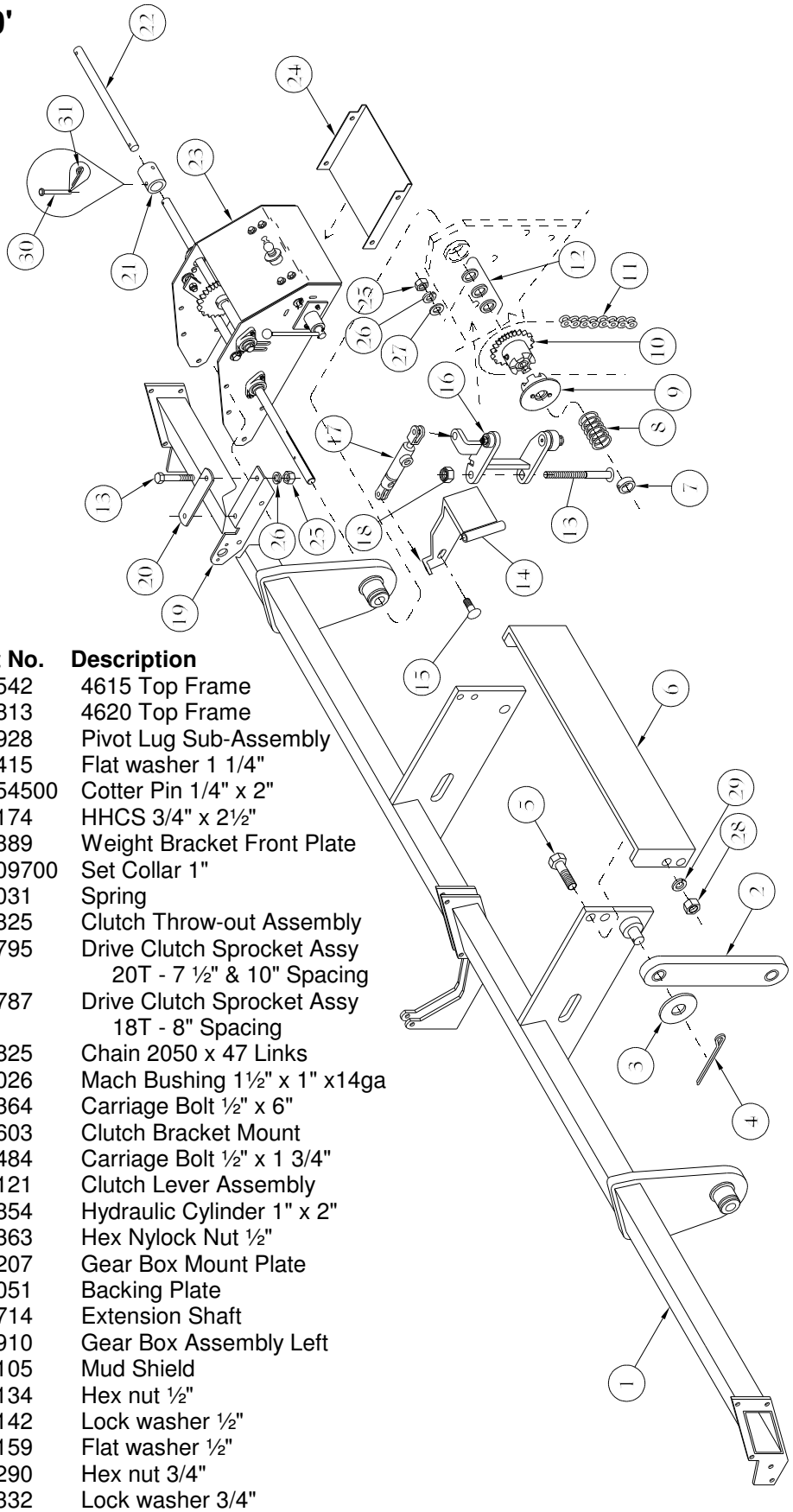
Item	Part No.	Description
14	961557	Chain Holder
15	403279	Bearing 2" 4B (5 1/8"center)
	403287	Insert for #403279
	400739	Bearing 2" 4B (4 3/8" center)
	400994	Insert for #400739
16	954370	Drive Sprocket 2050 18T 7 ½" & 8" Spacing
	953216	Drive Sprocket 2050 25T 10" Spacing
17	331314	Wheel Nut ½"-20 90°
18	330464	Wheel Bolt ½" x 1 3/4" SAE
19	334748	Set Screw 5/16" x1/2" Sq Head Cup
20	961516	4615 Main Frame
	961524	4620 Main Frame
21	868711	Spindle Assembly (5 1/8" center)
	863902	Spindle Assembly (4 3/8" center)
22	149765	Lock Collar
23	335174	HHCS 3/4" x 2½"
	330316	Hex Nylock Nut 3/4"
24	955476	4615 Tool Bar
	956920	4620 Tool Bar Right
	957001	4620 Tool Bar Left

Top Frame
10'



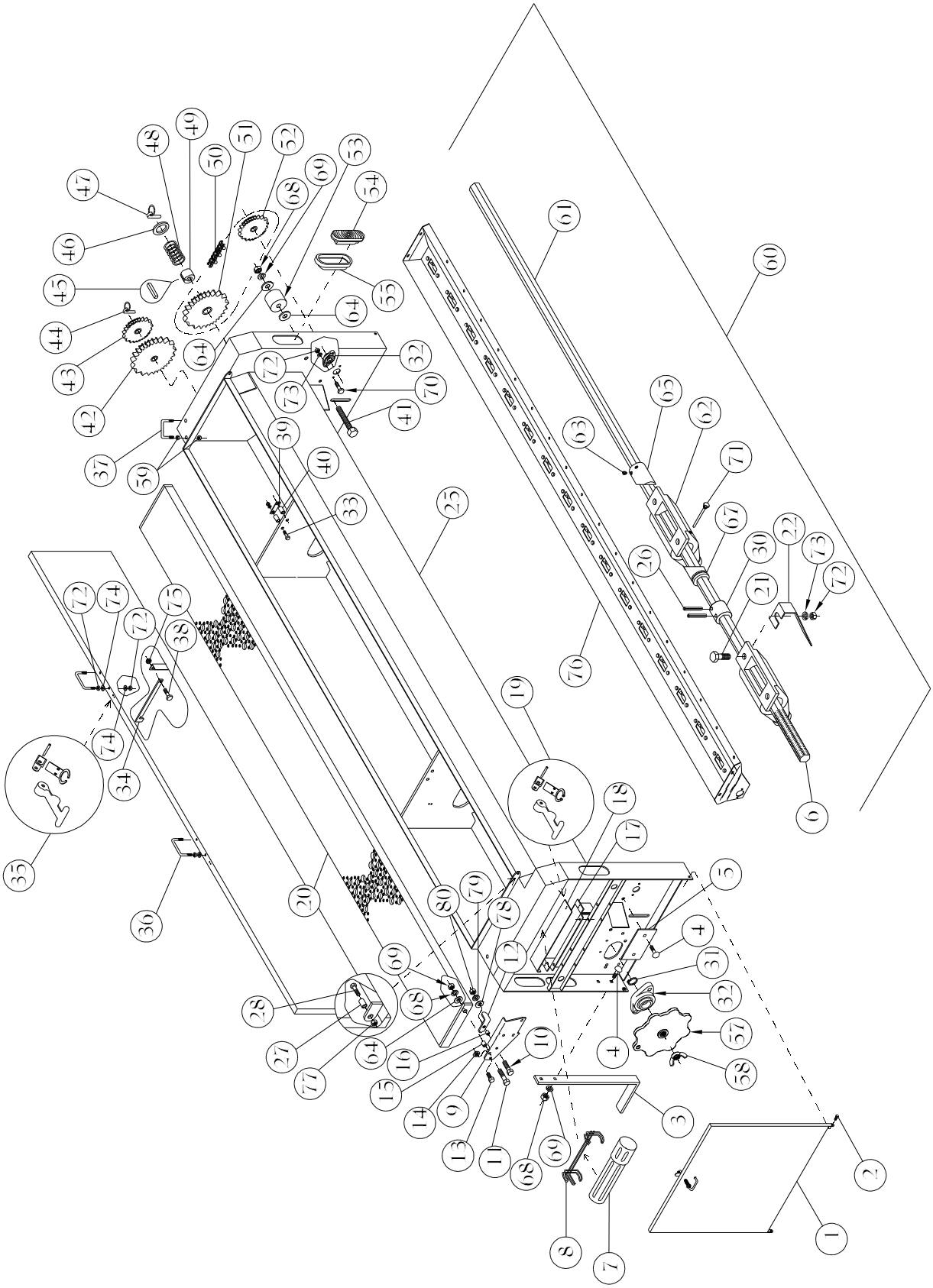
Item	Part No.	Description
1	964197	4610 Top Frame
2	636928	Pivot Lug Sub-Assembly
3	330415	Flat washer 1 1/4"
4	02054500	Cotter Pin 1/4" x 2"
5	335174	HHCS 3/4" x 2½"
6	213389	Weight Bracket Front Plate
7	06409700	Set Collar 1"
8	501031	Spring
9	860825	Clutch Throw-out Assembly
10	863795	Drive Clutch Sprocket Assy 20T - 7 ½" & 10" Spacing
11	431825	Chain 2050 x 47 Links
12	335026	Mach Bushing 1 ½" x 1" x14ga
13	335364	Carriage Bolt ½" x 6"
14	963603	Clutch Bracket Mount
15	333484	Carriage Bolt ½" x 1 3/4"
16	870121	Clutch Lever Assembly
17	471854	Hydraulic Cylinder 1" x 2"
18	331363	Hex Nylock Nut 1/2"
19	213207	Gear Box Mount Plate
20	216051	Backing Plate
21	150334	Adapter Sleeve
22	309714	Extension Shaft
23	870402	4610 Gear Box Assembly
24	257105	Mud Shield
25	330134	Hex nut ½"
26	330142	Lock washer ½"
27	330159	Flat washer ½"
28	330290	Hex nut 3/4"
29	330332	Lock washer 3/4"
30	335349	Clevis Pin 1/4" x 1 5/8"
31	337071	Cotter Pin 3/32" x ½"

Top Frame
15' & 20'



Item	Part No.	Description
1	955542	4615 Top Frame
	956813	4620 Top Frame
2	636928	Pivot Lug Sub-Assembly
3	330415	Flat washer 1 1/4"
4	02054500	Cotter Pin 1/4" x 2"
5	335174	HHCS 3/4" x 2½"
6	213389	Weight Bracket Front Plate
7	06409700	Set Collar 1"
8	501031	Spring
9	860825	Clutch Throw-out Assembly
10	863795	Drive Clutch Sprocket Assy 20T - 7 ½" & 10" Spacing
	863787	Drive Clutch Sprocket Assy 18T - 8" Spacing
11	431825	Chain 2050 x 47 Links
12	335026	Mach Bushing 1½" x 1" x14ga
13	335364	Carriage Bolt ½" x 6"
14	963603	Clutch Bracket Mount
15	333484	Carriage Bolt ½" x 1 3/4"
16	870121	Clutch Lever Assembly
17	471854	Hydraulic Cylinder 1" x 2"
18	331363	Hex Nylock Nut ½"
19	213207	Gear Box Mount Plate
20	216051	Backing Plate
22	309714	Extension Shaft
23	863910	Gear Box Assembly Left
24	257105	Mud Shield
25	330134	Hex nut ½"
26	330142	Lock washer ½"
27	330159	Flat washer ½"
28	330290	Hex nut 3/4"
29	330332	Lock washer 3/4"
30	335349	Clevis Pin 1/4" x 1 5/8"
31	337071	Cotter Pin 3/32" x ½"

Grain Box
10'

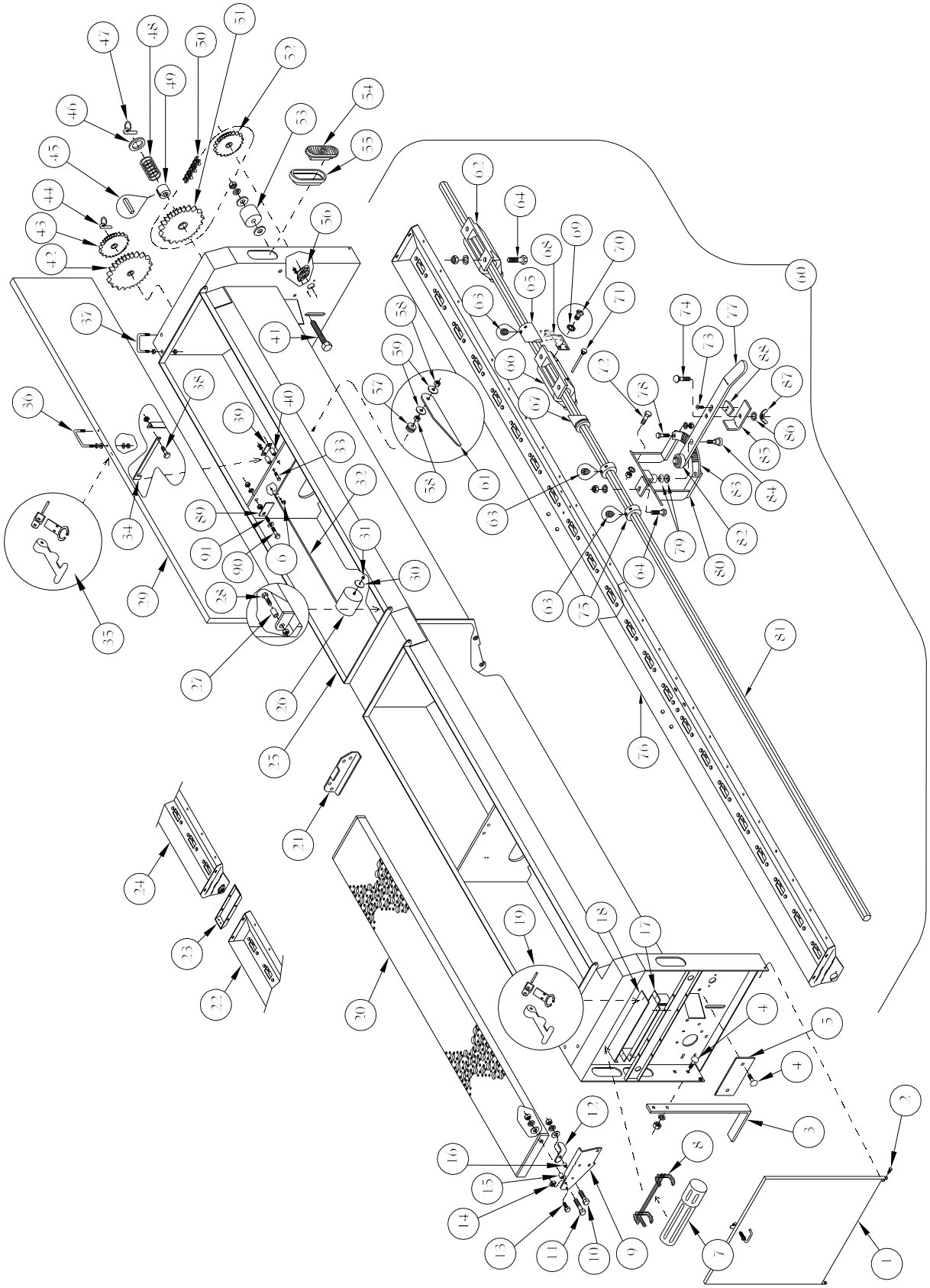


Grain Box
10'

Item	Part No.	Description
1	864140	Cover Shield Assembly
2	01145200	HHCS 3/8" x 3/4"
3	215376	Ladder Step Plate
4	01212000	Carriage Bolt ½" x 1½"
5	214239	Weight Door Plate
6	310888	Hex Adjustment Shaft
7	02889400	Cannister
8	02890200	Cannister Mounting Bracket
9	213702	Walkboard Bracket Right
	213868	Walkboard Bracket Left
10	01017300	HHCS 3/8" x 1"
11	335240	HHCS ½" x 1 3/4"
12	213645	Walkboard Lock Handle
13	01029800	HHCS ½" x 1"
14	332197	Square Nut ½"
15	150086	Walkboard Bushing
16	149393	Quadrant Bushing
17	257147	Tool Box
18	257154	Tool Box Lid
19	570606	Legume Lid Latch
20	956854	Walkboard **10' Drill**
21	01144500	HHCS 5/16" x 3/4"
22	261883	Gauge Plate Mount
23		
24		
25	964148	Grain Box **10' Drill**
26	337485	Roll Pin 3/16" x 1 1/4"
27	149385	Lid Bushing
28	335703	HHCS 3/8" x 1½"
29	964403	Box Lid **10' Drill**
30	141895	Shaft Coupler
31	605766	Retaining Ring 1" External
32	03001500	Bearing 1" Flange
33	335133	HHCS 1/4" x 1 3/4"
34	221317	Lid Latch Bracket
35	570341	Drill Lid Latch w/Hook
36	308122	Handle
37	335737	U-bp;t 5/8" x 4" x 3"
38	01011600	HHCS 5/16" x 1 1/4"
39	190942	Lid Latch
40	145144	Lid Latch Spool
41	333427	Bolt 1/2" x 3 1/2" All Thread
42	954362	Sprocket 2050 44T w/1" bore
43	954131	Sprocket 2050 18T w/1" bore
44	330456	Klik Pin 3/16"

Item	Part No.	Description
45	602367	Key 1/4" x 1"
46	332528	Mach Bushing
		1 1/4" x 3/4" x 18ga
47	330928	Klik Pin 7/16"
48	500330	Spring
49	309062	Hex Sprocket Adapter
50	431023	Chain 2050 x 41 Links
51	935106	Sprocket 2050 30T w/1" bore
52	935098	Sprocket 2050 25T w/1" bore
53	571273	Nylon Idler
54	605527	Amber Light
	605535	Red Light
55	605709	Light Grommet
56		
57	962985	Adjustment Handle
58	00751800	Wing Nut 3/4"
59	02016400	Flat washer 1/4"
60		Box Bottom Assembly **10' Drill**
	870519	10' x 7 ½"
	870535	10' x 10"
61	331126	Hex Shaft
62	550483	Cast Seed Cup
63	334516	Set Screw 1/4-28 x 1/4 Cone Pt
64	330159	Flat Washer ½"
65	550517	Wobble Slot Adj. Side Long
66		
67	550525	Wobble Slot Half w/Groove
68	330134	Hex Nut ½"
69	330142	Lock Washer ½"
70	01010800	HHCS 5/16" x 1"
71	601716	Wobble Slot Lock Bolt Pin
72	330811	Hex Nut 5/16"
73	330845	Lock Washer 5/16""
74	330852	Flat Washer 5/16"
75	331611	Hex Nylock Nut 5/16"
76		Box Bottom Weldment
	964437	10' x 7½"
	964445	10' x 10"
77	330837	Hex Nylock Nut 3/8"
78	330894	Flat Washer 3/8"
79	330043	Lock Washer 3/8"
80	330035	Hex Nut 3/8"

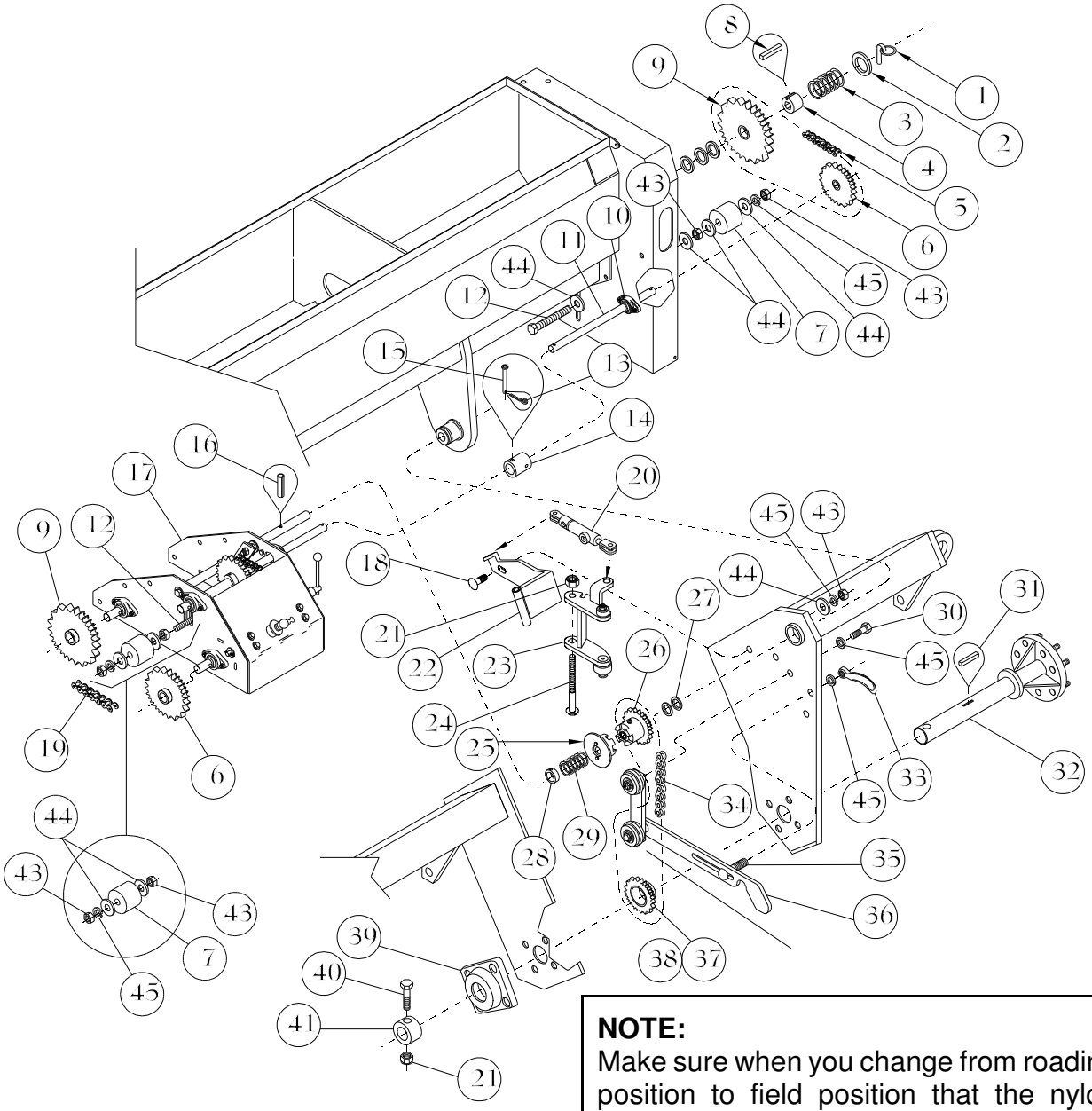
Grain Box
15' & 20'



Grain Box
15' & 20'

Item	Part No.	Description
1	864140	Cover Shield Assembly
2	01145200	HHCS 3/8" x 3/4"
3	215376	Ladder Step Plate
4	01212000	Carriage Bolt ½" x 1½"
5	214239	Weight Door Plate
6	02143600	Cable Clamp 3/16"
7	02889400	Cannister
8	02890200	Cannister Mounting Bracket
9	213702	Walkboard Bracket Right
	213868	Walkboard Bracket Left
10	01017300	HHCS 3/8" x 1"
11	335240	HHCS ½" x 1 3/4"
12	213645	Walkboard Lock Handle
13	01029800	HHCS ½" x 1"
14	332197	Square Nut ½"
15	150086	Walkboard Bushing
16	149393	Quadrant Bushing
17	257147	Tool Box
18	257154	Tool Box Lid
19	570606	Legume Lid Latch
20	956425	Walkboard **15' Drill**
21	956854	Walkboard **20' Drill**
22		Box Bottom Assembly **20' Drill**
	863977	20' x 7½" Right
	863985	20 x 8" Right
	863993	20' x 10" Right
23	257279	Center Brg Mount Plt **20' Drill**
24		Box Bottom Assembly **20' Drill**
	864165	20' x 7½" Left
	864173	20' x 8" Left
	864181	20' x 10" Left
25	956771	Grain Box **15' Drill**
	956839	Grain Box **20' Drill**
26	571083	Plastic Float
27	149385	Lid Bushing
28	335703	HHCS 3/8" x 1½"
29	957274	Box Lid **15' Drill**
	957282	Box Lid **20' Drill**
30	957175	Float Arm Washer
31	330522	Hex Nylock 1/4"
32	309757	Gauge Float
33	335133	HHCS 1/4" x 1 3/4"
34	221317	Lid Latch Bracket
35	570341	Drill Lid Latch w/Hook
36	308122	Handle
37	335737	U-bp;t 5/8" x 4" x 3"
38	01011600	HHCS 5/16" x 1 1/4"
39	190942	Lid Latch
40	145144	Lid Latch Spool
41	333427	Bolt ½" x 3½" All Thread
42	954362	Sprocket 2050 44T w/1" bore
43	954131	Sprocket 2050 18T w/1" bore
44	330456	Klik Pin 3/16"
45	602367	Key 1/4" x 1"
46	332528	Mach Bushing 1 1/4" x 3/4" x 18ga
47	330928	Klik Pin 7/16"
48	500330	Spring
49	309062	Hex Sprocket Adapter
50	431023	Chain 2050 x 41 Links
51	935106	Sprocket 2050 30T w/1" bore
52	935098	Sprocket 2050 25T w/1" bore
53	571273	Nylon Idler
54	605527	Amber Light
	605535	Red Light
55	605709	Light Grommet
56	03001500	Bearing 1" w/2 bolt flange
57	605659	Grommet 1/4" x 5/8" x 11/32"
58	332205	Hex Nut 1/4"
59	02016400	Flat washer 1/4"
60		Box Bottom Assembly **15' Drill**
	863878	15' x 7½"
	863886	15' x 8"
	863894	15' x 10"
61	961961	Seed Gauge Pointer
62	550483	Cast Seed Cup
63	334516	Set Screw 1/4-28 x 1/4 Cone Pt
64	01144500	HHCS 5/16" x 3/4"
65	550517	Wobble Slot Adj. Side Long
66	550616	Cast Seed Cup for Gauge Plt
67	550525	Wobble Slot Half w/Groove
68	601724	Seed Slot Adj. Gauge Plate
69	334565	Lock washer #8 Internal Tooth
70	334557	Machine Screw #8 x 1/4 Round
71	601716	Wobble Slot Lock Bolt Pin
72	333542	HHCS 5/16" x 5/8"
73	334490	Machine Screw 1/4" x 5/8"
74	332940	Carriage Bolt 3/8" x 2"
75	146090	Wobble Slot Adj. Collar
76		Box Bottom Weldment
	956680	15' x 7½"
	956698	15' x 8"
	956706	15' x 10"
	956862	20' x 7½" Right
	956870	20' x 7½" Left
	956888	20' x 8" Right
	956896	20' x 8" Left
	956904	20' x 10" Right
	956912	20' x 10" Left
77	957084	Slot Adj Bracket Handle
78	01011600	HHCS 5/16" x 1 1/4"
79	501320	Belleville Washer Springs
80	956672	Slot Adjustment Bracket
81	309799	Hex Shaft 122 1/4" **20' Drill**
	309807	Hex Shaft 182 5/8" **15' Drill**
82	401042	Bearing
83	550764	Slot Rack Plate
84	335299	Shoulder Bolt ½" x ½" Socket Head
85	198903	Shifter Lever Hold-Down
86	330043	Lock washer 3/8"
87	334847	Wing Nut 3/8"
88	550772	Slot Match Plate
89	259234	Lockout Plate
90	331843	HHCS 1/4" x 1½"
91	501205	Spring

10' Drive

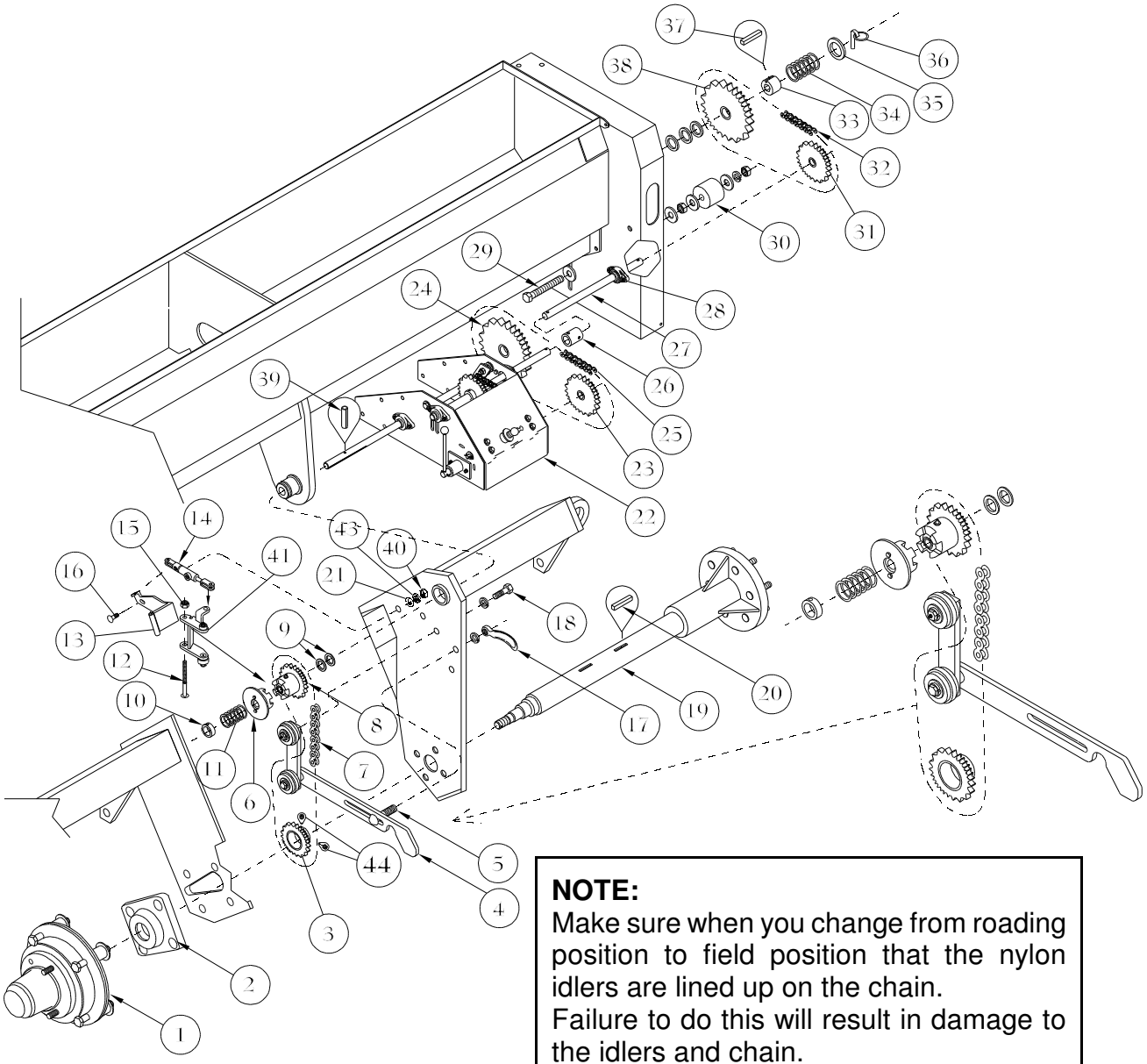


NOTE:
Make sure when you change from roading position to field position that the nylon idlers are lined up on the chain.
Failure to do this will result in damage to the idlers and chain.

10' Drive

Item	Part No.	Description
1	330928	Klik Pin 3/16"
2	332528	Machine Bush 1 1/4" x 3/4 x 18ga
3	500330	Spring 1½"
4	309062	Hex Sprocket Adapter
5	431023	Chain 2050 41 Links ***(See Page 17)***
6	935098	Sprocket 2050 25T w/1" bore
7	571273	Nylon Idler
8	602367	Key 1/4" x 1"
9	935106	Sprocket 2050 30T w/1" bore
10	03001500	Bearing 1" 2 bolt Flange
11	309714	Extension Shaft
12	333427	All Thread Bolt ½" x 3½"
13	337071	Cotter Pin 3/32" x ½"
14	150334	Adapter Sleeve
15	335349	Clevis Pin 1/4" x 1 5/8"
16	334813	Roll Pin 5/16" x 1½"
17	870402	10' Gear Box Assembly
18	333484	Carriage Bolt ½" x 6"
19	431239	Chain 2050 27 Links ***(See Page 17)***
20	471854	Cylinder 1" x 2"
21	331363	Hex Nylock Nut ½"
22	963603	Clutch Bracket Mount
23	870121	Clutch Lever Assy
24	335364	Carriage Bolt ½" x 6" Gr 5
25	860825	Throw-out Clutch Half Assembly
26	863795	Drive Clutch Sprocket Assy-20T (7½" & 10" Spacing)
27	335026	Machine Bushing 1½" x1 x14ga
28	501031	Spring 2 3/4"
29	06409700	Set Collar 1" Steel
30	01147800	HHCS ½" x 1½" Gr 5
31	310656	Key 3/16" x 1½"
32	964288	10' Wheel Spindle
33	337352	Handle Nut ½"-13 x 4½"
34	431825	Chain 2050 47 Links ***(See Page 17)***
35	01140300	Carriage Bolt ½" x 2 Gr 5
36	864157	Wheel Idler Assy ***(See Page 41)***
37	954370	Hub Drive Sprocket 2050 18T (7½" 10" Spacing)
38	334516	Set Screw 1/4-28 x 1/4 Cone Point
39	403279	Bearing 2" 4B (5 1/8"center)
	403287	Insert for #403279
40	330092	HHCS ½" x 4"
41	145623	Spindle Bushing
42	331363	Hex Nylock Nut ½"
43	330134	Hex Nut ½"
44	330159	Flat washer ½"
45	330142	Lock washer ½"

15' Drive



NOTE:
Make sure when you change from roading position to field position that the nylon idlers are lined up on the chain.
Failure to do this will result in damage to the idlers and chain.

15' Drive

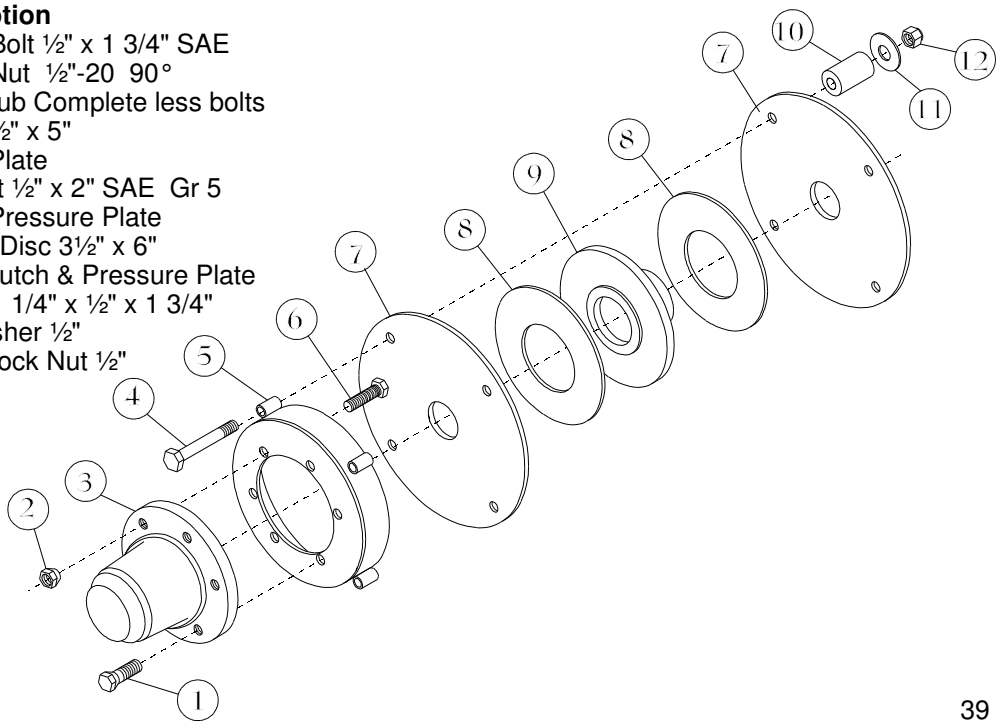
Item	Part No.	Description
1	870196	Clutch Assembly ***(Shown below)***
2	403279	Bearing 2" 4B (5 1/8"center)
	403287	Insert for #403279
	400739	Bearing 2" 4B (4 3/8" center)
	400994	Insert for #400739
3	954370	Hub Drive Sprocket 2050 18T (7½" & 8" Spacing)
	953216	Hub Drive Sprocket 2050 25T (10" Spacing)
4	864157	Wheel Idler Assy ***(See Page 41)***
5	01140300	Carriage Bolt ½" x 2 Gr 5
6	860825	Throw-out Clutch Half Assembly
7	431825	Chain 2050 47 Links ***(See Page 17)***
8	863795	Drive Clutch Sprocket Assy-20T (7½" & 10" Spacing)
	863787	Drive Clutch Sprocket Assy-18T (8" Spacing)
9	335026	Machine Bushing 1½" x1 x14ga
10	06409700	Set Collar 1" Steel
11	501031	Spring 2 3/4"
12	335364	Carriage Bolt ½" x 6" Gr 5
13	963603	Clutch Bracket Mount
14	471854	Cylinder 1" x 2"
15	331363	Nylock Nut ½"
16	333484	Carriage Bolt ½" x 1 3/4"
17	337352	Handle Nut ½-13" x 4½"
18	01147800	HHCS ½" x 1½" Gr 5

Item	Part No.	Description
19	961532	Wing Spindle (Stress Proof)
20	310656	Key 3/16" x 11/2"
21	330159	Flat washer ½"
22	863910	Gear Box Assembly
23	935098	Sprocket 2050 25T w/1" bore
24	935106	Sprocket 2050 30T w/1" bore
25	431239	Chain 2050 27 Links ***(See Page 17)***
26	150334	Adapter Sleeve
27	309714	Extension Shaft
28	03001500	Bearing 1" 2B Flange
29	333427	All Thread Bolt ½" x 3 ½" Gr 5
30	571273	Nylon Idler
31	935098	Sprocket 2050 25T w/1" bore
32	431023	Chain 2050 41 Links ***(See Page 17)***
33	309062	Hex Sprocket Adapter
34	500330	Spring 1½"
35	332528	Machine Bush 1 1/4" x 3/4 x 18ga
36	330928	Klik Pin 3/16"
37	602367	Key 1/4" x 1"
38	935106	Sprocket 2050 30T w/1" bore
39	334813	Roll Pin 5/16" x 1½"
40	330134	Hex Nut ½"
41	870121	Clutch Lever Assy
42	334110	Hex Jam Nylock Nut ½"
43	330142	Lock washer ½"
44	334516	Set Screw 1/4-28 x 1/4 Cone Point

Clutch Assembly #870196

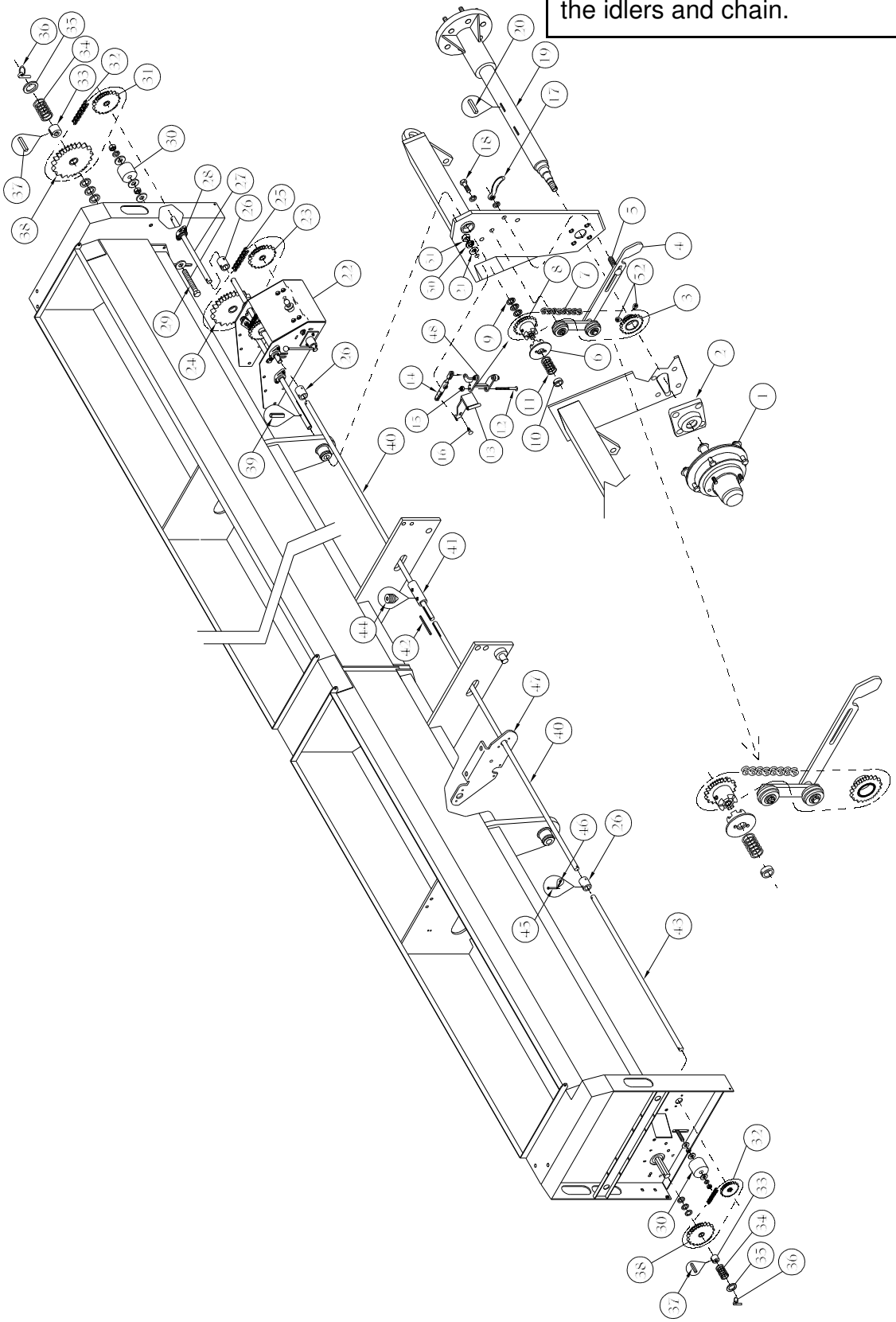
Item	Part No.	Description
*1	330464	Wheel Bolt ½" x 1 3/4" SAE
*2	331314	Wheel Nut ½"-20 90°
3	551291	Q783 Hub Complete less bolts
4	01225200	HHCS ½" x 5"
5	963835	Clutch Plate
6	337139	Tap Bolt ½" x 2" SAE Gr 5
7	222612	Clutch Pressure Plate
8	08476400	Friction Disc 3½" x 6"
9	963827	Drive Clutch & Pressure Plate
10	502286	Spring 1 1/4" x ½" x 1 3/4"
11	330159	Flat washer ½"
12	331363	Hex Nylock Nut ½"

*Not included in assembly



20' Drive

NOTE:
Make sure when you change from roading position to field position that the nylon idlers are lined up on the chain.
Failure to do this will result in damage to the idlers and chain.

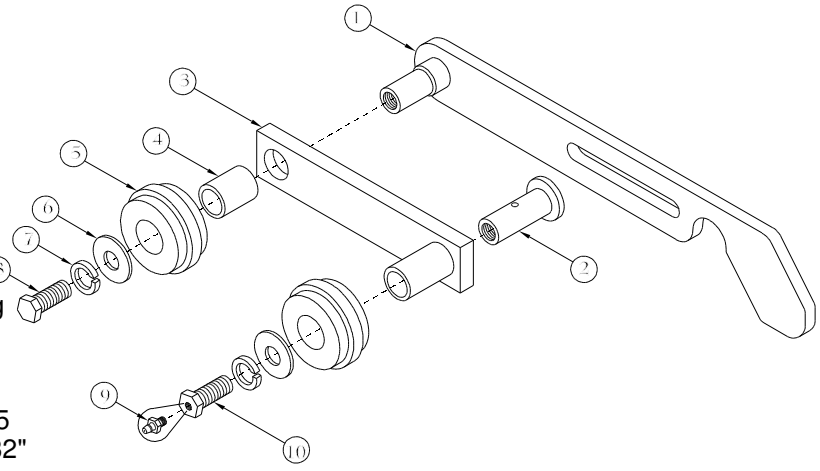


20' Drive

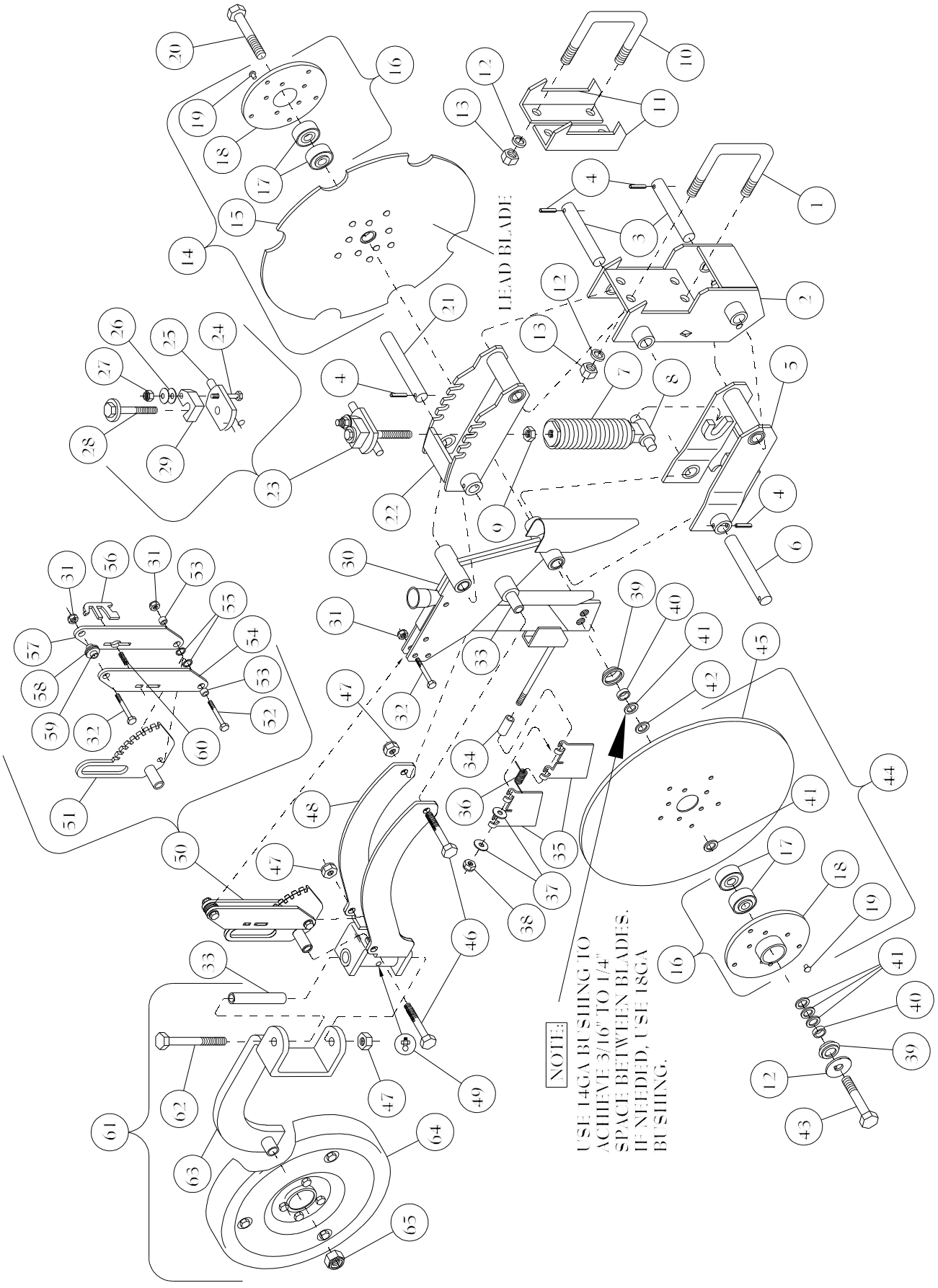
Item	Part No.	Description
1	870196	Clutch Assembly ***(Shown below)***
2	403279	Bearing 2" 4B (5 1/8"center)
	403287	Insert for #403279
	400739	Bearing 2" 4B (4 3/8" center)
	400994	Insert for #400739
3	954370	Hub Drive Sprocket 2050 18T (7½" & 8" Spacing)
	953216	Hub Drive Sprocket 2050 25T (10" Spacing)
4	864157	Wheel Idler Assy ***(See Page 41)***
5	01140300	Carriage Bolt ½" x 2 Gr 5
6	860825	Throw-out Clutch Half Assembly
7	431825	Chain 2050 47 Links ***(See Page 17)***
8	863795	Drive Clutch Sprocket Assy-20T (7½" & 10" Spacing)
	863787	Drive Clutch Sprocket Assy-18T (8" Spacing)
9	335026	Machine Bushing 1½" x1 x14ga
10	06409700	Set Collar 1" Steel
11	501031	Spring 2 3/4"
12	335364	Carriage Bolt ½" x 6" Gr 5
13	963603	Clutch Bracket Mount
14	471854	Cylinder 1" x 2"
15	331363	Nylock Nut ½"
16	333484	Carriage Bolt ½" x 1 3/4"
17	337352	Handle Nut ½-13" x 4½"
18	01147800	HHCS ½" x 1½" Gr 5
19	961532	Wing Spindle (Stress Proof)
20	310656	Key 3/16" x 1½"
21	330159	Flat washer ½"
22	863910	Gear Box Assembly
23	935098	Sprocket 2050 25T w/1" bore
24	935106	Sprocket 2050 30T w/1" bore
25	431239	Chain 2050 27 Links ***(See Page 17)***
26	150334	Adapter Sleeve
27	309714	Extension Shaft
28	03001500	Bearing 1" 2B Flange
29	333427	All Thread Bolt ½" x 3 ½" Gr 5
30	571273	Nylon Idler
31	935098	Sprocket 2050 25T w/1" bore
32	431023	Chain 2050 41 Links ***(See Page 17)***
33	309062	Hex Sprocket Adapter
34	500330	Spring 1½"
35	332528	Machine Bush 1 1/4" x 3/4 x 18ga
36	330928	Klik Pin 3/16"
37	602367	Key 1/4" x 1"
38	935106	Sprocket 2050 30T w/1" bore
39	334813	Roll Pin 5/16" x 1½"
40	309765	Drive Shaft 75½"
41	150342	Connector Spool
42	605683	Key 1/4 x 4½"
43	309773	Drive Shaft 54 1/8"
44	01139500	Set Screw 3/8-16 x 3/8" Star Cup
45	335349	Clevis Pin 1/4" x 1 5/8"
46	337071	Cotter Pin 3/32" x ½"
47	215871	20' Bearing Plate
48	870121	Clutch Lever Assy
49	334110	Hex Jam Nylock Nut ½"
50	330142	Lock washer ½"
51	330134	Hex nut ½"
52	334516	Set Screw 1/4-28 x 1/4 Cone Point

Wheel Idler Assembly
864157

Item	Part No.	Description
1	957134	Wheel Slotted Arm
2	309740	Rear Shaft Idler
3	957126	Wheel Idler Arm
4	150235	Front Shaft Bushing
5	571075	Nylon Chain Idler
6	330159	Flatwasher ½"
7	330142	Lockwasher ½"
8	01029800	HHCS ½" x 1" Gr 5
9	600346	Zerk 1/4"-28 x 17/32"
10	337394	HHCS ½" x 1" w/zerk hole



All Plant Opener Assembly

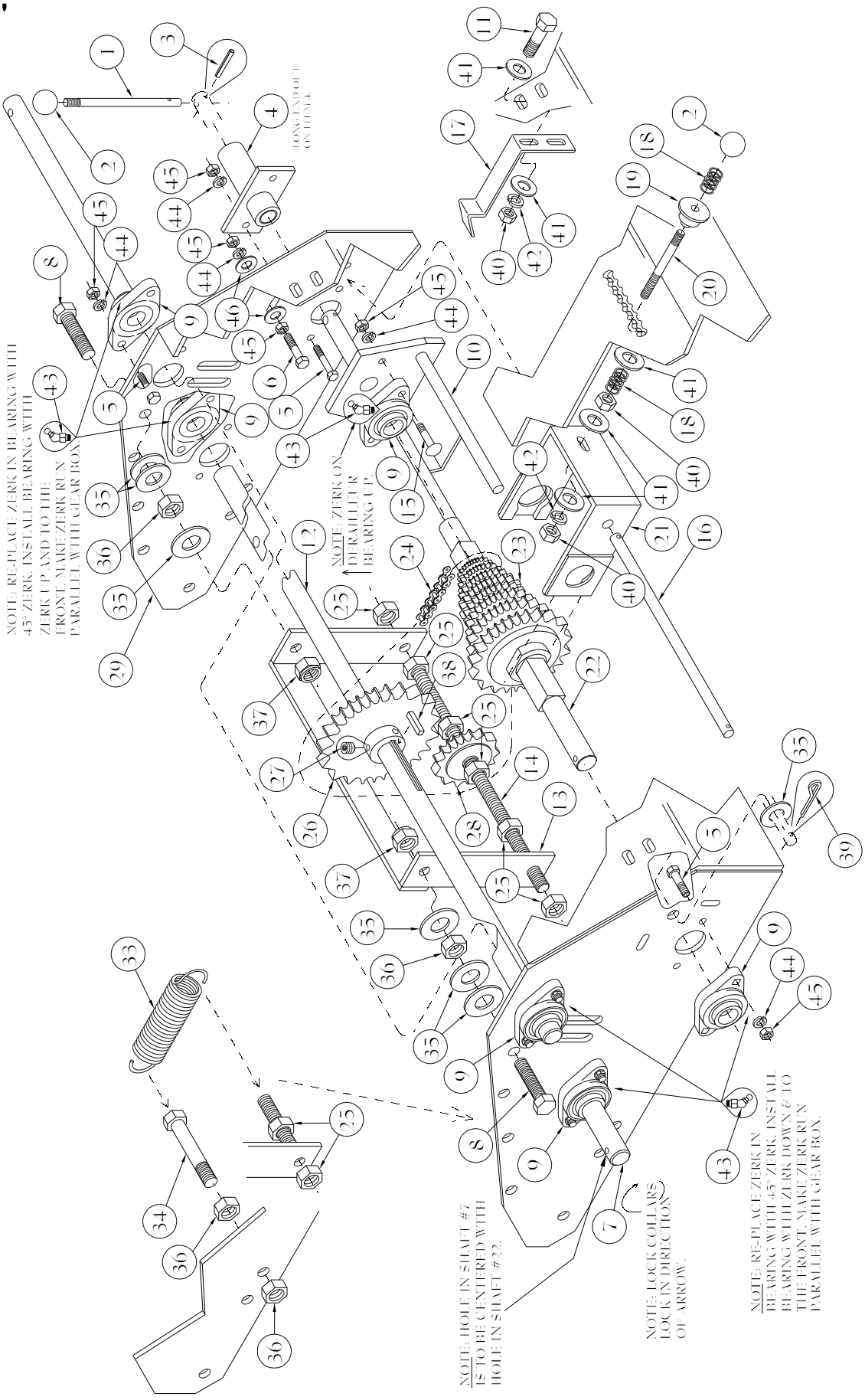


All Plant Opener Assembly

Item	Part No.	Description
	871111	Right Short Opener Assembly
	871129	Left Short Opener Assembly
	871137	Right Long Opener Assembly
	871145	Left Long Opener Assembly
		Items #10,11,13,24-29 & 61-65
		are NOT included in assembly
1		U-Bolt w/Lock washer & Hex nut
	335737	U-Bolt 5/8" x 4" x 3" (2x4 Tube)
	337147	U-Bolt 5/8" x 4" x 5" (4x4 Tube)
2	953695	Opener Mounting Bracket
3	306977	Mount Pin 3/4" x 5 15/16"
4	335604	Roll Pin 1/4" x 1 1/4"
5	953711	Lower Parallel Arm Bracket
6	306944	Mount Pin 3/4" x 5 3/4"
7	842906	Opener Spring Assembly
8	308593	Opener Spring Pin 5/8" x 3 5/16"
9	332262	Hex Jam Nut ½"
10	337469	U-Bolt 5/8" x 4" x 6½"
11	217562	Offset Mounting Plate
12	330183	Flat Washer 5/8"
13	330571	Hex Nut 5/8"
14	845925	Double Disc Blade Assy- 6 notch
		Includes #15,16, & 19
15	501437	Blade 16" x 4mm Notched
16	633891	Bearing & Flange Sub-Assembly
		Includes #17 & 18
17	401042	Bearing
18	551200	Bearing Flange
19	603084	Rivet 5/16" x 5/8" Button Head
20	335596	HHCS 5/8" x 3" Gr 8 Left Hand
21	307058	Upper Arm Bracket Pin 3/4" x 5½"
22	942235	Upper Parallel Arm Bracket
23	858506	Spring Adjustment Assembly
		Includes #9, 24-29
24	01152800	HHCS 5/16" x 1 3/4" Gr 5
		w/ Hex Nylock Nut
25	937417	Spring Adjustment Bracket
26	502070	Belleville Spring Washer 5/8"
27	331611	Hex Nylock Nut 5/16"
28	335612	Hex Head Flange Bolt
		1/2" x 2½" Gr 8
29	550830	Spring Adjustment Bracket Latch
30	953729	Short Opener -- Left (shown)
	953737	Short Opener -- Right
	953745	Long Opener -- Left
	953752	Long Opener -- Right
31	330837	Hex Nylock Nut 3/8"
32	335877	HHCS 3/8" x 1 3/4" Gr 5
		W/Hex Nylock Nut

Item	Part No.	Description
33	148999	Bushing 3 19/32"
34	150045	Scraper Bushing 1 3/8"
35	257048	Scraper Plate
36	502146	Scraper Spring - Left (shown)
	502153	Scraper Spring - Right
37	330852	Flat Washer 5/16"
38	336909	Hex Nylock Jam Nut 3/8"
39	400747	Neoprene Dust Seal
40	146209	Bushing 9/32"
41	330720	Machine Bush 1 1/8 x 5/8 x 14ga
42	333351	Machine Bush 1 1/8 x 5/8 x 18ga
43	335620	HHCS 5/8" x 3" Gr 5
44	845917	Double Disc Blade Assy -- Plain
		Includes 16,19, & 45
45	501429	Blade 16" x 4mm Plain
46	337865	HHCS ½" x 4½" Gr 8
		w/Hex Nylock Nut
47	03223500	Reversible Lock Nut ½" Gr 8
48	964908	Presswheel Swivel Bracket
49	604660	Zerk 1/4-28 x 9/16 Self tapping
50	871061	Quadrant Sub-Assembly
51	964874	Quadrant Handle
52	335703	HHCS 3/8" x 1½" Gr 5
53	149393	Bushing 5/16"
54	224014	Quadrant Strap Right
55	337063	Nylon Washer 11/16"OD x ½"ID
56	224030	Quadrant Lock Latch
57	224022	Quadrant Strap Left
58	604504	Rubber Grommet 1/2" ID x 1" OD
59	149385	Quadrant Bushing 3/4"
60	502310	Quadrant Spring 1 1/4
61		Presswheel Arm Assembly
		Includes #33,47, 62-65
	859967	Single 3x14 V-Type
	859975	Single 3x13 Center Rib
	859983	Single 3x13
	859991	Single 2x13 Peaked
	860007	Single 2x13 (Shown)
62	337873	HHCS ½" x 5½" Gr 8
63	954636	Presswheel Arm
64		Presswheels
	530717	2" x 13" w/Smooth Sides (shown)
	530667	2" x 13" Peaked w/Smooth Sides
	852368	3" x 13" Center Rib Assembly
	846774	3" x 14" V-Type **(Prior 1999)**
	530741	3" x 14" V-Type
	849760	3" x 13" w/Smooth Sides
65	01572700	Hex Nylock Nut 5/8"

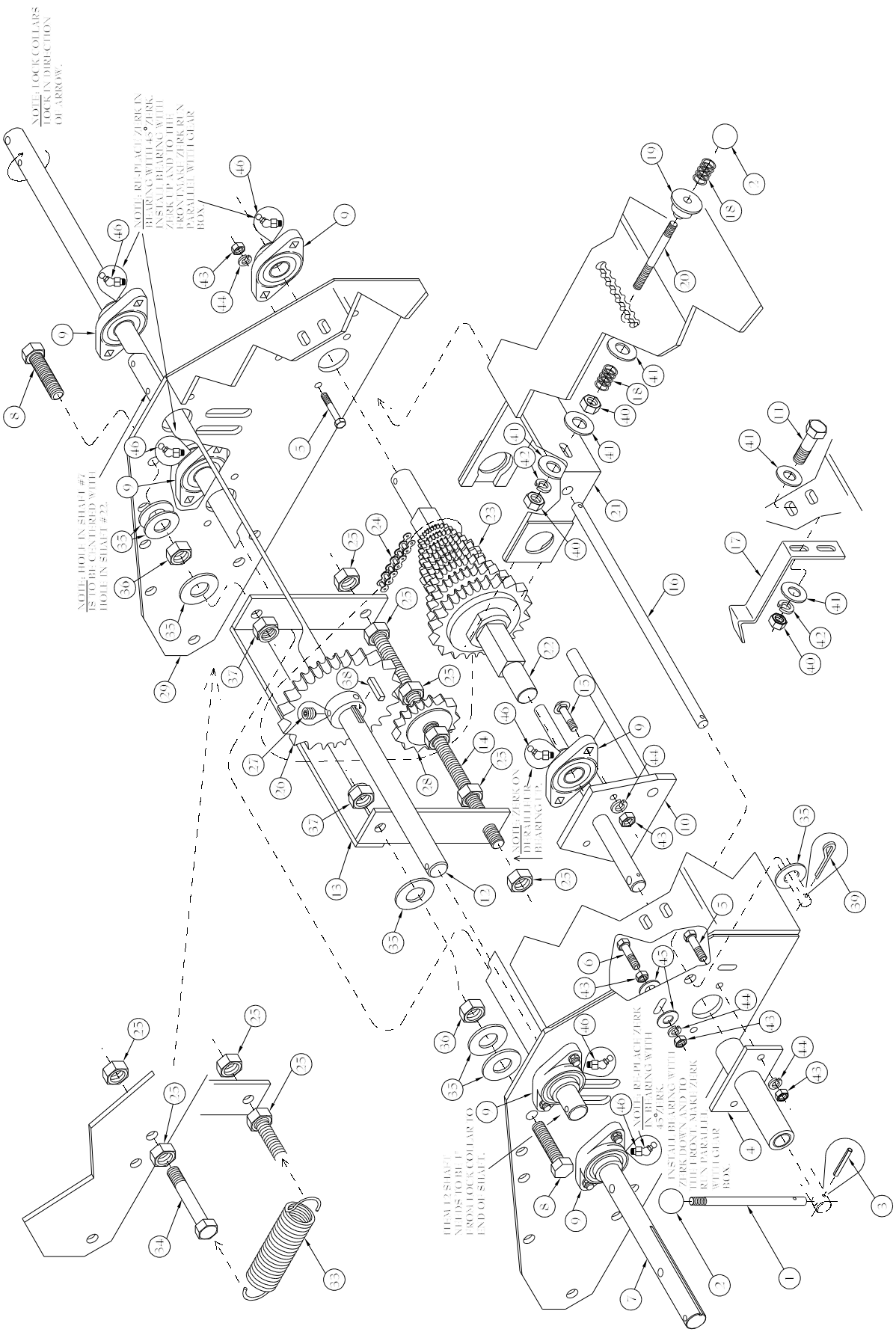
Gear Box Assembly
10'



Gear Box Assembly
10'

Item	Part No.	Description
1	309088	Handle Shaft
2	604611	Plastic Ball Knob 3/8" -16 T.P.I.
3	334581	Roll Pin 5/32" x 7/8"
4	860908	Derailleur Clutch Mount Assy
5	01010800	HHCS 5/16" x 1" Gr 5
	330845	Lockwasher 5/16"
	330811	Hex Nut 5/16"
6	02300200	HHCS 5/16 x 2" Gr 5
	330845	Lockwasher 5/16"
	330811	Hex Nut 5/16"
	330852	Flatwasher 5/16"
7	311092	Clutch Shaft
8	337212	Tap Bolt ½" x 2" Gr 5
	330134	Hex Nut ½"
	330159	Flatwasher ½"
	331363	Hex Nylock ½"
9	03001500	Bearing 1" Flange Mount
10	954339	Derailleur Bracket
11	01017300	HHCS 3/8" x 1" Gr 5
	330035	Hex Nut 3/8"
	330894	Flatwasher 3/8"
	330043	Lockwasher 3/8"
12	311100	Box End Drive Shaft
13	954941	Idler Arm
14	309112	Idler Arm All-thread Shaft
15	01261700	Carriage Bolt 5/16" x 1 1/2" Gr 5
	330845	Lockwasher 5/16"
	330811	Hex Nut 5/16"
16	309070	Gear Box Shaft
17	211896	Derailleur Spring Catch Plate
18	502161	Knob Spring
19	309138	Shift Lock
20	309104	Adjustment Handle Shaft
21	954347	Sprocket Cluster Bracket
22	309054	Cluster Shaft
23	432708	Sprocket Cluster
24	432542	Chain #40 x 64 Pitches Complete
25	330571	Hex Nut 5/8"
26	954149	Sprocket #40 30 Tooth w/1" bore
27	334516	Allen Set Screw 1/4"-28 x 1/4" Cone
28	430603	Sprocket 17 Tooth Idler
29	957092	Gear Box Shell
33	500173	Idler Spring
34	335422	HHCS ½" x 2½" Gr 5
	330134	Hex Nut ½"
35	330159	Flatwasher ½"
36	330134	Hex Nut ½"
37	331363	Hex Nylock ½"
38	10490100	Key 1/4" x 1/4" x 1 1/4"
39	330936	Cotter Pin 1/8" x 1"
40	330035	Hex Nut 3/8"
41	330894	Flatwasher 3/8"
42	330043	Lockwasher 3/8"
43	01162700	Zerk 1/4" -28 45°
44	330845	Lock Washer 5/16"
45	330811	Hex Nut 5/16"
46	330852	Flat Washer 5/16"

Gear Box Assembly
15' & 20'

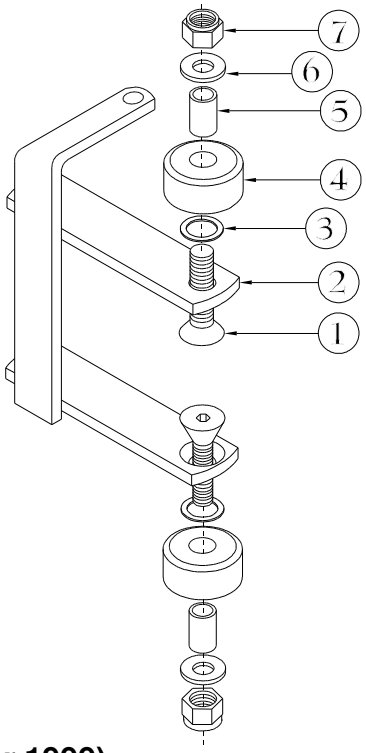


Gear Box Assembly
15' & 20'

Item	Part No.	Description
1	309088	Handle Shaft
2	604611	Plastic Ball Knob 3/8" -16 T.P.I.
3	332452	Roll Pin 5/32" x 1 1/4"
4	860908	Derailleur Clutch Mount Assy
5	01010800	HHCS 5/16" x 1" Gr 5
	330845	Lockwasher 5/16"
	330811	Hex Nut 5/16"
6	02300200	HHCS 5/16 x 2" Gr 5
	330845	Lockwasher 5/16"
	330811	Hex Nut 5/16"
	330852	Flatwasher 5/16"
7	309682	Clutch Shaft
8	337212	Tap Bolt 1/2" x 2" Gr 5
	330134	Hex Nut 1/2"
	330159	Flatwasher 1/2"
	331363	Hex Nylock 1/2"
9	03001500	Bearing 1" Flange Mount
10	954339	Derailleur Bracket
11	01017300	HHCS 3/8" x 1" Gr 5
	330035	Hex Nut 3/8"
	330894	Flatwasher 3/8"
	330043	Lockwasher 3/8"
12	309252	Box End Drive Shaft
13	954941	Idler Arm
14	309112	Idler Arm All-thread Shaft
15	01261700	Carriage Bolt 5/16" x 1 1/2" Gr 5
	330845	Lockwasher 5/16"
	330811	Hex Nut 5/16"

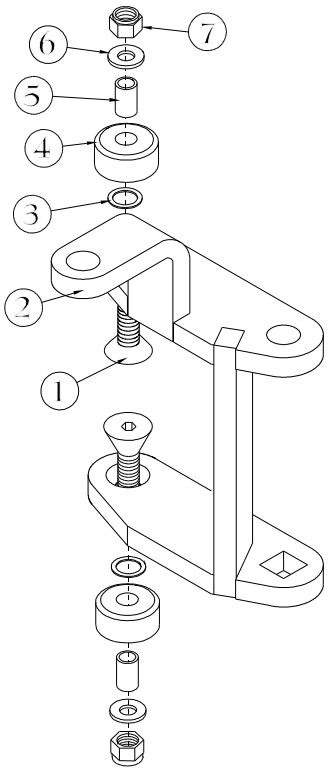
Item	Part No.	Description
16	309070	Gear Box Shaft
17	211896	Derailleur Spring Catch Plate
18	502161	Knob Spring
19	309138	Shift Lock
20	309104	Adjustment Handle Shaft
21	954347	Sprocket Cluster Bracket
22	309054	Cluster Shaft
23	432708	Sprocket Cluster
24	432542	Chain #40 x 64 Pitches Complete
25	330571	Hex Nut 5/8"
26	954149	Sprocket #40 30 Tooth w/1" bore
27	334516	Allen Set Screw 1/4"-28 x 1/4" Cone
28	430603	Sprocket 17 Tooth Idler
29	957092	Gear Box Shell
33	500173	Idler Spring
34	335422	HHCS 1/2" x 2 1/2" Gr 5
	330134	Hex Nut 1/2"
35	330159	Flatwasher 1/2"
36	330134	Hex Nut 1/2"
37	331363	Hex Nylock 1/2"
38	10490100	Key 1/4" x 1/4" x 1 1/4"
39	330936	Cotter Pin 1/8" x 1"
40	330035	Hex Nut 3/8"
41	330894	Flatwasher 3/8"
42	330043	Lockwasher 3/8"
46	01162700	Zerk 1/4" -28 45°

Clutch Lever Assemblies



 # 863829 (Prior 1999)

Item	Part No.	Description
1	337311	Screw 3/8" x 1 3/4" Flat Head Socket
2	956490	Clutch Lever Right
3	337063	Nylon Washer 1/2" ID x 11/16" OD x 1/32"
4	309641	Clutch Lever Bushing
5	149385	Bushing
6	330894	Flat washer 3/8"
7	330837	Nylock Hex Nut 3/8"



#870121

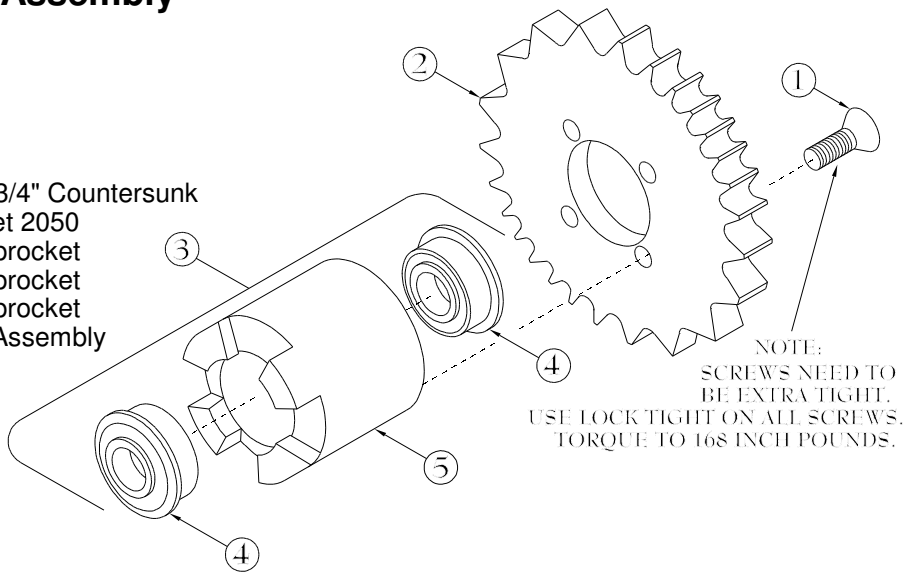
Item	Part No.	Description
1	337311	Screw 3/8" x 1 3/4" Flat Head Socket
2	963629	Clutch Lever Right
3	337063	Nylon Washer 1/2" ID x 11/16" OD x 1/32"
4	309641	Clutch Lever Bushing
5	149385	Bushing
6	330894	Flat washer 3/8"
7	330837	Nylock Hex Nut 3/8"

Drive Clutch Sprocket Assembly

#863787 18 Tooth
#863795 20 Tooth
#863803 25 Tooth

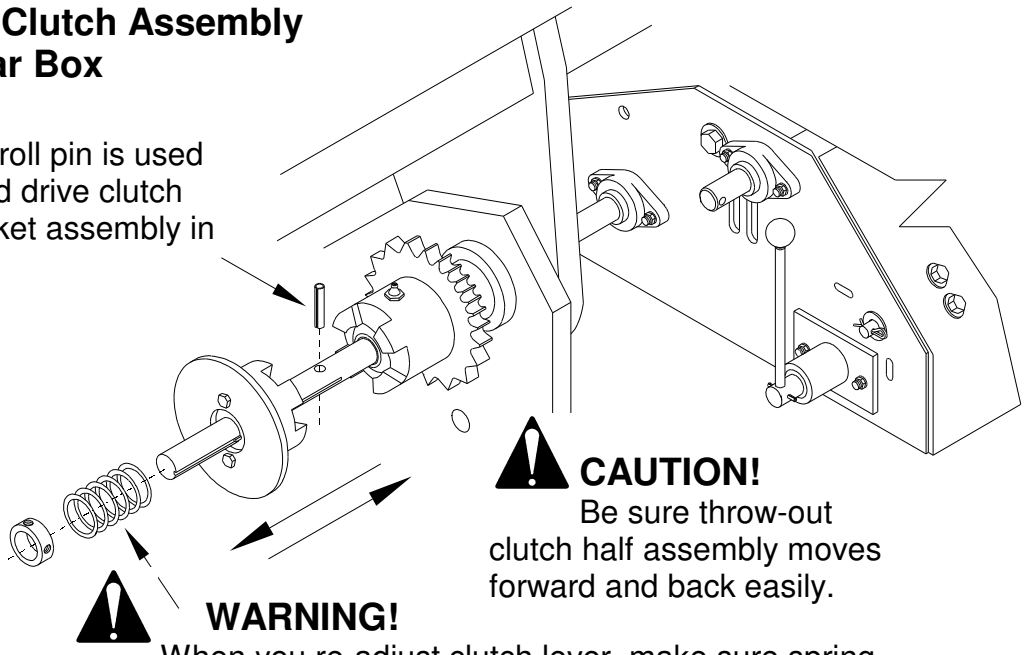
Item	Part No.	Description
1	337733	Screw 1/4" x 3/4" Countersunk
2		Drive Sprocket 2050
	432450	18 Tooth Sprocket
	431700	20 Tooth Sprocket
	432500	25 Tooth Sprocket
* 3	863779	Drive Clutch Assembly
4	401000	Bearing 1"
5	551218	Clutch Drive

* Includes Items #4 & #5.



Clutch Half & Drive Clutch Assembly to Gear Box

5/16" roll pin is used to hold drive clutch sprocket assembly in place.



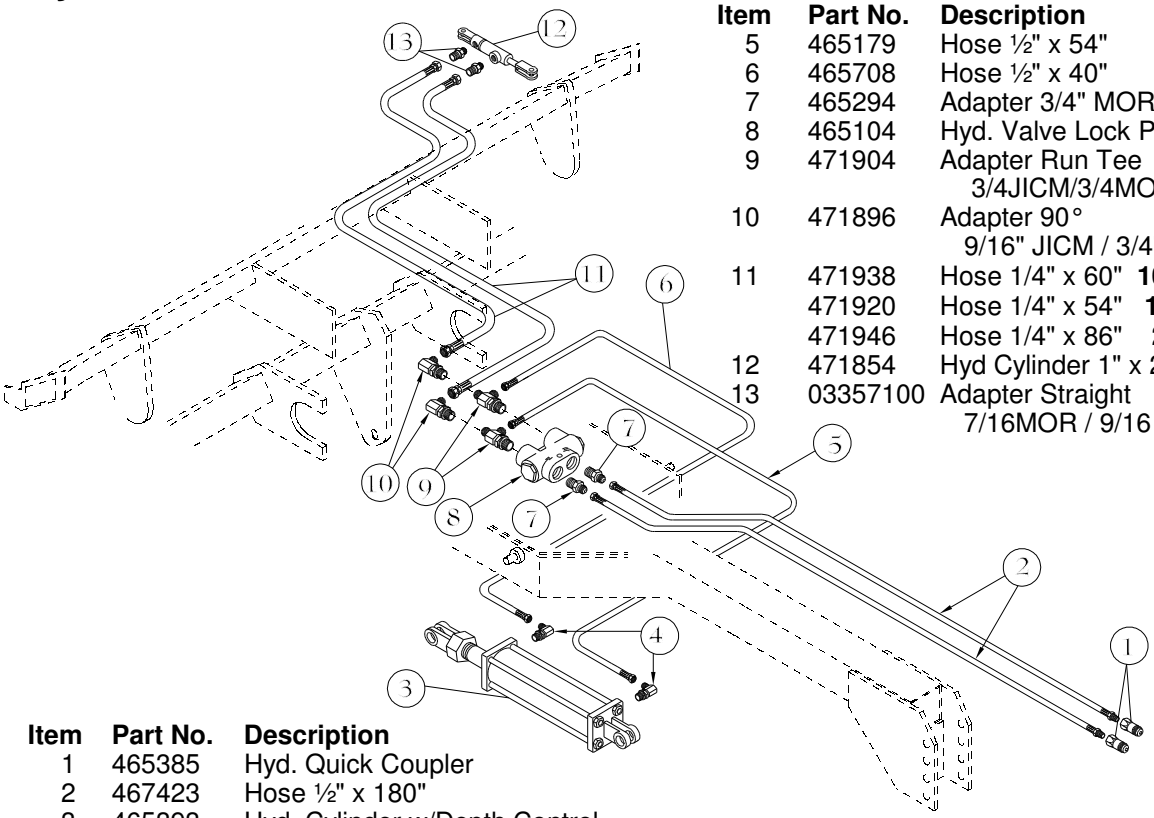
CAUTION!

Be sure throw-out clutch half assembly moves forward and back easily.

WARNING!

When you re-adjust clutch lever, make sure spring does not totally collapse. If spring totally collapses, pressure could force set collar off, resulting in loss of throw-out clutch half causing drill to stop seeding.

Hydraulics



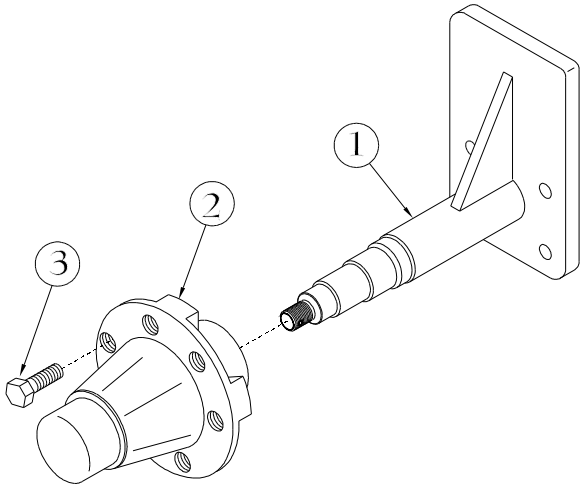
Item	Part No.	Description
5	465179	Hose ½" x 54"
6	465708	Hose ½" x 40"
7	465294	Adapter 3/4" MOR / 3/4" JICM
8	465104	Hyd. Valve Lock Pilot 3/4"JIC
9	471904	Adapter Run Tee 3/4JICM/3/4MOR
10	471896	Adapter 90° 9/16" JICM / 3/4" JICFSw
11	471938	Hose 1/4" x 60" **10' Drill**
	471920	Hose 1/4" x 54" **15' Drill**
	471946	Hose 1/4" x 86" **20' Drill**
12	471854	Hyd Cylinder 1" x 2"
13	03357100	Adapter Straight 7/16MOR / 9/16 JICM

Item	Part No.	Description
1	465385	Hyd. Quick Coupler
2	467423	Hose ½" x 180"
3	465393	Hyd. Cylinder w/Depth Control 4" x 8" w/3/4-16 SAE Ports
4	465310	Adapter 90° 3/4 MOR / 3/4 JICM

Spindle & Hub Assembly
#870576 - 10' Drill
#868711 - 15' & 20' Drills (5 1/8" centers)
#863902 - 15' & 20' Drills (4 3/8" centers)

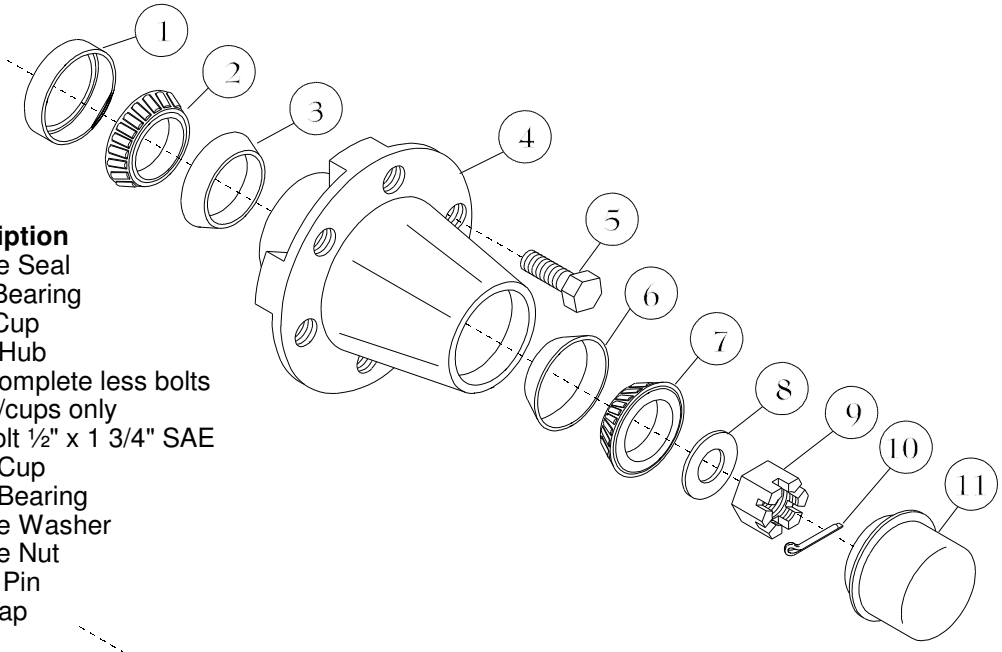
Item	Part No.	Description
1	964528	Spindle **10' Drill**
	961847	Spindle **15' & 20' Drill** (5 1/8")
	956730	Spindle **15' & 20' Drill** (4 3/8")
2	550897	8 Bolt Hub **10' Drill**
	551291	6 Bolt Hub less bolts **15' & 20' Drill**
* 3	330464	Lug Bolt for 6 Bolt Hub

*Lug Bolts are not included in hub #551291



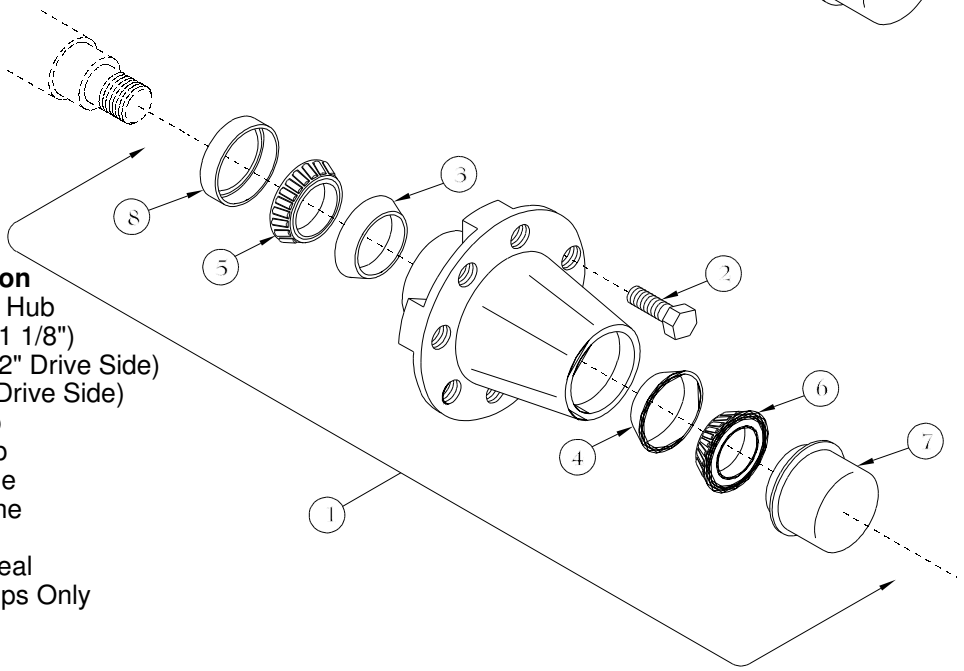
6 Bolt Hub
#551291

Item	Part No.	Description
1	400861	Grease Seal
2	400853	Inner Bearing
3	400846	Inner Cup
4		6 Bolt Hub
	551291	Hub Complete less bolts
	550707	Hub w/cups only
5	330464	Lug Bolt ½" x 1 3/4" SAE
6	05742200	Outer Cup
7	05741400	Outer Bearing
8	02080000	Spindle Washer
9	331801	Spindle Nut
10	02154300	Cotter Pin
11	05703400	Hub Cap



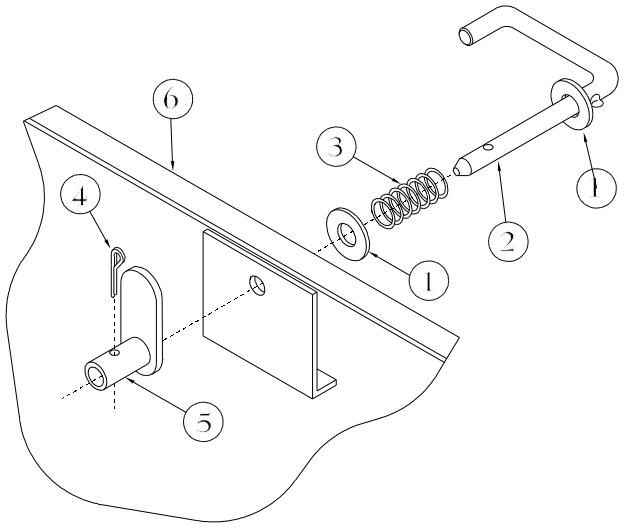
8 Bolt Hub
#550897

Item	Part No.	Description
1	550897	Complete Hub
2	336297	Lug Bolt (1 1/8")
	336867	Lug Bolt (2" Drive Side)
	336859	Lug Nut (Drive Side)
3	401661	Inner Cup
4	401679	Outer Cup
5	401653	Inner Cone
6	401687	Outer Cone
7	603613	Hub Cap
8	401646	Grease Seal
–	55097	Hub w/Cups Only



Cover Shield
864140

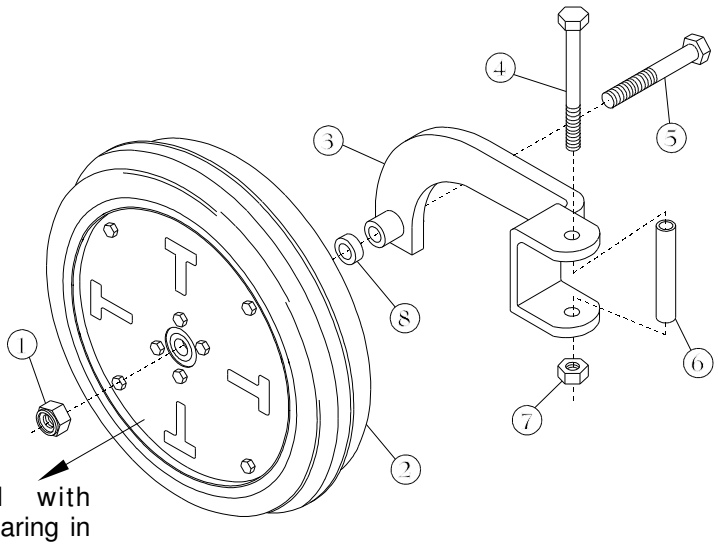
Item	Part No.	Description
1	257428	Washer 15/16" x 16 ga
2	309724	Handle Pin
3	501205	Quadrant Spring
4	330936	Cotter Pin 1/8" x 1"
5	957068	Shield Latch
6	956789	Cover Shield



All Plant
Presswheel Arm Assemblies

#859975
3" x 13" Center Rib

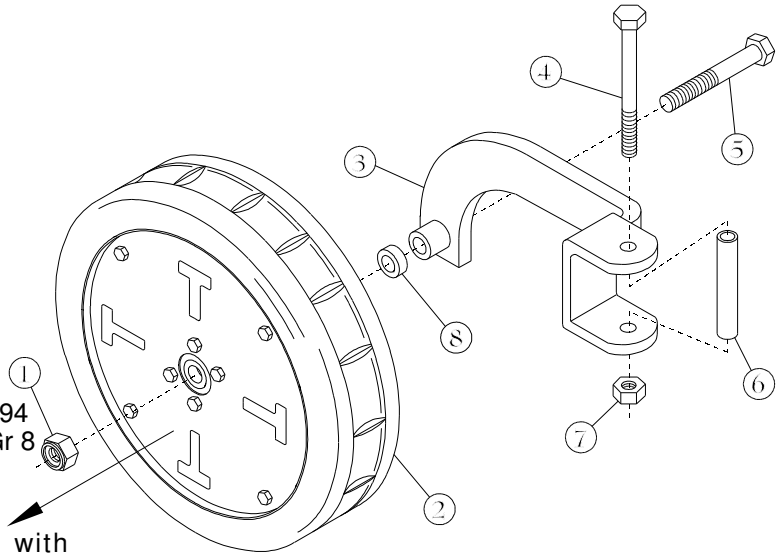
Item	Part No.	Description
1	01572700	Hex Nylock Nut 5/8"
2	852368	Presswheel 3 x 13 Center Rib
3	954636	Presswheel Arm
4	337873	HHCS ½" x 5 ½" Gr 8
5	331983	HHCS 5/8" x 4"
6	148999	Bushing .747 x .532 x 3.594
7	03223500	Reversible Lock Nut ½" Gr 8
8	151472	Presswheel Shim



Assemble wheel with extended race of bearing in direction of arrow.

#859983
3" x 13" w/Smooth Sides

Item	Part No.	Description
1	01572700	Hex Nylock Nut 5/8"
2	849760	Presswheel 3 x 13 w/Smooth Sides
3	954636	Presswheel Arm
4	337873	HHCS ½" x 5½" Gr 8
5	331983	HHCS 5/8" x 4"
6	148999	Bushing .747 x .532 x 3.594
7	03223500	Reversible Lock Nut ½" Gr 8
8	151472	Presswheel Shim

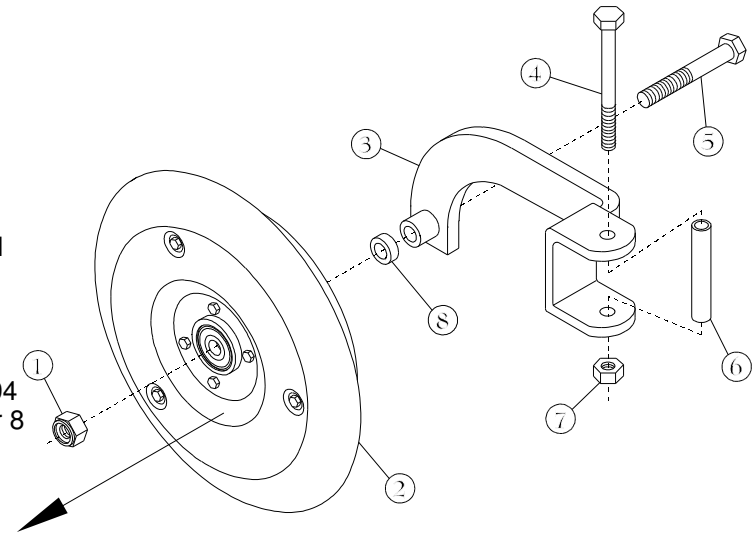


Assemble wheel with extended race of bearing in direction of arrow.

All Plant
Presswheel Arm Assemblies

#859991
2" x 13" Peaked w/Smooth Sides

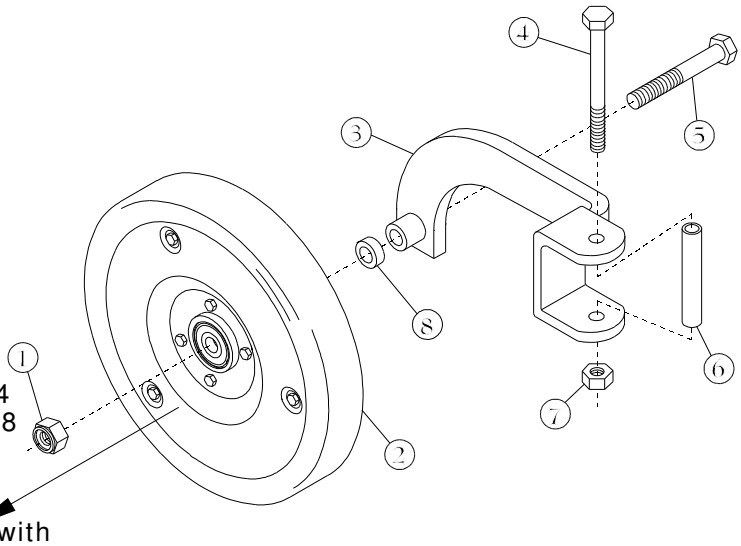
Item	Part No.	Description
1	01572700	Hex Nylock Nut 5/8"
2	530667	Presswheel 2 x 13 Peaked w/Smooth Sides
3	954636	Presswheel Arm
4	337873	HHCS ½" x 5½" Gr 8
5	331983	HHCS 5/8" x 4"
6	148999	Bushing .747 x .532 x 3.594
7	03223500	Reversible Lock Nut ½" Gr 8
8	151472	Presswheel Shim



Assemble wheel with extended race of bearing in direction of arrow.

#860007
2" x 13" w/Smooth Sides

Item	Part No.	Description
1	01572700	Hex Nylock Nut 5/8"
2	530717	Presswheel 2 x 13 w/Smooth Sides
3	954636	Presswheel Arm
4	337873	HHCS ½" x 5½" Gr 8
5	331983	HHCS 5/8" x 4"
6	148999	Bushing .747 x .532 x 3.594
7	03223500	Reversible Lock Nut ½" Gr 8
8	151472	Presswheel Shim

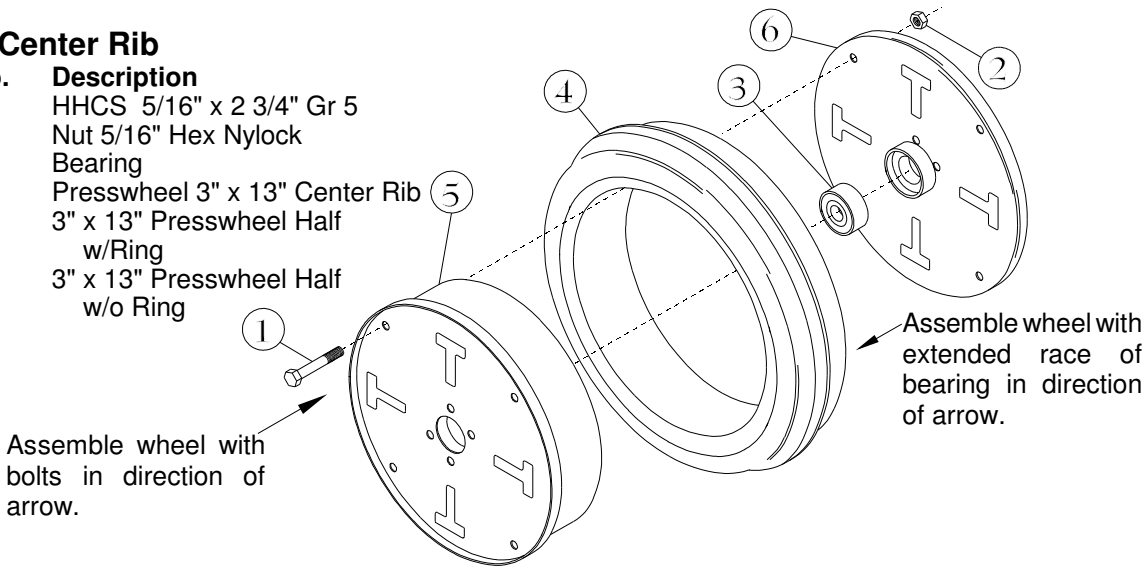


Assemble wheel with extended race of bearing in direction of arrow.

Presswheel Assemblies

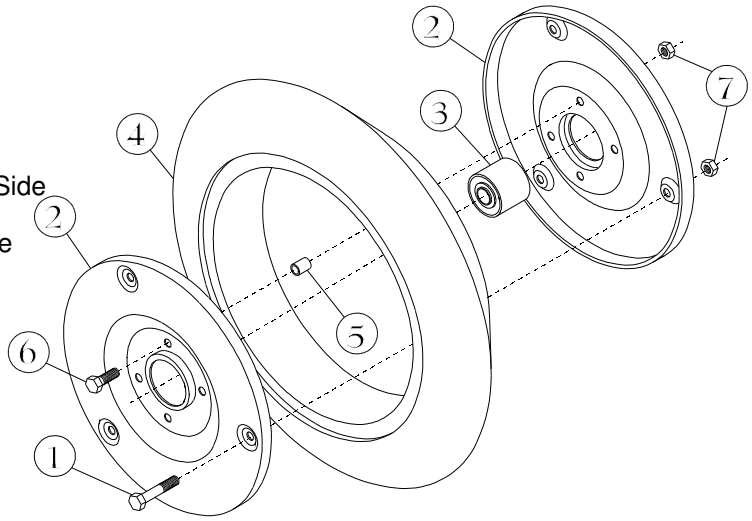
#852368
3" x 13" Center Rib

Item	Part No.	Description
1	334573	HHCS 5/16" x 2 3/4" Gr 5
2	331611	Nut 5/16" Hex Nylock
3	401042	Bearing
4	530642	Presswheel 3" x 13" Center Rib
5	951962	3" x 13" Presswheel Half w/Ring
6	951970	3" x 13" Presswheel Half w/o Ring



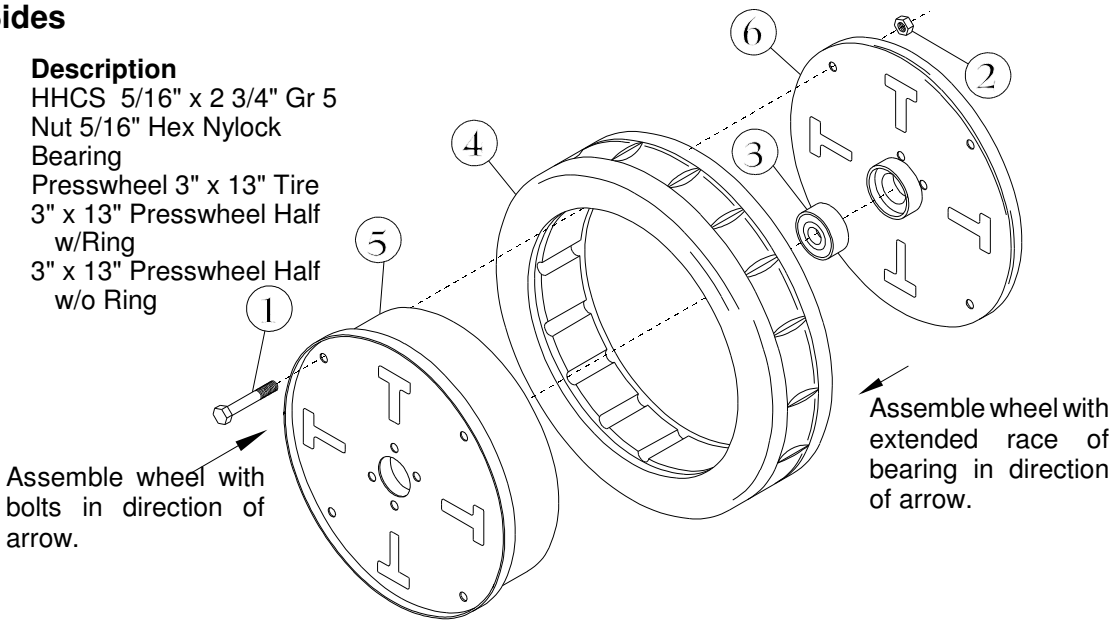
#530741 (Hammer)
3" x 14" V-Type

Item	Part No.	Description
1		HHCS 3/8" x 2.5" Gr 5
2	530782	3x14 Smooth Presswheel Side
3	403188	Bearing
4	530774	Presswheel 3" x 14" V-Type
5	606152	Bushing
6	337857	HHCS 3/8" x 1 3/8" Gr 5
7		Hex Locknut 3/8"



#849760
3" x 13" w/Smooth Sides

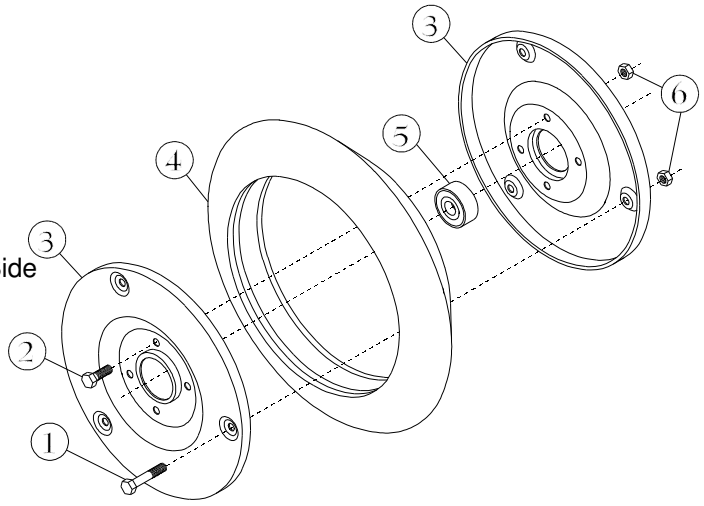
Item	Part No.	Description
1	334573	HHCS 5/16" x 2 3/4" Gr 5
2	331611	Nut 5/16" Hex Nylock
3	401042	Bearing
4	530493	Presswheel 3" x 13" Tire
5	951962	3" x 13" Presswheel Half w/Ring
6	951970	3" x 13" Presswheel Half w/o Ring



Presswheel Assemblies

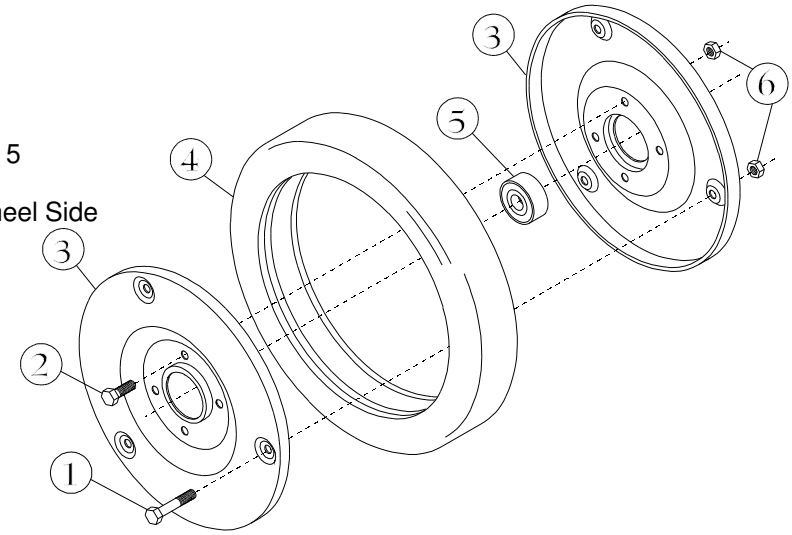
#530667 (Hammer)
2" x 13" Peaked
w/Smooth Sides

Item	Part No.	Description
1		HHCS 3/8" x 1 5/8" Gr 5
2		HHCS 3/8" x 5/8" Gr5
3	530758	2x13 Smooth Presswheel Side
4	530766	2x13 Peaked Presswheel
5	401042	Bearing
6		Hex Locknut 3/8"



#530717 (Hammer)
2" x 13"
w/Smooth Sides

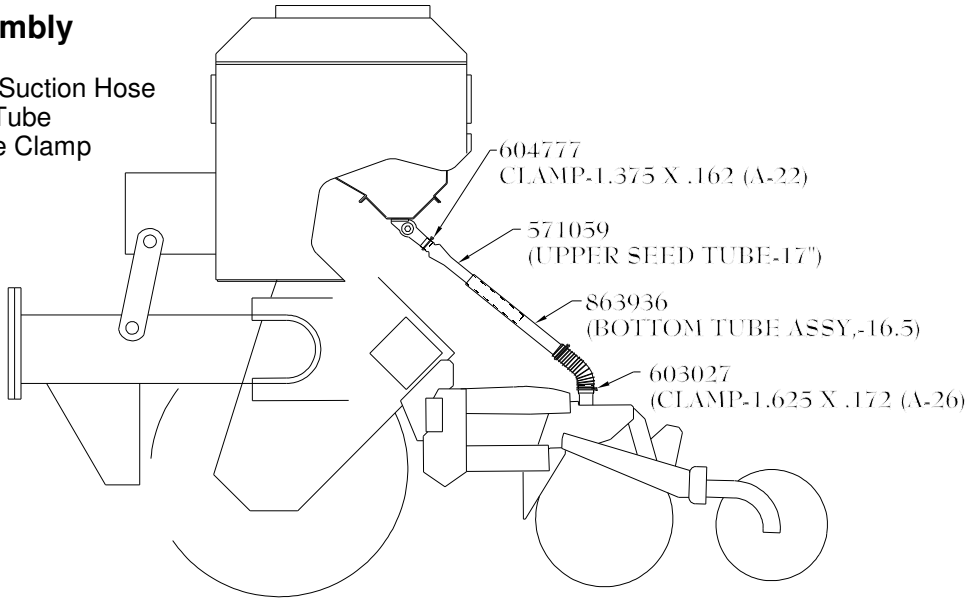
Item	Part No.	Description
1		HHCS 3/8" x 1 5/8" Gr 5
2		HHCS 3/8" x 5/8" Gr 5
3	530758	2x13 Smooth Presswheel Side
4	530790	2x13 Presswheel
5	401042	Bearing
6		Hex Locknut 3/8"



Feed Tube Assembly

#863936
Bottom Tube Assembly

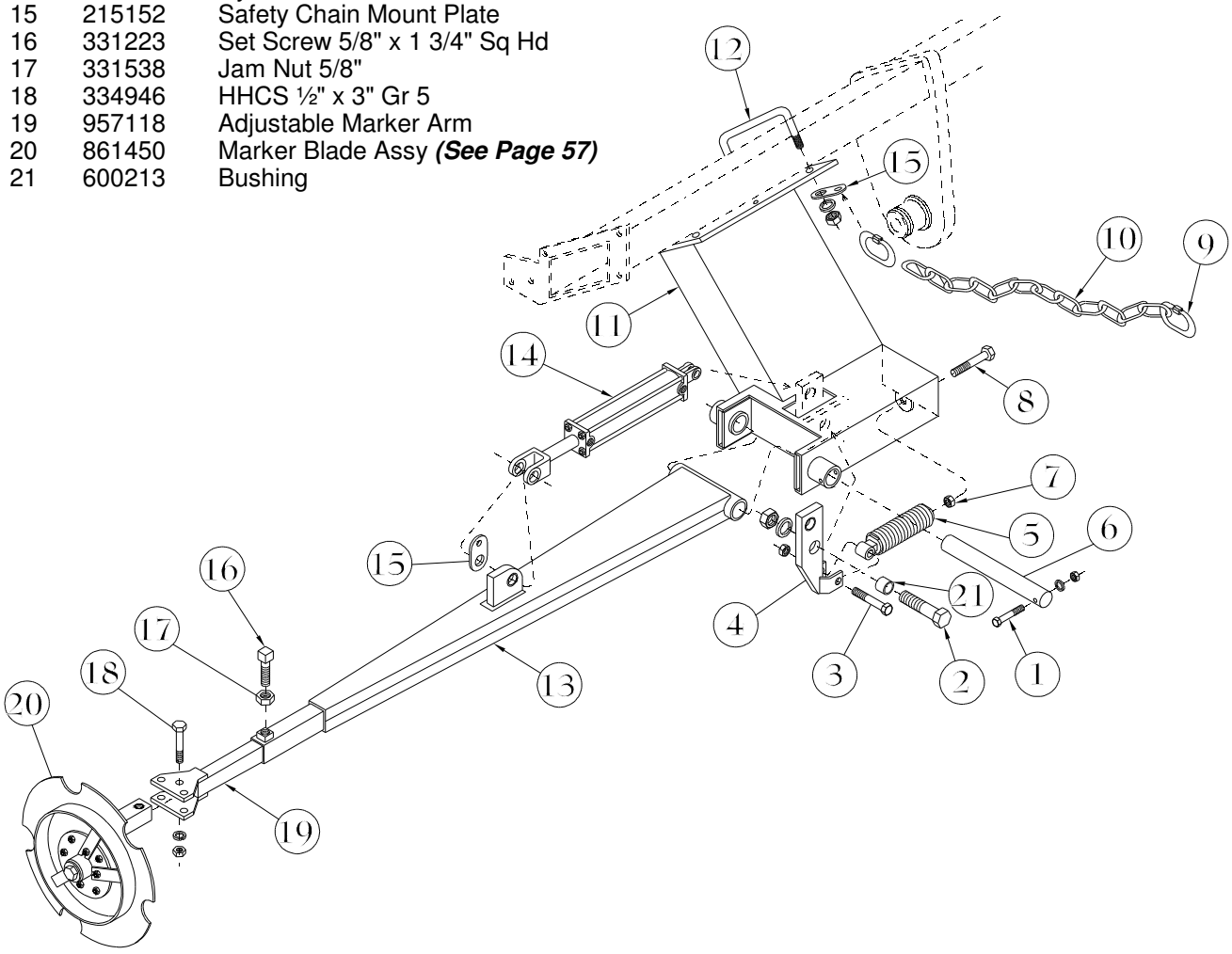
570960	4½" Suction Hose
571067	13" Tube
603027	Hose Clamp



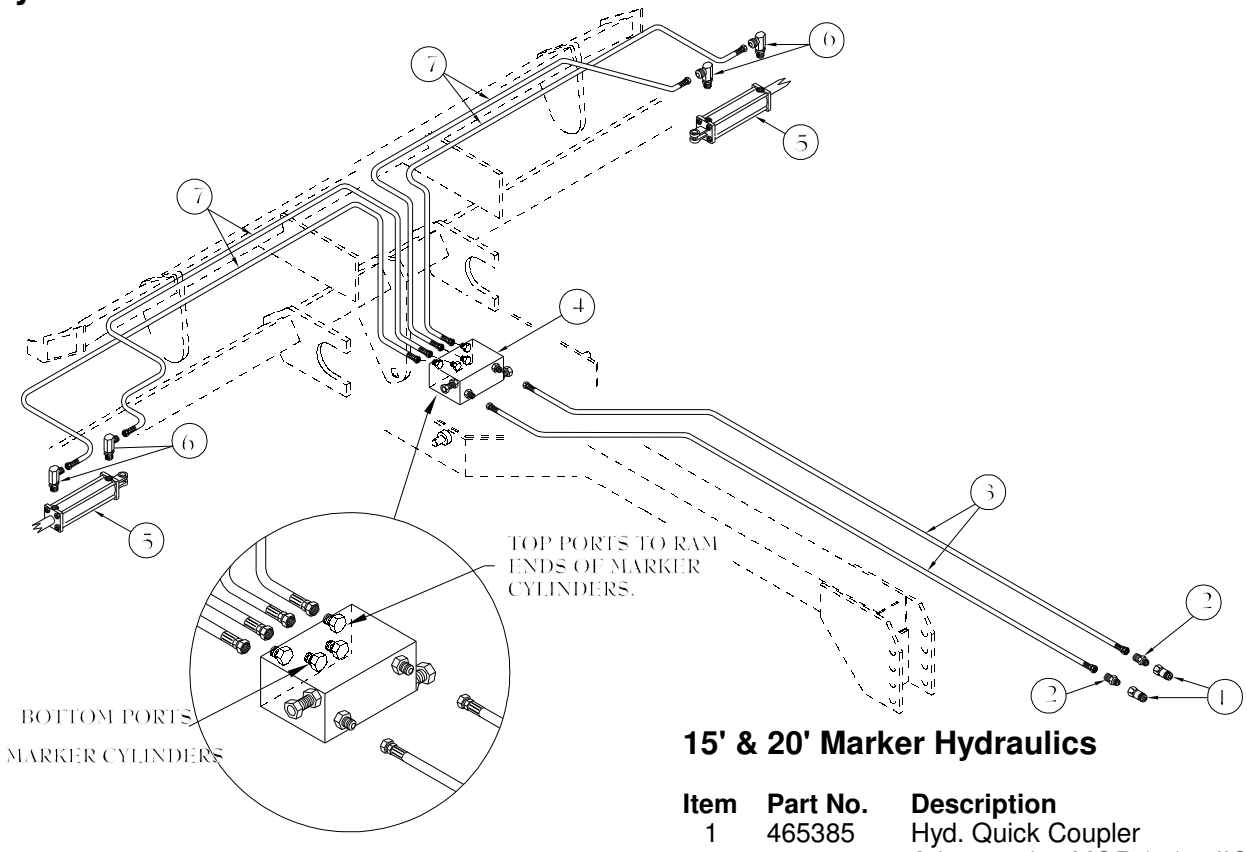
Hydraulic Markers

15' & 20' Marker

Item	Part No.	Description
1	331710	HHCS 5/16" x 2 ½" Gr 5
2	334789	HHCS 1" x 3 ½" Gr 5
3	335620	HHCS 5/8" x 3" Gr 5
4	956946	Base Lug Spring Mount
5	842906	Opener Spring Assembly
6	309708	Marker Pin
7	332262	Jam Nut ½"
8	335612	Screw ½" x 2½" Hex Fl Gr 8
9	332593	Chain Connector Link 5/16"
10	432765	Chain 1/4 Proof x 12 Links
11	956961	Base Mount - Right
	956953	Base Mount - Left
12	334185	U-bolt 3/4" x 6" x 5 ½"
13	956938	Marker Arm
14	463703	Cylinder 2" x 8" w/o DC
15	215152	Safety Chain Mount Plate
16	331223	Set Screw 5/8" x 1 3/4" Sq Hd
17	331538	Jam Nut 5/8"
18	334946	HHCS ½" x 3" Gr 5
19	957118	Adjustable Marker Arm
20	861450	Marker Blade Assy ***(See Page 57)***
21	600213	Bushing



Hydraulic Markers

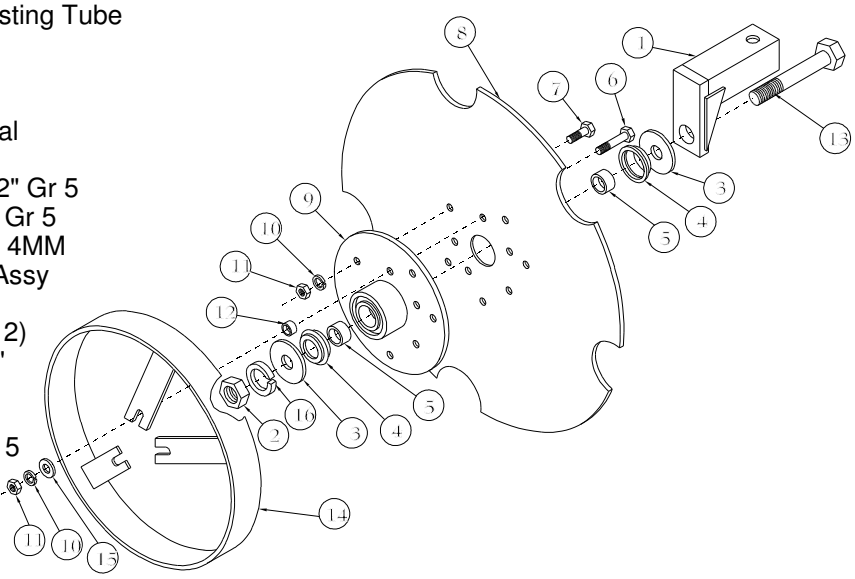


15' & 20' Marker Hydraulics

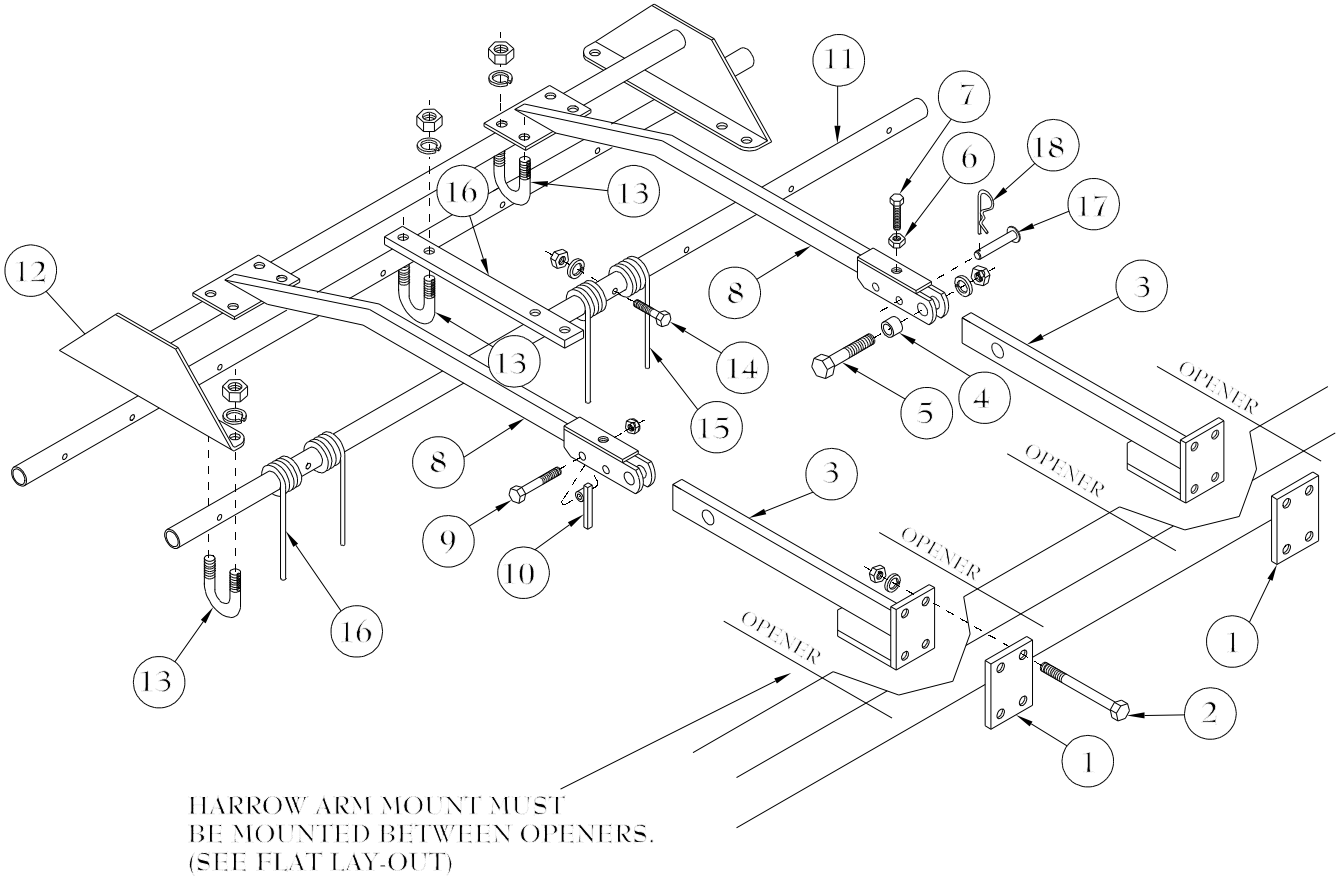
Item	Part No.	Description	
1	465385	Hyd. Quick Coupler	
2	465294	Adapter 3/ 4" MOR / 3/4" JICM	
3	469668	Hose 3/8" x 170"	
4	470179	Sequence Valve (6 Ports)	
5	463703	Hyd. Cylinder 2" x 8"	
6	00563700	Adpt 90° 3/8 NPTM / 9/16 JICM	
7	469650	Hose 1/4" x 125"	**15' Drill**
	469684	Hose 1/4" x 155"	**20' Drill**

Marker Blade Assembly
#861450

Item	Part No.	Description
1	956086	Marker Angle Adjusting Tube
2	330571	Hex Nut 5/8"
	330878	Lock Washer 5/8"
3	330183	Flat Washer 5/8"
4	400747	Neoprene Dust Seal
5	606558	Bushing
6	335448	HHCS 5/16" x 1 1/2" Gr 5
7	01144500	HHCS 5/16" x 3/4" Gr 5
8	501437	16" Notched Blade 4MM
9	633891	Bearing & Flange Assy
	551200	Flange Only
	401042	Bearing Only (Qty. 2)
10	330845	Lock Washer 5/16"
11	330811	Hex Nut 5/16"
12	923631	Bushing
13	331983	HHCS 5/8" x 4" Gr 5
14	928564	Depth Band
15	330852	Flat Washer 5/16"



Spring Tine Harrow

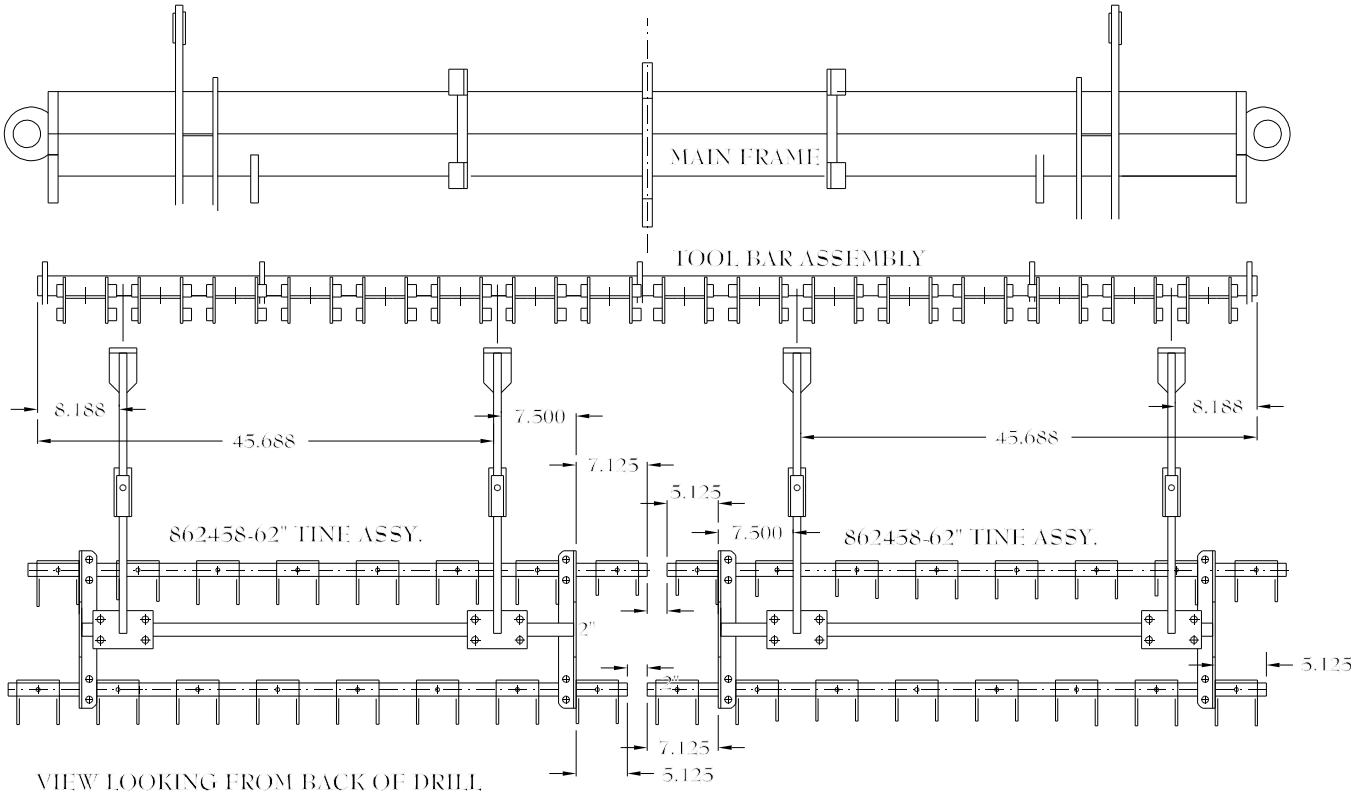


Item	Part No.	Description
1	959288	Bolt Plate
2	334458	HHCS ½" x 6" Gr 5
	330142	Lock washer ½"
	330134	Hex nut ½"
3	959254	Harrow Arm Mount
4	151050	Bushing
5	336321	HHCS 5/8" x 2 1/4" Gr 5
	330878	Lock washer 5/8"
	330571	Hex nut 5/8"
6	331538	Jam nut 5/8"
7	337584	Harrow Adj Bolt 5/8" x 2" Gr 8
8	959262	Harrow Arm Weldment
9	334243	HHCS 3/8" x 2" Gr 5
	330837	Hex Nylock 3/8"
10	959270	Harrow Lock Weldment

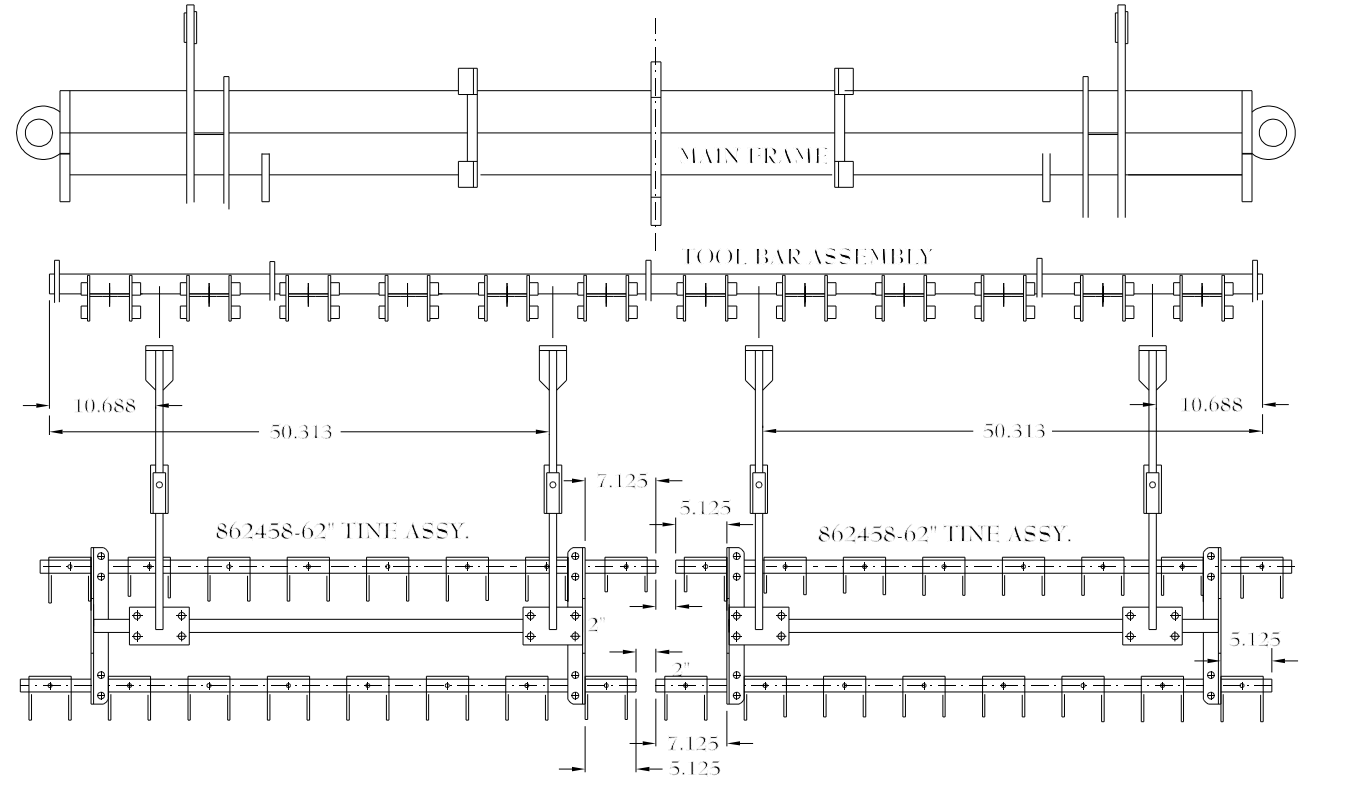
Item	Part No.	Description
11	149849	Harrow Pipe 94" (Center & Outside Wings)
	149476	Harrow Pipe 78" (Inside Wings Only)
12	956987	Tine Gang Bar
13	336032	U-bolt 5/8" x 1 3/8" x 2 9/16"
	330878	Lock washer 5/8"
	330571	Hex nut 5/8"
14	334243	HHCS 3/8" x 2" Gr 5
	330043	Lock washer 3/8"
	330035	Hex nut 3/8"
15	501544	Harrow Tine 11"
16	202226	Adjustment Plate
17	954024	Transport Pin
18	330860	Hairpin 5/32"

Harrow Layouts

10' Drill - 7½" Spacing

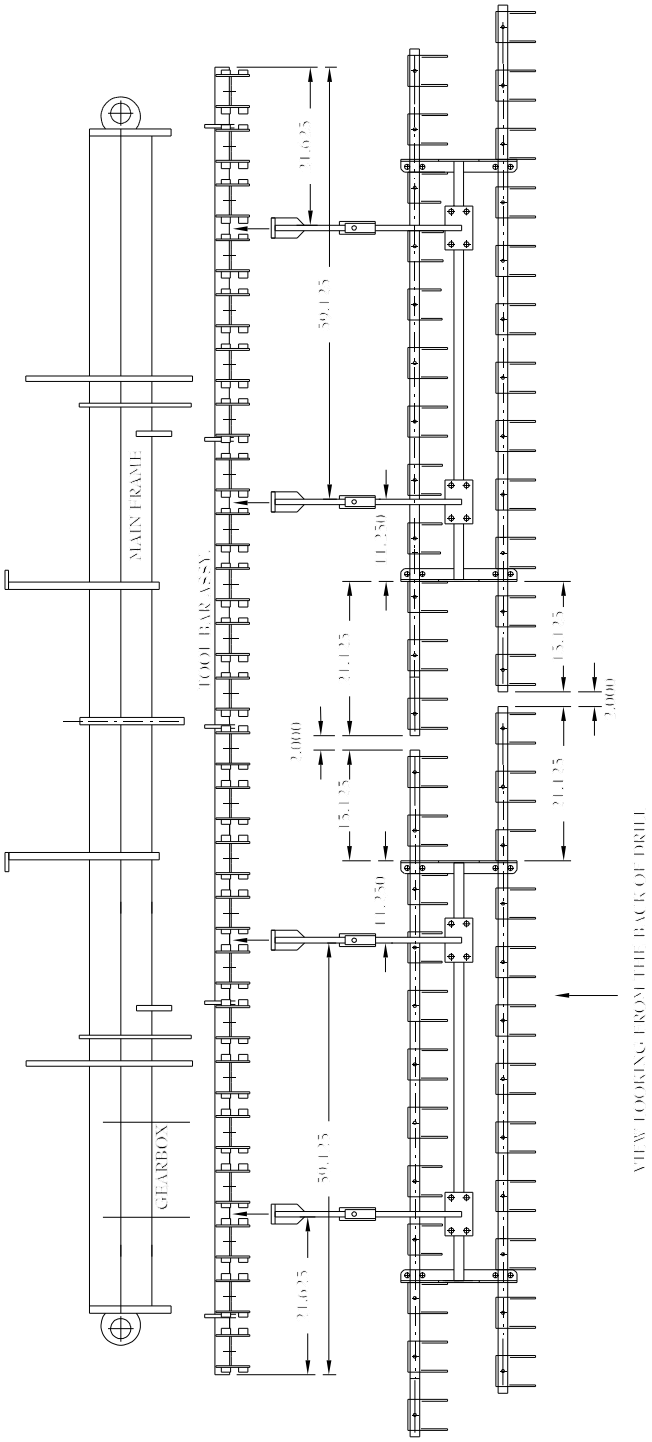


10' Drill - 10" Spacing

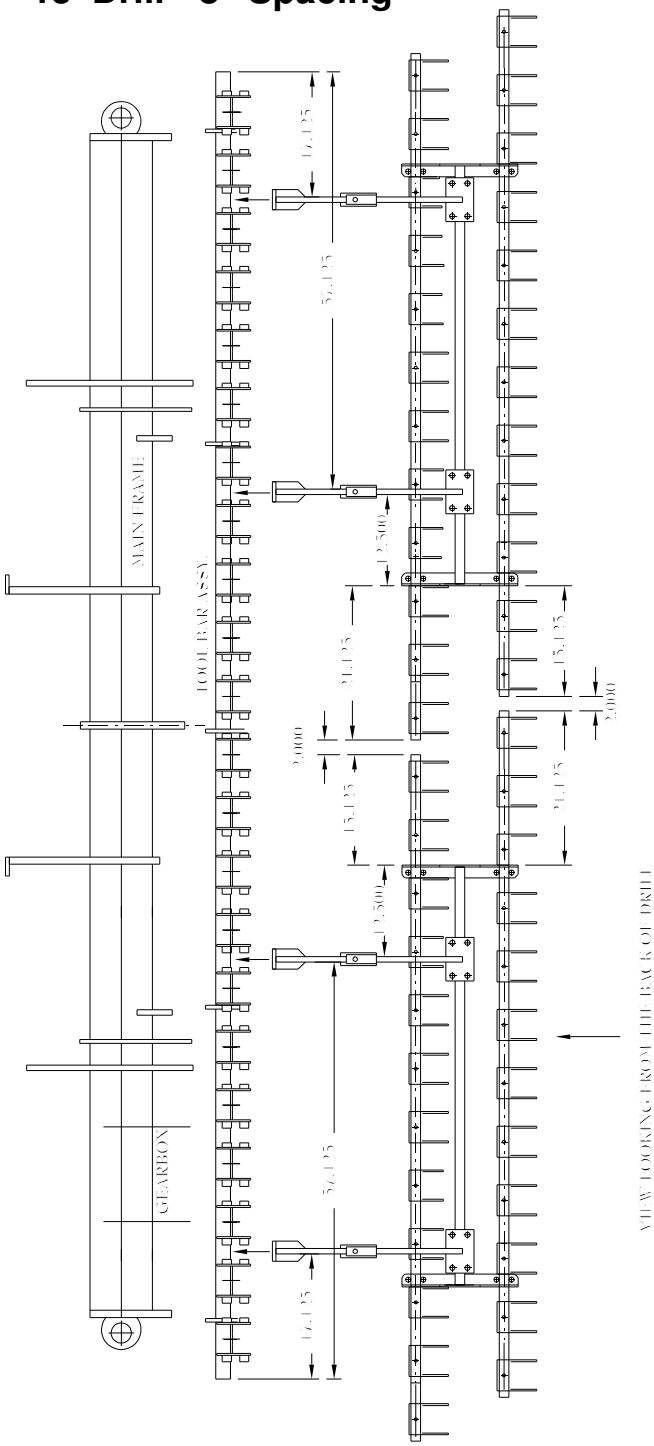


Harrow Layouts

15' Drill - 7½" Spacing

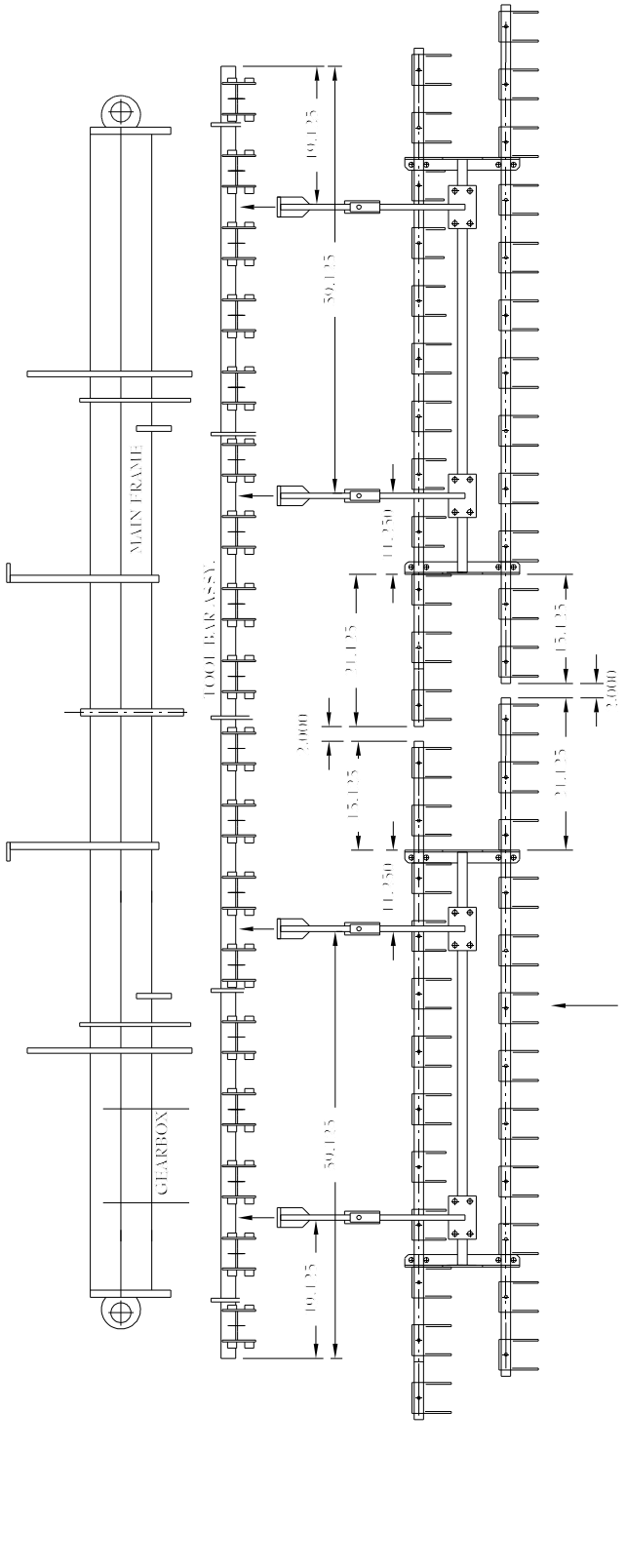


15' Drill - 8" Spacing

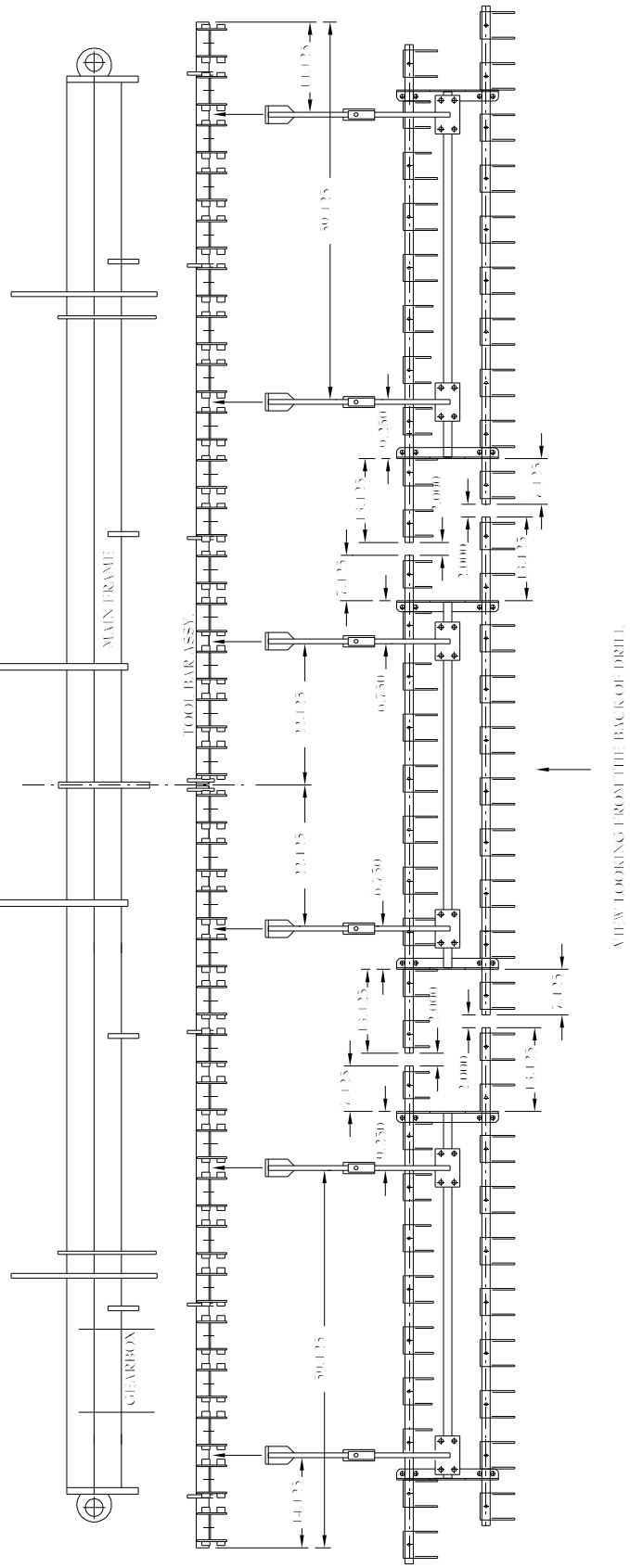


Harrow Layouts

15' Drill - 10" Spacing

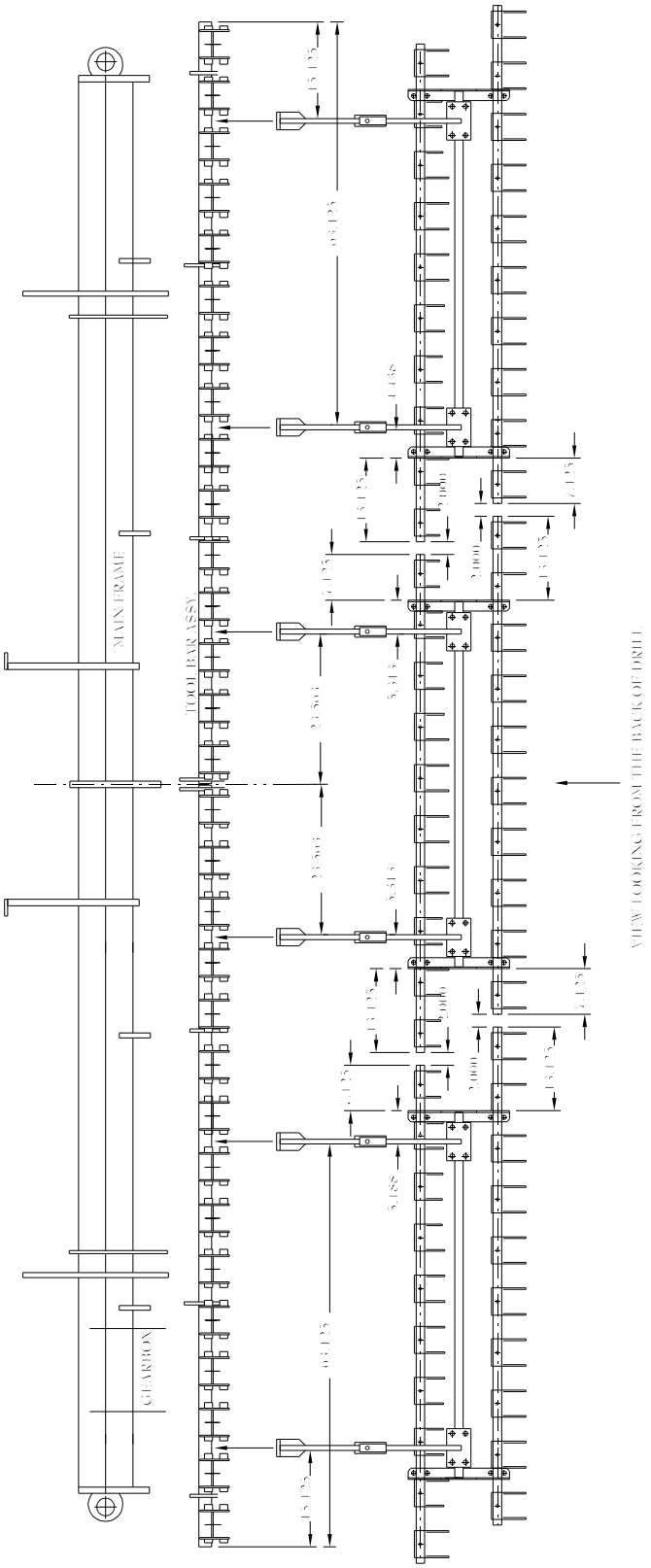


20' Drill - 7½" Spacing

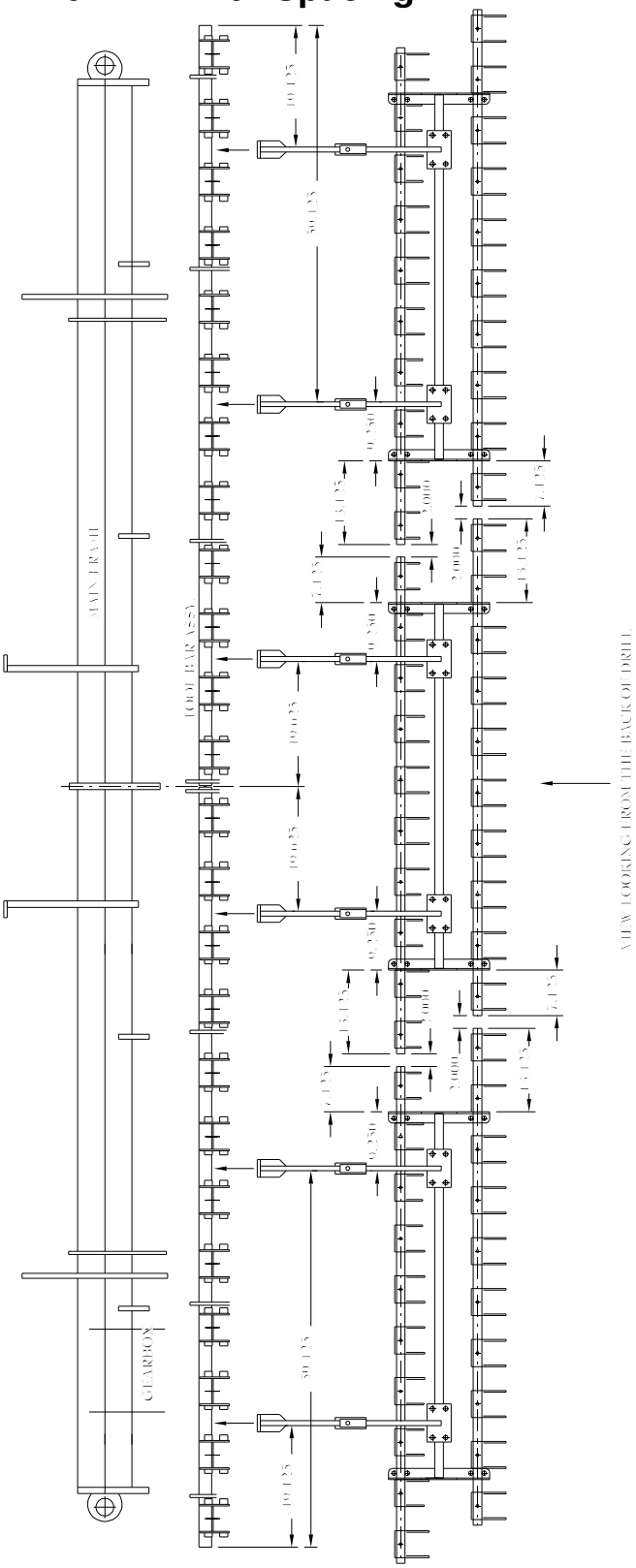


Harrow Layouts

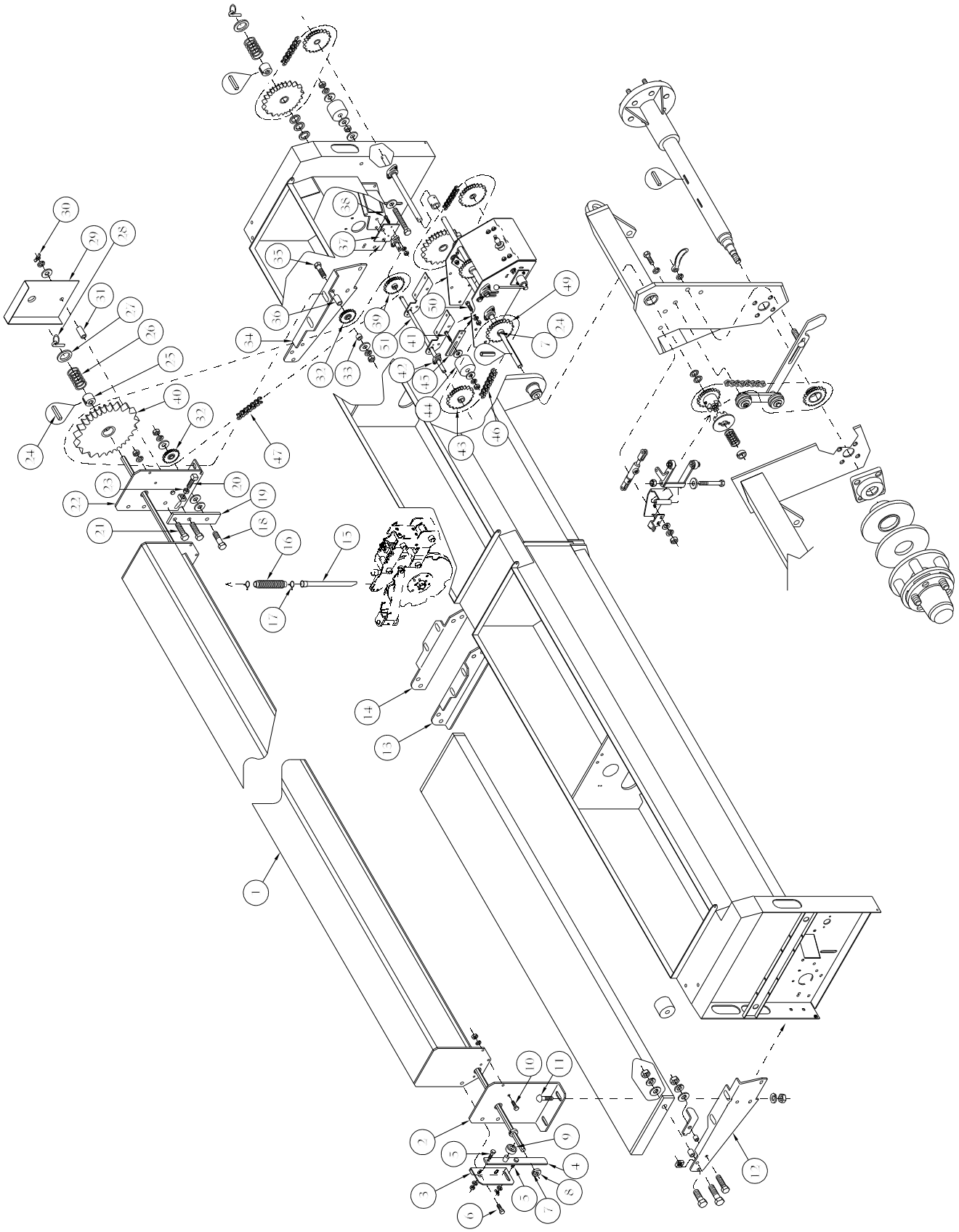
20' Drill - 8" Spacing



20' Drill - 10" Spacing



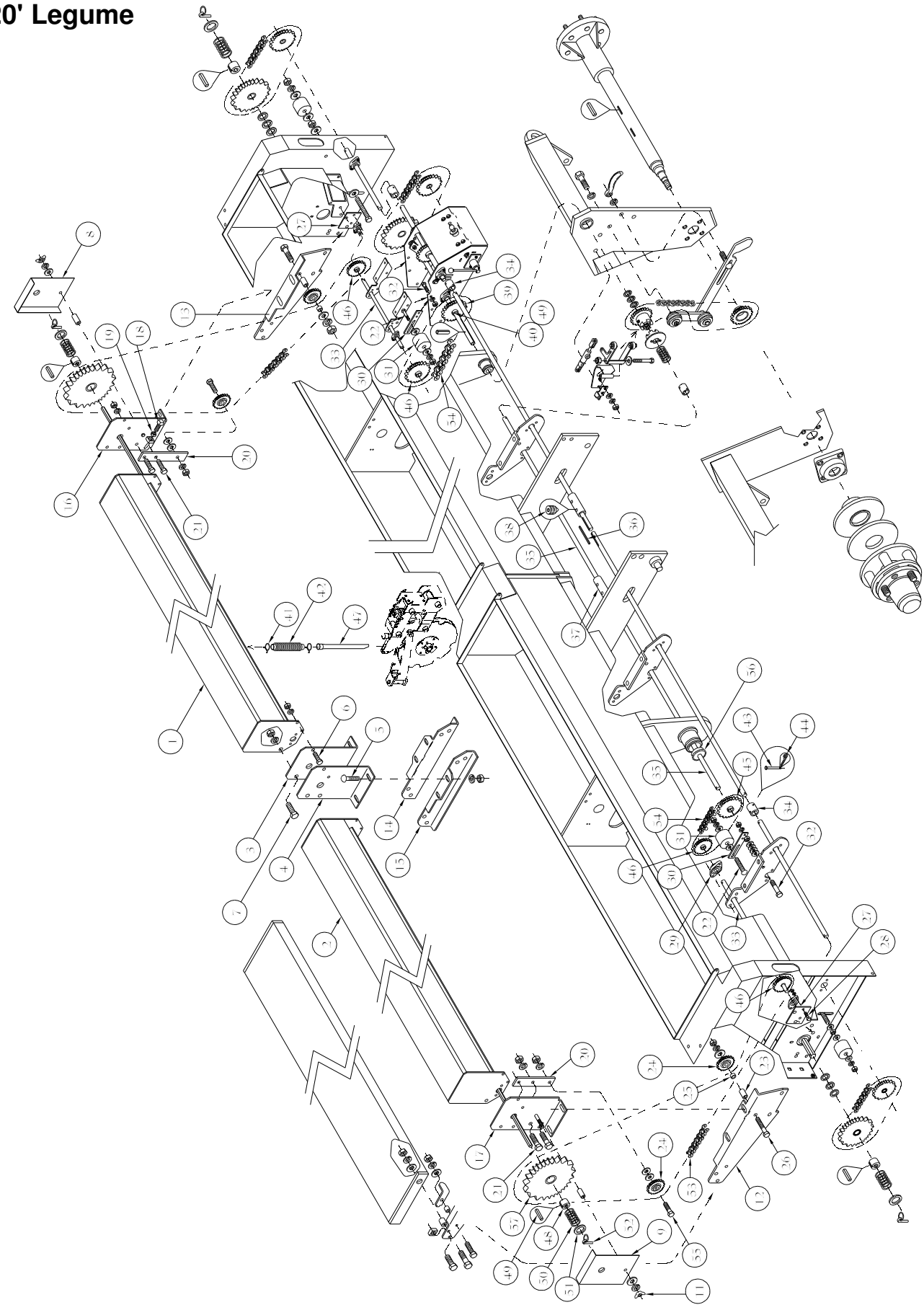
15' Legume



15' Legume

Item	Qty	Part No.	Description
1			Legume Box Assembly
	1	864934	15' x 7½"
	1	864983	15' x 8"
	1	864991	15' x 10"
2	1	215095	Legume mount Plate Right
3	1	215103	Handle Mount Plate
4	1	956565	Legume Box Handle
5	2	01017300	HHCS 3/8" x 1" Gr 5
6	2	01029800	HHCS ½" x 1" Gr 5
7	6	334516	Set Screw 1/4-28" x 1/4" Cone Point
8	2	146090	Wobble Adjustment Bushing
9	1	401042	Bearing
10	4	01144500	HHCS 5/16" x 3/4" Gr 5
11	4	01212000	Carriage Bolt ½" x 1½" Gr 5
12	1	213355	Walkboard Bracket Right Long End
13	1	213140	Walkboard Bracket Right
14	1	213298	Walkboard Bracket Left
15			Opener Tube
	24	954123	7½" Spacing
	22	954123	8" Spacing
	18	954123	10" Spacing
16			Feed Tube (59 Conv.)
	24	571091	7½" Spacing
	22	571091	8" Spacing
	18	571091	10" Spacing
17			Feed Tube Clamp
	48	600106	7½" Spacing
	44	600106	8" Spacing
	36	600106	10" Spacing
18	1	335620	HHCS 5/8" x 3" Gr 5
19	1	216630	Legume End Idler Plate
20	1	331223	Set Screw 5/8" x 1 3/4" Square Head
21	2	01180900	HHCS ½" x 1 1/4" Gr 5
22	1	956573	Legume Mount Plt Brkt Lt.
23	1	331538	Jam Nut 5/8"
24	2	602367	Key 1/4" x 1"
25	1	309062	Hex Sprocket Adapter2
26	1	500330	Spring
27	1	332528	Machine Bushing 1 1/4"
28	1	330928	Klik Pin 3/16"
29	1	257097	Legume Box Shield Plt Lt.
30	2	334847	Wing Nut 3/8"
31	1	119438	Shield Spacer Bushing
32	2	431726	Sprocket #50 13T Idler
33	1	143750	Bushing Idler 11/16"
34	1	213371	Walkboard Bracket Lt. L:ong End
35	1	334300	HHCS ½" x 3½" Gr 5
36	1	957571	Bushing Idler 1½"
37	1	215129	Legume Bearing Plate
38	6	01011600	HHCS 5/16" x 1 1/4" Gr 5
39	1	935080	Sprocket 2050 20T w/1" Bore
40	1	935106	Sprocket 2050 30T w/1" Bore
41	2	335323	Carriage Bolt ½" x 3" Gr 5
42	3	03001500	Brg 1" 2B Flange w/ LC
43	1	935098	Sprocket 2050 25T w/1" Bore
44	1	571273	Nylon Idler
45	1	184952	Idler Bracket
46	1	431833	Chain 2050 x 25 Links
47	1	432674	Chain 2050 x 57 Links
49	1	957423	Sprocket & Hub 2050 16T
50	1	331926	HHCS ½" x 2" Gr 5
51	1	309658	Legume Countershaft

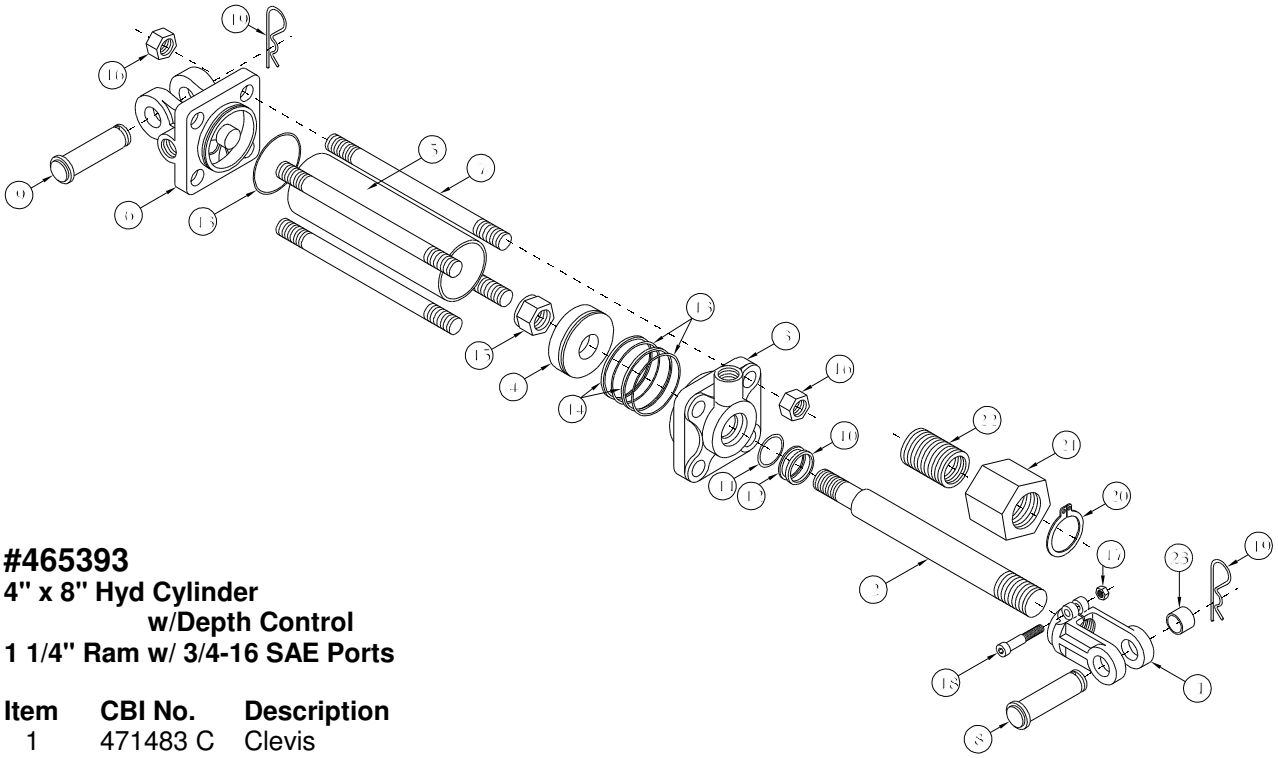
20' Legume



20' Legume

Item	Qty	Part No.	Description
1			Legume Box Assembly Lt.
	1	864926	20' x 7½"
	1	865014	20' x 8"
	1	865030	20' x 10"
2			Legume Box Assembly Rt.
	1	864918	20' x 7½"
	1	865006	20' x 8"
	1	865022	20' x 10"
3	1	215095	Legume mount Plate Right
4	1	216606	Legume Mount Plate Left
5	8	01212000	Carriage Bolt ½" x 1½" Gr 5
6	8	01144500	HHCS 5/16" x 3/4" Gr 5
7	4	01029800	HHCS ½" x 1" Gr 5
8	1	257097	Leg. Box Shield Plate Left
9	1	257527	Leg. Box Shield Plate Right
10	2	119438	Shield Spacer Bushing
11	2	334847	Wing Nut 3/8"
12	1	213355	Walkboard Bracket Right Long End
13	1	213371	Walkboard Bracket Left Long End
14	1	213140	Walkboard Bracket Right Long Center
15	1	213298	Walkboard Bracket Left Long Center
16	1	957431	Leg Mt. Plate Brkt Right
17	1	956573	Leg Mt. Plate Brkt Left
18	2	331223	Set Screw 5/8" x 1 3/4" Square Head
19	2	331538	Nut 5/8" Hex Jam
20	2	216630	Legume End Idler Plate
21	4	01180900	HHCS ½" x 1 1/4" Gr 5
22	3	335323	Carriage Bolt ½" x 3" Gr 5
23	2	143750	Bushing Idler 11/16"
24	4	431726	Sprocket 13T Idler
25	2	957571	Bushing Idler 1.5"
26	2	334300	HHCS ½" x 3 ½" Gr 5
27	2	215129	Legume Bearing Plate
28	18	01011600	HHCS 5/16" x 1 1/4" Gr 5
29	9	03001500	Bearing 1"Flange Mt.
30	2	184952	Idler Bracket
31	2	571273	Nylon Idler
32	2	331926	HHCS ½" x 2" Gr 5
33	2	309658	Legume Countershaft
34	1	150334	Adapter Sleeve
35	2	309765	Drive Shaft 75 1/2"
36	1	605683	Key 1/4" x 4 1/4"
37	1	150342	Connector Spool
38	2	01139500	Set Screw 3/8-16 x 3/8 Star Cup
39	1	957423	Sprocket 2050 16T w/1" Bore & 1/4" KW
40	2	334516	Set Screw 1/4" x 1/4" Socket Allen Head
41			Feed Tube Clamp
	64	600106	7½" Spacing
	60	600106	8" Spacing
	48	600106	10" Spacing
42			Feed Tube (59 Conv.)
	32	571091	7½" Spacing
	30	571091	8" Spacing
	24	571091	10" Spacing
43	6	335349	Clevis Pin 1/4" x 1 5/8"
44	6	337071	Cotter Pin 3/32" x ½"
45	2	935098	Sprocket 2050 25T w/1" Bore
46	2	954131	Sprocket 2050 18T w/1" Bore
47			Opener Feed Tube
	32	954123	7½" Spacing
	30	954123	8" Spacing
	24	954123	10" Spacing
48	2	309062	Hex Sprocket Adapter
49	3	602367	Key 1/4" x 1"
50	2	500330	Spring 1½"
51	2	332528	Machine Bushing 1 1/4" x 3/4" x 18 ga
52	2	330928	Klik Pin 3/16"
53	2	432674	Chain 2050 x 57 Links
54	2	431833	Chain 2050 x 25 Links
55	2	335620	HHCS 5/8" x 3" Gr 5
56	1	401000	Bearing 1" Don Dye w/o Ext. Race
57	2	954362	Sprocket 2050 44T w/1" bore

Hydraulic Cylinders



#465393
4" x 8" Hyd Cylinder
w/Depth Control
1 1/4" Ram w/ 3/4-16 SAE Ports

Item	CBI No.	Description
1	471483 C	Clevis
	471038 M	Clevis
2	461194	Rod 1 1/16" x 8"
4	461269	Piston
5	461293	Tube
6	467134	Clevis Base
7	461384	Tie Rod
8	463133	Clevis Pin
9	463133	Clevis Pin
10	460329	Seal (wiper lip type)
11	463109	O-ring
12	463042	Back-up
13	461186	O-ring
14	461277	Back-up
15	461285	Piston Nut
16	461442	Tie Rod Nut
17	460691	Clevis Nut
18	460477	Cap Screw
19	460469	Clip Pin
20	463398	Retaining Ring
21	463380	Outside Stop Collar
22	461525	Inside Stop Collar
23	466078	Bushing
	461830 C	Seal Kit
	470137 M	Seal Kit

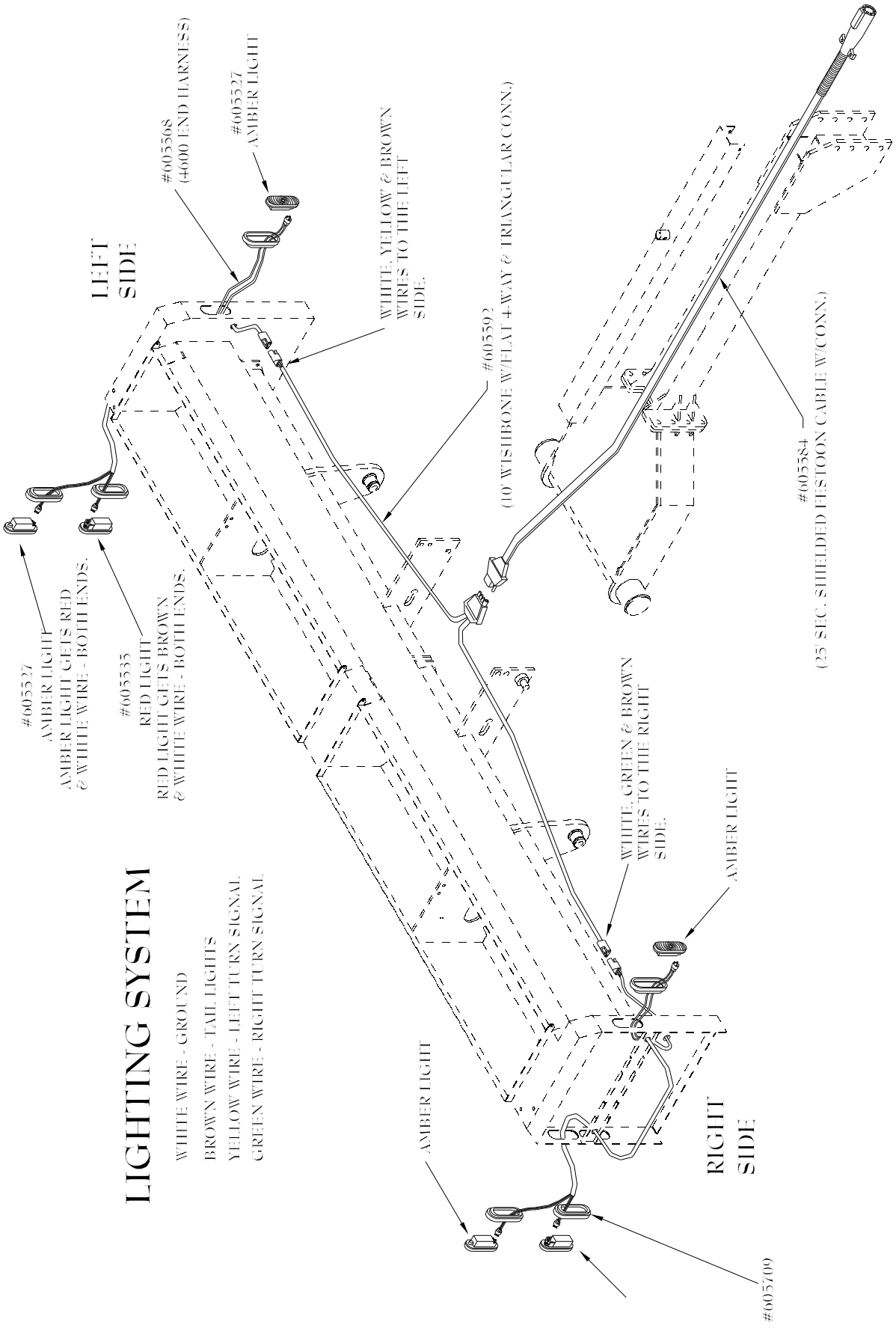
#471854
1" x 2" Hyd Cylinder
(Not Shown)

	472043	Seal Kit

#463703
2" x 8" Hyd Cylinder
w/o Depth Control
1 1/16" Ram

Item	CBI No.	Description
1	460295	Clevis
2	464420	Rod 1 1/16" x 8"
3	460626	Head
4	460683	Piston
5	460725	Tube
6	460741	Clevis Base
7	460758	Tie Rod
8	460451	Clevis Pin
9	460451	Clevis Pin
10	460634	Seal (wiper lip type)
11	460659	O-ring 2"
12	463034	Backup Washer
13	460642	O-ring 1 1/16"
14	460709	Backup Seal
15	460394	Piston Nut
16	460691	Tie Rod Nut
17	460691	Clevis Nut
18	460477	Cap Screw
19	460469	Clip Pin
	460782	Seal Kit

Light System

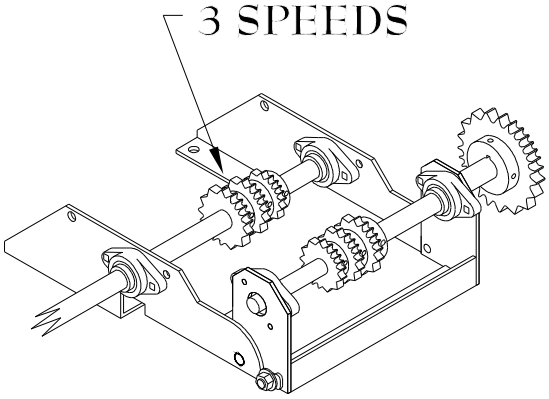


Fertilizer Unit

Fertilizer Feed Shaft Speed

Speed is determined by sprocket combinations. There are three (3) different speeds available in the fertilizer gear box along with six (6) speeds on the drive ends of the drill. See pages 60 and 61.

- Use a slow speed combination whenever possible for maximum efficiency and to minimize wear.
- Use a fast speed combination for drilling larger quantities.



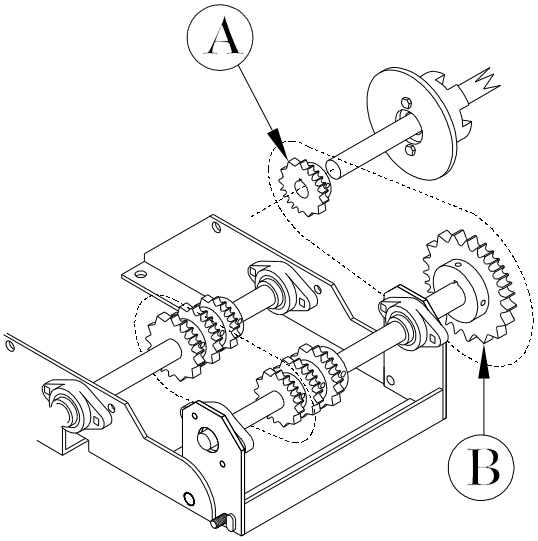
Fertilizer Drive Settings

The different types of fertilizer you apply will all have different delivery rates. Samples need to be caught to determine your particular material's delivery rate per rotor revolution in ounces per revolution.

To determine your rate, see page 61 and use example with your delivered ounces per 10 revolutions to find your rate column.

Determine how many pounds per acre you wish to apply and then find it on the chart page. Move over to the sprockets **A** through **F** on the same line to find the sprockets you need to apply the poundage you have selected. Locations of these sprockets can be found on page 60.

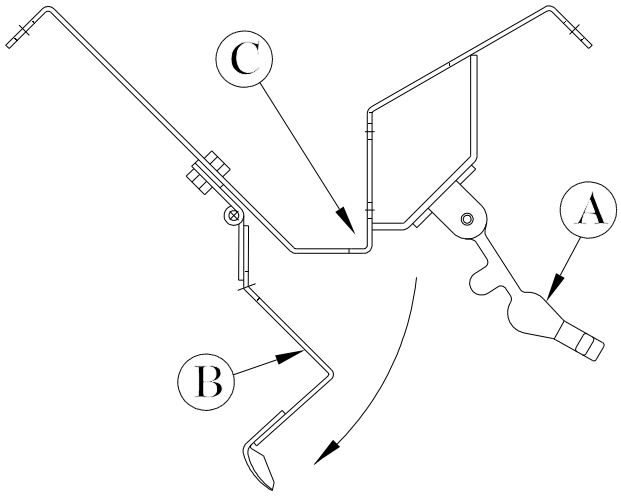
NOTE: When you are not distributing fertilizer, remove the chain between the 14 tooth sprocket **A** and the 40 tooth sprocket **B**.



Cleaning Fertilizer Box

- Release all door latches **A** to drop both bottom doors **B** as shown.
- Clean out fertilizer through clean out holes **C**.
- Relatch fertilizer doors.

IMPORTANT:
If drill is not used for several days, empty and clean out thoroughly. Fertilizer can corrode. Coat the box with diesel fuel but do not allow fuel to come in contact with the rubber seed tubes.



Fertilizer Unit Storage

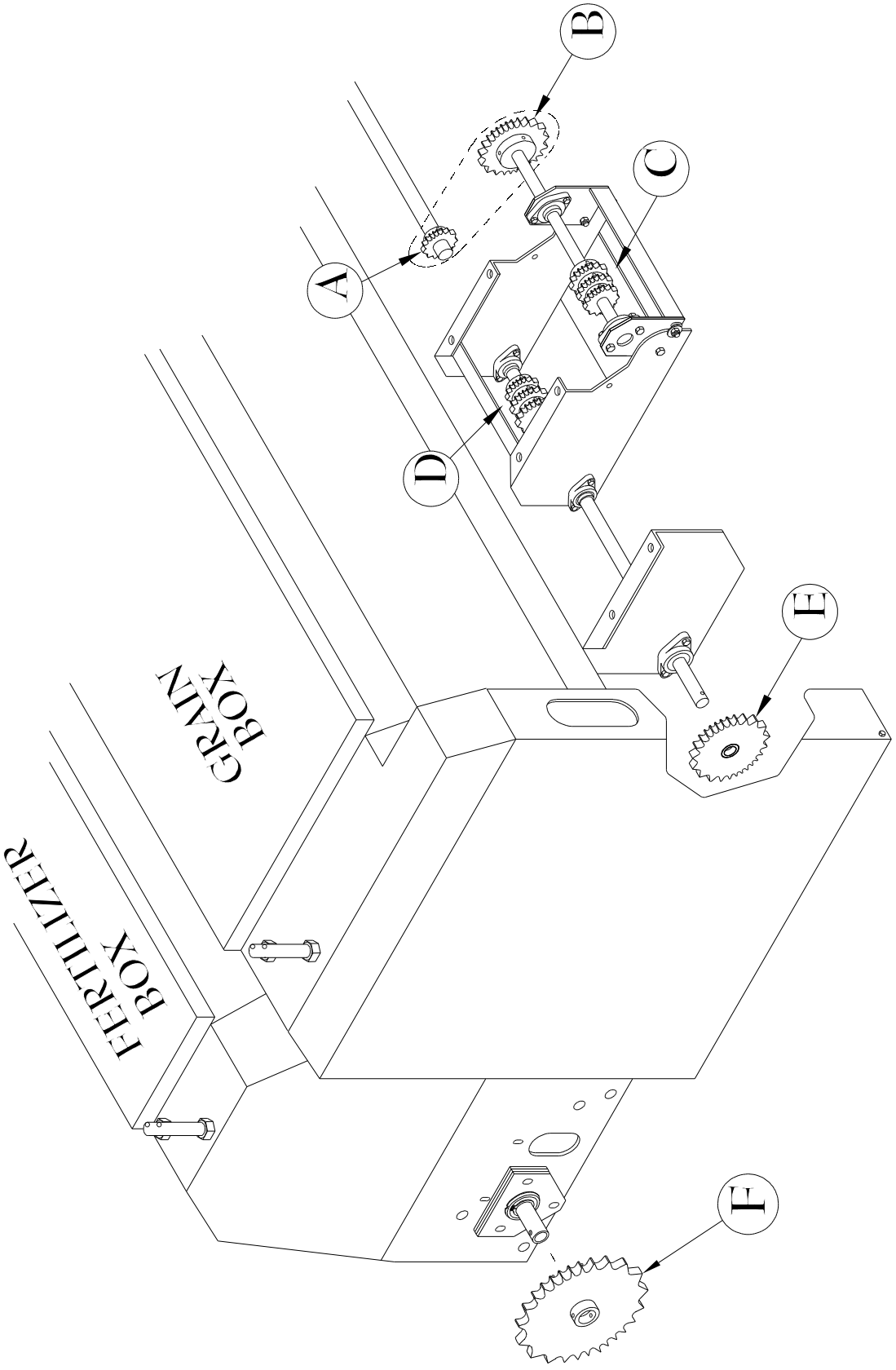


CAUTION:
Be careful when using diesel fuel so that it does not ignite. Serious injury or death to you or others can result. Use only in well ventilated areas away from any sparks or flames.

IMPORTANT:
DO NOT allow diesel fuel (or any other petroleum product) to come in contact with the rubber tubes as it will cause deterioration.

1. Locate a flat level surface to store drill, then follow safe detaching procedures.
2. Store in transport position with lift cylinder lockouts in place.
3. If setting drill on ground, place a wood board under openers so that openers do not penetrate the ground. Lower openers and remove pressure from hydraulic system.
4. Coat opener disks with oil or grease. Then lower on to board for storage.
5. Open the feed cups to their largest or wide open setting. Jack the drill up and rotate the drive wheel to remove any material left in the cup rotors.
6. Paint all bare metal and rust spots. Matching paint can be ordered from your local CrustBuster dealer.
7. Spray all moving parts with diesel fuel or lubricating oil. Move adjuster lever back and forth while spraying. Spray each feed cup, inside and outside. Work the adjustment levers back and forth while spraying. The cost of the fuel or oil is insignificant, when the alternative is considered.
8. For drills that have used fertilizer and/or treated seed (both highly corrosive materials), coat the entire box, inside and outside, with diesel fuel. DO NOT allow fuel to contact rubber seed tubes.
9. Lubricate the drill. See lubrication, maintenance, and service page.
10. Clean chains with diesel fuel. Apply new oil before storing the drill.
11. For row markers, if drill is stored with the cylinder rod extended, apply light coat of grease to exposed area of rod.

4615 Sprocket Locations
Fertilizer Unit



Fertilizer Box Capacity 21¼ bushels per box				REFER TO NOTE BELOW TO DETERMINE RATE, THEN REFER TO THIS CHART. Fertilizer delivery rate per revolution determined from sample of material you will apply of:				
Sprockets				.55 oz of fertilizer per rotor revolution will yield application rate in lb/acre of:	.6 oz of fertilizer per rotor revolution will yield application rate in lb/acre of:	.65 oz of fertilizer per rotor revolution will yield pplication rate in lb/acre of:	.7 oz of fertilizer per rotor revolution will yield application rate in lb/acre of:	.75 oz of fertilizer per rotor revolution will yield application rate in lb/acre of:
A B	C D	E F						
14 40	14 21	18 44		28	30	33	35	38
14 40	15 20	18 44		31	34	37	40	43
14 40	16 19	18 44		35	38	41	45	48
14 40	14 21	18 30		41	44	48	52	55
14 40	15 20	18 30		46	50	54	58	62
14 40	16 19	18 30		51	56	61	65	70
14 40	14 21	25 30		56	62	67	72	77
14 40	15 20	25 30		64	69	75	81	87
14 40	16 19	25 30		71	78	84	91	97
14 40	14 21	30 25		81	89	96	104	111
14 40	15 20	30 25		92	100	108	116	125
14 40	16 19	30 25		103	112	121	131	140
14 40	14 21	30 18		113	123	134	144	154
14 40	15 20	30 18		127	139	150	162	173
14 40	16 19	30 18		143	156	169	182	195
14 40	14 21	44 18		166	181	196	211	226
14 40	15 20	44 18		186	203	220	237	254
14 40	16 19	44 18		209	228	247	266	285

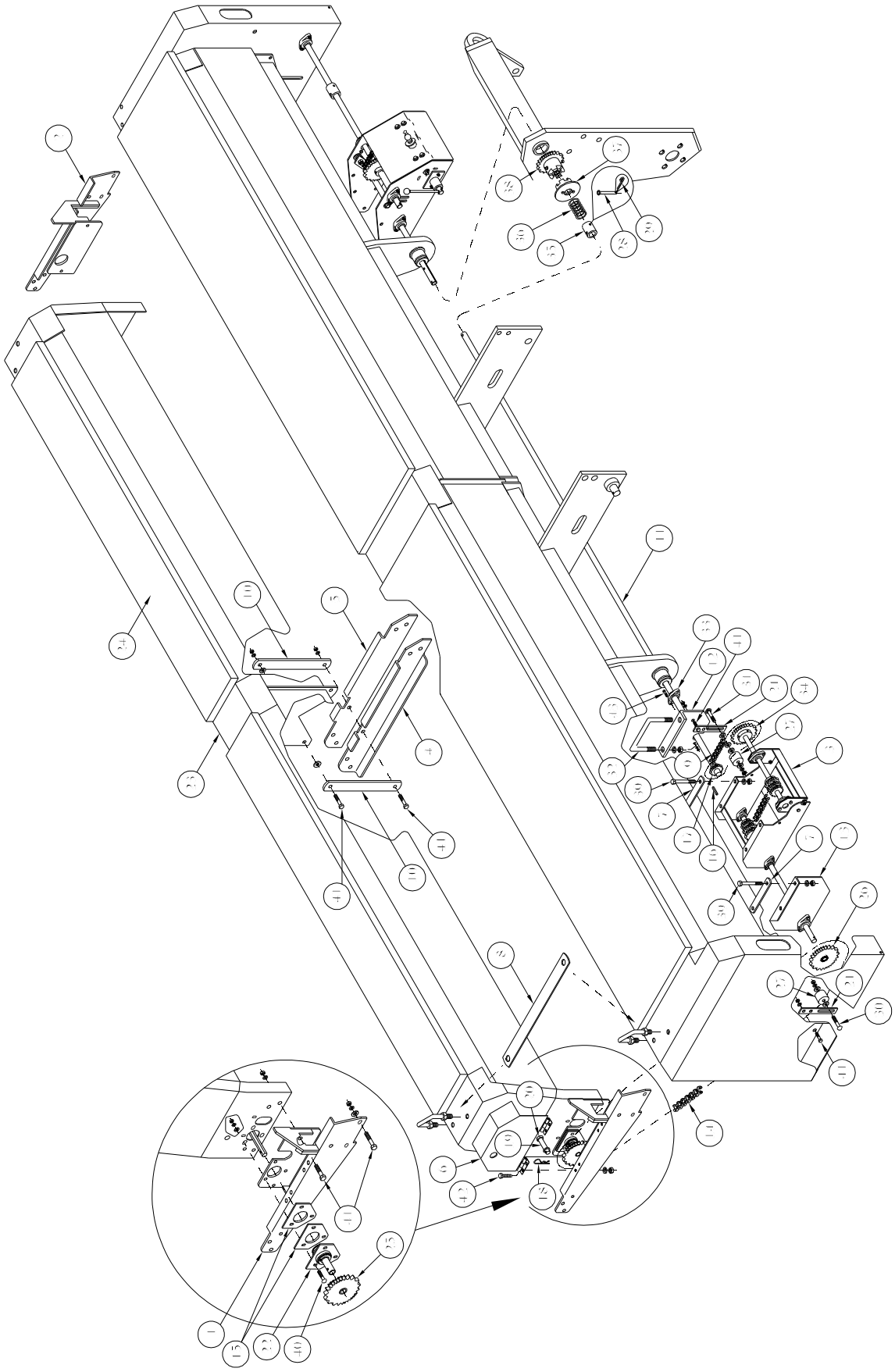
NOTE: **The different types of fertilizer you apply will all have different delivery rates. Samples need to be caught to determine your particular material's delivery rate per rotor revolution in ounces per revolution. A minimum of 10 turns is recommended because of the small amounts involved.**

Example: If 10 revolutions from one cup delivers 6.5 ounces, divide 6.5 by 10 to find ounces per revolution.

6.5 ÷ 10 = .65

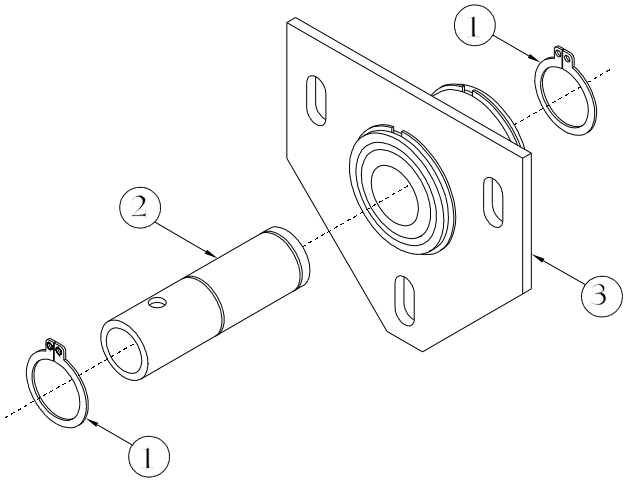
Refer to chart using the column for .65 ounces.

4615 Drive Assembly
Fertilizer Unit



4615 Drive Assembly
Fertilizer Unit

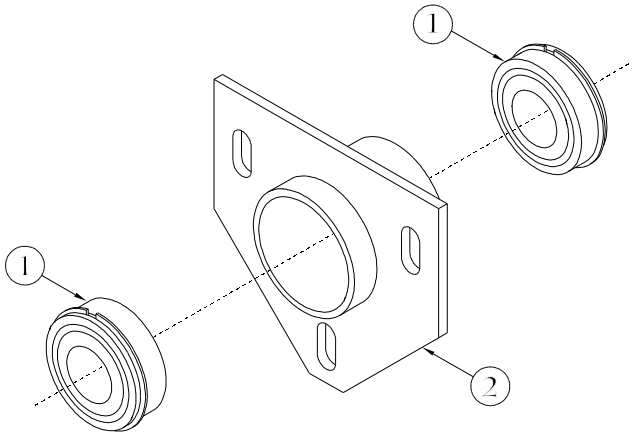
Item	Part No.	Description
1	960732	Walkboard Mount Right
2	960740	Walkboard Mount Left
3	867754	Gearbox
4	220566	Walkboard Brkt Center Plt Right
5	220574	Walkboard Brkt Center Plt Left
6	960757	Shield
7	220731	Backing Plate
8	259648	Box Strap
9	433052	Chain Assy #40 x 71P Complete
10	220723	Center Walkboard Strap
11	310540	Drive Shaft
12	220699	Bearing Plate
13	220665	Bearing Hanger Plate
14	432674	Chain 2050 x 57 links
15	220467	Bearing Assy Spacer Plate
16	10490100	Key 1/4" x 1 1/4"
17	433037	Sprocket #40 14T
		1/2" Pitch Cone Pt Set Screw
18	330860	Hair Pin 5/32"
19	958363	Shield Latch Pin
20	330985	Hex Jam Nut 3/4"
21	184952	Idler Plate
22	866442	Drive End Bearing Bracket Assy
23	959213	Welded Fertilizer Box
24	957928	Fertilizer Box Lid
25	935106	Sprocket 30T w/1" bore
26	935098	Sprocket 25T w/1" bore
27	571273	Nylon Idler
28	335349	Clevis Pin 1/4" x 1 5/8"
29	337071	Cotter Pin 3/32" x 1/2"
30	333310	Carriage Bolt 1/2" x 3 1/2"
31	335323	Carriage Bolt 1/2" x 3"
	330159	Flat washer 1/2"
	330142	Lock washer 1/2"
	330134	Hex nut 1/2"
32	334185	U-bolt 3/4" x 6" x 5 1/2"
	330332	Lock washer 3/4"
	330290	Hex nut 3/4"
33	03001500	Bearing 1" 2B Flange w/lock collar
34	433003	Sprocket 40T RC40
35	150334	Adapter Sleeve
36	501031	Spring
37	860825	Clutch Throw-out Assembly
38		Drive Clutch Sprocket Assy
	863795	7 ½" & 10" Spacing
	863787	8" Spacing
39	332007	HHCS 5/8" x 5 1/2"
	330878	Lock washer 5/8"
	330571	Hex nut 5/8"
40	337766	Carriage Bolt 5/16" x 2 1/4"
	330852	Flat washer 5/16"
	330845	Lock washer 5/16"
	330811	Hex nut 5/16"
41	01180900	HHCS 1/2" x 1 1/4"
	330142	Lock washer 1/2"
	330134	Hex nut 1/2"
42	01144500	HHCS 5/16" x 3/4"
	330845	Lock washer 5/16"
	330811	Hex nut 5/16"
43	01010800	HHCS 5/16" x 1"
	330845	Lock washer 5/16"
	330811	Hex nut 5/16"



Drive End Bracket & Bearing

#866442

Item	Part No.	Description
1	605766	External Snap Ring
2	310235	Seed Shaft Drive Adaptor
3	866434	Drive End Bracket/Brg Assy

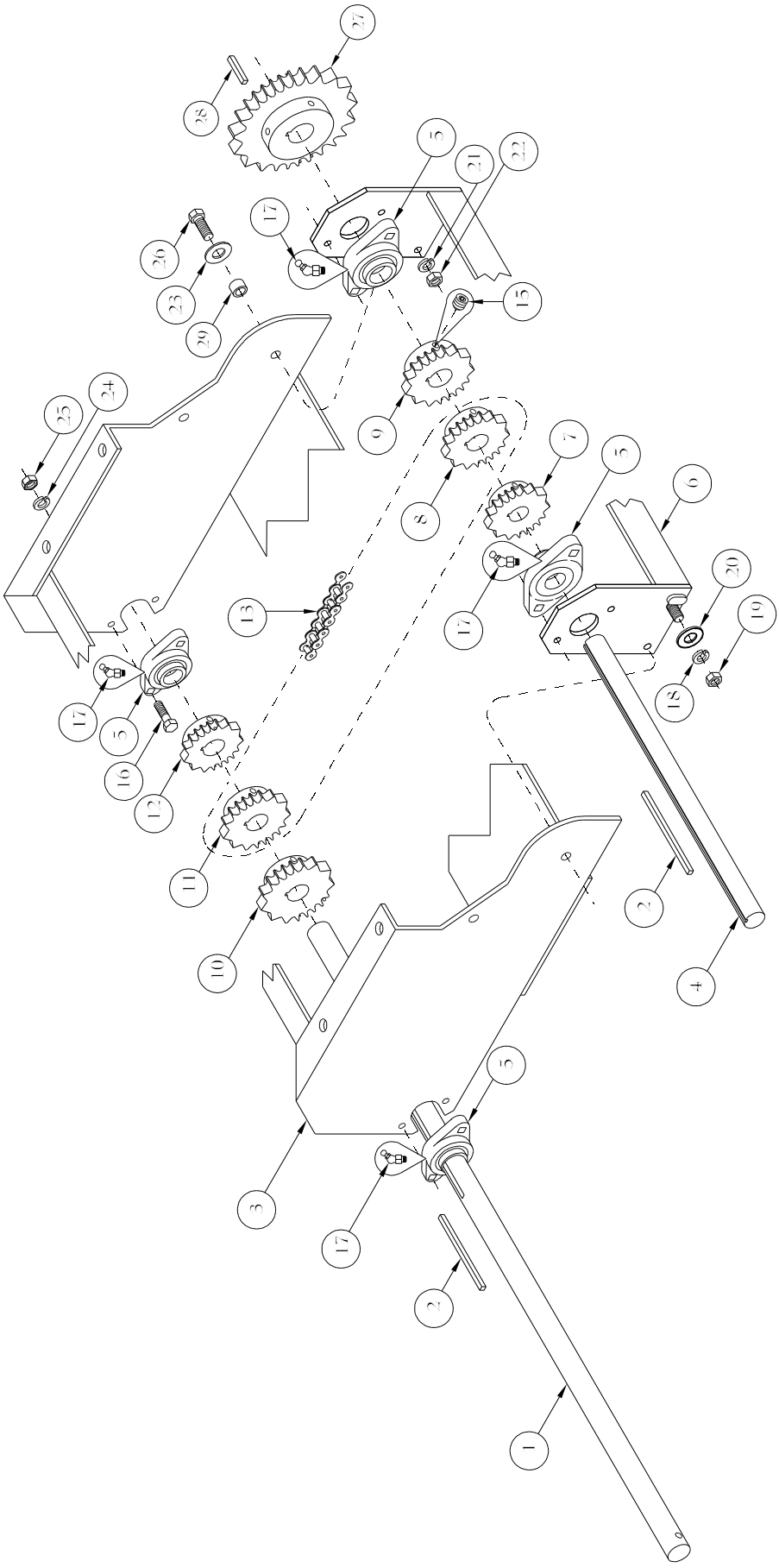


Drive End Bracket

#866434

Item	Part No.	Description
1	03003100	Bearing 1" w/Spring
2	959130	Drive End Bracket

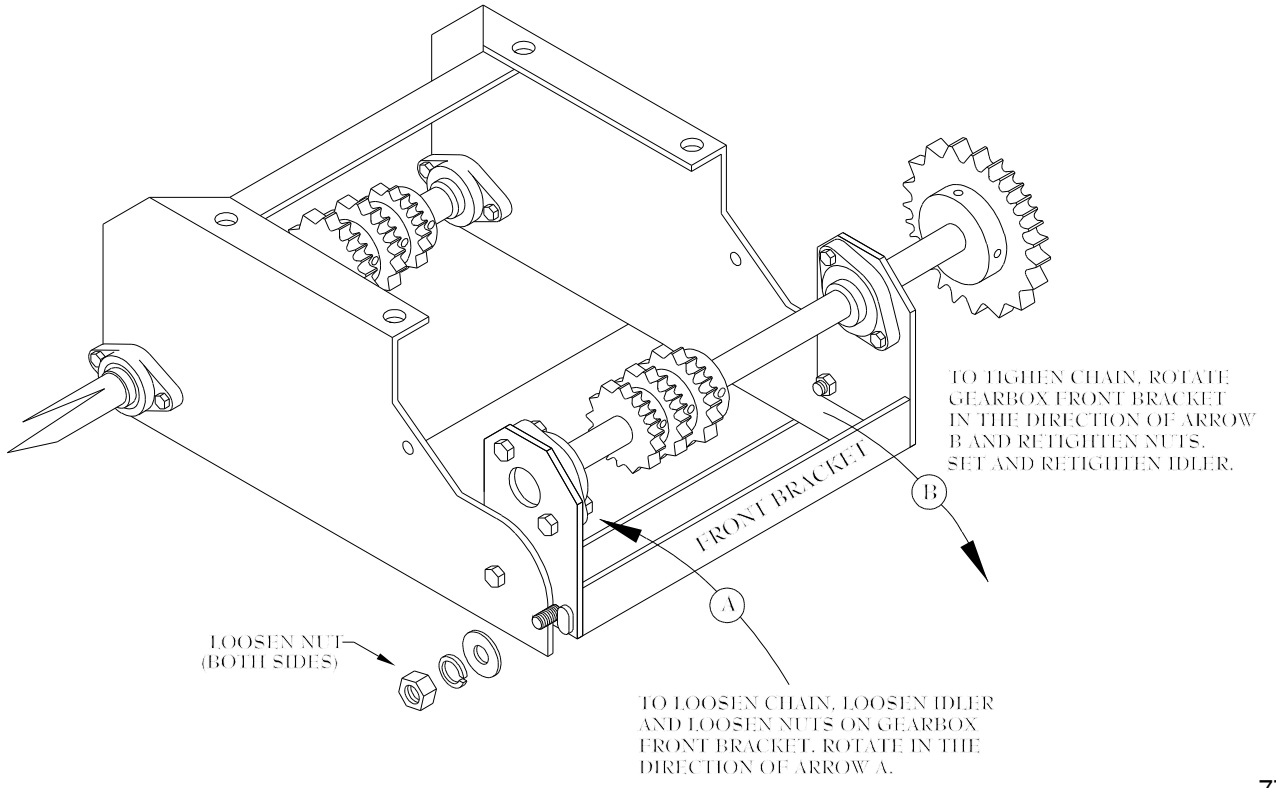
4615 Gear Box
Fertilizer Unit



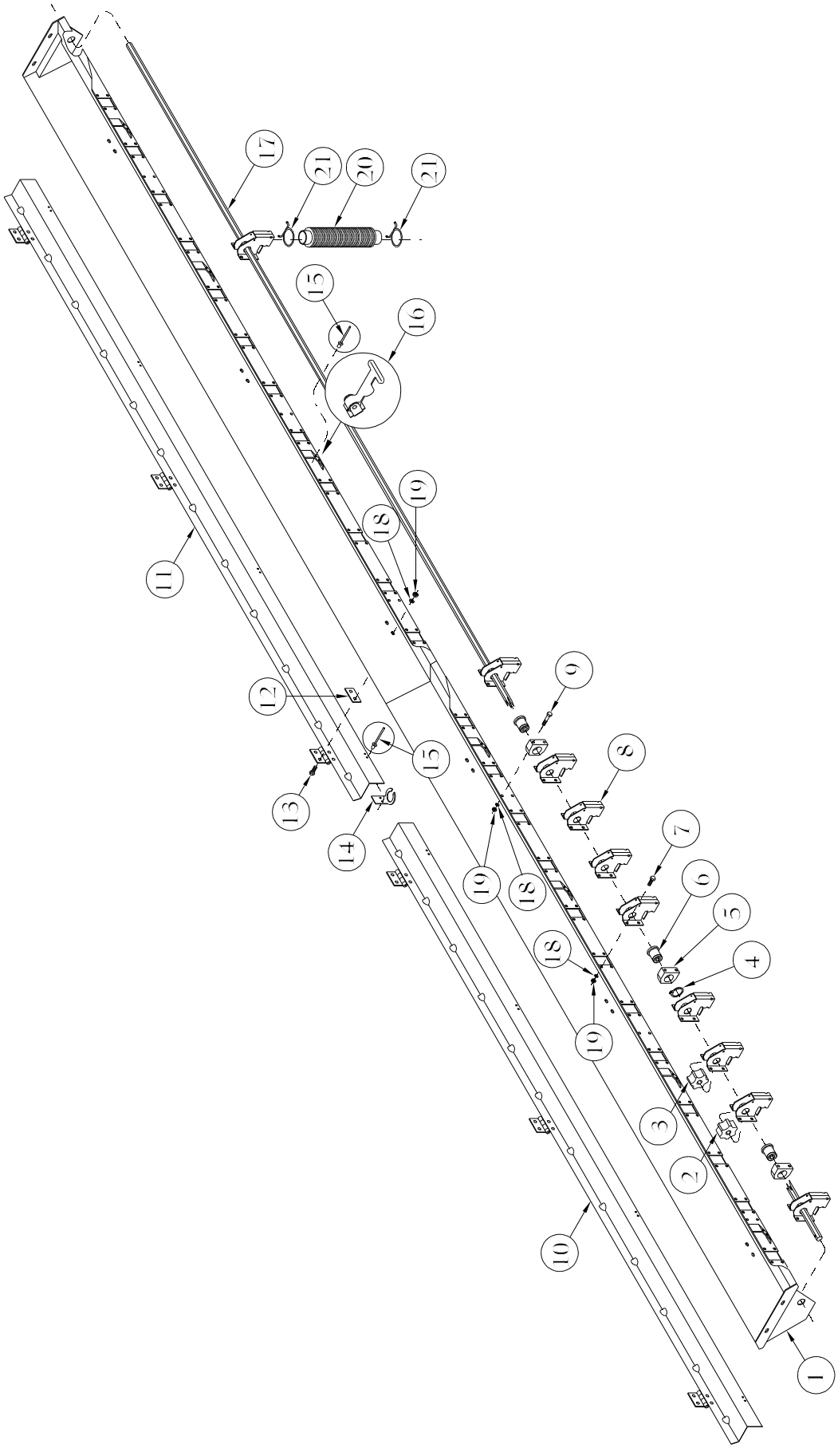
4615 Gear Box
Fertilizer Unit

Item	Part No.	Description
1	309039	Box End Drive Shaft
2	220616	Key 1/4" x 1/4" x 3 1/2"
3	960724	Fertilizer Gear Box
4	310524	Fertilizer Drive Shaft
5	03001500	Bearing 1" Flange Mount
6	960682	Fertilizer Gear Box Front Bracket
7	432948	Sprocket 14T RC Non-Stock 1/2" Pitch
8	432955	Sprocket 15T RC Non-Stock 1/2" Pitch
9	05237300	Sprocket 16T RC Non-Stock 1/2" Pitch
10	432997	Sprocket 21T RC Non-Stock 1/2" Pitch
11	432989	Sprocket 20T RC Non-Stock 1/2" Pitch
12	432971	Sprocket 19T RC Non-Stock 1/2" Pitch
13	433045	Chain Assy #40 x 91 Pitches Complete
15	01100700	Set Screw 5/16" x 5/16"
16	01011600	HHCS 5/16" x 1 1/4"
17	01162700	Zerk 1/4-28" x 45°
18	330142	Lock Washer 1/2"
19	330134	Hex Nut 1/2"
20	330159	Flat Washer 1/2"
21	330043	Lock Washer 3/8"
22	330035	Hex Nut 3/8"
23	330894	Flat Washer 3/8"
24	330845	Lock Washer 5/16"
25	330811	Hex Nut 5/16"
26	01158500	HHCS 3/8" x 1 1/4"
27	433003	Sprocket 40T RC Non-Stock 1/2" Pitch
28	10490100	Key 1/4" x 1 1/4"
29	149393	Spacer

Fertilizer Gear Box
Chain Tightening Instructions



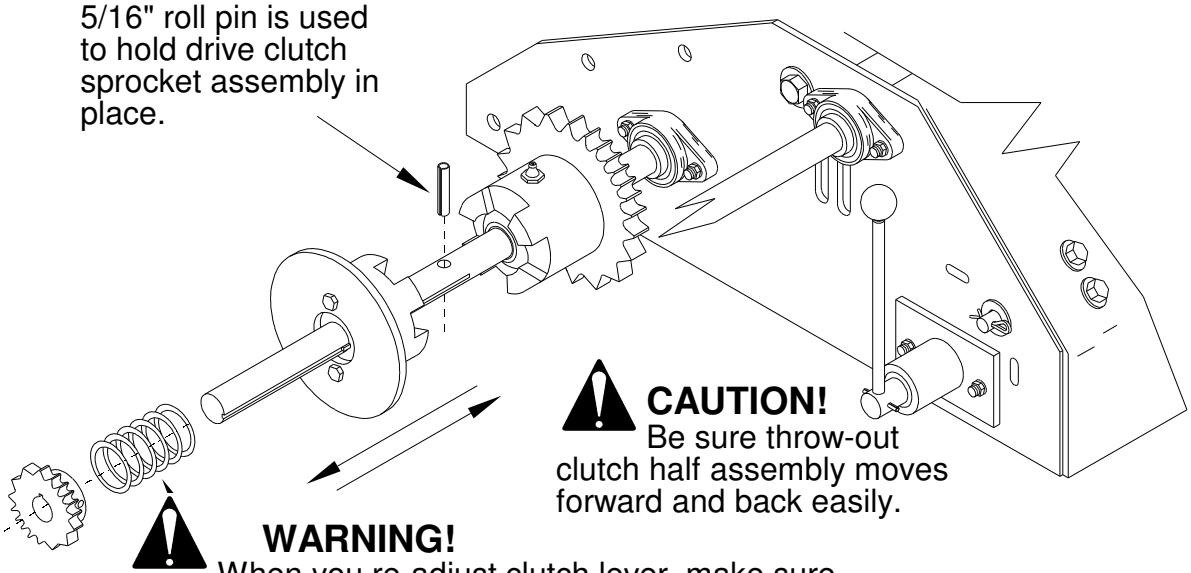
4615 Box Bottom Assembly
Fertilizer Unit



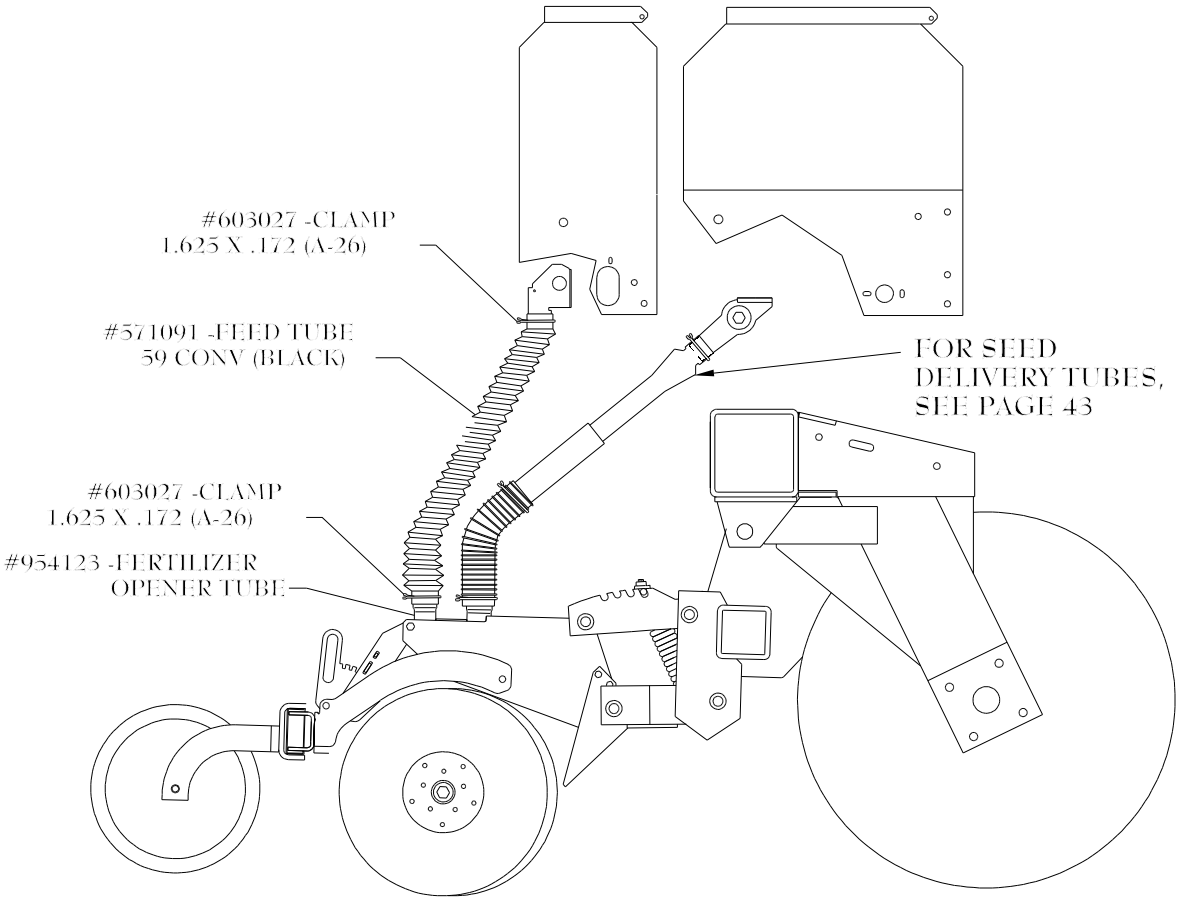
4615 Box Bottom Assembly
Fertilizer Unit

Item	Part No.	Description
		Box Bottom Assemblies
	867598	30' x 7½"
	867614	30' x 8"
	867697	30' x 10"
1		Box Bottom Weldment
	960633	30' x 7½"
	960641	30' x 8"
	960658	30' x 10"
2	571240	Nylon Fertilizer Rotor
3	571257	Nylon Fertilizer Rotor
		30° Hex Rotation
4	605766	External Snap Ring
5	571232	Fertilizer Bearing
6	310508	Fertilizer Hex Bearing Shaft
7	01245000	HHCS 1/4" x 1/2" SS
8	960625	Fertilizer Cup Weldment
9	337741	HHCS 1/4" x 2" SS
10	960690	Fertilizer Door Left
11	960708	Fertilizer Door Right
12	259523	Door Hinge Spacer Plate
13	02226900	HHCS 1/4" x 3/4" SS
14	570341	Lid Latch
		(Includes hook #16)
15	601989	Pop Rivet 3/16" x 1/4" Aluminum
16	570341	Lid Latch Hook
		(Includes latch #14)
17	310532	Hex Shaft 5/8" x 171"
18	337550	Lock Washer 1/4" SS
19	01507300	Hex Nut 1/4" SS
20	571091	Feed Tube 59 Convolutions
21	603027	Hose Clamp 1 5/8" x 11/64"

Clutch Half & Drive Clutch Assembly
to Gear Box for Fertilizer



4600 All Plant Feed Tubes
Fertilizer Unit



Problem	Solution
Reached limits on depth quadrant	Reposition top bolt in depth quadrant to remaining hole (up or down). Level drill front to back.
Unable to penetrate hard ground	Increase down pressure. Add weight to frame or suitcase weights to the weight bracket.
Press wheels ineffective	Add weight to frame or suitcase weights to the weight bracket. Level drill front to back with adjustable screw or hydraulic tongue cylinder.
Hairpinning residue	Residue tough due to wet soil or damp air. Wait for better conditions. Reduce speed (recommended speed 4-6 m.p.h.)
Opener pitching excessive dirt from seed zone.	Soil too damp. Wait for better conditions. Reduce speed.
Trash plugging ahead of openers	Remove nosepieces to avoid catching long pieces of residue.
Openers pushing and plugging in minimum tillage or conventional	Loose residue in loose soil may require less down pressure. Reduce pressure. Remove spring. Till at shallower depth. Firm soil with packer or roller.
Unable to hold depth in worked soil	Till at shallower depth. Use wider press wheels for more surface contact.

CrustBuster
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