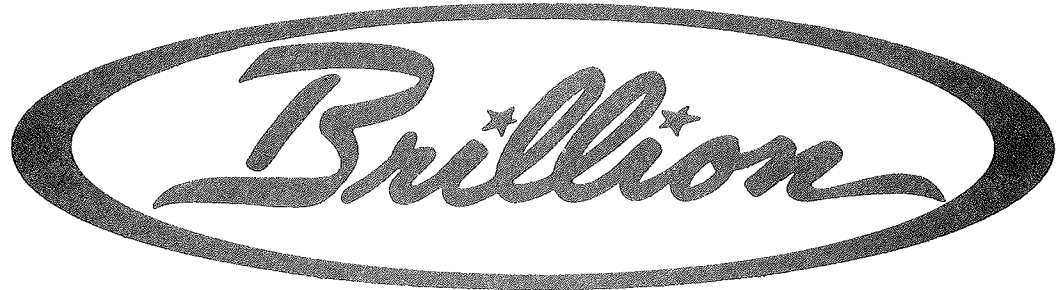


OPERATOR'S MANUAL

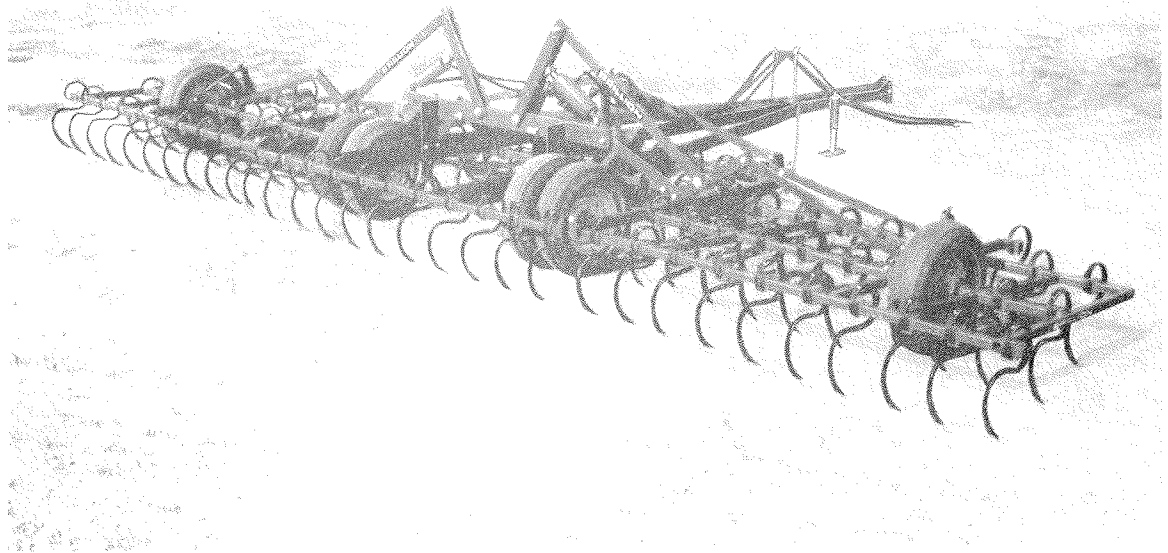
FOR



HYDRA-LIFT

SPRING TOOTH HARROW HSD 360

SPRING TINE HARROW HSDS 360



BRILLION IRON WORKS
BRILLION, WISCONSIN 54110
A DIVISION OF BEATRICE FOODS CO.



TABLE OF CONTENTS

	Page
Introduction	3
Machine Specifications	3
Safety Suggestions	4
Setting Up Instructions	
Shipping Bundles	5
Hardware	6
Frame Assembly & Drawbar	7
Drawbar Braces & Jack	10
Wing Assembly	12
Attaching Wings To Center Frame	12
Wing Lift Mechanism	12
Attaching Hydraulic Hoses	12
Wing Gage Wheels	14
Travel Link Straps	15
Attaching Teeth/Tines	15
Replacing Tooth Points	15
Tooth Spacing	16, 17, 18, 19
Operating Instructions	
Depth Control	20
Leveling the Harrow	20
Operating the Harrow	20
Transporting the Harrow	20

SETTING UP & OPERATING INSTRUCTIONS

HSD 360
HSDS 360

SPRING TOOTH HARROW
SPRING TINE HARROW

INTRODUCTION

Your Brillion Spring Tooth Harrow is built with the best materials and workmanship available. It has been designed to give years of low maintenance, trouble free operation. Proper operation and care of the machine will insure the service and long life built into it.

Study this manual carefully before attempting to assemble or operate the machine.

MACHINE SPECIFICATIONS

Machine Weight:

HSD-360	- - - - -	3650# (Includes Tires & Cylinders)
HSDS-360	- - - - -	3520# (Includes Tires & Cylinders)
Overall Width	- - - - -	30'2"
Transport Width	- - - - -	14 Feet
Transport Height	- - - - -	12 Feet 8 Inches
Road Clearance	- - - - -	9 Inches
Tooth Spacing	- - - - -	4 Inches & 6 Inches
Working Depth	- - - - -	1 Inch to 6 Inches
Transport Wheels	- - - - -	15"-5 Bolt 7.60-15 Tires Recommended
Wing Gage Wheels	- - - - -	15"-4 Bolt 6.40-15 Tires Recommended
Wing Fold	- - - - -	Two 8" Stroke Hydraulic Cylinders (Provided w/Machine)
Transport Cylinder	- - - - -	Standard 8" Ag Hydraulic Cylinder With Depth Stop Required (Not Provided with Machine)
3J-865	- - - - -	Smoothener Kit (Optional)

SAFETY SUGGESTIONS



This safety alert symbol is used to call your attention to instructions concerning your personal safety. Federal law requires you to explain the safety and operating instructions furnished with this machine to each employee before they are allowed to operate the machine. These instructions must be repeated to the employee at the beginning of each use season. Be sure to observe and follow these instructions for your and your employee's safety.

Do not stand between tractor and implement when attaching or detaching implement unless both tractor and implement are not moving.

Do not make adjustments or lubricate machine while it is in motion.

Do not allow anyone to ride on tractor or machine.

Relieve pressure in hydraulic lines before uncoupling hydraulic hoses from tractor.

When not in use, lower the machine and wings to the ground.

Block machine so that it will not roll when disconnected from tractor.

Do not transport at speeds over 20 MPH.

Always use transport pins when transporting the machine. One transport pin locks the transport axle to the frame. Each wing is also locked in the folded position using a transport pin.

Bleed all hydraulic lines before raising the wings completely.

Be sure the flow restrictor is installed in the base end of the wing raising cylinders as detailed in the setting up instructions.

Keep others away from the machine when raising and lowering wings.

Whenever transporting farm implements on public roads it is the responsibility of the operator to abide by state and local laws concerning wide loads, speed, safety emblems, and safety lighting equipment.

The tractor drawbar must be locked into a fixed position when transporting the harrow.

LOCATION REFERENCE

"Right" and "Left", "Front" and "Rear" refer to the operator's "Right" and "Left", and "Front" and "Rear" when he faces in the same direction that the machine will travel.

SETTING UP INSTRUCTIONS

SHIPPING BUNDLES

Your Brillion Harrow is shipped in assemblies and shipping bundles. Check to make sure that you have all the required bundles.

<u>Assembly No.</u>	<u>Name All Models</u>	<u>No. Used</u>
6D-582	Center Frame	1
3J-168	Axle Assembly	1
4J-126	Wing - R. H.	1
4J-127	Wing - L. H.	1
4J-128	Gage Wheel - R. H.	1
4J-129	Gage Wheel - L. H.	1
4J-501	Lift Link Bundle	1
4J-130	Cross Frame	1
4J-131	Drawbar	1
4J-132	Truss Brace Bundle	1
4J-133	Wing Lift Support Bundle	1
4J-134	Lift Arm Bundle	1
4J-555	Bag Assembly	1
4J-135	Wing Lift Strap Bundle	1
6D-668	Hitch Plate Bundle	1
6D-670	Tongue Brace Bundle	1
8D-398	Jack Mount Brace	1
6D-705	Inner Tongue Brace	1
4J-137	Box Assembly	1
4J-179	Box Assembly	1
6D-724	Hydraulic Cylinder	2
5C-916	Wheel (4 Bolt)	2
4C-129	Wheel (5 Bolt)	4
	HSD-360 Only	
6D-707	Box Assembly	1
6D-957	Box Assembly	1
6D-341	Spring Tooth	87
	HSDS-360 Only	
2J-228	Box Assembly	1
2J-233	Box Assembly	2
2J-234	Box Assembly	1
2J-325	Box Assembly	1
1J-887	Spring Tine	87

HARDWARE

Most of the hardware required in the assembly of your harrow is packaged in separate plastic bags. The number stamped on the bag will tell you which piece of hardware is contained in the bag. The remaining hardware is packaged loosely in boxes or it is used to assemble some of the shipping bundles.

<u>Bag Number</u>	<u>Hardware Description</u>	<u>Part No.</u>
4J-572, 4J-573, 4J-579	Cultivator Bolt 3/8 x 1-1/2	7D-728
4J-98, 4J-99, 4J-100	3/8-16 NC Nut	7D-730
4J-337, 4J-338, 4J-339	3/8" Flat Washer	7D-729
4J-283, 4J-284, 4J-285	7/16 x 3-1/2 Carriage Bolt	2J-241
4J-105, 4J-106	7/16-14 NC Locknut	1D-14
4J-94	1/2 x 2 Capscrew	1D-237
4J-50, 4J-51	1/2 x 3-1/2 Capscrew	5D-871
4J-109	1/2-13 NC Nut	1C-390
4J-110	1/2-13 NC Locknut	5C-392
4J-60, 4J-61	5/8 x 2 Capscrew	5C-460
4J-113, 4J-115	3/8-11 NC Nut	1C-392
4J-342	5/8" Flat Washer	5C-907
4J-173, 4J-182	3/4 x 2-1/2 Capscrew	3D-510
4J-174, 4J-175	3/4 x 3 Capscrew	6D-742
4J-176	3/4 x 3-1/2 Capscrew	6D-758
4J-118, 4J-119	3/4-10 NC Nut	1C-210
4J-121	3/4-10 NC Locknut	6C-729
4J-335	3/4" Flat Washer	1C-133
3J-990	Wheel Bolt	5C-100

NOTE: While assembling the harrow, refer to the Repair Parts Catalog for identification of the parts and their location in the machine.

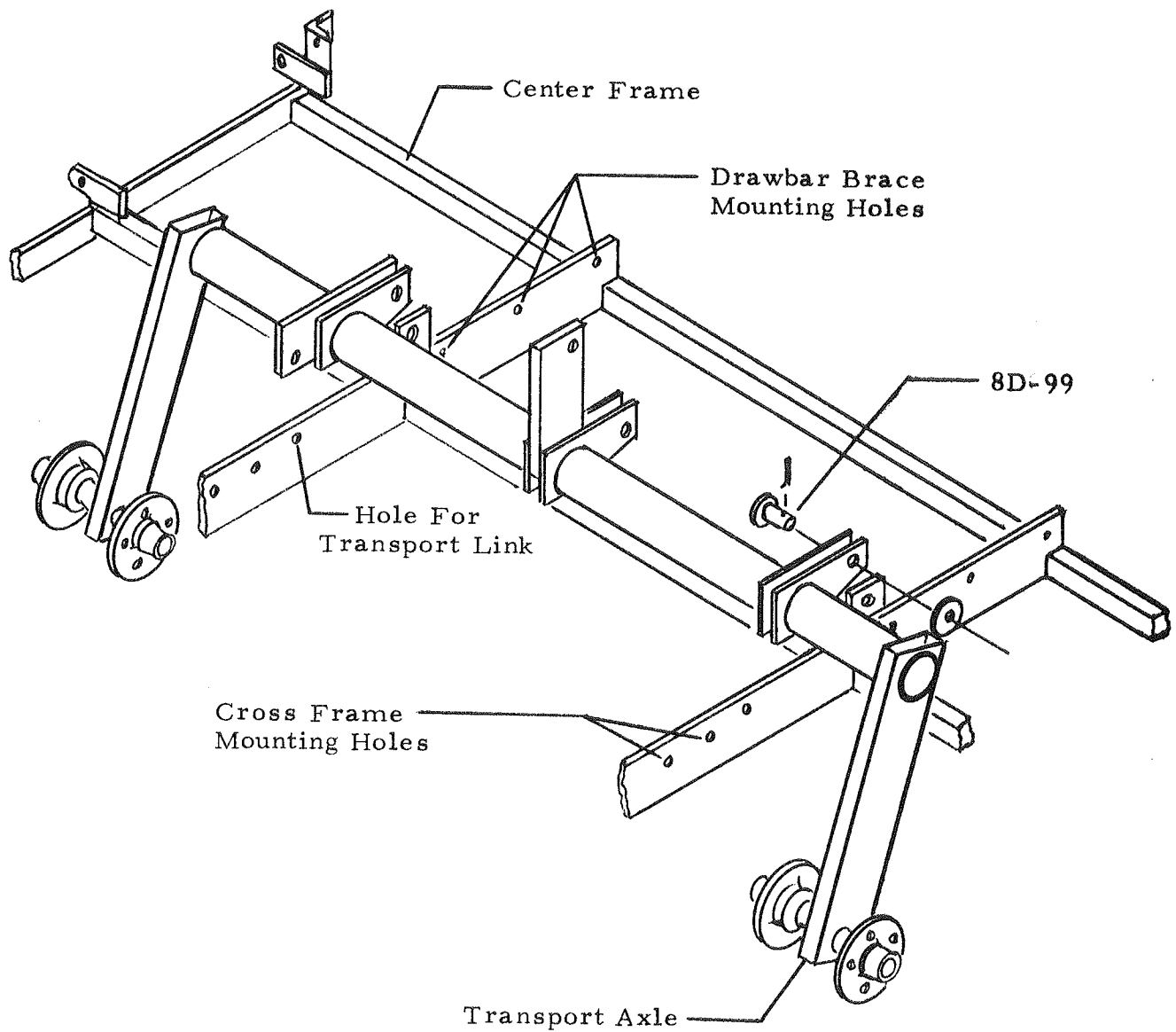


Figure 1

FRAME ASSEMBLY AND DRAWBAR

Position the center frame on blocks and fasten the transport axle side pivot arms to the two lugs with 8D-99 (1" dia. x 2-1/2") clevis pins, 1C-871 washers, and 6C-468 cotter pins (3/16 x 2). See Figure 1. Next, bolt the cross frame to the inside of the front to rear members of the center frame in the holes shown. Use a 5/8 x 2" capscrew with lockwashers and nuts. Be sure that the cross frame is perpendicular to the center frame before tightening the bolts.

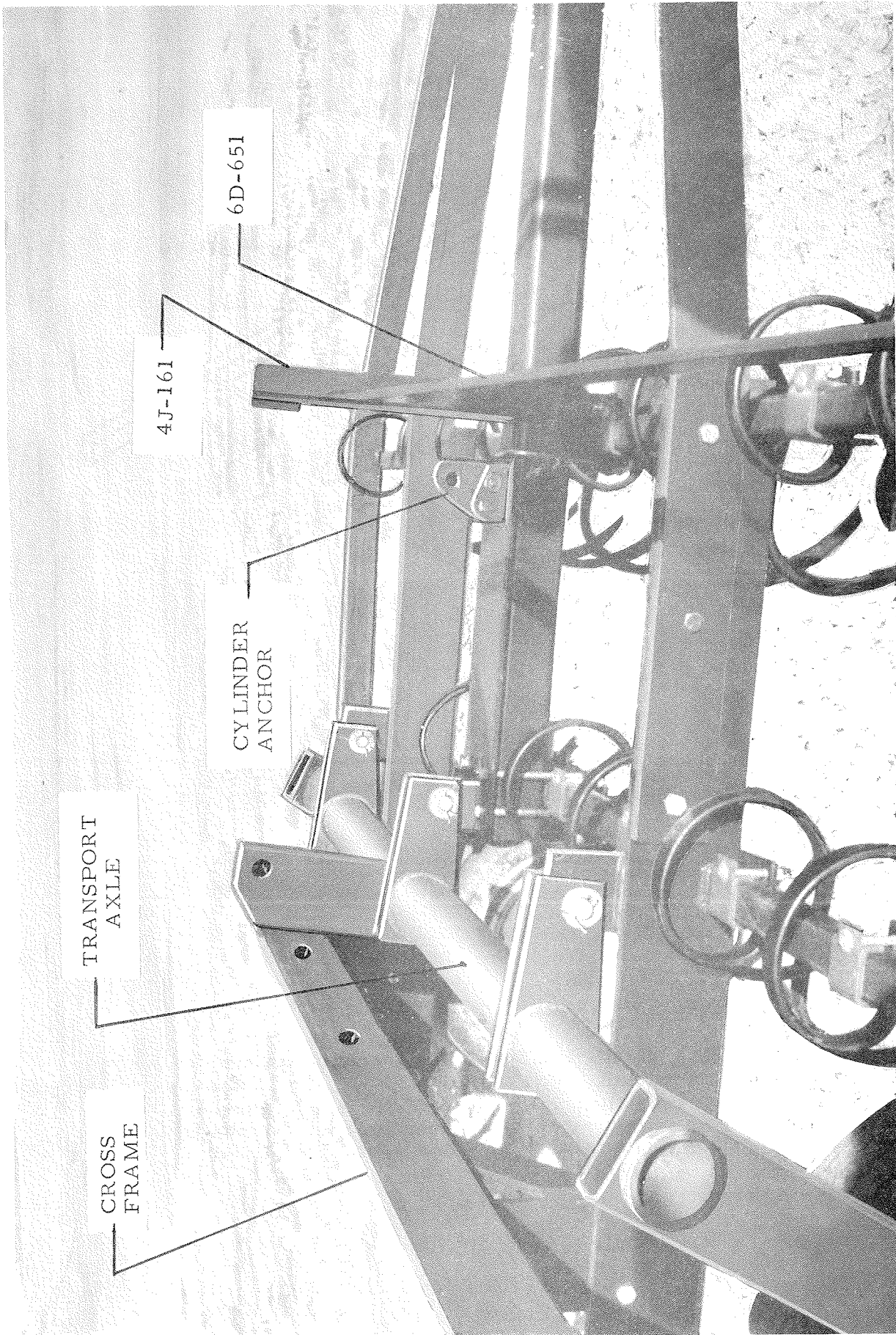


Figure 2

Position the drawbar on the center frame. Using the center pivot arm of the transport axle as a guide, center the drawbar on the frame. The angles welded to the underside of the drawbar straddle the front toothbar of the center section. Fasten the center pivot arm to the lug on the drawbar using the same clevis pin, washer, and cotter pin as the side pivot arms. Bolt the drawbar to the center frame. See Figure 2 and 3. Use four 1J-696 (1/2 x 7-1/2) bolts to join the drawbar to the second toothbar. The bolts straddle the toothbar and extend through two 5C-78 straps (3/8 x 1-1/4 x 4). Secure these with 1/2" lockwashers and nuts. Do not tighten these nuts until all drawbar braces are in place. Clamp the drawbar to the front toothbar by extending 3J-561 U-bolt over the drawbar behind the front toothbar and through two 4J-264 straps (1/2 x 1-1/4 x 5). Use two 1/2 x 2" capscrews to bolt the 4J-161 vertical brace support to the other end of these straps in front of the toothbar. Pin the transport cylinder anchor between the lugs on the drawbar with two 2J-997 clevis pins (3/4 dia. x 2-3/4) and two 4C-856 hairpin cotters.

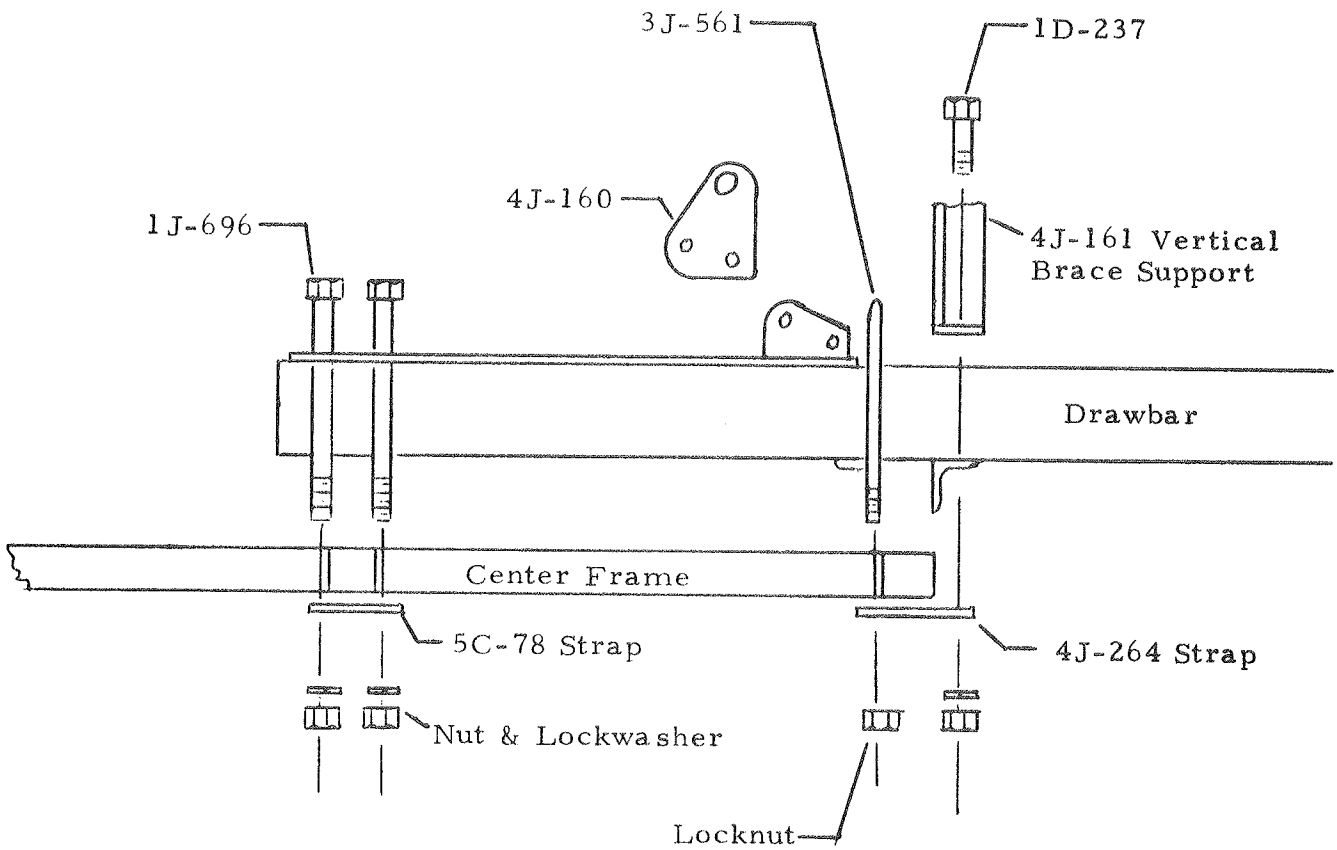


Figure 3

DRAWBAR BRACES

Attach the inner drawbar braces to the outside of the front to rear frame members to the holes shown in Figure 1. The brace with the swivel plate for the jack must be mounted on the right side. Bolt the braces loosely in place using $5/8 \times 2$ capscrews with lockwashers and nuts. Slide the 6D-691 tongue brace weldment over the drawbar tube with the holes for the hydraulic hose holders to the top, see Figure 4. Loosely bolt the two inner braces to the drawbar with two $5/8 \times 6-1/2$ bolts, lockwashers and nuts. Attach the outer drawbar braces to the outside of the center section with $3/4 \times 3$ capscrews, lockwashers and nuts. Fasten the inner and outer drawbar braces to the tongue brace weldment with $5/8 \times 2$ capscrews, lockwashers and nuts. Attach the two drawbar plates to the front of the drawbar tube with two $5/8 \times 6-1/2$ bolts, lockwashers and nuts. Install the hitch clevis between the two drawbar plates and secure with the $1 \times 6-1/2$ " bolt and locknut.

All the hardware mounting the drawbar to the frame may now be tightened.

Two 6D-651 straps ($1/2 \times 2-1/2 \times 63-3/4$) extend from the rear of the vertical brace support to the rear of the angles welded to the front of the center frame. Bolt the straps to the vertical brace support with a $3/4 \times 2-1/2$ " capscrew and a locknut. Bolt the opposite ends to the center frame with $5/8 \times 2$ capscrews, lockwashers and nuts.

Fasten the drawbar jack to the right hand drawbar brace with the snap ring provided.

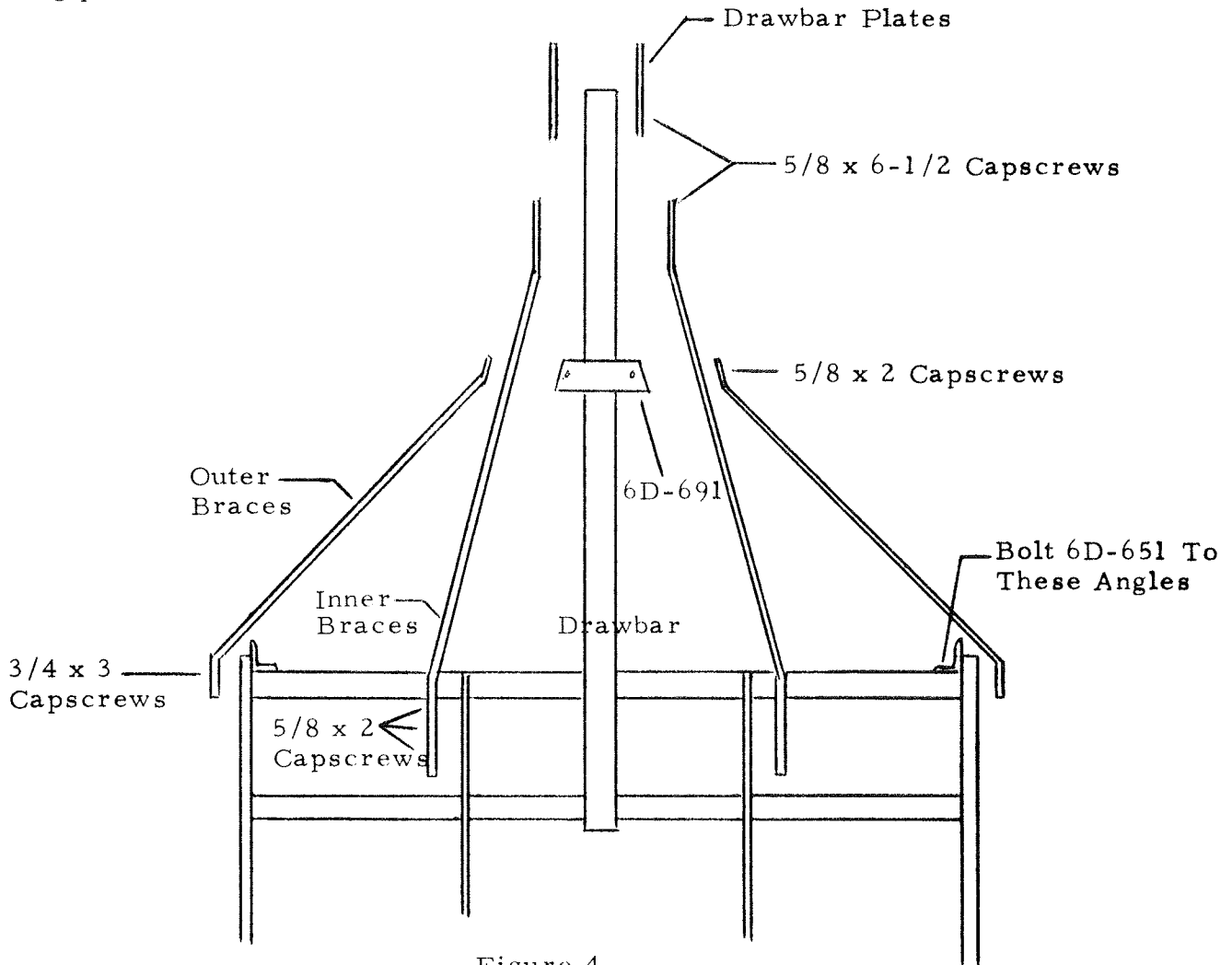


Figure 4

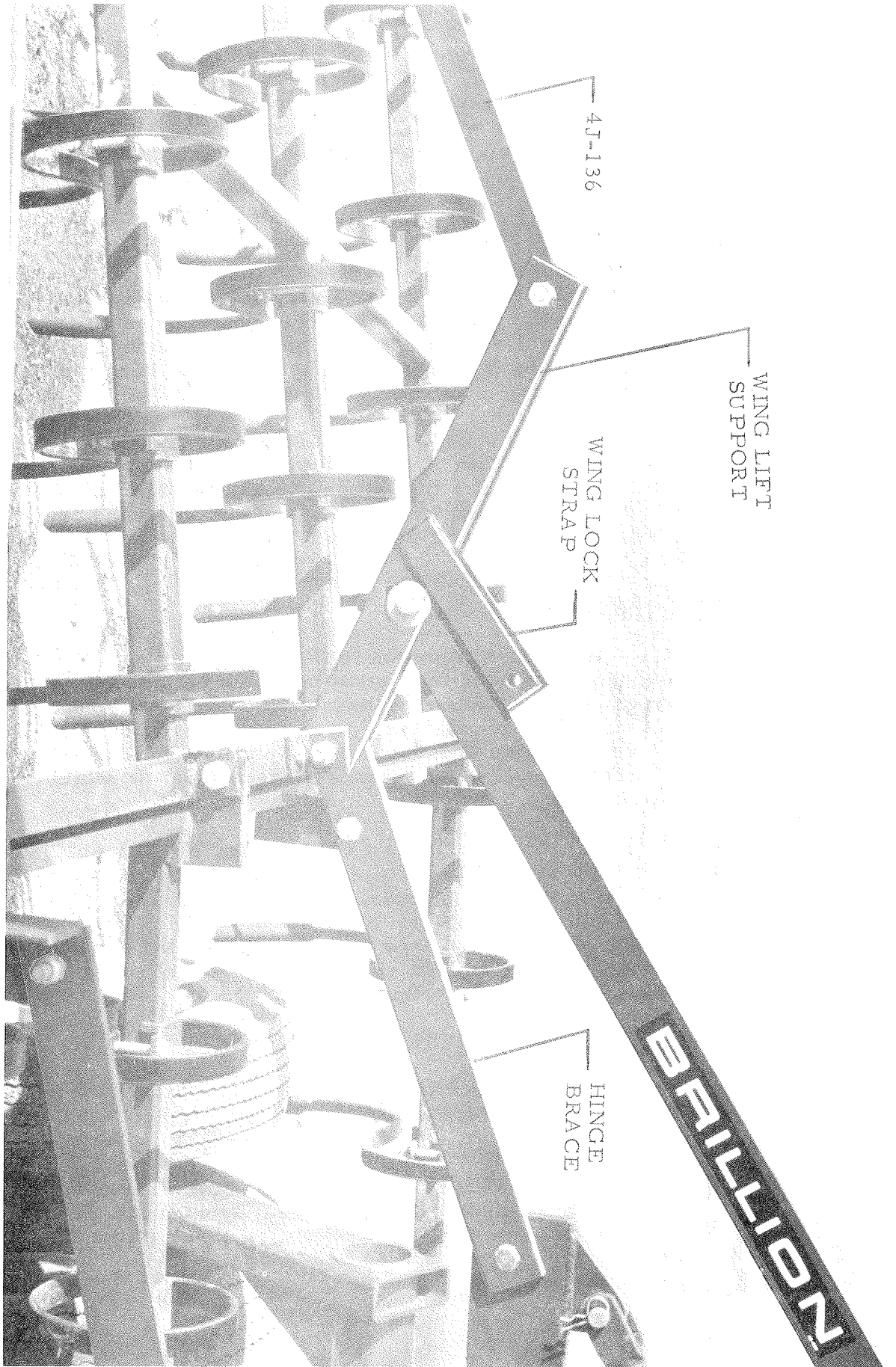


Figure 5

WING ASSEMBLY

Bolt left hand and right hand wing lift supports to each wing so that the wing lock straps are to the outside. See Figure 5. Bolt the supports to the wings with $1/2 \times 2$ " capscrews, lockwashers and nuts. The 4J-136 wing lift straps ($5/8 \times 2 \times 51-1/4$) brace the wing lift supports to the two lugs welded to each wing frame. Bolt the strap between the two lugs and between the two supports with $3/4 \times 2-1/2$ " capscrews, lockwashers and nuts.

ATTACHING WINGS TO CENTER FRAME

Straddle the front hinge lug on the wing over the front hinge on the center frame and secure in place with a $3/4 \times 3$ capscrew and a locknut. Straddle the second set of wing hinge lugs over the lug on the center section. Secure these lugs with a $3/4 \times 2-1/2$ capscrew and locknut. Bolt the rear wing hinge lug in front of the rear hinge angle of the center frame with a $3/4 \times 2-1/2$ " capscrew and a locknut.

Hinge braces 6D-663 ($5/8 \times 3 \times 29$) also act as hinges. Bolt them to the front of the cross frame with $3/4 \times 3$ capscrews, lockwashers and nuts. Bolt the brace to the front of a lug welded to the outside bar of the center frame with a $5/8 \times 2$ capscrew, lockwasher and nut. Bolt the brace between the two wing lift supports with a $3/4 \times 3-1/2$ capscrew and a locknut. See Figure 6.

WING LIFT MECHANISM

Attach the 4J-166 lift arm weldments to the cross frame. The 1 inch hole must be down and the cylinder lugs must be to the outside as shown in Figure 6. Fasten each lift arm to the cross frame with a 9D-294 pin (1" dia. x 4"), two washers, and two $3/16 \times 2$ cotter pins. Attach the cylinders to the lugs on the cross frame and the lugs on the lift arms with the pins and clips provided with the cylinders. The cylinders must be attached with the ports facing forward.

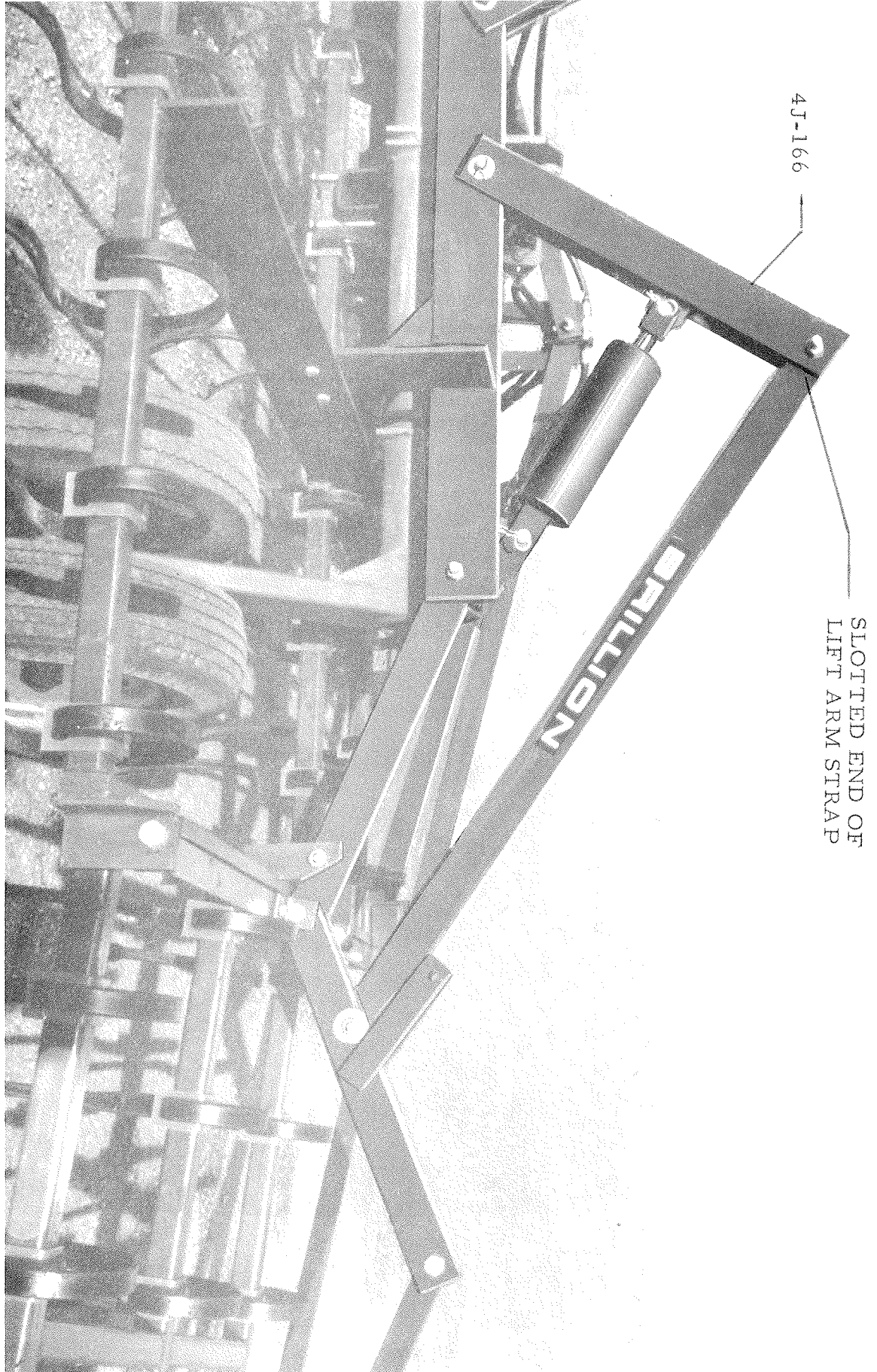
Connect the lift arm straps ($5/8 \times 3 \times 61$) between the lift arm weldments and the wing lift supports. Bolt the slotted end of the lift arm strap between the two arms of the weldment. Fasten with a $3/4 \times 3-1/2$ " capscrew and a locknut. Bolt the other end between the slots of the wing lift support. Use a $3/4 \times 3$ capscrew with flat washers on the outside of the wing lift supports, fasten with a locknut. The locknut should not be turned so tight that it prevents the lift arm from sliding in the slot.

ATTACHING HYDRAULIC HOSES

To complete the wing lift mechanism, connect the hydraulic hoses to the cylinders. In the bag with the hydraulic hoses, there are two flow restrictor valves.



These flow restrictors must be assembled into the port on the base or anchor end of the cylinders (end opposite the rod). Failure to install the flow restrictors or placing them in the wrong port may result in the wings unfolding too quickly, and may cause damage to the machine and danger to bystanders.



4J-166

SLOTTED END OF
LIFT ARM STRAP

BRILLION

Figure 6

Connect the hoses to the flow restrictor in the base of both cylinders to a tee with two of the 66 inch long hoses. Connect the rod end ports to a tee with an identical set of hoses. Connect the long hoses to the tees and extend them along the drawbar. Mount the hose holders to the tongue brace with 5/8 x 1-3/4 capscrews, flat washers, lockwashers and nuts. Thread the hoses through the hose holders. Use the four plastic cable ties to fasten the hoses to the vertical brace support and to the drawbar. Do not tighten the ties until you are sure that the hoses have enough slack during the entire stroke of the cylinders.

WING GAGE WHEELS

Mount the gage wheels to the wing frames. Refer to Figure 7. Extend the shaft of the gage wheel arm through the two lugs on the wing frame and hold them in place with a 1-1/4" flat washer and a 1/4 x 2 roll pin. Extend the 5/8 x 8 rod through the turnbuckles and lock in place with two 3/16 x 7/8 roll pins. Connect the turnbuckle between the gage wheel arm and the lug on the frame with 3/4 x 2-1/2" capscrews and locknuts.

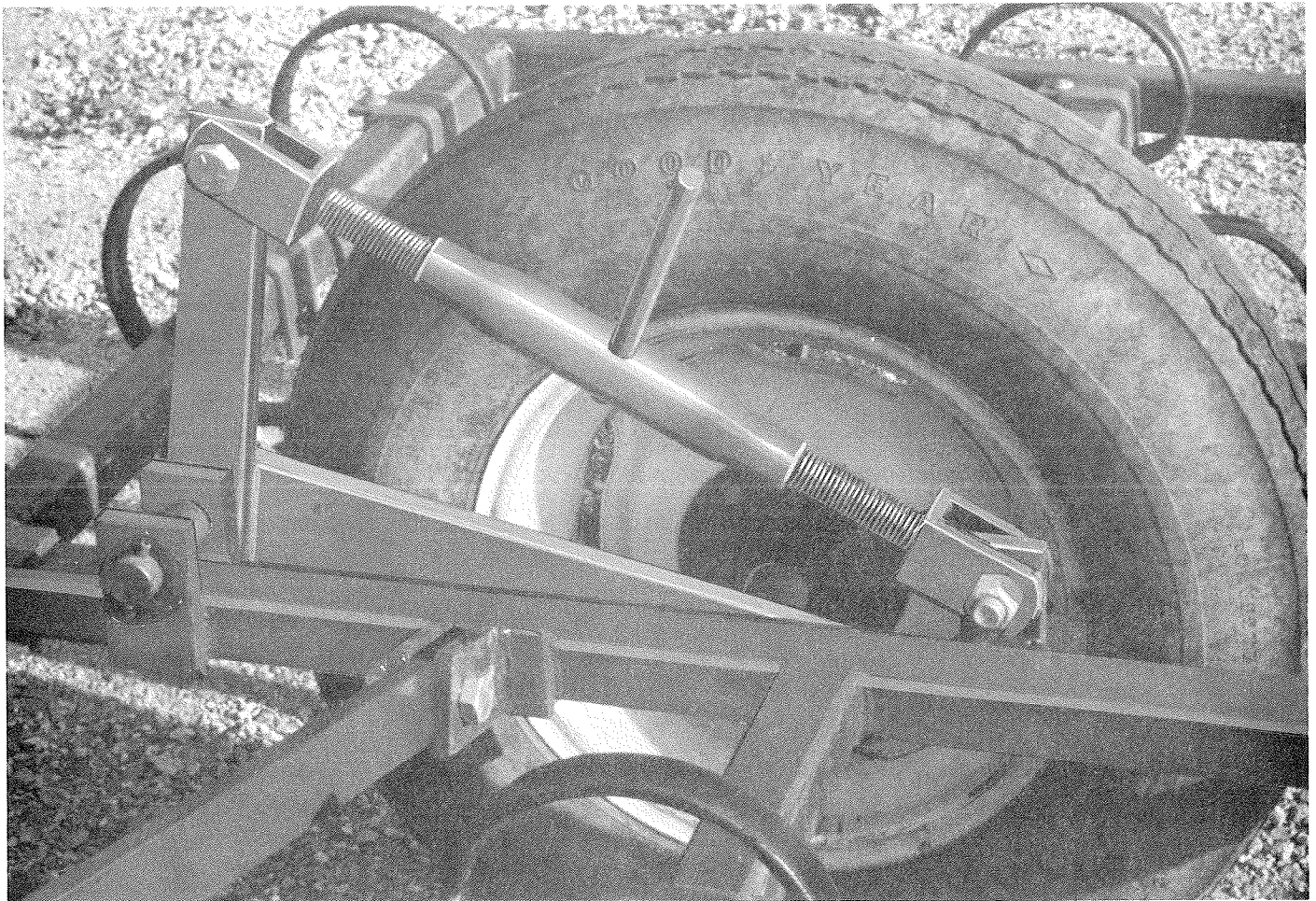


Figure 7

TRAVEL LINK STRAPS

Attach the two travel link straps to the left front to rear member of the center frame. Fasten the straps with the slotted end up. Place a 5/8" flat washer between the frame member and each strap. Fasten with a 5/8 x 2 capscrew and locknut so that the links can pivot on the capscrew. Use a 6D-720 (5/8 x 3) capscrew with a hole drilled through with a 4C-856 hairpin cotter to lock the axle in the transport position.

ATTACHING THE TEETH (OR TINES)

Figure 8 shows how the spring teeth and spring tines are attached to the toothbars. Figures 9, 10, 11 and 12 show the positions of the teeth on the center frame and the wings for both 4 inch spacing and 6 inch spacing. First locate the teeth at the dimensions shown in the illustration. From these teeth, locate the remaining teeth (12 inch gaps on each toothbar for 4 inch spacing and 18 inch gaps for 6 inch spacing). The spacing of teeth located near the front to rear frame members has to be altered slightly to compensate for the frame members.

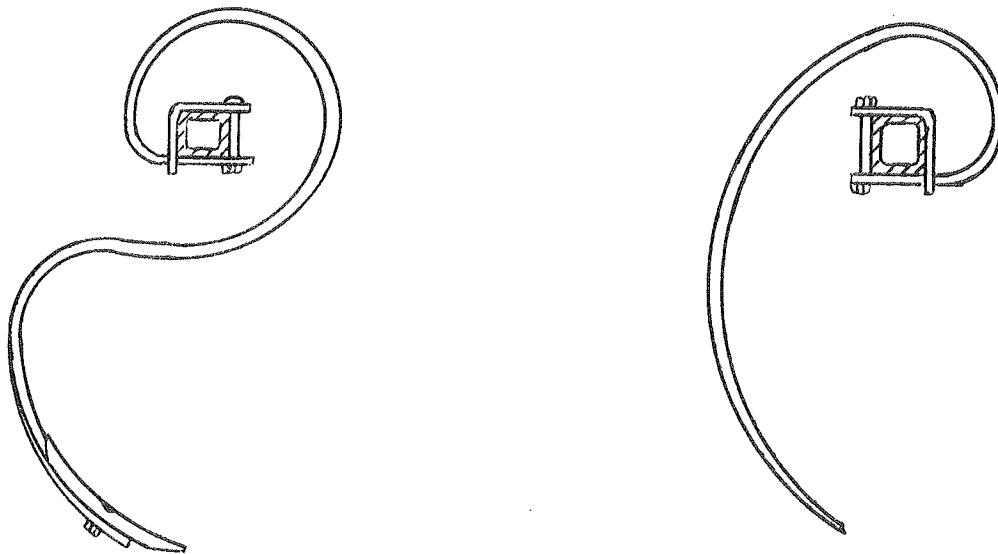


Figure 8

REPLACING TOOTH POINTS

The life of the teeth and S tines of your harrow is extended through the use of reversible points. Use the C shaped ribbon teeth without points until the teeth are worn to within 1 inch of the lower mounting hole. At this time bolt a 2D-551 point to the front of the spring tooth. When this becomes worn down, the point may be reversed.

The S-tine must be operated with a point at all times. When it wears down, this point may also be reversed. The correct hardware to be used with these points is shown in the Repair Parts Catalog.

4" TOOTH SPACING FOR WINGS

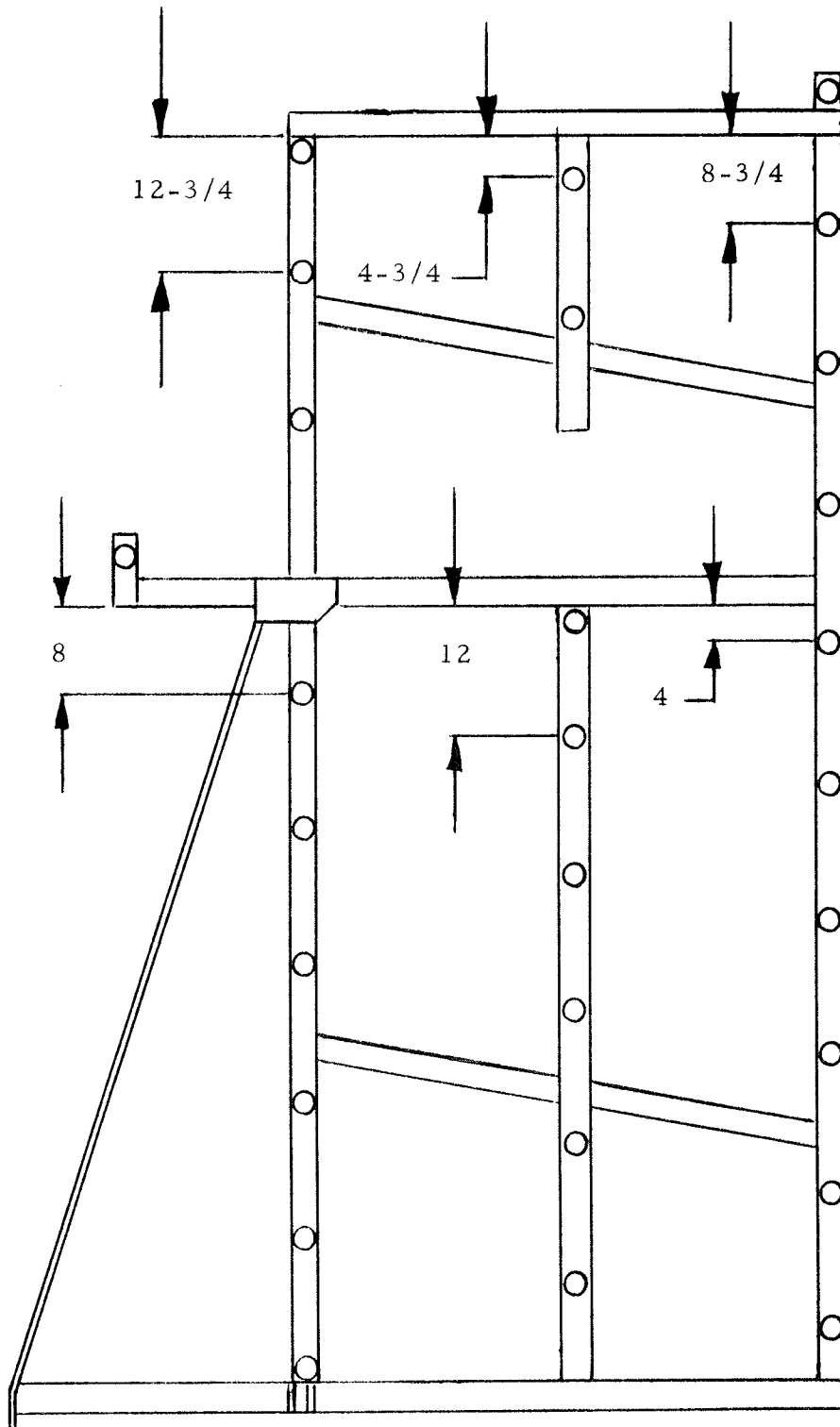


Figure 9

4" TOOTH SPACING FOR CENTER SECTION

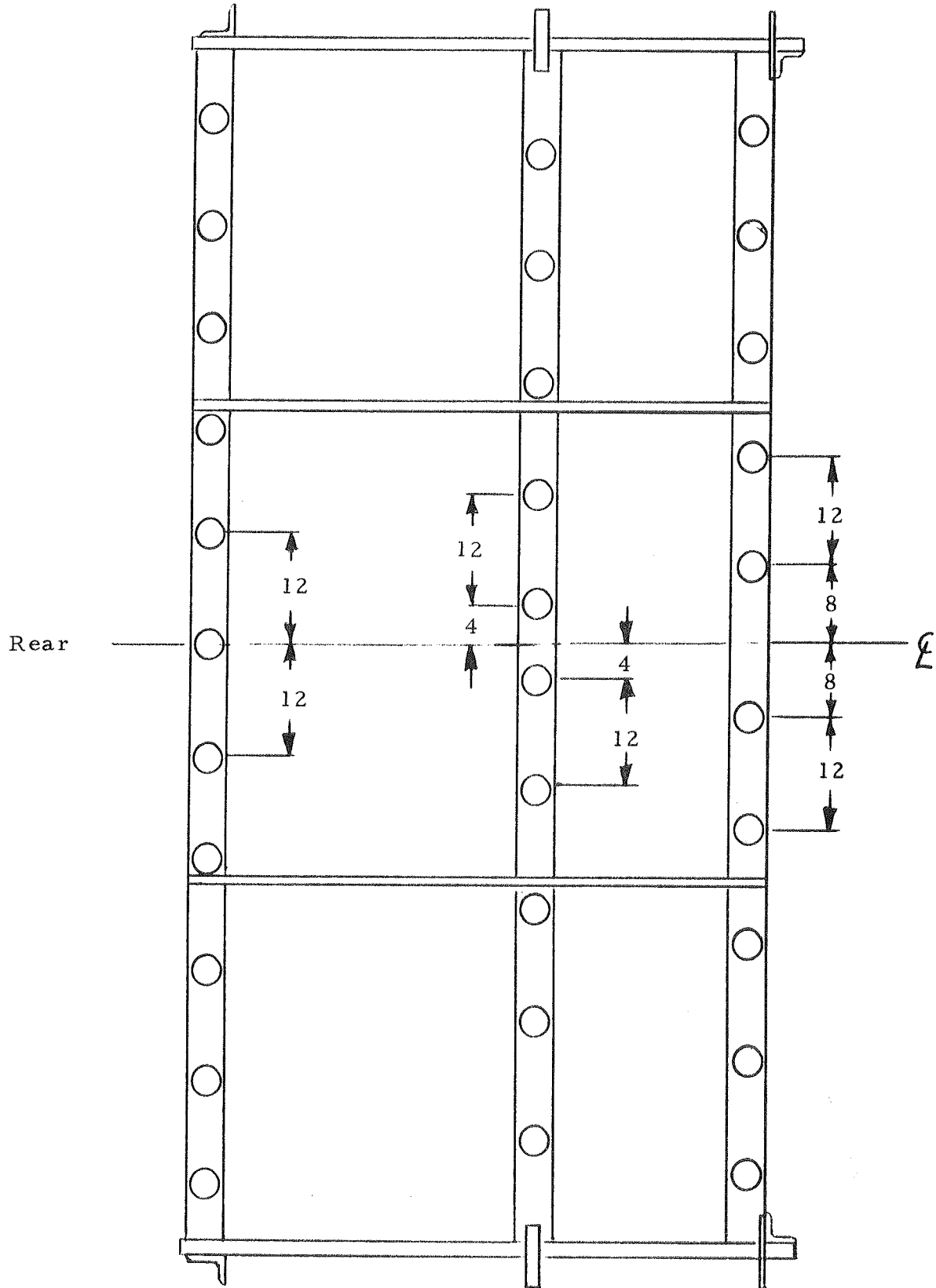


Figure 10

6" TOOTH SPACING FOR WINGS

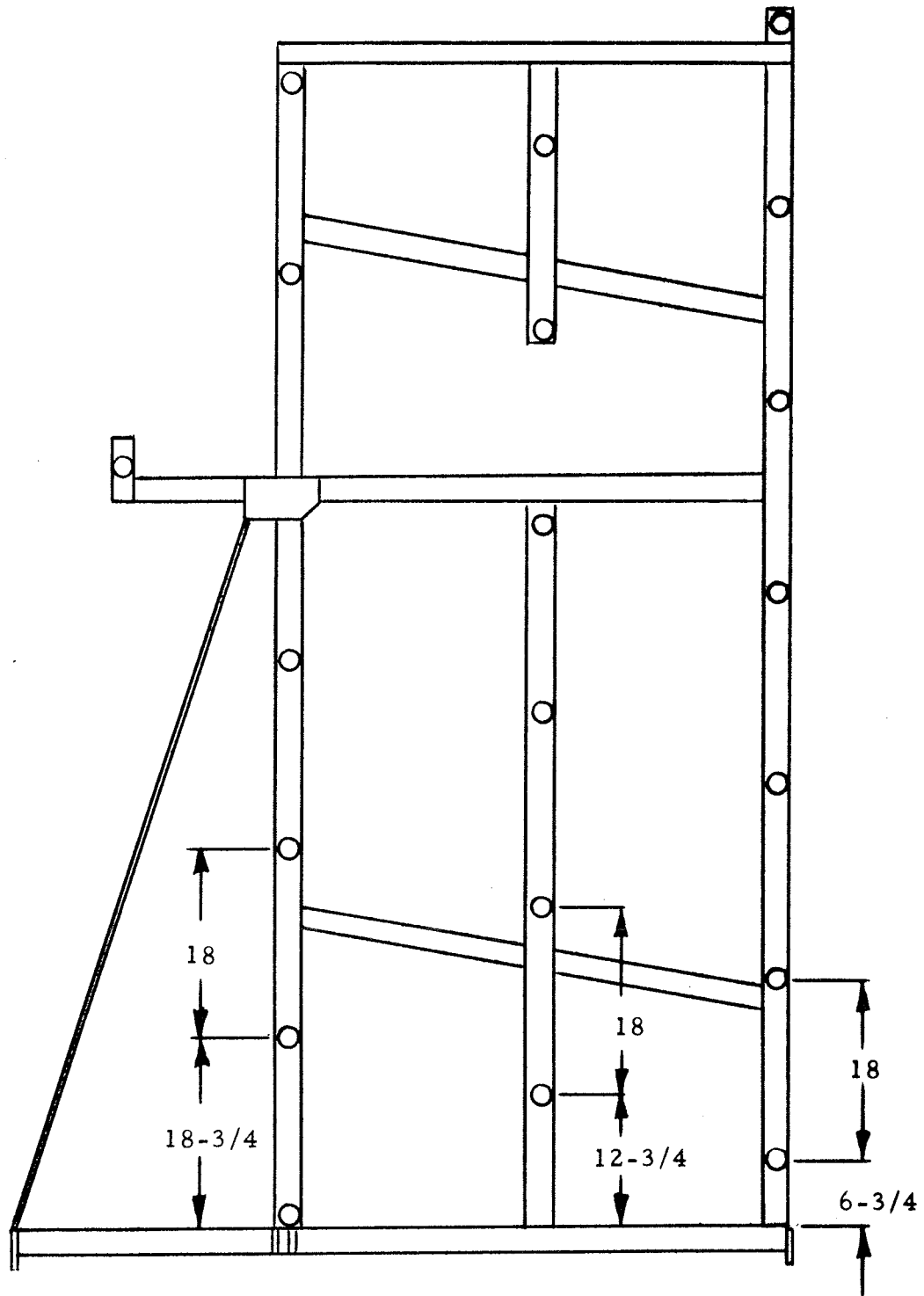


Figure 11

6" TOOTH SPACING FOR CENTER SECTION

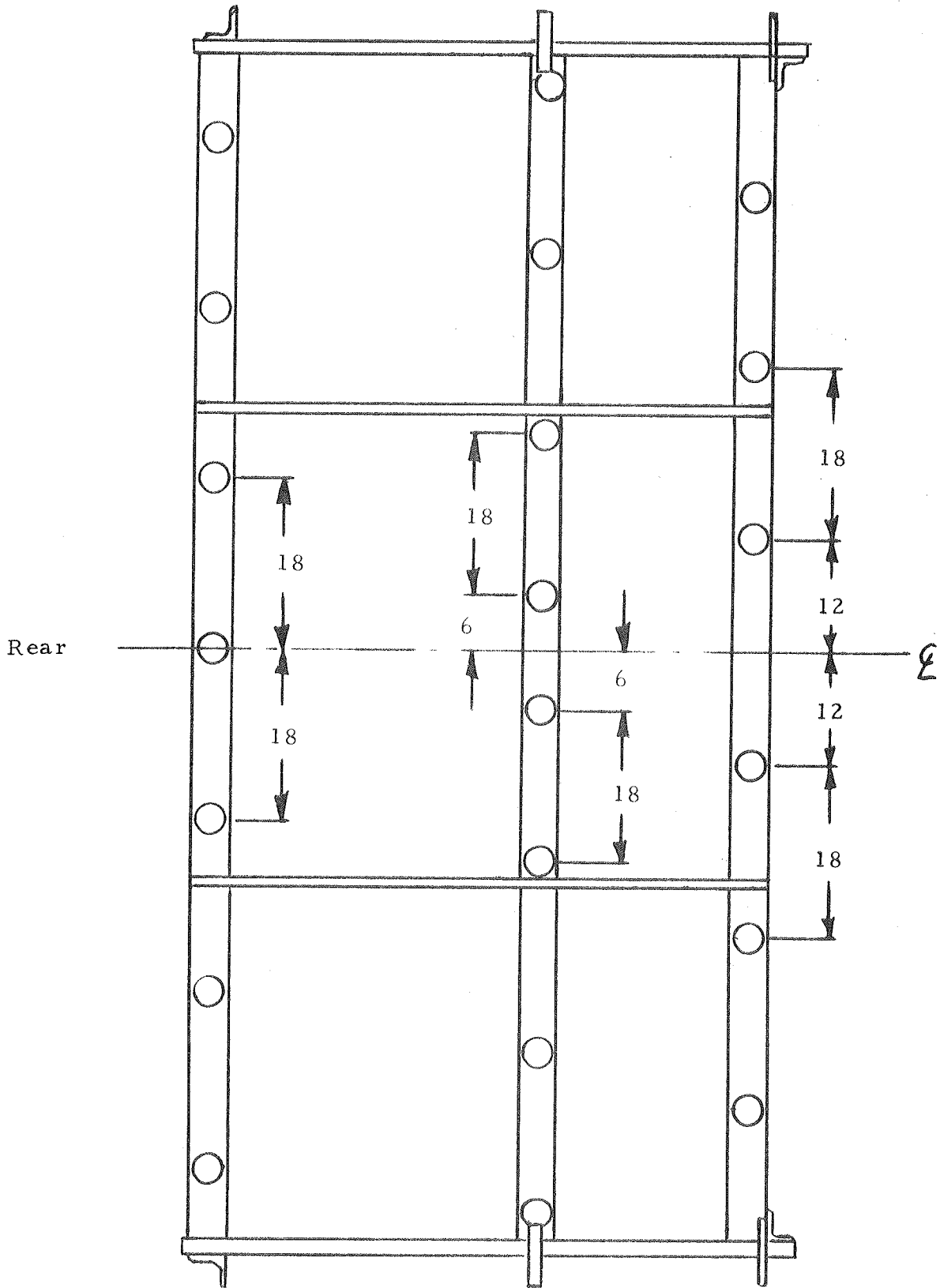


Figure 12



Keep others away from the machine when raising and lowering wings.

DEPTH CONTROL

A standard 8" stroke agricultural hydraulic cylinder with a depth setting control is required to raise the harrow. To simplify attachment of the cylinder, remove the front pin from the cylinder anchor so that the anchor can flip toward the transport axle. Replace this pin after installing the cylinder. Completely extend the transport cylinder to raise the machine for transport or for making turns in the field.

Adjust the depth stop on the transport cylinder for the desired working depth. Also adjust the turnbuckle on each wing gage wheel so the wings will operate at the same depth. It is important that both wing gage wheels are set to the same position. Failure to do this will cause the teeth on one wing to operate deeper than the other resulting in the entire harrow tracking to one side.

LEVELING THE HARROW

After the desired operating depth is determined, the machine must be leveled. Pull the machine forward in the field in the operating position. When all the teeth are engaged in the ground at the operating depth, check to make sure that the machine is level from front to rear. If it is not level, move the hitch clevis to the hole in the drawbar plates which brings the machine closest to level in the operating position.

OPERATING THE HARROW

The harrow should be raised when making sharp turns, such as at the end of the field. Failure to do this will place excessive stress on the machine. Attention should be given to the relative position of the harrow when working ridges or deep furrows. If the teeth on one side of the machine are being overloaded, change the position of the machine.

TRANSPORTING THE HARROW

The following sequence is recommended when preparing the harrow for transport. Raise the machine to its maximum height, then fold the wings into their transport position. Lock both wings in position by extending 5/8 x 3 capscrew with a hole drilled in the end through both straps on the wing lift supports. See Figure 5. Lock the pins in place with hairpin cotters. The transport axle is locked in the transport position by extending an identical pin through the slots in the two travel links and through the hole in the axle pivot arm. Lock the pin in place with a hairpin cotter.



The transport height of this machine is 12'8". Make sure you have adequate clearance under doorways and electrical lines.

Maximum transport speed is 20 miles per hour. It should be towed at much slower speeds when going around corners or when pulling it through hilly and uneven areas.