OPERATOR'S MANUAL
ASSEMBLY INSTRUCTIONS

Brillion™
Farm Equipment

HFC Field Commander

MODELS:

HFC16	THROUGH	HFC31
HFCT20	THROUGH	HFCT31
HFK16	THROUGH	HFK31
HFKT16	THROUGH	HFKT31

www.brillionfarmeq.com
BRILLION FARM EQUIPMENT
BRILLION, WISCONSIN 54110

1103rev3-31-05

2K314

Contents

INTRODUCTION

To obtain maximum benefits from the BRILLION FIELD CULTIVATOR, please study this manual carefully before starting assembly or operation. A special section, “Assembly Instructions”, is included. If items in this manual are not understood, contact your local Brillion dealer.

BE ALERT!
Your Safety Is Involved.

The Symbol Shown Is Used To Call Your Attention To Instructions Concerning Your Personal Safety. This Symbol Is Found On Your Machine - It Points Out Important Safety Precautions. It Means “ATTENTION! - Become Alert! Your Personal Safety Is Involved!” Read The Message That Follows And Be Alert To The Possibility Of Personal Injury Or Death.

Location Reference

Right hand, left hand, and forward designations are determined by standing behind the machine and facing the direction it will travel during field operation.

Parts Ordering

When ordering parts for this machine, include the complete model number and serial number. Refer to the name plate on the tongue as shown in Figure 1. Please read and record this number upon taking delivery of this machine.

FIELD CULTIVATOR Model _____

Serial Number _____

Date Purchased _____

Be sure to read the warranty card which is shipped with the machine. Return the proper portion of the card for recording at the factory.

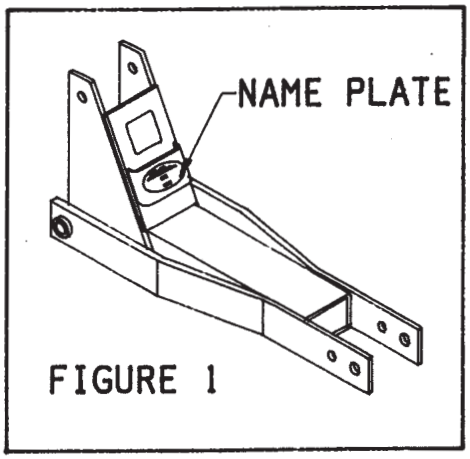


FIGURE 1

Safety Suggestions

Federal law requires you to explain the safety and operating instructions furnished with this machine to all employees before they are allowed to operate the machine. These must be repeated to the employees at the beginning of each season. Be sure to observe and follow the instructions for the safety of anyone operating or near the machine.

Investigation has shown that nearly 1/3 of all farm accidents are caused by careless use of machinery. You can do your part in improving safety by observing the following suggestions. Insist that all people working with you or for you abide by them.

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

2. Before applying pressure to the system, be sure all connections are tight and that hydraulic lines and hoses are not damaged.

3. Escaping fluid under pressure can be nearly invisible and have enough force to penetrate the skin causing serious injury. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks. If injured by fluid, see a doctor at once.

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

5. Do not allow anyone to ride on tractor or machine.

6. Always use transport locks while transporting the machine.

7. Do not transport at speeds over 15 mph. Use a tractor or towing machine heavier than the machine.

8. Avoid sudden stops or turns when transporting because the weight of machine may cause operator to lose control of tractor. Do not allow tractor drawbar to swing when in transport.

9. Use caution when towing behind articulated steering tractors; fast or sharp turns may cause the machine to shift sideways.

10. When transporting the machine on a road or highway, use adequate warning symbols, reflectors, lights, and slow moving vehicle signs as required. Use a safety chain.

11. Block machine so it will not roll when unhitched from tractor.

12. Relieve pressure in hydraulic lines before uncoupling hydraulic hoses from tractor. On most tractors this can be done by operating valves after engine is stopped.

13. Securely block machine when working on or under it to prevent injury in case of hydraulic failure or inadvertent lowering by another person.

14. Lower machine to ground when not in use.

15. Do not fold or unfold wings without first bleeding all air from the hydraulic circuit.

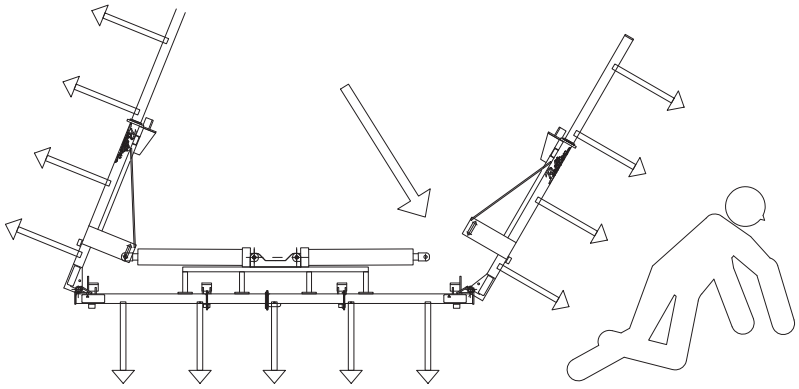
16. Know the height of your machine in the folded position, do not fold the wings under low power lines or other obstructions.

17. Fold wings on as level a surface as possible.

⚠ DANGER

FALLING WINGS CAN CAUSE INJURY OR DEATH. STAND CLEAR WHEN WINGS ARE BEING RAISED OR LOWERED.

3J675

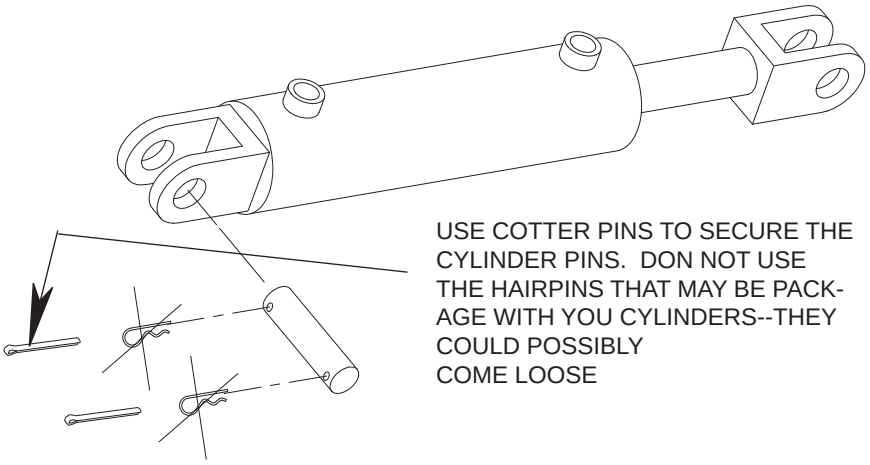


The wings of the HFC Cultivator **must not be raised by any other method** than using properly bled hydraulic cylinders provided with the machine.

If the wings have been raised by another method, and the cylinders are not filled with oil, the ***unfolding sequence becomes extremely dangerous***. Also, wings raised by other methods could fall when transporting a machine over uneven terrain.

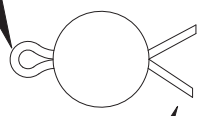
Do not remove the cylinder pins or service the cylinders unless the wings are unfolded and supported.

We have received reports that the hairpin that holds the cylinder pin in place can come out.



USE COTTER PINS TO SECURE THE CYLINDER PINS. DON NOT USE THE HAIRPINS THAT MAY BE PACKAGE WITH YOU CYLINDERS--THEY COULD POSSIBLY COME LOOSE

EXTEND THE COTTER PINS THROUGH THE CYLINDER PINS AS SHOWN --



DO NOT WRAP THE COTTER PINS TIGHTLY AROUND THE CYLINDER PINS

Safety Signs

The “WARNING” signs illustrated on this page and the next are placed on the machine to warn of hazards. “The warnings found on the signs are for your personal safety and those around you.” OBSERVE THESE WARNINGS!

There are three levels of hazard intensity that appear with the safety alert symbol on safety decals: DANGER, WARNING, and CAUTION. The level of hazard intensity is defined as follows:

DANGER - Immediate hazards which WILL result in severe personal injury or death.

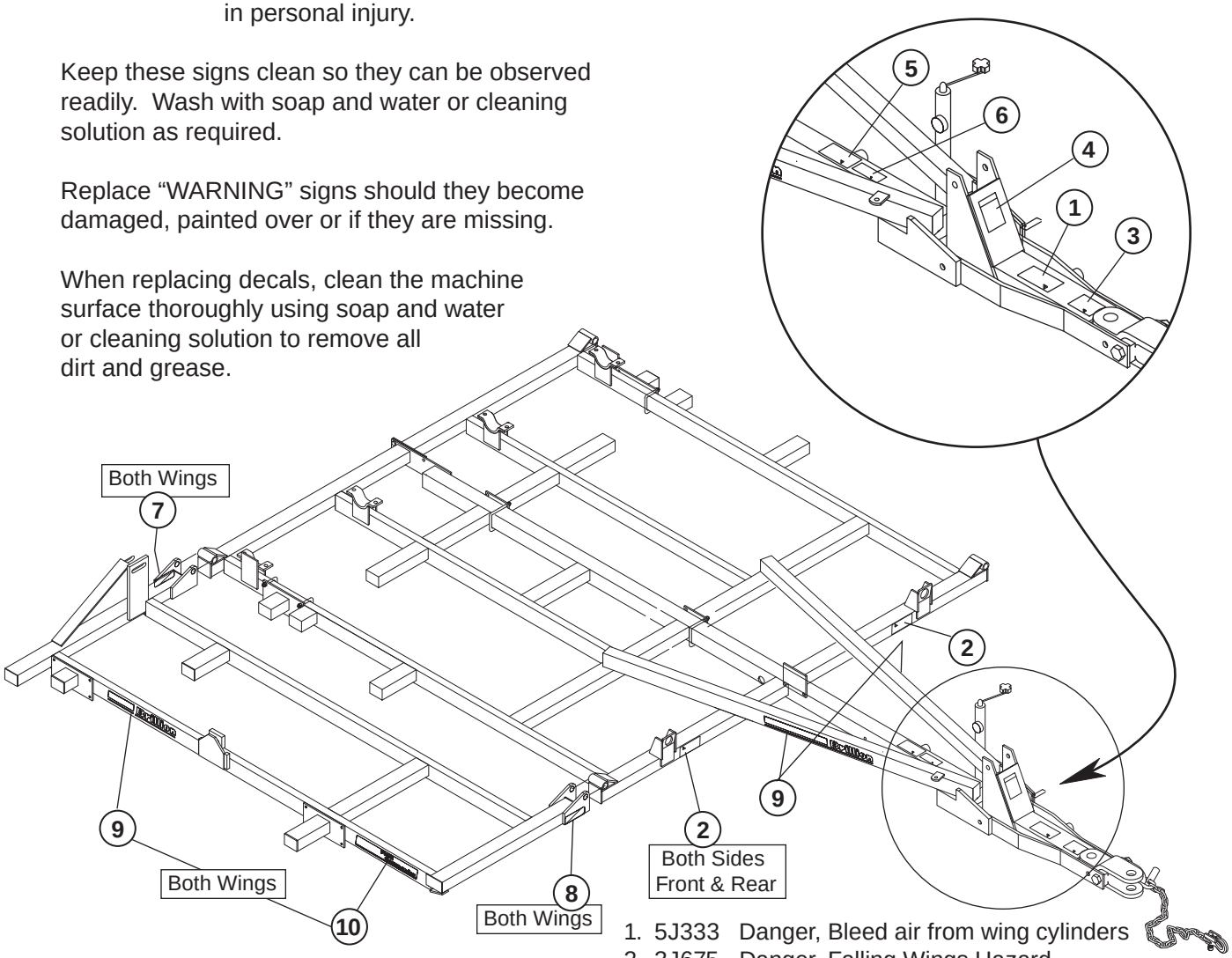
WARNING - Hazards or unsafe practices which COULD resutl in severe personal injury or death.

CAUTION - A reminder of safety practices, or an alert to unsafe practices which could result in personal injury.

Keep these signs clean so they can be observed readily. Wash with soap and water or cleaning solution as required.

Replace “WARNING” signs should they become damaged, painted over or if they are missing.

When replacing decals, clean the machine surface thoroughly using soap and water or cleaning solution to remove all dirt and grease.



1. 5J333 Danger, Bleed air from wing cylinders
2. 3J675 Danger, Falling Wings Hazard
3. 9J629 Danger, Electrical Wires Hazard
4. 3K706 Warning, Hydraulic Leak Hazard
5. 8J310 Caution List
6. 5J333 Harrows... Drawbar Light
7. 4J230 Red Reflective
8. 4J231 Amber Reflective
9. 4K037 Brillion Logo
10. 4K038 Field Commander Decal

DANGER

BLEED THE AIR FROM WING LIFT CYLINDERS BEFORE OPERATING. FAILURE TO DO SO WILL ALLOW WINGS TO FREE FALL AND MAY CAUSE SERIOUS PERSONAL INJURY. SEE OPERATOR'S MANUAL FOR CORRECT PROCEDURE.

3J678

5J333
Yellow & Black

DANGER

FALLING WINGS CAN CAUSE INJURY OR DEATH. STAND CLEAR WHEN WINGS ARE BEING RAISED OR LOWERED.

3J675

3J675
Red & White

WARNING

DO NOT GO NEAR LEAKS

- HIGH PRESSURE OIL EASILY PUNCTURES SKIN CAUSING SERIOUS INJURY, GANGRENE OR DEATH.
- IF INJURED, SEEK EMERGENCY MEDICAL HELP. IMMEDIATE SURGERY IS REQUIRED TO REMOVE OIL.
- DO NOT USE FINGERS OR SKIN TO CHECK FOR LEAKS.
- LOWER LOAD OR RELIEVE HYDRAULIC PRESSURE BEFORE LOOSENING FITTINGS.

10813A

3K706
Orange, Black & White

9J629
Red & White

DANGER

WATCH FOR ELECTRICAL WIRES AND OTHER OVERHEAD OBSTRUCTIONS WHEN FOLDING WINGS.

FAILURE TO HEED THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH.

9J629

1. 5J333 Danger, Bleed air from wing cylinders
2. 3J675 Danger, Falling Wings Hazard
3. 9J629 Danger, Electrical Wires Hazard
4. 3K706 Warning, Hydraulic Leak Hazard
5. 8J310 Caution List
6. 5J333 Harrows... Drawbar Light
7. 4K037 Brillion Logo
8. 4K038 Field Commander Decal

CAUTION

1. DO NOT LUBRICATE, ADJUST OR REPAIR WHEN MACHINE IS IN MOTION.
2. DO NOT TOW OR TRANSPORT FASTER THAN 15 MILES PER HOUR.
3. DO NOT RIDE OR ALLOW OTHERS TO RIDE ON THE MACHINE.
4. BLOCK UP ALL HYDRAULICALLY OR MECHANICALLY RAISED COMPONENTS TO PREVENT UNINTENDED LOWERING OR LOWER THE MACHINE TO THE GROUND TO MAKE ADJUSTMENT OR REPAIRS WHEN NOT IN USE.
5. KEEP ALL PERSONS AWAY FROM MACHINE DURING HITCHING AND OPERATING.
6. SLOW DOWN BEFORE MAKING SHARP TURNS OR USING THE BRAKES. DRIVE SLOWLY OVER ROUGH GROUND, SIDE HILLS, AND AROUND CURVES TO AVOID TIPPING.
7. COMPLY WITH ALL LAWS WHEN TRANSPORTING THE MACHINE ON PUBLIC ROADWAYS.
8. INSTRUCT ALL OPERATORS IN THE SAFE OPERATION OF THE MACHINE. REVIEW THE OPERATOR'S MANUAL FOR CORRECT PROCEDURES.
9. BLOCK IMPLEMENT TO PREVENT MOVEMENT WHEN UNHITCHED FROM TRACTOR.
10. KEEP ALL GUARDS AND SHIELDS IN PLACE WHILE MACHINE OR PARTS ARE IN MOTION.

8J310

8J310
Yellow & Black

CAUTION

HARROWS OR OTHER DEVICES MOUNTED ON THE REAR OF THIS MACHINE WILL USUALLY MAKE IT DRAWBAR-LIGHT. TO AVOID PERSONAL INJURY FROM MACHINE TIPPING REARWARD, ALWAYS LOWER MACHINE TO GROUND BEFORE DISCONNECTING TRACTOR. SEE OPERATOR'S MANUAL FOR DETAILS.

5J333

5J333
Yellow & Black

Brillion

4K037

4K037
Wings Only

4K038
Wings Only

Field Commander

4K038

PRE-OPERATING CHECKS

Hydraulic cylinders

Before raising or lowering the wings, be sure that the wing lift cylinders are properly bled (all air is removed from the hydraulic circuit). Improperly bled cylinders will permit the wings to free-fall, possibly causing injury to the operator and damage to the machine.

Bleed the system by removing the rod end pins which connect the cylinder to the wing and fully extend and fully retract the cylinders three or four times. Reconnect the cylinder rod ends to the wings.

Check to make sure that flow restrictors have been installed in the wing lift circuits. These are screwed into the elbows in the wing lift hydraulic circuit as shown in figure 17. These restrictors control the passage of oil to and from the wing lift cylinders and prevent the wings from falling too rapidly.

Tractor hydraulic level

The wing lift and depth control cylinders are shipped from the factory without oil in them. If all 6 cylinders must be charged with oil, they will use approximately 5 gallons of oil. Check your tractor hydraulic level to avoid any damage to the system.

Three point hitch position

Before moving the implement, be sure the three point lift arms of the tractor have been raised to avoid damaging the tongue on the cultivator when making sharp turns.

Jack

Make sure the jack has been moved to the storage position on the drawbar and pinned in place.

Level adjust

1. With the tractor and the field cultivator on a level surface, check to make sure that the machine is level from side to side.

   a. Make sure that all cylinder anchor adjust rods are adjusted to the same length. Check the indicator on the adjust tube to verify that all the anchors are adjusted equally.

   b. With the tractor running, operate the hydraulic control lever for the wheel cylinders to the extend position and hold it there until there is no movement in any of the wheel cylinders.

   c. Measure the pin center distances of the wheel cylinders, if they are all the same, (approximately 28 1/4”), proceed to step 2, if the pin centers differ, retract the cylinders and measure the pin centers if they are not all the same length (approximately 20 1/4”), adjust the rod end clevis as necessary so that all cylinders are the same length. Make sure that the rod end thread engages the clevis completely, and that the locking bolt on the cylinder clevis is tightened.

d. Extend the cylinders and hold the control lever in the extend position until there is no motion in any of the cylinders, check the pin center distances, if they are not all approxi mately 28 1/4", retract the cylinders, disconnect the pins from the wheel arms, and bleed the air from the hydraulic circuit by extending and retracting the cylinders at least 3 times. At the end of each extend stroke, hold the hydraulic control lever at least 30 seconds, or until there is no movement in any of the cylinder rods.

e. Reconnect the cylinders to the wheel arms, and raise the machine by extending the cylinders.

If your machine is <u>less</u> than 20 feet wide, proceed to step 3.

2. Measure to see that the wings are the same height from the ground as the center section.

a. If the heights are equal, proceed to step 4.

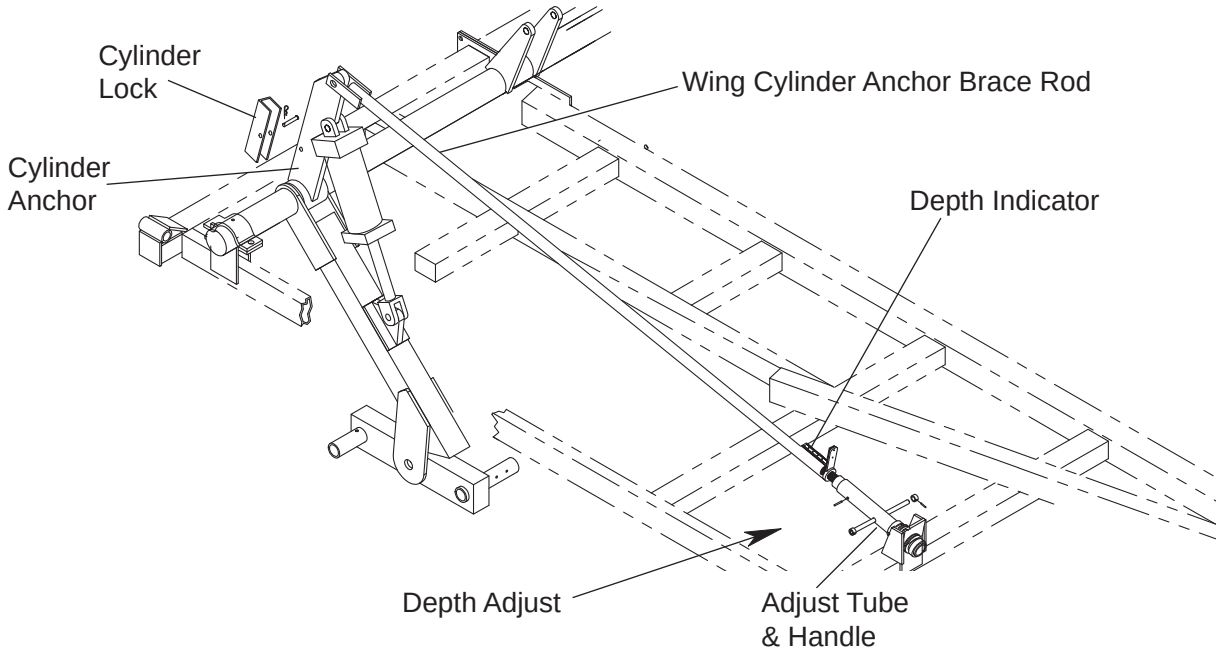
b. If the heights of either or both wings are different than the center section, adjust the wing cylinder anchor brace rods until the wing is the same height as the center.

1. The wing cylinder anchor braces can be adjusted independently of each other and independently from the center section.

2. Turn the adjust tube clockwise to raise the wing; counter-clockwise to lower the wing.

3. 1 turn of the adjust tube will equal about 5/16 inch of height difference.

Note: You will have to lower the machine onto the shanks to be able to turn the adjust tubes.

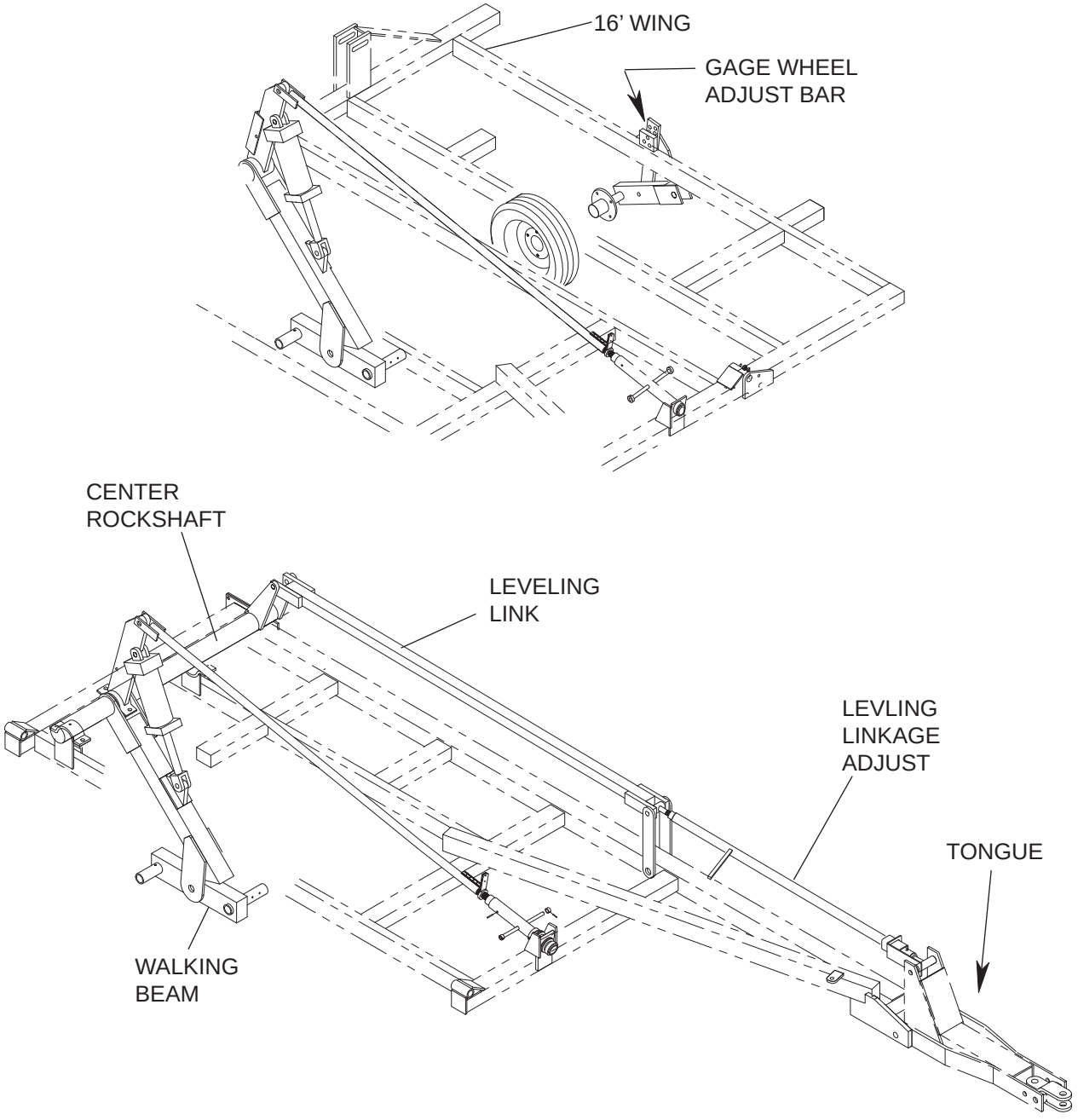


3. If your machine is 16 feet through 19 feet wide, the wing gage wheels are used only to control the operating depth. Check to make sure that the machine is level in the operating position. If it is not, set the wing gage wheel to a higher or lower position by using different holes in the gage wheel adjust bar. See Figure 3A.

4. Measure to see if the machine is level from front to rear.

   a. If the front of the machine is higher than the rear, shorten the leveling linkage between the tongue and leveling link by using the handle on the brace tube to turn the leveling link clockwise.

   b. If the rear is higher than the front, lengthen the leveling linkage (turn counter-clockwise).



OPERATING INSTRUCTIONS

DO NOT allow others on or near the tractor and the machine when operating or preparing to operate the machine.

Prepare the machine for transport

1. Extend the transport wheel cylinders completely. These are series cylinders and are designed to raise the machine evenly. The cylinders will rephase or equalize at the end of their stroke. Simply continue to hold the hydraulic control lever of the tractor in the extend position until all cylinders in the system are completely extended. Do this occasionally during operation at the end of the rows to make sure that the cylinders remain in phase.

2. With the machine in the up or transport position, raise the wings to folded position.

Know the folded height of your field cultivator and any attachments. Be sure that you are not under any electrical lines or any other obstruction that could cause injury to the operator or damage to the equipment.

3. Use the transport locks to lock the machine in the transport position. See figure 3.

Maximum road speed is 15 MPH under good conditions. Do not tow the machine at a speed at which the operator loses control of his vehicle.

It is the responsibility of the owner/operator to comply with all applicable laws regarding slow moving vehicle signs, warning lights, reflectors, and safety chains.

Safety Chain

Use of a safety chain is recommended if the machine is towed on a public road or highway. Total weight of towed machine must not exceed chain capacity as shown on the chain's identification tag. Such a chain, along with hardware to attach to the Field cultivator is available as Kit #1K822.

See illustration below and install as shown (not all of the hardware will be used). Slack in the chain should be only enough to permit turning. Distance from hitch pin to attachment point or intermediate support should not exceed 9".

CAUTION If two or more machines are pulled in tandem, a larger chain may be required. Chain capacity must be greater than the <u>total</u> weight of towed implements. A second chain should be used between each implement.

CAUTION Replace chain if one or more links are broken, stretched, or otherwise damaged or deformed.

Keep attaching hardware fastened securely.

If bolts are replaced, be sure to use grade 5 or higher.

If you have any questions regarding the safety chain call your Brillion dealer.

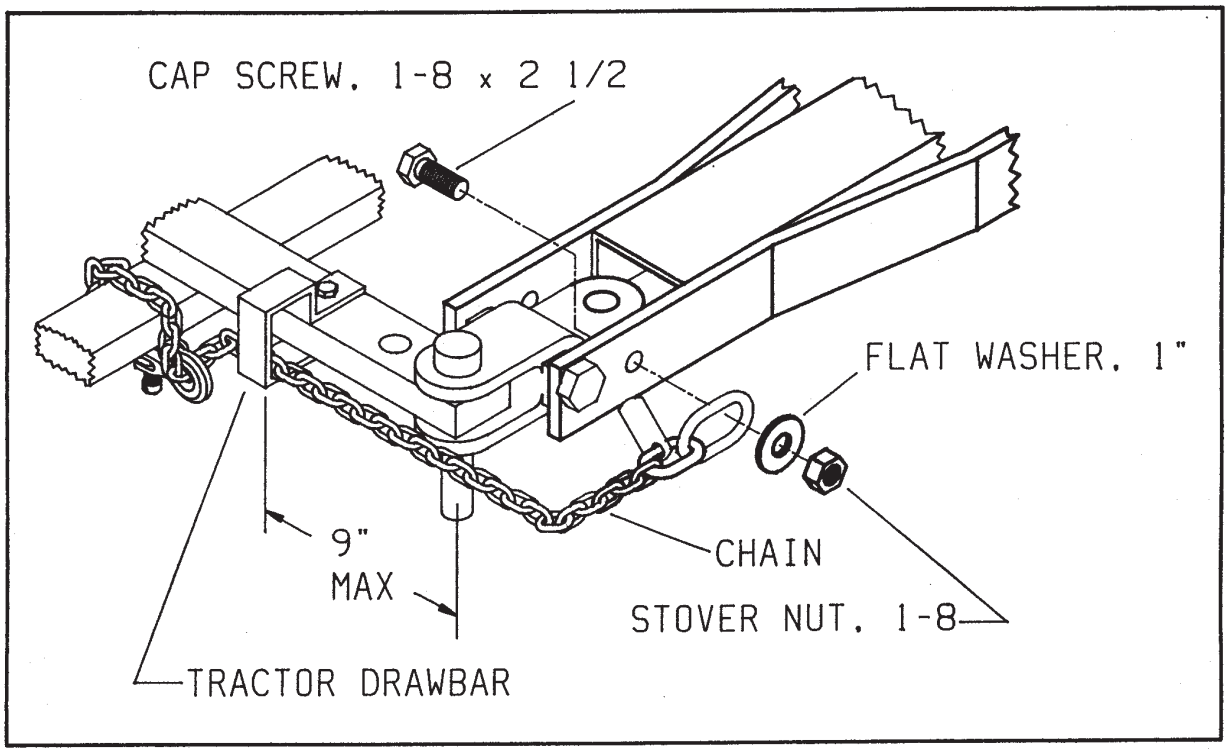


FIGURE 5

Prepare the machine for field operation

1. Raise the machine fully on its transport wheels.

2. Remove the transport locks on both center axle lift cylinders and place them in their stor age position. See figure 3.

3. Lower the wings by extending the wing lift cylinders. Make sure that the cylinders are extended completely, this will allow the wings to float down to follow the contour of the ground.

Operating depth adjustment

1. With the machine leveled, the transport locks removed, and the wings unfolded, set the approximate working depth by adjusting the cylinder anchor brace rods. See figure 6. The scales on the anchor adjust rods are used to make sure that the brace rods are set equally. The wing operating depth can be adjusted independently of the center section by changing the anchor rod length as required. Shortening the brace tube raises the wing, decreasing the operating depth. Lengthening the brace tube increases operating depth.

   Note: The wing operating depth of **16 through 19 foot wide machines** is controlled by pinning the gage wheel adjust bar where required.

   Note: Lower the machine onto the shanks to turn the adjust tubes.

   Important: Adjust both anchor braces on the center section equally. Unequal length braces will put a strain on the center axle, center frames, and on hydraulic cylinders.

INDICATOR SCALE READING	DIMENSION "A" (EXPOSED THREAD)	DIMENSION "B" (OPERATING DEPTH)
E	3/16"	0"
D	1"	1 1/4"
C	2"	2 3/4"
B	3"	4 3/8"
A	4"	6"

NOTE:
THESE ARE APPROXIMATE DIMENSIONS
VERIFY OPERATING DEPTH BY MEASURING PENETRATION OF TOOTH INTO THE GROUND.
ONE TURN OF THE DEPTH ADJUST ROD EQUALS 5/16" DIFFERENCE IN OPERATING DEPTH

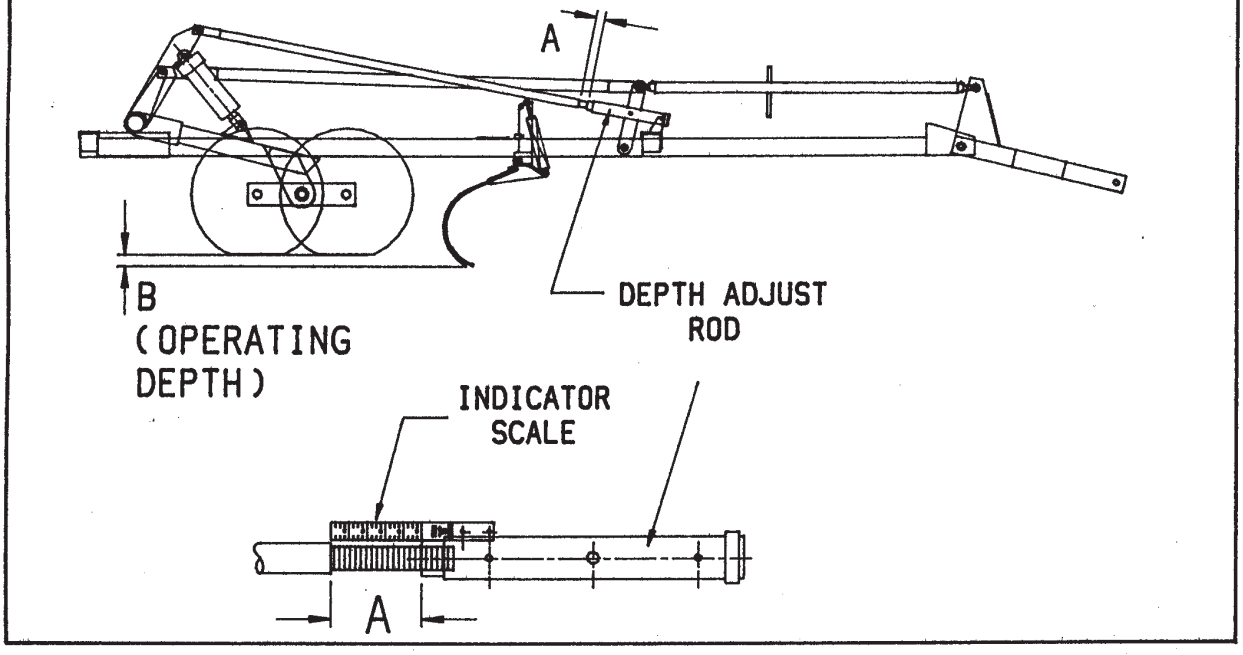


Figure 6

2. Level the machine front to rear by adjusting the leveling linkage as required. Lengthening the linkage raises the front, shortening the linkage lowers the front.

   NOTE: In operation, the adjustment of wing gage wheels will probably be different than the center section. This is due to the difference in tires and also because the wheels of the center section are probably following in the tractor tire tracks. **The best way to check if the machine is level**, is to make all the adjustments, lower the machine into the operat ing position, then drive forward several feet. Now, stop, slowly raise the machine and watch as the sweeps of the field cultivator come out of the ground. They should all come out at the same time. If the front of the machine comes out of the ground before the rear, lower the front of the cultivator. If the wings come out of the ground before the center, set the wings to operate deeper and vice versa.

3. After the machine has been leveled in the operating position, operate a few feet and verify the operating depth. The depth can now be changed by adjusting all brace rod tubes equally.

MAINTENANCE

Fasteners

After a few hours use, check entire machine and tighten any loose nuts or bolts. Daily or periodic checks should be made thereafter.

Shanks

After 5 hours of operation, and every 50 hours thereafter, check to make sure that the shank pivot bolts are tight. Loose pivot bolts will permit the bushing to rotate in the spring holder causing the holes to wear, resulting in sloppy shank support.

Tires

The wheels furnished with the FIELD CULTIVATOR are designed for use with **9.5L-15, 8 ply** rib implement tires on the center section, **7.60-15, 6 ply** rib implement tires are used on the wings when they are equipped with walking beams. When single tires are used on the wings, **9.5L-15, 8 ply** tires are used. Wing gage wheels on the 16 through 19 foot wide models are designed for use with **6.70-15, 4 ply** or **7.60-15 4 ply** tires. These tires must be inflated to 44 psi.

NOTE: USE OF SMALLER OR LIGHTER TIRES WILL CAUSE PREMATURE TIRE FAILURE AND MAY CAUSE AN ACCIDENT.

Lubrication

Lubricate your field cultivator at the locations shown in figure 7. The number in the lubrication symbol indicates the hourly interval between greasing.

Always lubricate your field cultivator before taking it to the field for the first time.

Lower the implement unto the shanks before greasing.

Replace any missing fittings and clean all fittings before greasing.

Wheel bearings and walking beam bearings should be repacked annually. Follow the disassembly and reassembly procedures on page 15 figure 8 when repacking these bearings.

When the machine is not to be used for some time, exposed portions of the cylinder rods should be cleaned and covered with a thick coat of grease. This will prevent corrosion which will damage seals.

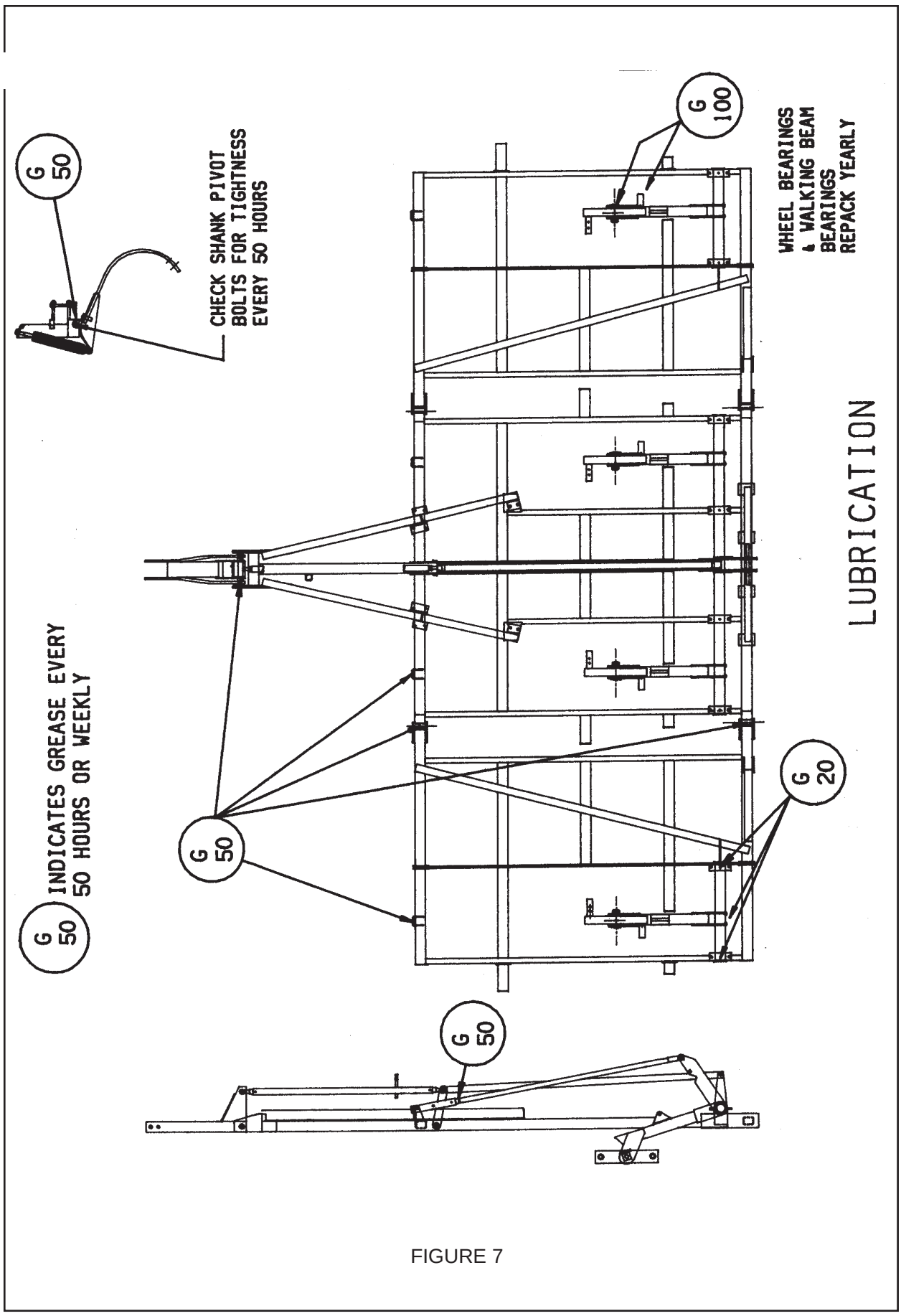
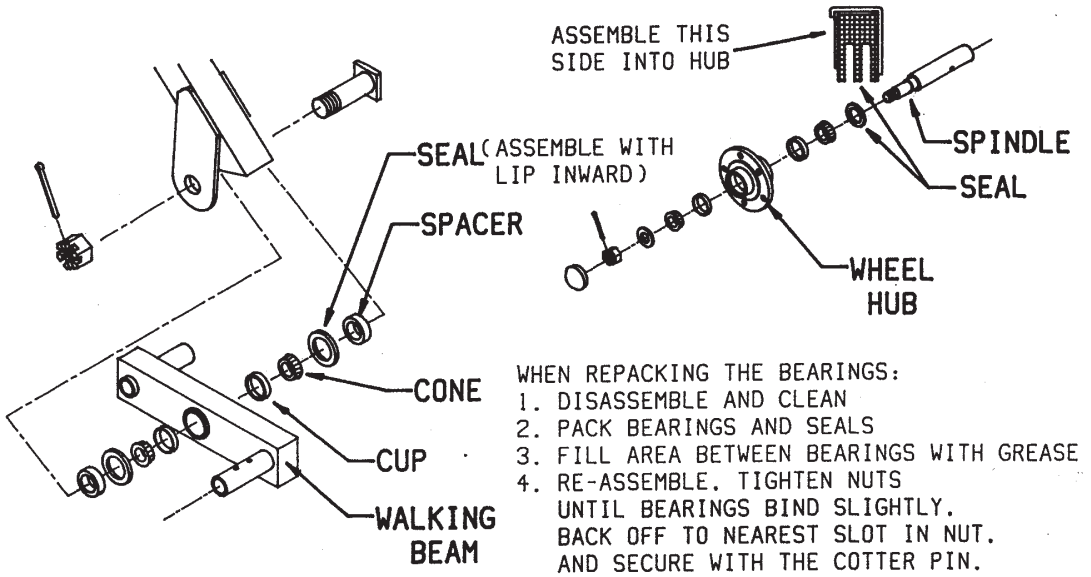

LUBRICATION
G 50 INDICATES GREASE EVERY 50 HOURS OR WEEKLY
G 50
CHECK SHANK PIVOT BOLTS FOR TIGHTNESS EVERY 50 HOURS
G 50
G 50
G 50
G 100
WHEEL BEARINGS & WALKING BEAM BEARINGS REPACK YEARLY
G 20

FIGURE 7



USE STANOLITH 57 LITHIUM BASE GREASE OR EQUIVALENT **FIGURE 8**

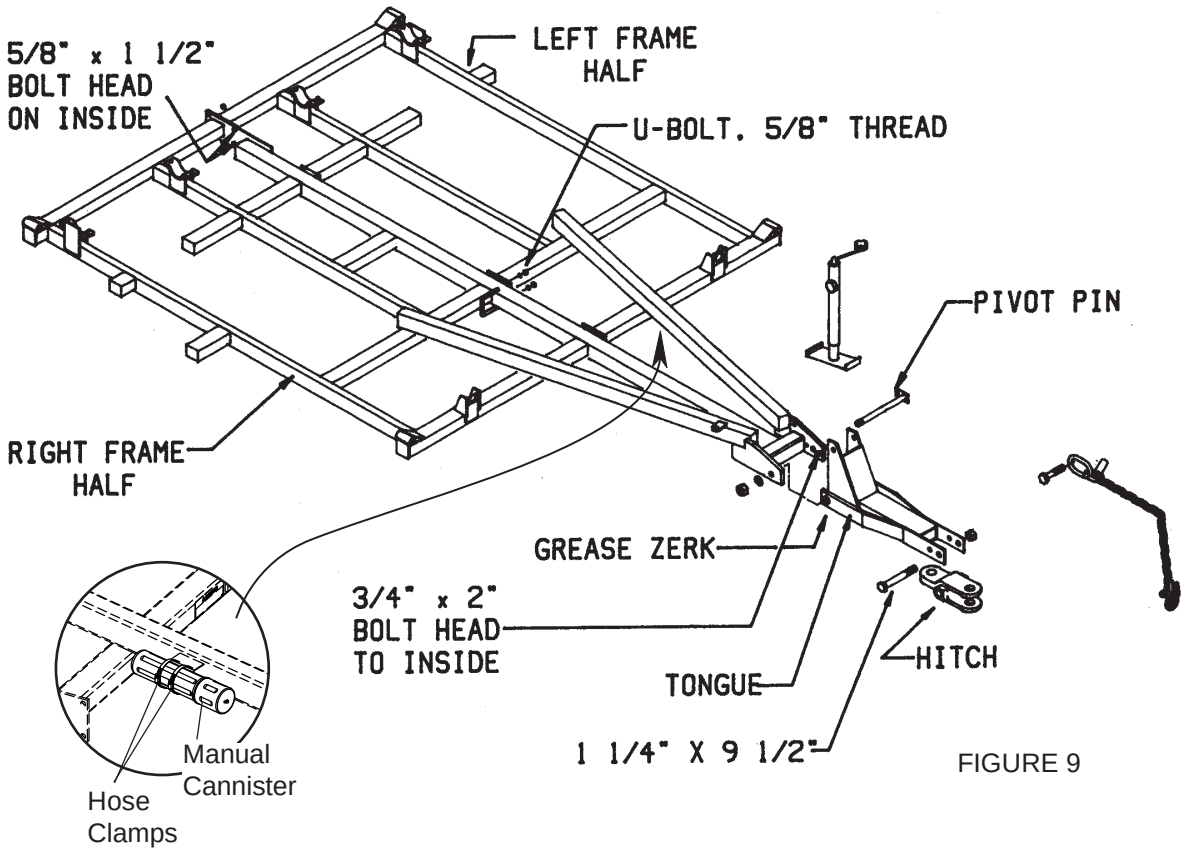


FIGURE 9

ASSEMBLY INSTRUCTIONS

1. Frame halves.

   A. Support the two frame halves on supports of equal height. Position the frame halves as shown in figure 9 on page 15.

   B. **Loosely** bolt the halves together with (4) 5/8 x 1 1/2" long capscrews, lockwashers, and nuts on the rear side plate, and (3) 3/4 x 2" long capscrews, lockwashers, and nuts at the front plates. The heads of the bolts must be to the inside of the drawbar as shown.

   C. Attach the plates of the left frame with (6) 5/8 x 4 11/16 x 5 1/2" deep U-bolts, lockwashers, and nuts. **DO NOT TIGHTEN UNTIL AXLE IS IN PLACE.**

   D. Using the 1 1/4" diameter pivot pin that will be used to attach the tongue to the drawbar, make sure that the holes for this pin align. **Tighten the 3/4" bolts on the hitch plates**. Make sure that the pivot pin holes remain in alignment while tightening the bolts.

2. Tongue to the drawbar and the clevis to the tongue.

   A. Install a grease zerk into the tongue. This is a self-tapping fitting (found in the box with the pivot pin) and should be turned into the hole.

   B. Attach the tongue to the drawbar with the pivot pin. Loosen one of the nuts connecting the drawbar brace to the drawbar and use this bolt to lock the pivot pin in place. Turn a 1 1/4" locknut on to the pivot pin. Do not over-tighten, (tongue must be able to pivot). Attach the hitch to the tongue with a 1 1/4" x 9 1/2" long capscrew and locknut.

3. Center rockshaft and wheels.

   A. Mount (4) **9.5L-15,8 ply** tires on the **15 x 8LB** rims and attach to the hubs of the center rockshaft.

      Note: If your FIELD CULTIVATOR is equipped with S-tines, the spindle should be bolted in the hole in the sleeve (of the walking beam) which will position the wheel farthest from the wheel arm. This will prevent the tire from contacting the tine in the transport position.

   C. Apply some grease to the bearing saddles on the frames, and lower the center rockshaft and wheels into the bearings. The cylinder anchors must be in the "up" position shown in figure 10 when positioning the rockshaft.

   D. Apply some grease to (4) bearing caps and use them to trap the rockshaft in place. Secure with (8) 3/4 x 2" long capscrews, lockwashers, and nuts. **TIGHTEN THESE BOLTS <u>THEN</u> TIGHTEN ALL FRAME HARDWARE.**

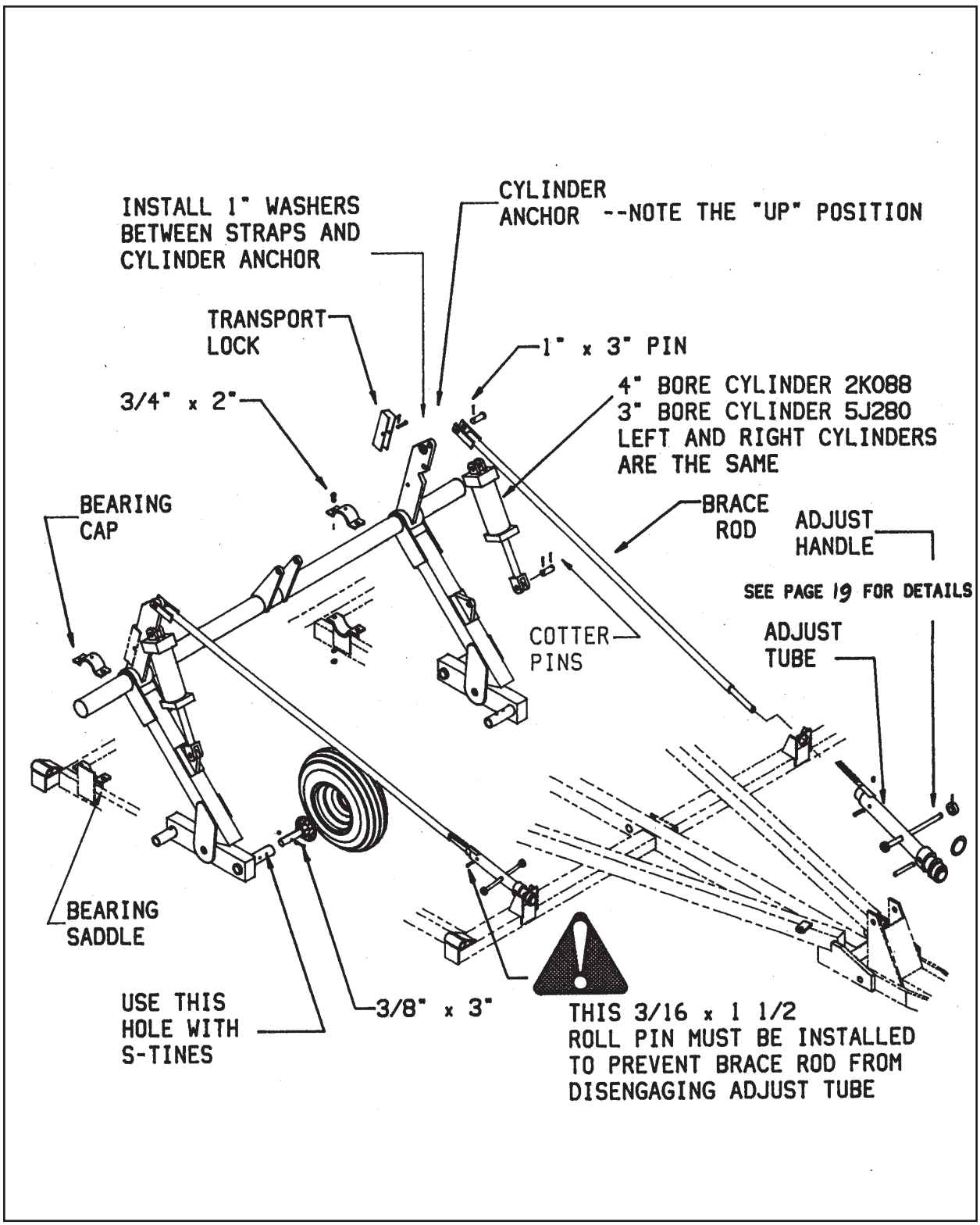

INSTALL 1" WASHERS BETWEEN STRAPS AND CYLINDER ANCHOR
CYLINDER ANCHOR --NOTE THE "UP" POSITION
TRANSPORT LOCK
1" x 3" PIN
3/4" x 2"
4" BORE CYLINDER 2K088
3" BORE CYLINDER 5J280
LEFT AND RIGHT CYLINDERS
ARE THE SAME
BEARING CAP
BRACE ROD
ADJUST HANDLE
SEE PAGE 19 FOR DETAILS
COTTER PINS
ADJUST TUBE
BEARING SADDLE
USE THIS HOLE WITH S-TINES
3/8" x 3"
THIS 3/16 x 1 1/2 ROLL PIN MUST BE INSTALLED TO PREVENT BRACE ROD FROM DISENGAGING ADJUST TUBE

FIGURE 10

4. Cylinder anchors and braces.

A. Remove the plug from the cylinder anchor and screw in 65° grease fittings.

B. Place 2 of the 3 1/2 O.D. x 10 gage machinery bushings onto each adjust tube, then extend (2) adjust tubes through the plates on the front of the center frames. now place 2 more of the machinery bushings and one of the 2 7/8" O.D. x 3/4" long collars (with a hole drilled through) over each adjust tube. Thread the brace rod into the adjust tube until you can install the 3/16" diameter x 1 1/2" long roll pin through the adjust tube and into the threaded end of the brace rod.
See Figure 11 on page 19.

This roll pin must be installed to prevent excess adjustment and to prevent the two halves of the adjust tube from coming apart causing damage to the machine or injury to the operator.

C. Drive 3/8" diameter x 3" long roll pins through the 2 7/8" O.D. collars and the adjust tubes to lock it in place.

D. Assemble the brace rods to the cylinder anchors with (2) 1" diameter x 3" long clevis pins, 1" diameter flat washers, and 3/16 diameter x 2" long cotter pins. Screw straight grease fittings into each adjust tube. These fittings are found in the box with the adjust tubes.

E. Insert the 5/8" diameter x 12" long adjust handles through the adjust tube and secure them by driving (2) 3/16" diameter x 7/8" long roll pins through the 1" O.D. x 9/16" long collar (with holes drilled through) and through the adjust handles.

F. Fasten the depth indicator scales to the adjust tube by using (2) self-tapping screws (found in a white cloth bag). Holes are drilled in the end of the adjust tube for these screws.

5. Center section wheel cylinders.

A. Using the pins that are packaged with the cylinders, connect the butt end of the cylinder with the 4" bore (part number **2K-088** is stamped on the box and on the cylinder barrel) to the cylinder anchor. **16 through 19 foot wide cultivators** use cylinders with a 3" bore (part number **5J-280**). Connect the rod end to the lug on the wheel arm. The ports on these cylinders must be facing up.

IMPORTANT The cylinder pins should be secured with **cotter pins.** If hairpin clips a packaged with your cylinders, do not use them as they may have a tendency to become loose. The ends of the cotter pins should simply be bent over, **do not** fold the ends of the cotter pins into the groove on the cylinder pins.

B. Place cylinder transport locks in their storage position on the wheel cylinder anchors and secure them with 1/2" diameter x 3 1/4" long clevis pins and hairpin clips.

CYLINDER ANCHOR ROD & ADJUST TUBE WITH DEPTH ADJUST SCALE (Detail)

WING SECTIONS

Note: *See the following page for special additional instructions on Center Section*

1. Attach the bent scale to the lock.
2. Turn the lock onto the cylinder anchor before connecting the cylinder anchor to the depth adjust tube.

**Note: The lock must be positioned as shown with the offset part toward the adjust tube.*

3. Turn the lock against the depth adjust tube to keep it from turning.

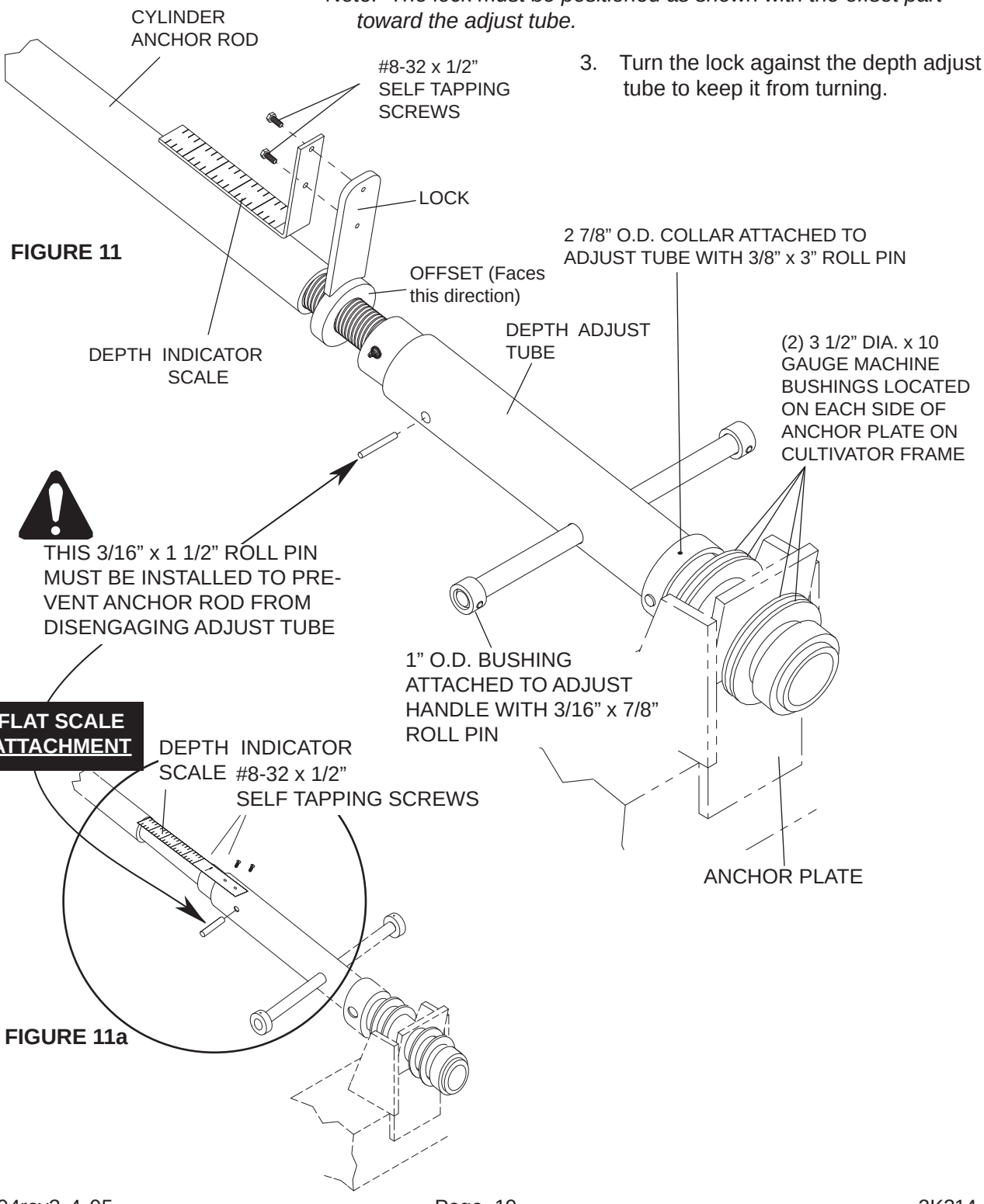


FIGURE 11

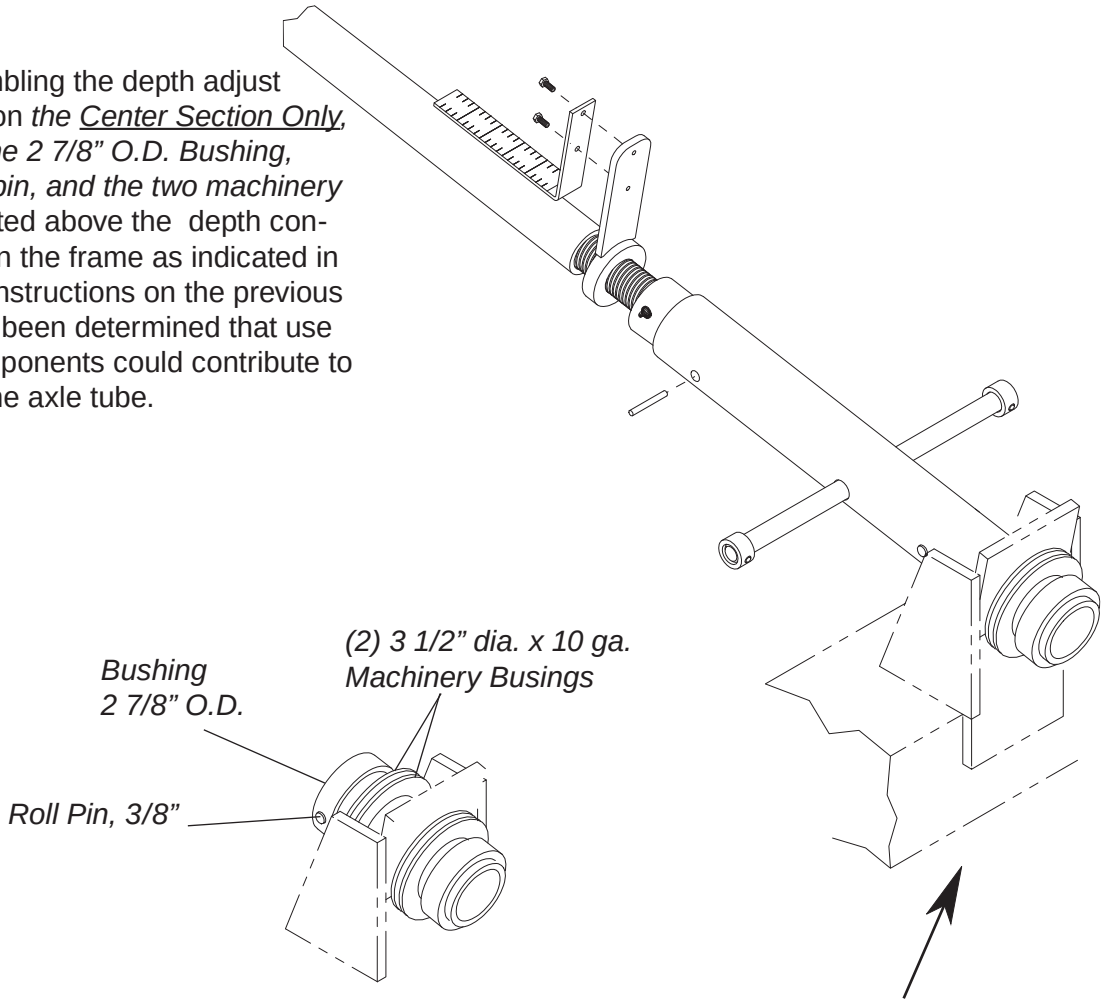
FLAT SCALE ATTACHMENT

FIGURE 11a

DEPTH ADJUST MECHANISM ASSEMBLY
CENTER SECTION ONLY

Follow the same general instructions as for the wing sections except with the following differences:

When assembling the depth adjust mechanism on *the <u>Center Section Only</u>, do not use the 2 7/8" O.D. Bushing, the 3/8" roll pin, and the two machinery busings* located above the depth control anchor on the frame as indicated in the general instructions on the previous page. It has been determined that use of these components could contribute to damage to the axle tube.



Do Not use these components -----it should look like this.

6. Leveling linkage.

A. Attach the 2 rocker arms to the drawbar part of the right frame with a 3/4 x 6 1/2" long bolt. Place a 3/4" flat washer and a spacer bushing (1 1/4 O.D. x 3/4 I.D. x 9/16" long) on the bolt, then position the large hole of the rocker arm over the bushing. Insert the bolt through the holes in the 4 x 4 frame tube and put a bushing and the other rocker arm onto the bolt. Trap the rocker arm with a flat washer and a locknut.

B. Connect the leveling link between the lugs on center rockshaft with a 1" diameter x 6 7/8" long pin, 1" diameter flat washers, and (2) 1/4" diameter x 2" long roll pins.

C. Install the other 1" diameter x 6 7/8" long pin through one of the rocker arms, then through a washer and through one of the lugs of the leveling link, then through a 1" washer, the rod end of the adjust tube, another 1" washer, then through the other lug of the leveling link, a washer, and finally through the remaining rocker arm. Trap the pin with (2) 1" diameter flat washers and (2) 1/4" diameter x 2" long roll pins.

D. Slide the rod screw of the other end of the adjust tube through the hole in the lock and connect that end to the plates on the tongue with a 1" diameter x 8 1/4" long pin, (2) 1" diameter flat washers, and (2) 1/4" diameter x 2" long roll pins. The lock fits down over the square tube near the end of the adjust tube to hold it in place during operation. See figure 12.

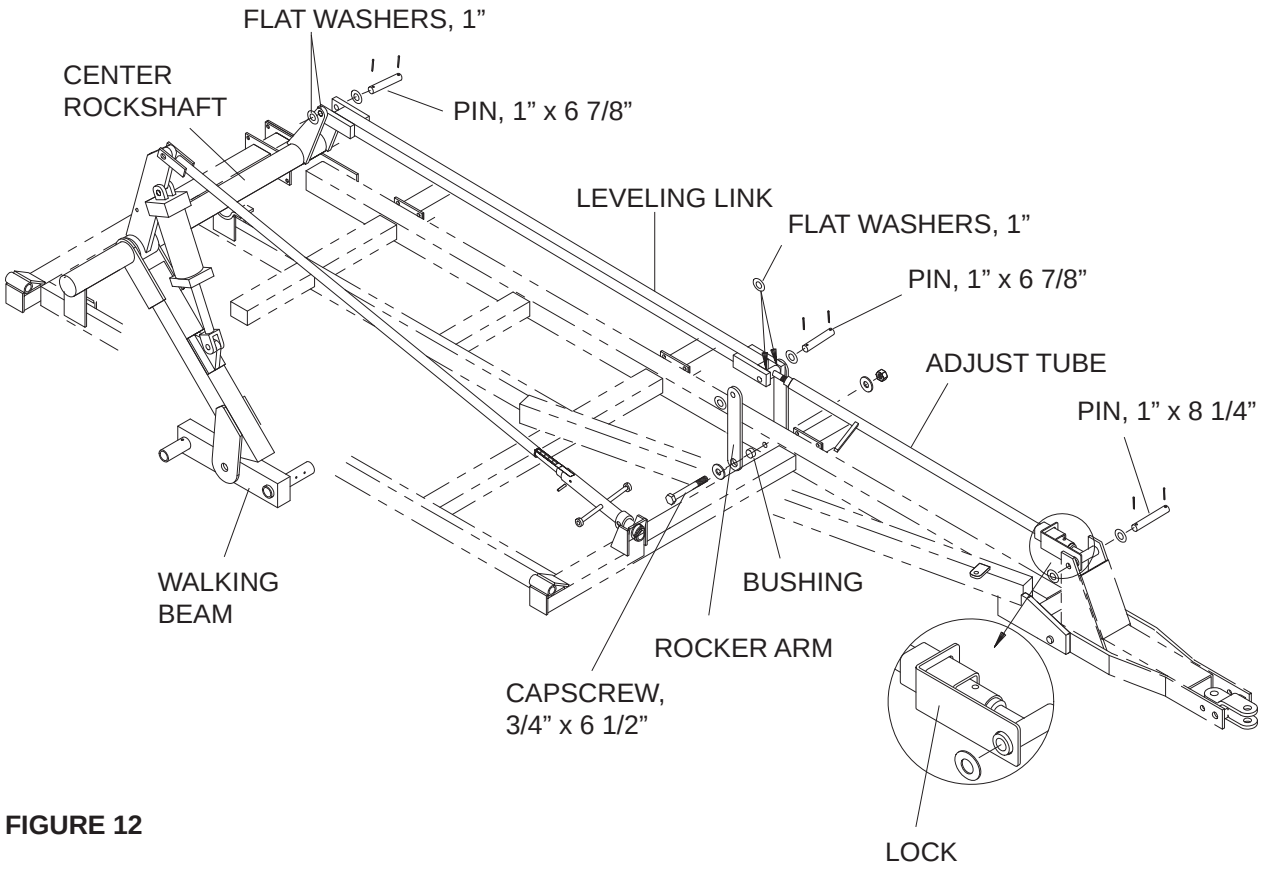


FIGURE 12

7. Wings and extensions. [Note: If your machine is smaller than HFC16 through HFC31 models (such as HFC12 through HFC15), see pages 21a -21c].

A. Attach the left and right wings to the center frame by installing hinge pins through the two sets of hinges on each side. Trap the hinge pin to the hinge by extending 1/2" x 1 1/2" long capscrews through the hinge pin and through the hole in a hinge plate, secure with a lockwasher and nut.

B. If the total machine width is 24 feet or greater, bolt a wing extension weldment to the wings. Attach the extension to the wing by using (8) 1/2" x 1 1/2" long capscrews and (8) 1/2" x 2" long capscrews, lockwashers, and nuts on each wing.

C. Attach shank mounts to the wings or to the extensions as shown in figures 21 through 24. Use the U-bolts, nuts, and lockwashers attached to the shank mounts.

D. If the cultivator is equipped with S-tines, attach the shank mounts to the center frame as shown in figures 21 through 24. Use the hardware attached to the shank mounts to attach them to the frame.

E. Screw (4) straight grease zerks into hinge tubes.

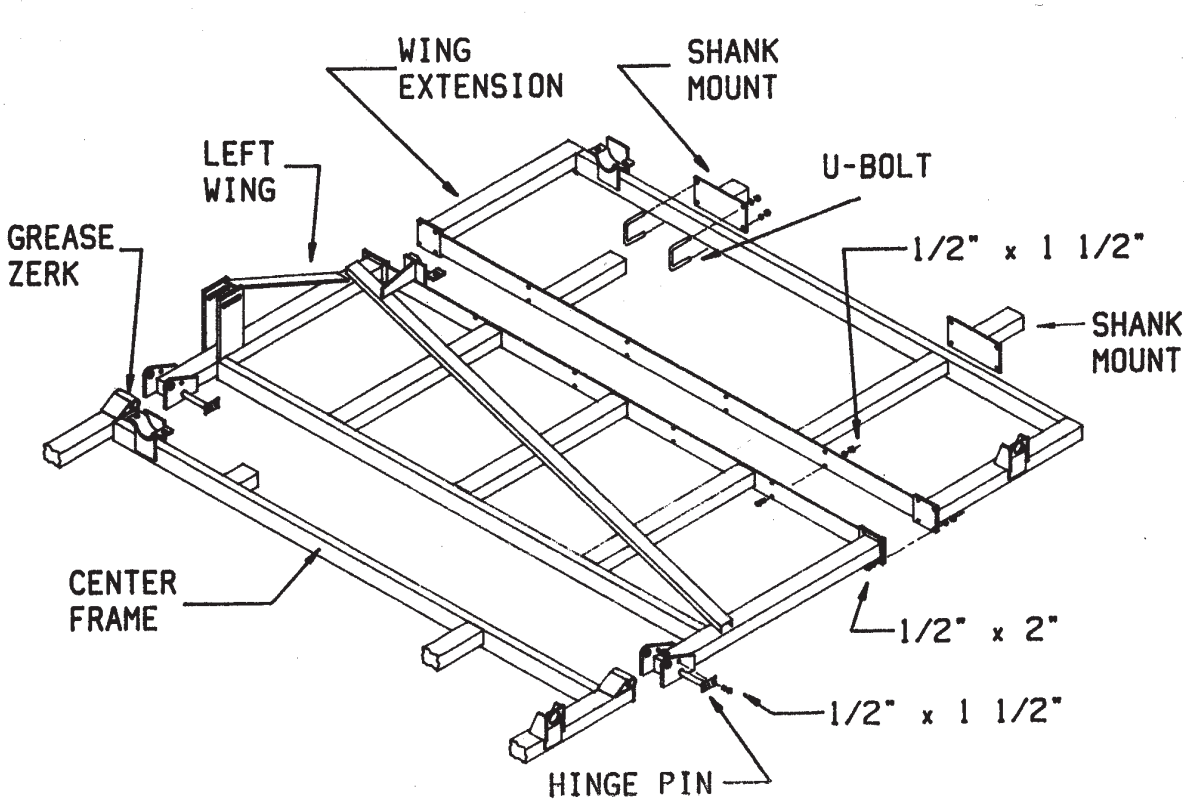
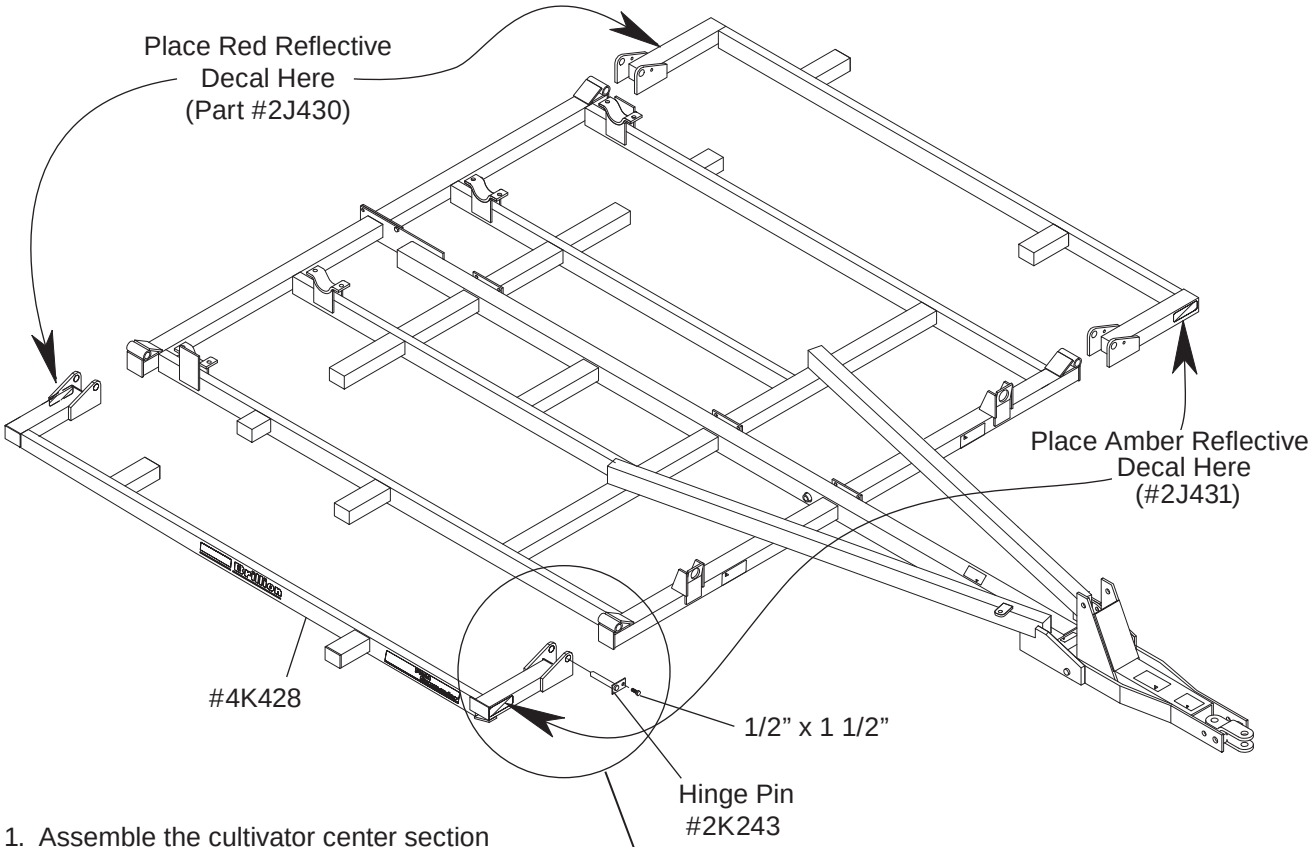


FIGURE 13



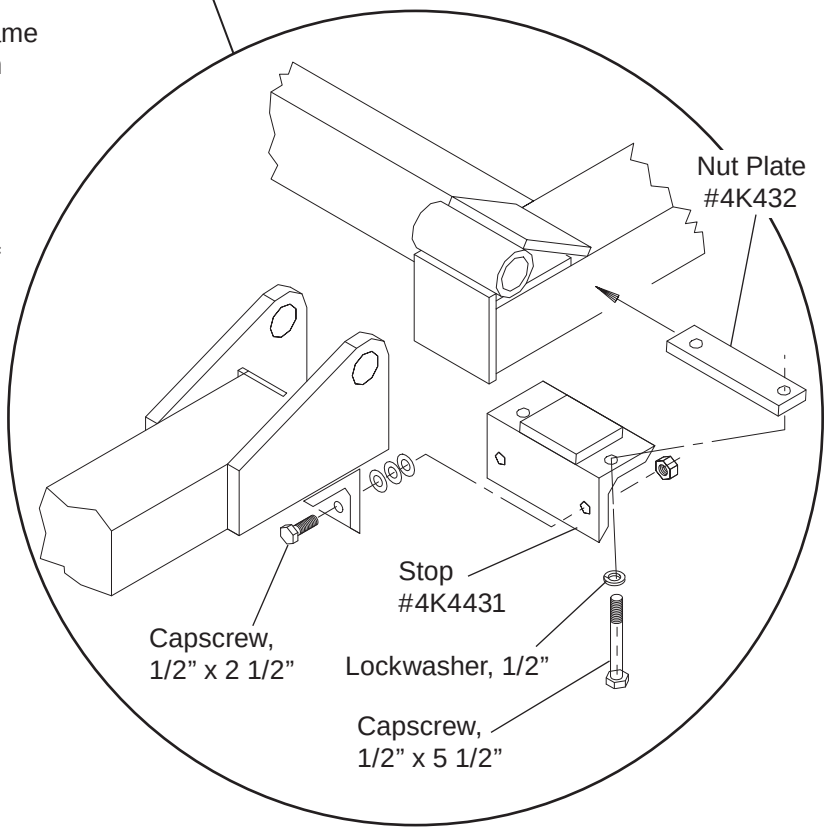
1. Assemble the cultivator center section according to the instruction on the preceding pages for 16- to 31-foot models through step 6 on page 20.

2. Assemble the two extensions the same way that wings would be mounted in step 7, pg. 21

3. Slide ;the 4K432 nut plate under the hinge tube brace as shown at right.

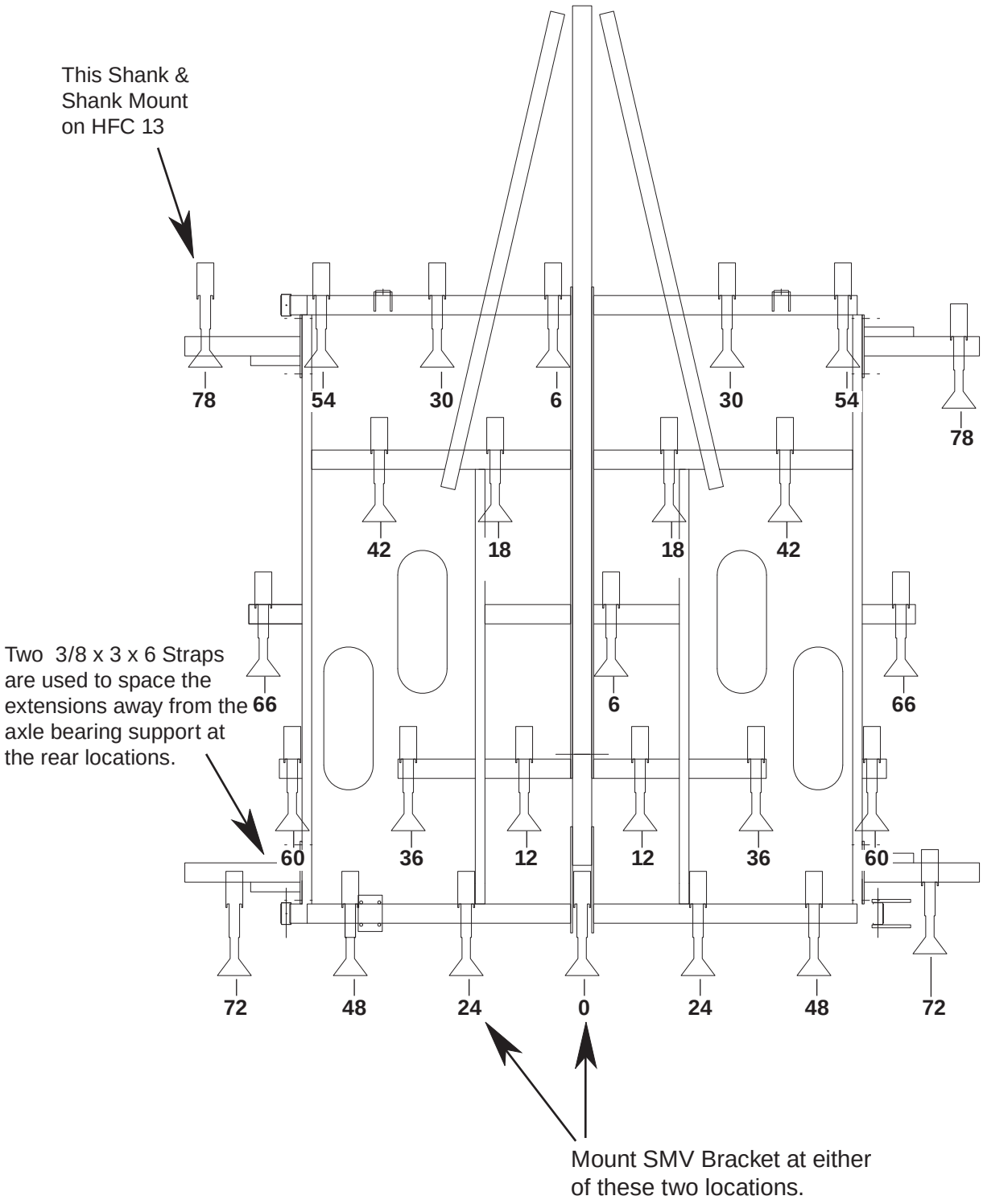
4. Bolt the 4K431 stop to the bottom of the center frame tube as shown.

5. Level the extensions and use an appropriate number of washers to keep the wing horizontal.

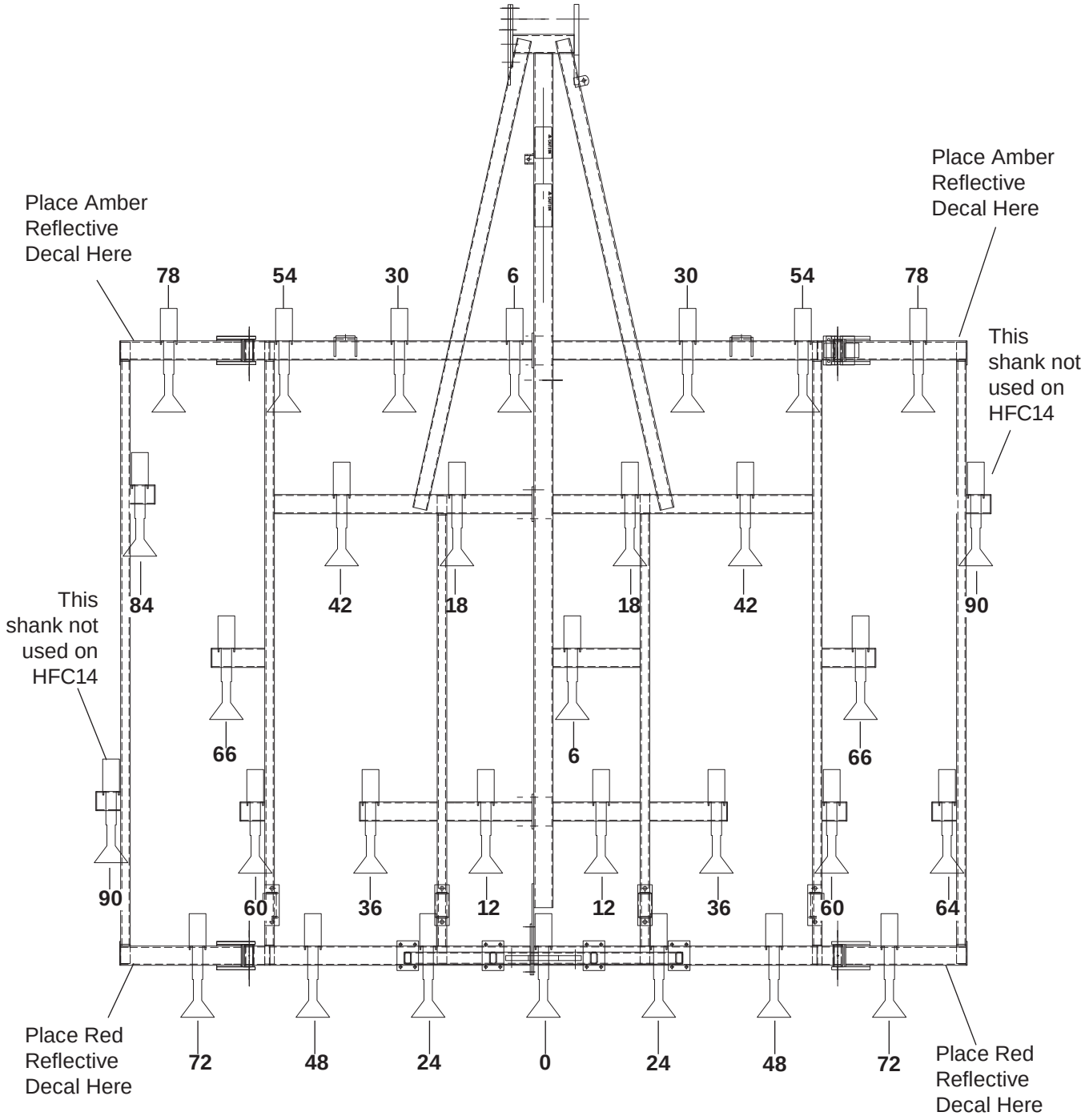


SHANK LOCATIONS FOR HFC 12 & 13

Assemble the cultivator center section according to instructons through Step t on Page 20, then add the extensions as required.



SHANK LOCATIONS - HFC14 & HFC15



Note: If drags are mounted to your Field Cultivator, make sure Reflective Decals are not obscurred:

Order Part #2J430-Red Reflecive Decal

Mount SMV Bracket at Either of These Two Locations

Note: If your FIELD CULTIVATOR is **16 feet through 19 feet wide** proceed to step 11.

8. Wing rockshafts and wheels.

   A. If your cultivator has single wheels on the wings, mount (2) **9.5L-15, 8 ply** tires on the **15 x 8LB** rims and attach to the hubs on the wheel arms.

   B. If your cultivator has tandem wheels on the wings, mount (4) **7.60-15, 6 ply** tires on the **15 x 6LB** rims and attach to the hub and spindle assemblies of the walking beam. If your cultivator is to be equipped with S-tines, the spindles should be bolted in the hole in the sleeve of the walking beam which is farther from the wheel arm. This will prevent the tire from contacting the tine in the transport position. Use the hole in the sleeve closest to the wheel arm if your cultivator will be equipped with the spring loaded shanks.

   Note: The left wing rockshaft assembly has the sleeve with two holes for the wheel spindle pointing toward the right as shown in figure 14. The right hand assembly has this sleeve pointing toward the left.

   Note: On machines with single tires on the wing gage wheels, the wheel points toward the outside of the machine.

   C. Apply some grease to the bearing saddles on the wings, and lower the wing rockshafts and wheels into the bearings.

   D. Apply some grease to (4) bearing caps and use them to trap the rockshafts in place. Secure with (8) 3/4 x 2” long capscrews, lockwashers, and nuts.

   E. Screw grease fittings into the cylinder anchors.

9. Wing cylinder anchors and braces.

   A. Place 2 of the 3 1/2 O.D. x 10 gage machinery bushings onto each adjust tube, then extend (2) adjust tubes through the plates on the front of the center frames. now place 2 more of the machinery bushings and one of the 2 7/8” O.D. x 3/4” long collars (with a hole drilled through) over each adjust tube. Thread the brace rod into the adjust tube until you can install the 3/16” diameter x 1 1/2” long roll pin through the adjust tube and into the threaded end of the brace rod. Figure 11.

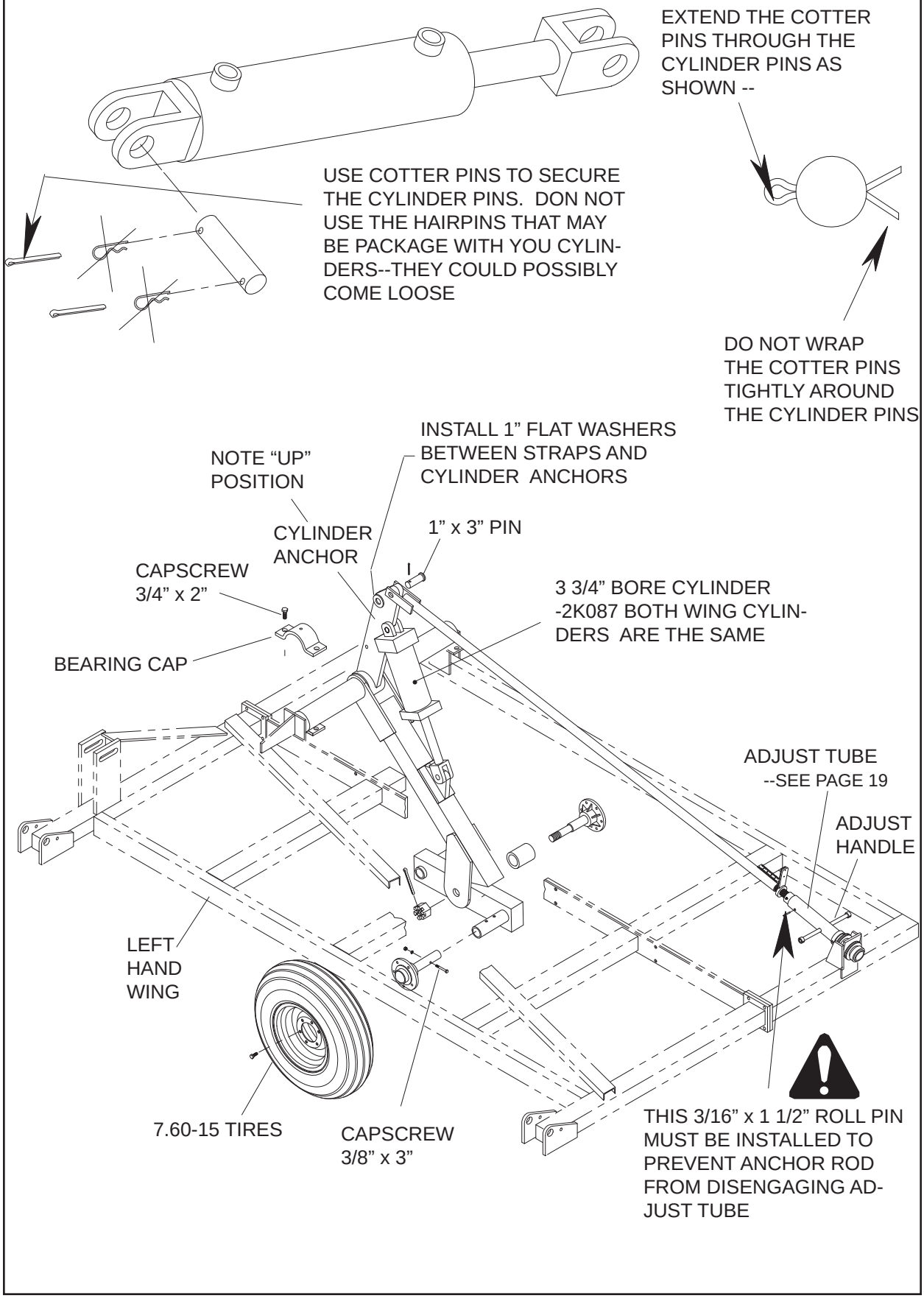
   This roll pin must be installed to prevent excess adjustment and to prevent the two halves of the adjust tube from coming apart causing damage to the machine or injury to the operator.

   B. Drive 3/8” diameter x 3” long roll pins through the 2 7/8” O.D. collars and the adjust tubes to lock it in place.

   C. Assemble the brace rods to the cylinder anchors with (2) 1” diameter x 3” long clevis pin, 1” diameter flat washers, and 3/16 diameter x 2” long cotter pins. Screw straight grease fittings into each adjust tube. These fittings are in the same box with the adjust tube.

   D. Insert the 5/8” diameter x 12” long adjust handles through the adjust tube and secure them by driving (2) 3/16” diameter x 7/8” long roll pins through the 1” O.D. x 9/16” long collar (with holes drilled through) and through the adjust handles.

FIGURE 14


EXTEND THE COTTER PINS THROUGH THE CYLINDER PINS AS SHOWN --
USE COTTER PINS TO SECURE THE CYLINDER PINS. DON NOT USE THE HAIRPINS THAT MAY BE PACKAGE WITH YOU CYLIN-DERS--THEY COULD POSSIBLY COME LOOSE
DO NOT WRAP THE COTTER PINS TIGHTLY AROUND THE CYLINDER PINS
INSTALL 1" FLAT WASHERS BETWEEN STRAPS AND CYLINDER ANCHORS
NOTE "UP" POSITION
CYLINDER ANCHOR
1" x 3" PIN
CAPSCREW 3/4" x 2"
3 3/4" BORE CYLINDER -2K087 BOTH WING CYLIN-DERS ARE THE SAME
BEARING CAP
ADJUST TUBE --SEE PAGE 19
ADJUST HANDLE
LEFT HAND WING
7.60-15 TIRES
CAPSCREW 3/8" x 3"
THIS 3/16" x 1 1/2" ROLL PIN MUST BE INSTALLED TO PREVENT ANCHOR ROD FROM DISENGAGING AD-JUST TUBE

10. Wing wheel cylinders.

A. Using the pins that are packaged with the cylinders, connect the butt end of the cylinder with the 3 3/ 4" bore (part number **2K-087** is stamped on the box and on the cylinder barrel) to the cylinder anchor. Connect the rod end to the lug on the wheel arm. Mount these cylinders with the ports up.

IMPORTANT The cylinder pins should be secured with **cotter pins.** If hairpin clips a packaged with your cylinders, do not use them as they may have a tendency to become loose. The ends of the cotter pins should simply be bent over, **do not** fold the ends of the cotter pins into the groove on the cylinder pins.

11. Wing gage wheels for **16 foot through 19 foot wide machines.**

A. Mount (2) **6.70-15 or 7.60-15, 4 ply** tires on the **15 x 4.5 KB** 4 bolt rims and attach to the hubs of the wheel arm assemblies.

B. Mount the wheel arm to the pivot tube welded to the bottom of the wing. Extend a 1 1/4 O.D. x 2 15/16" long bushing through the lugs on the wheel arm and through the pivot tube of the frame. Secure the wheel arm to the frame by extending a 3/4 x 5" long capscrew with a flat washer through the bushing and fasten with a flat washer and a 3/4" locknut. The wheel arm must be able to pivot on the frame.

C. Connect the single hole of the gage wheel adjust bar to the outside of the gage wheel arm with a 3/4 x 3 1/2" long capscrew and a locknut. The adjust bar must be able to pivot on the wheel arm. Extend the gage wheel adjust bar between the two lugs on the top of the wing and lock in place with a 3/4 x 2 3/4" long clevis pin and a hairpin clip.

12. Wing lift cylinders.

A. Center the wing lift cylinder anchor on top of the rear frame tube of the center frame.

Note: The wing lift cylinder anchor is not symmetric, and must be mounted with the cylinder lug offset to the rear as shown in figure 16.

B. Secure the cylinder anchor to the rear frame tubes with (8) 5/8" diameter x 4" wide x 4 1/2" deep U-bolts, lockwashers and nuts.

C. Using the clevis pin supplied with the cylinder, attach the butt ends of the two 30" stroke cylinders to the cylinder lug. Mount the cylinders with the ports facing the

D. Extend the cylinder, and attach the clevis end between the two lugs on the wings. Use a 1" diameter x 6" long pin, (2) 1" diameter flat washers, and (2) 5/16" diameter x 2" long roll pins to attach the clevis.

Note: When using the 3" diameter bore cylinder on 16 foot through 23 foot wide machines, center the cylinder clevis between the two wing lugs by using 1" diameter flat washers on each side of the cylinder clevis.

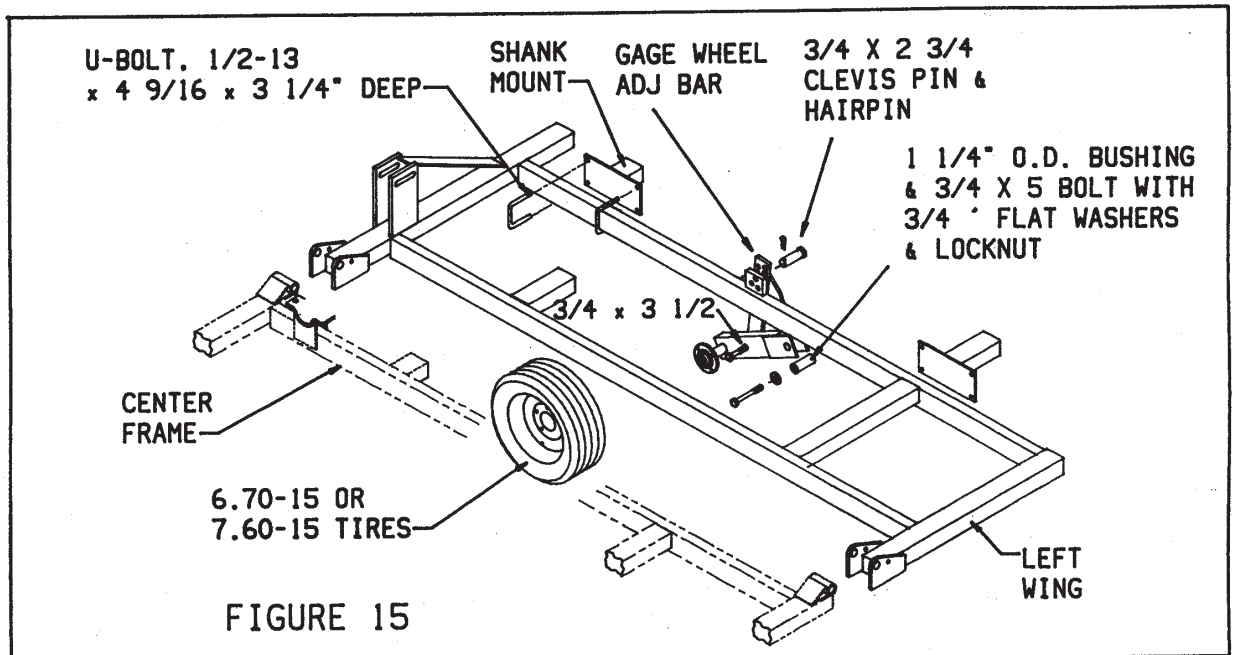


FIGURE 15

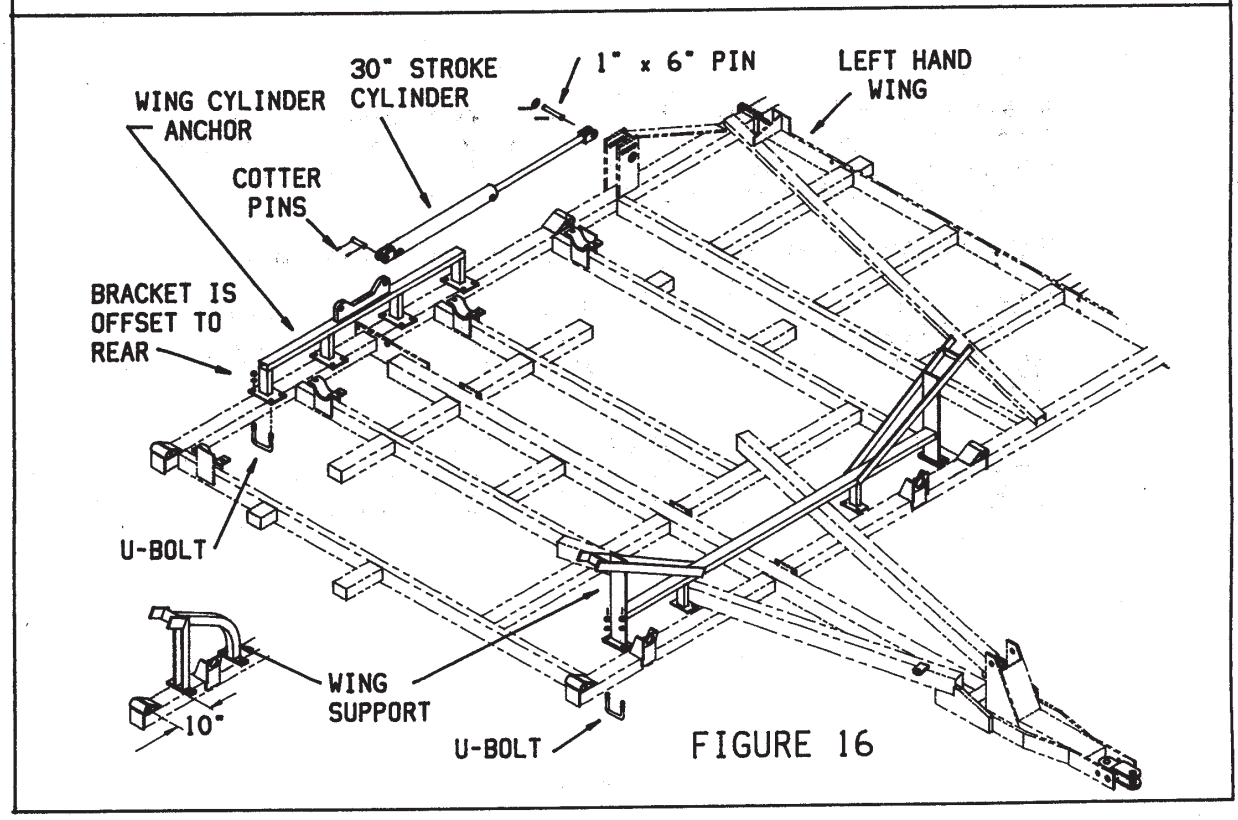


FIGURE 16

13. Wing support.

    A. If you have a one piece wing support, center it above the drawbar braces over the front tube of the center frame. If there are two wing supports, locate them 10” in from the hinge center as shown.

    B. Use (4) 5/8” diameter x 4” wide x 4 1/2” deep U-bolts to fasten the wing supports to the front tube of the center frame. Secure with lockwashers and nuts.

14. Hydraulic hoses.

    A. Connect the hydraulic hoses and fittings as shown in figures 17, 18, and 19 and in the repair parts catalog on pages 14, 16, and 18. Secure the hoses with the plastic cable ties where indicated. Part numbers of the hoses are stamped on the hose ends.

    Note: When folding and unfolding the wings the first time, and when lowering and raising the machine the first time, carefully observe the hoses to make sure that they are not pinched or stretched by any of the machine movement.

    B. Attach the hose holder to the lug on the right drawbar brace with a 5/8” x 2” long capscrew, flatwasher, lockwasher, and nut. Thread the hoses through the loop on the hose holder.

    C. It is suggested that the hydraulic system be charged with oil at this time.

    CAUTION: Escaping hydraulic fluid under pressure can have sufficient force to penetrate the skin, causing serious personal injury. Escaping hydraulic fluid can be almost invisible, use a piece of wood or cardboard to search for suspected hydraulic leaks rather than your hands.

    If injured by escaping hydraulic fluid, seek medical attention at once.

    Relieve pressure on hydraulic lines before uncoupling hoses from the tractor or adjusting any of the fittings. This is accomplished by shutting down the tractor, and operating the hydraulic control levers in both directions until there is no movement in any of the cylinders.

    Before raising or lowering the wings, be sure that the wing lift cylinders are properly bled (all air is removed from the hydraulic circuit). Improperly bled cylinders will permit the wings to free-fall, possibly causing injury to the operator and damage to the machine.

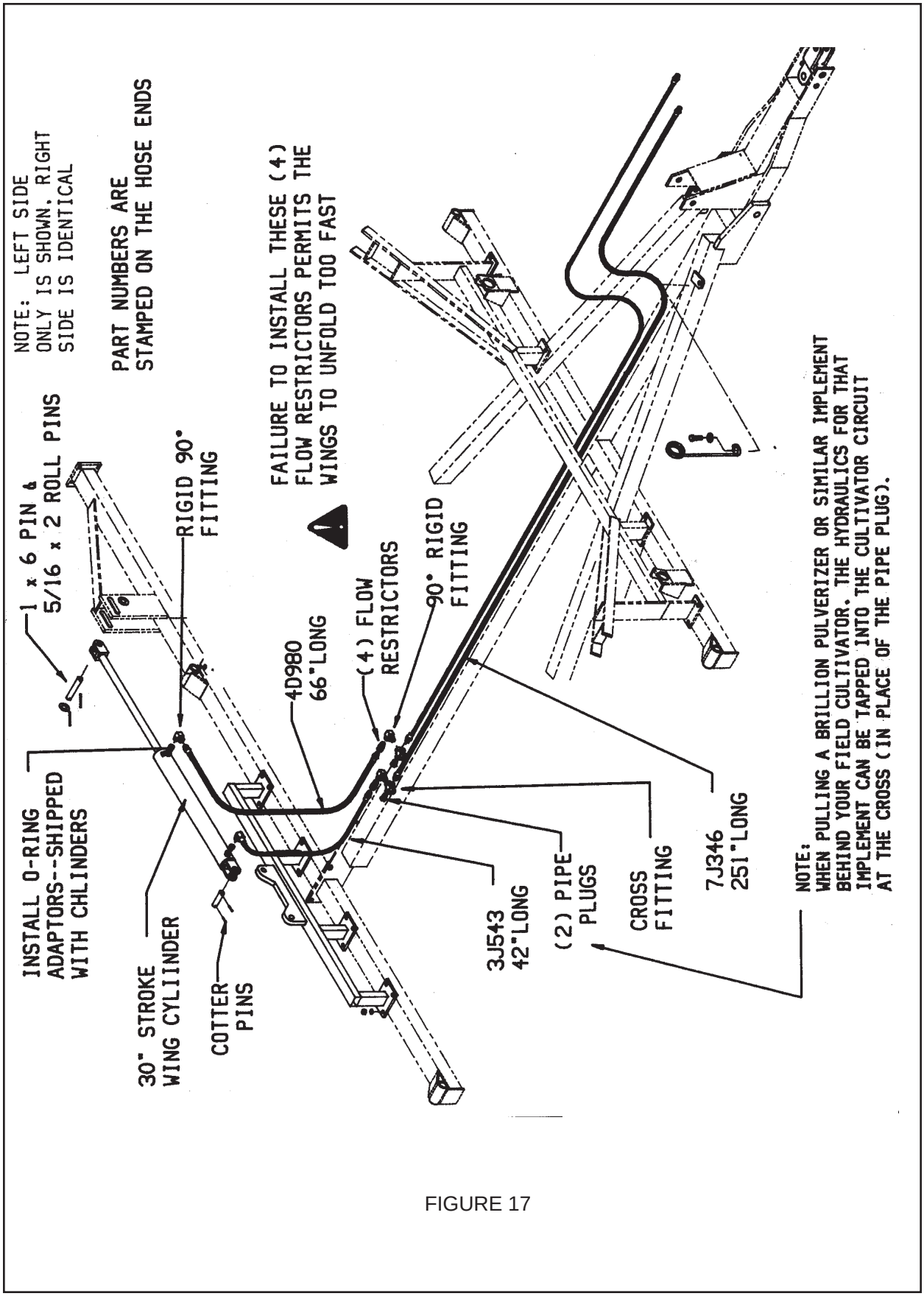
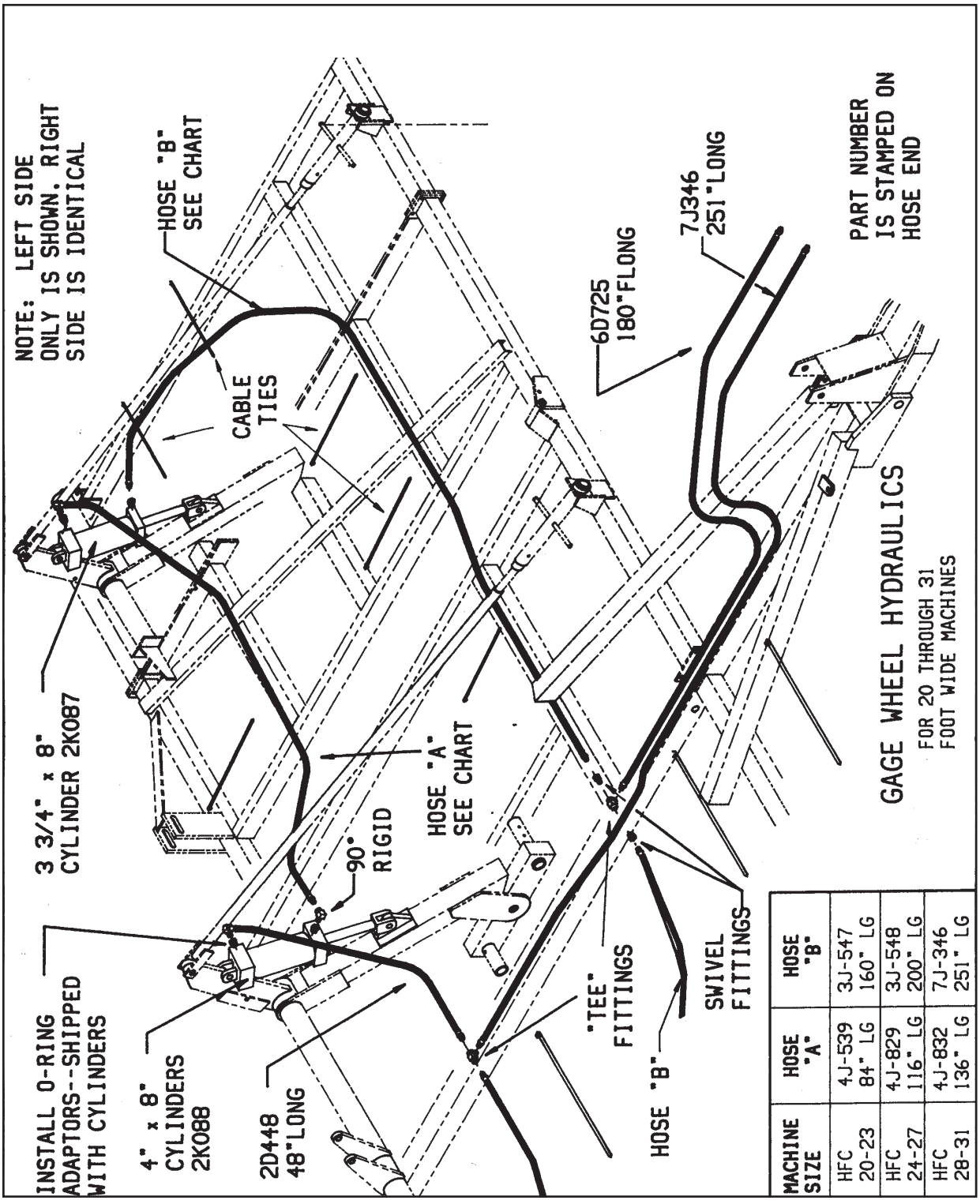
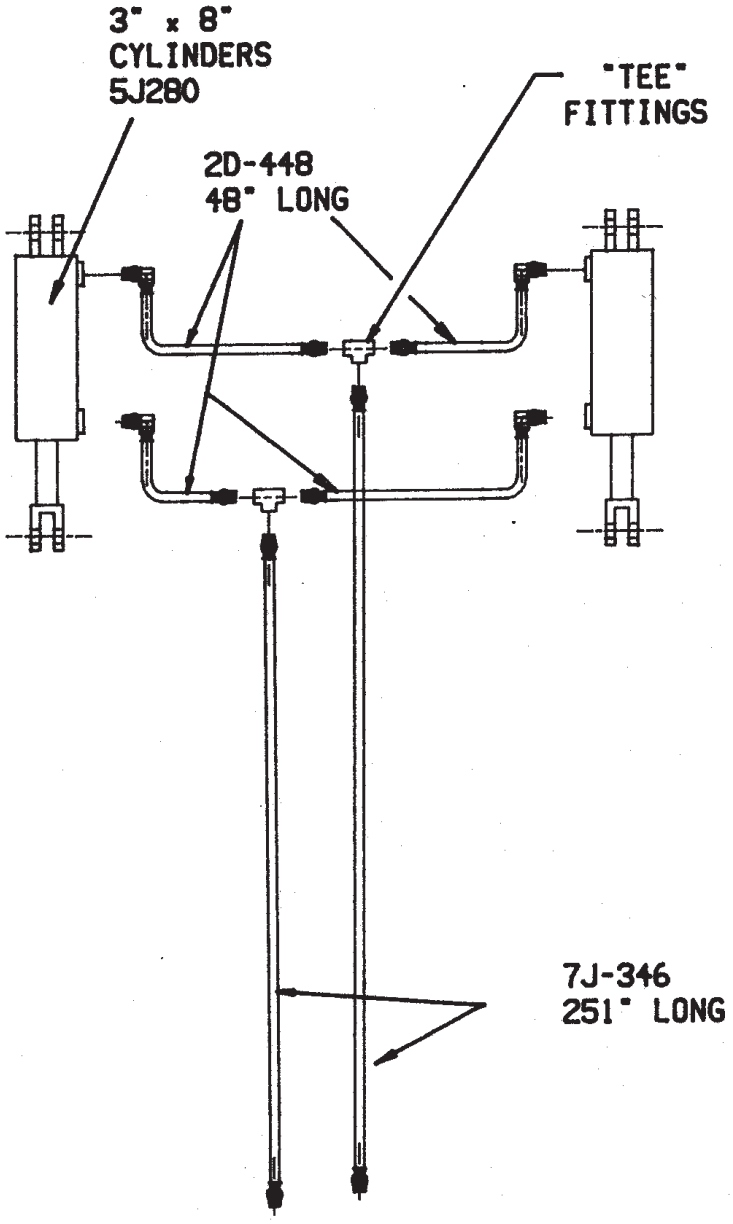

NOTE: LEFT SIDE ONLY IS SHOWN. RIGHT SIDE IS IDENTICAL
PART NUMBERS ARE STAMPED ON THE HOSE ENDS
1 x 6 PIN & 5/16 x 2 ROLL PINS
RIGID 90° FITTING
FAILURE TO INSTALL THESE (4) FLOW RESTRICTORS PERMITS THE WINGS TO UNFOLD TOO FAST
4D980 66"LONG
(4) FLOW RESTRICTORS
90° RIGID FITTING
INSTALL O-RING ADAPTORS--SHIPPED WITH CHLINDERS
30" STROKE WING CYLIINDER
COTTER PINS
3J543 42"LONG
(2) PIPE PLUGS
CROSS FITTING
7J346 251"LONG
NOTE: WHEN PULLING A BRILLION PULVERIZER OR SIMILAR IMPLEMENT BEHIND YOUR FIELD CULTIVATOR, THE HYDRAULICS FOR THAT IMPLEMENT CAN BE TAPPED INTO THE CULTIVATOR CIRCUIT AT THE CROSS (IN PLACE OF THE PIPE PLUG).

FIGURE 17



MACHINE SIZE	HOSE "A"	HOSE "B"
HFC 20-23	4J-539 84" LG	3J-547 160" LG
HFC 24-27	4J-829 116" LG	3J-548 200" LG
HFC 28-31	4J-832 136" LG	7J-346 251" LG

FIGURE 18



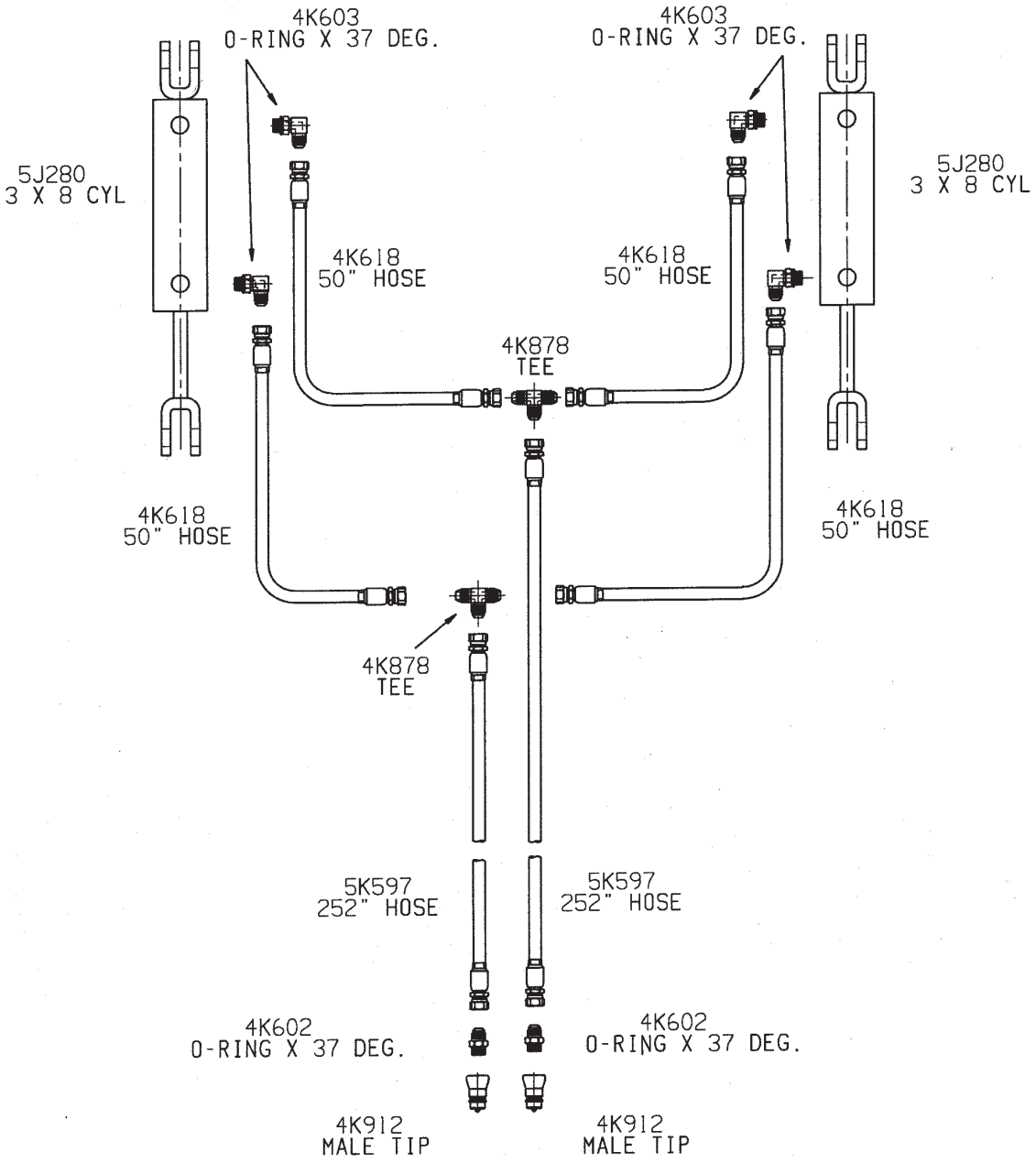
GAGE WHEEL HYDRAULICS
FOR 16 FT THROUGH 19 FT
WIDE MACHINES

FIGURE 19

GAGE WHEEL HYDRAULICS
HFC 11'-19'

FOR MACHINES WITH 3/8 JIC HOSES

DO NOT USE MALE O-RING X FEMALE PIPE ADAPTERS
WHICH MAY BE INCLUDED



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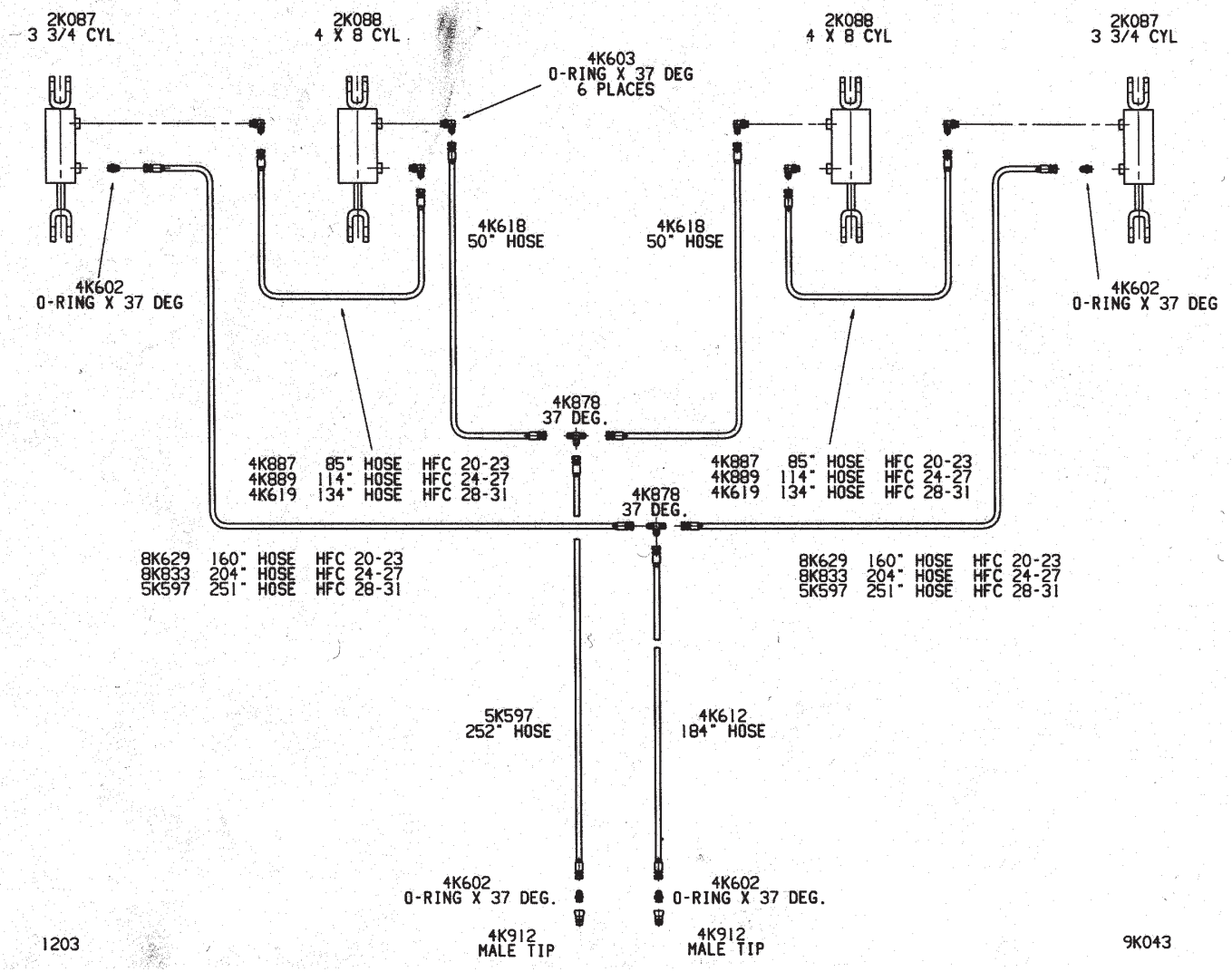
GAGE WHEEL HYDRAULICS
HFC 20-31 FIELD CULTIVATOR

FOR MACHINES WITH 3/8 JIC HOSES

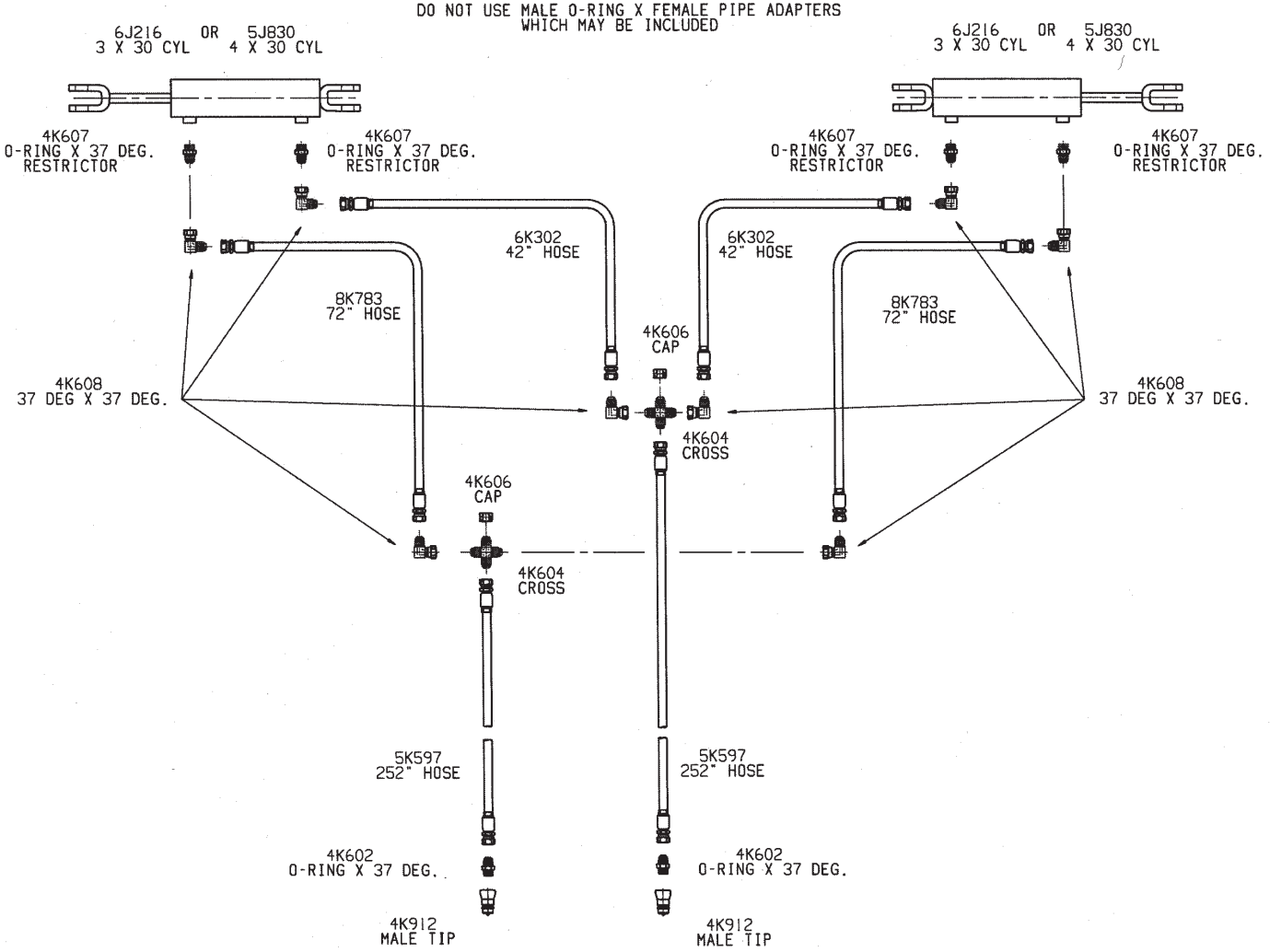
DO NOT USE MALE O-RING X FEMALE PIPE ADAPTERS WHICH MAY BE INCLUDED



WING FOLD HYDRAULICS
HFC 16'-31'

FOR MACHINES WITH 3/8 JIC HOSES

DO NOT USE MALE O-RING X FEMALE PIPE ADAPTERS
WHICH MAY BE INCLUDED



1203

8K940

D. With the wings supported, disconnect the pin from the clevis of the wing lift cylinders and raise the rod end of the cylinder so that it is higher than the butt end. Completely extend and retract both wing lift cylinders at least 3 times to make sure that all air is removed from the wing lift hydraulic circuit. Reconnect the clevis of the cylinders between the lugs on the wings.

E. Completely extend the transport wheel cylinders, hold the tractor hydraulic control lever in the raise position for at least 30 seconds after the outside wing cylinders have been extended.

Note: The transport wheel hydraulic system on the **20 through 31 foot wide** field cultivators is a master/slave system; the oil from the cylinders on the center section travels to the cylinders on each of the wings. At the end of the stroke, an internal valve allows oil to flow from one cylinder into the next in the series. Holding the control lever in the raised position forces air out of the hydraulic circuit.

F. Retract the wheel cylinders and repeat step E above 3 times.

Note: The wing lift and depth control cylinders are shipped from the factory without oil in them. If all 6 cylinders must be charged with oil, they will use approximately 5 gallons of oil. Check your tractor hydraulic level to avoid any damage to the system.

15. **Shanks.**

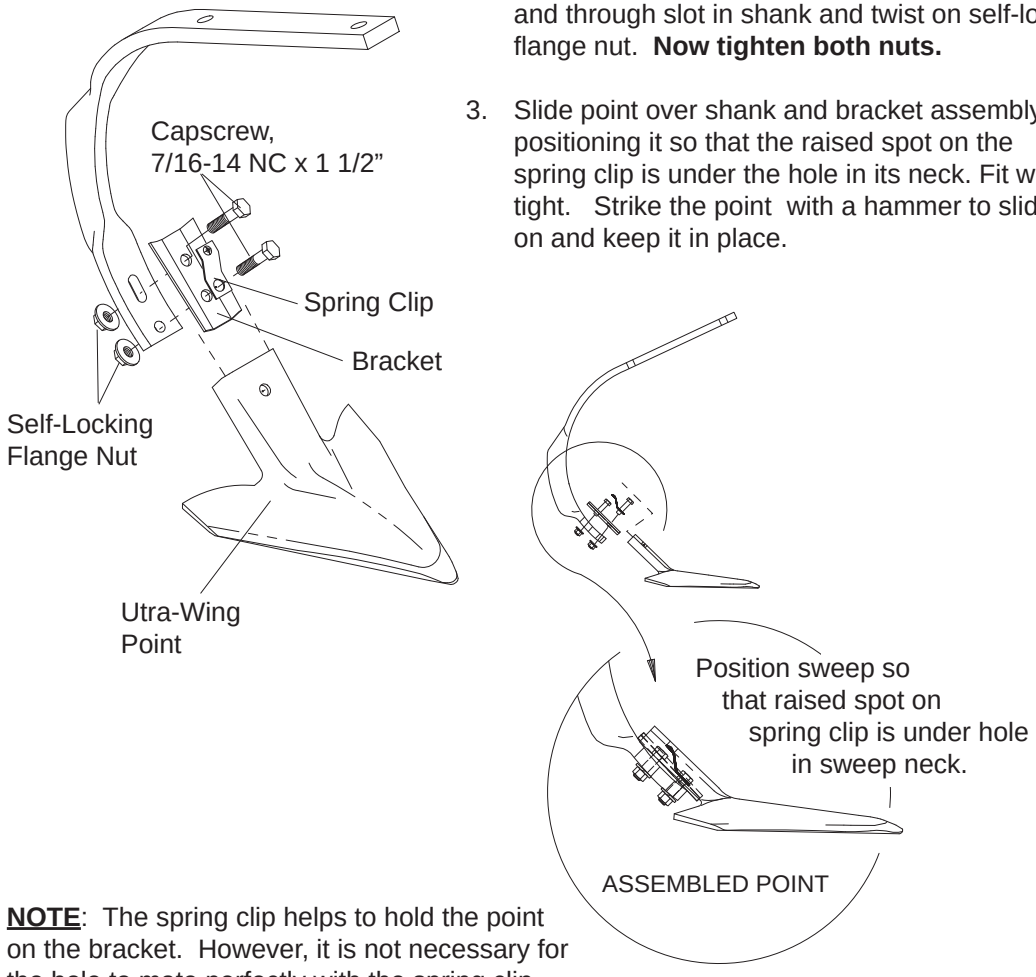
---Assemble the sweeps or points to the shanks before mounting the shanks.

Note: The field cultivator is designed for using 7” wide sweeps, if wider sweeps are used, be sure to check clearances around all tires in both the operating and transport positions.

For assembly of points using the Quick-Change Point Assembly:

1. Insert one 7/16” capscrew first through the spring clip, then the bracket and shank, and fasten **loosely** with self-locking flange nut.
2. Insert the other 7/16” capscrew through bracket and through slot in shank and twist on self-locking flange nut. **Now tighten both nuts.**
3. Slide point over shank and bracket assembly positioning it so that the raised spot on the spring clip is under the hole in its neck. Fit will be tight. Strike the point with a hammer to slide it on and keep it in place.

Figure 20A



NOTE: The spring clip helps to hold the point on the bracket. However, it is not necessary for the hole to mate perfectly with the spring clip.

A. **Mount the shanks** to the field cultivator according to figures 21, 22, 23, and 24.

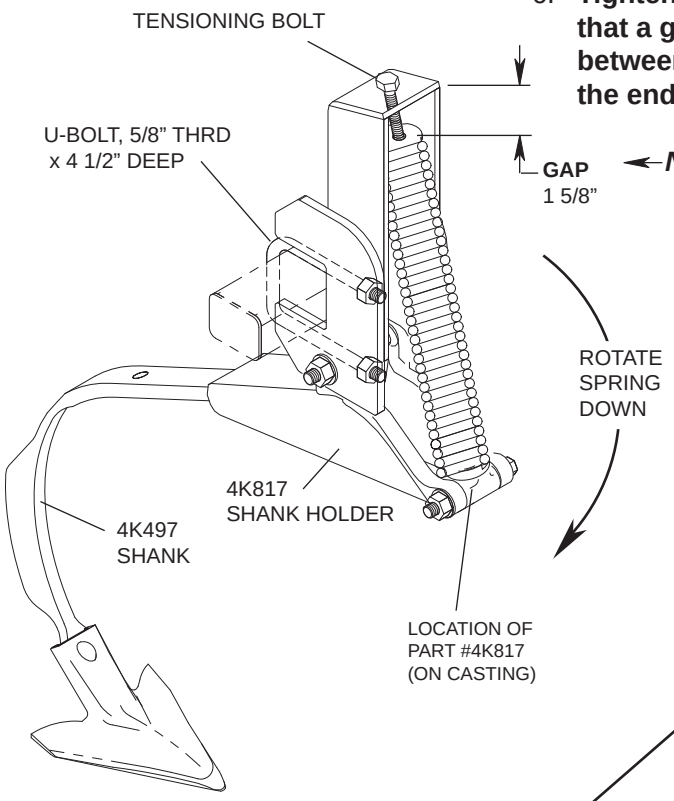
B. Hardware for mounting the spring loaded shanks is attached to each shank assembly. Hardware for the S-shaped tines is provided in separate box assemblies. Each S-tine requires (1) S-Tine clamp, (1) S-Tine Clip, (2) 1/2" x 6" capscrew, (1) 1/2" x 2" capscrew, and, (3) locknuts.

Spring Loaded Shanks:

To mount the spring loaded shank on your Field Cultivator, use the following procedure (Refer to Figure 20b):

1. Remove the tensioning bolt from the spring assembly.
2. Rotate the spring out of the spring holder bracket.
3. Remove the nuts from the U-bolt, and then also remove the U-bolt.
4. Position the shank assembly at the desired location on the cultivator frame.
5. Insert the U-bolt around the frame tube, and install the two nuts back onto the U-bolt.
6. **Tighten the tensioning bolt making sure that a gap of 1 5/8" remains between the spring holder and the plug in the end of the spring.**

SPRING LOADED SHANK



Note: ***The <u>1 5/8" gap dimension is critical</u> to obtain correct point pressure and to prevent possible damage to the spring.*** (Refer to Figure 20b.)

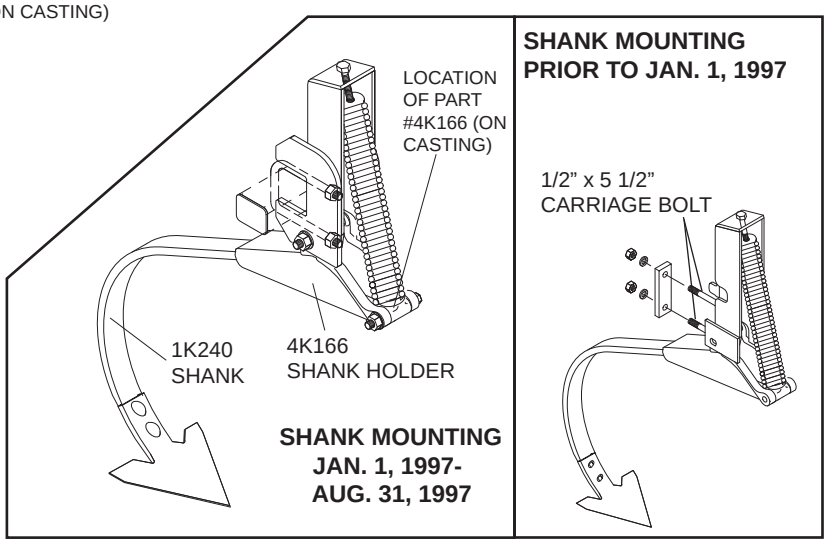
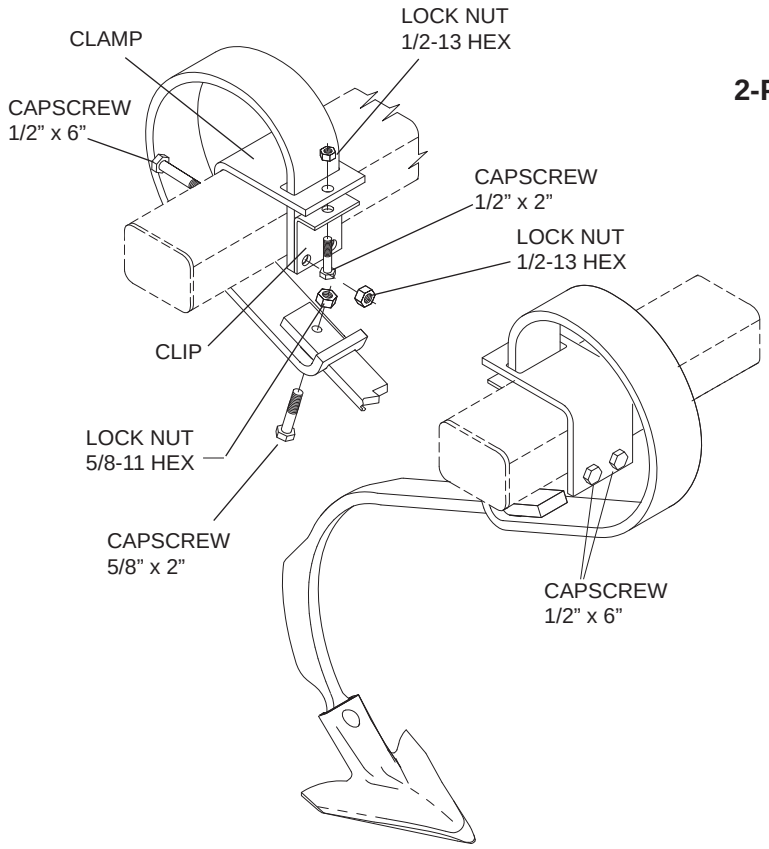


Figure 20B

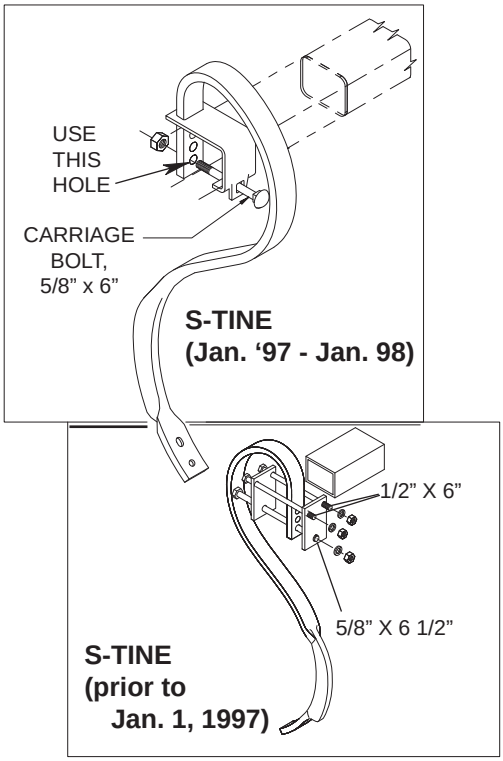
2-Piece S-Tine Shanks:

The 2-piece S-Tine shank is shipped preassembled from the factory.



2-PIECE S-TINE

Figure 20C



For mounting, use the clamp and clip assembly shown above to fasten the shanks at the positions indicated on your model. Follow the diagrams on pages 32-35 for correct placement.

MOUNTING SMV STRAPS

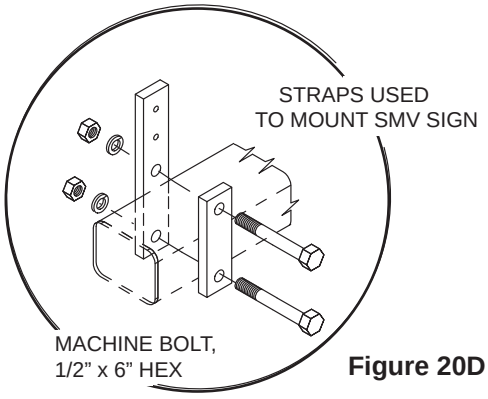


Figure 20D

C. A strap is provided which has two holes for mounting a Slow Moving Vehicle (SMV) bracket. Use this strap with the SMV strap and bolts provided in the hardware box assembly. Locate the SMV bracket as close to the center of the machine as possible on the back tooth bar as shown in figures 21, 22, 23, and 24.

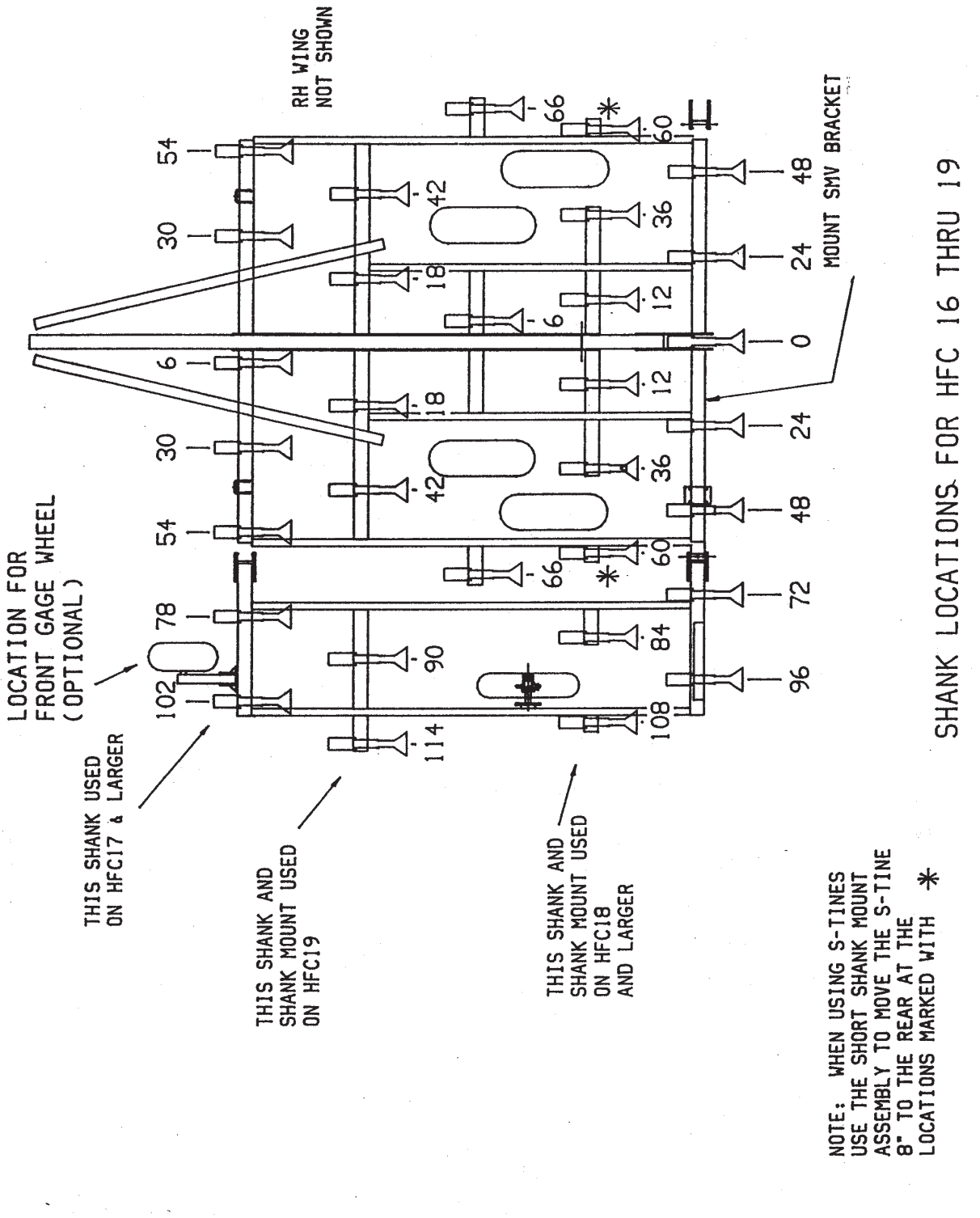

SHANK LOCATIONS FOR HFC 16 THRU 19
RH WING
NOT SHOWN
MOUNT SMV BRACKET
LOCATION FOR
FRONT GAGE WHEEL
(OPTIONAL)
THIS SHANK USED
ON HFC17 & LARGER
THIS SHANK AND
SHANK MOUNT USED
ON HFC19
THIS SHANK AND
SHANK MOUNT USED
ON HFC18
AND LARGER
NOTE: WHEN USING S-TINES
USE THE SHORT SHANK MOUNT
ASSEMBLY TO MOVE THE S-TINE
8" TO THE REAR AT THE
LOCATIONS MARKED WITH *

FIGURE 21

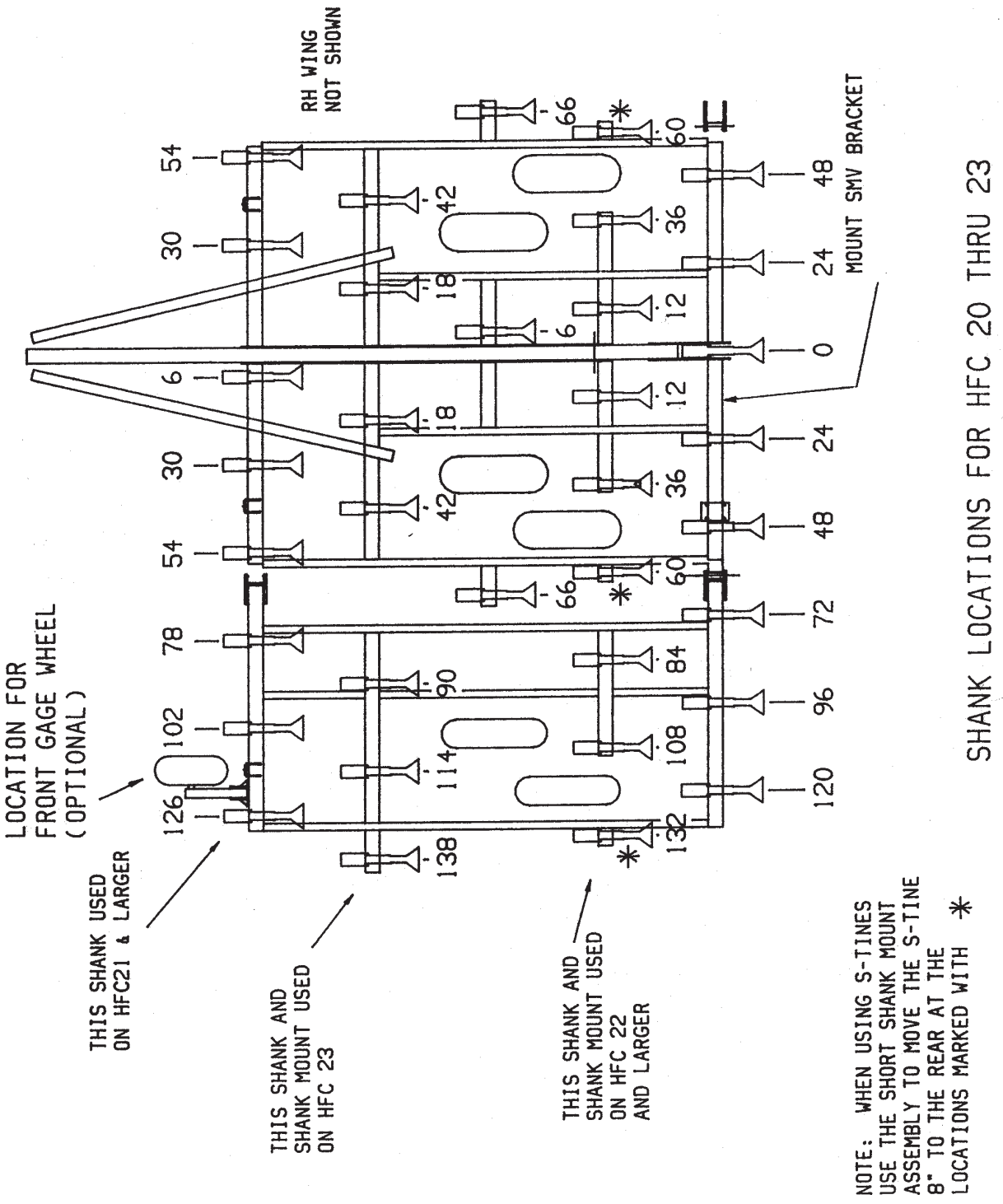

SHANK LOCATIONS FOR HFC 20 THRU 23
RH WING
NOT SHOWN
MOUNT SMV BRACKET
LOCATION FOR
FRONT GAGE WHEEL
(OPTIONAL)
THIS SHANK USED
ON HFC21 & LARGER
THIS SHANK AND
SHANK MOUNT USED
ON HFC 23
THIS SHANK AND
SHANK MOUNT USED
ON HFC 22
AND LARGER
NOTE: WHEN USING S-TINES
USE THE SHORT SHANK MOUNT
ASSEMBLY TO MOVE THE S-TINE
8" TO THE REAR AT THE
LOCATIONS MARKED WITH *

FIGURE 22

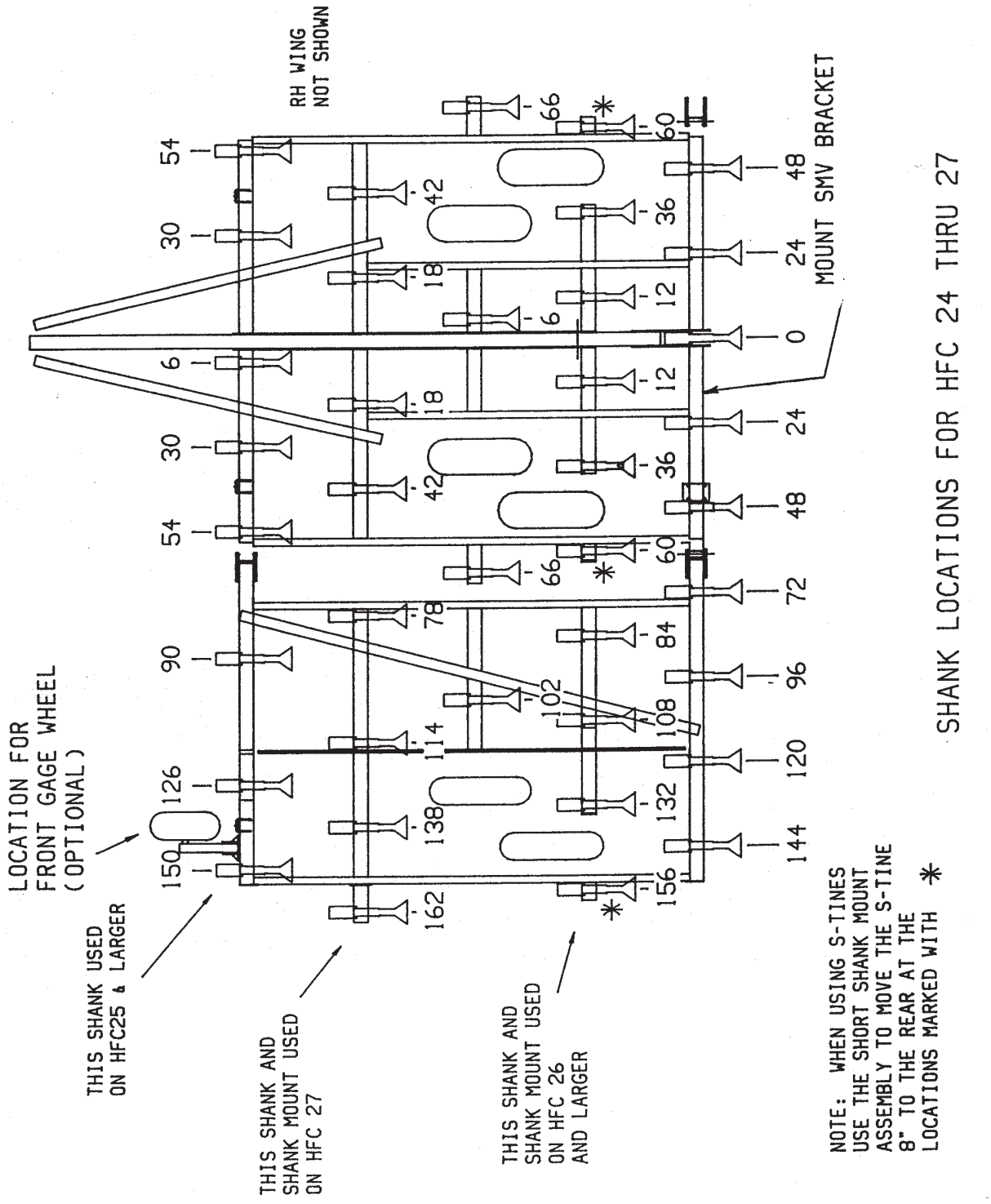

SHANK LOCATIONS FOR HFC 24 THRU 27
RH WING
NOT SHOWN
MOUNT SMV BRACKET
LOCATION FOR
FRONT GAGE WHEEL
(OPTIONAL)
THIS SHANK USED
ON HFC25 & LARGER
THIS SHANK AND
SHANK MOUNT USED
ON HFC 27
THIS SHANK AND
SHANK MOUNT USED
ON HFC 26
AND LARGER
NOTE: WHEN USING S-TINES
USE THE SHORT SHANK MOUNT
ASSEMBLY TO MOVE THE S-TINE
8" TO THE REAR AT THE
LOCATIONS MARKED WITH *

FIGURE 23

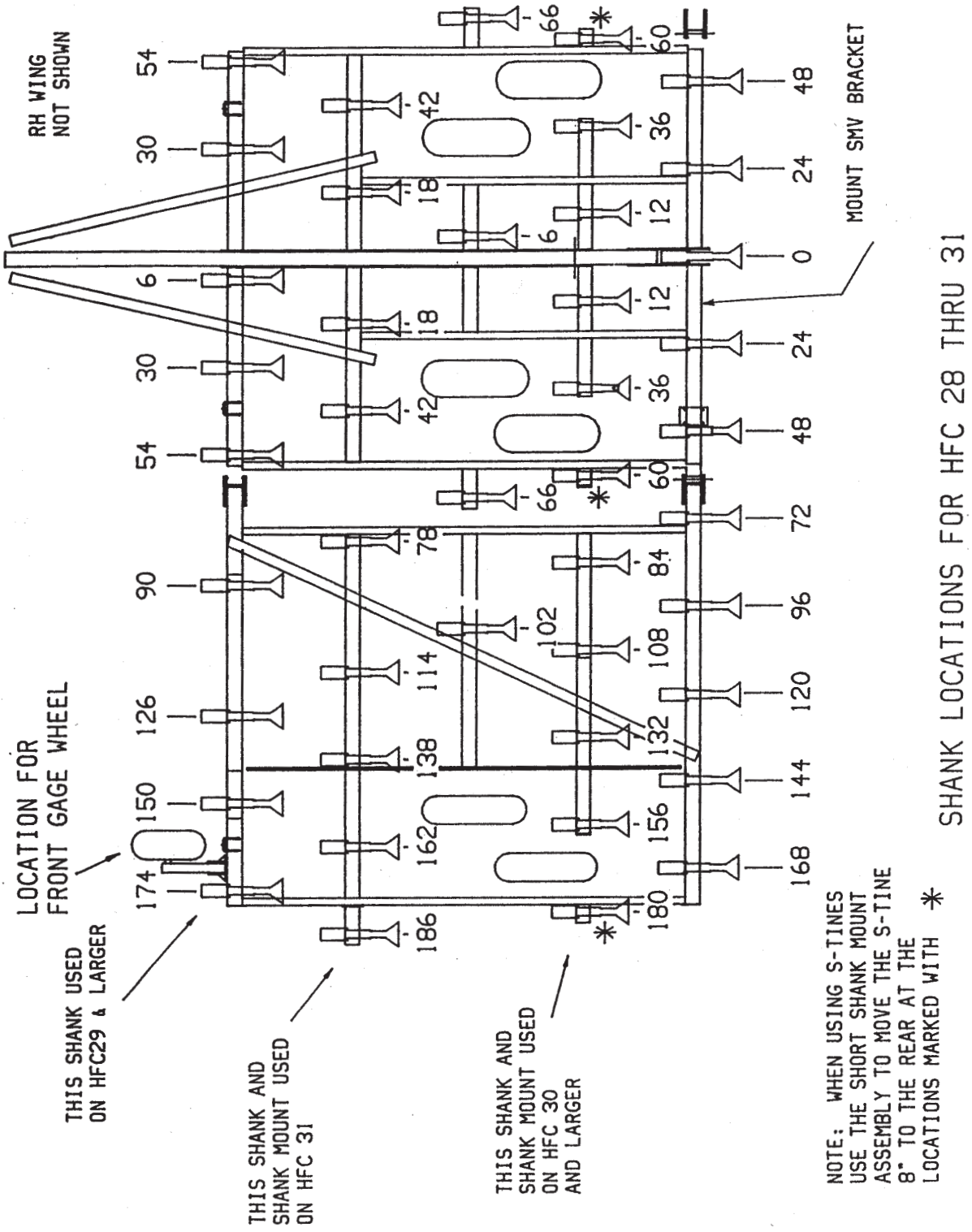
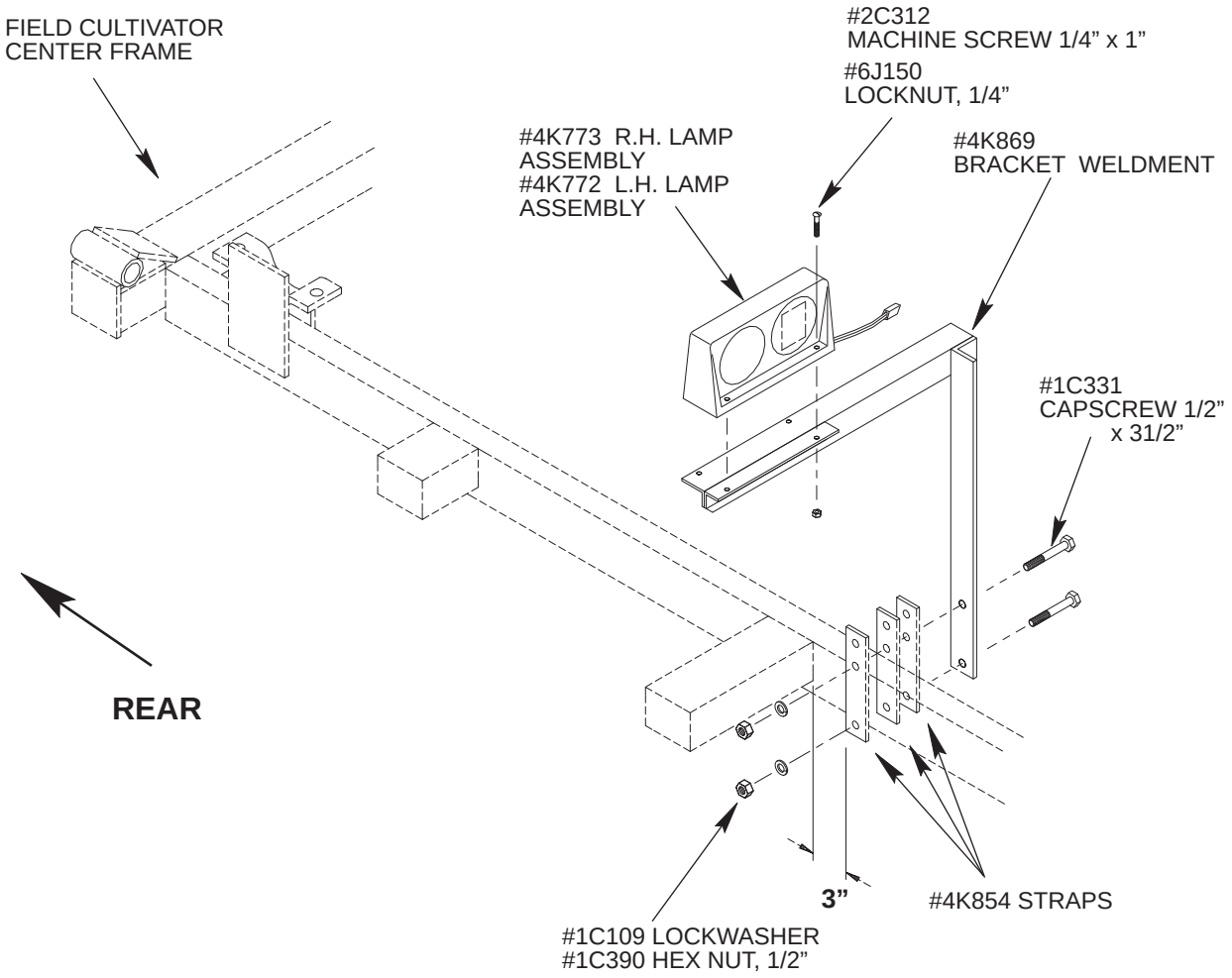

SHANK LOCATIONS FOR HFC 28 THRU 31
RH WING
NOT SHOWN
MOUNT SMV BRACKET
LOCATION FOR
FRONT GAGE WHEEL
THIS SHANK USED
ON HFC29 & LARGER
THIS SHANK AND
SHANK MOUNT USED
ON HFC 31
THIS SHANK AND
SHANK MOUNT USED
ON HFC 30
AND LARGER
NOTE: WHEN USING S-TINES
USE THE SHORT SHANK MOUNT
ASSEMBLY TO MOVE THE S-TINE
8" TO THE REAR AT THE
LOCATIONS MARKED WITH *

FIGURE 24

INSTRUCTIONS FOR #4K865 WARNING LIGHT KIT

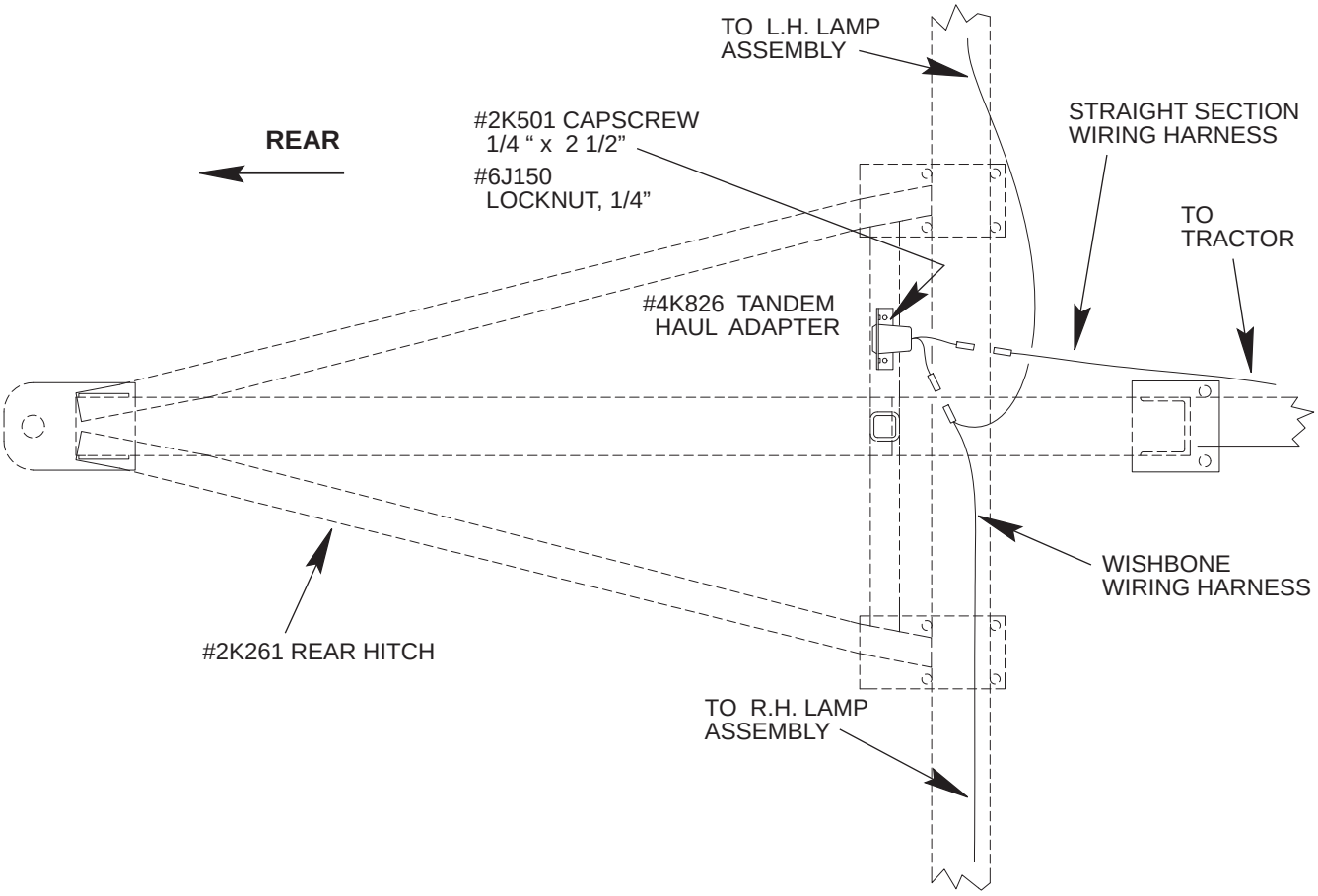


WARNING LAMP ASSEMBLY

Assemble #4K869 bracket weldment to right side of Field Cultivator center frame. **Locate bracket 3" forward of the longer shank mounting stub as dimensioned above.** The bracket weldment mounts to the inside of the frame tube with two #4K854 straps used as spacers between this bracket and cultivator frame. One #4K854 strap, on outside of frame, and two 1/2" x 3 1/2" capscrews secure the assembly. See illustration above. Assemble the other bracket weldment in similar fashion on left side of machine.

Attach lamp assemblies to bracket weldments (amber facing forward; red and amber facing rearward with amber in outer-most position). See illustration above for fasteners required.

If your Field Cultivator is equipped with a rear hitch, for tandem towing another implement, you will need to assemble the #4K846 tandem haul adapter to the rear hitch as shown on page 2 (Warning lights from second implement can be plugged into this adapter so warning lights are fully functional on both implements).



Attach center connector of “wishbone” wiring harness to tandem haul adapter. Then run wishbone harness ends over to L.H. and R.H. lamp assemblies. ***(Important*: Wires are color coded on wishbone harness. Run end with yellow wire along frame members to left side lamp assembly, and assemble connectors. Run end with green wire along frame members to right side lamp assembly, and assemble connectors.**) Attach “straight section” wiring harness connector to tandem haul adapter. Then run this harness along machine frame members over to front of drawbar.

If your machine is not equipped with a rear hitch, you have no need to use the tandem haul adapter. In this case, simply plug the “straight section” connector into the center connector of the wishbone harness. Then run wires to lamp assemblies along frame members as described above.

All wires must be firmly attached to machine frame members so they don’t droop or become torn loose by field debris. Use plastic cable ties, provided, and electrical tape to secure all wiring.

After assembly of warning lamps is complete, fold wings of machine **slowly** while watching for any interference that could damage lamp assemblies, wiring harnesses, or mounting brackets.

16. Options.

A. Front gage wheels - 2K279

1. Front gage wheels are recommended for use on all larger machines.

2. Kit includes brackets, supports, wheels, and hardware.

3. Mount where shown in figures 21, 22, 23, and 24.

B. Rear hitch - 2K280

1. The rear hitch kit includes the hitch weldment and U-bolts necessary to attach the hitch to the rear of the field cultivator.

2. It is necessary to remove the rear center shank to install the hitch.

3. Extend the front of the hitch weldment between the two lugs on the center rockshaft and use the U-bolt to attach it to the drawbar. The weldment will have to be rotated 90 degrees to fit between the lugs. If desired, the leveling link can be removed from the lugs, and the hitch lowered between the lugs.

Note: If the leveling link is removed, be sure that there is no weight on the linkage before removing the pins.

4. Replace the rear center shank after the rear hitch has been installed.

C. Safety chain - 1K822

1. Use of a safety chain is recommended if the machine is towed on a public road or highway. The chain should be rated at 10,100 pounds minimum in accordance with ASAE S338 specifications. This kit contains such a chain, along with the hardware to attach it to the Field Cultivator.

CAUTION

If two or more machines are pulled in tandem, a larger chain may be required. Chain capacity must be greater than the <u>total</u> weight of towed implements. A second chain should be used between each implement.

CAUTION

Replace chain if one or more links are broken, stretched, or otherwise damaged or deformed.

SPIKE TOOTH DRAG

Refer to the assembly drawing on page 38 and the location charts on pages 39 and 40. These drawings show the location of the drag supports and the width and part numbers of the drag assemblies needed for a particular field cultivator. **Dimensions are from the center of the cultivator to the center of the drag support.**

A. Center section. The center section of all the field cultivators use the same drag assembly, 3K308 which is 120" wide.

1. Fasten 2 drag supports to the rear tube of the center frame using 2 U-bolts for each support. These centers of these supports are to be 43" from the center of the cultivator. Also, use 1 U-bolt to fasten a draft angle 5" to the right of center of the frame.

2. Bolt the support chains of the drag assembly to the drag supports using 7/16 x 3 1/2" long capscrews with a flat washer and a 7/16" locknut. On Brillion Field Cultivators, support the drags by the fourth link from the end (3 links are left hanging).

3. On earlier models of the drag supports, bolt the draft chains of the drag to the angles of the supports and the draft angle with 1/2 x 1 1/2" long capscrews. On later models, extend a chain link through the slot on the drag support plates and on the draft angle and secure the chain with a klik pin. On Brillion Field Cultivators the draft chain is attached to the third link of the chain.

B. Wing sections.

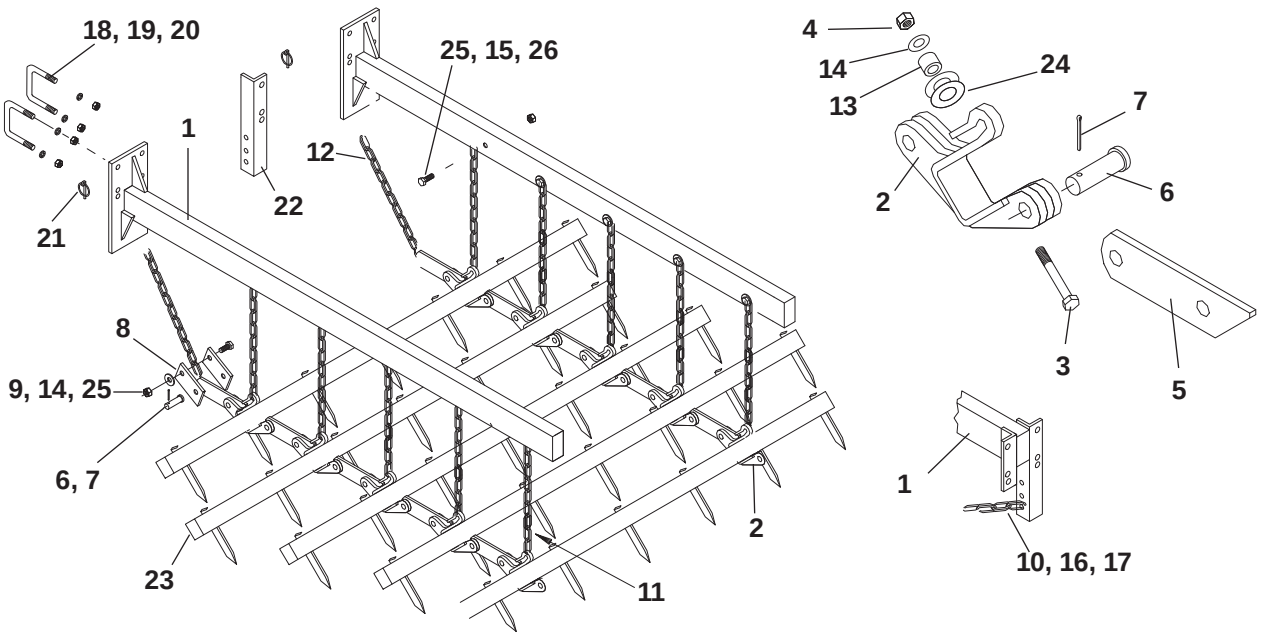
1. Use the charts on pages 39 and 40 to locate the drag supports and the drag assemblies used for your particular cultivator. **Note** in some cases the drag assembly for the left wing is different than the drag assembly for the right wing, refer to the metal assembly number tag attached to each drag section. Only wings on 28 foot wide and larger cultivators use the draft angles on the wing section.

2. Attach the drag supports to the wing frames at the proper locations.

3. Attach the chains to the support arms in the same way as they were attached for the center section.

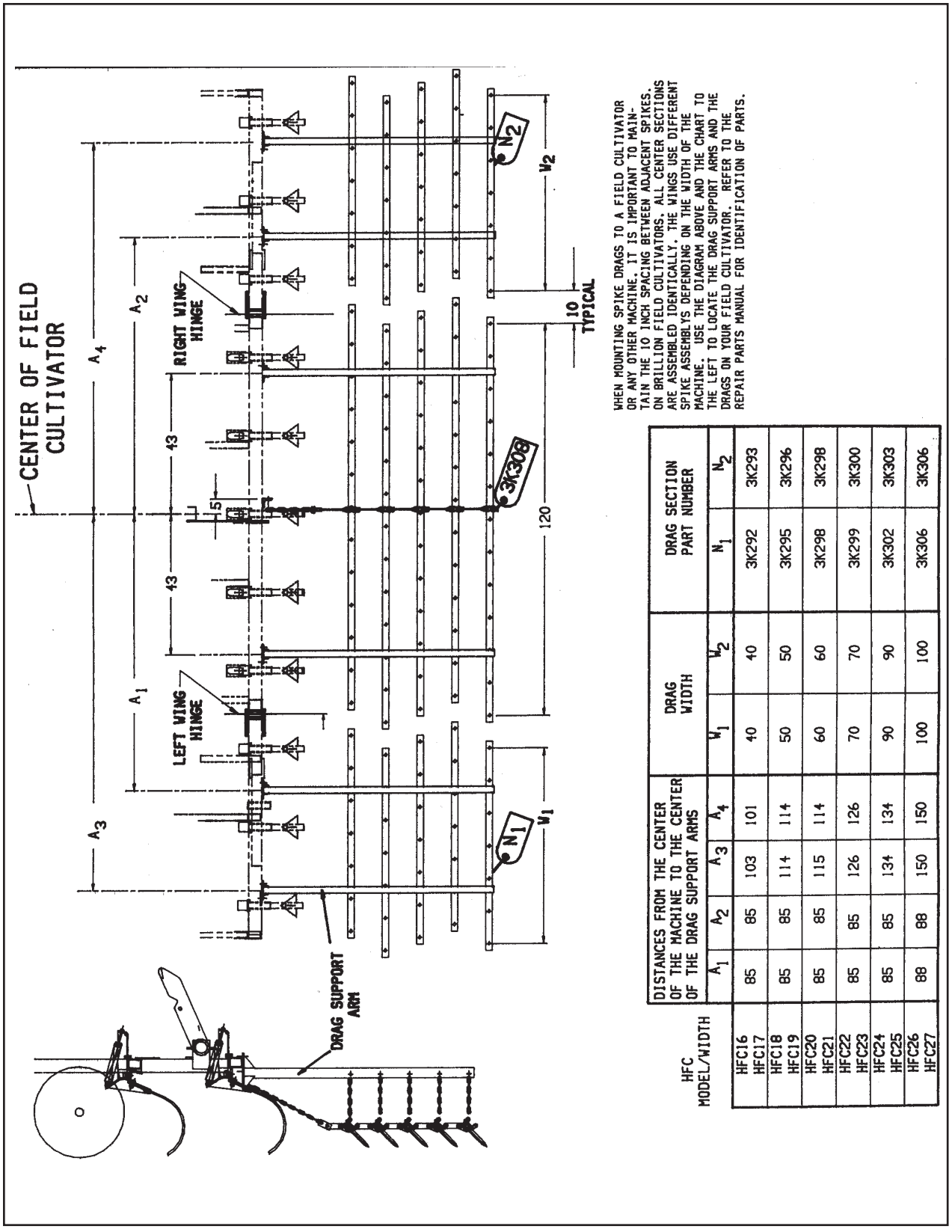
ADJUSTING SPIKE TOOTH DRAGS

The tooth angle is preset and cannot be changed. All harrow adjustments are made by adjusting the length of the draft chains. Shortening the draft chains tends to lift the front of the harrow and is helpful when plugging becomes a problem in heavy trash. In operation, the draft chains should be pulling the drag and the support chains should be slack, in transport, the support chains should be holding the drag, and the draft chains should be slack.



DRAG KIT COMPONENTS

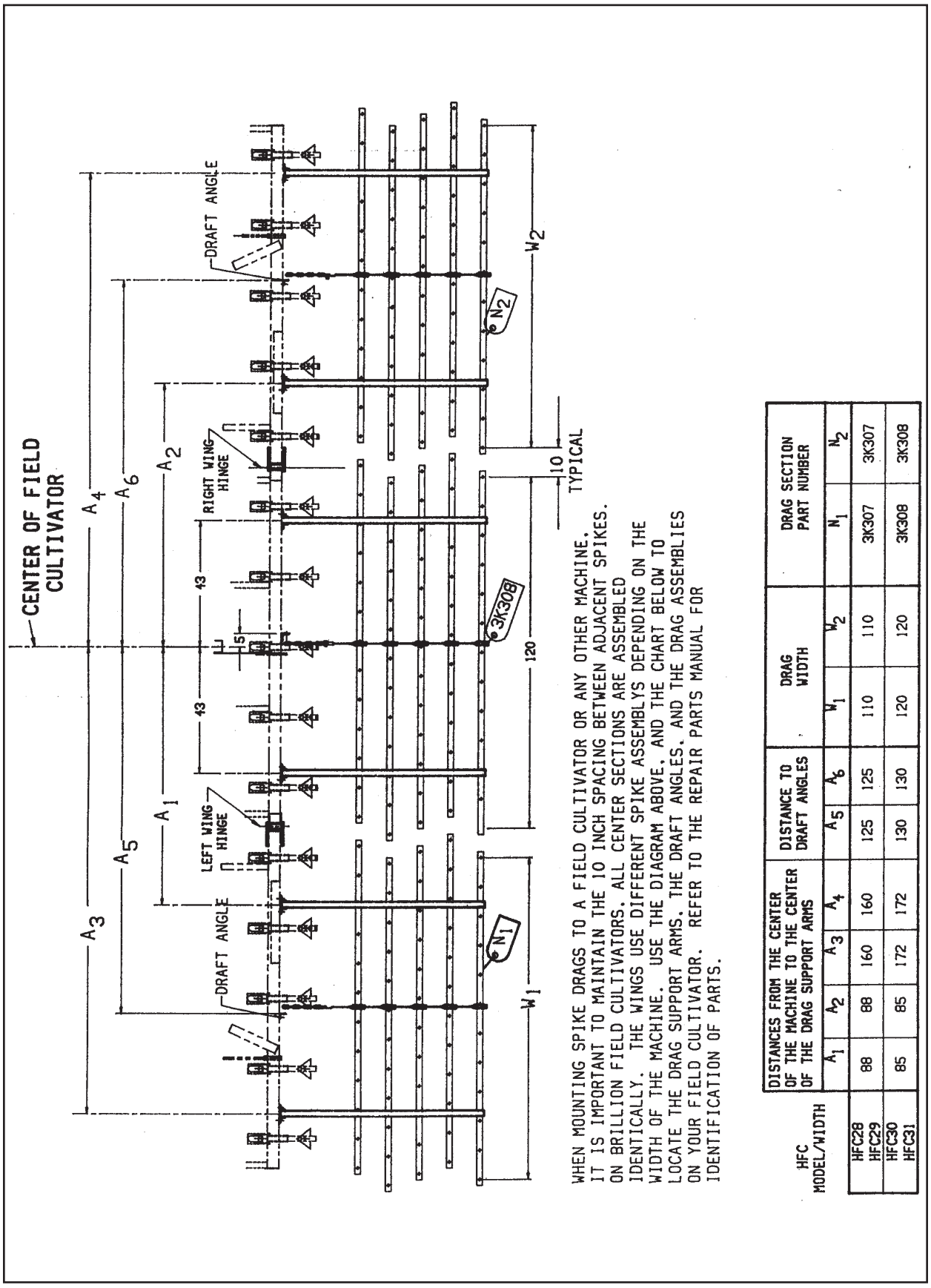
Index No.	Part No.	Description	Weight
1	2K824	Drag Support	41
2	3K270	Drag Clamp	2
3	2K702	Cap Screw, 3/8 x 4	-
4	5C954	Locknut, 3/8-16 Hex	-
5	3K286	Link	1.5
6	3K287	Clevis Pin, 5/8 x 1 1/2”	.5
7	3C350	Cotter Pin, 5/32 x 1	-
8	3K288	Strap	.5
9	4K664	Cap Screw, 7/16 x 1 3/4	-
10	5C392	Locknut, 1/2-13 Hex	-
11	2K828	Chain, Short	1.2
12	2K829	Chain, Long	2.2
13	3K291	Sleeve	.2
14	1C182	Flat Washer, 3/8	-
15	6D965	Capscrew, 7/16 x 3 1/2	.3
16	1C267	Cap Screw, 1.2 x 1 1/2	.1
17	9C134	Flat Washer, 1/2” SAE	-
18	6J050	U-Bolt, 5/8 x 3 11/16 x 5 5/16 Dp	.8
19	1B166	Lockwasher, 5/8	-
20	1C392	Nut, 5/8-11 Hex	-
21	2J784	Klik Pin	-
22	2K826	Draft Angle	6
23	6J587	Spike Bar--50” (5 spikes)	25
	7J072	Spike Bar--60” (6 spikes)	31
	6J588	Spike Bar--70” (7 spikes)	36
	7J077	Spike Bar--80” (8 spikes)	42
	6J589	Spike Bar--90” (9 spikes)	47
	6J590	Spike Bar-100” (10 spikes)	53
	7J102	Spike Bar-110” (11 spikes)	58
	2K800	Spike Bar-120” (12 spikes)	64
	1K313	Spike Bar-130” (13 spikes)	72
24	1C122	Flat Washer, 5/8	-
25	1D014	Lock Nut, 7/16-14 Hex Stover	-
26	6D340	Flat Washer, 7/16” SAE	-



WHEN MOUNTING SPIKE DRAGS TO A FIELD CULTIVATOR OR ANY OTHER MACHINE, IT IS IMPORTANT TO MAINTAIN THE 10 INCH SPACING BETWEEN ADJACENT SPIKES. ON BRILLION FIELD CULTIVATORS, ALL CENTER SECTIONS ARE ASSEMBLED IDENTICALLY, THE WINGS USE DIFFERENT SPIKE ASSEMBLYS DEPENDING ON THE WIDTH OF THE MACHINE. USE THE DIAGRAM ABOVE AND THE CHART TO THE LEFT TO LOCATE THE DRAG SUPPORT ARMS AND THE DRAGS ON YOUR FIELD CULTIVATOR. REFER TO THE REPAIR PARTS MANUAL FOR IDENTIFICATION OF PARTS.

HFC MODEL/WIDTH	DISTANCES FROM THE CENTER OF THE MACHINE TO THE CENTER OF THE DRAG SUPPORT ARMS				DRAG WIDTH		DRAG SECTION PART NUMBER	
	A_1	A_2	A_3	A_4	W_1	W_2	N_1	N_2
HFC16 HFC17	85	85	103	101	40	40	3K292	3K293
HFC18 HFC19	85	85	114	114	50	50	3K295	3K296
HFC20 HFC21	85	85	115	114	60	60	3K298	3K298
HFC22 HFC23	85	85	126	126	70	70	3K299	3K300
HFC24 HFC25	85	85	134	134	90	90	3K302	3K303
HFC26 HFC27	88	88	150	150	100	100	3K306	3K306

FIGURE 26



WHEN MOUNTING SPIKE DRAGS TO A FIELD CULTIVATOR OR ANY OTHER MACHINE, IT IS IMPORTANT TO MAINTAIN THE 10 INCH SPACING BETWEEN ADJACENT SPIKES. ON BRILLION FIELD CULTIVATORS. ALL CENTER SECTIONS ARE ASSEMBLED IDENTICALLY. THE WINGS USE DIFFERENT SPIKE ASSEMBLYS DEPENDING ON THE WIDTH OF THE MACHINE. USE THE DIAGRAM ABOVE, AND THE CHART BELOW TO LOCATE THE DRAG SUPPORT ARMS. THE DRAFT ANGLES, AND THE DRAG ASSEMBLIES ON YOUR FIELD CULTIVATOR. REFER TO THE REPAIR PARTS MANUAL FOR IDENTIFICATION OF PARTS.

HFC MODEL/WIDTH	DISTANCES FROM THE CENTER OF THE MACHINE TO THE CENTER OF THE DRAG SUPPORT ARMS				DISTANCE TO DRAFT ANGLES		DRAG WIDTH		DRAG SECTION PART NUMBER	
	A_1	A_2	A_3	A_4	A_5	A_6	W_1	W_2	N_1	N_2
HFC28 HFC29	88	88	160	160	125	125	110	110	3K307	3K307
HFC30 HFC31	85	85	172	172	130	130	120	120	3K308	3K308

FIGURE 27

3- & 4-BAR COIL TINE HARROWS

Refer to the Assembly drawing on page 42, and the location charts on pages 43 through 45. These drawings show the location of the carrier arms on the rear toothbar of the cultivator and the location and sizes of the coil tine sections. Locations for both 3-bar and 4-bar coil tine harrows are the same. Component part differences are detailed in the Repair Parts Catalog. The 57" wide and 72" wide coil sections each require only one carrier arm per section, the 87" wide coil tine section requires two carrier arms per coil section.

IMPORTANT. On the center section only, remove the short spring from the end of the pressure rod, slide the collar up on the pressure rod to maintain the same load on the long spring, and locate the pressure rod in the rearmost or second from the rear hole on the carrier arm to maintain the arm approximately level. This is done to prevent the pressure rod from striking the wing raising cylinders on the center frame of the cultivator. Refer to the assembly drawing on page 42.

A. Fasten the carrier arms to the rear tube of the cultivator locating them as shown on the charts. Use the hardware assembled to the carrier arms.

B. Attach the coil sections to the carrier arms using the U-bolts attached to the coil sections. Adjust the angle of the coil sections so that the coil tines will be approximately level in the operating position.

ADJUSTING COIL TINE HARROWS

Coil tine height can be adjusted by locating the pressure rod in different holes on the carrier arms. Downward pressure can be adjusted by repositioning the collar below the long spring. The angle of the entire coil section can be changed by loosening the U-bolts which mount the section to the carrier arm. Finally the pitch of the coil tines can be changed by changing the position of the bar adjust lever. Moving the lever forward makes the operating angle less severe and aids in trash flow. Operating the lever to the rear makes the coil tines more aggressive when operating in cleaner fields and is especially valuable when using your cultivator for incorporating chemicals.

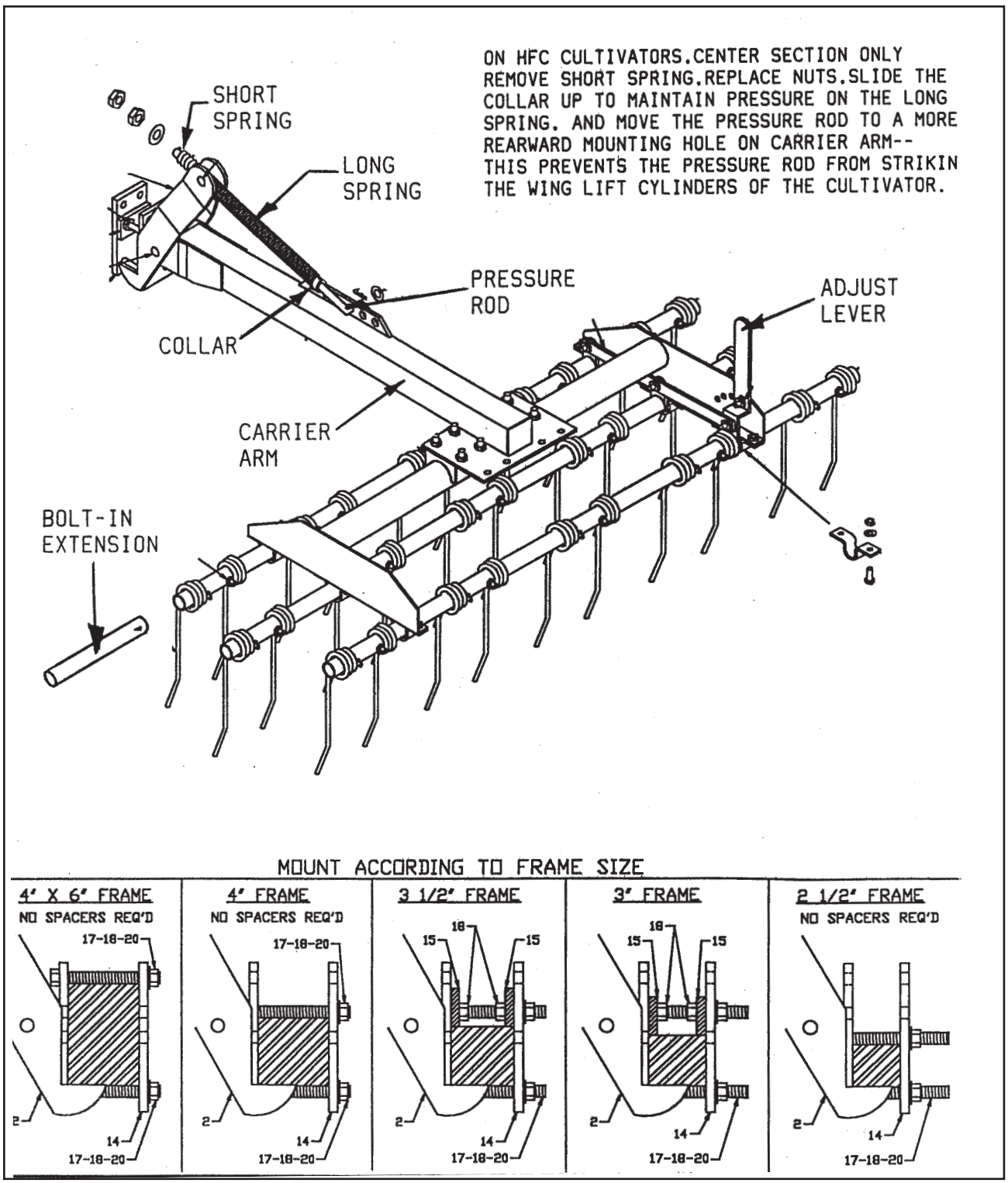
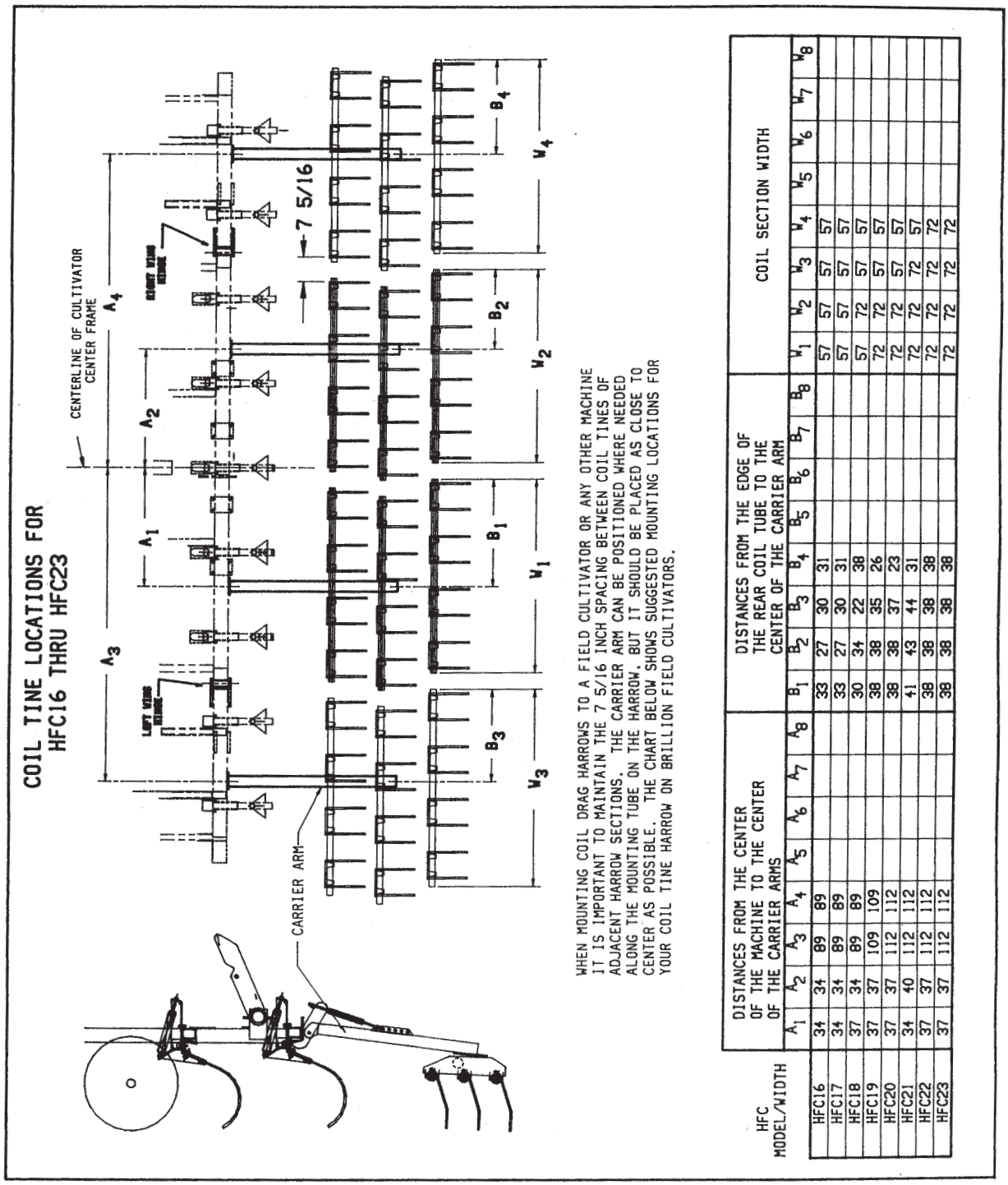

ON HFC CULTIVATORS.CENTER SECTION ONLY REMOVE SHORT SPRING.REPLACE NUTS.SLIDE THE COLLAR UP TO MAINTAIN PRESSURE ON THE LONG SPRING. AND MOVE THE PRESSURE ROD TO A MORE REARWARD MOUNTING HOLE ON CARRIER ARM-- THIS PREVENTS THE PRESSURE ROD FROM STRIKIN THE WING LIFT CYLINDERS OF THE CULTIVATOR.
SHORT SPRING
LONG SPRING
PRESSURE ROD
ADJUST LEVER
COLLAR
CARRIER ARM
BOLT-IN EXTENSION
MOUNT ACCORDING TO FRAME SIZE
4" X 6" FRAME
NO SPACERS REQ'D
17-18-20
2
14
17-18-20
4" FRAME
NO SPACERS REQ'D
17-18-20
2
14
17-18-20
3 1/2" FRAME
18
15
15
2
14
17-18-20
3" FRAME
18
15
15
2
14
17-18-20
2 1/2" FRAME
NO SPACERS REQ'D
2
14
17-18-20

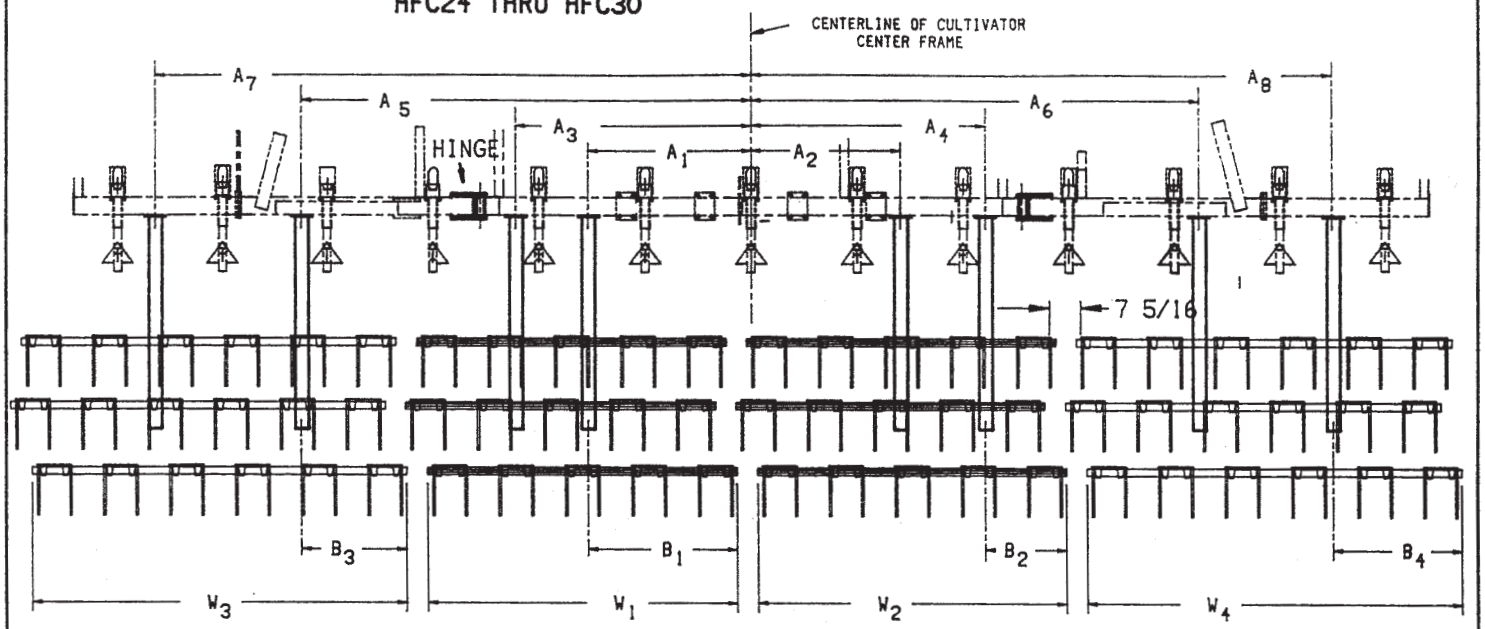
FIGURE 28



HFC MODEL/WIDTH	DISTANCES FROM THE CENTER OF THE MACHINE TO THE CENTER OF THE CARRIER ARMS								DISTANCES FROM THE EDGE OF THE REAR COIL TUBE TO THE CENTER OF THE CARRIER ARM								COIL SECTION WIDTH							
	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	B_1	B_2	B_3	B_4	B_5	B_6	B_7	B_8	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8
HFC16	34	34	89	89					33	27	30	31					57	57	57	57				
HFC17	34	34	89	89					33	27	30	31					57	57	57	57				
HFC18	37	34	89	89					30	34	22	38					57	72	57	57				
HFC19	37	37	109	109					38	38	35	26					72	72	57	57				
HFC20	37	37	112	112					38	38	37	23					72	72	57	57				
HFC21	34	40	112	112					41	43	44	31					72	72	72	57				
HFC22	37	37	112	112					38	38	38	38					72	72	72	72				
HFC23	37	37	112	112					38	38	38	38					72	72	72	72				

FIGURE 29

COIL TINE LOCATIONS FOR HFC24 THRU HFC30

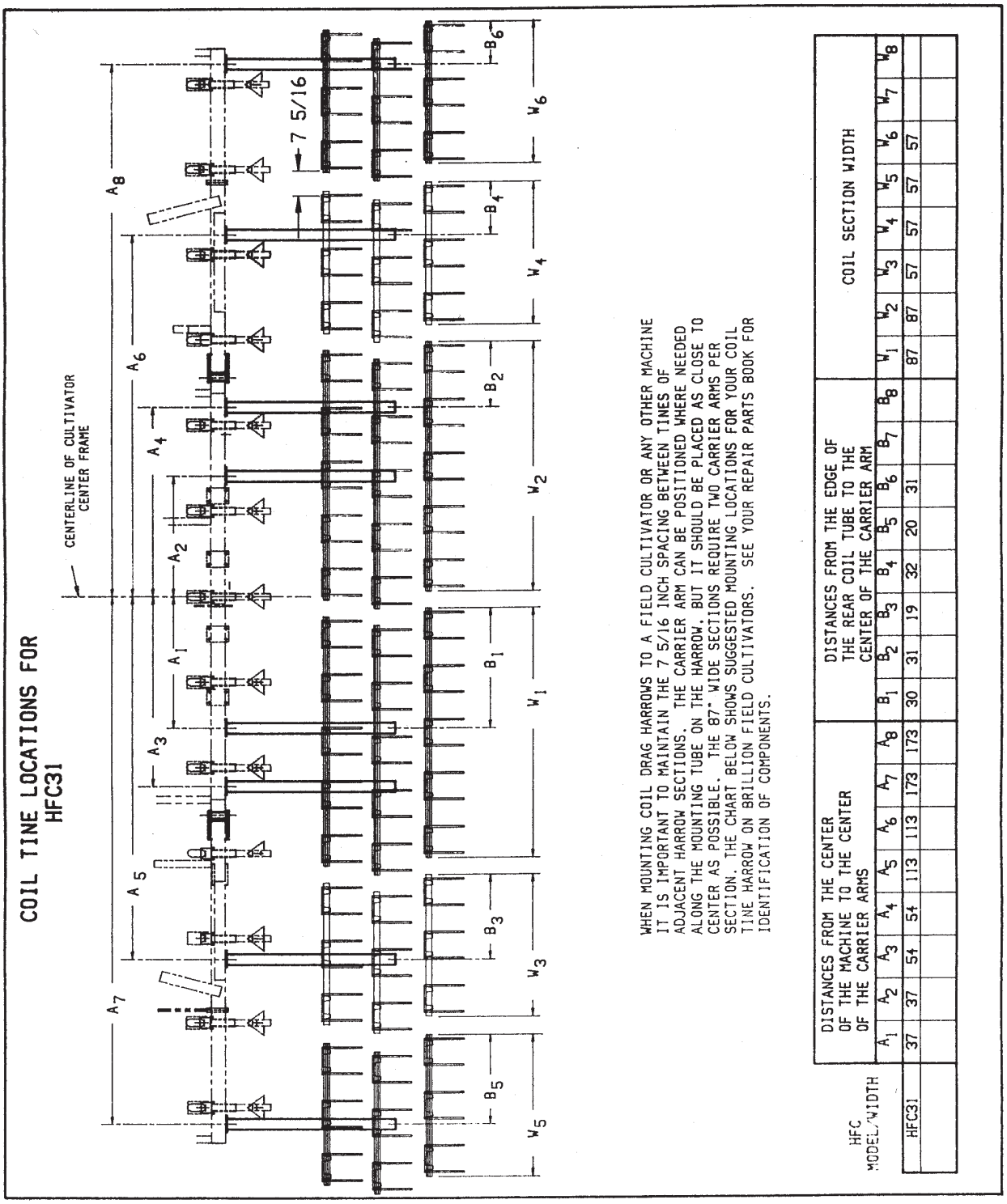


WHEN MOUNTING COIL DRAG HARROWS TO A FIELD CULTIVATOR OR ANY OTHER MACHINE IT IS IMPORTANT TO MAINTAIN THE 7 5/16 INCH SPACING BETWEEN TINES OF ADJACENT HARROW SECTIONS. THE CARRIER ARM CAN BE POSITIONED WHERE NEEDED ALONG THE MOUNTING TUBE OF THE HARROW, BUT IT SHOULD BE PLACED AS CLOSE TO CENTER AS POSSIBLE. THE 87" WIDE SECTIONS REQUIRE 2 CARRIER ARMS PER SECTION. THE CHART BELOW SHOWS SUGGESTED MOUNTING LOCATIONS FOR YOUR COIL TINE HARROW ON BRILLION FIELD CULTIVATORS. SEE YOUR REPAIR PARTS BOOK FOR IDENTIFICATION OF COMPONENTS

HFC MODEL/WIDTH	DISTANCES FROM THE CENTER OF THE MACHINE TO THE CENTER OF THE CARRIER ARMS								DISTANCES FROM THE EDGE OF THE REAR COIL TUBE TO THE CENTER OF THE CARRIER ARM								COIL SECTION WIDTH							
	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	B_1	B_2	B_3	B_4	B_5	B_6	B_7	B_8	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8
HFC24	37	37	N/A	N/A	134	134	89	89	38	38	15	31					72	72	87	87				
HFC25	37	37	N/A	N/A	134	134	89	89	38	38	15	31					72	72	87	87				
HFC26	34	41	54	N/A	89	89	137	137	37	37	14	30					87	72	87	87				
HFC27	34	34	54	54	125	125	150	150	30	31	31	26					87	87	87	87				
HFC28	34	34	54	54	113	113	158	158	30	31	20	17					87	87	87	87				
HFC29	34	34	54	54	113	113	158	158	30	31	20	17					87	87	87	87				
HFC30	34	34	54	54	113	113	158	158	30	31	20	17					87	87	87	87	BOLT EXTENSIONS TO OUTER TINE TUBES			

N/A MEANS NO CARRIER ARM IS LOCATED AT THIS POSITION

FIGURE 30



HFC MODEL/WIDTH	DISTANCES FROM THE CENTER OF THE MACHINE TO THE CENTER OF THE CARRIER ARMS								DISTANCES FROM THE EDGE OF THE REAR COIL TUBE TO THE CENTER OF THE CARRIER ARM								COIL SECTION WIDTH							
	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	B_1	B_2	B_3	B_4	B_5	B_6	B_7	B_8	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8
HFC31	37	37	54	54	113	113	173	173	30	31	19	32	20	31			87	87	57	57	57	57		

FIGURE 31

TROUBLE SHOOTING

POSSIBLE CAUSE	SUGGESTED REMEDY
Sweeps or shovels do not penetrate evenly	
Worn sweeps or shovels	Replace
Incorrect sweep angle	Replace with sweeps having 47 degree stem angle
Field cultivator not level	Level the cultivator, both front to rear and side to side See Level Adjust, page 7.
Cylinders not retracting completely	Bleed air from system. Rephase hydraulic cylinders. See Assembly Instructions, item 14, hydraulic hoses on page 26.
Wings not following contour of the ground to float.	Extend wing lift cylinders completely, allowing wings
Outside front of wing “nose-dives” are on the machine.	Use optional wing gage wheels, or adjust them if they
Inadequate spring tension on shank spring. One turn on bolt increases point pressure approximately 5 pounds.	Increase spring preload by turning bolt into spring end
Extremely hard ground	Use Heavy duty, 2 inch wide reversible points in place of sweeps (Brillion part no. 2J605), and/or make 2 passes with the first at a shallower depth.
Shanks stretching	
Shank pivot is seized	Free up the pivot and lubricate.
Too much spring pressure	Loosen bolt which preloads shank spring; each turn of the bolt reduces point pressure by approx. 5 lb.
	Shank casting is clamped too tight to spring end, the bolt should allow the spring to pivot in the casting.
Shanks wobble	
Pivot bolt is loose	Tighten the pivot bolt.
Shank mount bolts are loose	Tighten the bolts equally.
Machine does not raise or lower properly	
Cylinders not synchronized properly	Bleed air from system. Rephase hydraulic cylinders. See Assembly instructions, item 14 on page 26.
Cylinders connected in wrong sequence	See Figure 18, page 28.
Hoses not connected properly	See figures 17, 18, and 19.
Hydraulic hose ends not working properly	Replace hose ends

Wings do not fold properly

Too fast	Make sure restrictors are installed in the circuit.
Too slow	Check tractor flow adjustment and hydraulic pressure. 1500 PSI is required to fold large machines with spike tooth harrows mounted to rear tooth bar. Make sure hydraulic hose ends are functioning properly, if not, replace.
Wings are not even when folded	Center the cylinder anchor on the rear tooth bar. Center the wing support on the front tooth bar.
Cylinder leakage, external or internal	Repair or replace the cylinder.

Plugging

Incorrect shank location	Refer to shank locating charts on pages 32, 33, 34, and 35.
Plugging at wheel with S-tine	Be sure to use shank mount to locate S-tine rearward in the area next to the tire. See the shank locating charts on pages 32, 33, 34, and 35.
Too much trash	Operate at an angle to the rows if possible. Make sure that your combine is spreading the stalks. In extreme conditions it may be necessary to shred or disk the stalks before cultivating.

Tire and shank interference

Tire strikes S-tine in transport position	Use the hole in walking beam which will position the inner wheel farthest from the wheel arm.
Tire strikes sweep	Check shank spacing charts. Only 7 inch wide sweeps can be used in the area adjacent to tires.

Cultivator does not follow properly

Machine is not leveled properly	Level the cultivator front to rear and side to side. See level adjust, page 7.
Incorrect shank locations	See shank locating charts on pages 32, 33, 34, & 35.
Unequal tire diameters	Check tire diameters and inflation pressures.
Towed implement is causing side loading	Check operation of any implement you are towing

SPECIFICATIONS

(Subject to change for product improvement)

Model Designation

The basic model designations are:

"HFC" - "HFCT" - "HFK" - "HFKT"

The numbers following the letters indicates the machine width in feet between the centers of the two outermost shanks on the machine.

Basic Machine Specifications

Operating depth range	0 to 5 inches
Shank clearance	26 inches from bottom of frame to sweep tip
Road clearance	9 to 14 inches (varies with operating depth)
Shank trip height	13 1/4 inches
Shank trip force	142 pounds
Shank spacing	6 inch center to center, no shanks closer than 24" on any tooth bar
Front to rear spacing	30 inch on rear bar, 32 inch all others
Sweeps	1J808, 7 inch wide 47 degree shank angle--check clearances if using wider shanks
Points	2J605, 2 inch wide reversible point
Shank Material	9/16 x 1 3/4 alloy steel
Pivot	Greaseable, hardened bushing
Main frame & wings	5 bars of 3" x 4" tubing
Overall length	21 feet
Maximum Transport heights (optional spike harrows add to transport height & width)	HFC 23 & HFK 23 -- 10' 5" HFC 27 & HFK 27 -- 12' 5" HFC 31 & HFK 31 -- 14' 5"
Transport width	HFC 16 to HFC 23 -- 13' 10" HFC 24 to HFC 31 -- 14' 3"
Machine weights	HFC 23 -- 5963# HFK 23 -- 5219# HFCT 23 - 6117#
	HFC 27 -- 6619#
HFK 27 -- 5739#	HFCT 27 - 6833#
	HFC 31 -- 7640# HFK 31 -- 6661# HFCT 31 - 7283#
Wheels & tires	
Center section	Walking tandem with (4) 9.5L-15 tires
Wings, 16 through 19 foot machines	Single tires with (2) 6.70-15 or 7.60-15 tires
Wings, 20 through 27 foot machines	Single tires with (2) 9.5L-15 tires; walking tandem optional (use (4) 7.60-15 tires on tandems)
Wings, 28 through 31 foot machines	Walking tandem with (4) 7.60-15 tires

Other features

Your BRILLION Field Cultivator is designed with a special linkage which keeps the machine level throughout its operating and transport range. A link adjusts the tongue height to suit any tractor drawbar height and serves to level the machine from front to rear. The drawbar hitch is a balanced reversible yoke or bar type hitch made of heat treated ductile iron. The transport wheels are controlled by a pair of master-slave cylinders which raise and lower the center section and the wings evenly. In the operating position, the cylinders are completely retracted. Operating depth is changed by adjusting the cylinder anchor adjust rods from a position in front of the machine.

Equipment from Landoll Corporation is built to exacting standards ensured by ISO 9001:2008 registration at all Landoll manufacturing facilities.

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