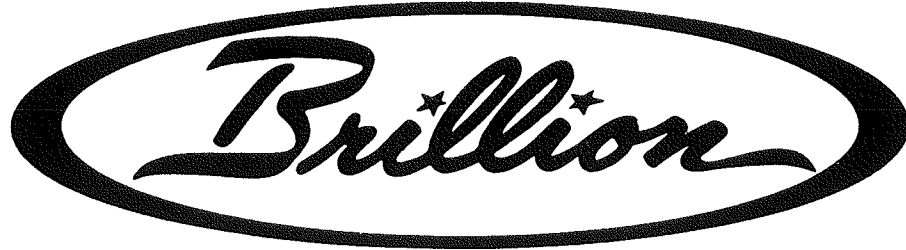
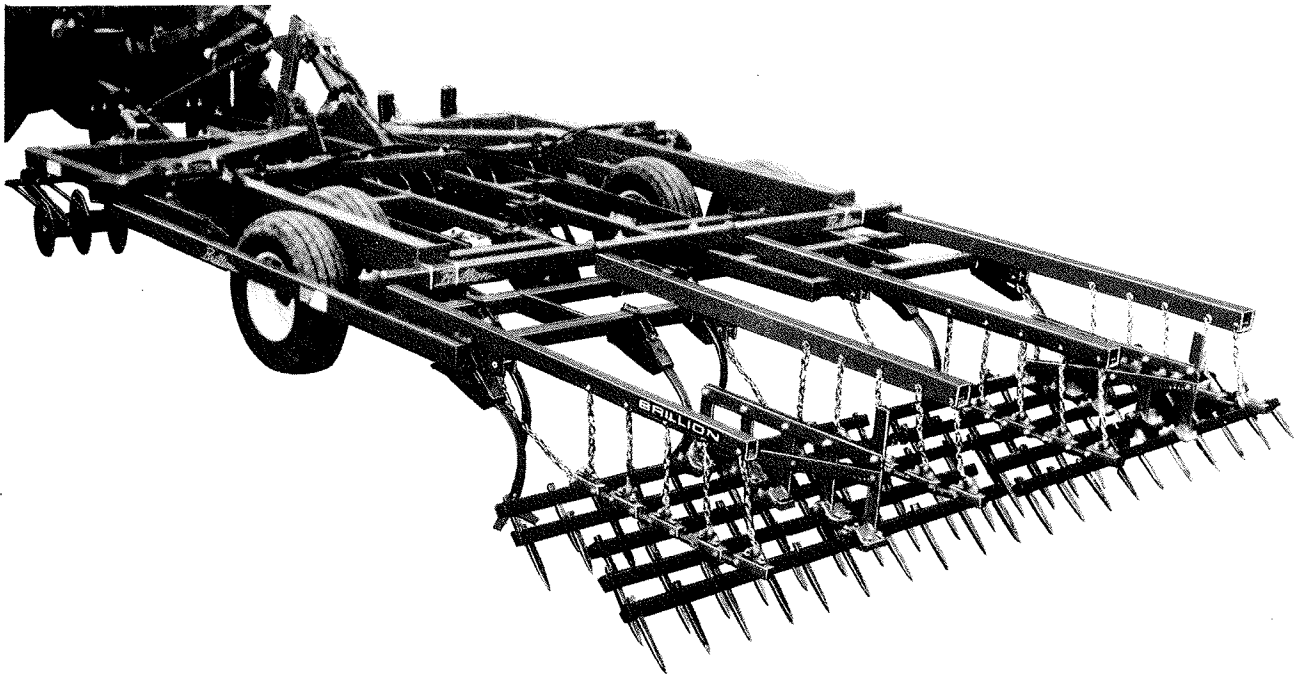


SETTING-UP AND OPERATING MANUAL



SOIL GROOMER



MODELS:	SGS-181	SGR-181
	SGS-181-1	SGR-181-1
	SGS-211	SGR-211
	SGS-211-1	SGR-211-1

BRILLION IRON WORKS, INC.
BRILLION, WISCONSIN 54110

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INTRODUCTION

Your Brillion Soil Groomer is built with the best materials and workmanship available. It has been designed to give years of trouble-free operation. Proper care and operation will insure that you receive the service and long life built into this machine.

Study this manual carefully before attempting to assemble or operate the machine. A special section, "Setting Up Instructions", is included.



This safety alert symbol is used to call your attention to instructions concerning 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 must be repeated to the employee at the beginning of each season. Be sure to observe and follow the instructions for the safety of anyone operating or near the machine.

Location Reference

Right hand, left hand, forward and rear refer to operator's right, left, front and rear when he faces the same direction as the machine will travel in field.

Parts Ordering

When ordering parts for this machine, include the complete model number and serial number. Refer to the name plate on the right rear hinge of the center section. Please record these numbers upon taking delivery of the unit.

Soil Groomer Model No. _____

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.



SAFETY SUGGESTIONS

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. Do not fold or unfold the wings or operate the machine without first bleeding air from the hydraulic systems.
3. Do not allow anyone near the machine when folding or unfolding the wings.
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. 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.
7. Always use two transport locks for center frame wheel cylinders and the lock on front center master cylinder when transporting machine.
8. Lower machine to ground when not in use.
9. Block machine so it will not roll when unhitched from tractor.
10. Do not transport at speeds over 20 mph.
11. Avoid sudden stops or turns when transporting because weight of machine may cause operator to lose control of tractor. Use a tractor heavier than machine. Do not allow tractor drawbar to swing when transporting.
12. Use caution when towing behind articulated steering tractors; fast or sharp turns may cause the machine to whip sideways.
13. Securely block machine when working on or under it to prevent injury in case of hydraulic failure or inadvertent lowering by another person.

OPERATING INSTRUCTIONS

Tractor Preparation



Lock tractor drawbar in center position. Do not allow the drawbar to swing, especially during transport.

Soil Groomer Preparation

Hydraulic oil capacity of the Soil Groomer is approximately 3.7 gallons.

Clean hose fittings before connecting to tractor. It is also necessary during initial operation to watch tractor oil level closely to avoid damage.

Depth control and machine leveling is accomplished by a system of three cylinders in series. Be sure they are connected so that flow is from largest bore cylinder to the smallest in decreasing size. Also the rod end of the first cylinder must be connected to the anchor end of the second, etc. See hydraulic diagram on page 29.

Bleeding Depth Control Cylinders

For machine to operate at uniform depth, all air must be removed from series circuit. The following procedure is suggested.

1. Remove the two "U" shaped transport lock members over wheel arm cylinder rods. Slide striker plate against cylinder rod yoke on master cylinder on front center of machine.
2. Activate the hydraulic system until all rods are fully extended.
3. Cycle the cylinders from fully extended to fully retracted at least two times, pausing at full extension about 30 seconds.
4. Fully extend cylinders one more time and allow oil to flow through system about one minute by holding tractor valve open.
5. Depth control circuit should not be opened after this. If parts are removed and air enters system, circuit must be bled again.

If after this has been completed and the smallest hydraulic cylinder has a different extended pin center distance than the other cylinders, it will be necessary to repeat the above procedure with the rod end pins removed and the cylinders supported in a near vertical position.

Bleeding Wing Lift Cylinders

Raise the wings partially, and then lower them again. It is important to do this 7 or 8 times before the wings are raised 90°. The wings depend upon the passage of oil through a flow restrictor to keep them from free-falling. If the cylinders are not full of oil, the wings may drop and damage the machine.



The two wings are not tied together, and one may raise before the other. Both wings should raise before either goes over 90°.

If it becomes necessary to drain the oil from one or more cylinders, it is important to bleed the air out of the system before operating.

Center Side To Side Leveling

Consistent cultivating depth is maintained along the center of the machine by operating properly bled cylinders. If additional leveling is necessary, lengthen the cylinder on the side of machine with the deeper working depth. NOTE: A setscrew in the rod yoke will have to be loosened, then tightened after adjustment is made.

Center Depth Adjustment

The master cylinder (located on the front center of machine) controls operating depth of the entire machine. When the desired depth is obtained, slide the striker plate along the cylinder rod, depressing the plunger on top of the cylinder. Fix the striker plate in this position by tightening the tee handle. The depth gate strip attached to the cylinder yoke is merely a reference tool to enable you to reset depth stop to a predetermined setting.

Wing Leveling on Manual Models

The wing side to side leveling may be accomplished by extending or retracting the ratchet jack attached to the wheel.

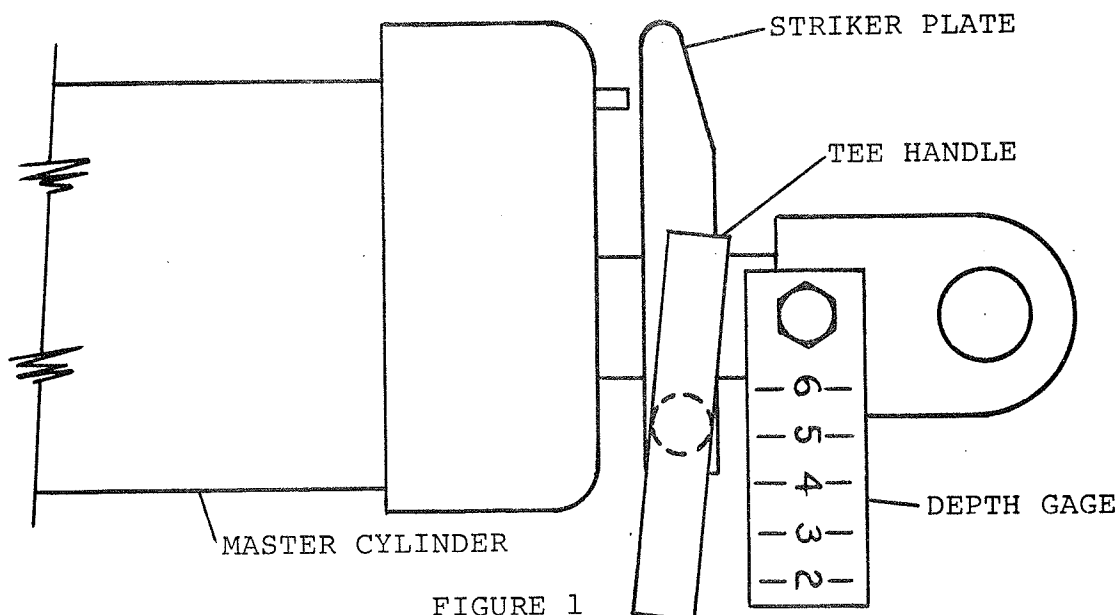


FIGURE 1

Wing Leveling on Hydraulic Gage Wheel Models

The wing side to side leveling is done by adjusting the nuts on the eye bolt of the cylinder anchor. If additional adjustment is needed the clevis on the cylinders may be adjusted.

Wing Down Float Adjustment

The stop blocks on frame hinges can be rotated to change down float. Adjust to hold the outside up as far as possible. This will lessen soil piling and stress on wing frame. If one of the four settings does not provide the exact setting, remove material from a long side of blocks to obtain float desired. The stop blocks used with manual controlled wing gage wheels for down float adjustment should not be used with hydraulic gage wheels.

Transport

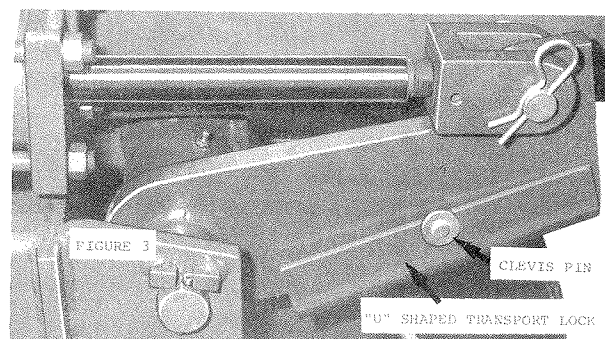
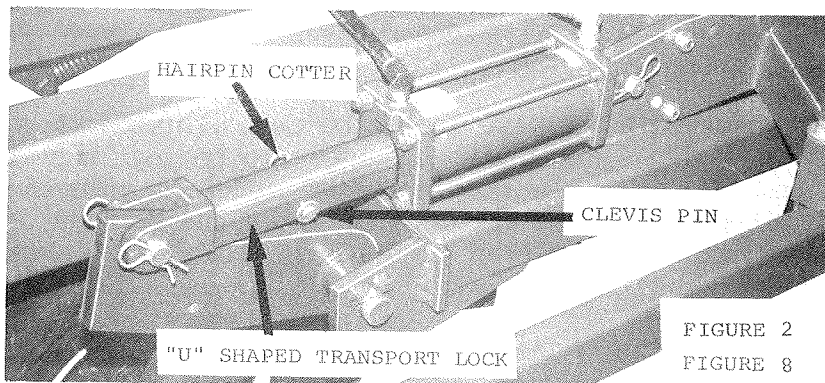
To prepare a machine for transport, raise it fully out of ground. Then place two "U" shaped transport lock members over wheel arm cylinder rods. Secure with 1/2" x 3-1/4" clevis pins and hair pin cotters. The "U" shaped members can be stored on the wheel lift arms. The "U" shaped transport lock members must not be exchanged between cylinders.

The front center master cylinder must also be locked for transport. Note depth setting using depth gage strip before moving striker plate. Loosen the tee handle on the master cylinder striker plate and slide this striker plate down against depth stop plunger; then retighten.



Maximum road speed is 20 MPH under good conditions. Do not tow the machine at a speed where 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 and reflectors.



Rephasing

Occasionally, machine should be raised completely out of the ground and lift lever on tractor held for a few seconds. This will rephase depth control cylinders and insure uniform working depth.

Hitch Leveling

The machine may be leveled (front to rear) in transport position after the depth control cylinders are synchronized by bleeding. Make sure the tractor and Soil Groomer are on a level surface and extend or retract the drawbar brace rod assembly until the machine is parallel (front to rear) to the ground surface. Only minor adjustments will be necessary in field.

Working Speed

Best results are obtained by operating at a speed of 5 to 8 MPH, especially if roller harrows are used. Somewhat higher rates are also acceptable, but in no event should speed exceed the point at which the operator can safely control tractor and implement.

Turning

Because of the sideways anchoring affect of the disk gangs the machine should always be raised when turning at the end of the field. This will relieve stress on the disk gangs and machine frame as well as eliminate large soil piles resulting from forcing the disks sideways.

Disk Depth Adjustment

This adjustment is provided to allow the disk cutting depth to be set independent of the cultivator shanks. This provides for more cutting and leveling in rough, trashy conditions and also allows the disks to be raised in loose soil conditions where aggressive disk tillage is not desired (shallow incorporation) and where excess sideways soil movement causes disk gang ridging.

The disks may be adjusted to cut two inches below to three inches above the cultivator sweeps. The procedure involves loosening the horizontal carriage bolts and advancing the double nutted vertical adjusting bolt in the appropriate direction. Both are located under the springs on the disk gangs. When adjustment is completed tighten the double jam nuts and nuts on carriage bolts.

Disk Pressure Adjustment

The disk gangs are spring loaded to provide protection from impacts but they must be adjusted correctly to provide maximum protection without reducing working depth. The lock nuts on top of the spring pairs should be adjusted down for increased pressure and constant working depth, if the disk gangs are constantly bobbing up and down. Conversely, the pressure should be reduced by advancing the nuts up, if the gangs never or seldom retract. Less spring pressure reduces possibility of disk damage. Adjust both nuts per spring set the same amount.

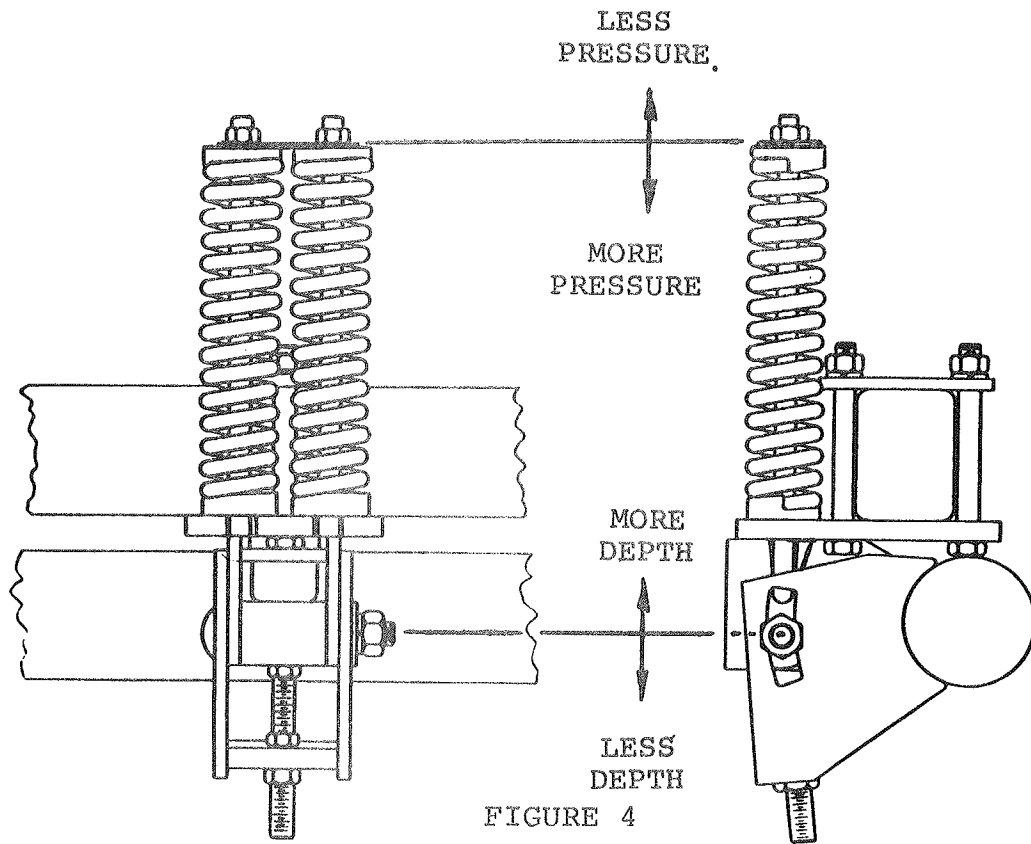


FIGURE 4

Disk Scraper Pressure Adjustment

Do not tighten scrapers tight against disk blades, this will cause rapid wear.

To properly adjust scrapers, loosen both the 3/8" bolt in the arm and the set screw in the scraper. Swing the scraper against the disk blade and tighten the set screw, then swing the scraper 1/16" to 1/8" away from the disk blade and tighten the 3/8" bolt to lock in place.

All the scrapers can be adjusted by loosening the two bolts that hold the scraper bar to the disk frame and sliding the bar in the direction needed and then retightening the bolts. Take care not to slide the bolts out of the slots.

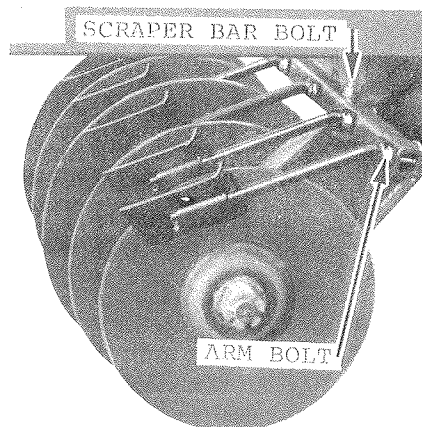


FIGURE 5

Spike Tooth Harrow Adjustment

If spike tooth harrow sections build up with soil or plant residue one or more of the following can be done: 1) flatten spike angle, 2) shorten draft chains, 3) shorten the support chains.

Adjustments are easiest to make with spike tooth harrow sections not in contact with ground. The most soil mixing will occur with steeper spike angle section not being held up by support chains.

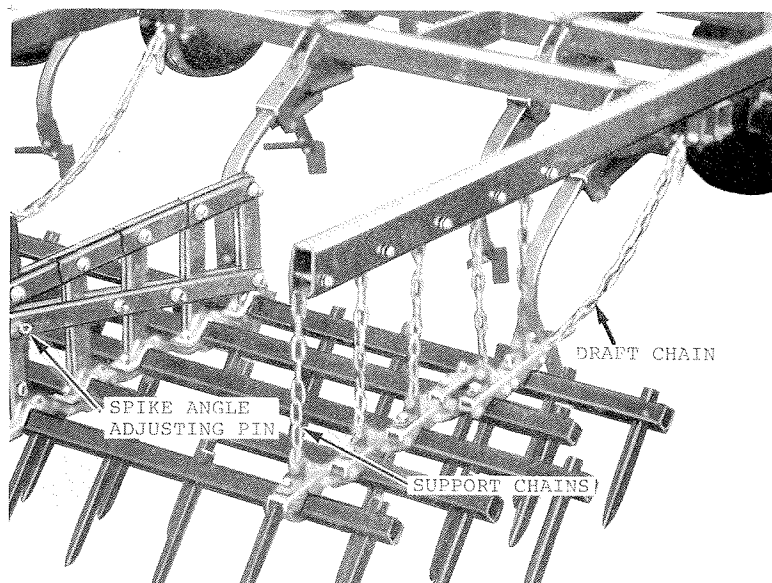


FIGURE 6

Chemical Incorporation

The primary requirement for successful incorporation is following the chemical manufacturer's instructions. However, the following suggestions are generally recognized, and should be observed unless specific instructions say otherwise:

1. Many herbicides, especially shallow incorporated types should be sprayed on level ground. This can be accomplished by mounting spray nozzles in the 42" spray zone provided behind the disk gangs on the Soil Groomer. In extreme conditions, it may be necessary to install an optional spray curtain to protect the nozzles from soil thrown by the disks.
2. Two passes, with the second at an angle to the first, usually give the best mixing. Disk gangs are best set shallow if a second pass is used to reduce oneway soil movement and resulting hot and cold spots.
3. Second pass should not be deeper than the first or untreated soil will be brought to the top.
4. If only one pass is made, shovels or sweeps will do a better job than points.
5. Machine should be level; rear tines must not be set deeper than those at front.
6. Good mixing can not be obtained in wet soil.

7. Relatively high speeds (6 - 8 mph) provide the best mixing.

Spray nozzles may be mounted on the Soil Groomer, but tanks should not, since the machine has not been designed to handle the extra weight.

Roller Harrow Adjustments

Three types of adjustments are provided: (1) Upward-downward of entire assemblies, (2) angular (changes height of front harrow reel with respect to rear reel), and (3) spring tension. While exact settings will need to be determined by trial, the following is intended as a general guide:

1. Entire assemblies can be held out of the ground. This may be desirable if the machine is being used to work a wet field at a shallow depth for drying.

By inserting depth control pins as high as possible with harrows still penetrating the ground, the harrows can be lifted out of the ground without raising the machine fully when turning. This will reduce side loading and resultant stress on harrows and mounting brackets.

Disconnecting spring handles to release spring tension or lowering machine with a block under each rolling harrow reel can make this adjustment easier.

2. Angular adjustment for shallow working depths can have both reels at the same height. At greater depths with more loose soil available, the front reel should be slightly higher than the rear. This will prevent "blocking" of the front reel.
3. Spring tension prevents excessive bouncing. Extreme tension, beyond that which can be comfortably obtained with one hand, is usually not necessary.

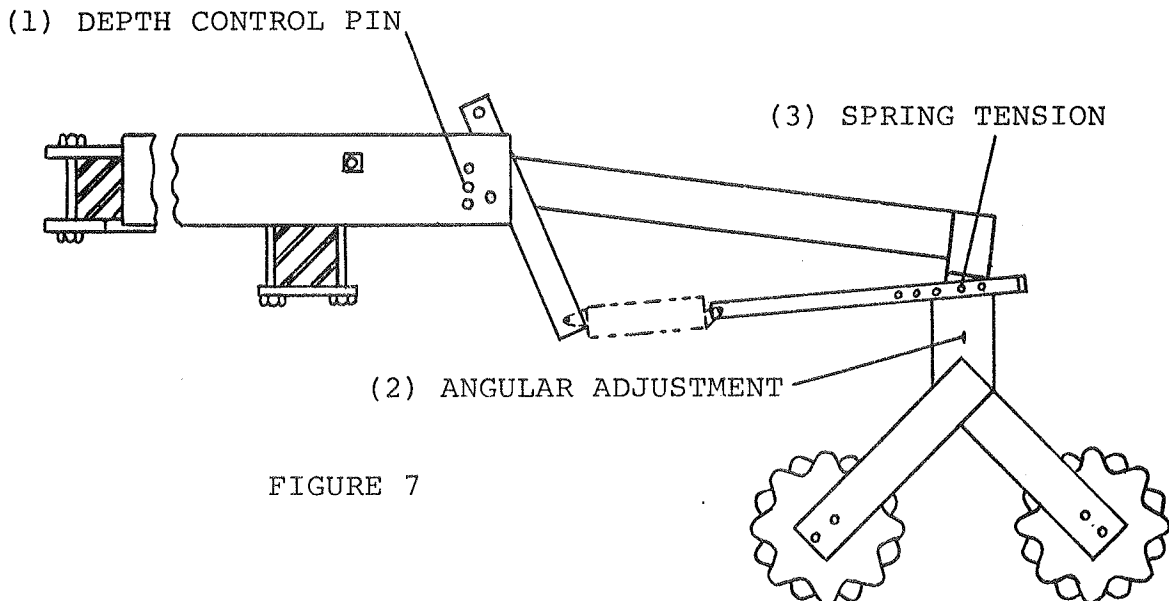


FIGURE 7

MAINTENANCE

Fasteners

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

Center Tires

Recommended size of four tires on 18' machine: 9.5L x 15 6 ply inflated to 28 psi (for 21' machine 8 ply inflated to 40 psi). 11L x 15 tires may be used with same ply rating and inflation specified above for your width machine.

Wing Tires

Recommended size of two tires: 6.70 or 7.60 x 15 6 ply inflated to 24 psi.

Lubrication

Grease zerk fittings daily. Locations are:

Disk rockshaft bearings - - - - - 8 (2 zerks per bearing)
Wheel arm pivots - - - - - 2

The above items are not sealed and cannot be overgreased. Roller harrows should also be greased daily. The best time is after machine is done running, to prevent condensation in the bearings. Give each bearing about two "shots" or grease until seal just starts to lift.

Wheel bearings and walking beam pivots should be repacked annually.

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

Replacing Points or Sweeps

When points or sweeps are turned or replaced, all of them on the machine should be of the same length to insure uniform operating depth and proper trailing of the Soil Groomer. It is normal for points or sweeps working in the tractor tracks to wear faster because of soil compaction. Turn or replace points or sweeps before the end of the tooth shank begins to wear.

Disk Gang Maintenance

After a few hours of use check tightness of gang nut. Tighten to 1,100 foot pounds torque, then loosen slightly to allow reinstalling locking cotter pin. Daily or periodic checks should be made there after.

CAUTION: Loose blades will cut disk gang axle, damage bearing, spacer spools and will cause disk gang axles to bend.

SHIPPING BUNDLES

NOTE: REFER TO REPAIR PARTS CATALOG FOR IDENTIFICATION OF PARTS AND FOR APPROXIMATE RELATIONSHIP OF PARTS IN ASSEMBLY.

SHIPPING BUNDLE CHECK LIST: Your Brillion Soil Groomer is shipped to you in separate assemblies. These shipping bundles and assemblies are:

BUNDLE NAME	Spike Tooth Harrow Models								
	SGS-18	SGS18-1	SGS-21	SGS21-1	SGSH-18	SGSH18-1	SGSH-21	SGSH21-1	
	Shank Spacing Working Width	9" 18'	6" 18'	9" 21'	6" 21'	9" 18'	6" 18'	9" 21'	6" 21'
Center frame	1	1	1	1	1	1	1	1	1
Front Lift Arm	1	1	1	1	1	1	1	1	1
Brace Rod Assembly	1	1	1	1	1	1	1	1	1
Drawbar Assembly	1	1	1	1	1	1	1	1	1
Drawbar Jack	1	1	1	1	1	1	1	1	1
Disk Axle Assembly L.H.	2	2	2	2	2	2	2	2	2
Disk Axle Assembly R.H.	2	2	2	2	2	2	2	2	2
Walking Beam Assembly L.H.	1	1	1	1	1	1	1	1	1
Walking Beam Assembly R.H.	1	1	1	1	1	1	1	1	1
Rear Super Tube	1	1	1	1	1	1	1	1	1
Tube Weldment L.H.	1	1	1	1	1	1	1	1	1
Tube Weldment R.H.	1	1	1	1	1	1	1	1	1
Master Hydraulic Cylinder 4-1/4 x 8	1	1	1	1	1	1	1	1	1
Hydraulic Cylinder 4 x 8	1	1	1	1	1	1	1	1	1
Hydraulic Cylinder 3-3/4 x 8	1	1	1	1	1	1	1	1	1
Hydraulic Cylinder 3 1/2 x 16	2	2	2	2	2	2	2	2	2
Hydraulic Cylinder 3 1/2 x 8	-	-	-	-	1	1	1	1	1
Hydraulic Cylinder 3 1/2 x 8	-	-	-	-	1	1	1	1	1
Tooth Frame	4	4	4	4	4	4	4	4	4
Wheel	6	6	6	6	6	6	6	6	6
Cultivator Shank Assembly	25	37	29	43	25	37	29	43	43
Tooth Extension 4-1/2	2	12	4	14	2	12	4	14	14
Tooth Extension 6	2	-	2	-	2	-	2	-	-
Tooth Extension 8-1/2	2	2	2	2	2	2	2	2	2
Tooth Extension 12	-	-	-	4	-	-	-	4	4
Tooth Extension 17-1/2	2	2	6	4	2	2	6	4	4
Drag Support	8	8	8	8	8	8	8	8	8
Drag Bar Assembly 50"	2	2	-	-	2	2	-	-	-
Drag Bar Assembly 70"	2	2	4	4	2	2	4	4	4
Middle Tube Extension 20"	1	1	1	1	1	1	1	1	1
Box Assembly	15	16	15	16	16	17	16	17	17
Front Wing Frame	2	2	2	2	2	2	2	2	2
Wing Hinge Tube	2	2	2	2	2	2	2	2	2
Gauge Wheel Arm	2	2	2	2	2	2	2	2	2
Ratchet Jack Assembly	2	2	2	2	-	-	-	-	-
Wing Stand	2	2	2	2	2	2	2	2	2
Hinge Weldment	6	6	6	6	6	6	6	6	6
Lift Hinge Weldment	2	2	2	2	2	2	2	2	2
Anchor Assembly	2	2	2	2	2	2	2	2	2
Weight	2	2	-	-	2	2	-	-	-

Points or sweeps are ordered separately.

Spray Shield (for mounting behind discs) is optional.

Wing Hold Kit is optional.

SHIPPING BUNDLES

NOTE: REFER TO REPAIR PARTS CATALOG FOR IDENTIFICATION OF PARTS AND FOR APPROXIMATE RELATIONSHIP OF PARTS IN ASSEMBLY.



SHIPPING BUNDLE CHECK LIST: Your Brillion Soil Groomer is shipped to you in separate assemblies. These shipping bundles and assemblies are:

BUNDLE NAME	2 Gang Roller Harrow Models							
	SGR-18	SGR18-1	SGR-21	SGR21-1	SGRH-18	SGRH18-1	SGRH-21	SGRH21-1
Shank Spacing	9"	6"	9"	6"	9"	6"	9"	6"
Working Width	18'	18'	21'	21'	18'	18'	21'	21'
	QUANTITY PER MACHINE							
Center Frame	1	1	1	1	1	1	1	1
Front Lift Arm	1	1	1	1	1	1	1	1
Brace Rod Assembly	1	1	1	1	1	1	1	1
Drawbar Assembly	1	1	1	1	1	1	1	1
Drawbar Jack	1	1	1	1	1	1	1	1
Disk Axle Assembly L.H.	2	2	2	2	2	2	2	2
Disk Axle Assembly R.H.	2	2	2	2	2	2	2	2
Walking Beam Assembly L.H.	1	1	1	1	1	1	1	1
Walking Beam Assembly R.H.	1	1	1	1	1	1	1	1
Rear Super Tube	1	1	1	1	1	1	1	1
Tube Weldment L.H.	1	1	1	1	1	1	1	1
Tube Weldment R.H.	1	1	1	1	1	1	1	1
Master Hydraulic Cylinder								
4-1/4 x 8	1	1	1	1	1	1	1	1
Hydraulic Cylinder 4 x 8	1	1	1	1	1	1	1	1
Hydraulic Cylinder								
3-3/4 x 8	1	1	1	1	1	1	1	1
Hydraulic Cylinder 3 1/2 x 16	2	2	2	2	2	2	2	2
Hydraulic Cylinder 3 1/2 x 8	-	-	-	-	1	1	1	1
Hydraulic Cylinder 3 1/2 x 8	-	-	-	-	1	1	1	1
Tooth Frame	4	4	4	4	4	4	4	4
Wheel	6	6	6	6	6	6	6	6
Cultivator Shank Assembly	25	37	29	43	25	37	29	43
Tooth Extension 4 1/2	2	12	4	14	2	12	4	14
Tooth Extension 6	2	-	2	-	2	-	2	-
Tooth Extension 8 1/2	2	1	2	1	2	1	2	1
Tooth Extension 12	-	-	4	2	-	-	4	2
Tooth Extension 17 1/2	2	2	2	4	2	2	2	4
Middle Tube Extension	2	2	2	2	2	2	2	2
Roller Harrow Bracket	7	7	9	9	7	7	9	9
Roller Harrow Extension	7	7	9	9	7	7	9	9
Roller Harrow Section 40"	4	4	4	4	4	4	4	4
Roller Harrow Section 24"	3	3	5	5	3	3	5	5
Frame Tube Extension 13 1/2"	-	-	2	2	-	-	2	2
Box Assembly	14	15	16	17	15	16	17	18
Front Wing Frame	2	2	2	2	2	2	2	2
Wing Hinge Tube	2	2	2	2	2	2	2	2
Gauge Wheel Arm	2	2	2	2	2	2	2	2
Ratchet Jack Assembly	2	2	2	2	-	-	-	-
Wing Stand	2	2	2	2	2	2	2	2
Hinge Weldment	6	6	6	6	6	6	6	6
Left Hinge Weldment	2	2	2	2	2	2	2	2
Anchor Assembly	2	2	2	2	2	2	2	2
Weight	2	2	-	-	2	2	-	-

Points or sweeps are ordered separately.

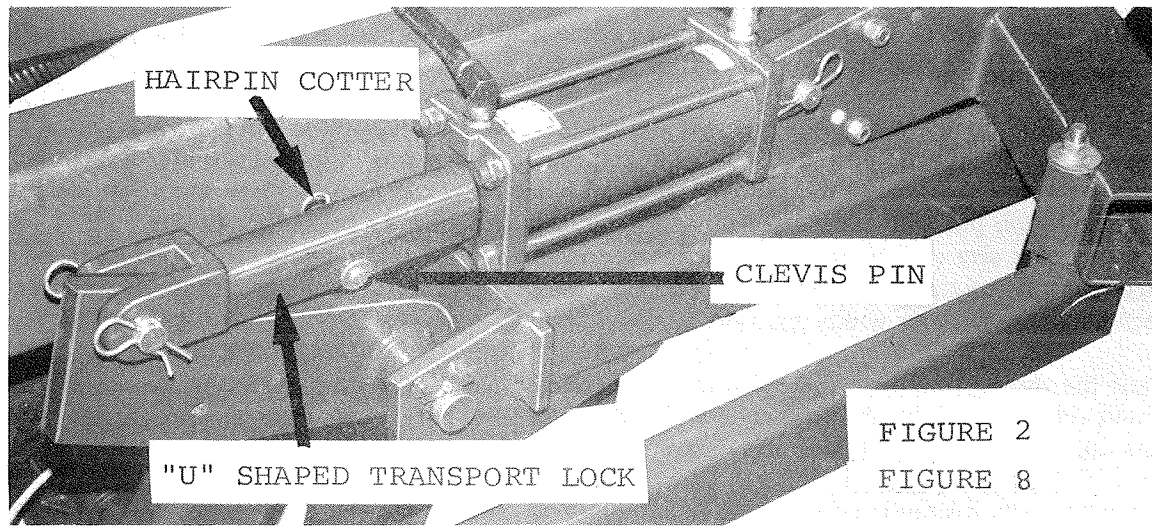
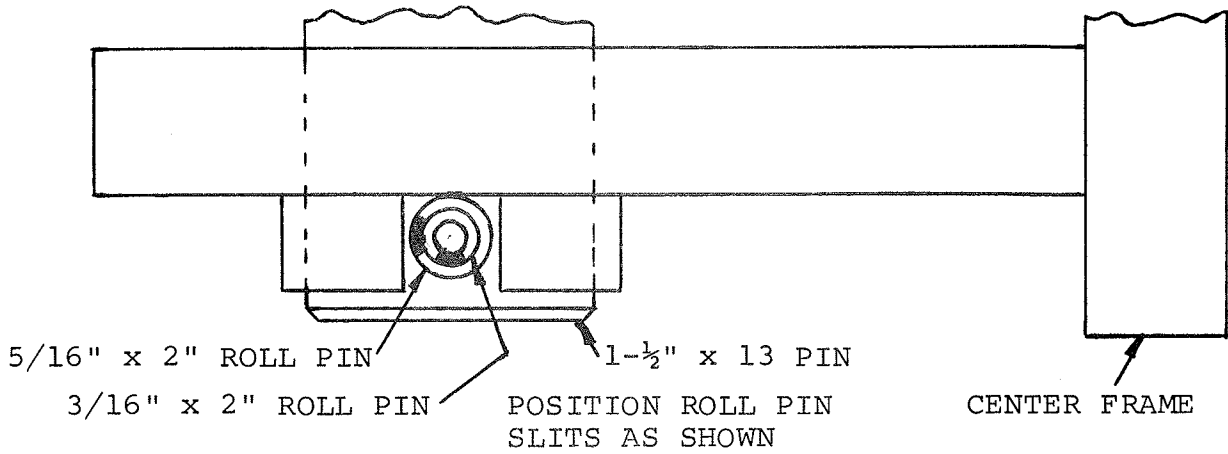
Spray Shield (for mounting behind discs) is optional. Wing Hold Kit is optional.

SETTING UP INSTRUCTIONS

BOLTS AND NUTS		
Recommended Torque in Foot-Pounds Coarse and Fine Threads		
		
Bolt Diameter	Grade 2	Grade 5
1/4	5	8
5/16	11	17
3/8	20	30
7/16	30	50
1/2	50	75
9/16	65	110
5/8	90	150
3/4	160	260
7/8	140	400
1	220	580

Tighten all bolts to the torques specified in the chart above. It is important that bolts be kept tight at all times. Loose bolts can cause breakage of parts. Check the tightness of bolts periodically and keep them tightened to the torques specified above.

1. Support center frame on four stands at least 30" high. Be sure supports are stable and of adequate strength to carry machine weight. NOTE: Use boxes 6J-37, 6J-682 and 6J-323 for initial set up sets. Install one shank on each side of center frame near lug for base end of wheel arm hydraulic cylinder. (These are the shanks shown at 12½" or 13" on pages 32-39).
2. Attach right and left walking beam assemblies on machine with wheels on hubs. Use 1-1/2" x 13" pins with 5/16" x 2" roll pins and 3/16" x 2" roll pins between small blocks on center frame. Position the slit in the large roll pin against small block on center frame. Place small roll pin inside large roll pin with slit rotated 90°. The outside tire must be behind inside tire. Recommended size of four tires on 18' machines are 9.5L x 15 6 ply inflated to 28 psi (for 21' machine 8 ply inflated to 40 psi). 11L x 15 tires may be used with same ply rating and inflation specified above for your width machine.
3. Adjust the three hydraulic cylinders to 20-1/4" retracted pin centers (if necessary). Be sure to tighten clevises of all hydraulic cylinders. Install 9J-484 (4" bore) slave cylinder on right side with ports up. Install 9J-483 (3-3/4" bore) slave cylinder on left side with ports up.
4. With wheel arm hydraulic cylinders extended, place "U" shaped transport members over each wheel arm cylinder rod. 9J-484 (4" bore right side) uses 6J-649 (10" painted red). 9J-483 (3-3/4" bore left side) also uses 6J-649. Secure both with 1/2" x 3-1/4" clevis pins and hair pin cotters.



NOTE: Use boxes 7J901 (18' & 21') and 2 of 6J681 (18' & 21') next.

5. Position the left and right disk gang assemblies under center frame, with frames forward, scraper bars on top with blades cupped inward. Lubricate the inner bearing of castings with grease before assembly. Bearing halves will be placed around rock shafts pipes, near standards, toward middle of frame. The side grease zerks on top halves must be away from frame standard. Assemble inside bearing with 5/8" thick strap between bearing and frame, 1/2" thick strap on top of frame, 5/8" x 11" bolts, lockwashers, and nuts. Pivot frames up with blades resting on floor. Do not tighten these bolts at this time.

Next slide a bearing bracket over front of center frame and position bearing halves around rockshaft and attach with 5/8" bolts, lockwashers and nuts. The bearing bracket requires a 6" and 11" bolt around the frame and a 6 1/2" bolt on the end extending through the bearing halves. All bolts can be tightened now.

6. Run a 3/4" jam nut all the way onto each of the adjusting bolt weldments and insert threaded ends through cross plate between arm pairs on the rock shaft. Place cast iron U-bolt clips on the pin of coupler weldment. Slide long U-bolts through coupler weldments and rotate 90°. Place the 3 part assembly between arms of rock shaft with the bolt weldment between the plates of coupler weldment. Insert 3/4" x 5-1/2" carriage bolt through the assemblies. Place another 3/4" jam nut on bolt weldment. Lock the 2 jam nut pairs in the middle position for initial set up. Tighten the 3/4" lock nuts on the carriage bolts.
7. Install outside spring holders on center frame with 5/8" x 6" bolts, nuts and lockwashers with bolt heads on bottom loosely. Position spring holders by placing long vertical U-bolts in center of slots then tighten bolts.

Install inside spring holders on center frame with 5/8" x 6" bolts, nuts, lockwashers and straps with rounded ends forward loosely. Position spring holders by placing long vertical U-bolts in center of slots then tighten bolts.

8. Install springs with a cap on both ends (having flat sides outward) on long U-bolts resting on spring holders. Place a 3/16" x 2" x 4-1/2" strap on U-bolts with lock nut tightened initially to expose 1" thread.

For 18' machines only place no small springs inside large springs. For 21' machines only place no small spring inside large springs on center section. Wings require the installation of small springs inside large springs.

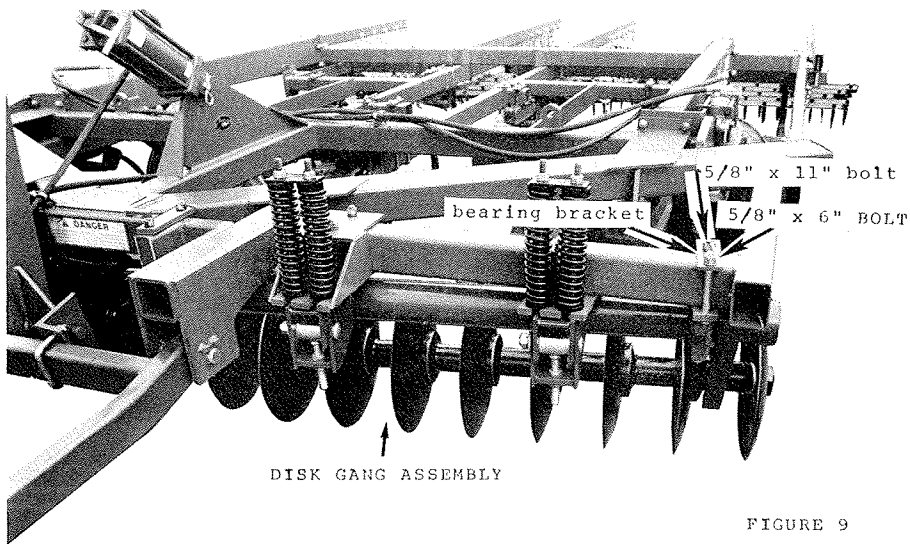


FIGURE 9

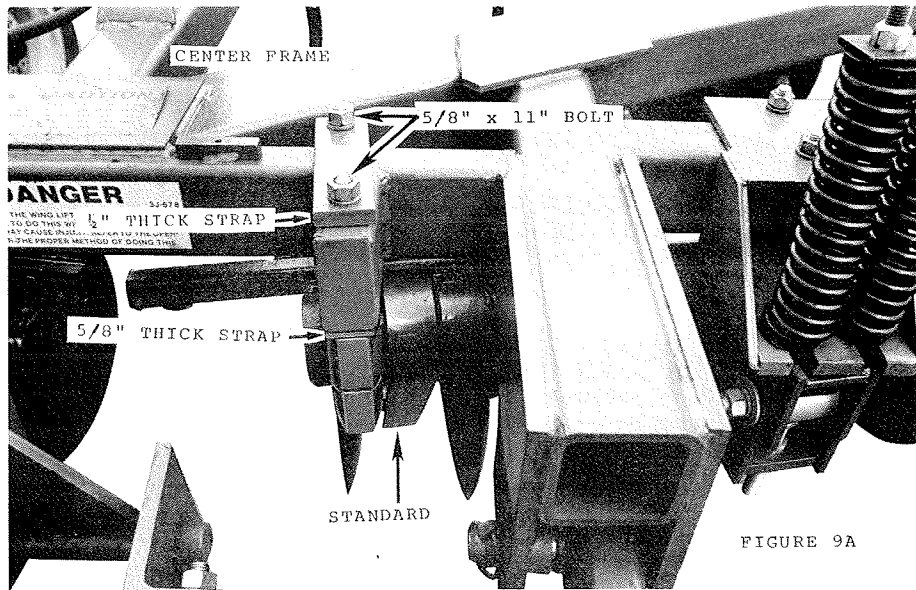
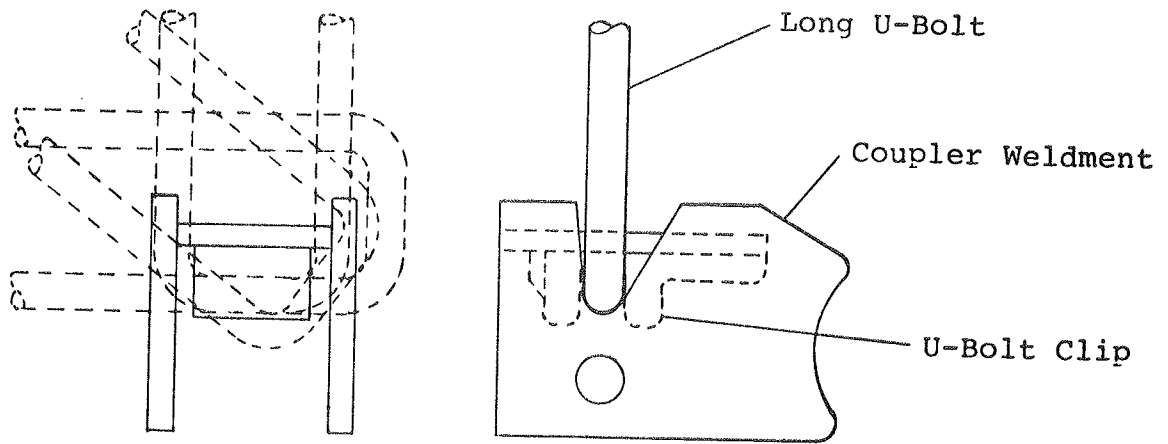


FIGURE 9A



U-BOLT AND COUPLER ASSEMBLY

FIGURE 10

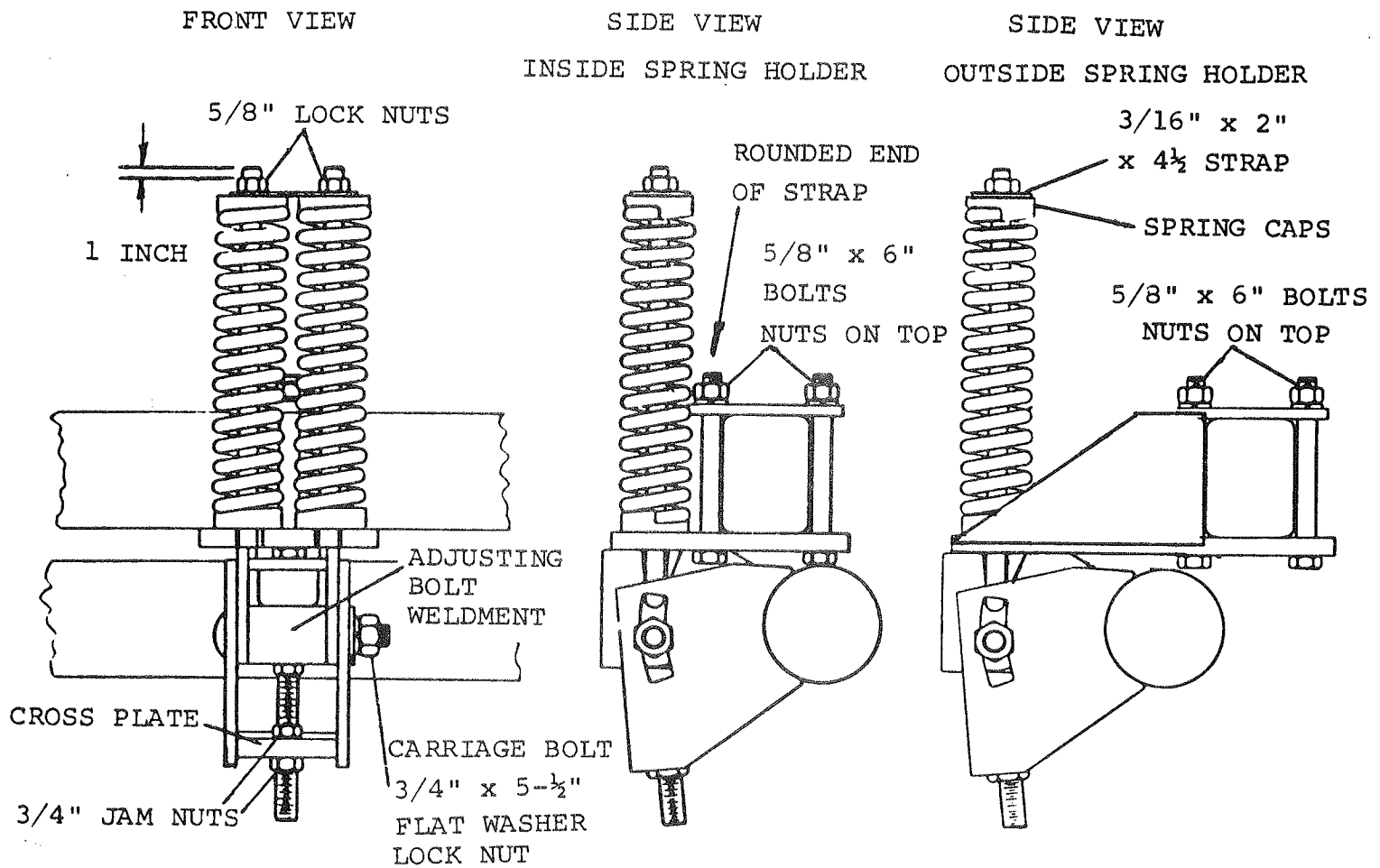
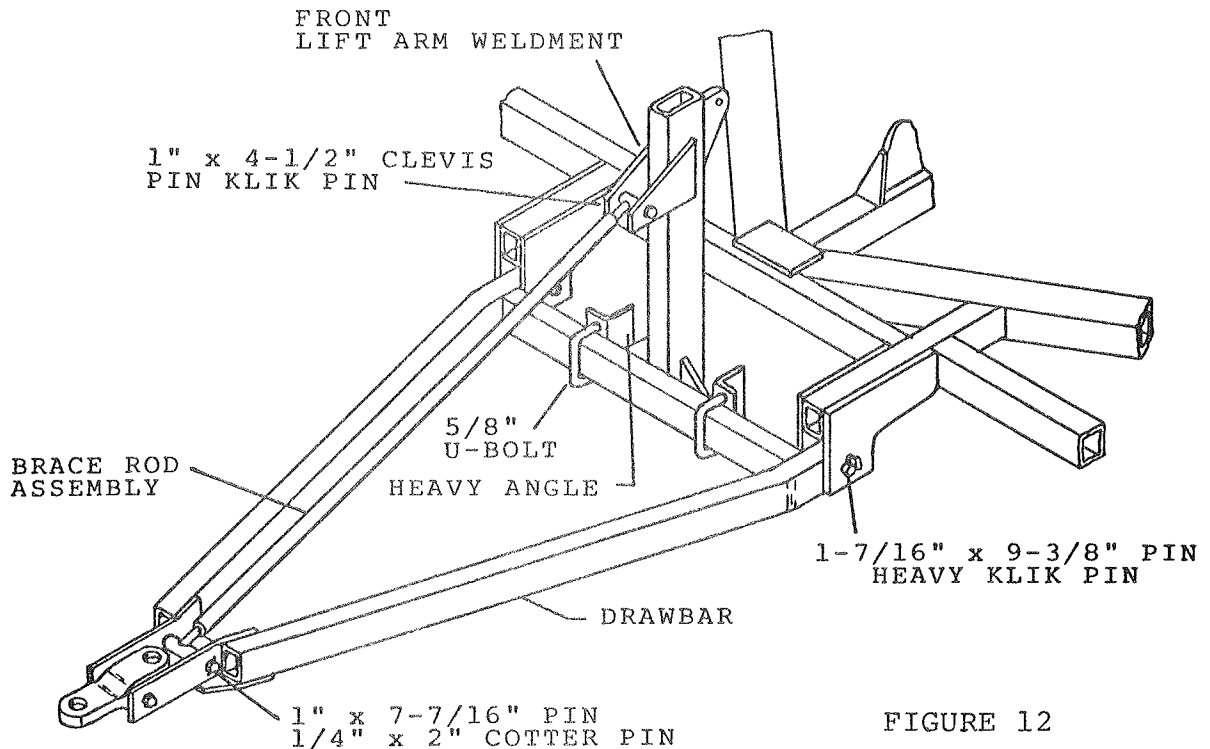


FIGURE 11





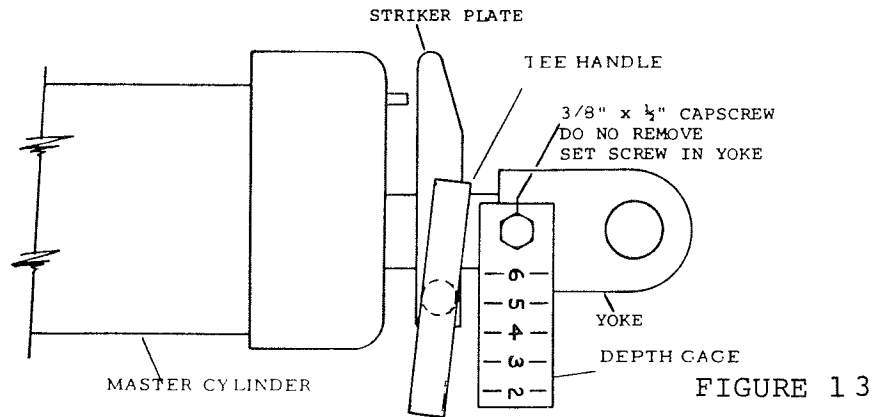
9. Install drawbar to center frame with 1-7/16" x 7-1/8" pins and klik pins with roll pins between small blocks on center frame.
10. Slide heavy angles over lift arm weldment shaft ends. Attach the angles to the rear center of drawbar stiffener tube with two 5/8" x 3-1/2" deep U-bolts, nut and lockwashers.
11. Assemble the tee handle on the striker plate adjusting bolt. This provides a quick and convenient means of depth stop adjustment. Assemble the depth gage to the cylinder yoke using a 3/8" x 1/2" bolt, turned into the set screw hole. Do not remove setscrew. This depth gage is merely a reference tool to enable you to reset depth stop to a predetermined setting.

Attach base end of cylinder with ports up to center frame. Attach yoke end to lift arm weldment.

12. Install the drawbar brace rod assembly. Attach to the lift arm weldment with 1" x 4-1/2" clevis pin and klik pin. Attach to the front with the 1" x 7-7/16" pin in drawbar assembly. (The brace rod adjusts to locate the hitch clevis at the correct height for tractor drawbar and to level the machine.) Adjusting can be accomplished by turning the brace rod by its handle. Install the drawbar jack to the jack mounting tube. The mounting tube on the inside of the drawbar is intended for storage of jack when using machine; to avoid possible contact with tractor tire.

Install hose holder to drawbar with 5/8" x 2" capscrew, flat washer, lockwasher and nut. (12' and 15' machines)

Install two hose holders to drawbar with 5/8" x 2" capscrew, flat washer, lockwasher and nut. (18' and 21' machines)



13. Do not tighten the hardware in Steps 13, 14 and 15 until all associated parts are in place. Attach left and right tube weldments with formed flanges to the center frame against one inch thick cylinder anchors with 5/8" x 2-1/4" capscrows, lockwashers and nuts. The tube weldments must have short angles (which are welded on) downward and toward middle of machine. Use 5/8" x 1-3/4" capscrows, lockwashers and nuts to attach tube weldments to front. Attach wheel arm supports to tube weldments with 5/8" x 5-1/2" bolts (through bolt guides), heavy washers, lockwashers and nuts.

On 18' and 21' machines only use 5/8" x 2-3/4" capscrows in place of top 5/8" x 2-1/4" capscrows. Lift hinge will be attached here in step 17 for 18' and 21' machines.

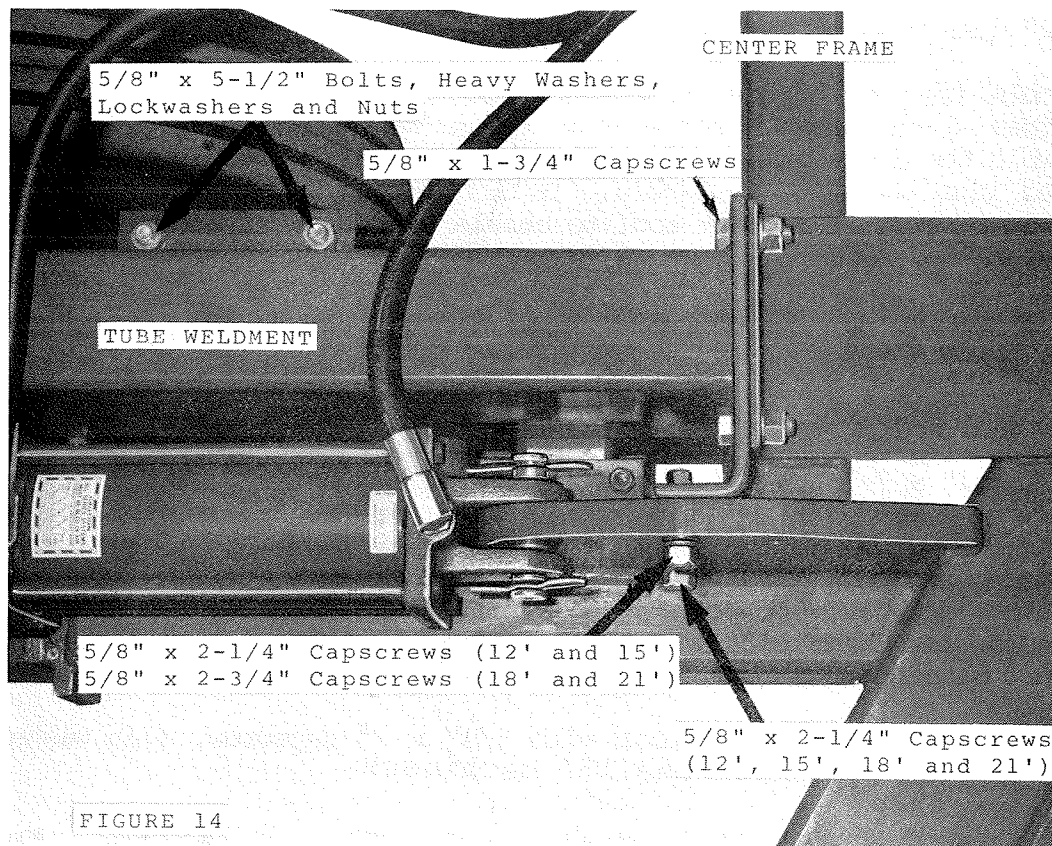
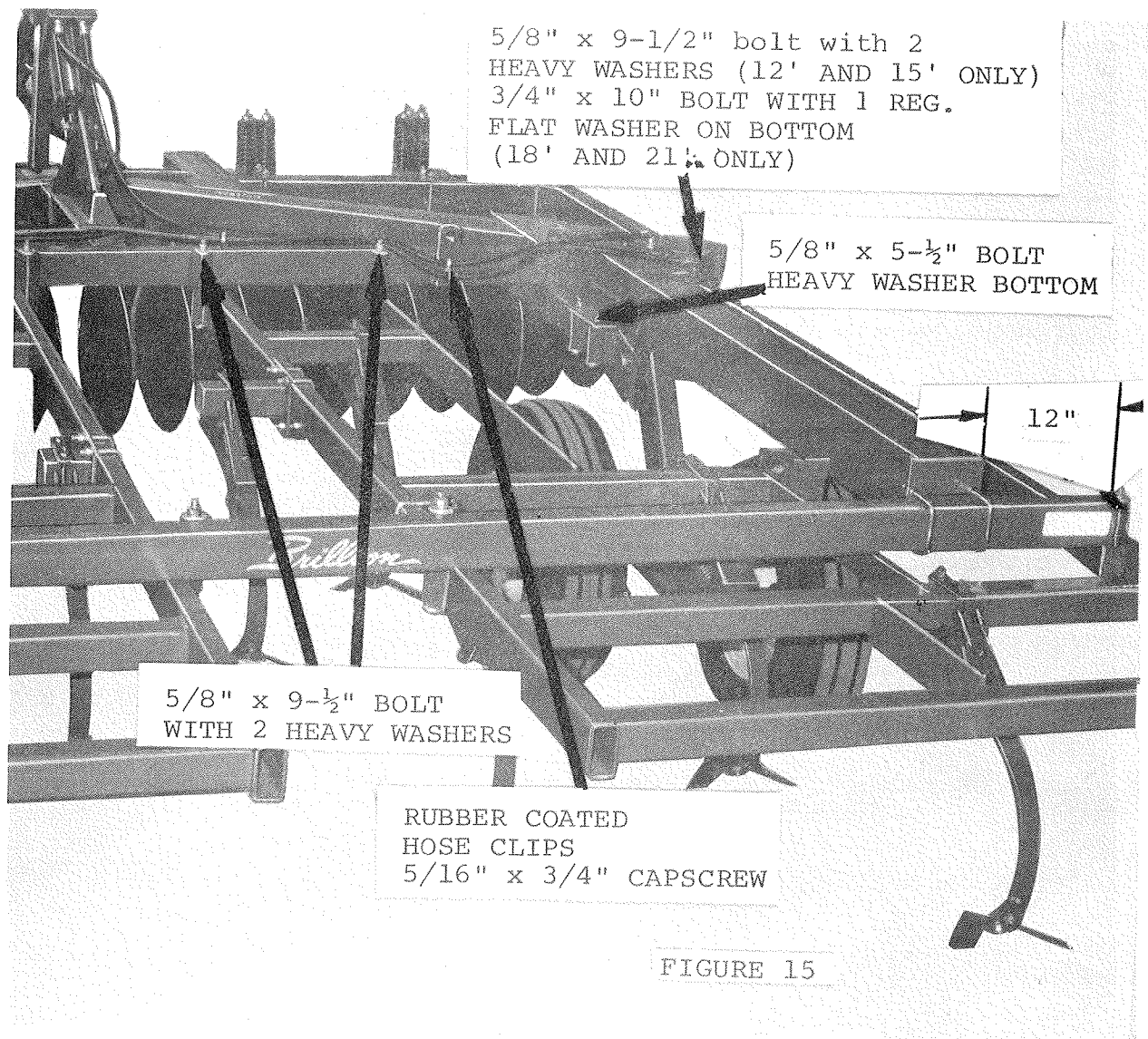


FIGURE 14

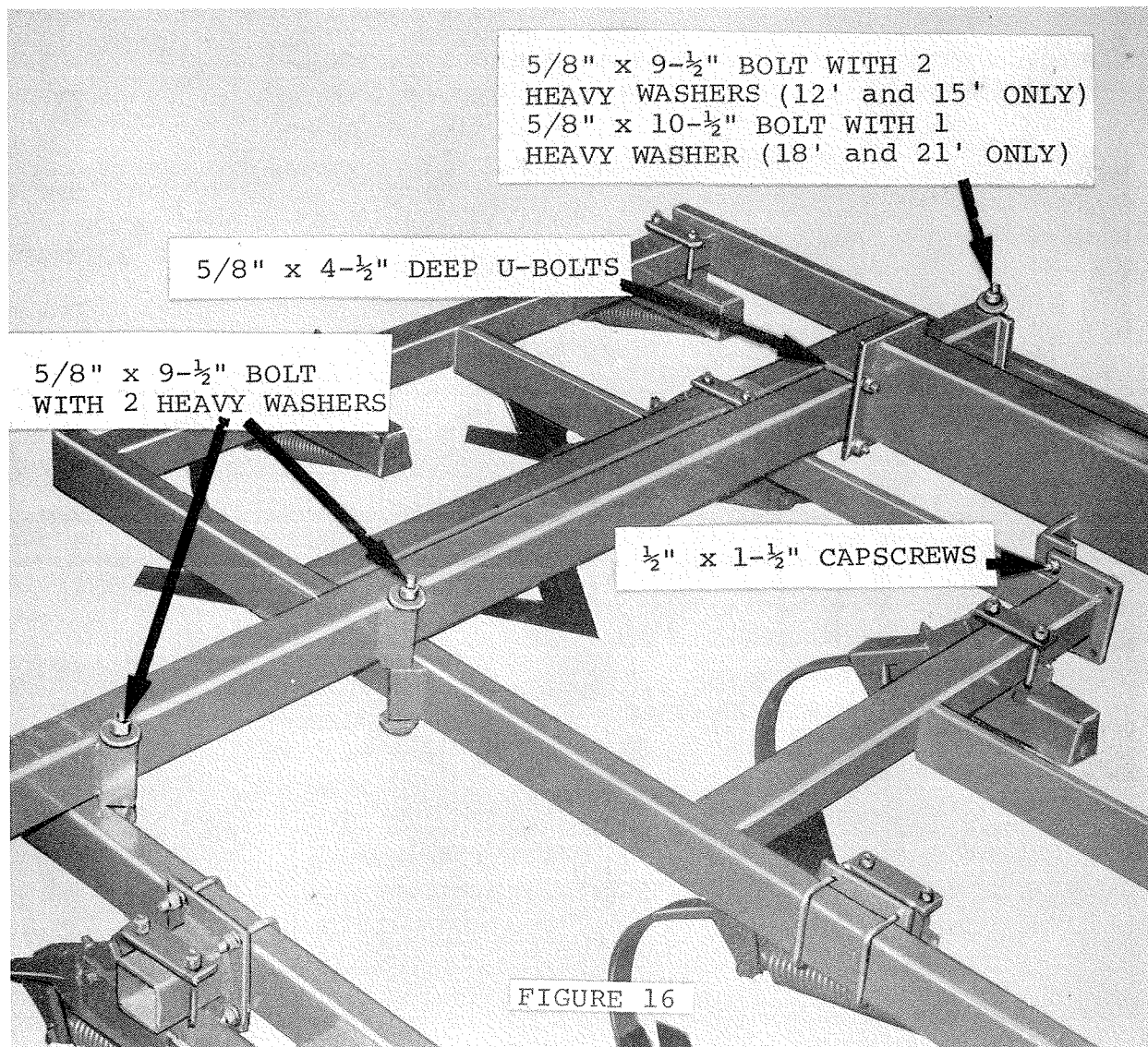
14. Position the two identical large tooth frames under the machine as shown in set up location pages at end of this manual. Block rear of tooth frame up level with front. With six 5/8" x 9-1/2" bolts, twelve heavy washers, six lockwashers and six nuts, attach tooth frames to center frame loosely. Use 1/2" x 1-1/2" capscrews, nuts and lockwashers to attach plates near middle of each tooth frame to short angles on tube assemblies attached in Step 13.

On 18' and 21' machines only use 3/4" x 10" bolts with flat washers on bottom in place of outside 5/8" x 9-1/2" bolts. Lift hinges will be attached here in step 17 for 18' and 21' machines.



15. Attach 3" x 4" rear super tube having bolt guides forward on top of tooth frames to end plates of tube weldments with $5/8"$ x $4-1/2"$ deep U-bolts, nuts and lockwashers. Slide the tube weldments to obtain a distance of 12 inches between plates on tube weldments and outside edge of plates on 3" x 4" rear super tube. Attach rear of tooth frames to 3" x 4" rear super tubes with four $5/8"$ x $9-1/2"$ bolts, eight heavy washers, four lockwashers and four nuts. All the hardware in Steps 13, 14 and 15 can now be tightened.

On 18' and 21' machines only use $5/8"$ x $10-1/2"$ bolts in place of $5/8"$ x $9-1/2"$ bolts. Hinge weldments will be attached here in step 18 for 18' and 21' machines.



NOTE: Use boxes 5J-917, 5J-918, 5J-919 next.

16. Find the set up location page for your machine to determine where to attach extensions and shanks on machine.

Some of the following notes may apply to your machine.

- A. It may be easier to mount optional sweeps or points to shanks before mounting to machine.
- B. Most extensions mount around 2" x 4" tubes with 1/2" x 3-1/4" deep U-bolts, nuts and lockwashers.
- C. Some shanks may mount under roller harrow brackets.
- D. Two extensions used for 6 inch spacing use 3/8" x 5-1/2" x 6" plates, 1/2" x 2" capscrews instead of U-bolts where mounted to 1/2" tooth frame plate.
- E. The location of shanks indicates its center.

NOTE: Use box 7J464 next.

17. Attach one lift hinge on each side of center frame near depth control cylinder anchors. Remove hardware in this location and attach center of lift hinge with 3/4" x 10" bolt, flat washer, lockwasher and nut. Attach inside with 5/8" x 2-1/4" capscrew, 5/8" x 2-3/4" capscrew, lockwashers and nuts.
18. Attach front and rear hinge weldments next to center frame front and rear. Rear hinge weldments require using outside rear super tube bolt with heavy washer removed and 5/8" U-bolts with lockwashers and nuts into matching holes. The front hinge weldments are attached to the front center frame tube with 5/8" U-bolts, lockwashers, and nuts in middle pair of holes. Slide hinges into a position leaving 2 inches between front of hinge plate and rear edge of front side to side 3" x 4" center frame tube.
19. Attach front wing frames to lift hinges with 1-1/4" x 7-5/8" pins. Thin washers (on outside) and 1/4" x 2" roll pins with front supported parallel to center frame. Attach hinge weldments to front wing frames 5/8 inches ahead of matching hinge on center frame with 5/8" U-bolts (in middle pair holes), lockwashers, nuts, 1-1/4" x 6-1/8" pins, thin washers and 1/4" x 2" roll pins. Attach rear wing frames to rear hinge weldments with 1-1/4" x 6-1/8" pins, thin washers and 1/4" x 2" roll pins. Attach front wing stand on outside front wing frame tube in line with front 3" x 4" tube on center frame with 3/8" x 5" capscrews, lockwashers and nuts.

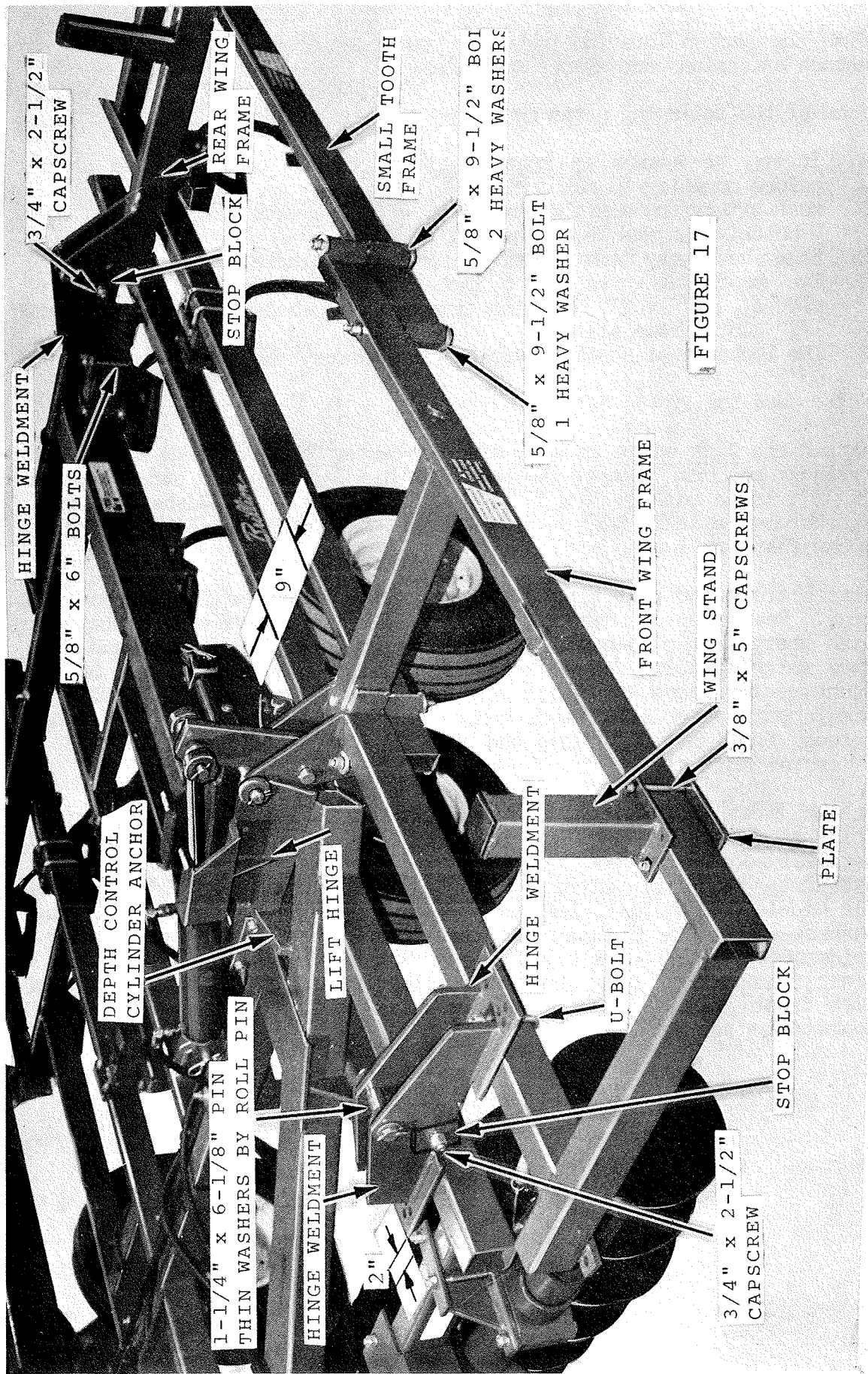


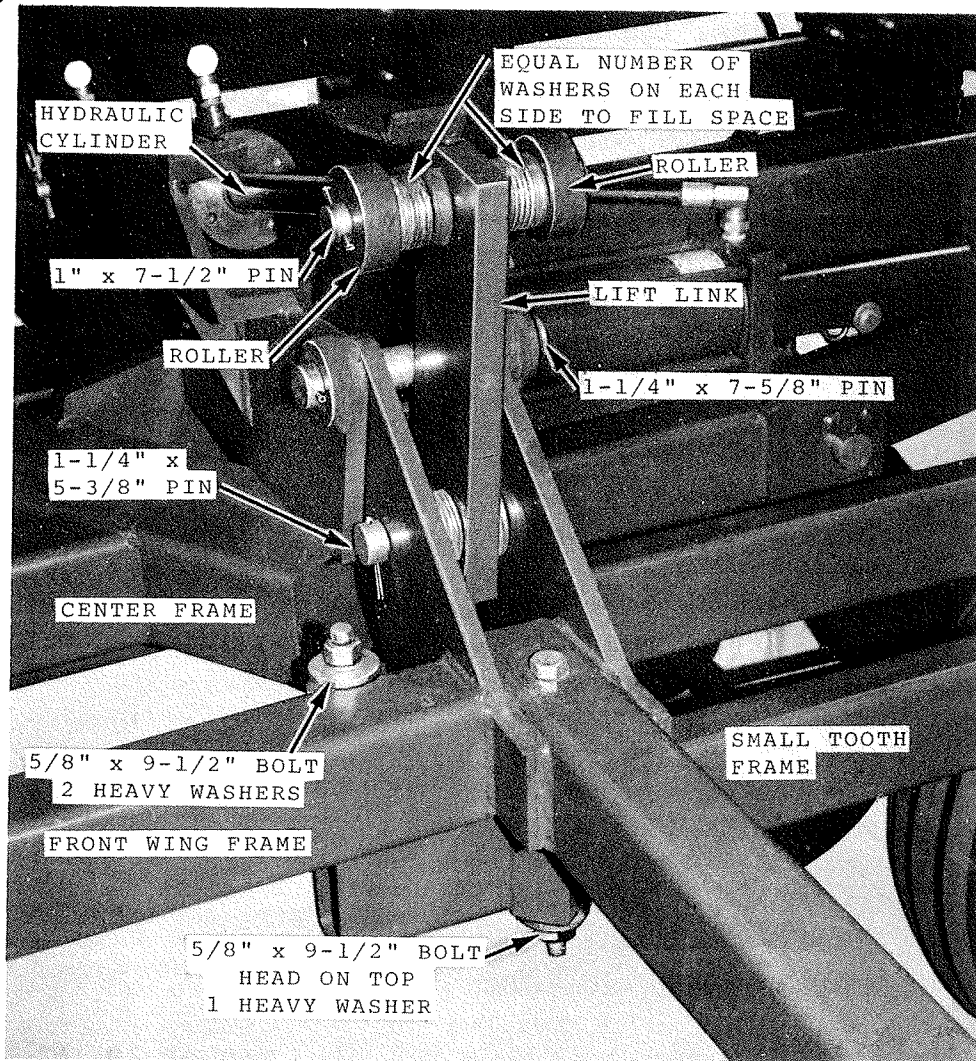
FIGURE 17

NOTE: Use box 6J-43 next.

20. Attach folding linkage next. Attach lift links to front wing frames with 1-1/4" x 5-3/8" pins, flat washers and 1/4" x 2" roll pins. The lift link must have notch toward center. Place an equal number of flat washers on each side of lift link to fill the space.

Adjust hydraulic cylinder to 26-1/4 inches retracted pin centers if it is a tie rod type. Attach hydraulic cylinder base end to center frame cylinder anchor with pin with hydraulic cylinder in extended position. Attach hydraulic cylinder to lift link with 1" x 7-1/2" pin, roller assemblies, and 1/4" x 2" roll pins. Place an equal number of flat washers between each roller and lug of cylinder yoke.

21. Attach the two identical small tooth frames to the wing frames loosely with 5/8" x 9-1/2" bolts, heavy washers, lockwashers and nuts. NOTE: The bolt head at the lift hinge must be on top (if this is not done, damage will result when folding wings). Heavy washers are used in all places next to bolt guides. With wing tooth frames parallel to center tooth frames, slide wing tooth frames to obtain (9 inches 18' and 21' machines only) or (24 inches 24' machine only) between frames, then tighten.



NOTE: Next use boxes 6J-129, 6J-681 (18' only) and 6J-697 (21' and 24' only).

22. Attach disc assemblies to wings as described in Step 5.
23. Assemble adjusting bolt weldments, cast iron U-bolt clips, coupler weldments, and long U-bolt as described in Step 6.
24. Attach spring holders as described in first part of Step 7.
25. Install Springs with a cap on both ends (having flat sides outward) on long U-bolts resting on spring holders. NOTE: On 21' and 24' model wings another smaller spring must be installed inside larger springs. Place a 3/16" x 2" x 4-1/2" strap on U-bolts with lock nuts tightened initially to expose 1" thread.
26. Attach four wing stop blocks to four hinge weldments with 3/4" x 2-1/2" capscrews, nuts and lockwashers. Turn block for initial setup to hold wings level with center.
27. Install the anchor assemblies to the wings next. TO install, slide the two straps around the rear 3" x 4" tube on the wing, with the lug up. Match the 4 holes in the end plate with the 2" x 4" tube that forms the end of the wing and bolt loosely with 1/2" x 3-1/2" capscrews, lockwashers and nuts. Use a 5/8" x 6" capscrew to fasten the straps around the 3" x 4" tube and two 1/2" x 5-1/2" capscrews and a flat strap to fasten the angle to the 2" x 4" tube of the tooth frame. Do not tighten the bolts.

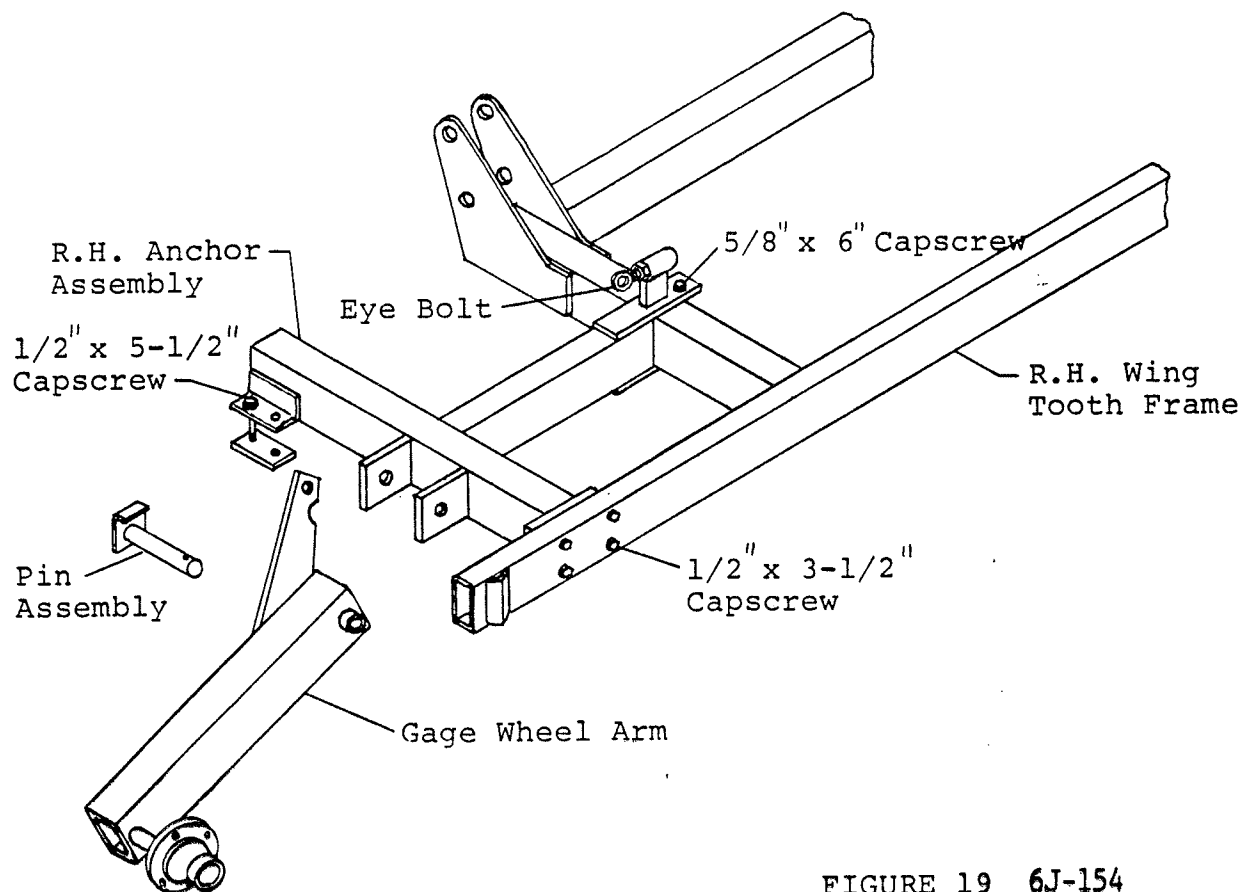


FIGURE 19 6J-154

Now install the gage wheel arm. Note that the tire is toward the outer end of the wing. Use the 1-1/4" diameter pins with the locking tabs. On some gage wheel arms it may be necessary to place three machinery bushings between the lugs on the anchor assembly to fill up the space and provide clearance for the actuating arm on the gage wheel. This can be done by sticking the pin through the inner lug and sliding on the bushings, then, with the pin and bushings flush; slide in the gage wheel arm and insert the pin the rest of the way. Lock the pin in place with a roll pin. The tab on the pin locks around the lug to stop the pin from turning.

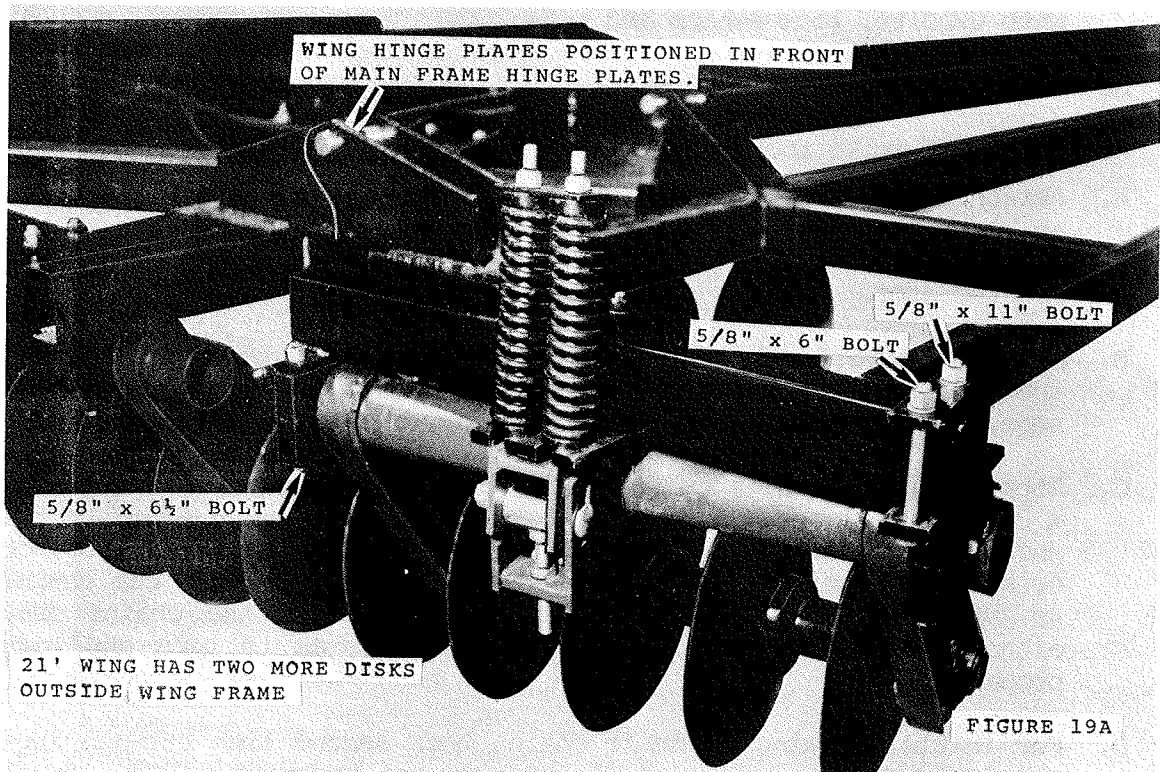
Now line the wheel up parallel with the wing frame by shifting the anchor assembly. Bolt the anchor assembly tight.

Take an eye bolt and run a nut on most of the thread length. Then stick the eye bolt through the tube on the anchor assembly lug, with the eye toward the rear of the machine, and put on another nut. Now install the ratchet jack.

The recommended tire size is 7:60 x 15 6 ply inflated to 24 psi. It is also recommended that on the initial set up, the ratchet jack be retracted most of the way so that the tire does not pry sideways when folding and unfolding the wings.

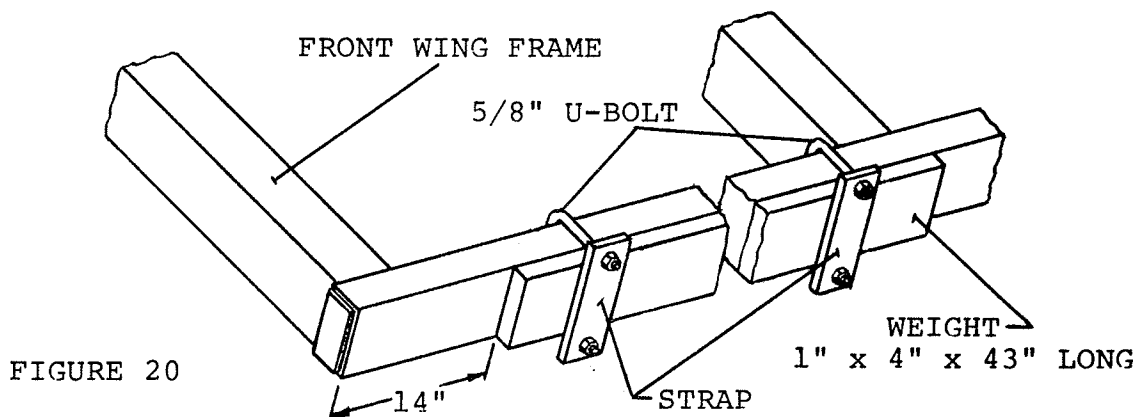
If the unit is equipped with hydraulic gage wheels, the set up is the same except hydraulic cylinders are used in place of the ratchet jacks. These cylinders are a continuation of the series cylinders used for machine raising. See page 31 for hydraulic cylinder and hose layout.

It is important to check that the fittings and the wing gage wheel cylinder do not hit the fittings on the wing fold cylinders when the wings are folded. When tying down the hydraulic hoses check to make sure they will not be pinched when folding the wings.



NOTE: Use box 6J-883 (18' Only)

28. For 18' machines only it is necessary to attach weight to the front outside of wing frame with 5/8" U-bolts, straps, lockwashers and nuts.



NOTE: Use boxes 5J-917, 5J-918, 5J-919 next.

29. Find the set up location page for your machine to determine where to attach extensions and shanks on machine.

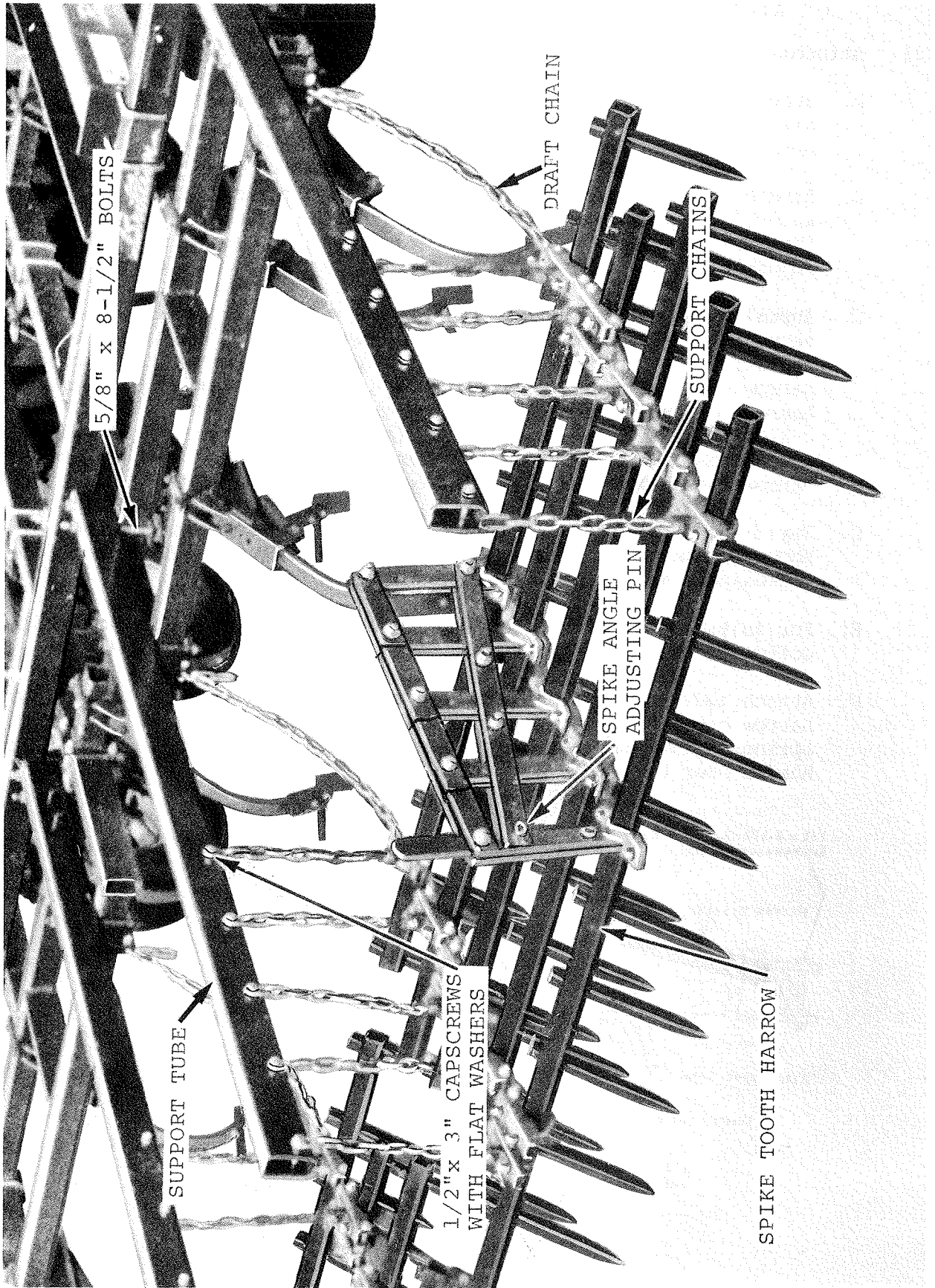
Some of the following notes may apply to your machine.

- A. It may be easier to mount optional sweeps or points to shanks before mounting to machine.
- B. Most extensions mount around 2" x 4" tubes with 1/2" x 3-1/4" deep U-bolts, nuts and lockwashers.
- C. Some shanks may mount under roller harrow brackets.
- D. The location of shanks indicates its center.
- E. 21 foot machines with two gang roller harrows require a 13-1/2" x 3" x 4" extension mounted on outside rear wing frame bolt along with U-bolts, lockwashers and nuts.

NOTE: Use two of box 6J-986 next.

30. Attachment of spike tooth harrow is next (if equipped).

- A. Attach the support tubes to the top side of the rear two tooth bars as shown in the setup locations, with 5/8" x 8-1/2" bolts, nuts, lockwashers and 1/2" x 2" x 6" long straps. NOTE: All the tubes are the same.
- B. Set the spike tooth harrow sections under the support tubes with the spikes angled rearward. All sections of equal width are the same. See setup location pages for proper positions.
- C. Attach the vertical support chains to the support tubes using 1/2" x 3" capscrews, flat washers, lockwashers and nuts. Normally the end link of the chain is used. Put the chains either inside or outside each pair of support tubes as necessary to get the chains as vertical as possible. On each drag section the chains must either be between or outside the support tubes to hang and work properly.
- D. For initial setting of draft chain, hook second link between lugs and fasten with 7/16" x 1-1/2" capscrew and locknuts. NOTE: Draft chains may not be straight back.



NOTE: Use box 6J-255 (for 18' width) or 6J-254 (for 21' width) and 6J-253 (for 21' width).

31. Attachment of two gang roller harrows is next (if equipped).
 - A. Secure roller harrow brackets to rear of machine frame with 1/2" x 5-1/2" capscrews, 1/2" x 2-1/2" carriage bolts, 1/2" x 1-1/2" x 5" straps, lockwashers and nuts as shown on next page.
 - B. Attach roller harrow extensions to roller harrow brackets with 5/8" x 5-1/2" capscrews and locknuts. Tighten nuts so extensions are free to pivot vertically. Your machine may have side to side adjustable extensions. See setup location pages for locations.
 - C. Install roller harrow assemblies to extension assemblies. See setup location pages to determine whether to adjust extension to the left or right. See set up location pages for matching proper harrow width section to extensions. NOTE arrows on upper frame of harrow assemblies must point in direction of travel. Use 5/8" x 2-1/4" special capscrews with head inside frame for attaching extensions to roller harrow assemblies. Tighten nuts so roller harrow assemblies can pivot freely.
 - D. For initial setup raise bottom of both rollers approximately 3" above bottom sweeps. Lock in place with 1/2" x 1-1/2" capscrews, lockwashers and nuts.
 - E. For initial setup install 5/8" x 4-3/4" clevis pin and hair pin in bottom of the four holes in a group with the extension on top.
 - F. Attach extension springs in the rear bottom holes of the roller harrow brackets. Attach spring handle to opposite end of extension springs. For initial setup hook spring handle in hole nearest handle over the special capscrew. Fasten with a hairpin cotter.

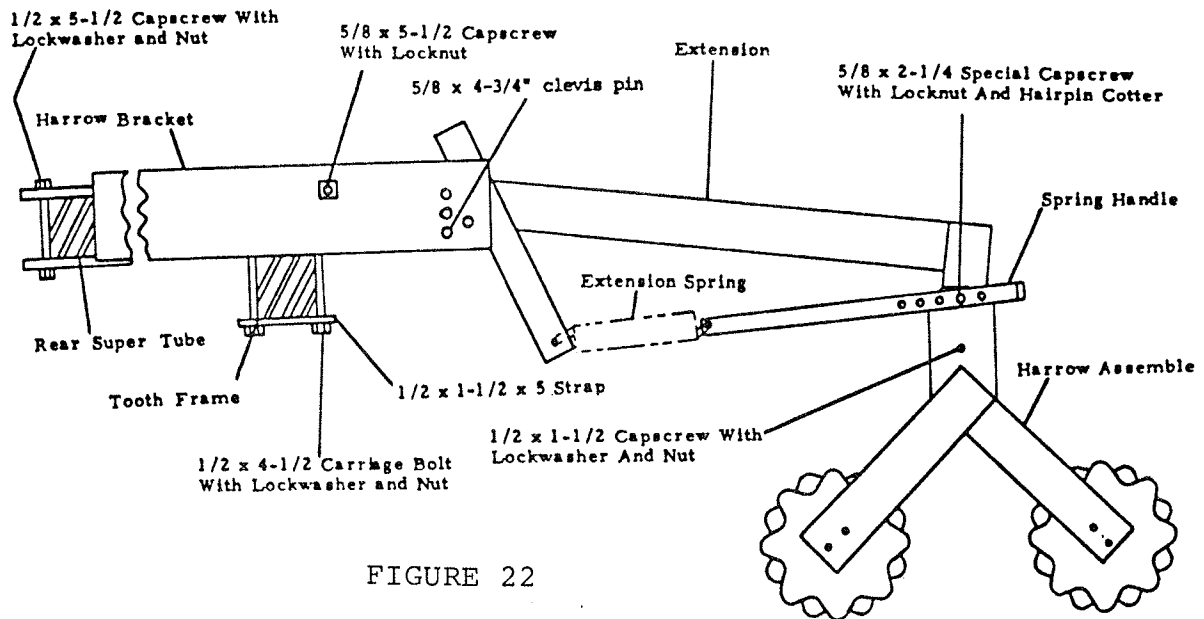


FIGURE 22

NOTE: Use box 6J-323 next.

32. Install the hydraulic hoses as shown in Figure 23. The cylinders are connected in series and must be connected as shown.

Attach ten hose clips to the hose at five tapped holes on the center frame with 5/16" x 3/4" capscrews and lockwashers. Thread hoses through hose holder on drawbar.

33. Install hydraulic hose and fitting as shown in Figure 24. Attach two hose clips to the hose at top hole near front of center frame with 5/8" x 3/4" capscrews and lockwashers. Thread hose through hose holder on drawbar. Tie hoses with plastic ties between cylinder anchor and middle of machine. Tie hose with plastic ties in front and rear of middle cylinder anchor 4" x 4" tube.
34. Bleed the depth control hydraulic cylinders by the procedure explained in operating instructions on page 5.
35. Bleed the wing lift cylinders by the procedure explained in operating instructions on page 6.

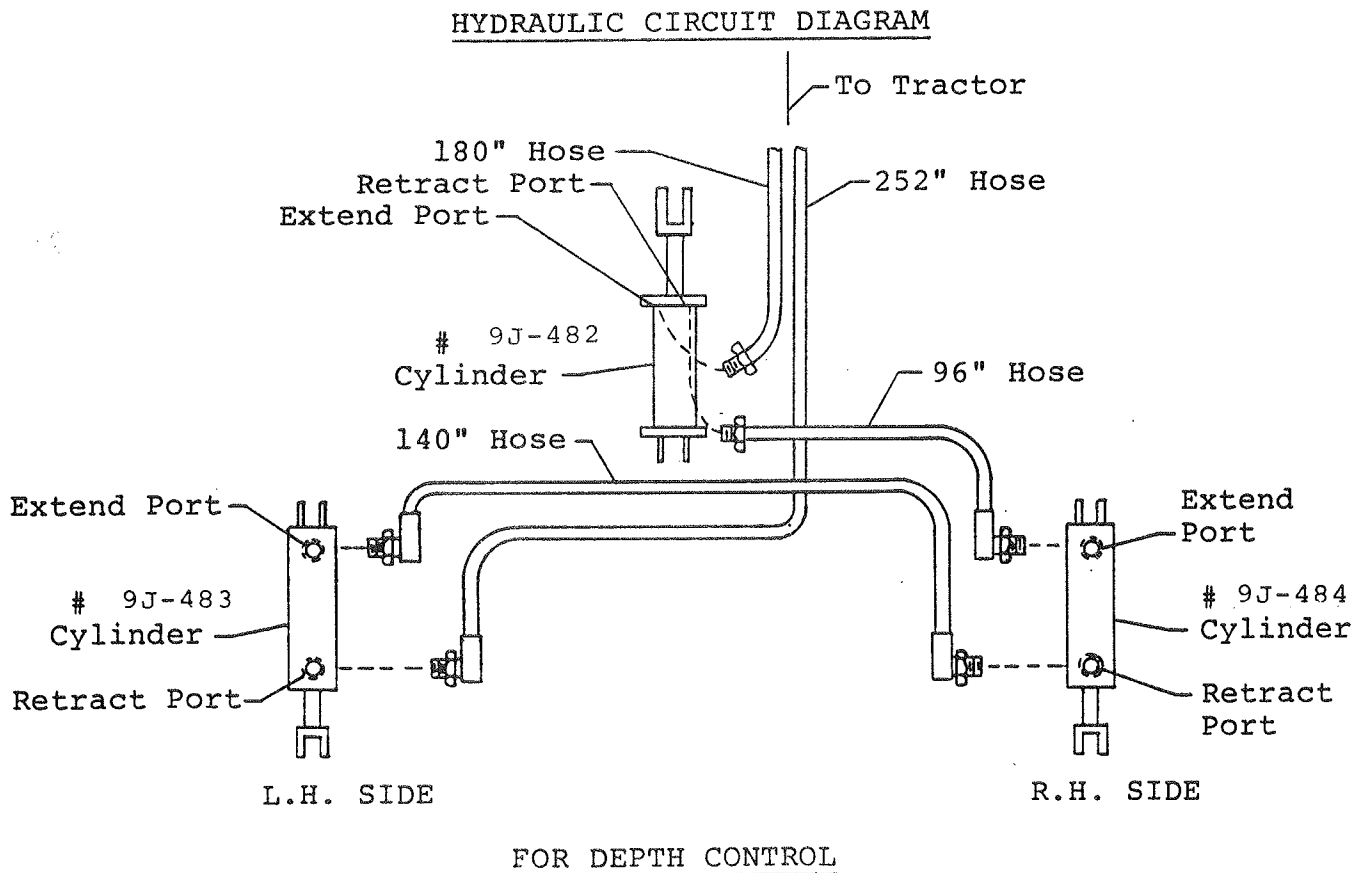
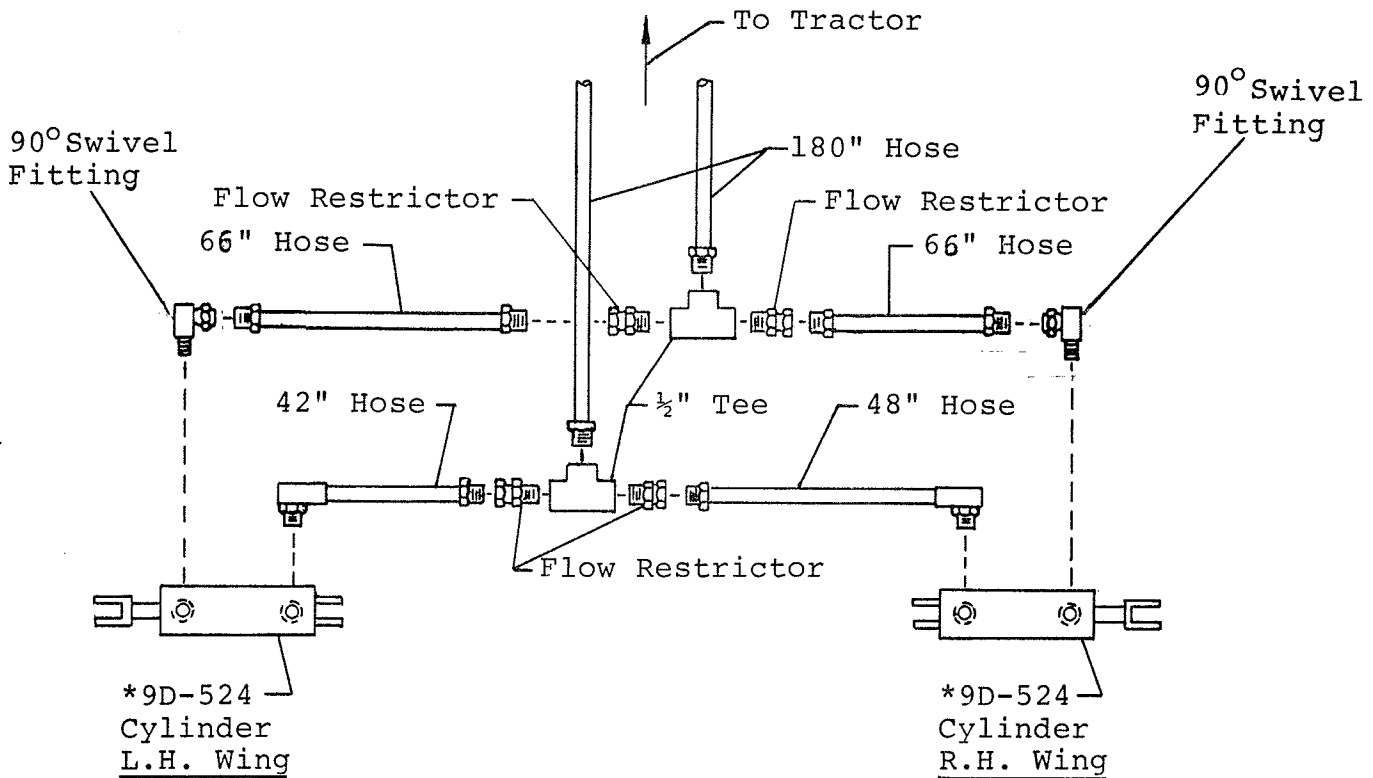


FIGURE 23

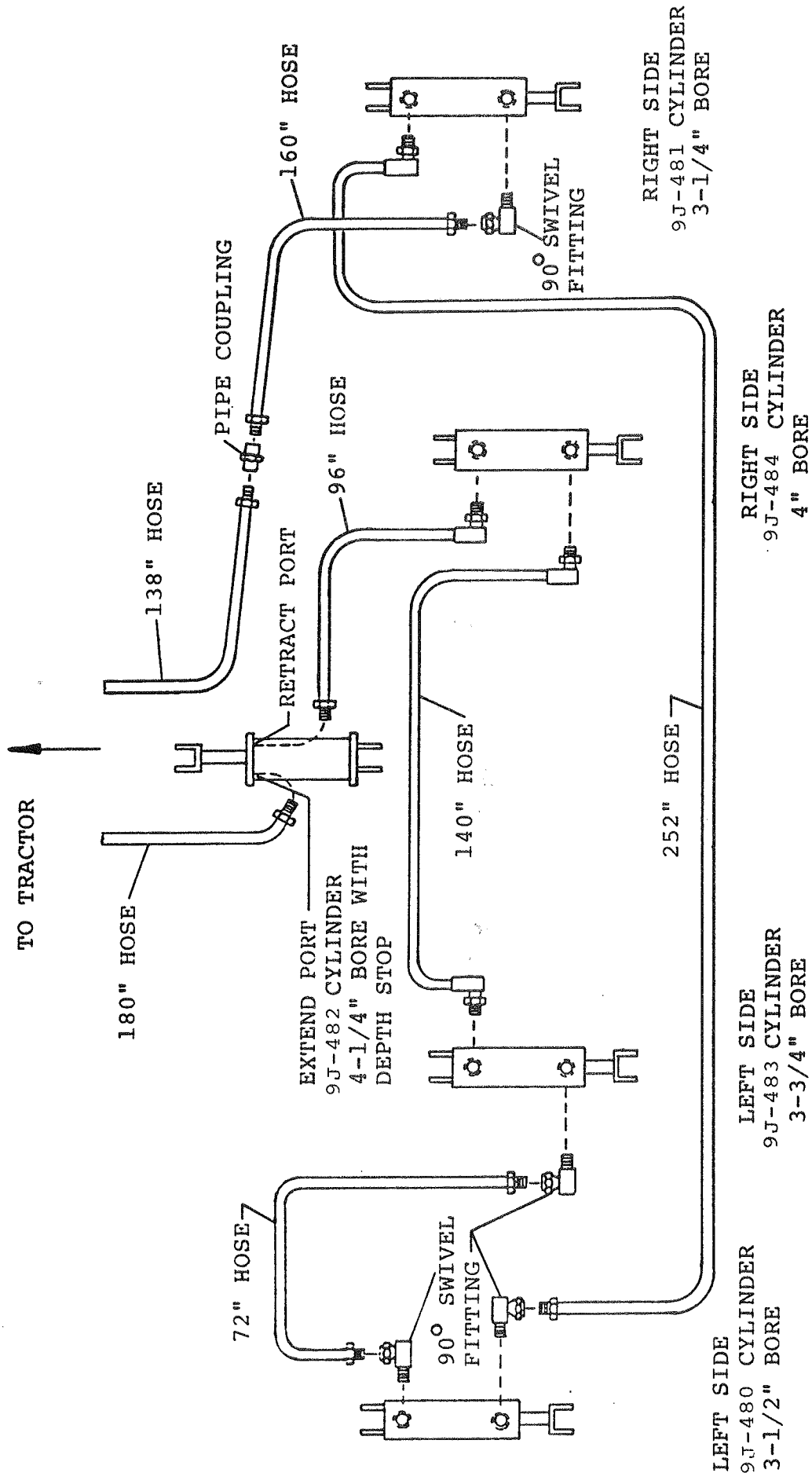
HYDRAULIC CIRCUIT DIAGRAM



FOR WING FOLD

FIGURE 24

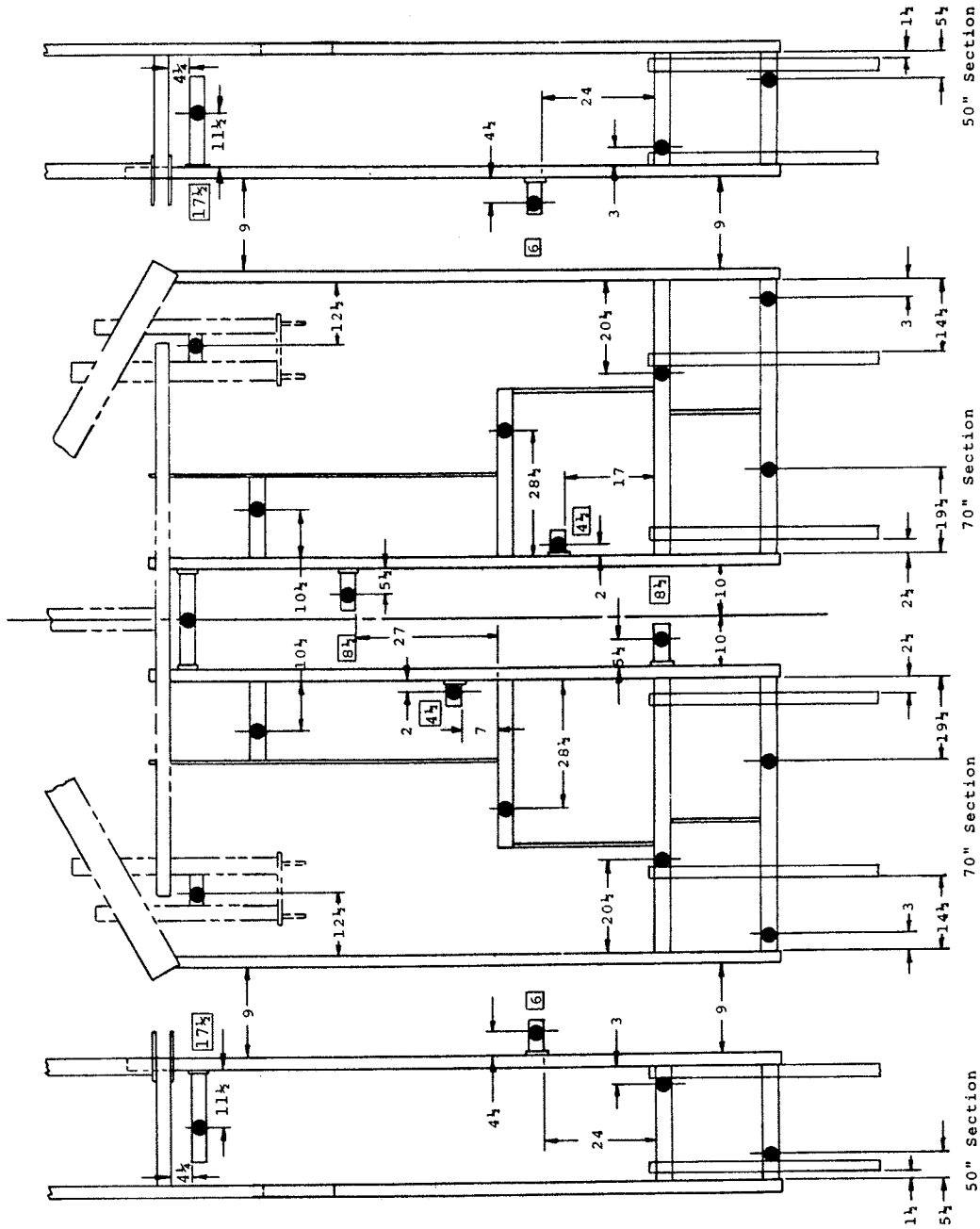
Install 90° swivel fittings so swivel end for hose points toward front of machine. Otherwise, fittings may be broken when wings are folded.



DEPTH CONTROL WITH WING GAGE WHEELS

FIGURE 25

SGS-18
 RECOMMENDED SET UP LOCATIONS
 9" Field Cultivator Shank Spacing
 18' Working Width
 Spike Tooth Harrow Sections on Rear
 [8] Extension Length
 ● Shank Location
 17 Shanks Center, 4 Shanks Each Wing



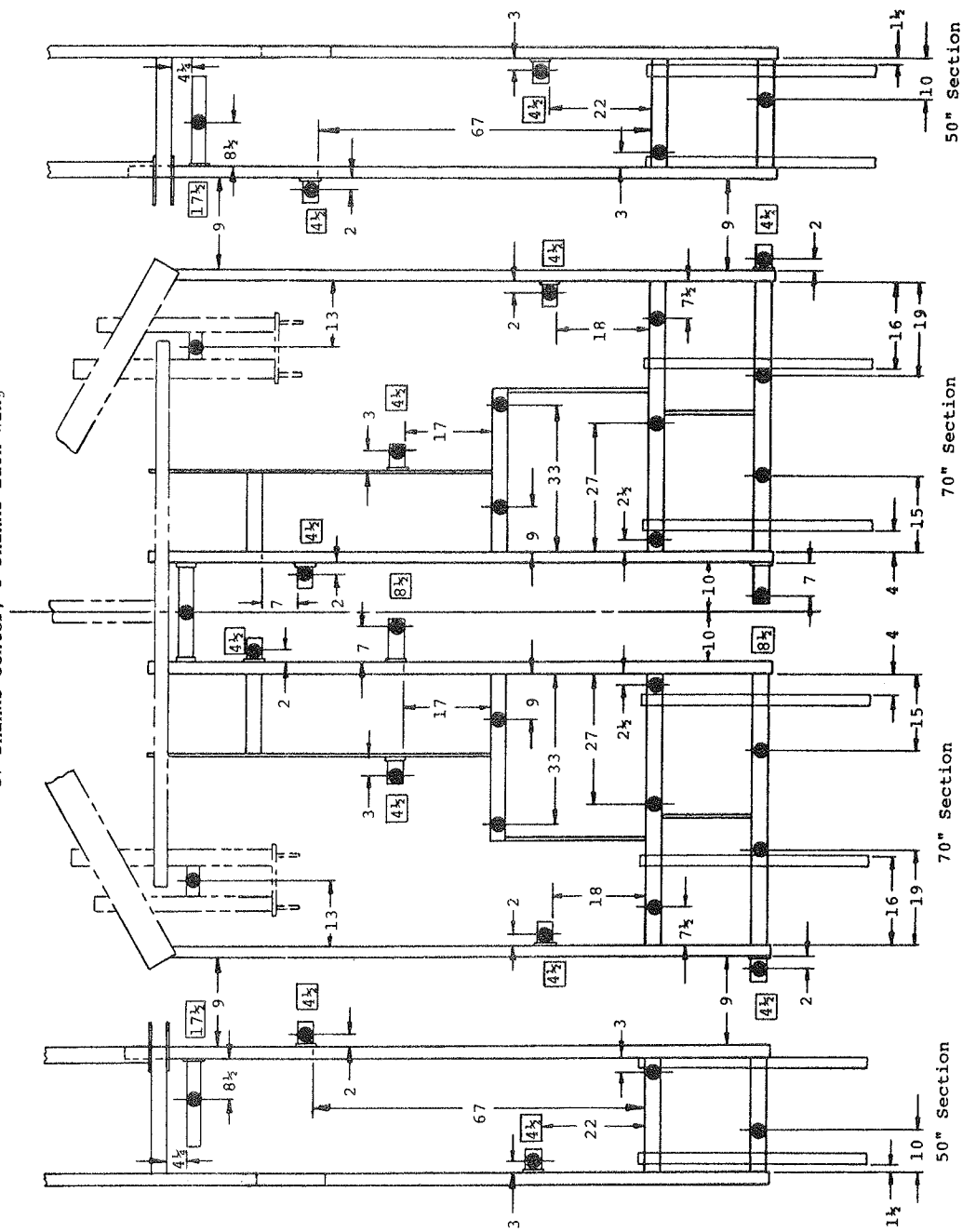
50" Section

70" Section

70" Section

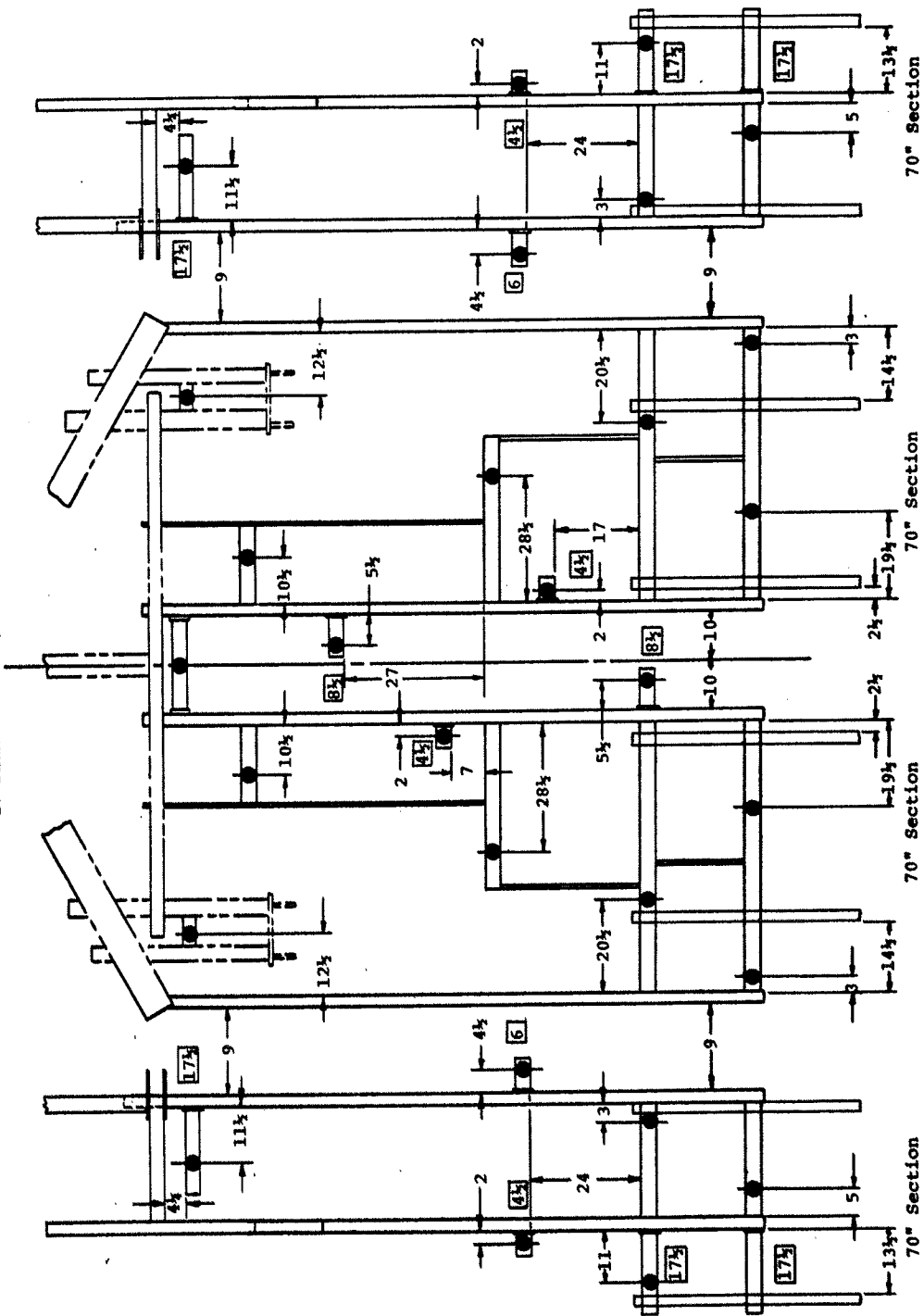
50" Section

SGS-18-1
 Recommended Set Up Locations
 6" Field Cultivator Shank Spacing
 18' Working Width
 Spike Tooth Harrow Sections on Rear
 8½ Extension Length
 ● Shank Location
 27 Shanks Center, 5 Shanks Each Wing

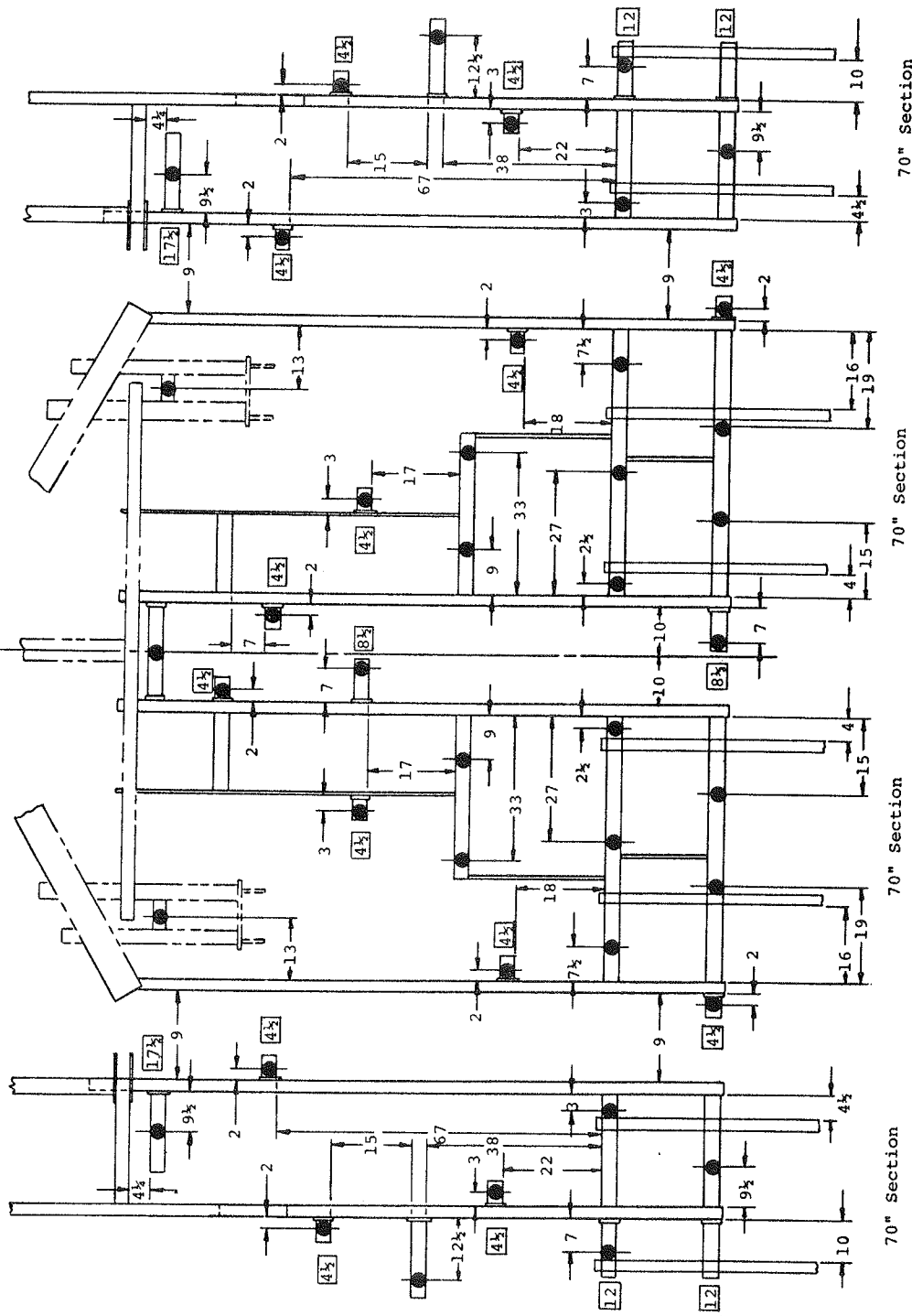


SGS-21

- Recommended Set Up Locations
- 9" Field Cultivator Shank Spacing
- 21" Working Width
- Spike Tooth Harrow Sections on Rear
- 8½" Extension Length
- Shank Location
- 17 Shanks Center, 6 Shanks Each Wing



SGS-21-1
Recommended Set Up Locations
6" Field Cultivator Shank Spacing
21' Working Width
Spike Tooth Harrow Sections on Rear
8" Extension Length
● Shank Location
27 Shanks Center, 8 Shanks each Wing



70" Section

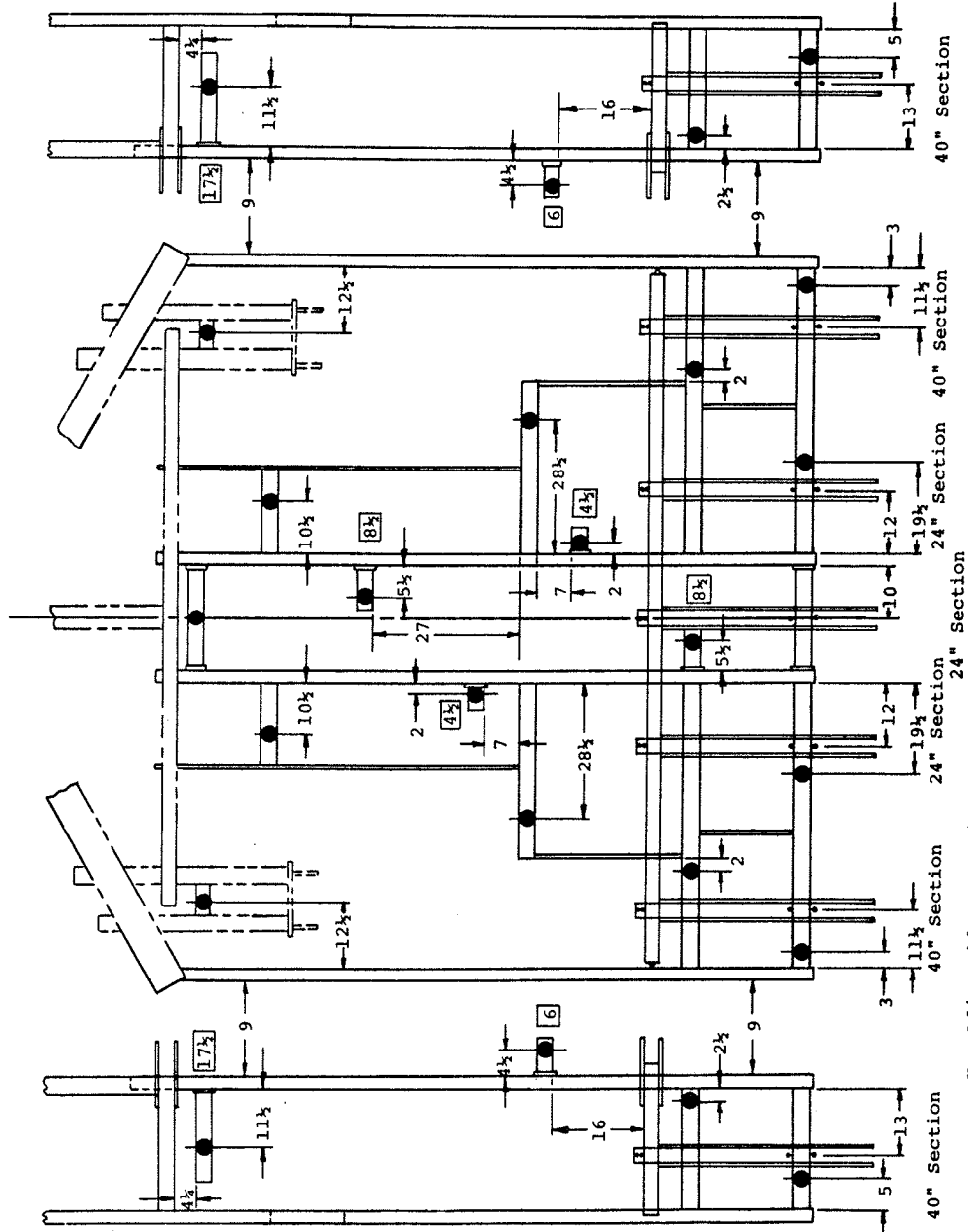
70" Section

70" Section

70" Section

SCR-18

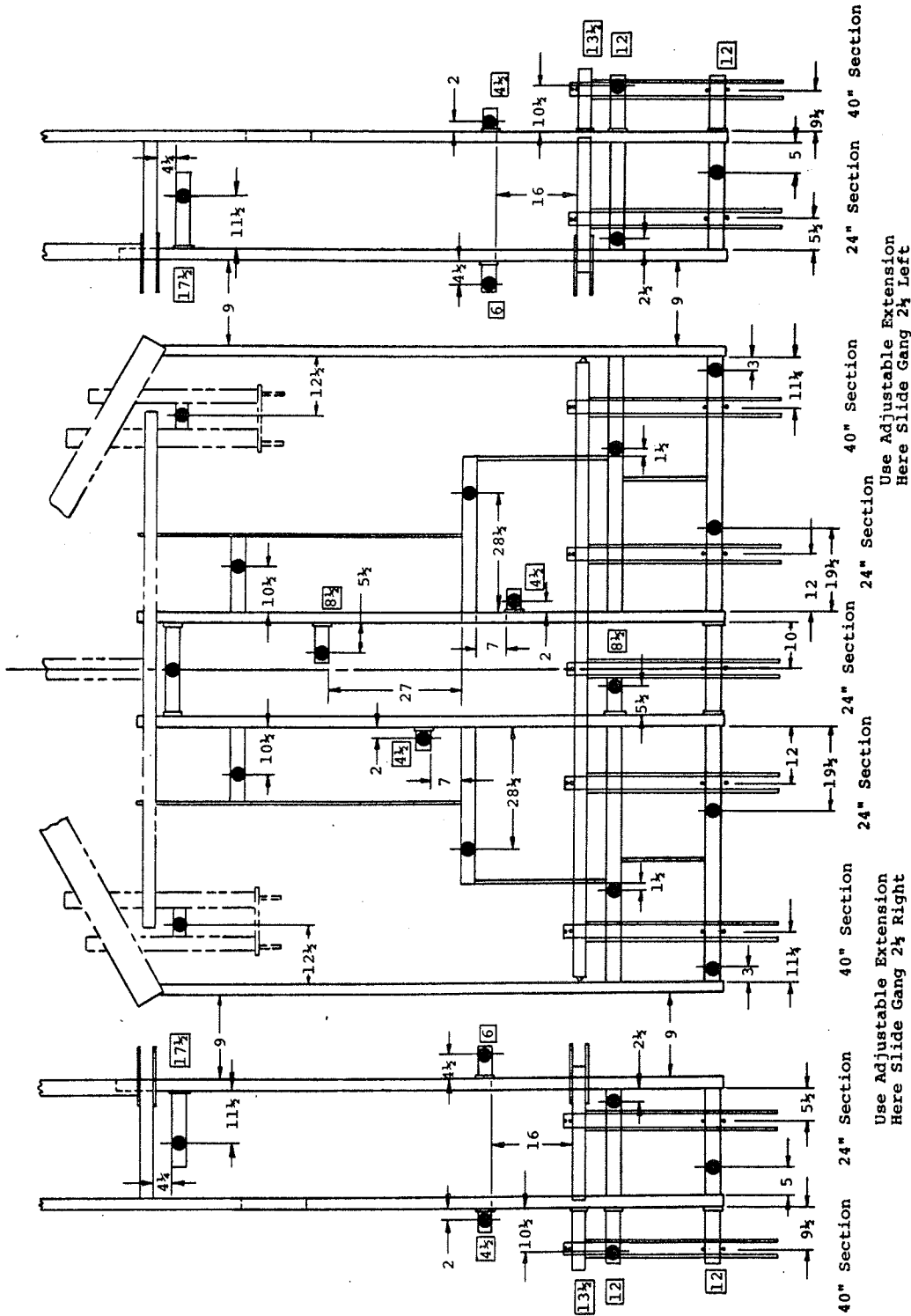
- Recommended Set Up Locations
- 9" Field Cultivator Shank Spacing
- 18' Working Width
- 2 Gang Roller Harrow on Rear
- 8½" Extension Length
- Shank Location
- 17 Shanks Center, 4 Shanks Each Wing



Use Adjustable Extension
Here Slide Gang 2½" Right

Use Adjustable Extension
Here Slide Gang 2½" Left

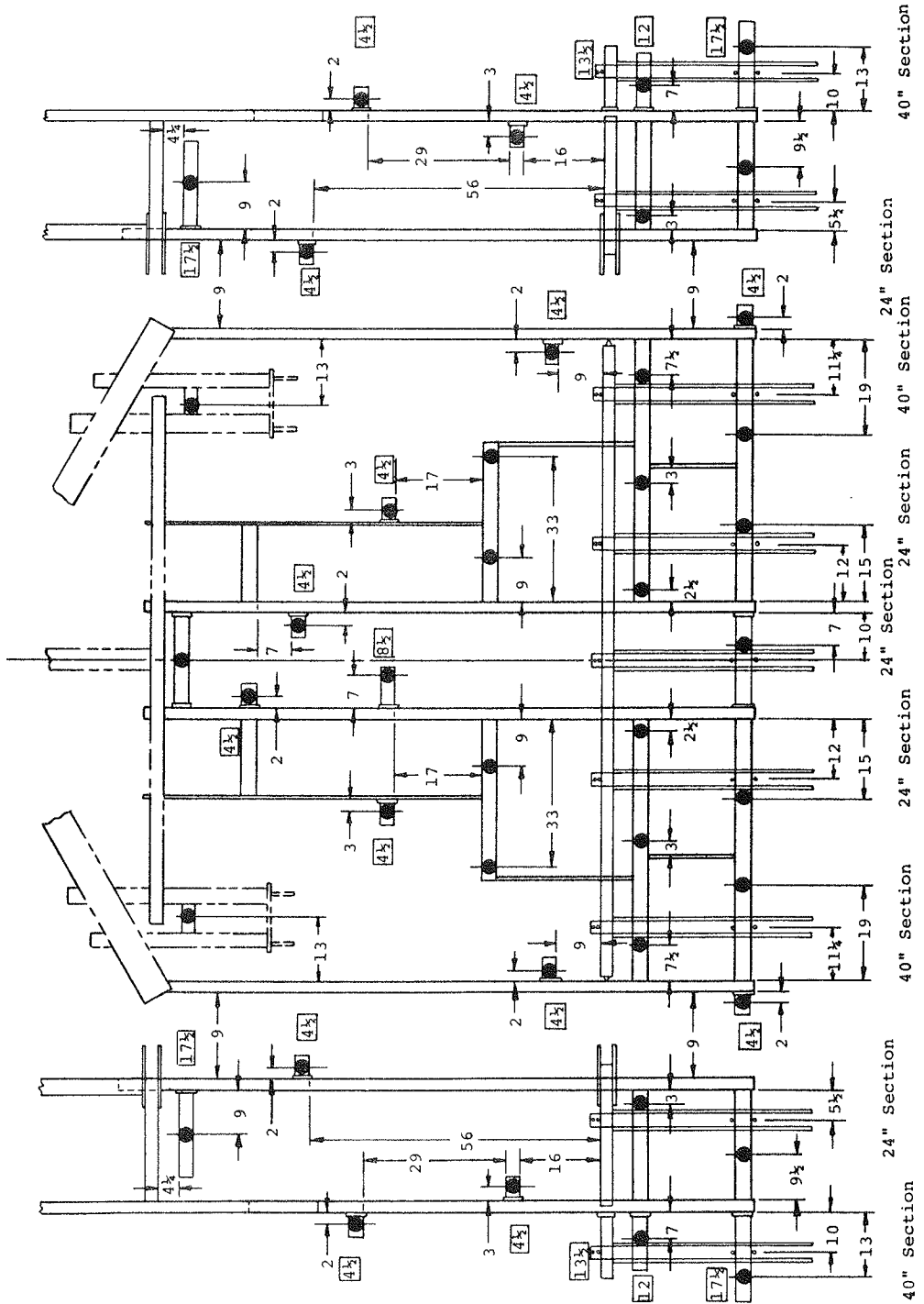
- SGR-21
 Recommended Set Up Locations
 9" Field Cultivator Shank Spacing
 21' Working Width
 2 Gang Roller Harrow on Rear
 8 1/2" Extension Length
 ● Shank Location
 17 Shanks Center, 6 Shanks Each Wing



Use Adjustable Extension
 Here Slide Gang 2 1/2 Left

Use Adjustable Extension
 Here Slide Gang 2 1/2 Right

- SGR-21-1
 Recommended Set Up Locations
 6" Field Cultivator Shank Spacing
 21' Working Width
 2 Gang Roller Harrow on Rear
 8½' Extension Length
 ● Shank Location
 27 Shanks Center, 8 Shanks Each Wing



SPECIFICATIONS

(Subject to Change Without Notice)

The name plates are stamped "SG".
Model identification is as follows:

SGS = Soil Groomer, Field Cultivator Shanks
Spike Tooth Harrow Sections On Rear
SGR = Soil Groomer, Field Cultivator Shanks
Two Gang Roller Harrow On Rear

Working width is indicated with the next two digits representing working width of shanks in feet.

SG -18 18 Foot Working Width
SG -21 21 Foot Working Width

If a third digit -1 appears at the end, this represents 6" shank spacing.

SG - - -1 6" Shank Spacing
SG - - - 9" Shank Spacing

Wheels and tires:

Walking beams on center section on all models.

- (4) 15 x 8 LB wheels for 9.5L x 15 6 ply for 18' (8 ply for 21') tires recommended
- (4) (11L x 15 6 ply for 18' (8 ply for 21') tires may be used on same wheels.)
- (2) 15 x 4-1/2 KB wheels for 6.70 or 7.60 x 15 6 ply tires

Wheel tread dimensions:

Inner wheels of walking beams center section: 6'10"
Outer wheels of walking beams center section: 10'5"
Wing wheels: 16'11"

Depth control hydraulics (three series cylinders) center section:

- 4-1/4" x 8" hydraulic depth stop rephasing master (front center of machine)
- 4" x 8" rephasing slave connected to wheel arm (right side center)
- 3-3/4" x 8" rephasing slave connected to wheel arm (left side center)

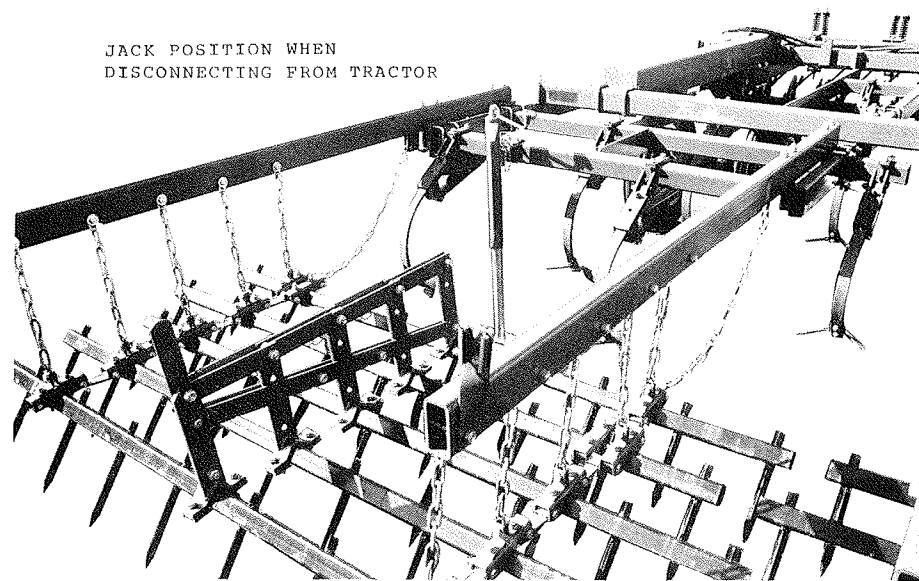
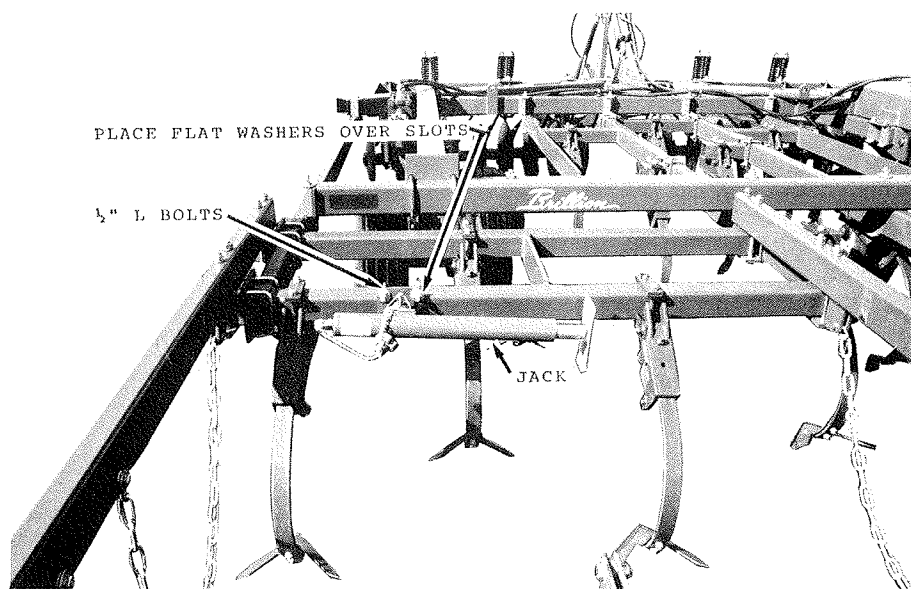
Machine is self leveling.

Wing depth control: Ratchet jack.

Wing folding hydraulics: Two 3-1/2" x 16" cylinders
All models flat fold.

Drawbar: one piece ductile iron flip-flop hitch (clevis one end single lug opposite end)
1-1/2" diameter holes.
Ratchet jack link for leveling front to rear (for different tractor drawbar heights).
Jack stand is standard.
Drawbar length: 75"

When the drag bars are installed, the drawbar of the unit will become light when raised into transport position. To avoid possible injury and to attach the drawbar to the tractor, mount the included jack in a convenient location on the rear toothbar. With the machine in transport position, screw the jack down until it nearly touches the ground. Continue to screw the jack down to disconnect the machine from the tractor.



Disk Gangs: 20" diameter discs, 2" concavity on 7-1/2" centers
16" end discs, 18" second disc
Triple lip sealed self aligning bearings
1-1/2" square axles
Discs have adjustable spring protection.
5" gang depth adjustment, 2" under to 3" above sweeps.
Adjustable rigid scrapers standard on all discs.

Field Cultivator Shanks: 21-3/4" under the mounting tube clearance.
Each shank is spring protected.
1/2" x 1-3/4" shanks
Maximum working depth 6-1/2"
Working width of field cultivator shanks are approximately
(3" for 18'), (9" for 21') more than disc working width.

One of two finishing tools on rear as part of Soil Groomer:

Spike Tooth Drag (no tools required to make adjustments)
5 ranks of 2" spacing, 3/4" square x 12" long hardened spikes
2" square x 3/16" wall tube spike holders
5 angle positions for spikes
1 draft chain height position
Draft chains and support chains can be lengthened or shortened.
Each bar can flex independently of each of the other bars.
Working width of spike tooth drag sections (24" for 18'),
(28" for 21') more than field cultivator shanks working width.

Two Gang Roller Harrows

Two spiral type baskets
1/4" x 1" abrasion - resistant steel blades
10-1/4" outside diameter
Each section has adjustable spring downward pressure
Each section can move up and down freely
Front basket can be set lower or higher than rear.
Pin on each section for raising section partially or completely
out of ground.
40" maximum section width
Triple lip sealed bearings
Working width of two gang roller harrow sections (16" for 18')
and (28" for 21') more than field cultivator shanks working width.

Overall length of all models is approximately 27'

Transport road clearance: 11"

When incorporating chemicals 7" sweeps are recommended for 6" spacing,
10" sweeps for 9" spacing.

Optional Equipment:

Spray shields (mount behind discs)
1-3/4" x 11" reversible points
2" heavy duty reversible points
4", 7", 9" and 10" full sweeps
2" reversible point or 4" full sweep on center shank

Speed and power requirements: 5 to 7 mph is recommended.

Drawbar power required 6 to 10 H.P. per foot of width.

Model	Transport Width	Approx. Weight	Model	Transport Width	Approx. Weight
SGS-18	12'10"	9,273#	SGR-18	13'0"	9,048#
SGS-21	12'10"	9,501#	SGR-21	12'3"	9,432#
SGS-18-1	12'10"	9,633#	SGR-18-1	13'0"	9,412#
SGS-21-1	12'10"	9,916#	SGR-21-1	12'3"	9,844#

Transport height all models: 6'9"

SGSH-18	12'10"	9,323#	SGRH-18	13'0"	9,098#
SGSH-21	12'10"	9,551#	SGRH-21	12'3"	9,482#
SGSH-18-1	12'10"	9,683#	SGRH-18-1	13'0"	9,462#
SGSH-21-1	12'10"	9,966#	SGRH-21-1	12'3"	9,894#