

# **OPERATOR'S MANUAL**

## **WIL-RICH 3411, 3420 & 3450 FIELD CULTIVATOR**

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**WIL-RICH  
PO Box 1030  
Wahpeton, ND 58074  
PH (701) 642-2621  
Fax (701) 642-3372**

# **SAFETY**

Safety decals appear at various locations on your machine. These decals are provided for your safety, your family's safety and your employee's safety and must be kept clean. Replace any decal that becomes worn, damaged, painted over or otherwise difficult to read. Replacement decals are available through your **WIL-RICH** dealer.

## ***THINK! Safety First***

### **BEFORE OPERATING**

Use extreme care when making adjustments.

When working under or around the machine always lower the Chisel Plow to the ground.

After servicing, be sure all tools, parts, or servicing equipment is removed from the machine.

Make sure that there is no one near the machine just before and during operation. Serious injury can result from improper use.

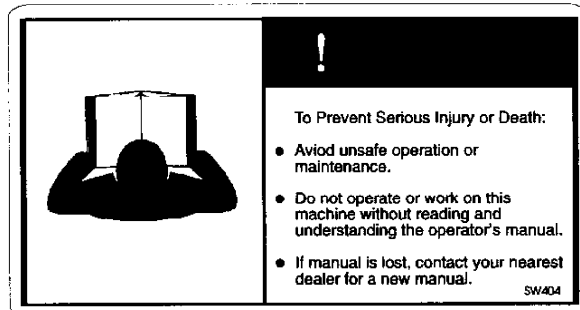
Reduce speed when cornering on field ends and when operating on rough ground.

Do not attempt to remove any obstruction while machine is in motion.

Use extreme care when operating close to ditches, fences, or on hillsides.

No one other than operator should ride on the tractor.

Do not raise or lower wings when implement is in motion.



Hydraulic fluid escaping under pressure can have enough force to penetrate the skin. Hydraulic fluid may also infect a minor cut or opening in the skin.

If injured by escaping fluid, see a doctor at once. Serious infection or reaction may result if medical treatment is not given immediately. Make sure all connections are tight and that hoses and lines are in good condition before applying pressure to the system.

To find a leak under pressure use a small piece of wood or cardboard. Never use your hands.

### **ON-HIGHWAY OPERATION**

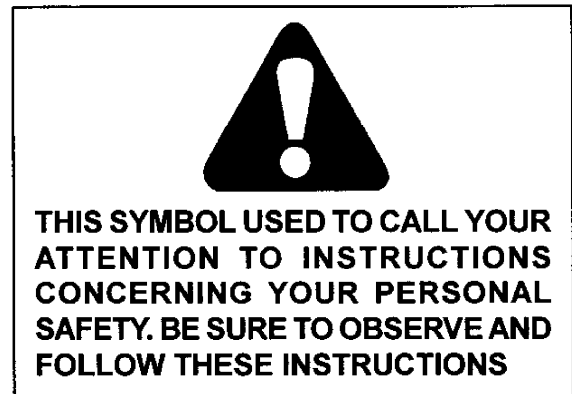
Always place the machine in transport position (Lift cylinders fully extended and locked with channel locks).

Comply with your state and local laws governing highway safety when moving machinery on a highway.

Reduce road speed on corners.

Drive at a reasonable speed to maintain complete control of the machine at all times.

A S.M.V. emblem and safety chain must be used at all times while traveling on public roads.



## PREPARATION

### PREPARATION

Before using the Wil-Rich field cultivator a careful inspection should become routine. A check should be made to insure that all hardware is securely tightened and moving parts properly lubricated.

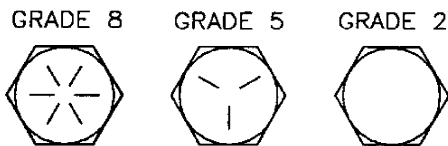
Tighten all loose nuts and bolts and replace any bent or broken parts.

When tightening bolts, they should be torqued to the proper number of foot-pounds as indicated in the table unless specified. It is important that all bolts be kept tight.

On new machines, all nuts and bolts should be rechecked after a few hours of operation.

#### TORQUE IN FOOT POUNDS

BOLT DIA	3/8	1/2	5/8	3/4	7/8	1	
HEX HEAD	9/16	3/4	15/16	1-1/8	1-5/16	1-1/2	
UNC GRADE	2	18	45	89	160	252	320
	5	30	68	140	240	360	544
	8	40	100	196	340	528	792
UNF GRADE	2	21	51	102	178	272	368
	5	32	70	168	264	392	572
	8	48	112	216	368	792	840



CI-75623

When replacing a bolt, use only a bolt of the same grade or higher.

Bolts with no marking are grade 2.

Grade 5 bolts furnished with the machine are identified by three radial lines on the head.

Grade 8 bolts furnished with the machine are identified by six radial lines on the head.

All U-bolts are grade 5.

### TIRE INFLATION

The use of the proper air pressure is the most important factor in satisfactory performance and maintenance of implement tires. Underinflation will damage the cord body of the tire and causes a series of diagonal breaks in the fabric in the sidewall area.

If the tire buckles or wrinkles, the air pressure should be increased to the point where the sidewalls remain smooth while operating.

Check the air pressure every two or three weeks and do not allow the pressure to drop to a point where buckling or wrinkling of the tire may be possible.

**NOTE: DO NOT OVERINFLATE TIRES.**

### WHEEL BOLTS

It is recommended that all wheel bolts be checked for tightness before using and again after one day of use. Paint or rust can work out causing the wheel to become loose. Check periodically to be sure the wheel bolts are tight.

### BEARING ASSEMBLIES

**IMPORTANT** - The spindle nut on all hub and spindle assemblies is preset at the factory. Road transport and field working will seat the bearings and may require additional adjustment. After 20 hours of machine operation remove the grease cap and check the bearing tightness of all hub and spindles. Remove the cotter pin and rotate the tire while tightening the spindle nut. Tighten until the drag on the tire assembly stops the tire rotation. Locate the cotter pin hole in the spindle and loosen the spindle nut enough to allow insertion of the cotter pin. Replace cotter pin and grease cap.

### LUBRICATION

Make sure the field cultivator is properly lubricated. (See maintenance, page 9-10.)

### HYDRAULICS

Check lift and wing folding linkages and cylinders for proper alignment and operation. On new machines check that the hydraulic system has been properly charged and purged. (See wing lift circuitry and depth control circuitry, page 5.)

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## TRACTOR PREPARATION

Refer to the operator's manual furnished with your tractor for recommended adjustments and weight distribution.

When using a field cultivator, the tractor drawbar must always be pinned in the center to allow for more stability.

**NOTE:** Check your tractor's hydraulic fluid level after cycling hydraulics and filling new cylinders and lines. Refill if necessary.

## HITCHING

After backing your tractor into position, attach the cultivator hitch to the tractor drawbar, using a hitch pin of adequate strength for the tractor-cultivator combination. Lock the pin in place to prevent loss (particularly when transporting). It is recommended that a safety chain be used for road transport.

Connect the cultivator's hydraulic hoses to the proper couplers on your tractor.

**NOTE:** An optional pole jack makes the hitching operations easier.

## TRANSPORTING

A S.M.V. (Slow Moving Vehicle) emblem must be used at all times while traveling on public roads.

The implement must always be placed in the transport position and the cylinder channel locks (Fig. 5) used when traveling on public roads. Never depend on your tractor's hydraulic system to carry the weight of the implement while transporting.


**NOTE:** Use extreme caution when working around overhead power transmission lines.



**NOTE:** Use a low tractor throttle when unfolding wings.

**NOTE:** Always install lock channels in the main lift cylinders for road transport (See Fig. 5).

Reduce speed when cornering and when traveling over rough and/or uneven ground. Drive at a reasonable speed to maintain complete control of the machine at all times.

Comply with your state and local laws governing highway safety when moving machinery on a highway.

 <b>CAUTION</b>	<ul style="list-style-type: none"><li>•Just before and during operation be sure no one is on or around the implement.</li><li>•Before activating the hydraulic system, check hoses for proper connections.</li></ul>	<ul style="list-style-type: none"><li>•Before lowering the wings for the first time, make sure the entire system has been charged with oil.</li><li>•With wings down always install hydraulic cylinder channel lock(s) for transporting.</li></ul>
<b>FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY AND/OR EQUIPMENT DAMAGE.</b>		

	 <b>DANGER</b>	<ul style="list-style-type: none"><li>• Never walk or stand in the path of the wings.</li><li>• Completely lower wings before performing service and/or adjustments.</li><li>• Failure to do so will result in serious injury or death.</li></ul>
	<b>STAND CLEAR AT ALL TIMES:</b>	

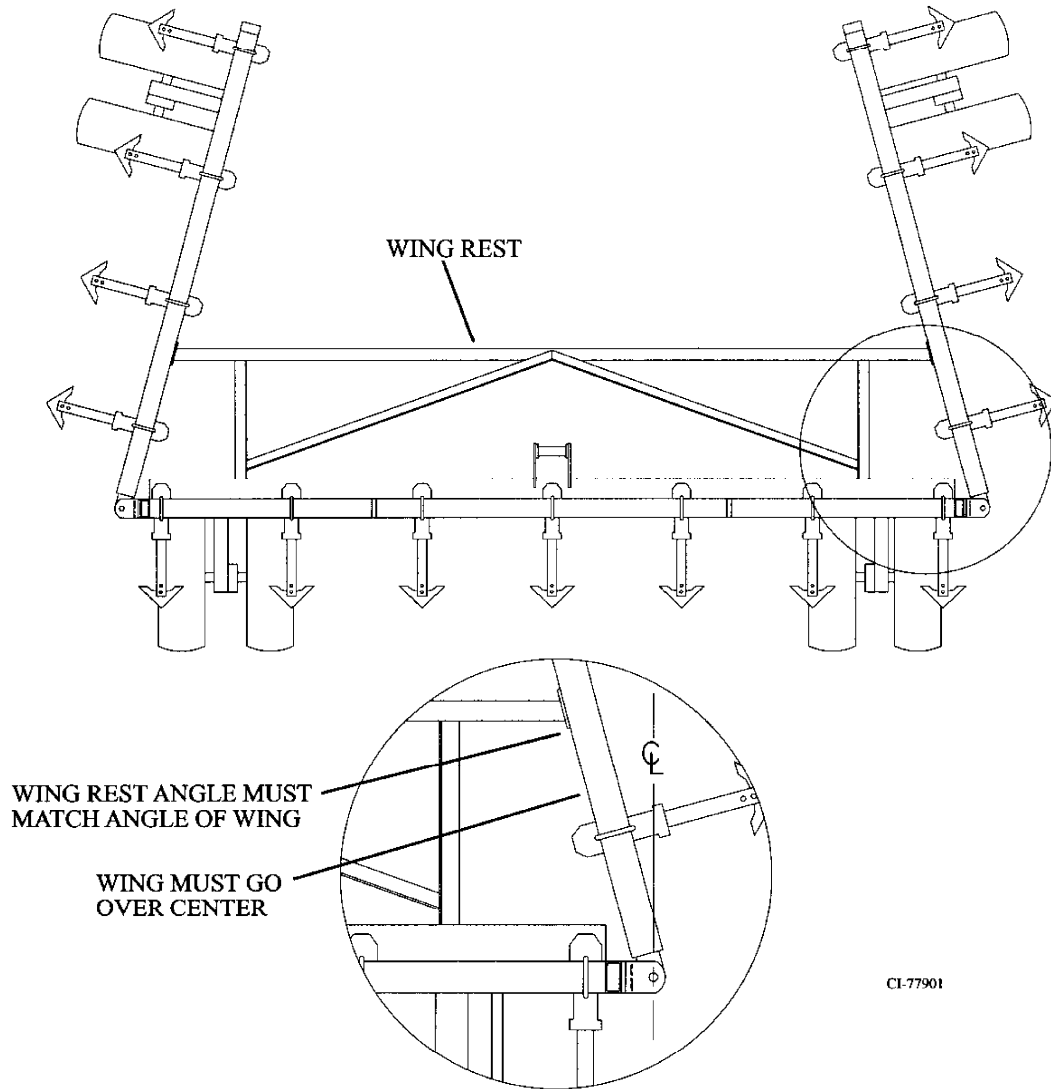


Fig. 1 Wing Rest

## WING LIFT CIRCUITRY

Wing equipped Wil-Rich field cultivators have hydraulic wing lift cylinders to fold the implement for road transport.

Wing lift cylinders are equipped with an integral restrictor on the rod end cylinder port (see fig.2.). This allows the wings to lower at a slower rate and prevents the wings from falling to fast should there be some type of hydraulic failure.

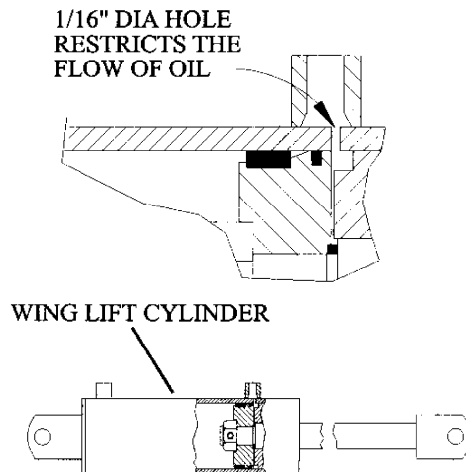


Fig. 2 Wing Lift Cylinder

## MAIN FRAME DEPTH ADJUSTMENT

Fig 3 shows a simple two (2) cylinder circuit used to fold a pair of wings. This system is used on Wil-Rich field cultivators with a single pair of 4'8" or 7' folding wings.

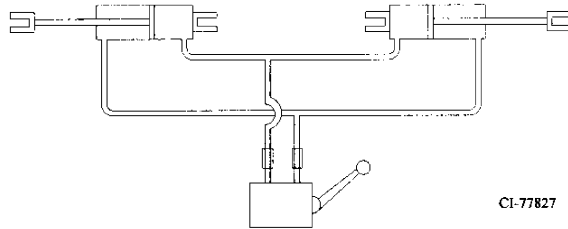


Fig. 3 Two Cylinder Wing Lift Circuit

Fig. 4 shows a simple four (4) cylinder circuit used to fold a pair of wings. This system is used on Wil-Rich field cultivators with a single pair of 9'4" or 11'8" folding wings.

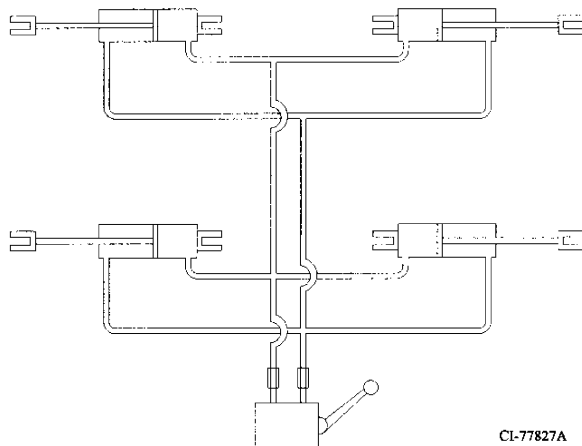


Fig. 4 Four Cylinder Wing Lift Circuit

When lowering the wings, hold the tractor control lever until all cylinders are completely extended. Fully extending the cylinders allows the wings to flex properly in the field.

When raising the wings be sure the wing rest is properly positioned to allow the wings to fold. Fold the main wings until they contact the wing rest.

The main frame depth on the Wil-Rich 3400 Series field cultivator is regulated by a pair of top bypass hydraulic cylinders located in the wheel well area. (See Fig. 5.)

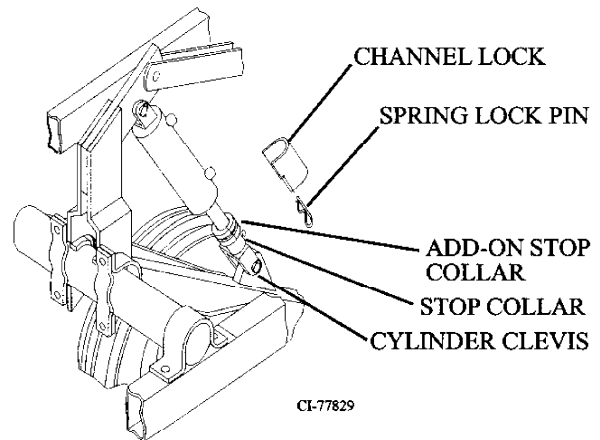


Fig. 5 Main Lift Cylinders

The top bypass cylinders have adjustable, mechanical depth stop collars. The stop collars are rotated on the cylinder rod to vary the retracted length of the cylinder, providing a means of machine depth adjustment.

The main frame depth is mechanically set by turning the stop collar "Down" the cylinder rod, away from the cylinder clevis for decreased working depth, and "Up" the cylinder rod, toward the cylinder clevis for increased working depth. An add-on stop collar is provided in situations where the cylinder rod stop collar does not allow a shallow enough setting. (See Fig 5.)

**NOTE: Proper field operation is dependent upon the main frame cylinders being first to contact the mechanical stops. If a wing cylinder stops contacts first the leveling function of the system will not function properly.**

**NOTE: The cylinder stop collars on the main frame depth control cylinders must be set equally - failure to do so can twist the main axle and cause axle failure. Measure the collar locations or count the number of turns each collar is rotated to ensure they are set the same.**

## DEPTH CONTROL CIRCUITRY

The lower hole of the main frame mast rod anchor will give you a working depth of 0" to 5" deep, dependent on the soil conditions. For deeper tillage use the upper mounting hole (See Fig. 6). This upper hole location will reduce transport height.

Wing depth will need to be readjusted if the mast rod anchor hole is changed.

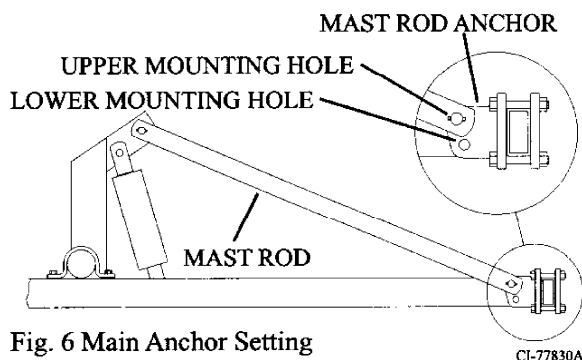


Fig. 6 Main Anchor Setting

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## WING DEPTH ADJUSTMENT

The operational depth of the wing is set by use of a slave cylinder located above the wing axle. These cylinders are connected in series with the main frame top bypass cylinders. (See Hydraulic Depth Control Circuitry, Fig. 7B)

**NOTE: Stop collars are used to set total machine depth. Adjustments required to level the wings relative to the main frame are made with the mast adjustment rod at the wing mast adjustment point.**

To set the wing axle, the mast adjustment rod is made shorter or longer. Length the mast rod will lower the wing relative to the main frame. By adjusting the mast rod to a shorter dimension the wing will be raised. (See Fig. 7.)

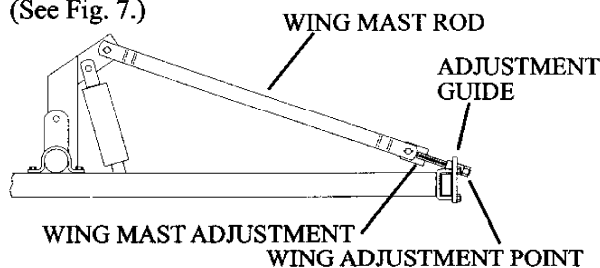


Fig. 7 Wing Axle Adjustment

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The depth control cylinders are hooked in series. Each cylinder is a top bypass cylinder and when fully extended will pass oil by the piston into the next cylinder charging the system.

Top bypass cylinders will bypass oil when the cylinder is fully extended. This bypass condition will exist when implement is raised to maximum ground clearance. At this time oil will pass through the 1/16" dia. bypass hole and go on to next cylinder. (See Fig. 7A).

**NOTE: This system requires periodic raising of the unit and holding of the tractor valve to expel air or contaminants.**

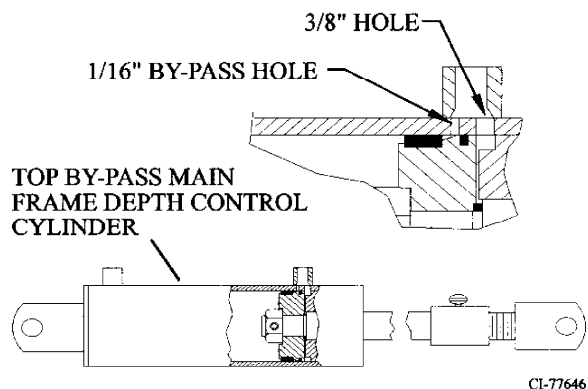


Fig. 7A Top By-Pass Cylinder

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**NOTE: To synchronize the bypass system, the tractor control valve is held in the raised position until the entire implement is raised and any air that may be in lines has been expelled.**

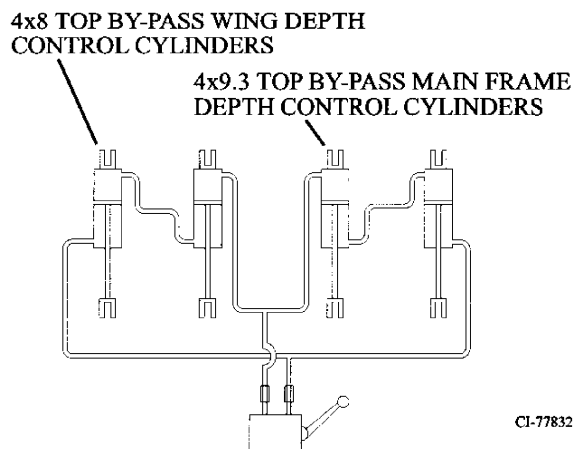


Fig. 7B Single Wing Depth Control Circuit

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## LEVELING

The operational leveling of the machine must be done in a level area of the field, at the working depth. Preliminary setting can be made in the yard to speed up the field setting operation.

This unit is equipped with a self-leveling hitch. This hitch allows the unit to be leveled to the tractor at the working depth desired and subsequent depth changes of the unit will maintain the cultivator level with the ground. On the go depth changes can be made without having to readjust the front to rear level of the machine. As the main lift hydraulics are activated to raise and lower the unit the main hitch rotates to maintain machine level. Initial setting of the unit to the tractor drawbar height is critical to proper operation.

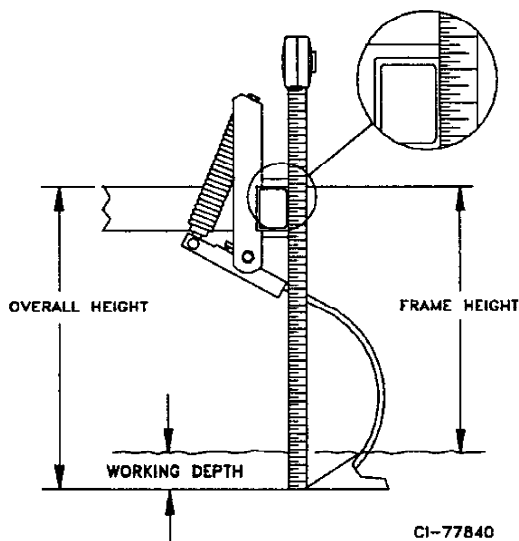


Fig. 8 Frame Height

## PRELIMINARY SETTINGS

Proper preliminary and field settings will require the use of a tape measure. After the unit has been properly assembled and hitched to the tractor with the shims provided (see Fig. 9), make certain all hydraulic systems are charged and locate a level area on which to do the pre-field adjustment. Unfold the wings, fully extend main lift cylinders and hold the tractor hydraulic lever to purge any air from the main lift system. Lower the unit to the ground, resting the weight of the unit on the shovels.

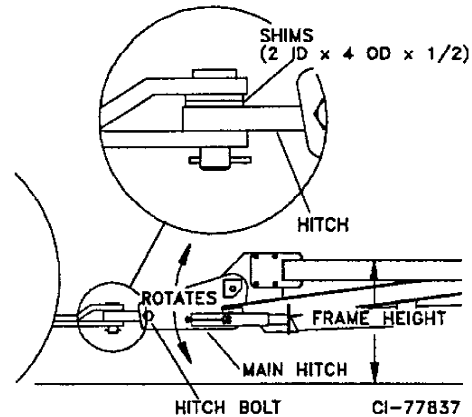


Fig. 9 Hitch

**NOTE: NEVER USE THE UNIT HYDRAULICS TO LIFT THE TIRES OFF THE GROUND. IF THE MACHINE IS NOT MOVING FORWARD INTO THE GROUND THE SELF-LEVELING HITCH WILL ATTEMPT TO MOVE UPWARD AS THE MAIN UNIT IS LOWERED. BECAUSE THE UNIT IS RESTING ON THE SHOVELS AND CAN NOT MOVE DOWN THE FRONT HITCH WILL TRY TO LIFT THE BACK OF THE TRACTOR, ROCKING THE CULTIVATOR ON THE FRONT ROW OF SHANKS. THIS WILL PUT EXTENSIVE PRESSURE ON BOTH THE HITCH AND THE FRONT SHANKS, CAUSING POSSIBLE DAMAGE.**

With the unit resting flat on the ground measure from the ground surface to the top of the main frame at the front bar. Shown in fig. 8. Measure to the top of the main pole where noted in fig. 9. For the machine to be level these dimensions should be equal. By use of the adjustment rod at the rear of the hitch, the main hitch can be rotated, raising or lowering the front of the machine. Shorten the setting noted to raise the front hitch point or lengthen to lower. Refer to fig. 10. Once the hitch pole adjustment is made tighten the jam nut.

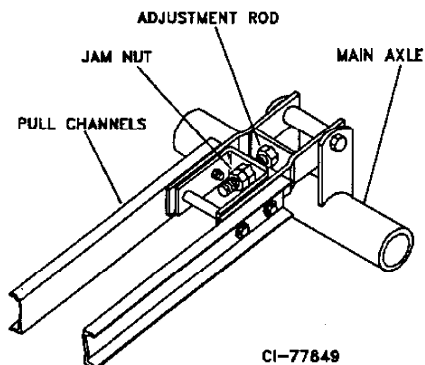


Fig. 10 Hitch Leveling Assembly



## **STABILIZER WHEEL**

Larger models of 3400 series field cultivator can be equipped with a stabilizer wheel mounted on the outer wing of the implement (See Fig. 12). This gives added stability to the machine during tillage operation.

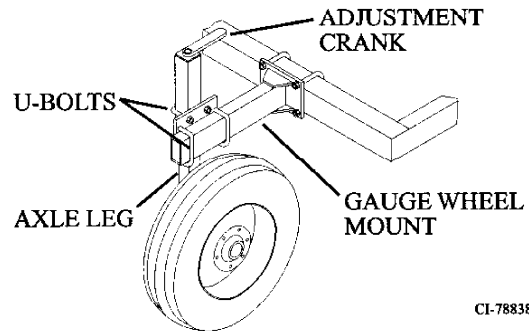


Fig. 12 Stabilizer Wheel

To set gauge wheels, it is advisable to have the weight off the tire, then turn the crank to raise or lower the tire until the desired working depth is attained (See Fig. 12).

The stabilizer wheel should be set to control forward "dipping" of the wing, it is not used for depth control. Set the wheel 1/2" to 1" above ground level, with the field cultivator at working depth and the tractor in neutral.

## **SHANK ADJUSTMENT**

Each shank comes fully assembled from the factory. Install the shanks in their proper location (See assembly instructions for shank placement.) and securely tighten U-bolt nuts.

It is recommended that a 47 degree stem angle shovels be used on all shank assemblies, except the S-shank, where 41 degree shovels are recommended.

**NOTE: Spring adjust bolt should be tightened just enough to crack the paint between spring coils.**

The mounting bolts, u-bolts and shank bolts should all be checked after a few days work and kept tightened.

The shank pivot bolt should not be overtightened, but kept tight enough to prevent turning.

## **LEVELING - WINGS**

With the main frame leveled at the desired operating depth raise unit, hold the hydraulic lever to bypass the main lift system. Move to the level area of the field and drop the unit in the ground until the main frame stop collars contact the cylinder end plates.

After moving a short distance stop the unit and measure the wing depth at the front bar. Compare to the measured depth of the main frame. If the wing needs to be lowered relative to the main frame lengthen the wing mast rod (See Fig. 11) to lower the wing. If the wing needs to be raised, shorten the wing mast rod. Move the unit through the field a short distance, stop and measure again and readjust as needed. Once the wings have been leveled to the main frame raise the unit back to operating depth. Turn the stop collars on the wing cylinder end plates and tighten the thumb-screw to lock in the depth settings.

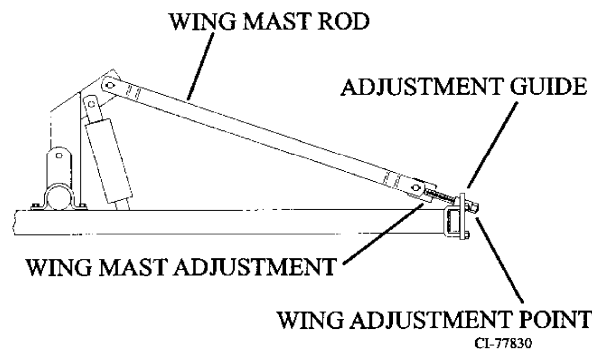


Fig. 11 Hydraulic Wing Adjustment

**NOTE: Make sure all tires are equally inflated.**

**NOTE: It is important that all of the stop collars contact the cylinder end plates when at working depth. If all the stop collars fail to contact the cylinders at the same time, the first to contact will stop the lowering of the machine and the remaining cylinders will not be positively locked.**

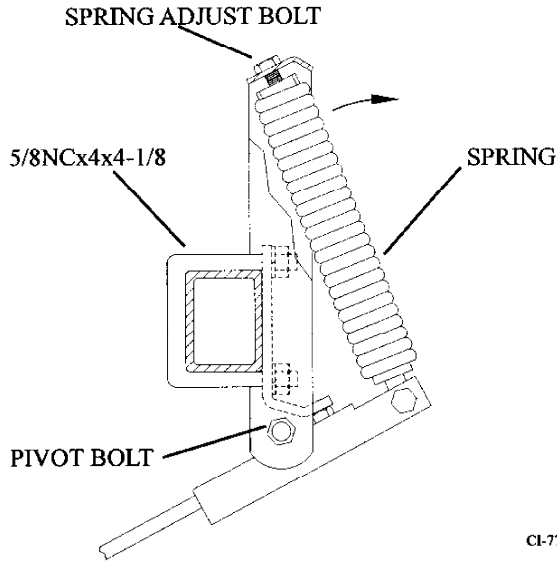


Fig. 13 Shank Assembly

Wil-Rich field cultivators are also available with twin spring, hi-torque, or S-shank assemblies. The twin spring shank assemblies are recommended for heavy duty use. (See optional Equipment page 12).

**NOTE: Be sure to maintain adequate tire/shovel clearance on shanks located in and around the wheel well when machine is fully raised or lowered.**

## MAINTENANCE

Periodic checks should be made to assure that all nuts and bolts remain tight. Loose hardware is easily bent or lost and can cause excessive wear on parts. Replace any bent or broken bolts as soon as they are discovered.

Clean off any dirt grease that may accumulate on moving parts at regular intervals. This will prevent any abrasive action which could cause excess or premature wear. Thoroughly inspect the implement for loose or broken parts and adjust or replace as necessary.

It is important that the implement be regularly lubricated as recommended to obtain the most efficient operation. Proper lubrication helps prevent downtime due to excessive wear and increase machine life.

## CYLINDER SHAFTS

If cylinder shafts are left exposed for any extended period of time, they should be coated with grease to protect them from rust and corrosion.

## AXLE CAPS

All axle caps should be greased once a day with a good quality grease. Lower machine onto the shovel points to relieve pressure on the caps which will make greasing easier. (See Fig. 14.)

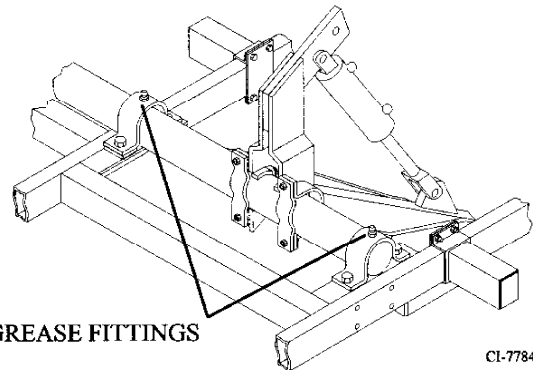


Fig. 14 Axle Cap

## HUB AND SPINDLE ASSEMBLIES

Each hub and spindle assembly comes with a grease fitting installed in the hub. These should be greased once a week during steady usage. Caution - do not over grease.

Clean and repack hub and spindle bearings once each season.

Tighten spindle nut so that there is a slight drag on the wheel when turned by hand (See page 2).

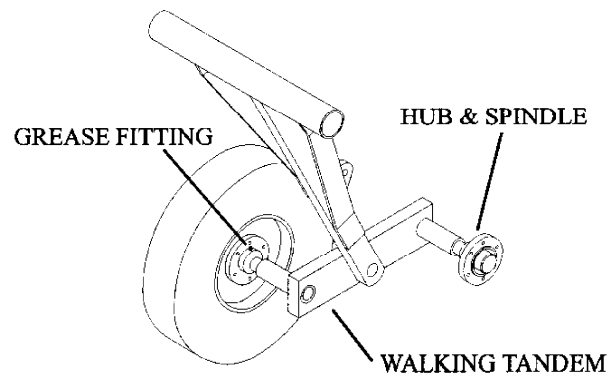


Fig. 15 Walking Tandem

## WALKING TANDEM ASSEMBLIES

Periodically check each walking tandem assembly for looseness and tighten spindle nut if the bearings show any evidence of side play.

Clean and re-pack walking tandem assemblies once each season.

The spindle nut should be tightened to allow a heavy drag when assembly is rotated by hand (See fig. 15).

## HYDRAULICS

Inspect all hydraulic hoses and fittings for cracks and abrasion at least once a year. Tighten or replace as needed.

When connecting the hoses to the cylinders, tubing, or fittings; always use one wrench to prevent the hose from twisting and another wrench to tighten the union. Excessive twisting will shorten the hose life.

Do not over-tighten hydraulic fittings, excessive torque may cause them to crack.

Care should be taken to prevent twisting when tightening hose connections. Straighten any hose that appears twisted immediately. A twisted hose can burst under operating pressure.

## STORAGE

**NOTE: IF POSSIBLE STORE YOUR CULTIVATOR INSIDE.**

At the end of a season, clean the implement thoroughly to remove any trash, soil or dirty grease which could hold moisture and cause premature rusting. Repaint any chipped, bare, or rusted areas to prevent any further deterioration. Inspect the machine for any worn or broken parts and adjust or replace as required.

**SEE YOUR WIL-RICH DEALER FOR ANY PARTS AND/OR SERVICE WHICH MAY BE NEEDED.**

Thoroughly lubricate all grease fittings at the end of the season's use and again before the first operation of the next season.

It is advisable, if possible, to store larger field cultivators with the wings down. With the wings completely lowered, the rod end cylinder pins of the wing lift cylinders should be removed and the cylinders carefully retracted.

Avoid possible damage to the hydraulic system by lowering the machine onto the shanks and relieve the pressure on the system. Doing this will also prevent damage to the tires by removing the field cultivator's weight.

Coat the shovels with grease and place boards under the points to prevent the shovels from settling into the ground.

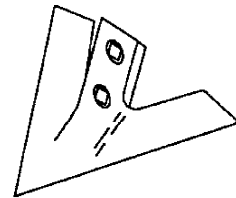
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## OPTIONAL EQUIPMENT

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### SHOVELS

Shovels should be used for general tillage, seedbed preparation and weed eradication.

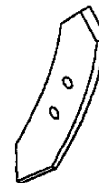


- 4" Shovel (924)
- 7" High Crown Shovel
- 9" High Crown Shovel
- 9" Dura-Face Sweep
- 7" Low Crown Shovel (924)
- 9" Low Crown Shovel (924)
- 10" Low Crown Shovel (924)
- 12" Low Crown Shovel (924)
- 10" High Crown FC Shovel
- 12" High Crown FC Shovel

**NOTE: WIL-RICH RECOMMENDS A 52° SHANK ANGLE AND A 47° SWEEP ANGLE.**

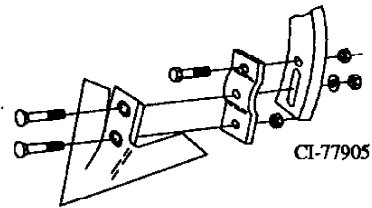
### SPIKES

Spikes are recommended for deep penetration, hard soil conditions, killing of quack grass and other grassy weeds, and also for general tillage. These spikes are reversible for longer wear.

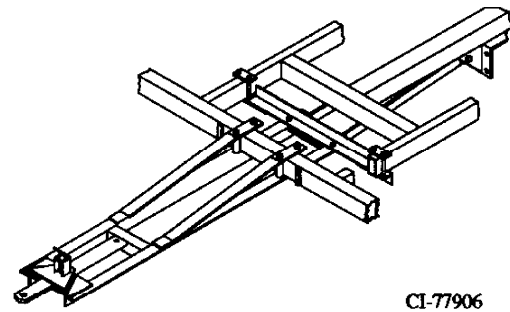


## SHOVEL EXTENSION

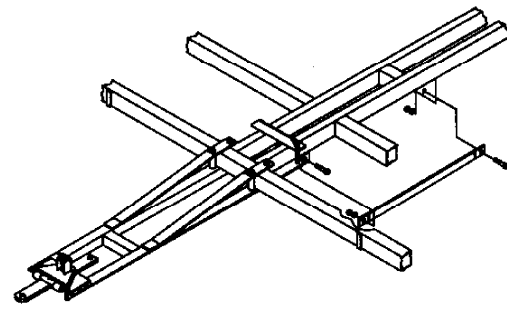
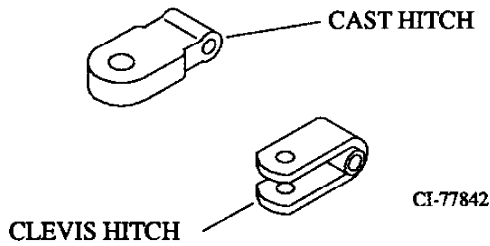
A shovel extension kit is available to increase shovel penetration behind wheel tracks.



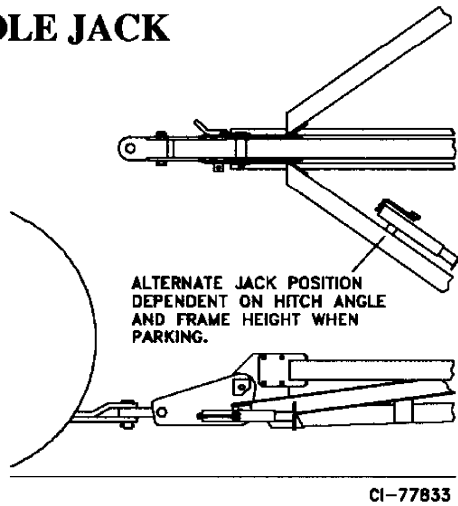
## AUXILIARY HITCHES



## HITCHES

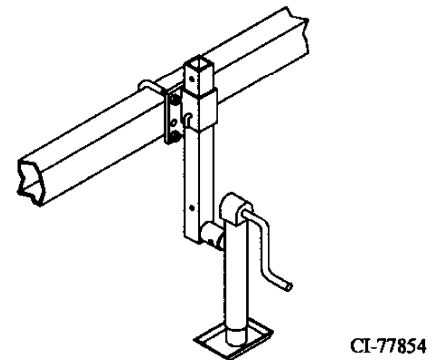


## POLE JACK

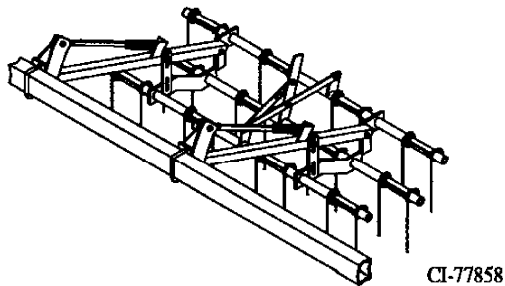


## REAR JACK STAND

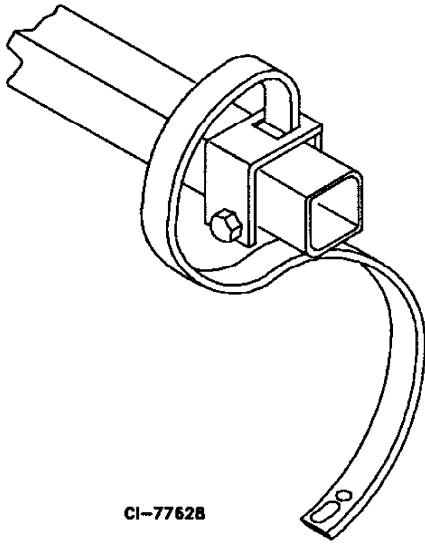
The rear jack stand kit can be attached to the rear of the cultivator to prevent it from tipping backwards. The pole jack, which attaches to the jack stand, must be ordered separately.



## HARROWS

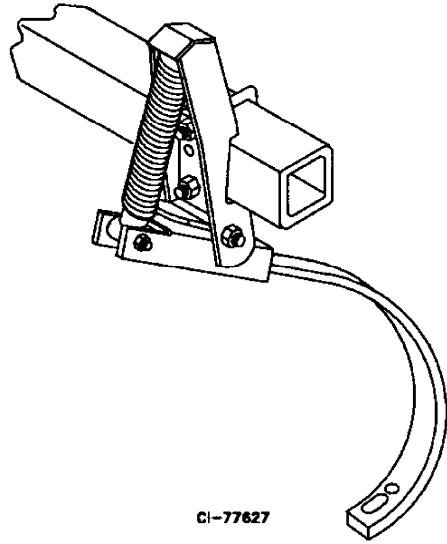


**S-SHANK**



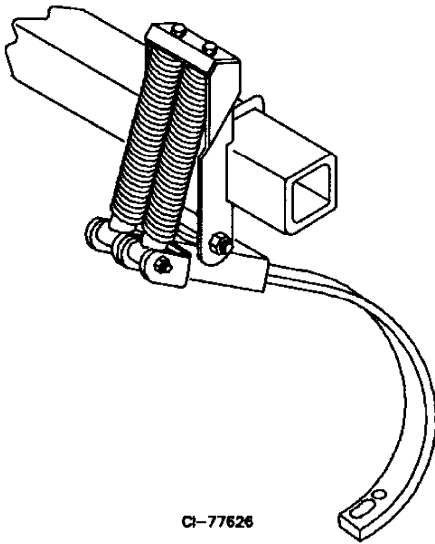
CI-77628

**HI-TORQUE SHANK**



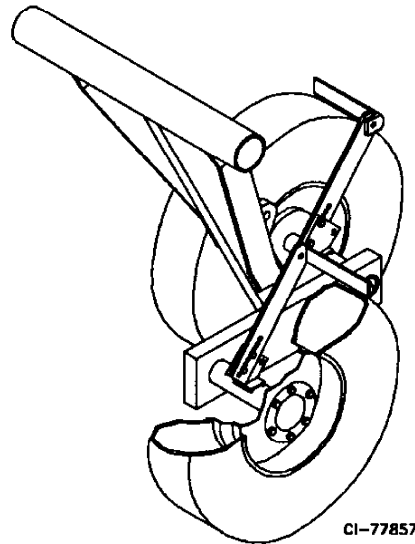
CI-77627

**TWIN SPRING SHANK**



CI-77626

**MUD SCRAPERS**



CI-77857