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300 Series Cultivator

Owner's Manual



Many thanks for choosing Penta as the brand of your new tillage equipment! This equipment has been designed and manufactured to provide you with optimal performance and maximum durability for years of safe and economical use.

As with any piece of equipment, there are numerous settings and adjustments to insure optimum performance and ease of operation while maximizing the life and reducing wear on your new Penta tillage component; we suggest you take a few moments to review this operator's manual for some of these tips and procedures.

Safety is always of concern for any operators of equipment; a brief review of some of the safety features and procedures is outlined for you and any operators of this equipment.

Keep this manual readily available for reference and be sure to pass it on to any new operators or owners.

Customer Reference Information

Penta Machine and Model #: _____

Serial #: _____

Standard Equipment: _____

Options: _____

Date Purchased: _____

Dealer Name: _____

Dealer Telephone #: _____

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Section 1- Safety

Above all else WORK SAFELY!!!

General Safety

1. Do not wear loose fitting clothes that can catch in moving parts or snag on obstructions.
2. Use caution when making any adjustments.
3. Always use the proper tools or equipment.
4. Ensure all parts, service equipment, and tools are clear of the machine before operating any component or moving the machine.
5. Never allow any person to ride on the machine when in motion.
6. Do not attempt to remove obstructions or debris while the machine is in motion.
7. Warning and Caution stickers are affixed to your machine; be aware of their location and message and do not remove.
8. Use extreme caution when working on hillsides, near ditches or fence rows, or around other people or machinery.
9. Be aware of clearances all around your machine! Generally your Penta tillage equipment is much wider than the towing vehicle.
10. Never rely on hydraulic operating systems to hold your machine! Always use mechanical locks or stands and blocking to support the machine when working under or around it.
11. Do not work on any towed equipment with the tow vehicle running. Wise operators always remove keys from towing vehicles and insure all hydraulic systems are in the neutral or "float" position to avoid possible unanticipated movement of the machine.
12. Always work at a deliberate pace; rushing can often result in accidents!
13. Use mechanical chocks or blocks on wheels and tires before disconnecting from any tow vehicle.
14. Relieve all hydraulic pressure before disconnecting any hydraulic connections or servicing any hydraulic components. Place tractor hydraulic controls in the "neutral" or float position.
15. Ensure all guards, shields or safety decals remain in place and in good condition.
16. Be aware of others around you or the machine!

Working with Hydraulics

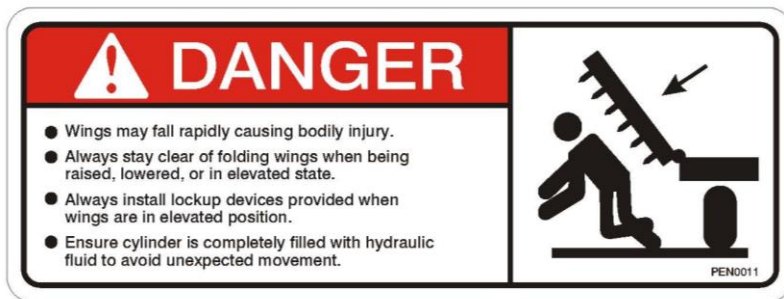
1. Never rely on hydraulics to hold your machine in position when working around or under it! Failure of simple components can result in drastic and sudden movements of any components. Always use mechanical locks, stands or supports to hold the machine.
2. Hydraulic systems rely on fluids under high pressure! Ensure all hydraulic components are free from pinching, abrasion areas or possible shear points.
3. Always visually inspect hydraulic components and connections for fluid leakage or seeping. Minor staining or seepage may indicate a pending component failure resulting in a hazardous rupture or failure.
4. Hydraulic systems can generate heat and high oil temperatures. Avoid contact with hot oils and fluids.
5. Proper eye protection should be worn when working around hydraulic systems to avoid eye contact with any hydraulic fluids.
6. Insure all hydraulic fittings and couplings are free of any debris or dirt before coupling or connecting. These fittings rely on excellent surface contact to preserve their integrity!
7. Visually inspect hydraulic lines for any signs of abrasion, pinching or wear.
8. Insure all hydraulic lines are secured and positioned with minimal movement to avoid snagging, catching or dragging.
9. IMPORTANT: Always loosen or “crack open” hydraulic fittings slowly and with proper caution to insure there is no latent pressure in the hydraulic system. Once determined the system is at zero pressure it is safe to disconnect.
10. Always “cap” or cover any open hydraulic lines or fittings to prevent contaminants from entering the system.

Safe Transport Practices

1. Always use locking pins and safety chains when transporting.
2. Engage all mechanical transport locks on the machine. Do not rely on the hydraulic system!
3. Travel at reasonable speeds. No tillage tool is designed for higher speed balance in transport position.
4. Be mindful of weights and momentum!
5. Use proper safety lighting (signal flashers, etc) and signage to make others aware of over width or over dimensional, slower moving potential hazards.
6. Be aware of dimensions! Be alert for overhead wires and signs as well as obstructions on the road shoulders.
7. Always practice courteous operation!

Safety Warnings and Decals

The following decals and safety warnings are affixed to your Penta tillage tool. Please insure that all operators are aware of their locations and they are kept in clear and legible condition.



Section 2- Settings and Adjustments

To insure best performance and optimal results with your Penta cultivator, it is manufactured with some very basic adjustments. Your machine should arrive from your dealer with these adjustments preset but it is a good practice to check and reset these measurements from time to time to accommodate changes in field conditions, normal wear of the machine or changes in the configuration (towing tractor, finishing harrows, etc).

Your new Penta 300 Cultivator features the very unique pivoting caddy assembly on the front of it; making it a true “floating frame” cultivator. This machine rides fully on its own undercarriage so all depth and leveling points are on the machine...any changes in drawbar hook up height or tractor attachment do not affect it. Because of this geometry the Penta 300 cultivator has unparalleled depth control and field contouring as all of the terrain following is reacting within the frame from ground contact points very close together.

A few simple adjustments and measurements can assure that your Penta cultivator will do the best of tillage jobs while reducing uneven stressing on the machine as well as the power required for optimal operation.

We suggest you check and correct these settings at the start of every season and monitor the overall performance of the machine throughout its use for any signs of requirement to reset.

Leveling

The best tillage jobs are ones with thorough and complete fracture and mixing of the soil, uniform incorporation of the desired amount of residue and the job done to a consistent depth.

Depth of the seed placement with the planter, water percolation and residue decomposition all are dependent on the ground being worked at a consistent depth. If one section of shanks is running deeper than the others the planter openers will have issues of running at a consistent depth with varying soil surface consistencies to control them, plant nutrients availability will be different and you run the risk bringing more stones or undesirable sub soil up onto the surface or into the main planting zone.

With current increasing working widths a small variance of the depth control system in the main frame can result in a large variance 15 feet away on the frame; causing shank tips to run many inches deeper into the soil than others on the same pass. This not only leads to uneven performance but a much harder pulling machine, added component stress and greater risk of breakage.

Because of the simple design of the Penta cultivator the following simple steps can be taken to assure your cultivator is working at its best!

1. Tires

During field operations the cultivator relies on the amount of retraction of the tires to the depth setting stops to determine its depth of operation.

- Always insure all tires on cultivator are the correct (and same) size.

- Make sure all tires are at the same air pressure. A difference of 10 lbs. of air pressure may alter the circumference of the tire by several inches, changing the operating depth.

2. Side-to-Side Leveling

To insure even or correct working depth across the whole width of the cultivator frame, the wheel modules must be synchronized to assure all are retracting to the same position relative to the ground and the frame.

-Place the cultivator on a smooth level surface where it can be set down on its shanks. A cement pad or a hard surface farm yard is ideal.

-Loosen both the jam nuts on the lift wheel assemblies.

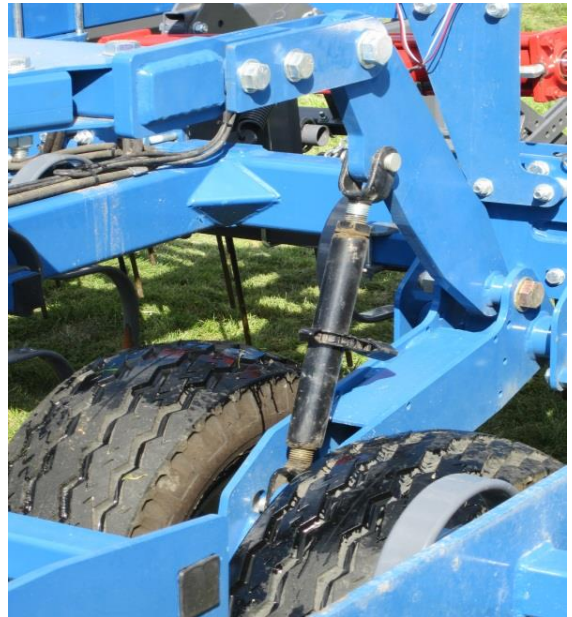
-Measure from the CENTRE of the walking beam pin (the pivot point between the tandem wheels on the wheel assembly to the frame).

-For optimum performance (both field working depth and transport height clearance), this measurement should be the same on ALL wheel assemblies. A further cross check is measuring from the ground to a similar point on the frame across the full width of the cultivator.

-To adjust turn the bodies of the turn buckle assembly on the adjusting threads to lengthen or shorten it. Lengthening it will raise the cultivator; shortening it will lower it.

-Once all wheel assemblies are adjusted to the correct and SAME measurement, re-tighten the front and back jam nuts on all upper control tubes to lock in place.

-Your Penta cultivator will now run level from side to side with all shanks at a uniform depth relative to the surface the tires are running on.



3. Front to Back Leveling

To insure that the shanks at the front of the cultivator frame and the ones at the back are operating at the same depth, the cultivator can be set-up on a hard flat surface (when doing side-to-side leveling) but should be fine-tuned in the field at a level bias when running at working depth.

The field adjustment allows the operator to adjust for soil and field conditions; for example in high residue conditions the front wheels may sink less into the ground than the back wheels or in hard soil conditions the front openers (or sweeps) – which are the first to break un-touched ground- may be pulling down much harder than the rears. Field adjustment is not often required but is a good idea when drastically changing soil types or field conditions occur. Going from doing a second pass on open ground to ripping up un-touched high residue ground would be a good example of this. If the conditions cause the front wheels to ride two inches above the rears because the rears are riding in softer soil this should be adjusted accordingly. This level is controlled entirely by the linkage settings on the wheel linkages and totally independent of the drawbar or tongue heights. Being level not only affects the working depth of the shanks but can very much affect the load to the tractor and how easily the cultivator pulls.

Front to back leveling is simply accomplished in these few easy steps:

-Initial leveling front to back on a smooth level surface with the cultivator in any lifted position or with the tips or openers resting on the ground. Measure distance from the leading edge of the opener to the ground...it should be similar from the tips on the front row of frame to those on the back (and all in between). If not just loosen the jam nuts in the upper control arms (the main connecting link from the front lift caddy to the rear wheel assemblies) and adjust accordingly. Lengthening the linkage will raise the back rank of openers; shortening it will raise the back openers (or tips). Once the distance from the tip of the opener to the ground is the same for all openers tighten lock nut back onto the linkage.

With the unique geometry and linkage on the Penta 300 the machine should now be level front to back; however it is not a bad practice to double check in actual field conditions. This re-check allows you to “fine tune” for field conditions (front tires not sinking into unworked soil surface as much as rears, front shanks drawing much harder down than rear shanks in very hard soil conditions, etc).

-Set depth control collars to targeted working depth.

-In the field slowly drive ahead while lowering machine to full working depth (collars fully retracted to their stops) and engaging shanks to targeted working depth.

-Stop tractor with cultivator fully engaged in the ground.

-Measure from the bottom of the front main frame member to the ground on both front corners and on the bottom of the rear main frame member at the rear corners of the machine. These measurements should be similar. If the back number is much less the machine is lifting to the front; if greater it is digging at the front.

-Loosen jam nuts on either end of the telescopic turnbuckle on the upper control arm of the lift assembly of the cultivator.

-Turn body tube of the telescopic top link to change length; extending it will raise the back of the cultivator frame; retracting it will lower the back.

-With cultivator fully engaged in the ground drive ahead another hundred feet or so and re-measure. This will allow the cultivator to re-position to the soil surface conditions.

-Tighten jam nuts on telescopic top link to their locked position.



4. Front Depth Wheels- Wing Assemblies

Your Series 300 Penta cultivator is equipped with front depth wheels on the wing assemblies. These units feature the same turnbuckle adjustment used on the rear lift wheel assemblies and are linked to the working depth adjustment control linkages through the rear lift assembly to the main frame lift. Once the main frame is leveled and the rear assembly adjusted for side to side level then the front depth wheels should be set adjusted through the turnbuckle assembly for front to back level and even weight distribution on the wing.

Upon beginning of field operations and initial working depth is established, adjustment can be done through the turnbuckle to place lesser or greater weight on these front gauge wheels depending on soil type and condition. Once set to desired working depth, these wheels will operate at a constant regardless of changing working depth- they adjust to changes in working depth through the control linkages.



5. Wing Depth Wheels

Five section and larger Penta cultivators offer an optional front depth control wheel to allow for better terrain following. These wheels contain a turnbuckle adjustment but are not linked to the rest of the lift mechanism. Adjustment is accomplished through the turnbuckle adjustment and should be set once in the field and desired working depth is established. Down pressure on this linkage should be adjusted so that the outer wing sections will flex up and down to conform to surface contours. This setting should be adjusted when large changes are made to over all working depth or soil surface changes (hard or soft surfaces will affect the depth the tire will sink into it).

6. Operating Depth Adjustment

All Series 200 and Series 300 Penta cultivators feature this exclusive mechanical depth control.



Pictured are the main frame depth control (above left) and the wing wheel depth control (above right).

With the cultivator in the raised position (no pressure on the depth control stops), the operator removes the lock pin and slides the lock collar to the desired working depth. Gauge lines are in quarter inch working depth increments and rotating the locking collar will line up the locking pin holes to correspond to these gauge lines. Insert pin through the locking collar and depth control arm to lock mechanism to desired working depth.

In field operation lowering the cultivator causes the whole depth control mechanism to come up against these stops; mechanically limiting travel to desired working depth. In field operation the full load of the cultivator rests on these stops and there will be no load going through the hydraulic system.

To increase or decrease working depth these adjusting collars are the only adjustment to change working depth. Simply raise the implement and re-position the collars so the linkage is stopped at the desired working depth.

For road transport, disconnecting from the implement or storage, these mechanical stops are equipped with a single lock-up setting. Raise the implement to full up position and slide the locking collars to the inner-most pin position then allow the implement to lower onto the stops. Placing the tractor hydraulic control in the neutral or float position should depressurize the complete hydraulic system for easy coupling and uncoupling of hydraulic connections.

NOTES:

*Steps 1 through 4 would be considered “seasonal or maintenance” procedures; only Step 5 (actual working depth adjustment) would be considered an “operating” adjustment used to fine tune the cultivators performance to individual crop requirements, soil type and field conditions.

*With the cultivator leveled the geometry of the equalizing hitch will keep it level (front to back) in all positions (including transport position). This should allow for maximum clearance (to the ground) of all shanks when in the fully raised position as well as insuring consistent front to back working depths. If in extreme conditions and more front clearance is required, extending the draw bar telescopic top link will roll the cultivator back on its axis; effectively increasing the front clearance and lowering the back of the machine.

Section 4- Recommended Maintenance

Periodic maintenance can extend the life of your Penta tillage machine as well as preventing expensive lost time during busy periods due to break downs. Tillage equipment tends to be very durable and somewhat simple in design but a few basic steps can go a long way in preventing time consuming repairs.

The following simple practices and procedures should be adopted and followed on a regular basis to insure a full season of trouble free operation:

Grease Points:

Please refer to the enclosed schematic (at the back of this manual) for location of greasing points on your particular machine. These points should be greased regularly (at the start or finish of the day). Grease serves as lubricant as well as forcing any foreign matter or particulate away from the wear point which can cause abrasion and wear. Of equal importance is its function as a water or moisture barrier preventing possibility of premature corrosion or rust.

Any grease nipples which do not take grease should be replaced immediately to allow proper penetration. Rotation of the component during greasing will assure fresh grease is spread throughout the lubricated area.

Tires and Wheels:

-Visually inspect tires on a regular basis for any cuts, loss of pressure, wear or checking. Remember, the tires and wheels are a key component of controlling machine, leveling and working depth.

Inspect all wheel lug nuts for tightness and re-torque regularly.

WARNING:

TIRE & WHEEL SERVICING CAN BE DANGEROUS!

MOUNTING/ DISMOUNTING MUST BE DONE BY TRAINED PERSONNEL ONLY!

Hydraulics:

Visually inspect all hydraulic lines and connections for possible leakage, wear or abrasion. Insure that all lines are firmly affixed to their mounts and securely held in place. Any signs of oil staining or dust build up are very visible signs of connections working loose, fitting failure or minor leaks developing and should be remedied immediately.

Hydraulic cylinders should be inspected for any signs of corrosion or pitting on the shafts or leakage around piston seals.

Hinge or Pivot Points:

Inspect for corrosion, premature wear or stress cracking. It is recommended to remove pivot pins once a year and thoroughly coat with a lubricant then replace. This practice can extend the life of these wear points substantially.

C- Shank or S-Tine:

Check mounts and mounting bolts for tightness and any possible bending or stress cracks.

The shanks or tines are made of spring steel and are made to flex and vibrate as part of their action in the soil; however in severe conditions they may crack or fracture. Visibly inspect for wear or stress cracks developing and replace any showing initial signs of breakage.

Points or Shank Tips:

These replaceable wear points determine the stirring or “action” of your cultivator in the soil and have many different wear characteristics dependent on soil type, use and configuration. Visually inspect to determine state of wear and possible breakage. Often the resulting soil finish or the job they are doing will determine if replacement is warranted. Inspect mounting bolts for tightness or potential breakage or loss.

MAINTENANCE SAFETY

Remember.....always safety first!!

-Be aware of others around you.

-Perform all maintenance with the tractor turned off, parking brake applied and the hydraulics in the “neutral” or float position.

-Never trust hydraulics to hold things in position.

-Never work under anything unless securely mechanically locked or blocked in position with stands or solid blocks.

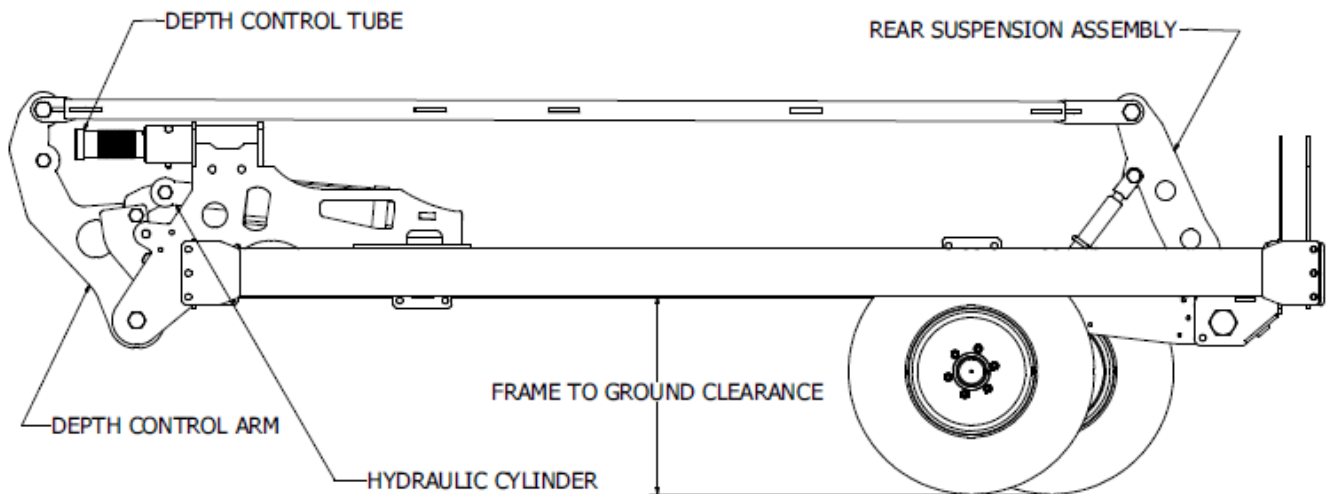
-Take your time; slow deliberate action assures thoroughness as well as safety.

Section 5- Service or Repair Tips

Hydraulic Lift Cylinder Removal

1. With wings down lower the cultivator to a resting position so all of the weight is on the shank assemblies.
2. Position cultivators lift circuit control (tractor control lever) in neutral or float position (de-pressurizing the hydraulic system). Turn tractor off.
3. In neutral or float there should be no pressure on the lift cylinders! Attaching pins on either end of the lift cylinders should turn freely with no load on them.
4. Remove locking clips and attaching pins; freeing cylinder from cultivator.
5. Loosen hydraulic line fittings at the cylinder then disconnect.

IMPORTANT: Always loosen or “crack open” hydraulic fittings slowly and with caution to insure no latent pressure is in the system. Once it is ascertained it is at zero pressure then it can be safely disconnected and the lines removed from the cylinder. Always cover open hydraulic connections with caps or a clean rag to prevent entry of contaminants to the hydraulic system.



Note:

*It may be necessary to cycle the lift mechanism several times to re-charge the lines and cylinder with oil after replacement. It is always a good practice to recheck frame leveling after this procedure.

Hydraulic Wing Lift Cylinder Removal

1. Place cultivator in lowered position with wings down; everything resting on the ground.
2. Place hydraulic controls on tractor in float position (zero or neutral hydraulic pressure supplied). Shut tractor off.
3. Extend or retract wing lift cylinder so upper connecting pin is in the center or neutral position in the mounting slot.
4. Shake or move cylinder to determine and confirm it is bearing no weight.
5. Loosen hydraulic line fittings at the cylinder then disconnect.
IMPORTANT: Always loosen or “crack open” hydraulic fittings slowly and with caution to insure no latent pressure is in the system. Once it is ascertained it is at zero pressure then it can be safely disconnected from the cylinder.



Always cover open hydraulic connections with caps or a clean rag to prevent entry of contaminants to the hydraulic system.

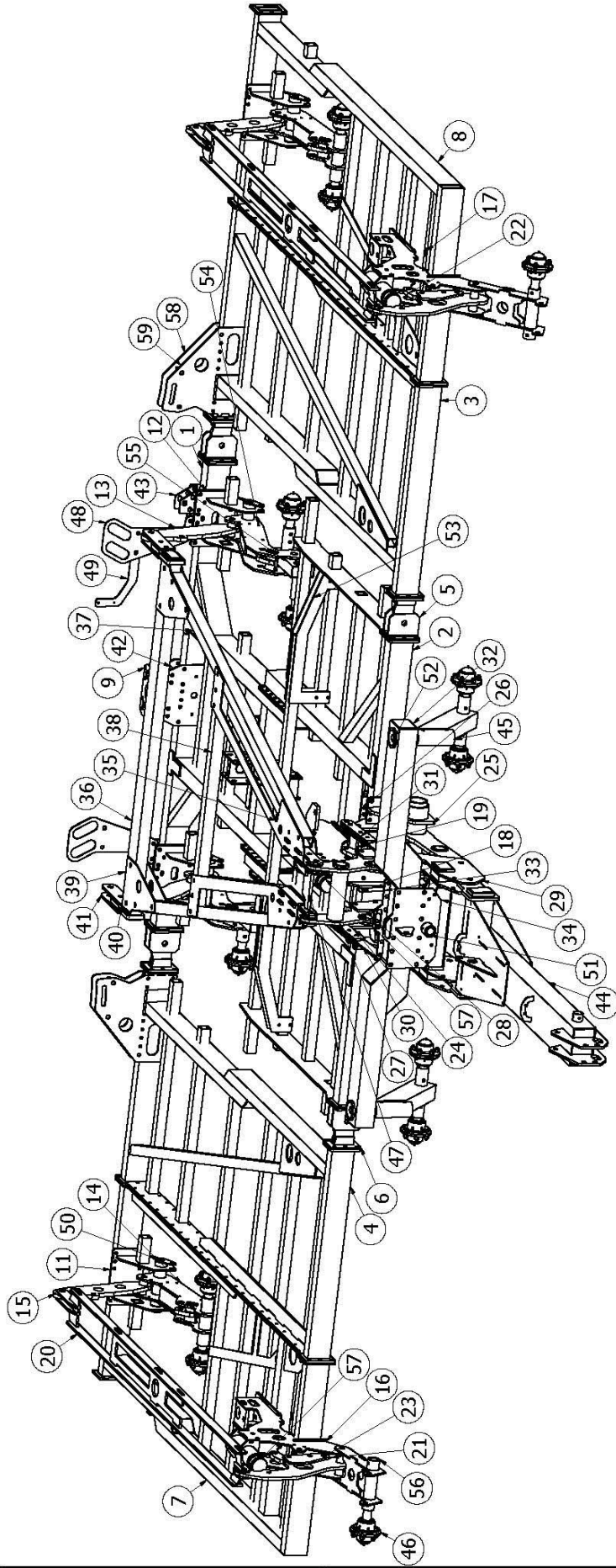
6. Remove lower cylinder attaching bolt or pin.
7. Remove upper cylinder attaching bolt or pin.
8. Remove cylinder.
9. To re-install reverse the above procedure.

Note:

*You may have to cycle the wing lift system several times after this procedure to re-charge and replace line or cylinder oil lost during this procedure.

Section 6- Machine Schematics
&
Part Breakouts

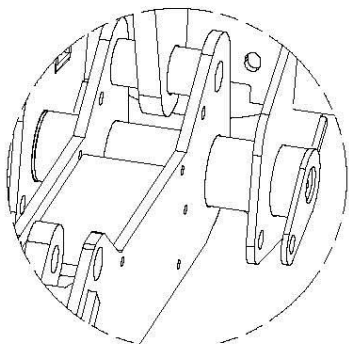
300 SERIES CULTIVATOR



PARTS LIST			
ITEM	QTY	PART #	DESCRIPTION
1	1	320110	MAIN FRAME, STANDARD, REAR
2	1	320111	MAIN FRAME, STANDARD, FRONT
3	1	320113	WING, LARGE HINGE SECTION, LEFT
4	1	320114	WING, LARGE HINGE SECTION, RIGHT
5	4	320003	MAIN HINGE
6	4	320148	WING HINGE
7	1	320116	WING, SUSPENSION, RIGHT
8	1	320115	WING, SUSPENSION, LEFT
9	1	320117	REAR HITCH MOUNT
10	8	220050	MAIN FRAME CYLINDER BRACKET BUSHING
11	2	320118	DOWNARM MOUNT, WING
12	2	320119	MAIN DOWNARM MOUNT
13	2	320120	UPRIGHT SUSPENSION ARM, MAIN
14	2	320121	DOWNARM
15	2	320122	UPRIGHT SUSPENSION ARM, WING
16	2	320123	DEPTH CONTROL, WING
17	2	124067	DEPTH CONTROL, WING, SANDWICH PLATE
18	1	320124	DEPTH CONTROL, MAIN
19	1	124073	DEPTH CONTROL, MAIN, SANDWICH PLATE
20	2	320125	WING SUSPENSION ARM
21	2	320126	WING DEPTH CONTROL ARM
22	4	127015	WING DEPTH CONTROL BREAK AWAY PLATE
23	8	124080	WING BREAK AWAY PLATE SIDE PLATE
24	1	320128	CAM MOUNT, RIGHT
25	1	320129	CAM MOUNT, LEFT
26	2	124084	CAM MOUNT BACKING PLATE
27	1	320130	FRONT CAM
28	4	124085	CAM MOUNT SUPPORT PLATE
29	1	320131	TONGUE MOUNT
30	2	320132	CADDY PARALLEL LINKAGE, LOWER
31	4	124089	CADDY PARALEL LINKAGE, UPPER
32	1	320133	CADDY
33	1	320134	CADDY PIVOT, REAR
34	1	320135	CADDY PIVOT, FRONT
35	2	320136	A FRAME FRONT ARM
36	1	320137	A FRAME REAR TUBE
37	2	224333	A FRAME SIDE TUBE
38	1	224334	A FRAME MIDDLE TUBE
39	4	122103	A FRAME REAR TUBING JOINT PLATE
40	4	123213	A FRAME SPACER PLATE
41	4	124093	A FRAME REAR BRACKET
42	1	127010	MAIN FRAME CYLINDER BRACKET
43	4	123215	WING LOCK
44	1	320138	TONGUE
45	2	320139	FRONT CADDY WHEEL DOWNARM
46	14	320100	6000LBS ASSEMBLY
47	1	320140	TRANSPORTATION LOCK
48	2	122105	LIGHT MOUNT
49	1	122106	YIELD SIGN MOUNT
50	4	320021	DOWNARM MOUNT PIN
51	1	222010	CADDY PIVOT PIN
52	2	221010	CADDY CRAZY WHEEL SPINDLE
53	1	320143	MAIN FRAME, STANDARD, BRACE
54	2	320142	WALKING BEAM DOWNARM
55	2	320141	WALKING BEAM
56	2	320127	GAUGE WHEEL ARM
57	3	320150	DEPTH CONTROL
58	2	123206-3	WING CYLINDER BRACKET, FRONT
59	2	123214-2	WING CYLINDER BRACKET, REAR

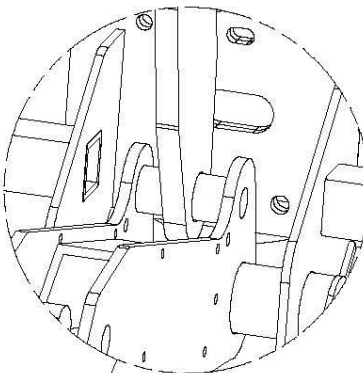


GREASE POINTS



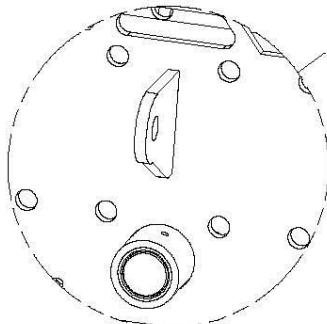
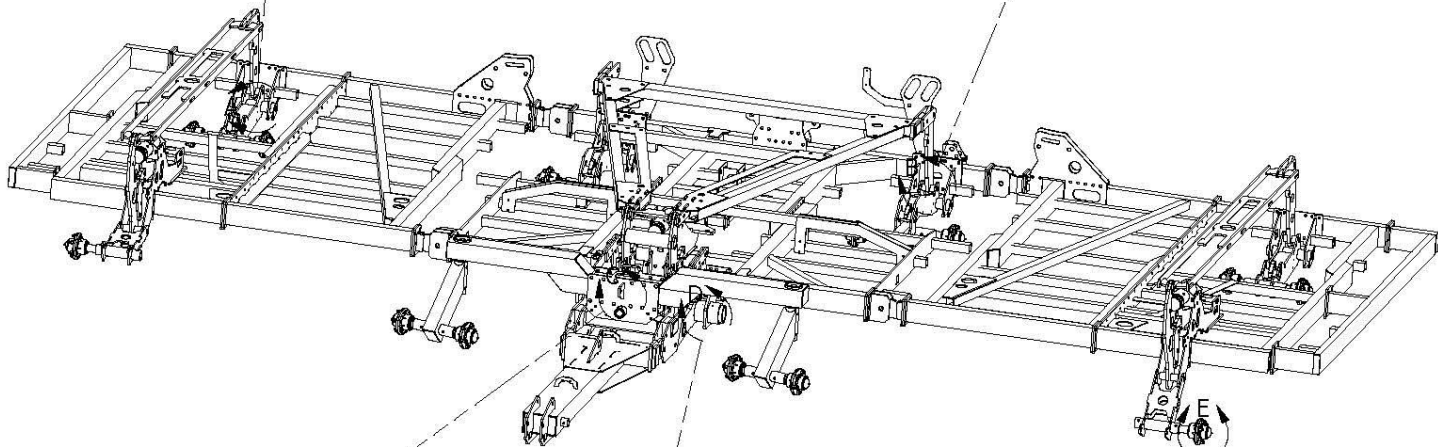
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DETAIL A



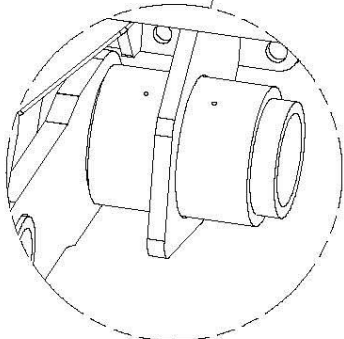
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DETAIL B



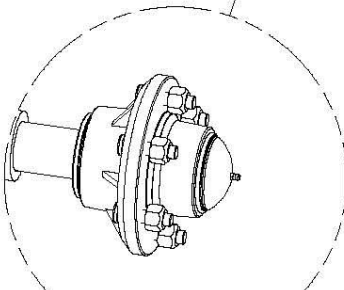
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DETAIL C



X2

DETAIL D



X14

