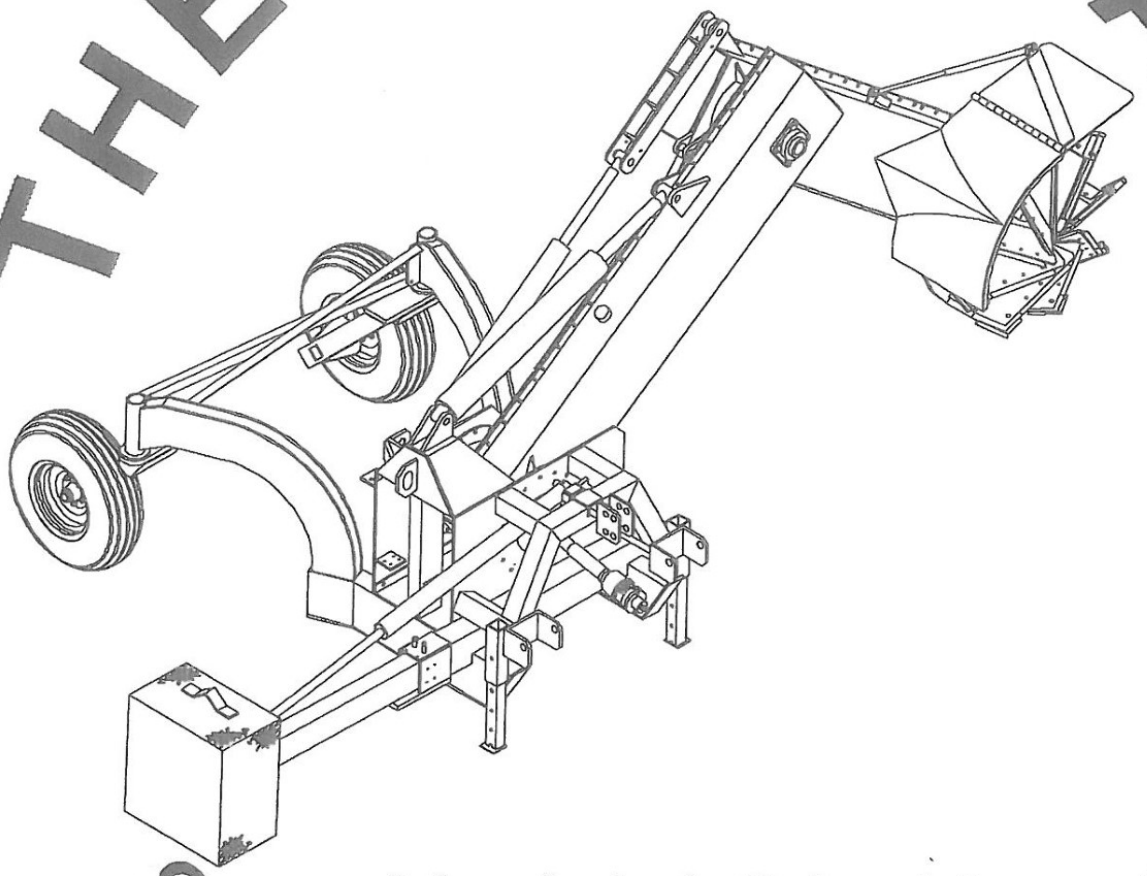
MODEL NUMBER LSA42 SERIAL NUMBER _____

THE HURRICANE



Model LSA-42

SIDEARM DITCHER

HURRICANE DITCHER CO., INC.
2425 CATHLINETTE ROAD
VINCENNES IN 47591
Phone: 1-812-886-9663

04-30-99

HURRICANE DITCHER CO., INC.

Model LSA–42 SIDEARM DITCHER

INTRODUCTION

Thank you and congratulations on the purchase of your Hurricane SideArm Ditcher. We certainly hope that it will be helpful and useful to you. Your machine has been tested and built with knowledge, precision, and quality for years of dependable service.

The Hurricane Ditcher was developed to be used by county & township highway departments for cleaning roadside ditches. It is also being used to fill a need in agriculture as an efficient and affordable machine to make surface drainage ditches using a standard farm tractor.

Whatever your application, we hope it works well for you. Please read and follow all safety precautions, operating procedures, and maintenance requirements. Following these recommendations will prevent injury and operation down time. Proper maintenance and lubrication will prevent machine breakdown and increase its life expectancy, which will lead to better performance for you.

Listed below is an address and phone number. Please let us know of any comments, suggestions, or problems that may arise.

SPECIFICATIONS – Model LSA–42 Sidearm Ditcher

HP required: 150 HP to 250 HP on 1000 RPM PTO.
Width of cut: 42 inches.
Depth of cut: up to 18 inches in a single pass. 8–10 inches recommended.
Reach (outward): Approximately 14 feet from center.
Reach (downward): At about 8 feet from center this machine will reach 9 feet deep.
Volume of soil moved: With a 150 HP tractor, 8 inches deep and ground speed of 1 1/2 miles per hour, 375 cubic yards per hour or 6.25 cubic yards per minute. With a 250 HP tractor, 14 inches deep and ground speed of 2 miles per hour, 1097 cubic yards per hour or 18.25 cubic yards per minute.
Weight of machine: Approx. 10,000 pounds.
Drive train: 55 series PTO with shear bolts at the tractor end and on the impeller. Double 80 roller chain with idler adjustment in inner gearbox. Triple 80 roller chain with idler adjustment in outer gearbox.

OBSERVE THIS SYMBOL THROUGOUT THIS MANUAL

It calls out potential hazards and dangers.

The symbol described above will be associated with a key SIGNAL WORD. A signal word will designate a degree or level of hazard seriousness. These are as follows:

DANGER – An imminently hazardous situation that WILL result in death or serious injury. A danger that safety guards cannot protect against.

WARNING – A potentially hazardous situation that COULD result in death or serious injury that are exposed if gaurds are not in place. Also an alert to unsafe practices.

CAUTION – A potentialy hazardous situation that MAY result in injury that are present when an unsafe practice is used.

TABLE OF CONTENTS

SAFETY  Please treat all safety recommendations as a potential DANGER.

BEFORE OPERATION:

– Review this manual. Be sure the operator has read and understands all operations before using your machine.
– Learn to operate this machine safely. Be alert, observe all safety practices. Machines can be hazardous in the hands of an unfamiliar, untrained or complacent operator. Do not risk injury or death.
– After servicing, be sure all tools and servicing equipment have been removed from the machine.
– Be certain there is no one near the machine before starting.

– WARNING: Do not operate machine designed for 1000 RPM above 1000 RPM. Excessive speed of PTO can be dangerous.

– WARNING: Do not exceed recommended horsepower for this machine, excessive horsepower could be dangerous. 1000 RPM – 250 HP or less.

– CAUTION: Make sure drawbar is moved to one side. Do not leave drawbar in middle of your tractor as PTO damage may occur!

DURING OPERATION:

– Keep all shields in place.
– Allow no one to stand on the left side (discharge side) of the machine while it is in operation, whether it is moving or standing still.
– Do not allow anyone to ride on this equipment at any time.
– Keep clear of all moving parts.
– Remember soil may be thrown over 80 feet, rocks and other debris may go farther, so use extreme caution in any area with buildings or objects that could be damaged from the flying debris.
– Disengage the PTO and shut off the engine before servicing, cleaning, or clearing a clogged machine.
– Keep hands, feet and clothing away from all moving parts.

TRANSPORTATION

If you will be transporting your ditcher on a trailer, make sure the machine is safely secured. It may cause injury to yourself, others, or damage the machine if it is not securely tied down.

If you are transporting the ditcher behind a tractor it is important to make the machine as narrow as possible. To accomplish this, do the following:

(1) Retract the large cylinder fully. The inner arm will be as high as possible.
(2) Extend the small cylinder fully. The outer arm will be approximately vertical.

UNHITCHING FROM TRACTOR

Park on level ground far enough from obstacles that the arm and counterweight will not hit them.
Raise tractor's 3 point hitch, lifting front of ditcher 6-8 inches off ground.
Remove pins from parking stands lowering parking stands to 2-6 inches below skids of the main frame. Reinstall the pins to the nearest holes.
Gently lower the Ditcher until the parking stands are firmly supported on the ground.
Using the tractor's hydraulics position the outer arm in a vertical position, then lower the inner arm until the impeller (digging wheel) is firmly resting on the ground. NOTE: A wooden 4 X 4 under the drag plate will hold the impeller off the ground, allowing you to check for Free Movement before the next use (see page 5).
Release the hydraulic pressure from the hydraulic lines. NOTE: Some tractors require the engine to be turned off to release the pressure.
Proceed to disconnect the hydraulic lines.
Unhitch from tractor. See A or B below.
A) – If using a quick hitch, release and remove the PTO, release the pins, lower the quick hitch, and slowly pull forward.
B) – If not using a quick hitch, release and remove the PTO, release the clip pins, remove the lynch pins, and slowly pull forward.

USING YOUR HURRICANE DITCHER

Each customer will use this machine for different purposes and in slightly different ways. We cannot tell you the proper way to use your machine for your particular purpose, but, we can make recommendations for various uses.

Be aware of the impeller and the surroundings at all times. Watch for buildings and other structures in the path of the discharge side of the machine. Also, inspect the ground forward of the impeller for debris and wire fence or other dangers. Large stones can become extremely dangerous projectiles that can fly up to 150 feet. The manufacturer cannot be responsible for improper use including breaking-up and moving asphalt and heavy stone laden soil (max. 8 inch diameter or 12 pounds). Always use common sense and follow safety procedures.

CLEANING and MAINTAINING ROADSIDE DITCHES is the primary application of the Sidearm Ditcher. It is best to use this machine with the impeller as close to the center of the tractor and ditcher. The farther you reach with the machines' arms the more side draft will occur, thus resulting in a slower ground speed and less digging capacity.

The impeller may be operated at 8-10 inches deep and a forward travel of about 1 1/2 miles per hour.

BUILDING OR REWORKING A DRAINAGE DITCH – The ditcher throws soil and debris to the left side. When possible, it is more efficient if the soil is thrown to both sides of the ditch or waterway. To do this, make your first pass in the center of your ditch or waterway. After turning around make your second pass in the opposite direction just to the outside of your previous pass. If the ditch or waterway needs to be deeper start in the center again and work outward.

CHECKLIST BEFORE OPERATION

- Read and understand the operator's manual.
- Read all information on the safety decals on the machine.
- Check all bolts to make sure they are tight.
- Before connecting to tractor PTO and as general daily maintenance, check for free movement of driveline and/or slack in chain. See Free Movement of Driveline section, Page 5.
- Be sure the PTO is hooked up correctly and will not interfere with the drawbar on the tractor.
- Be sure the hitch is secure.
- Check the hydraulic oil reservoir level. See Lubrication section, Page 5.
- Lubricate machine. See Lubrication section, Page 5.
- WARNING: Do not operate machine designed for 1000 RPM above 1000 RPM. Excessive speed of PTO can be dangerous.
- WARNING: Do not exceed recommended horsepower for this machine, excessive horsepower could be dangerous. 1000 RPM – 250 HP or less.

OPERATING INSTRUCTIONS

- Observe all tractor related safety precautions.
- Keep all shields in place.
- Keep hands, feet and clothing away from all moving parts.
- Be sure to operate at the correct RPM. WARNING: Do not operate this machine designed for 1000 RPM above 1000 RPM. Excessive speed of PTO can be dangerous.
- Do not allow anyone to ride on this equipment at any time.
- Learn to operate this machine safely. Be alert, observe all safety practices. Machines can be hazardous in the hands of an unfamiliar, untrained or complacent operator. Do not risk injury or death.
- Allow no one to stand on the left side (discharge side) of the machine while the tractor is running, whether it is moving or standing still.
- Disengage PTO and shut off the engine before servicing, cleaning, or clearing a clogged machine.
- When the machine is in operation, keep in mind that soil, roots, rocks, and other debris may be thrown 80 feet or more out the discharge side causing damage to an object or harm to a person within its range.
- NOTE: You may need to use rubber straps to secure hoses at some location on the tractor to keep them from getting into the PTO. You may also adjust the slack in hose at the hose bracket (DO NOT adjust it too tight).
- Be sure to keep the slip shaft portion of the PTO shaft well lubricated. See Daily Lubrication section, Page 5.
- Do not engage PTO when tractor is running at high RPM. Slow RPM to idle, engage PTO, then throttle up.
- Shear bolts: Shear bolts are designed to break under a specific load.

WARNING: Do not use a stronger bolt than is specified by manufacturer.

A) – The impeller has two (2) shear bolts near the center of the impeller wheel. See page 17&18 item D10. If a rock or other object is fed into the impeller, these bolts may shear causing the impeller to stop rotating. When this happens, stop forward movement, stop the PTO, shut off the tractor engine, and replace the sheared bolts.

B) – There are two (2) shear bolts in the PTO shaft. See page 11–12 item #A4. If these bolts shear, stop tractor, disengage PTO, and turn off tractor engine before replacing bolts.

- In normal conditions, when mud or trash become a problem, stop forward travel and allow the machine to clear itself before moving ahead.
- WARNING: Do not operate machine designed for 1000 RPM above 1000 RPM. Excessive speed of PTO can be dangerous.
- WARNING: Do not exceed recommended horsepower for this machine, excessive horsepower could be dangerous. 1000 RPM – 250 HP or less.

FREE MOVEMENT OF DRIVELINE

When adjusted properly and operating correctly the driveline should move freely, by hand, with no slack in chain.

⚠ WARNING: Operation of improperly adjusted machine will cause damage to this machine and possibly your tractor.

To check for free movement of driveline and proper tension on chain.
Step 1 – Grasp the front PTO yoke, quickly rock it back and forth, if the PTO moves before the impeller turns, the chain requires tightening. See Idler Adjustment section (page 7).
Step 2 – If the impeller is difficult to move check that debris is not lodged in the machine, remove the interfering debris and return to step 1, if no interferences are found continue to step 3.
Step 3 – Release chain tension until impeller and PTO turn freely. See Idler Adjustment section (page 7). Adjust as needed and return to step 1, if free movement has not been restored continue to step 4.
Step 4 – Remove the inspection plate on the rear of the gear box and carefully inspect bearings, sprockets, chain and idler for damage. Perform this on both gearboxes. Use a quality grade silicone sealant behind the bearings and under the inspection plates.

LUBRICATION

The Model LSA-42 Ditcher has 47 grease fittings. Refer to the illustration on page 6 for the location of these fittings and read carefully the information on lubricating those areas. NOTE: Damage may occur due to lack of lubrication.

A – DAILY (before each use) – Approximately 6-8 hours
1. Check your tractor's hydraulic oil reservoir level. See Hydraulic Oil Reservoir Level (*).
2. Grease the following with gun grease:
   a – The slip joint between PTO halves (remove from tractor, separate halves, apply grease, spread on full length of the splined shaft, reassemble). NOTE: While disconnected from tractor check for free movement of driveline (see Free Movement of Driveline, page 5).
   b – The two (2) universal joints at the ends of each PTO halves. Slowly apply grease as to not overgrease and blow out seals.
   c – The 24 grease fittings located on the 3 pivot rings. Apply grease it is full and visibly exiting the joints.
   d – The 8 grease fittings located on the 4 hydraulic cylinder ends. Also, the 1 end of the leverage link. Apply grease until full and visibly exiting the joints.

B – 24 HOURS OF OPERATION
1 – Check the enclosed gear box oil level of both arms. See Gearbox Oil Level (**).

C – 60-80 HOURS or once WEEKLY
1 – Six (6) flange bearings on the gearboxes – gun grease 1 pump each. Slowly apply grease as to not overgrease and blow out seals.
2 – One grease fitting located in hub of impeller – gun grease 1 or 2 pumps.

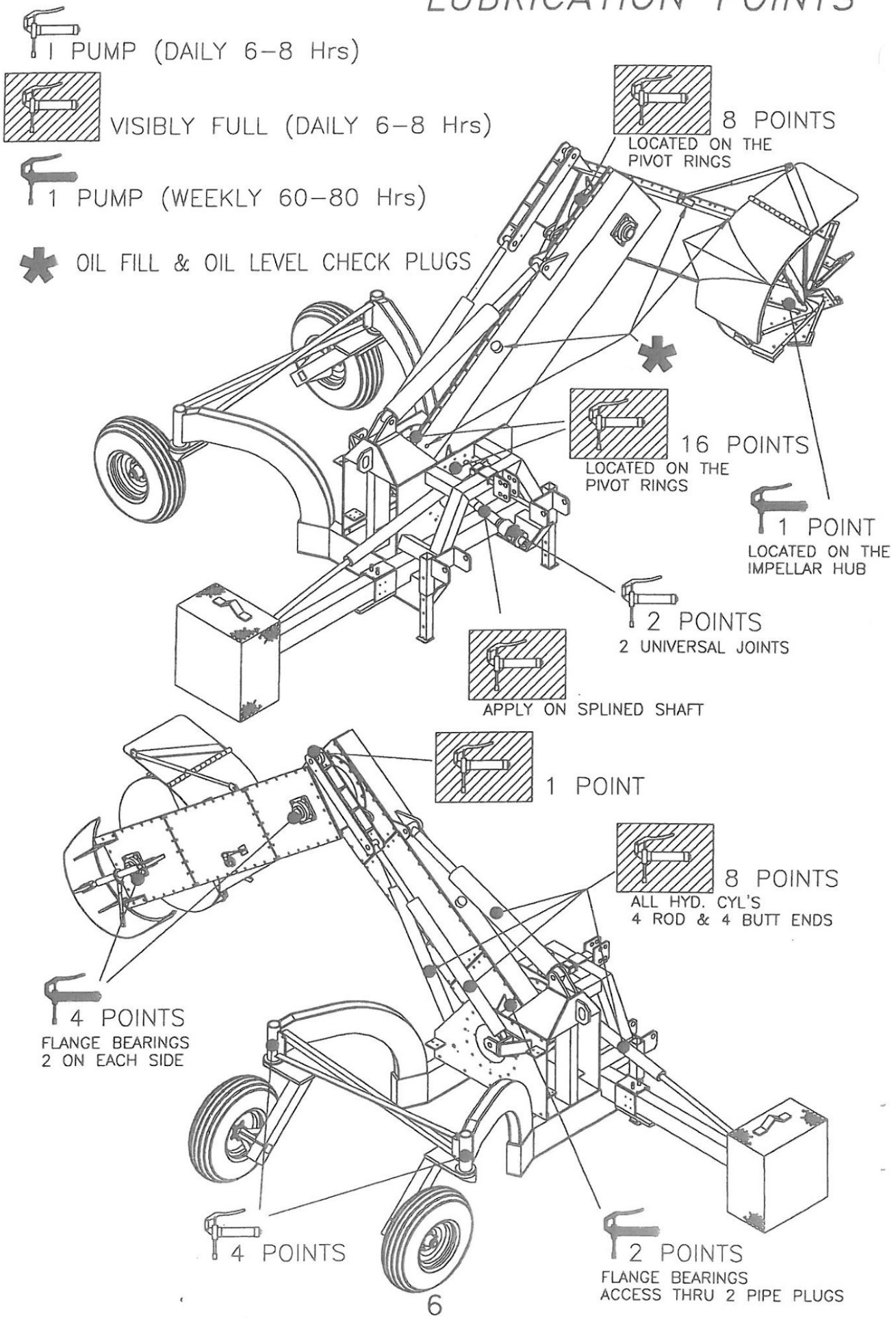
D – 100 HOURS OF OPERATION
1 – Remove the inspection plate on the rear of the gear box, check for wear on chain, sprockets, idler, and adjust the idler assembly as required. Perform this on both gearboxes. Use a quality grade silicone sealant behind the bearings and under the inspection plates. See Idler Adjustment section, page 7.

* – Hydraulic Oil Reservoir Level (of tractor).
If system is completely empty the machine will require approximately 2 1/2 gallons of oil. Use any quality hydraulic oil of your choice.

** – Gearbox Oil Level
With the arms (gearboxes) in their most vertical position; remove the oil level check plug (on high side of gearboxes about 12 inches above the low ends of the gearboxes, if oil begins to run heavily, it is too full. Allow the flow to slow, and replace plug. If there is no flow, the oil level is low. Remove the oil fill plug and fill to the oil level check plug. The factory installed oil is INCA 1000. The factory reccomends the use of INCA 1000 when refilling. Approx. 18 gallons.

HURRICANE
DITCHER CO., INC.

Model LSA-42' SIDEARM DITCHER
LUBRICATION POINTS



MAINTENANCE

Storage – If you are not going to use your machine for a period of time.
1. Paint the areas where the soil has worn off the paint (i.e. hardened cutter blades, impeller wheel, inside the deflector). Factory color is School Bus Yellow.
2. You should also apply a thin coat of grease to the exposed hydraulic cylinder rods to prevent rusting and corrosion.
3. Storing inside and/or covering with a tarp will extend life.

As a part of daily lubrication maintenance (approximately every 10 hours of use), disconnect from tractor and check for the free movement of drive train (see page 5) and proper chain tension (see Idler Adjustment, page 7).

When hardened cutter blades wear – If slightly worn, weld with a hard surfacing rod on each paddle to build them back up. Use a welding rod that is equal to a 60RC Rockwell hardness. The hardened wear plates on each paddle may also be replaced (check with your dealer or the manufacturer).

NOTE: Be sure to add the same amount of material to each paddle to keep the impeller assembly in balance.

The paddles should never be worn past the diameter of the impeller wheel. Replace paddles when worn flush with the impeller wheel.

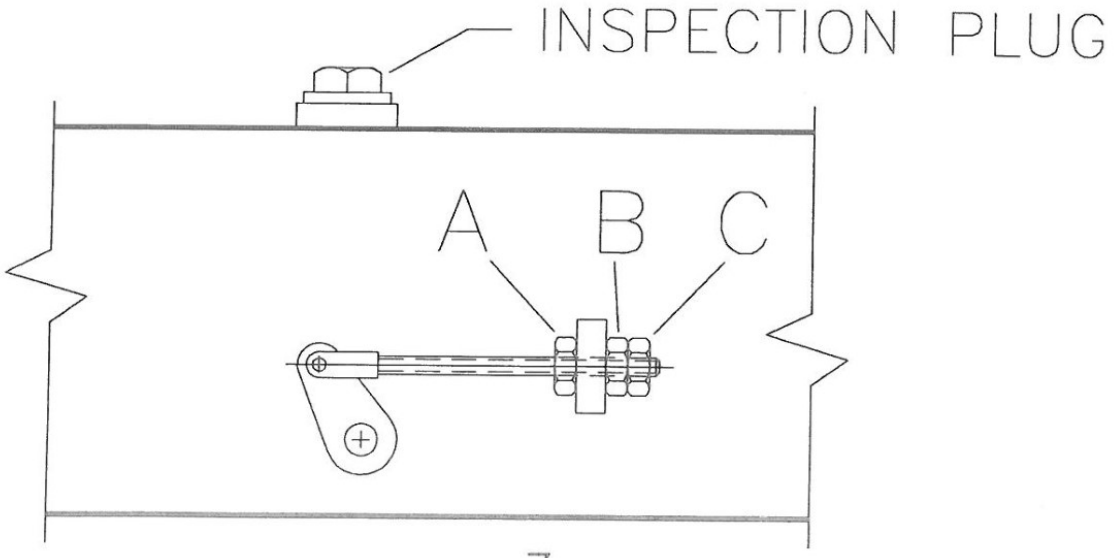
If any component of your ditcher appears to be worn and needs replacement please call our office or contact your dealer for replacement parts.

IDLER ADJUSTMENT

Remove the inspection plug. Visually inspect the U.H.M.W. plastic wear pad for wear or damage. Replace if needed. The idler adjustment assembly has one (1) bolt and three (3) nuts, see illustration. The nuts holds the idler assembly against the chain, and act as a jam nut to lock the idler assembly in the set position.

Chain needs MORE tension
–Loosen nuts A & C.
–Tighten nut B to remove any slack and apply slight tension on chain.
–Tighten nuts A & C to secure the assembly.

Chain needs LESS tension
–Loosen nuts A & C.
–Loosen nut B until chain is too loose.
–Tighten nut B to remove any slack and apply slight tension on chain.
–Tighten nuts A & C to secure the assembly.



MACHINE IMPROVEMENTS

Hurricane Ditcher Co., Inc. reserves the right to change or modify future models of this machine without obligation to owners of earlier models.

LIMITED WARRANTY

For a period of one year from date of purchase Hurricane Ditcher Co. Inc., warrants each new product, to be free from defects in materials and/or workmanship under normal use for which it was intended. Hurricane Ditcher's obligation under this warranty is limited to repairing or replacing F.O.B. factory, any part or parts which are reported in writing, giving all details by owner or dealer within 30 days from date of failure thereof, and which Hurricane Ditcher's inspection shall disclose to have been defective. In no event will Hurricane Ditcher assume any responsibility for consequential damages to tractor or any other equipment. Hurricane Ditcher shall not be liable for any damages of any nature or source resulting from defects in materials or workmanship and/or loss of use of said equipment. Hurricane Ditcher makes no warranty on allied parts which are not manufactured by Hurricane Ditcher.

The warranty set forth herein shall be void if any part or parts not manufactured or supplied by Hurricane Ditcher, are used in the assembly or repair of implement manufactured by Hurricane Ditcher. This warranty is void if equipment is improperly assembled, modified, altered, cut up, rewelded, or used for other purpose not intended for. To enhance warranty, replace decals when worn, destroyed, removed, or as needed.

⚠ CAUTION

Read the Operator's Manual.
Learn to operate this machine SAFELY.
Be alert. Observe ALL Safety Practices.
Machines can be hazardous in the hands of an UNFAMILIAR, UNTRAINED, or COMPLACENT operator.
Do not risk INJURY or DEATH!

GENERAL ASSEMBLY

ASSEMBLIES

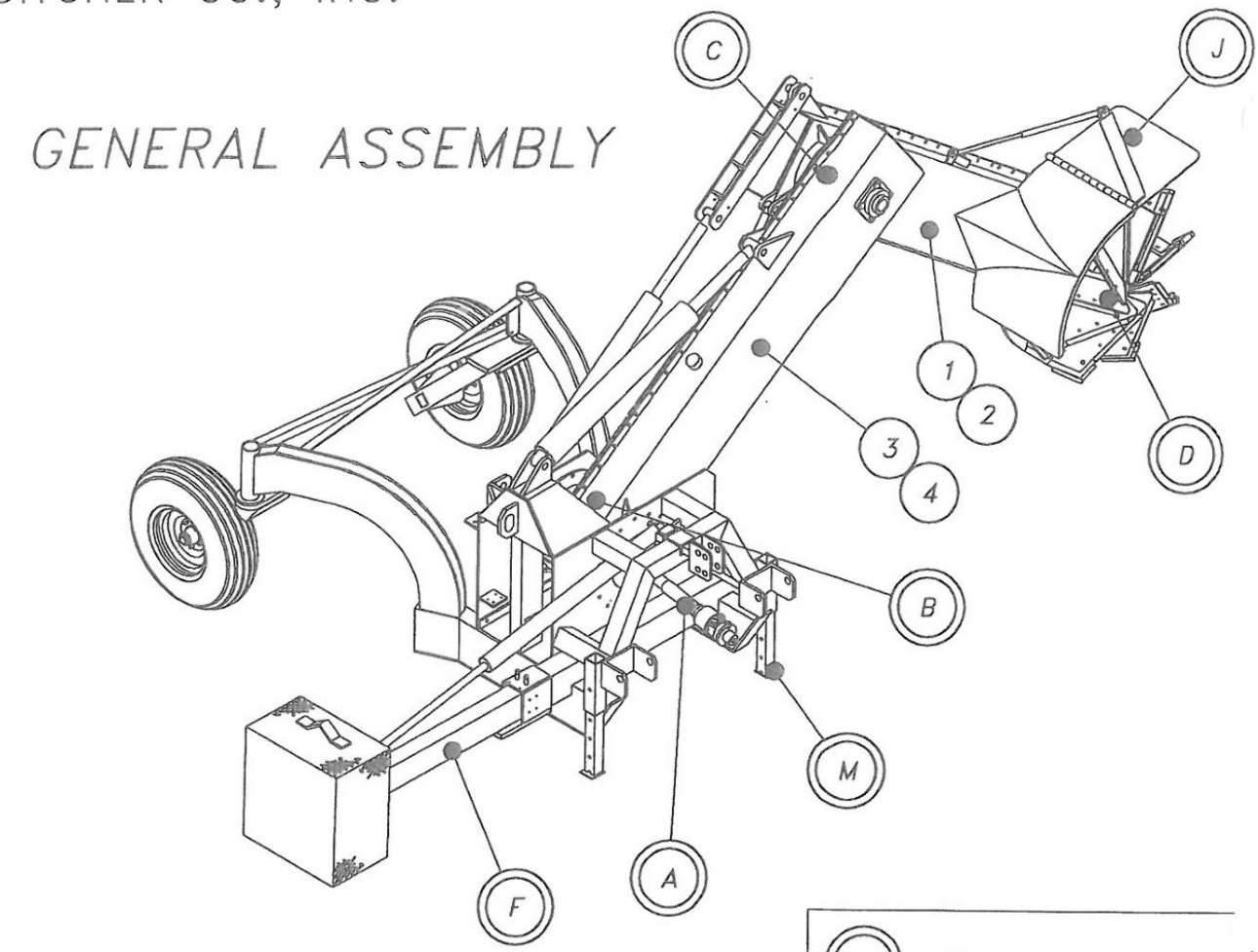
ITEM	DESCRIPTION	QTY	PAGE No.
A	PTO SHAFT ASSEMBLY	1	11 & 12
B	PTO / FRAME JOINT ASSEMBLY	1	13 & 14
C	PIVOT JOINT ASSEMBLY	1	15 & 16
D	IMPELLER ASSEMBLY	1	17 & 18
E	CHAIN TENSIONING ASSEMBLY (IDLER)	2	19 & 20
F	COUNTER WEIGHT ASSEMBLY	1	21 & 22
G	CRAZY WHEEL ASSEMBLY	2	23 & 24
H	DRAGPLATE ASSEMBLY	1	25
J	DEFLECTOR ASSEMBLY	1	26
K	ARM CONTROL HYD. SYSTEM & MECH. ASSEMBLY	1	27 & 28
L	COUNTER WEIGHT HYD. SYSTEM & MECH. ASSEMBLY	1	29 & 30
M	PARKING STAND ASSEMBLY	2	31

COMPONENTS

ITEM	DESCRIPTION	QTY
1	OUTER GEARBOX WELDMENT (OUTER ARM)	1
2	208 LINKS OF No.80 TRIPLE STRAND ROLLER CHAIN	1
3	INNER GEARBOX WELDMENT (INNER ARM)	1
4	206 LINKS OF No.80 DOUBLE STRAND ROLLER CHAIN	1
5	MAIN FRAME WELDMENT	1

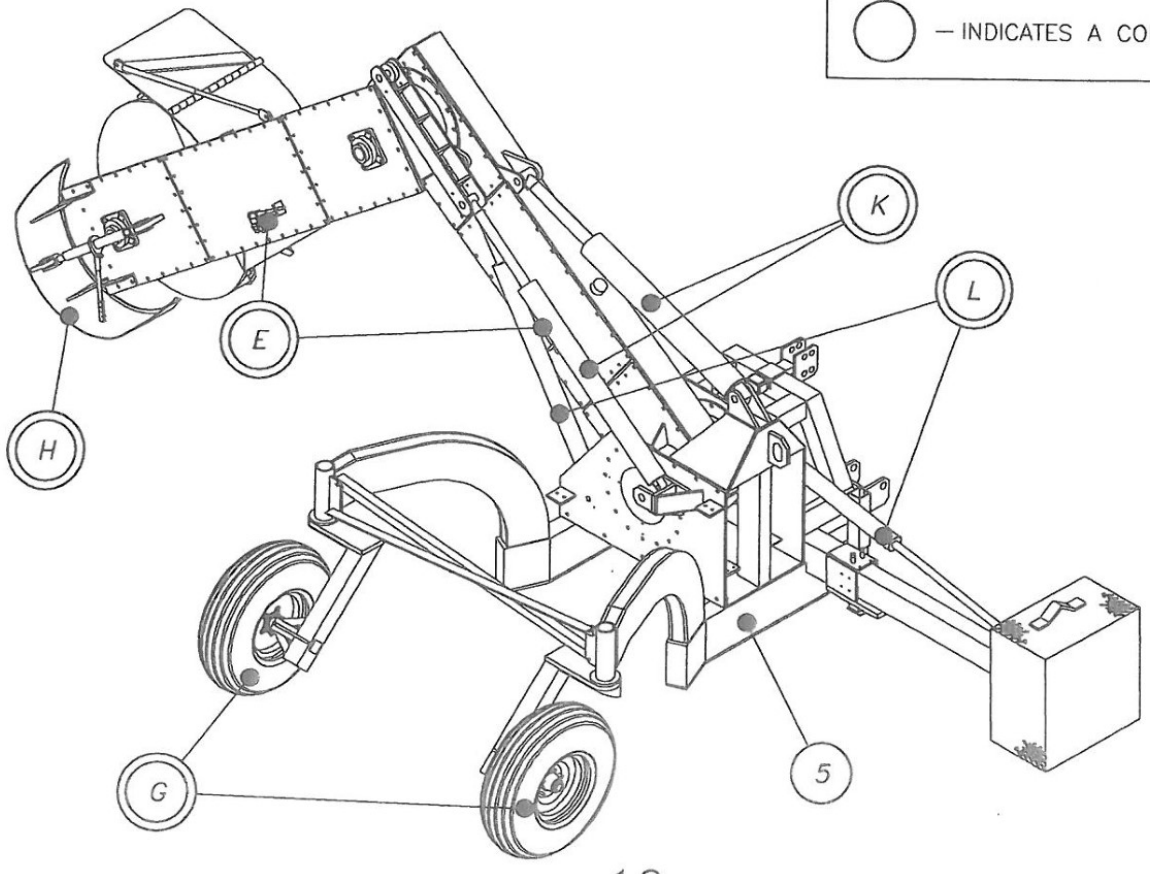
Model LSA-42 SIDEARM DITCHER

GENERAL ASSEMBLY



— INDICATES AN ASSEMBLY

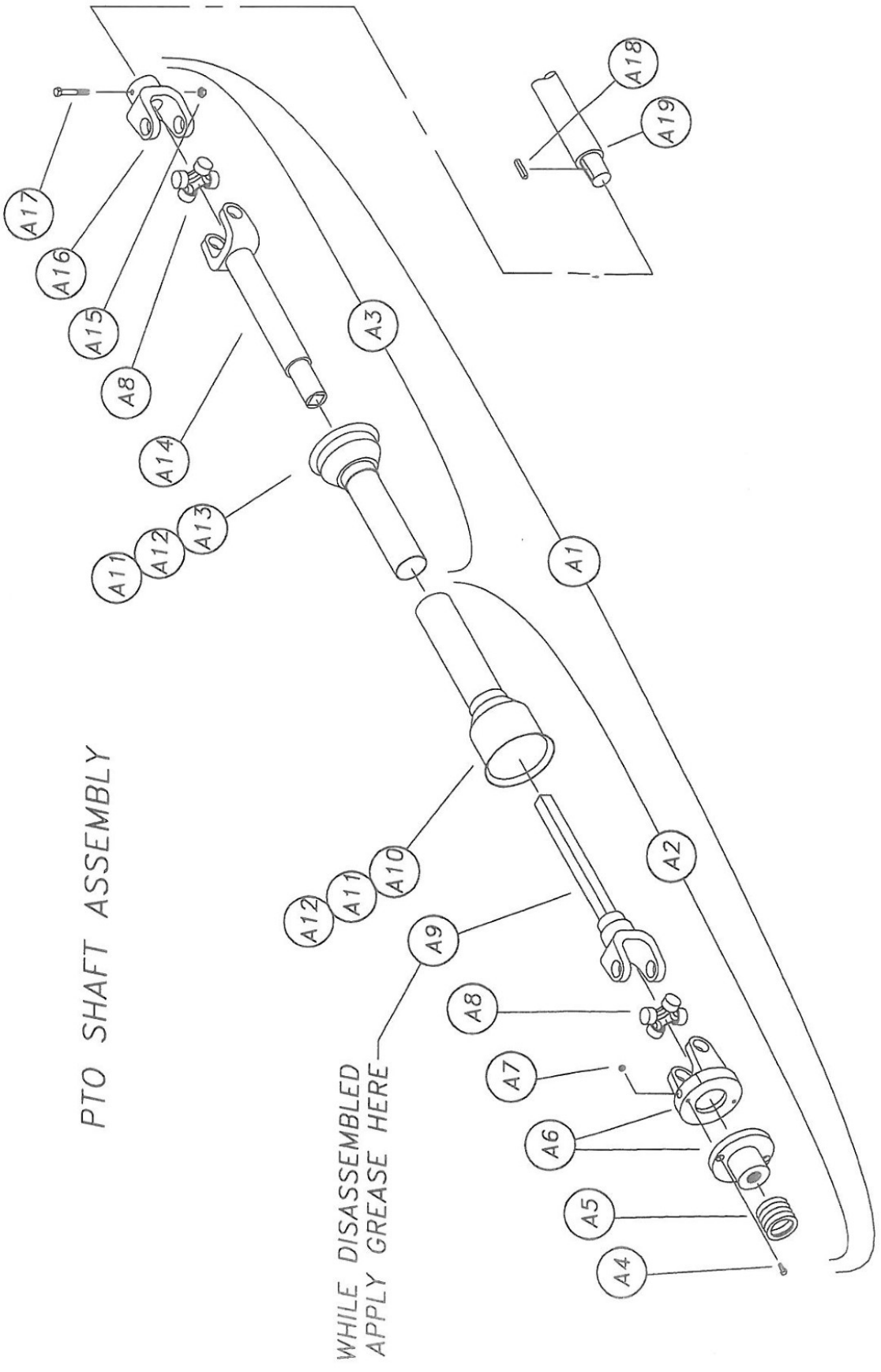
— INDICATES A COMPONENT



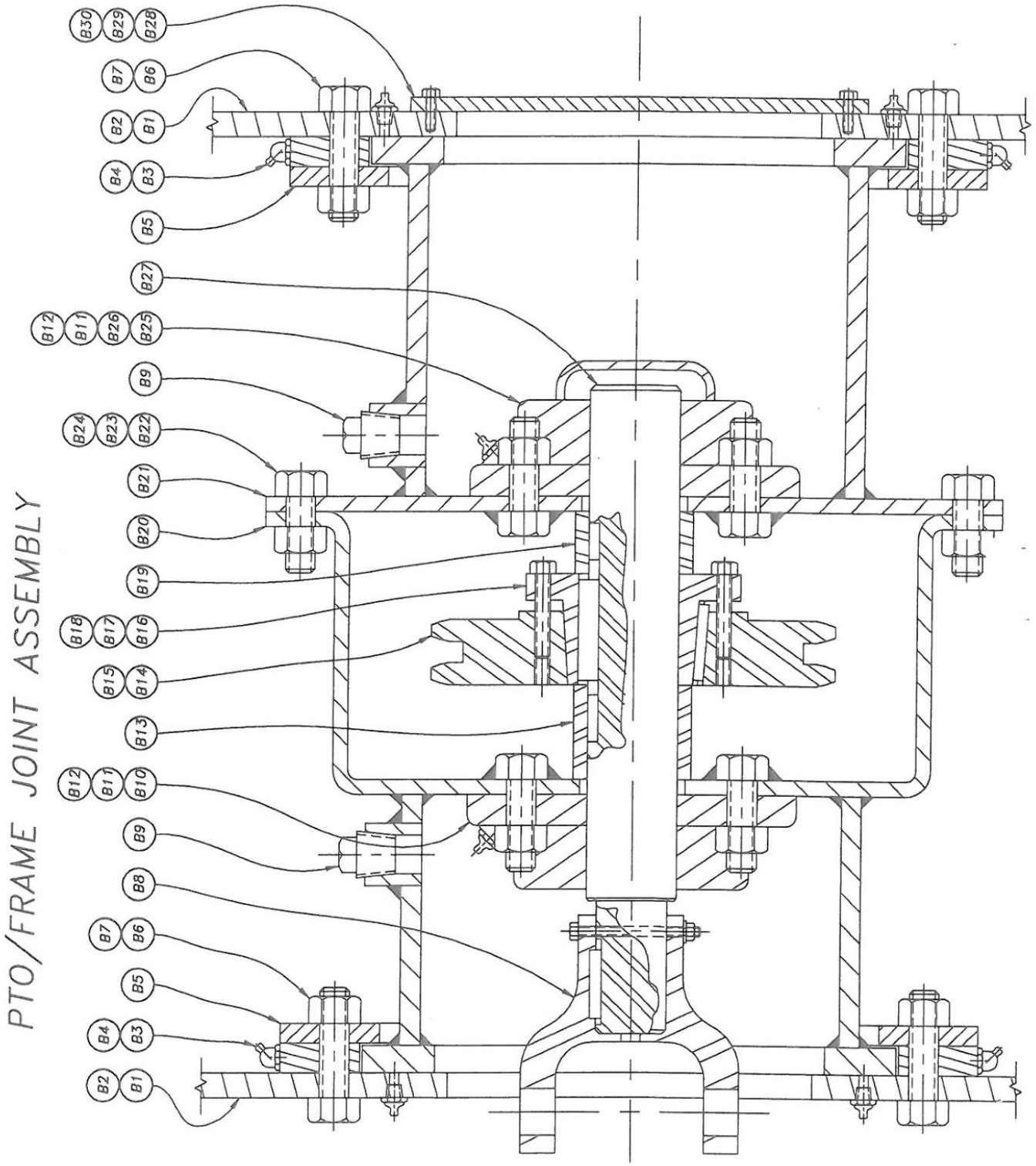
PTO SHAFT ASSEMBLY

ITEM	DESCRIPTION	QTY
A1	PTO SHAFT COMPLETE (INCLUDES ITEMS A4 THRU A17)	1
A2	PTO SHAFT FRONT HALF (INCLUDES ITEMS A4 THRU A12)	1
A3	PTO SHAFT REAR HALF (INCLUDES ITEMS A8 & L11 THRU A17)	1
A4	SHEAR BOLT (ø3/8-16UNC X 1 HHCS Gr.5)	2
A5	PTO SAFETY SLIDE LOCK ASS'Y (INCLUDES: COLLAR, SPRING, EARS, & BALLS)	1
A6	SHEAR YOKE ASS'Y ø1 3/4 20 SPLINE	1
A7	ø3/8-16UNC HEX LOCK NUT	2
A8	UNIVERSAL JOINT 1 3/4 55 SERIES	2
A9	YOKE AND SHAFT	1
A10	PTO COVER (FRONT HALF)	1
A11	PLASTIC RETAINING RING (NOT SHOWN)	2
A12	STEEL SNAP RING (NOT SHOWN)	2
A13	PTO COVER (REAR HALF)	1
A14	YOKE, TUBE, AND SLIP SLEEVE	1
A15	ø3/8-16UNC HEX LOCK NUT	1
A16	YOKE 1 3/4 KEYED	1
A17	ø3/8-16UNC X 3 1/2 HHCS Gr.8	1
A18	SQUARE KEY 3/8 X 2	1
A19	PTO SHAFT (SEE PTO/FRAME JOINT ASSEMBLY)	-

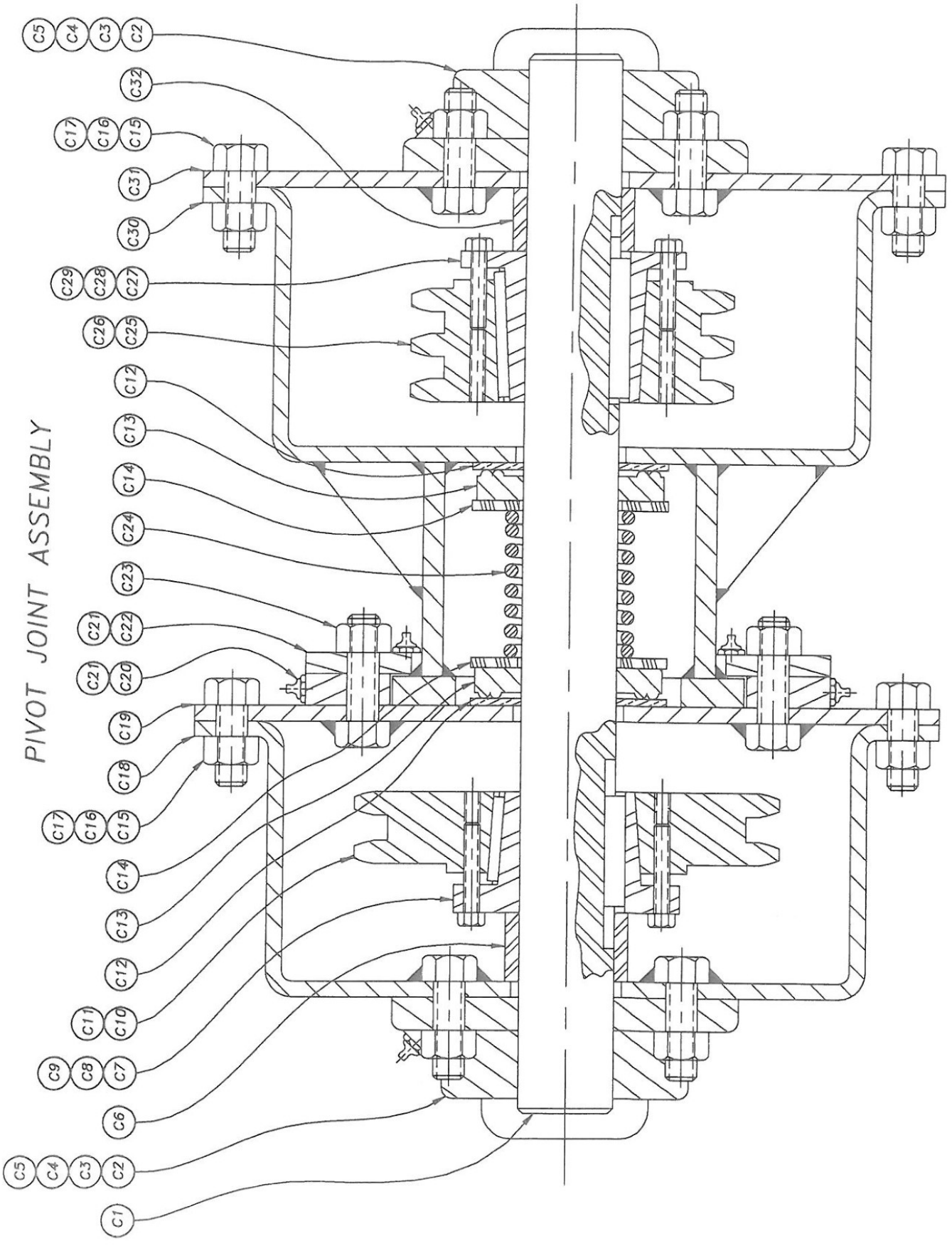
Model LSA-42 SIDEARM DITCHER



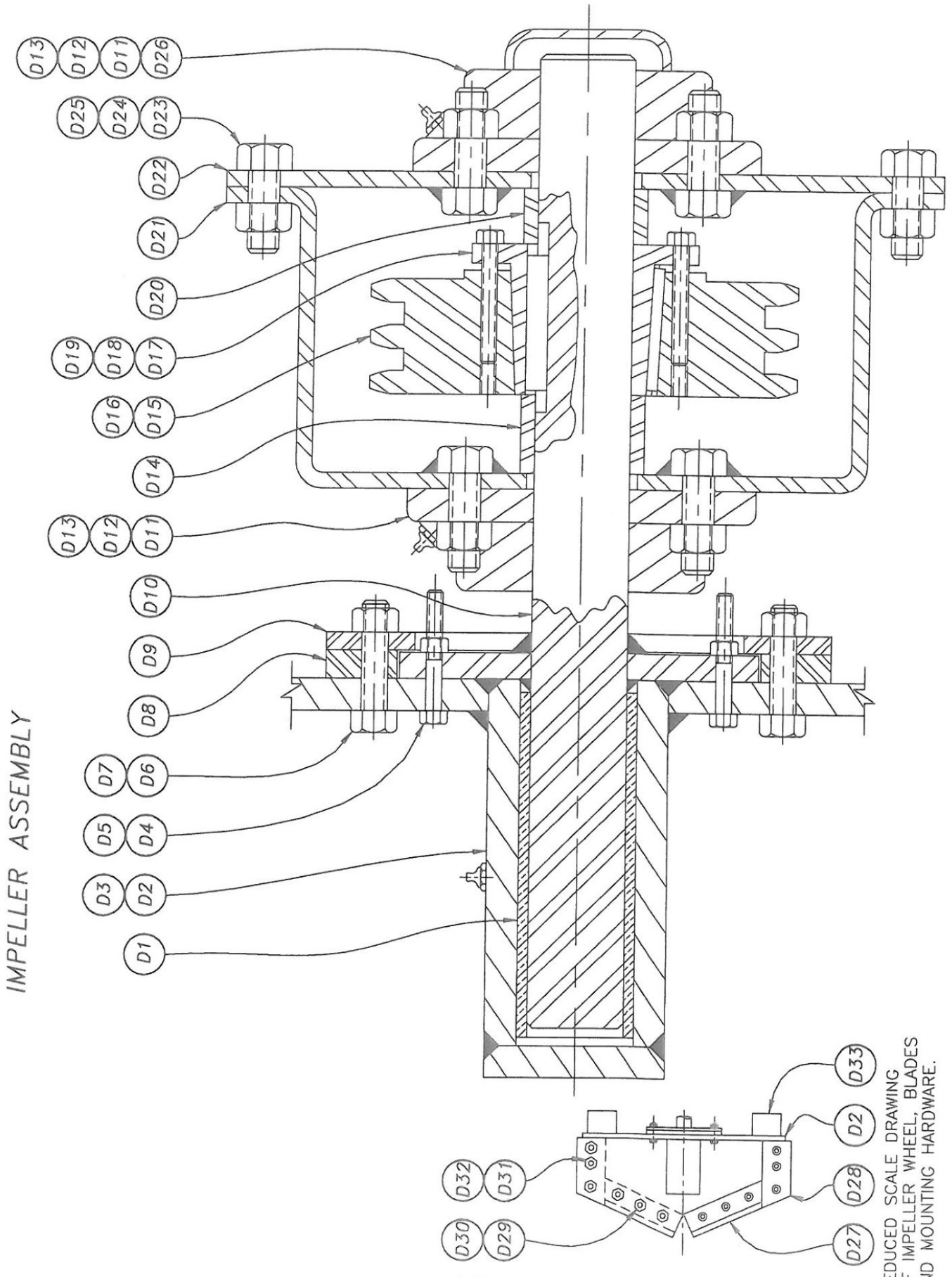
PTO/FRAME JOINT ASSEMBLY		
ITEM	DESCRIPTION	QTY
B1	MAIN FRAME WELDMENT	1
B2	ø1/8-27NPT GREASE FITTING STRAIGHT	8
B3	ø1/8-27NPT GREASE FITTING 45 DEGREE	8
B4	RETAINING RING	1
B5	CLASP RING (PART OF ITEM B20)	-
B6	ø5/8-18UNF X 3 HHCS Gr.8	24
B7	ø5/8-18UNF HEX NUT	24
B8	PTO YOKE, NUT, BOLT & KEY (SEE PTO SHAFT ASSEMBLY)	-
B9	ø1-11 1/2NPT PIPE PLUG	2
B10	FLANGE BEARING w/ SILICONE SEALANT	1
B11	ø5/8-18UNF HEX NUT (BOLTS ARE PART OF ITEM B20)	8
B12	STRAIGHT GREASE FITTING	2
B13	SPACER TUBE (LONG)	1
B14	25 TOOTH, No. 80 DOUBLE ROLLER CHAIN SPROCKET	1
B15	RECTANGULAR KEY (SPROCKET TO HUB)	1
B16	R1 TAPER LOCK HUB (MAY INCLUDE ITEM B18)	1
B17	ø3/8-16UNC X 1 1/4 HHCS	3
B18	RECTANGULAR KEY (HUB TO SHAFT)	1
B19	SPACER TUBE (SHORT)	1
B20	INNER GEARBOX WELDMENT (SEE PAGE 9&10)	-
B21	COVER PLATE (PTO END) w/ SILICONE SEALANT	1
B22	ø5/8-18UNF X 1 1/2 HHCS Gr.8	17
B23	ø5/8-18UNF HEX LOCK NUT	14
B24	ø1/2-20UNF X 1 HHCS Gr.8	4
B25	FLANGE BEARING w/ SILICONE SEALANT	1
B26	BEARING CAP	1
B27	PTO SHAFT	1
B28	REAR BEARING ACCESS COVER	1
B29	ø3/8-16UNC X 1" HHCS Gr.5	4
B30	ø3/8 SPLIT LOCK WASHER	4


PTO/FRAME JOINT ASSEMBLY
B30 B29 B28
B7 B6
B2 B1
B4 B3
B5
B27
B12 B11 B26 B25
B9
B24 B23 B22
B21
B20
B19
B18 B17 B16
B15 B14
B13
B12 B11 B10
B9
B8
B7 B6
B5
B4 B3
B2 B1

PIVOT JOINT ASSEMBLY		
ITEM	DESCRIPTION	QTY
C1	PIVOT SHAFT	1
C2	FLANGE BEARING w/ SILICONE SEALANT	2
C3	BEARING DUST CAP	2
C4	GREASE FITTING	2
C5	ø5/8-18UNF HEX LOCK NUT (BOLTS PART OF ITEMS C18 & C31)	8
C6	SPACER TUBE	1
C7	R2 TAPER LOCK HUB (MAY INCLUDE ITEM C11)	1
C8	ø3/8-16UNC X 1 1/4 HHCS Gr.8	3
C9	RECTANGULAR KEY (HUB TO SHAFT)	1
C10	48 TOOTH, No. 80 DOUBLE ROLLER CHAIN SPROCKET	1
C11	RECTANGULAR KEY (SPROCKET TO HUB)	1
C12	NEOPRENE SEALING WASHER (SOFT SEAL)	2
C13	NEOPRENE SEAL (HARD SEAL)	2
C14	U.H.M.W. WEAR WASHER	2
C15	ø5/8-18UNC X 1 1/2 HHCS Gr.8	28
C16	ø5/8-18UNC HEX LOCK NUT	28
C17	ø1/2-20UNC X 1 HHCS Gr.8	16
C18	INNER GEARBOX WELDMENT (SEE PAGE 9&10)	–
C19	COVER PLATE (INNER GEARBOX) w/ SILICONE SEALANT	1
C20	RETAINING RING	1
C21	ø1/8-27NPT GREASE FITTING STRAIGHT	8
C22	CLASP RING (PART OF ITEM C30)	–
C23	ø5/8-18UNF HEX LOCK NUT (BOLTS ARE PART OF ITEM C19)	16
C24	COMPRESSION SPRING	1
C25	25 TOOTH, No. 80 TRIPLE ROLLER CHAIN SPROCKET	1
C26	RECTANGULAR KEY (SPROCKET TO HUB)	1
C27	R1 TAPER LOCK HUB (MAY INCLUDE ITEM C26)	1
C28	ø3/8-16UNC X 1 3/4 HHCS Gr.8	3
C29	RECTANGULAR KEY (HUB TO SHAFT)	1
C30	OUTER GEARBOX WELDMENT (SEE PAGE 9&10)	–
C31	COVER PLATE (OUTER GEARBOX) w/ SILICONE SEALANT	1
C32	SPACER TUBE	1


PIVOT JOINT ASSEMBLY
C5 C4 C3 C2
C32
C17 C16 C15
C31
C30
C29 C28 C27
C26 C25
C12
C13
C14
C24
C23
C21 C22
C21 C20
C19
C18
C17 C16 C15
C14
C13
C12
C11 C10
C9 C8 C7
C6
C5 C4 C3 C2
C1

IMPELLER ASSEMBLY		
ITEM	DESCRIPTION	QTY
D1	BRONZE BUSHING	1
D2	IMPELLER WELDMENT	1
D3	STRAIGHT GREASE FITTING	1
D4	ø1/2-13UNC X 2 1/2 HHCS Gr.5 (SHEAR BOLT)	2
D5	ø1/2-13UNC HEX LOCK NUT	2
D6	ø5/8-18UNF X 2 1/2 HHCS Gr.8	9
D7	ø5/8-18UNF HEX LOCK NUT	9
D8	RETAINER RING	1
D9	CLASP RING	-
D10	IMPELLER SHAFT & SHEAR HUB WELDMENT	1
D11	FLANGE BEARING w/ SILICONE SEALANT	1
D12	GREASE FITTING	2
D13	ø5/8-18UNF HEX LOCK NUT (BOLTS ARE PART OF ITEM D27 & D28)	8
D14	SPACER TUBE (LONG)	1
D15	45 TOOTH, No. 80 TRIPLE ROLLER CHAIN SPROCKET	1
D16	RECTANGULAR KEY (SPROCKET TO HUB)	1
D17	S1 TAPER LOCK HUB (MAY INCLUDE ITEM D22)	1
D18	3/8-16UNC X 1 3/4 HHCS Gr.8	3
D19	RECTANGULAR KEY (HUB TO SHAFT)	1
D20	SPACER TUBE (SHORT)	1
D21	OUTER GEARBOX WELDMENT (SEE PAGE 9&10)	-
D22	GEARBOX COVER PLATE w/ SILICONE SEALANT	1
D23	ø5/8-18UNF X 1 1/2 HHCS Gr.8	14
D24	ø5/8-18UNF HEX LOCK NUT	14
D25	ø1/2-20UNF X 1 HHCS Gr.8	4
D26	FLANGE BEARING	1
D27	FRONT CUTTER BLADE	9
D28	HARDENED OUTER PADDLE	9
D29	ø1/2-13UNC X 1 1/2 FHCS	27
D30	ø1/2-13UNC HEX LOCK NUT	27
D31	ø5/8-11UNC X 1 1/2 FHCS	27
D32	ø5/8-11UNC HEX LOCK NUT	27
D33	CATTAIL CUTTER (5/8 X 4 X 9 H.R.S. w/ 5/8 X 4 GUSSET)	2


D13
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D5
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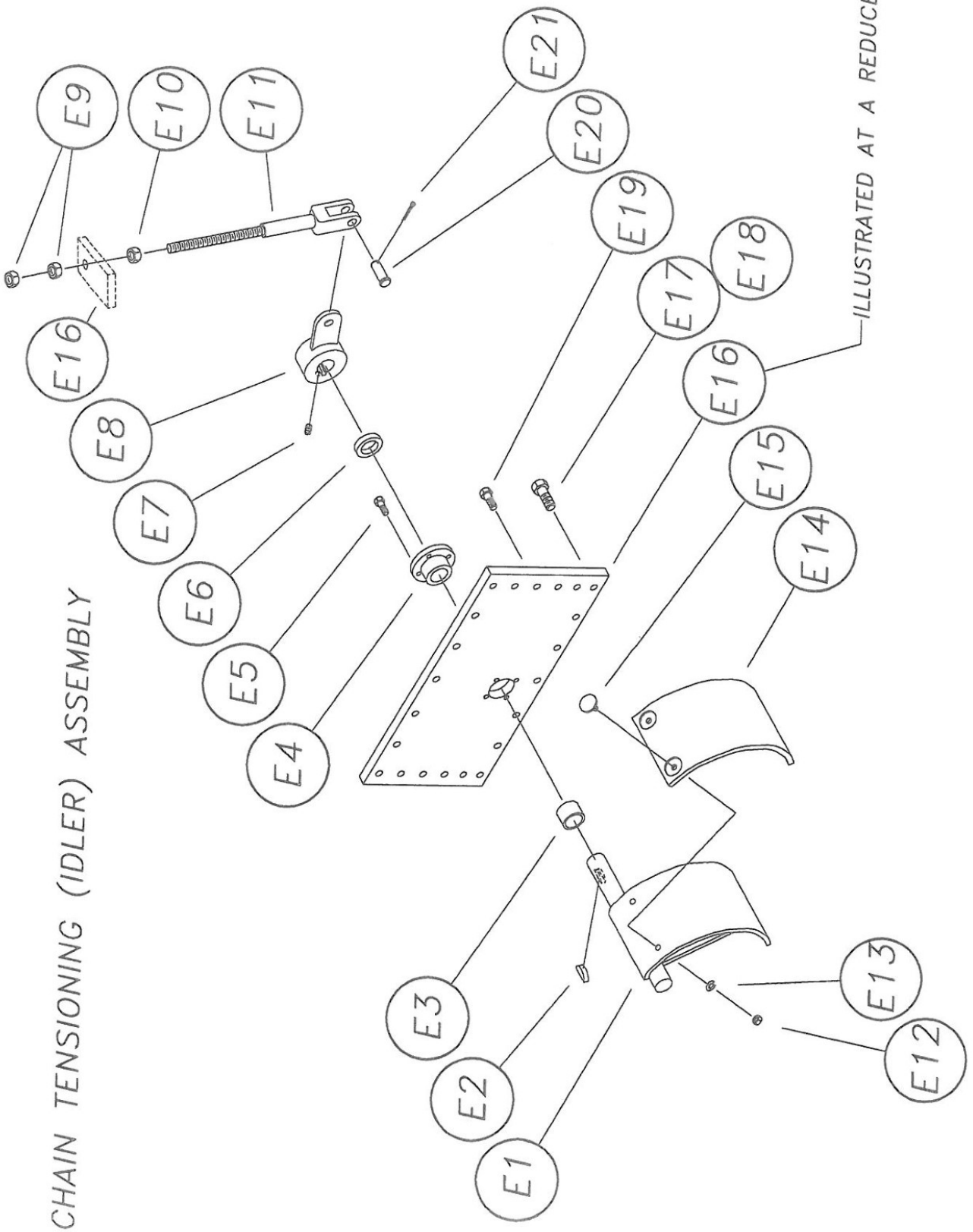
D3
D2
D1
IMPELLER ASSEMBLY
D33
D2
D28
D27
D32
D31
D30
D29
REDUCED SCALE DRAWING
OF IMPELLER WHEEL, BLADES
AND MOUNTING HARDWARE.

CHAIN TENSIONING (IDLER) ASSEMBLY		
ITEM	DESCRIPTION	QTY
E1	IDLER WELDMENT	1
E2	WOODRUFF KEY #608	1
E3	SPACER 1 I.D. X 3/8 APPROX.	1
E4	BUSHING ø1 w/ SILICONE SEALANT	1
E5	ø5/16-18UNC X 1 1/2 HHCS Gr.8	4
E6	OIL SEAL ø1	1
E7	ø3/8-16UNC X 1/2 SSS CUP POINT	1
E8	IDLER ARM	1
E9	ø5/8-11UNC HEX NUT	2
E10	ø5/8-11UNC HEX LOCK NUT	1
E11	IDLER ADJUSTING YOKE	1
E12	ø1/4-20UNC HEX NUT	4
E13	ø1/4 SPLIT LOCK WASHER	4
E14	U.H.M.W. PAD	1
E15	ø1/4-20UNC X 1 ELEVATOR BUCKET BOLT	4
E16	COVER/INSPECTION PLATE (MIDDLE) w/ SILICONE SEALANT	1
E17	ø5/8-18UNF X 1 1/2 HHCS Gr.8	14
E18	ø5/8-18UNF HEX LOCK NUT	14
E19	ø1/2-20UNF X 1 HHCS Gr.8	8
E20	CLEVIS PIN ø1/2 X 1 1/2	1
E21	COTTER PIN ø1/8 X 3/4	1
E22	REBUILD KIT (INCLUDES ITEMS E6, E12, E13, E14, AND E15)	1



CHAIN TENSIONING (IDLER) ASSEMBLY

COUNTER WEIGHT ASSEMBLY		
ITEM	DESCRIPTION	QTY
F1	COUNTER WIEGHT WELDMENT	1
F2	U.H.M.W. WEAR PLATE	1
F3	ø1/4-20UNC X 1 ELEVATOR BUCKET BOLT	18
F4	ø1/4 SPLIT LOCK WASHER	18
F5	ø1/4-20UNC HEX NUT	18
F6	U.H.M.W. WEAR PLATE	1
F7	ø5/16-18UNC X 1/2 HHCS Gr.8	2
F8	ø5/16 SPLIT LOCK WASHER	2
F9	RETAINING ANGLE	1
F10	U.H.M.W. WEAR PLATE	1
F11	U.H.M.W. WEAR PLATE	1
F12	U.H.M.W. WEAR PLATE	1
F13	ø1-11 1/2NPT PIPE CAP	2
F14	ø3/4 X 1 7/8 COMPRESSION SPRING	2
F15	ø5/16 X 1 1/2 RIVET	2
F16	MAIN FRAME WELDMENT (SEE PAGES 9 & 10)	-
F17	END CAP	1
F18	ø1/2 SPLIT LOCK WASHER	2
F19	ø1/2-13UNC X 3/4 HHCS Gr.8	2

HURRICANE
DITCHER CO., INC.

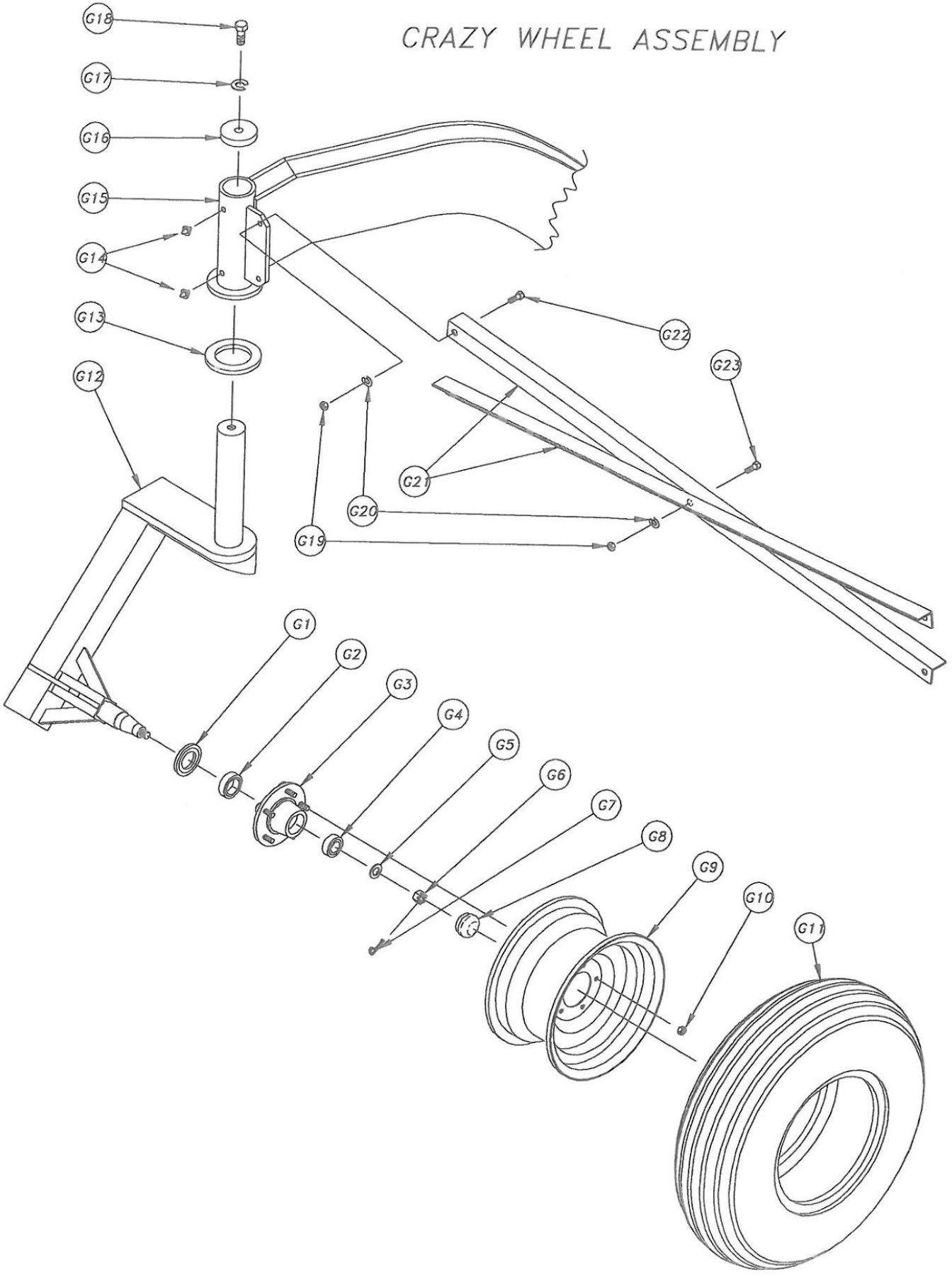
Model LSA-42' SIDEARM DITCHER

COUNTER WEIGHT ASSEMBLY

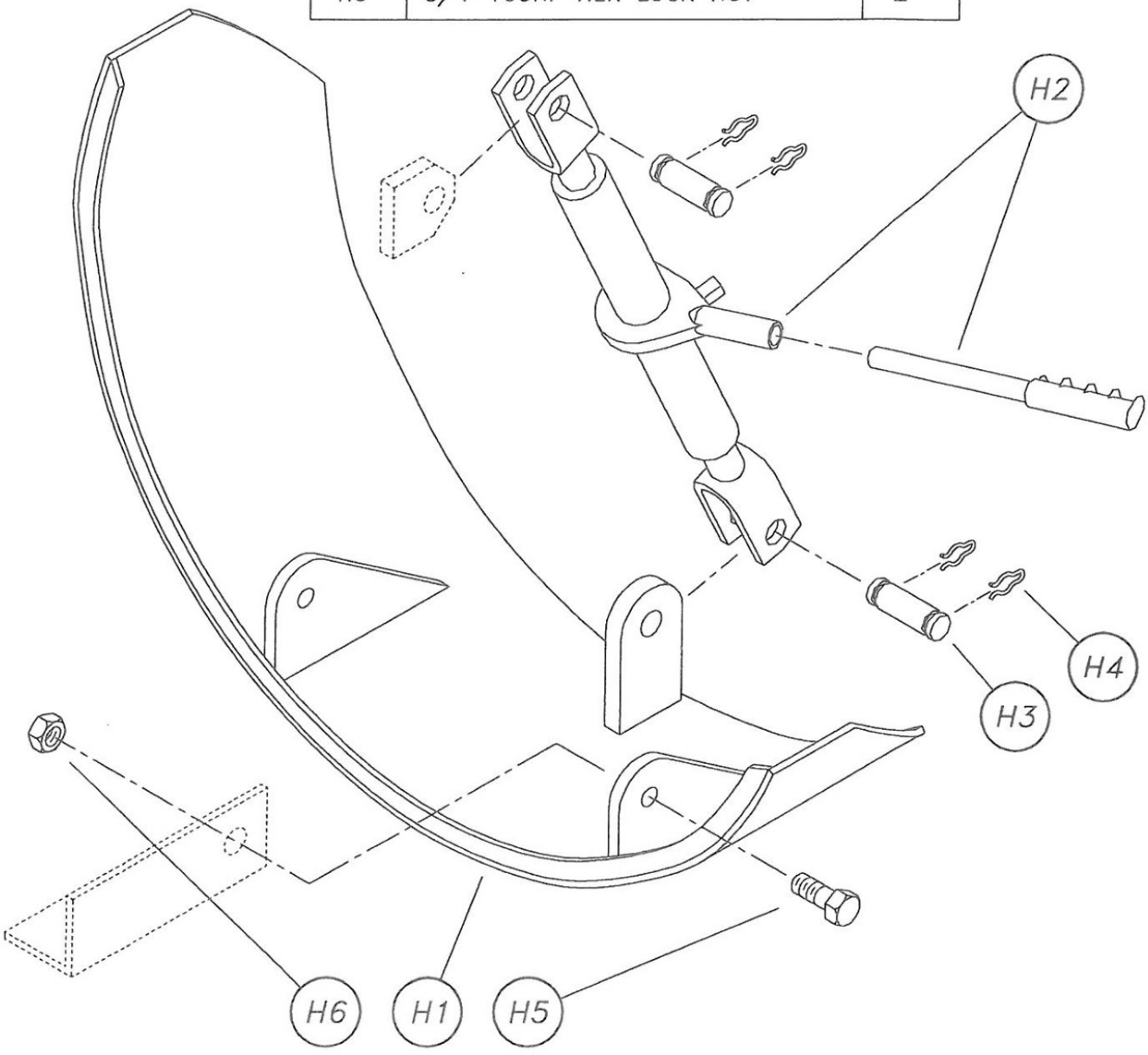
REDUCED SCALE DRAWING OF COUNTERWEIGHT IN FRAME (FRONT VIEW SHOWN)

CRAZY WHEEL ASSEMBLY		
ITEM	DESCRIPTION	QTY
G	TIRE, WHEEL AND HUB ASSEMBLY	2
G1	GREASE SEAL	2
G2	OUTER BEARING AND RACE	2
G3	HUB	2
G4	INNER BEARING AND RACE	2
G5	RETAINING WASHER	2
G6	CASTLE NUT ø7/8-9UNC	2
G7	COTTER KEY ø1/8 X 1 1/2	2
G8	DUST CAP	2
G9	WHEEL 10 X 16.5 6 HOLE	2
G10	LUG NUT ø7/16-14UNC	22
G11	TIRE 37 X 12.5 X 16.5	2
G12	CRAZY WHEEL WELDMENT	2
G13	UHMW WEAR WASHER	2
G14	ø1/8-27NPT GREASE FITTING STRAIGHT	4
G15	MAIN FRAME WELDMENT (SEE PAGE 9 & 10)	-
G16	RETAINING WASHER	2
G17	ø5/8 SPLIT LOCK WASHER	2
G18	ø5/8-18UNF X 1 3/4 HHCS Gr.8	2
G19	ø1/2-13UNC HEX NUT	5
G20	ø1/2 SPLIT LOCK WASHER	5
G21	MAIN FRAME CROSS TIES	2
G22	ø1/2-13 X 1 1/4 HHCS Gr.8	1
G11	ø1/2-13 X 3/4 HHCS Gr.8	1

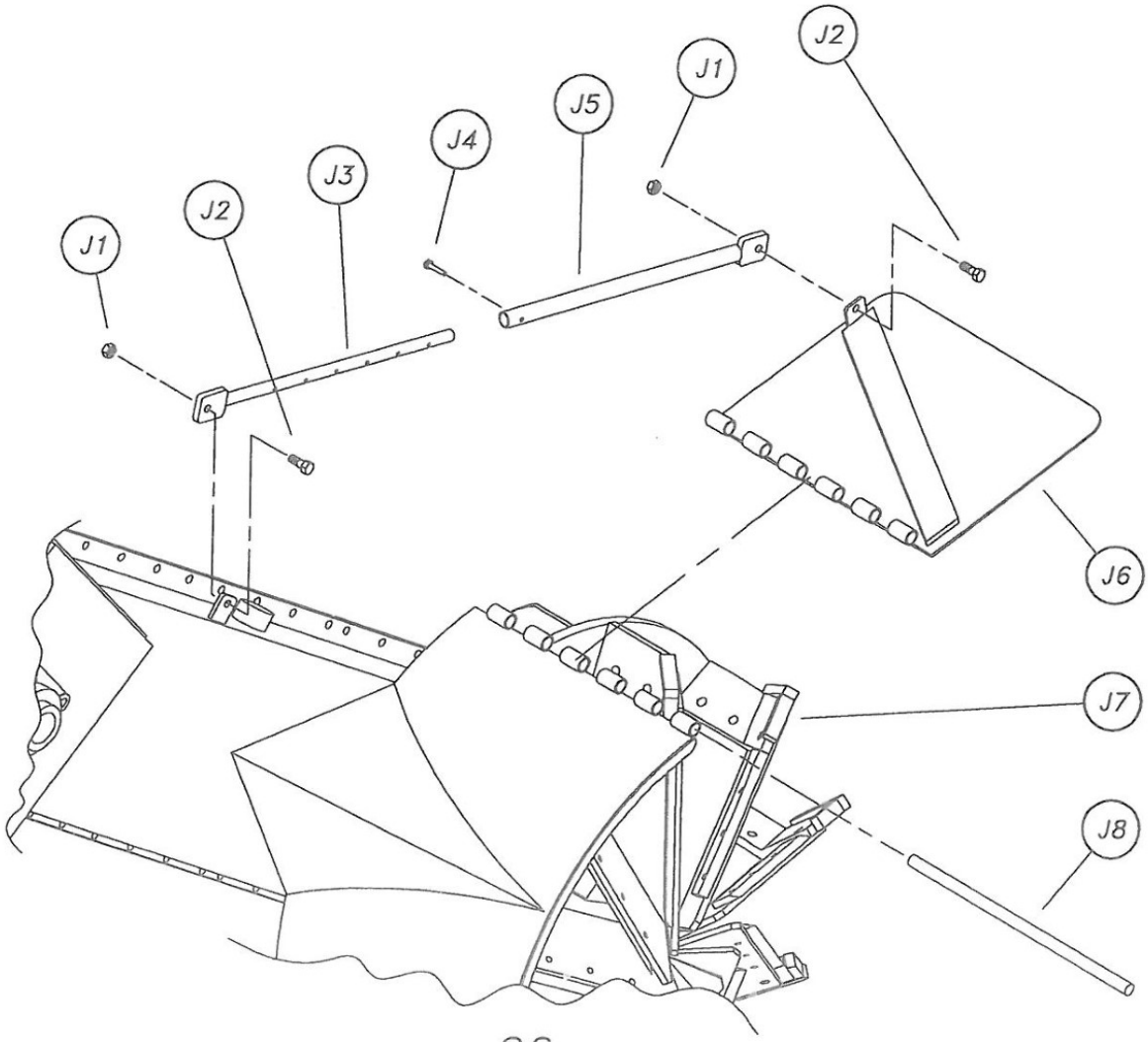
CRAZY WHEEL ASSEMBLY



DRAGPLATE ASSEMBLY		
ITEM	DESCRIPTION	QTY
H1	DRAG PLATE	1
H2	RATCHET JACK & HANDLE	1
H3	PIN ø1	2
H4	CLIP PIN	4
H5	3/4-16UNF X 2 3/4 HHCS Gr 8	2
H6	3/4-16UNF HEX LOCK NUT	2

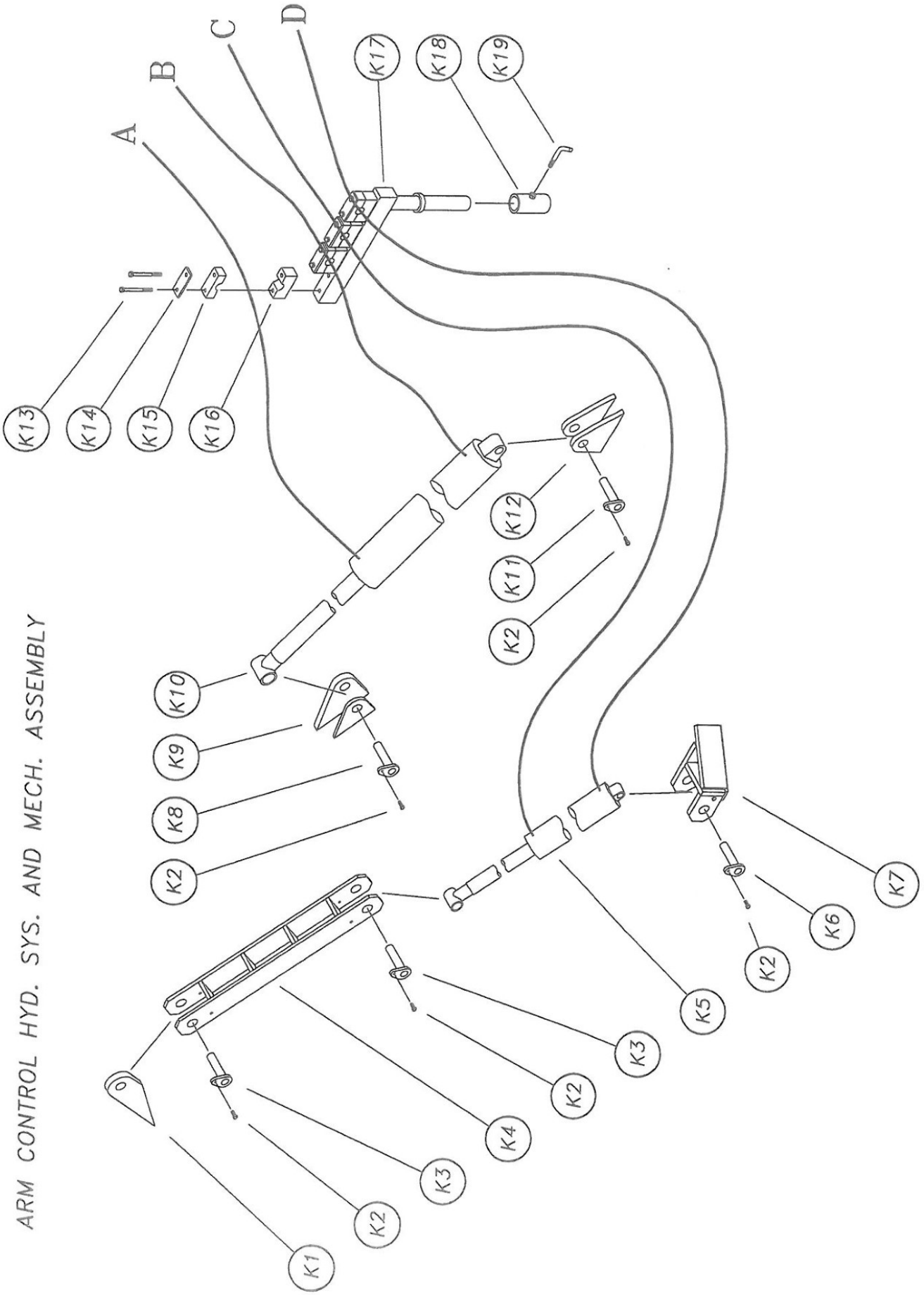


DEFLECTOR ASSEMBLY		
ITEM	DESCRIPTION	QTY
J1	ø1/2–20UNF HEX LOCK NUT	2
J2	ø1/2–20UNF X 1 1/4 HHCS Gr.8	2
J3	LOWER DEFLECTOR ARM	1
J4	WIRE LOCKING CLEVIS PIN	1
J5	UPPER DEFLECTOR ARM	1
J6	DEFLECTOR PLATE	1
J7	OUTER GEARBOX, IMPELLER, & SHROUD	–
J8	PIPE HINGE PIN	1



ARM CONTROL HYD. SYS. AND MECH. ASSEMBLY		
ITEM	DESCRIPTION	QTY
K1	CYL. LUG, UPPER OUTER ARM (OUTER GEARBOX WELDMENT)	–
K2	ø3/8-16UNC X 3/4 HHCS Gr.8 & LOCK WASHER OR JAM NUT	5
K3	CYL. PIN & RETAINER	2
K4	OUTER ARM LEVERAGE LINK	1
K5	OUTER ARM DOUBLE ACTING HYD. CYLINDER ø4 BORE X 36 STROKE	1
K6	CYL. PIN & RETAINER	1
K7	OUTER ARM CYL. BASE LUG (MAIN FRAME ASSEMBLY, REAR PLATE)	–
K8	CYL. PIN & RETAINER	1
K9	INNER ARM CYL. EYE LUG (MAIN FRAME WELDMENT)	–
K10	INNER ARM DOUBLE ACTING HYD. CYLINDER ø5 BORE X 36 STROKE	1
K11	CYL. PIN & RETAINER	1
K12	INNER ARM CYL. BASE LUG (MAIN FRAME WELDMENT)	–
K13	ø5/16-18UNC X 3 HHCS Gr.8	8
K14	STEEL RETAINER	4
K15	RUBBER HYD. HOSE RETAINER (UPPER HALF)	4
K16	RUBBER HYD. HOSE RETAINER (LOWER HALF)	4
K17	HYD. HOSE RETAINER BRACKET	1
K18	BRACKET CLAMP (MAIN FRAME WELDMENT)	–
K19	BRACKET RETAINER CLAMP SCREW	1
	HYDRAULIC CYLINDER REBUILD KITS	
K20	DOUBLE ACTING HYD. CYLINDER REBUILD KIT ø4 BORE	1
K21	DOUBLE ACTING HYD. CYLINDER REBUILD KIT ø5 BORE	1

HYDRAULIC HOSES	
A	INNER ARM CYLINDER HYD. HOSE (ROD END) 1/2 DIA. X 10 FEET
B	INNER ARM CYLINDER HYD. HOSE (BUTT END) 1/2 DIA. X 10 FEET
C	OUTER ARM CYLINDER HYD. HOSE (ROD END) 1/2 DIA. X 12 FEET
D	OUTER ARM CYLINDER HYD. HOSE (BUTT END) 1/2 DIA. X 12 FEET

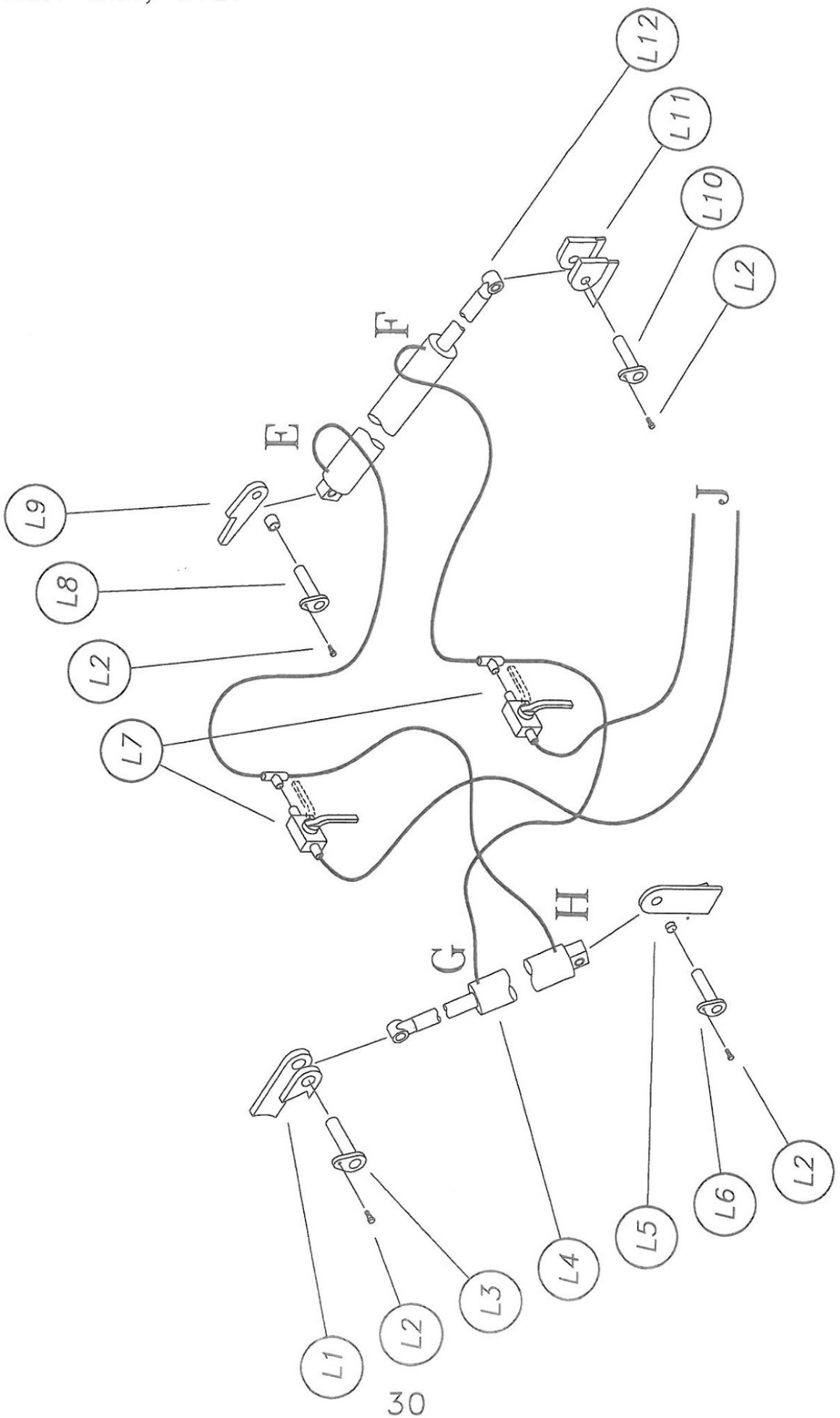


ARM CONTROL HYD. SYS. AND MECH. ASSEMBLY

COUNTER WEIGHT HYD. SYSTEM AND MECH. ASSEMBLY		
ITEM	DESCRIPTION	QTY
L1	MASTER CYL. EYE LUG, LOWER OUTER ARM (OUTER GEARBOX WELDMENT)	–
L2	ø3/8-16UNC X 3/4 HHCS Gr.8	4
L3	CYL. PIN & RETAINER	1
L4	MASTER CYL. – DOUBLE ACTING HYD. CYLINDER ø3 BORE X 42 STROKE	1
L5	MASTER CYL. BASE LUG (MAIN FRAME WELDMENT)	–
L6	CYL. PIN & RETAINER	1
L7	PRIMING VALVE	2
L8	CYL. PIN & RETAINER	1
L9	SLAVE CYL. BASE LUG (MAIN FRAME WELDMENT)	–
L10	CYL. PIN & RETAINER	1
L11	SLAVE CYL. EYE LUG (COUNTER WEIGHT WELDMENT)	–
L12	SLAVE CYL. – DOUBLE ACTING HYD. CYLINDER ø3 BORE X 42 STROKE	1
	HYDRAULIC CYLINDER REBUILD KITS	
L13	DOUBLE ACTING HYD. CYLINDER REBUILD KIT ø3 BORE	2

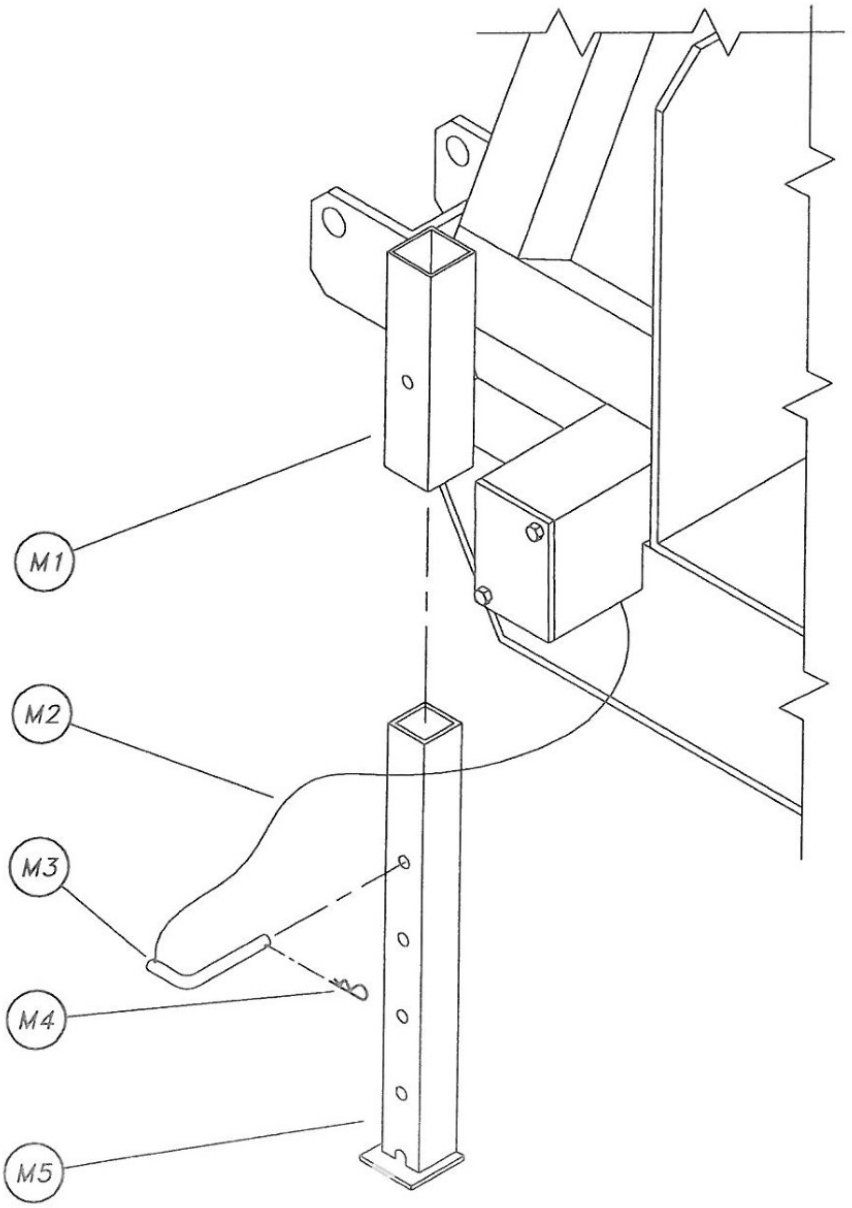
	HYDRAULIC HOSES
E	SLAVE CYLINDER HYD. HOSE (BUTT END) 3/8 DIA. X 3 FEET
F	SLAVE CYLINDER HYD. HOSE (ROD END) 3/8 DIA. X 5 FEET
G	MASTER CYLINDER HYD. HOSE (ROD END) 3/8 DIA. X 4 FEET
H	MASTER CYLINDER HYD. HOSE (BUTT END) 3/8 DIA. X 5 FEET
J	SYSTEM PRIMING HYD. HOSE 3/8 DIA. X 10 FEET – 2 REQUIRED

Model LSA-42' SIDEARM DITCHER



COUNTER WEIGHT TIMING HYD. SYS. AND MECH. ASSEMBLY

PARKING STAND ASSEMBLY		
ITEM	DESCRIPTION	QTY
M1	MAIN FRAME WELDMENT	–
M2	ø1/8 X 9 CABLE LANYARD	2
M3	PARKING STAND PIN	2
M4	ø1/8 HAIRPIN	2
M5	PARKING STAND WELDMENT	2



COUNTERWEIGHT TIMING SYSTEM AND ADJUSTMENT

PRINCIPAL OF OPERATION

This is a closed hydraulic system, meaning it functions without any external hydraulic power supply (a pump).
This system is powered by means of a master cylinder (master) and a slave cylinder (slave). See figure 2.
The butt end of the master is plumbed directly to the butt end of the slave, and, the rod end of the master is plumbed directly to the rod end of the slave. As oil is forced out of the master it is forced into the slave. This results in the synchronous movement below:
As the master retracts the slave will extend (figure 3).
As the master extends the slave will retract (figure 4).
The pivot points of the master have been engineered so that any movement of the gearbox(es) will push or pull on the rod and piston of the master.
This movement of the master piston will displace oil from the master and force it (as a pump) into the slave causing the slave to extend or retract a distance equal to the movement of the master.
This movement of the slave will then push or pull the counterweight, which has been engineered to offset the weight of the gearboxes and maintain a left/right balance of weight as the gearboxes are at any position.

⚠ The timing of this counterweight system is critical, as an improper setting could cause damage to the machine resulting in property damage or injury to persons nearby.

The ideal setting would be such that when the master is at midstroke then the slave will also be at midstroke. However, installation of the two cylinders with both gearboxes and the counterweight in these mechanical positions is not likely to be achieved.
So here is where it gets a little tricky.
The cylinders are going to be installed such that if the slave is extended some distance then the master must be installed while retracted that same distance. i.e. If the slave is extended 21 inches the master must be retracted 21 inches.

The following document will provide the procedures to obtain a proper timing of this hydraulic/mechanical system.
We begin with the understanding that both cylinders & hardware are installed and they are plumbed correctly. Also, the ditcher is properly hitched to the tractor.
Two possible procedures may be used, depending upon whether the system has been opened or not. See No. 1 or No. 2 below.

⚠ These procedures should be performed by two persons.

No. 1 – AIR IS IN THE SYSTEM – After replacing a hydraulic hose or a hydraulic cylinder, allowing air to enter the system.
1. Park the tractor and ditcher on solid level ground away from any obstacles.
2. Position the gearboxes (arms and impeller) as shown in figure 5. The impeller is positioned on the ground approximately 8 feet from the center of the ditcher.
3. Measure and record dimension "X". See figure 3, figure 4, and also figure 5.
NOTE: DO NOT move the positions of either gearbox. It may be a good idea to unhook the tractor hydraulic system.
4. Remove the hex head cap screw and the pin from the gearbox end of the master. See page 29-30 Items L2 & L3.
5. Using a rope or chain, tie the loose end of the master to the gearbox so that the rod is pointing up in the air and it will not hit anything when it is fully extended. See figure 5.
6. Hook-up the tractor hydraulic system to the priming connection fittings at priming valves A and B. See figure 2 and figure 6.
NOTE: Two (2) hydraulic hoses will be required. See figure 1 for their specifications.
7. Open both priming valves A and B. See figure 6.

8. Purge the air from both cylinders by fully extending and then fully retracting both cylinders. Repeat this cycle 10 times stopping with the slave cylinder fully retracted (the counterweight is positioned nearest to frame).

NOTE 1: Since the master is loose it will fully extend and retract before the slave will begin to move.

NOTE 2: If the system were completely empty of hydraulic oil, it will require 1080 cubic inches (4 1/2 gallons) to fill it. Be sure not to empty your tractor's oil reservoir during this procedure.

9. Using the table in figure 7, find the "X" dimension closest to the measurement you recorded in step 3.
10. Using dimension "Y" from that table, move the counterweight outward until the slave cylinder matches dimension "Y". See figure 5.
11. Extend or retract the master as needed to get the distance back to its starting position (Dimension "X").

NOTE: DO NOT fully extend or fully retract the master, as this would move the counterweight and cause the timing to be incorrect.

12. Reinstall the pin and hex head cap screw. See Page 29-30 Item L2 & L3.
13. Close the priming valves A and B. See figure 6.
14. Unhook the tractor hydraulic system from the priming connection fittings at priming valves A and B. See figure 2 and figure 6.
15. Hook-up the tractor hydraulic system to the ditcher for testing of the counterweight mechanical operation.
16. Slowly move the gearboxes through their complete range of motion (as far in, out, up, and down as possible).
17. As the cylinders reach their fully extended and retracted positions, carefully watch the counterweight and hydraulic hoses for unusual movements. This would indicate an out of time bottoming out of one of the cylinders.

NOTE: If any of the hoses do show signs of straining, STOP any further movement and follow the next procedures.

No. 2 – AIR HAS BEEN PURGED – The system has not been opened and air has not been allowed to get in it.

1. Park the tractor and ditcher on solid level ground away from any obstacles.
2. Position the gearboxes (arms and impeller) as that shown in figure 4.

NOTE: The inner gearbox (I.G.) is almost vertical and the outer gearbox (O.G.) is against the stop.

3. Hook-up the tractor hydraulic system to the priming connection fittings at priming valves A and B. See figure 2 and figure 6.

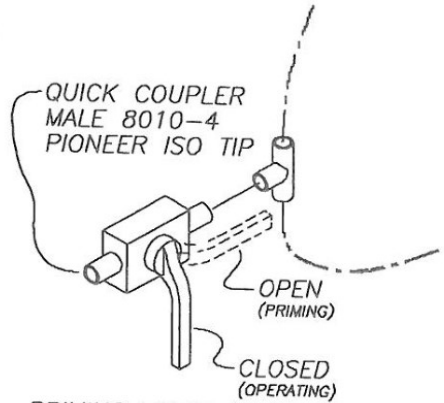
NOTE: Two (2) hydraulic hoses will be required. See figure 1 for their specifications.

4. Open both priming valves A and B. See figure 6.
5. Move the counterweight inward until it stops.
6. Move the counterweight outward two (2) inches.
7. Close the priming valves A and B. See figure 6.
8. Unhook the tractor hydraulic system from the priming connection fittings at priming valves A and B. See figure 2 and figure 6.
9. Hook-up the tractor hydraulic system to the ditcher for testing of the counterweight mechanical operation.
10. Slowly move the gearboxes through their complete range of motion (as far in, out, up, and down as possible).
11. As the cylinders reach their fully extended and retracted positions, carefully watch the counterweight and hydraulic hoses for unusual movements. This would indicate an out of time bottoming out of one of the cylinders.

NOTE: If any of the hoses do show signs of straining, STOP any further movement and repeat this procedure.

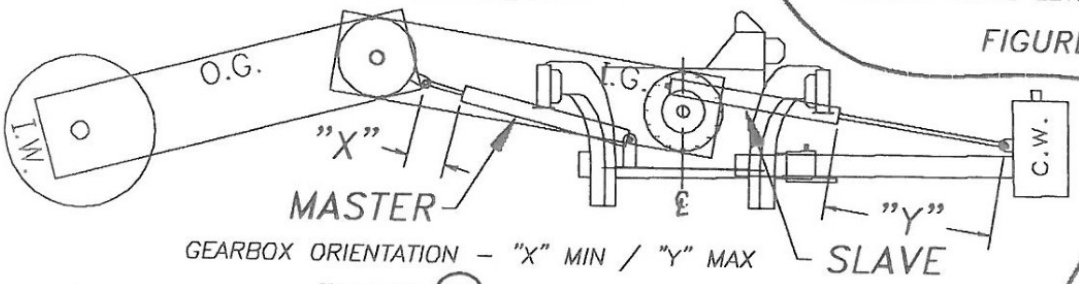
"X"	"Y"	"X"	"Y"	"X"	"Y"	"X"	"Y"	"X"	"Y"
4	43	12	35	20	27	28	19	36	11
4 1/2	42 1/2	12 1/2	34 1/2	20 1/2	26 1/2	28 1/2	18 1/2	36 1/2	10 1/2
5	42	13	34	21	26	29	18	37	10
5 1/2	41 1/2	13 1/2	33 1/2	21 1/2	25 1/2	29 1/2	17 1/2	37 1/2	9 1/2
6	41	14	33	22	25	30	17	38	9
6 1/2	40 1/2	14 1/2	32 1/2	22 1/2	24 1/2	30 1/2	16 1/2	38 1/2	8 1/2
7	40	15	32	23	24	31	16	39	8
7 1/2	39 1/2	15 1/2	31 1/2	23 1/2	23 1/2	31 1/2	15 1/2	39 1/2	7 1/2
8	39	16	31	24	23	32	15	40	7
8 1/2	38 1/2	16 1/2	30 1/2	24 1/2	22 1/2	32 1/2	14 1/2	40 1/2	6 1/2
9	38	17	30	25	22	33	14	41	6
9 1/2	37 1/2	17 1/2	29 1/2	25 1/2	21 1/2	33 1/2	13 1/2	41 1/2	5 1/2
10	37	18	29	26	21	34	13	42	5
10 1/2	36 1/2	18 1/2	28 1/2	26 1/2	20 1/2	34 1/2	12 1/2	42 1/2	4 1/2
11	36	19	28	27	20	35	12	43	4
11 1/2	35 1/2	19 1/2	27 1/2	27 1/2	19 1/2	35 1/2	11 1/2		

FIGURE (7)



PRIMING VALVE LEVER POSITIONS

FIGURE (6)



GEARBOX ORIENTATION – "X" MIN / "Y" MAX

FIGURE (3)

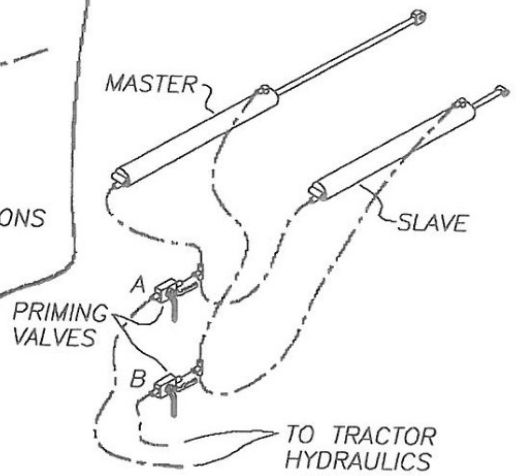
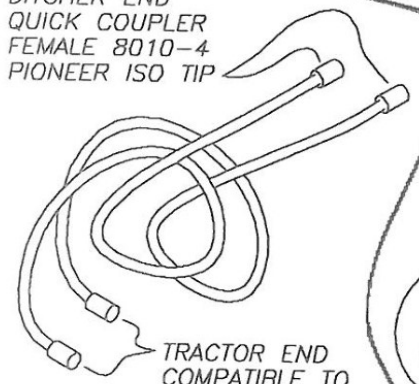
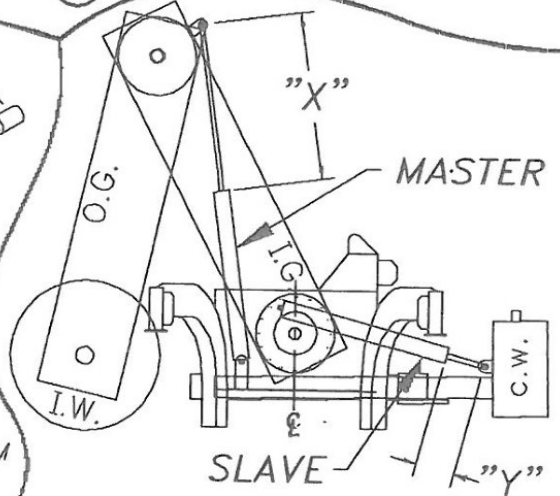


FIGURE (2)



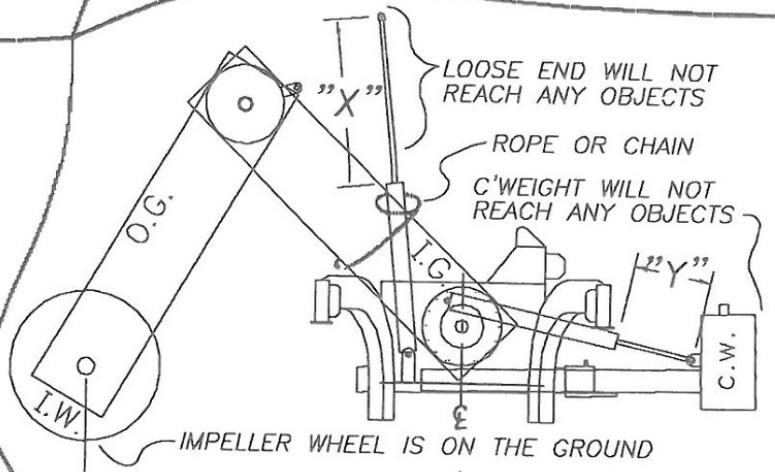
HYDRAULIC PRIMING HOSES
2 HOSES REQUIRED
APPROX. 10' EACH

FIGURE (1)



GEARBOX ORIENTATION – "X" MAX / "Y" MIN

FIGURE (4)



MASTER CYL. ROD END LOOSE AND TIED TO GEARBOX

FIGURE (5)

HYDRAULIC MECHANISM

This section is intended to inform you of the design intent of the hydraulic mechanism and give you the information required to safely release the mechanical forces generated if/when the situation arises.

⚠ DANGER: Keep link in tension by always pulling with CYL."2". Hydraulic cylinder rod can be bent or broken by an unaware operator. This machine is not designed to withstand a pushing force on CYL."2" (see illustrations on page 36).

The operator of this machine needs to be aware of this potential problem. He/She must pay close attention to which cylinder is being actuated and which direction the cylinder(s) are being energized.

The problem will only occur when the arms are extended to a near maximum reach AND the impeller is being lifted off the ground from a resting position.

There are 3 situations that this may be possible.

1) When the machine has been parked with arms extended.

2) During operation with arms extended and forward movement of tractor has been stopped allowing the impeller end of the outer arm to rest on the drag plate.

3) Possibly during operation in a very deep roadside ditch (outer arm vertical) and arms are being lifted with CYL."1".

⚠ Keep link in tension.

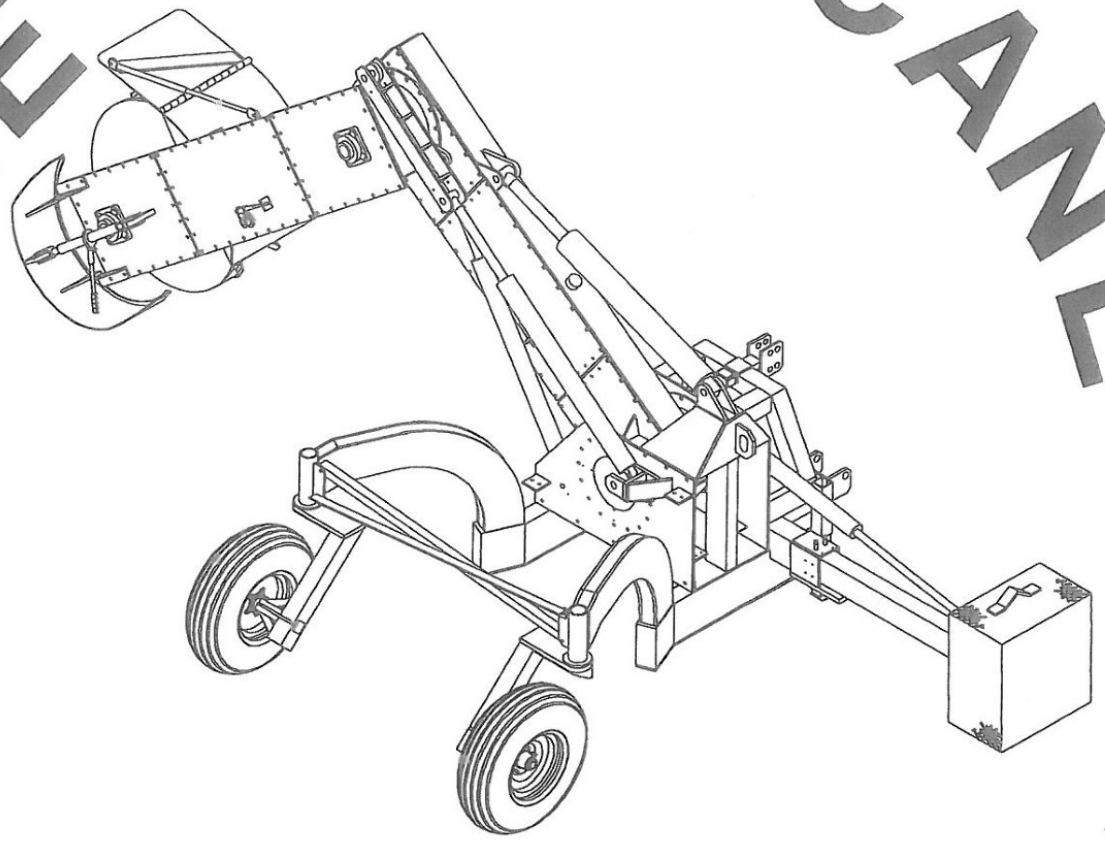
The instance of greatest hazardous force on CYL."2" occurs when the link is in contact with the outer arm and CYL."1" is used to lift both arms. This could cause the moment of the cylinder geometry to "break over center" and immediately reverse from a pushing force to a pulling force allowing the impeller to jerk downward.

To avoid this problem the operator simply needs to pay attention that the link is always in tension when the arms are being moved.

To release the forces caused by the above:

1. stop the tractor's forward movement,
2. stop the impeller rotation,
3. use CYL."1" to lower the arms and impeller to the ground,
4. use CYL."2" to pull on the link lifting impeller off the ground, hazardous forces are now released,
5. Operate as required.
6. After several extensions and retractions check that CYL."2" is not leaking.

THE HURRICANE



Model LSA-42

SIDEARM DITCHER

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