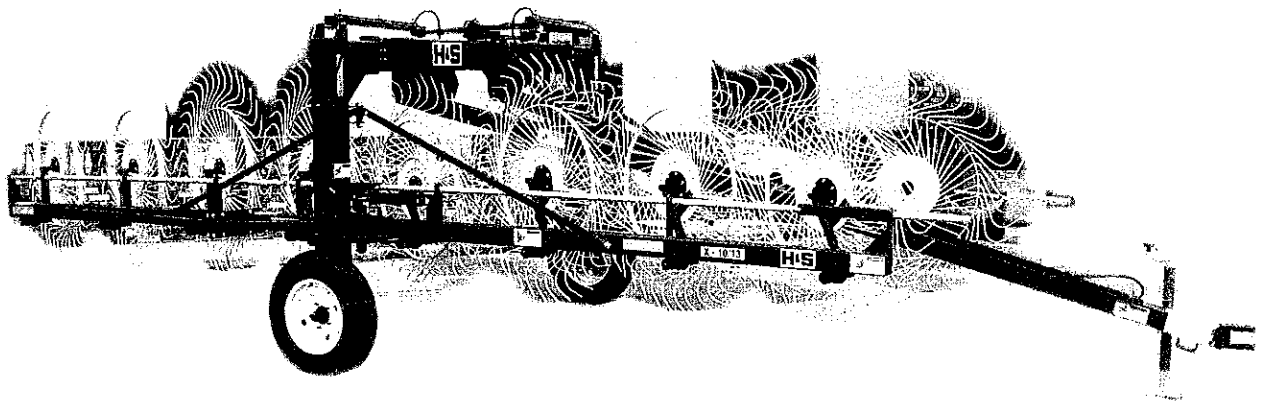


H&S

X SERIES RAKE



WARNING

READ AND UNDERSTAND THIS MANUAL
BEFORE OPERATING THIS EQUIPMENT

UNSAFE OPERATION OR MAINTENANCE OF THIS EQUIPMENT CAN RESULT IN
SERIOUS INJURY OR DEATH

OPERATOR'S MANUAL AND PARTS LIST

HSMFG0206

Manufactured By

H&S MANUFACTURING CO., INC.

P.O. BOX 768 (715) 387-3414 FAX (715) 384-5463
MARSHFIELD, WISCONSIN 54449

H & S

X SERIES RAKE

PARTS AND OPERATOR'S MANUAL

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WARRANTY

H & S WARRANTY

H & S Manufacturing Co., Inc. ("H & S") warrants this product to be free from defect in material and workmanship. Except as noted below, this warranty term is twelve (12) months from the date of delivery of the product to the original purchaser by an authorized H & S dealer. Under this warranty, H & S will repair or replace, at its option, any covered part which is found to be defective in material or workmanship during the applicable warranty term. In no case will the covered repair cost of a part or parts exceed the replacement cost of that part. Warranty service must be performed by H & S or a dealer authorized by H & S to sell and/or service the product involved, which will use only new or remanufactured parts or components furnished by H & S. This warranty includes approved parts and labor to fix the product but does not include, and the purchaser is responsible for, any service call and/or transportation of the product to and from the dealer's place of business, for any premium charged for overtime labor requested by the purchaser, and for any service work not directly related to any defect covered under this warranty. This warranty includes only those components of the product manufactured by H & S. Warranty for any component not manufactured by H & S including, but not limited to, engines, batteries, tires, rims, hydraulic motors, pumps, etc. are covered by the warranty, if any, provided separately by their respective manufacturers.

This warranty in all its parts, is extended solely to the original purchaser of the product, is terminated upon any subsequent transfer or sale from or by the original purchaser and extends no third party benefits or rights whatsoever.

The warranty term for any product used in any commercial, custom, for hire or rental application, is limited to six (6) months from the date of delivery of the product to the original purchaser by an authorized H & S dealer.

Polybonded (polyethylene and plywood) panels utilized in H & S Manure Spreaders are warranted, to the original purchaser, to not wear through and the polyethylene overlay to not tear free of the plywood for the functional life of the spreader. This specific warranty on polybonded panels includes only replacement of any defective panel part without any allowance for labor beyond the terms of the general warranty (12 or 6 months), and is further limited to manure spreaders used to spread normal agricultural manure.

This warranty does not include: (1) Any product that has been altered or modified in ways not approved by H & S; (2) Depreciation or damage caused by normal wear, misuse, improper or insufficient maintenance, improper operation, accident or failure to follow the product Operator's Manual recommendations and product decal recommendations; (3) Normal maintenance parts and service; (4) Repairs made with parts other than those available from H & S or performed by anyone other than H & S or a dealer authorized by H & S to sell and/or service the product involved.

To secure warranty service the purchaser must report the product defect to a dealer authorized by H & S to sell and/or service the product involved within the applicable warranty term together with evidence of the warranty start date and make the product available to that dealer within a reasonable period of time.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE OF THIS WARRANTY. H & S and the companies affiliated with it makes no warranties, representations, or promises, express or implied, as to the performance or freedom from defect of its products other than those set forth above and NO IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS OR FITNESS FOR A PARTICULAR PURPOSE IS MADE. IN NO EVENT WILL THE DEALER, H&S OR ANY COMPANY AFFILIATED WITH H&S BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. The ONLY REMEDY the purchaser has in connection with the breach of performance of any warranty on H & S products are those set forth above.

The selling dealer has no authority to make any representation or promise on behalf of H & S, or to modify the terms or limitations of this warranty in any way.

2/04

WARRANTY REGISTRATION

FILL OUT AND MAIL
IMMEDIATELY TO MAKE
WARRANTY EFFECTIVE



Date of Purchase _____

Purchaser _____ Address _____

City _____ State _____ Zip _____

Product _____ Model# _____ Serial# _____

Dealer _____ Address _____

City _____ State _____ Zip _____

Signature of Original Buyer

AFTER COMPLETION, DEALER SHOULD REMOVE AND RETAIN FOR RECORDS

**H&S
DEALER PRE-DELIVERY CHECK LIST**

After the X Series Rake has been completely set-up, check to be certain it is in correct operating order before delivering to the customer. The following is a list of points to inspect. Check off each item as you have made the proper adjustments and found the item operating satisfactorily.

- All grease fittings have been lubricated
(See lubrication guide in this manual).
- All mechanisms are operating trouble free.
- Rake wheels touch ground in unison when lowered into position.
(Rake setting level)
- All bolts and fasteners are tight.
- All decals are in place and legible.

(Dealer's Name)

Model Number

Serial Number

(Signature of Pre-Delivery Inspector)

(Inspection Date)

DEALER DELIVERY CHECK LIST

This check list that follows is an important reminder of valuable information that should be passed on to the customer at the time this X Series Rake is delivered.

Check off each item as you explain it to the customer.

This delivery check list, when properly filled out and signed assures the customer that the Pre-delivery service was satisfactorily performed.

- Explain to the customer that the pre-delivery inspection was made.
- Explain to the customer all the safety precautions they must exercise when operating this unit.
- Explain raking and windrow width adjustments.
- Explain to customer that regular lubrication is required for proper operation and long life of machine. Show customer the lubrication section of Owner's Manual.
- Give the customer Owner's Manual and make sure they read and understand all operating and service instructions.
- Record Serial Number on page 19 of this Manual.
- Have customer sign a completed "Warranty Registration," and mail it promptly.

Date Delivered _____

Dealer's Name _____

By _____

Signature of Original Buyer

Note: Warranty is not valid until warranty card is completed and returned to H & S Mfg. Co., Inc.



**BE
ALERT!**

**YOUR SAFETY
IS INVOLVED.**

THIS SYMBOL IS USED THROUGHOUT THIS BOOK WHENEVER YOUR PERSONAL SAFETY IS INVOLVED. TAKE TIME TO BE CAREFUL. REMEMBER: THE CAREFUL OPERATOR IS THE BEST OPERATOR. MOST ACCIDENTS ARE CAUSED BY HUMAN ERROR. CERTAIN PRECAUTIONS MUST BE OBSERVED TO PREVENT THE POSSIBILITY OF INJURY OR DAMAGE.

TRACTORS

This operator's manual uses the term "Tractor" when identifying the power source.

H & S MANUFACTURING CO. INC.

RECOGNIZE SAFETY INFORMATION

This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.



UNDERSTAND SIGNAL WORDS

A signal word- DANGER, WARNING, or CAUTION - is used with the safety-alert symbol. DANGER identifies the most serious hazards.

Safety signs with signal word DANGER or WARNING are typically near specific hazards.

General precautions are listed on CAUTION safety signs.



WARNING



CAUTION



CAUTION

FOLLOW SAFETY INSTRUCTIONS

Carefully read all safety messages in this manual, and all safety signs on your machine. Follow all recommended precautions and safe operating procedures.


Keep signs in good condition. Immediately replace any missing or damaged signs.

⚠ WARNING

HELP AVOID INJURY

- READ & UNDERSTAND THE OPERATORS MANUAL PROVIDED WITH THIS MACHINE. IF MISPLACED CALL H & S MANUFACTURING AT 715-387-3414 WITH MODEL AND SERIAL NUMBER.
- UNDERSTAND ALL SAFETY WARNINGS AND FUNCTION OF CONTROLS.
- KEEP SAFETY DEVICES IN PLACE AND WORKING.
- KEEP YOURSELF AND OTHERS WELL CLEAR OF MOVING PARTS.
- DISCONNECT ALL POWER BEFORE SERVICING OR CLEANING THIS MACHINE.
- DO NOT EXCEED 20 MPH

72203A



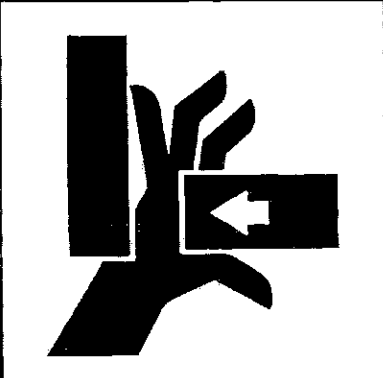
⚠ DANGER

STAY CLEAR OF RAKE WHEN OPENING OR CLOSING.

FAILURE TO HEED THIS WARNING MAY RESULT IN PERSONAL INJURY OR DEATH

KEEP CLOTHING, YOURSELF AND OTHERS WELL CLEAR.

11694A



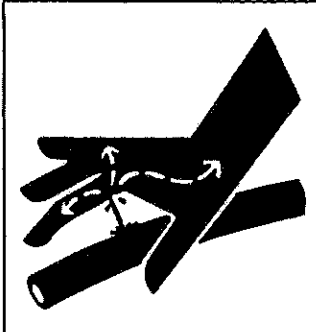
⚠ WARNING

STAY CLEAR OF RAKE WHEN RAISING OR LOWERING RAKE WHEELS.

FAILURE TO HEED THIS WARNING MAY RESULT IN PERSONAL INJURY OR DEATH.

KEEP CLOTHING, YOURSELF AND OTHERS WELL CLEAR.

2195



⚠ WARNING

DO NOT GO NEAR LEAKS

- High pressure oil easily punctures skin causing serious injury, gangrene or death.
- If injured, seek emergency medical help. Immediate surgery is required to remove oil.
- Do not use finger or skin to check for leaks.
- Lower load or relieve hydraulic pressure before loosening fittings.

11599

TRACTORS

This operators manual uses the term "Tractor" when identifying the the power source.



WARNING

TO PREVENT SERIOUS INJURY OR DEATH

BEFORE YOU ATTEMPT TO OPERATE THIS EQUIPMENT, READ AND STUDY THE FOLLOWING INFORMATION. IN ADDITION, MAKE SURE THAT EVERY INDIVIDUAL WHO OPERATES OR WORKS WITH THIS EQUIPMENT, WHETHER FAMILY MEMBER OR EMPLOYEE, IS FAMILIAR WITH THESE SAFETY PRECAUTIONS.

DO NOT attempt to perform maintenance or repair with tractor running.

DO NOT step up on machine at any time.

DO NOT allow minors to operate or be near the machine.

DO NOT ALLOW PERSONNEL OTHER THAN THE QUALIFIED OPERATOR NEAR THE MACHINE.

Loose or floppy clothing should not be worn by the operator.

Stop the tractor engine, remove ignition key, and allow all mechanisms to stop before cleaning, working, or adjusting on machine.

Stay clear of hydraulic lines, they may be under extreme pressure or heat.

Stay clear of rake when opening or closing main rake arm beams, or raising or lowering rake wheels.

For transport, always make sure that the hair pin at the rear of the lift pipes, and the transport lock bracket with safety lynch pins for main rake beam cylinders, are securely locked in place.

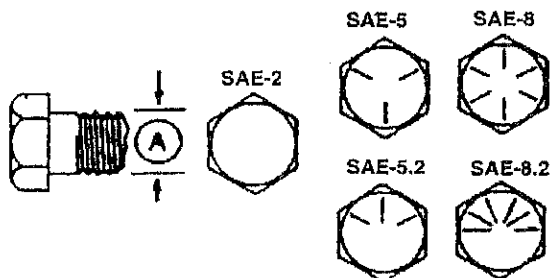
To reduce stress on rake arms, lift pipe, springs and spring brackets, reduce oil flow from tractor to lift cylinders whenever possible.

Be sure to raise rake wheels before opening or closing main rake beams.

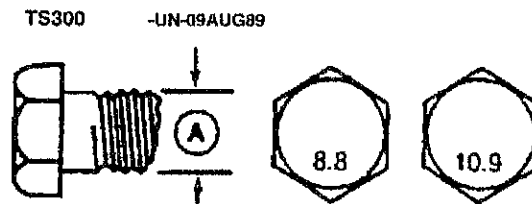
H&S Mfg. Co. always takes the operator and his safety into consideration and guards exposed moving parts for their protection. However, some areas cannot be guarded or shielded in order to assure proper operation. In addition, the operators manual and decals on the machine itself warn you of further danger and should be read and observed closely.

Study The Above Safety Rules
ATTENTION - BE ALERT - YOUR SAFETY IS INVOLVED

CAP SCREW TORQUE VALUES



Inch Cap Screw Head Markings



Metric Cap Screw Head Markings

-JUN-09AUG89
TS298

INCH CAP SCREW TORQUE VALUES

Bolt Diameter Wrench (A) Size	Cap Screw Grade							
	SAE 2		SAE 5		SAE 8			
	N-m	lb.-ft	N-m	lb.-ft	N-m	lb.-ft		
1/4" 7/16"	7 (5)		11 (8)		16 (12)			
5/16" 1/2"	14 (10)		23 (17)		33 (24)			
3/8" 9/16"	24 (18)		41 (30)		54 (40)			
7/16" 5/8"	41 (30)		68 (50)		95 (70)			
1/2" 3/4"	61 (45)		102 (75)		142 (105)			
9/16" 13/16"	88 (65)		142 (105)		203 (150)			
5/8" 15/16"	122 (90)		197 (145)		278 (205)			
3/4" 1-1/8"	217 (160)		353 (260)		495 (365)			
7/8" 1-5/16"	224 (165)		563 (415)		800 (590)			
1" 1-1/2"	332 (245)		848 (625)		1193 (880)			
1-1/4" 1-7/8"	665 (490)		1492 (1100)		2393 (1765)			

METRIC CAP SCREW TORQUE VALUES

Bolt Diameter Wrench (A) Size	Markings on Cap Screw Heads					
	8.8		10.9			
	N-m	lb.-ft	N-m	lb.-ft		
5 mm 8 mm	6 (4.5)		9 (6.5)			
6 mm 10 mm	10 (7.5)		15 (11)			
8 mm 13 mm	25 (18)		35 (26)			
10 mm 16 mm	50 (37)		75 (55)			
12 mm 18 mm	85 (63)		130 (97)			
16 mm 24 mm	215 (159)		315 (232)			
20 mm 30 mm	435 (321)		620 (457)			
24 mm 36 mm	750 (553)		1070 (789)			
30 mm 46 mm	1495 (1103)		2130 (1571)			



CAUTION: Use only metric tools on metric hardware. Other tools may not fit properly. They may slip and cause injury.

DO NOT use these values if a different torque value tightening procedure is listed for a specific application. Torque values listed are for general use only. Check tightness of cap screws periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade. Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

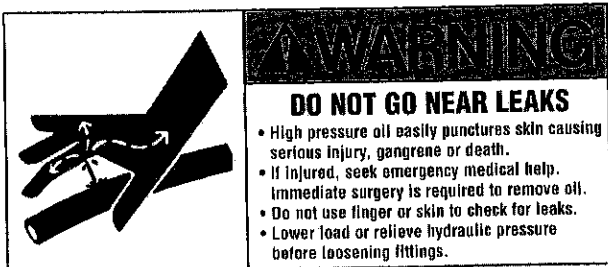
Make sure fastener threads are clean and you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of amount shown in chart. Tighten toothed or serrated-type lock nuts to full torque value.

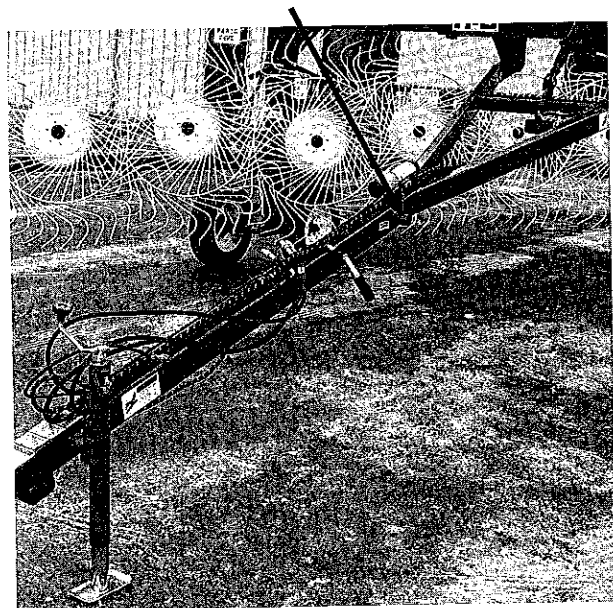
OPERATION

1. Check for proper assembly and adjustment and make sure that all bolts are tightened. Securely retighten after a few hours of operation as bolts can loosen up on new machinery. Check wheel bolts upon delivery and periodically thereafter. Wheel bolts should be tightened at 85-95 ft./lbs. of torque.
2. Check tires and inflate to recommended pressure (Standard 6.70 x 15 to 44 PSI, optional tandems ST175/80D13 to 35 PSI).
3. Adjust the tractor hitch (13 to 17 inches above ground) and attach to tractor with a **hitch pin that has a safety locking device**.
4. Remove weight from lift jack. Remove jack from pipe mount and place on convenient storage mount located toward the left rear of the front pole assembly (See Picture Below).
5. Connect hydraulic hose for raising and lowering rake wheels to a single or double acting valve on the tractor.
6. Connect hydraulic hoses for opening and closing main frame to a double acting valve on the tractor.
7. If equipped with optional Hydraulic Beam Angle Kit connect control box to a 12 volt power source on the tractor.
8. Lubricate the rake completely (See Lubrication Section in This Manual).
9. Check all bolts on rake after 100 acres. Re-torque if necessary.

NOTE: Determine right or left side of your X-Rake by viewing it from the rear. If instructions or parts lists call for hardened bolts. See page # 9 to identify.



JACK STORAGE POSITION

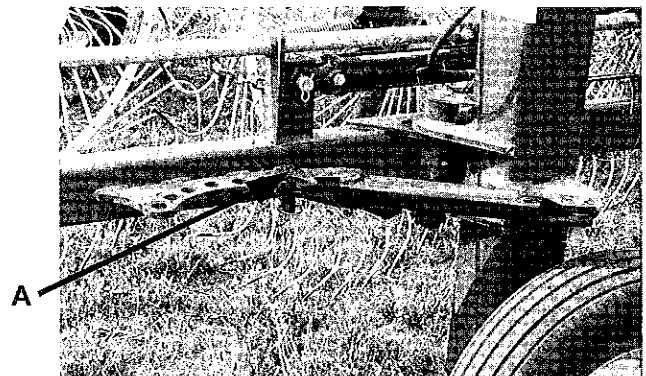


OPERATION (Continued)

TRANSPORT LOCKS

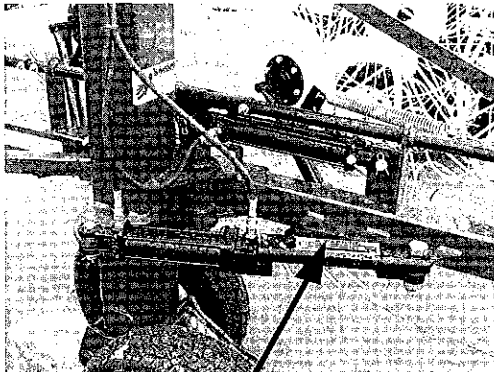
RAKE BEAM LOCKS

When transporting the standard X Series Rake the beam locking bar **must be in the transport hole (A)**. The balance of the holes give you a wide variety of raking widths.

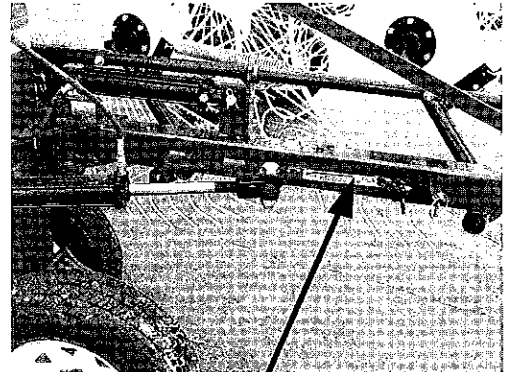


RAKE BEAM LOCKS (OPTIONAL BEAM ANGLE KIT)

Mounted on the rake beams are Self-storing transport locks for rake beam arms. Remove the clip pin and swing the transport lock toward the rake beam. There should be a fair amount of drag required to swing the lock. (B) Shows the transport lock in the engaged position. (C) Shows the transport lock in the storage position, to be used when in the raking mode.



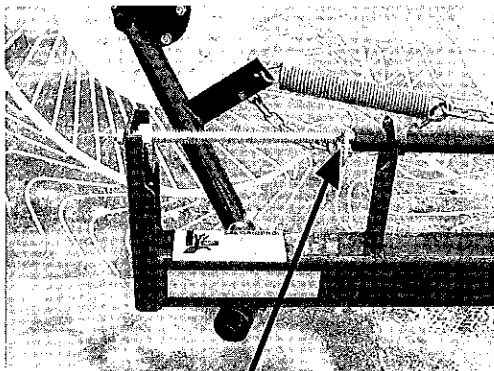
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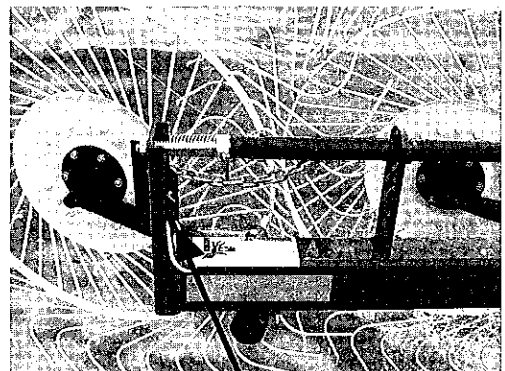
C

RAKE WHEEL LOCKS

Located at the rear of the lift pipe, is a hair pin which is used to secure the rake wheels in the up position for transport (D). When in the down, or raking position, place the locking hair pin in the convenient storage position as shown (E).



D



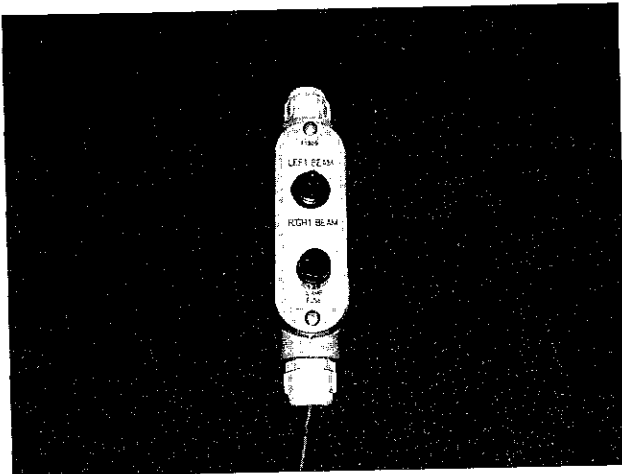
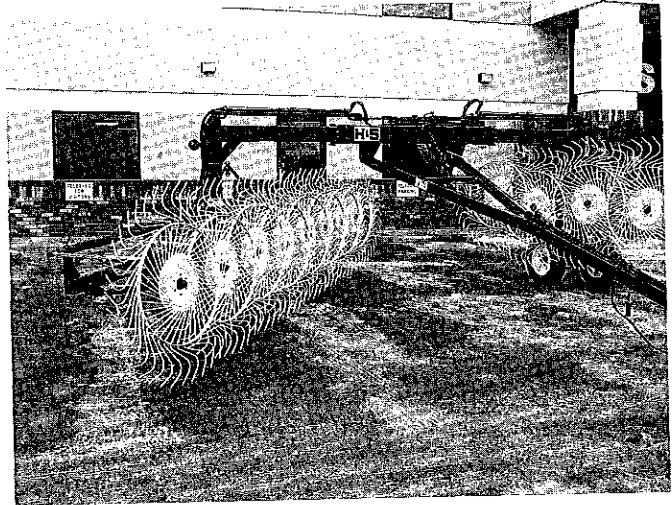
E

OPERATION (Continued)

CENTER FRAME

When opening or closing the center frame of the rake, it is **necessary to have forward or rearward motion to prevent any serious damage to rake.** Both sides of the rake will open evenly by activating the tractor hydraulic valve when moving forward or rearward.

ATTENTION
NEVER ADJUST MAIN FRAME WIDTH WITHOUT FORWARD OR REARWARD MOTION OF RAKE. FAILURE TO HEED WILL CAUSE DAMAGE TO MAIN FRAME OR AXLE UPRIGHTS. 21804

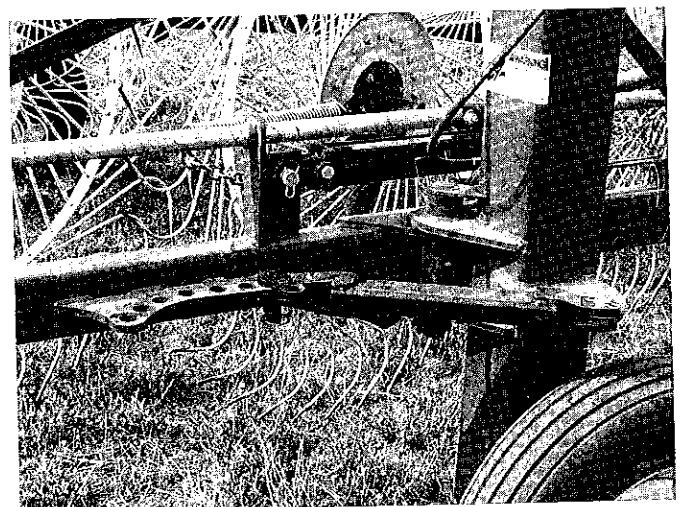


CONTROL BOX

The optional Hydraulic Beam Angle Kit requires the use of a control box. When rake beam angling is needed, hold the switch for either the right or left beam. Use the same hydraulic valve that opens and closes the center frame. A solenoid valve will divert the oil to either function the operator chooses.

RAKING ANGLE/WINDROW WIDTH

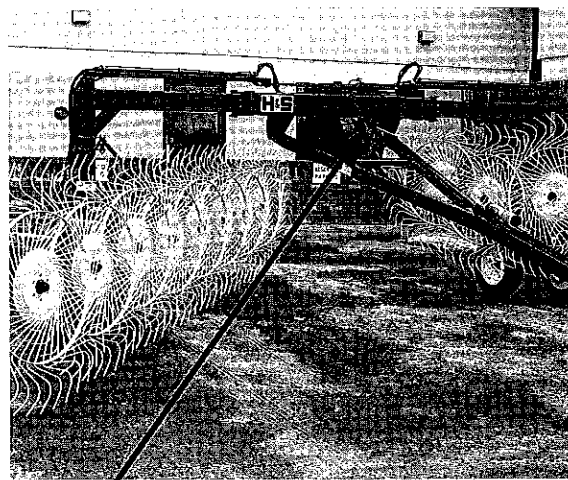
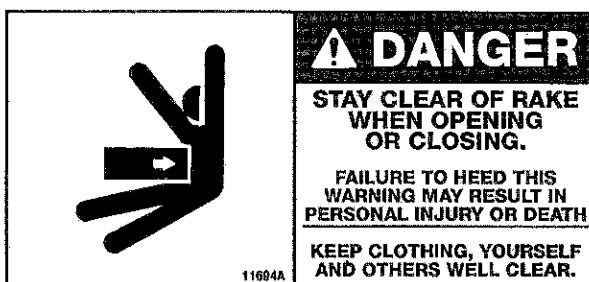
The Raking Angle/Windrow Width adjustment allows the user to cover a wide range of raking widths. Each rake beam can be adjusted independently of each other. This gives the operator the ability to match numerous conditions.



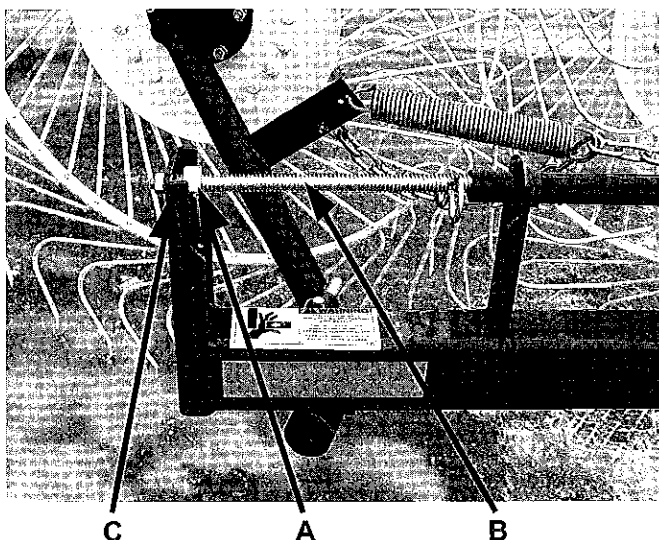
ADJUSTMENTS

RAKE BEAM

Rake beams should be adjusted so they are level to slightly up in the front. They can be adjusted by using the ratchet jack located near the center of the rake. This adjustment is important to keep rake wheel ground pressure even along the rake beam. Failure to do this will cause the front wheels to make heavier or lighter contact with the ground.



RATCHET JACK

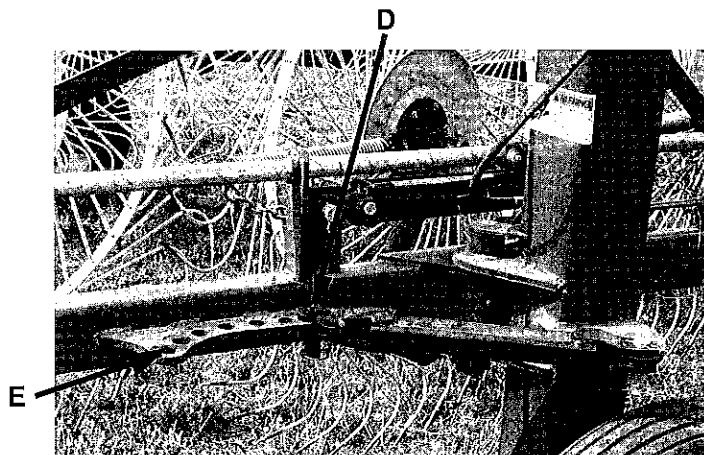


GROUND PRESSURE

Rake wheel ground pressure is adjusted by turning locking Nut and Collar (A) in to decrease pressure or out to increase pressure. The length of the Threaded Rod (B), between (A) and Rear Support (C), will determine the rake wheel ground pressure. Measuring this distance or counting the threads will give you the same ground pressure on both rake beams.

RAKE BEAM ANGLE

Before the rake beams can be angled the center frame must be widened first (as described in the operation section). Failure to do so will cause damage to rake wheels. After the center frame has been widened, angle the rake beams to the desired angle by removing pin (D). Manually move rake beam to desired rake beam angle and re-insert pin (D) into one in the series of holes (E).



LUBRICATION GUIDE

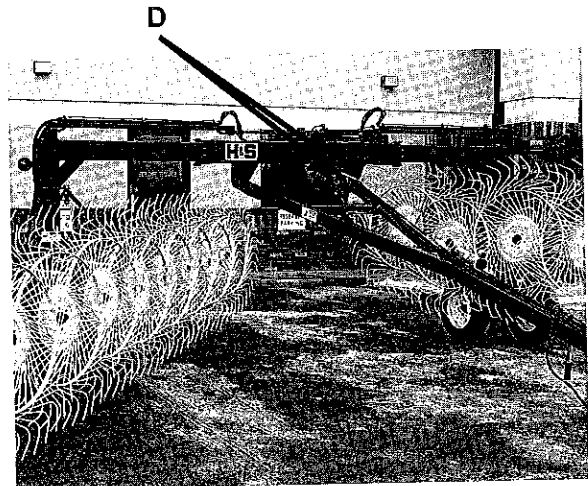
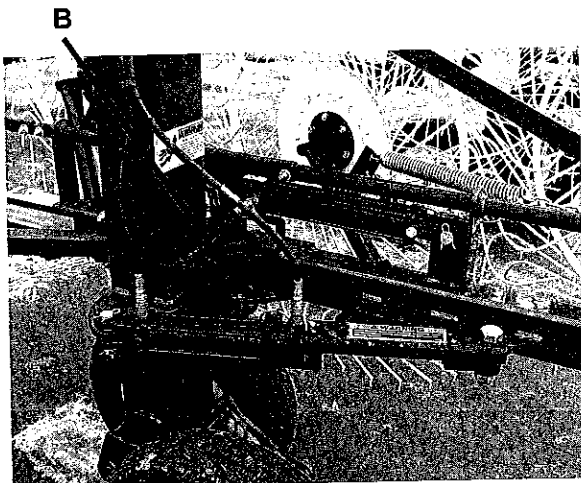
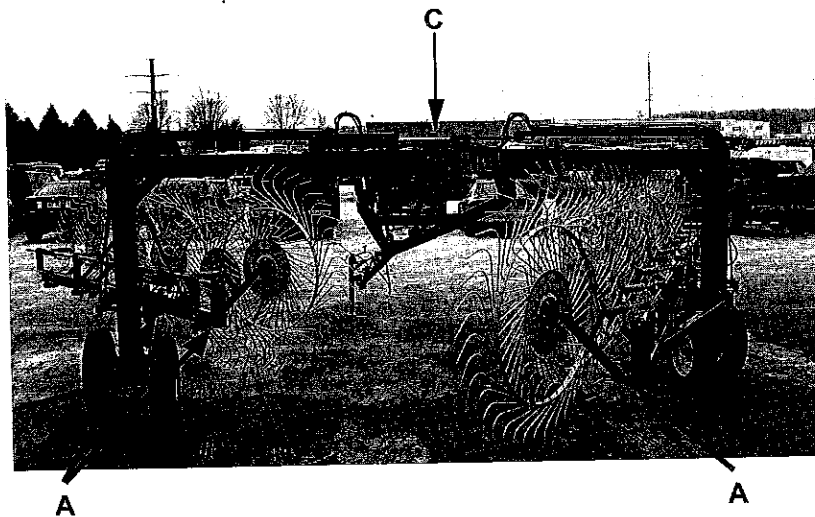
GREASE FITTINGS

There are fifteen grease fittings on the X10 Rake and eighteen on the X13 Rake. If lubricated properly and often enough, it will prolong the life of your X Series Rake. Grease daily during normal use and **before and after storage and after power washing**. Use a good grade of high quality grease. Make sure that grease comes out around the shaft on sleeve type bearings. Wipe off excessive grease to prevent accumulation of chaff or grit around the bearing.

LOCATION

Listed and shown are the description of location and number of grease fittings.

- A. (10) One on each Rake Arm Pivot
- B. (2) One on each Rake Beam Pivot
- C. (1) One on Width Adjustment Cam
- D. (2) Ratchet Jack



DECAL LOCATION

Your H & S X Series Rake was manufactured with operator safety in mind. Located on the X Series Rake are various decals to aid in operation, and warn of caution areas. Pay close attention to all decals.

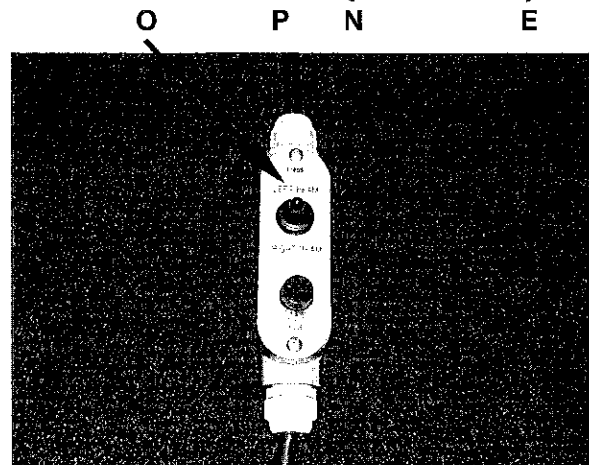
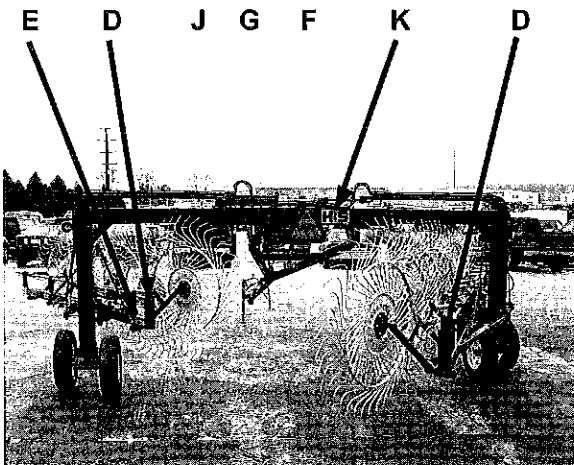
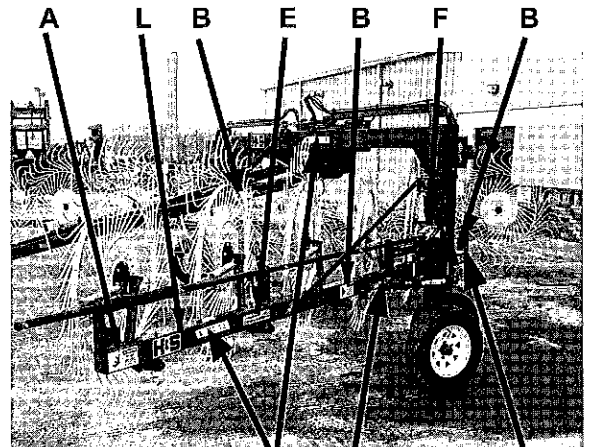
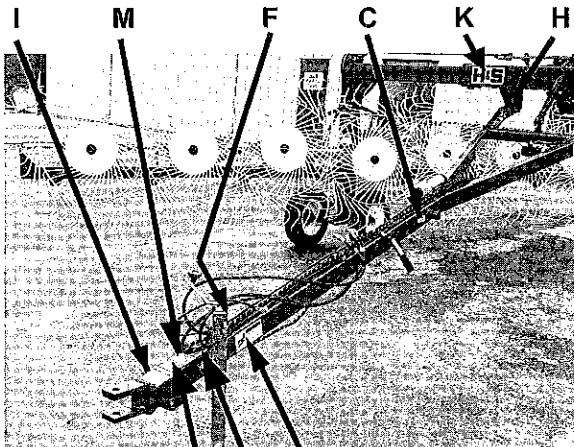


DO NOT REMOVE ANY OF THESE DECALS. IF DECALS ARE LOST, DAMAGED, OR IF X SERIES RAKE IS REPAINTED, REPLACE DECALS. REMEMBER: DECALS ARE FOR YOUR PROTECTION AND INFORMATION.

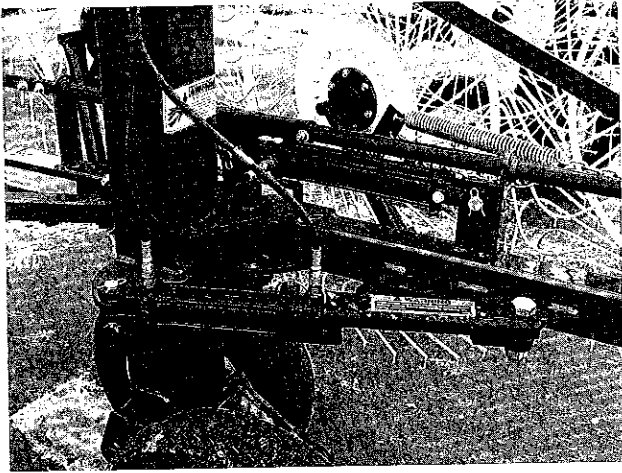
Listed below are the decals on your X Series Rake. These decals may be ordered individually by part number or by ordering a complete set.

ITEM	PART NO.	DESCRIPTION
A.	11694A	(4) DANGER - Stay Clear of Rake
B.	2195	(4) WARNING - Stay Clear of Rake (6) on X13 Model
C.	71188B	Jack Storage
D.	2X9 Red	(2) Red Reflectors (3) on X13 Model
E.	2X9 Amber	(4) Amber Reflectors (5) on X13 Model
F.	11599	(3) WARNING - Do Not Go Near Leaks
G.	H&S	Patent Numbers
H.		Serial Number
I.	72203A	(2) WARNING - Help Avoid Injury
J.	12197A	ATTENTION - Raise Rake Wheels
K.	B12	(2) H & S Decal
L.	B8	(2) H & S Decal
M.	21804	ATTENTION - Never Adjust Frame
N.	22405	(2) WARNING - Install Transport Locks (Optional Hyd. Beam Angle Kit Only)
O.	11806	Beam Control Box Decal (Optional Hyd. Beam Angle Kit Only)
P.	X10/13	X Series Rake Decal

0206-X Rake Complete Set of Decals

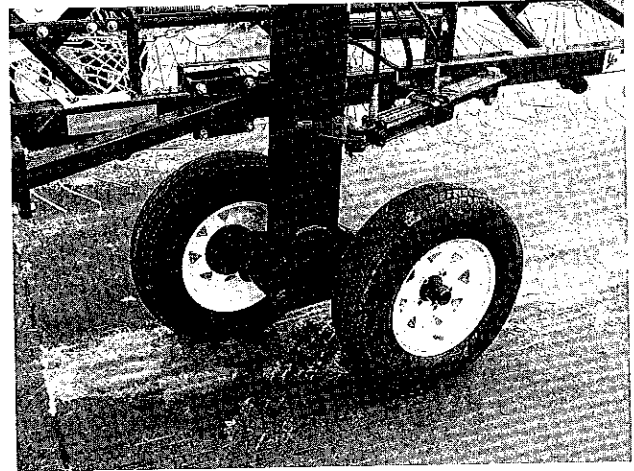


OPTIONAL EQUIPMENT



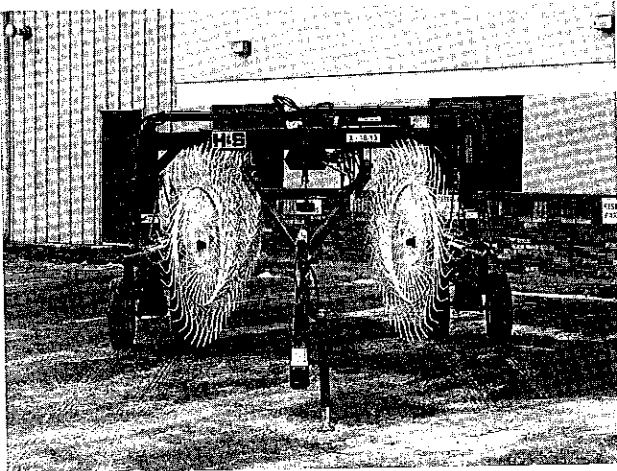
HYDRAULIC BEAM ANGLE

The optional hydraulic beam angle kit is available for the X Series Rakes. This allows the operator to adjust the rake beam angle at any time from the tractor seat. This option can be added to your rake at any time.



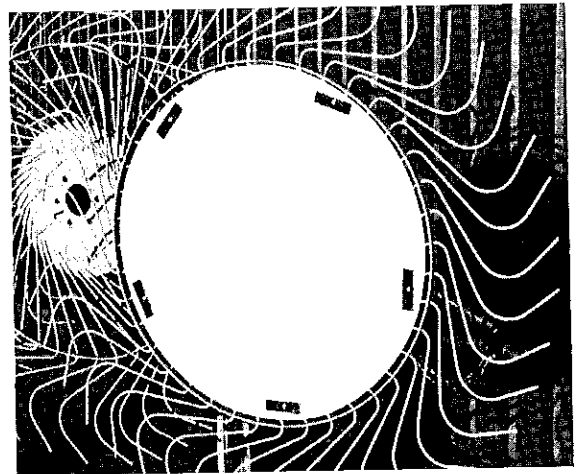
TANDEM AXLE

The optional tandem axle is available for the X Series Rakes. The tandem axles allow the rake to operate smoothly in rough fields and gives more floatation in soft conditions. This option can be added to your rake at any time.



TRANSPORT/WORK LIGHTS

The optional transport lights/work light are available for your X Series Rake. This option provides added safety during transport and also provides better visibility during dusk and night raking. This option can be added to your rake at any time.



RAKE WHEEL WIND GUARDS

The optional rake wheel wind guards are available for your X Series Rake. This option helps the operator stay in control of the windrow during windy conditions. This option can be added to your rake at any time.

TROUBLE SHOOTING



WARNING

MAKE SURE THAT THE TRACTOR IS SHUT OFF AND THE RAKE CAN NOT MOVE BEFORE SERVICING THE X SERIES RAKE. MAINTENANCE AND REPAIR SERVICE WORK TO BE PERFORMED BY A QUALIFIED SERVICE PERSON ONLY.

<u>TROUBLE...</u>	<u>POSSIBLE CAUSE...</u>	<u>POSSIBLE REMEDY...</u>
Main Frame Will Not Open	Hydraulic Lever Not Engaged or Engaged in Wrong Direction	Engage Hydraulic Lever In Opposite Direction
	Hydraulic Hoses Not Connected to Tractor Properly	Check Hydraulic Hoses For Proper Connection
	Hydraulic Hoses Mixed Up With Rake Wheel Lift Hose	Sort Hoses and Re-Couple To Tractor
	Tractor Hydraulics Do Not Have Sufficient Pressure	Tractor Should Have At Least 2250 PSI To Operate Rake Note: Tractor Must Have Forward Or Rearward Motion To Avoid Any Damage To Rake
Rake Wheels Will Not Lower	Transport Lock Hair Pins Still Engaged	Remove Transport Lock Hair Pins and Place in Storage Position (See Page #11)
	Hydraulic Lever Engaged In Wrong Direction	Engage Hydraulic Lever In Opposite Direction
	Hydraulic Hose Not Connected To Tractor Properly	Check Hydraulic Hose For Proper Connection
	Hydraulic Hose Mixed Up With Frame Opening Hoses	Sort Hose and Re-Couple To Tractor
	Tractor Hydraulics Not Able To Operate A Single Acting Cylinder	Check With Your Tractor Dealer How This Can Be Done
Rake Wheels Will Not Raise	Hydraulic Lever Engaged In Wrong Direction	Engage Hydraulic Lever In Opposite Direction
	Hydraulic Hose Not Connected To Tractor Properly	Check Hydraulic Hose For Proper Connection
	Hydraulic Hose Mixed Up With Frame Opening Hoses	Sort Hose and Re-Couple To Tractor

INSTRUCTIONS FOR ORDERING PARTS

All service parts should be ordered through your authorized H & S dealer. They will be able to give you faster service if you will provide them with the following

1. Model & Serial number is located on the inside right pole mount, under center frame.
2. All reference to left or right apply to the machine as viewed from the rear.
3. Parts should not be ordered from illustration only. Please order by complete part number.
4. If your dealer has to order parts - give shipping instructions:

VIA truck - large pieces (please specify local truck lines)

VIA United Parcel Service (include full address)

H&S MFG. CO. INC.	
MARSHFIELD, WIS.	
MOD. NO.	<input type="text"/>
SER. NO.	<input type="text"/>
DESCR.	<input type="text"/>

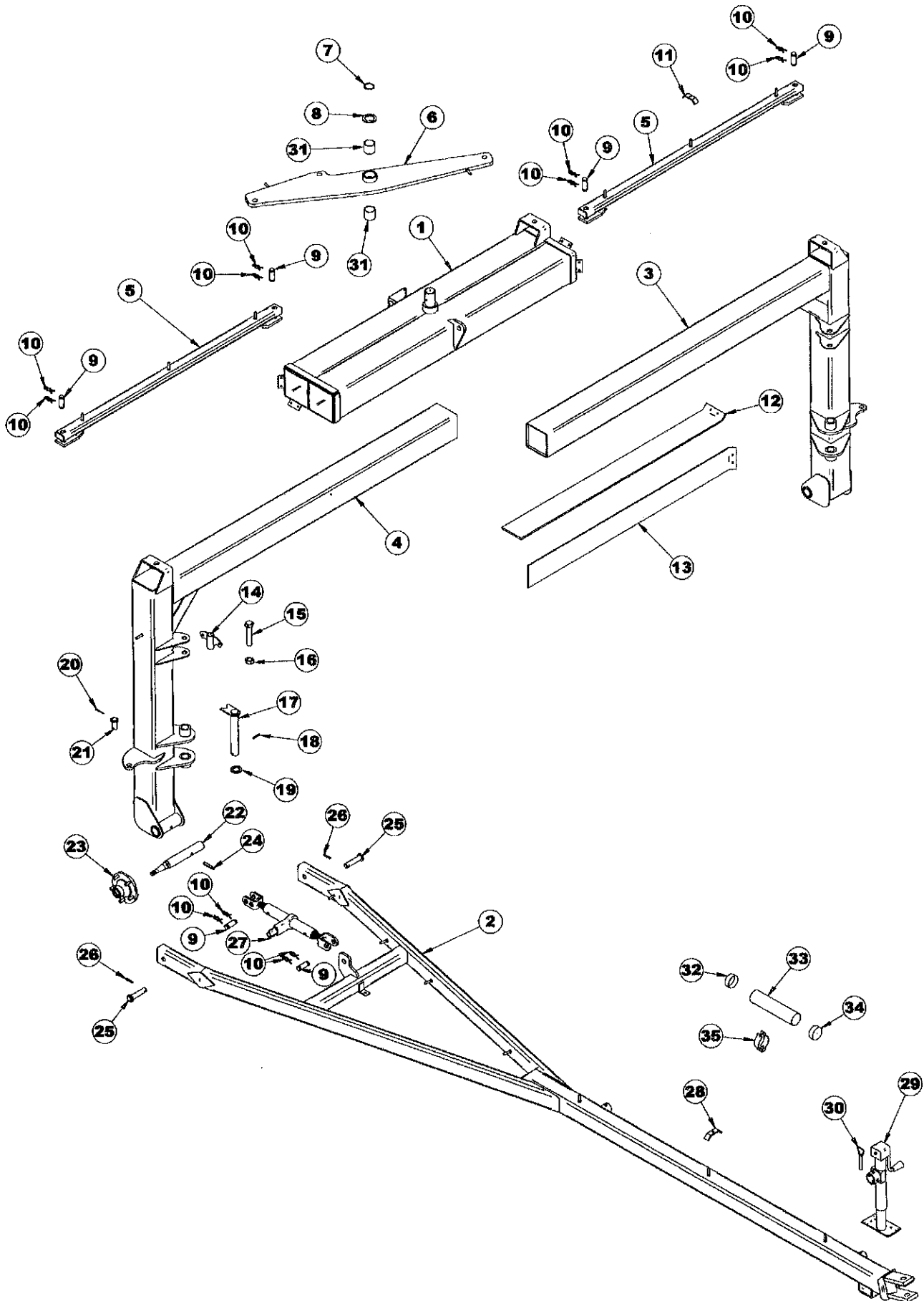
PLEASE RECORD NUMBERS FOR YOUR UNIT FOR QUICK REFERENCE

ABOUT IMPROVEMENTS

H & S IS CONTINUALLY STRIVING TO IMPROVE IT'S PRODUCTS

We must therefore, reserve the right to make improvements or changes whenever it becomes practical to do so without incurring any obligation to make changes or additions to the equipment previously sold.

FIGURE 1



**FIGURE 1
X SERIES RAKE
MAIN FRAME**

ITEM	PART NO.	DESCRIPTION
1.	XR1	Main Frame
2.	XR2	Pole
3.	XR3	Left Axle Upright
4.	XR4	Right Axle Upright
5.	XR5	Width Link
6.	XR6	Width Cam
7.	DWM280	Snap Ring 2"
8.	XR7	Cam Pivot Washer
9.	T143	Jack Pin
10.	T144	Hair Pin
11.	23N67	Two Hose Clamp
12.	XR8	Thick Poly Slide
13.	XR9	Thin Poly Slide
14.	XR10	Stabilizer Pivot
15.	XR11	1" x 5" Bolt GR. 5
16.	BFR178	1" Top Lock Nut
17.	XR12	Beam Pivot Pin
18.	F26	5/16" x 2-1/4" Expansion Pin
19.	XR13	Beam Pivot Pin Washer
20.	HSB52	1/4" x 1-3/4" Cotter Pin
21.	XR14	Transport Lock Pivot
22.	XR15	Removable Spindle
23.	BFR60	Hub
*	BFR57	Seal
*	BFR58	Inner Bearing
*	BFR59	Inner Race
*	BFR61	Outer Race
*	BFR62	Outer Bearing
*	BFR63	Washer
*	BFR64	Nut
*	BFR65	Cotter Pin
*	BFR66	Hub Cap
*	BFR143	Stud Bolt
*	BFR144	Nut
*	BFR67	5 x 15 Wheel
*	BFR128	6.70 x 15 Tire
24.	12V59	3/8" x 2-3/4" Roll Pin
25.	XR16	Pole Hinge Pin
26.	3G22	5/16" x 1-3/4" Roll Pin
27.	T138	Ratchet Jack
28.	HE42	Four Hose Clamp
29.	BFR223	Jack
30.	BFR4	Jack Pin & Chain
31.	XR17	Cam Pivot Bushing
32.	S414	Cap
33.	S415	Manual Holder Tube
34.	S418	Cap w/Hole
35.	S416	Manual Hanger Clamp

NOTE: * (MEANS NOT SHOWN)

FIGURE 2

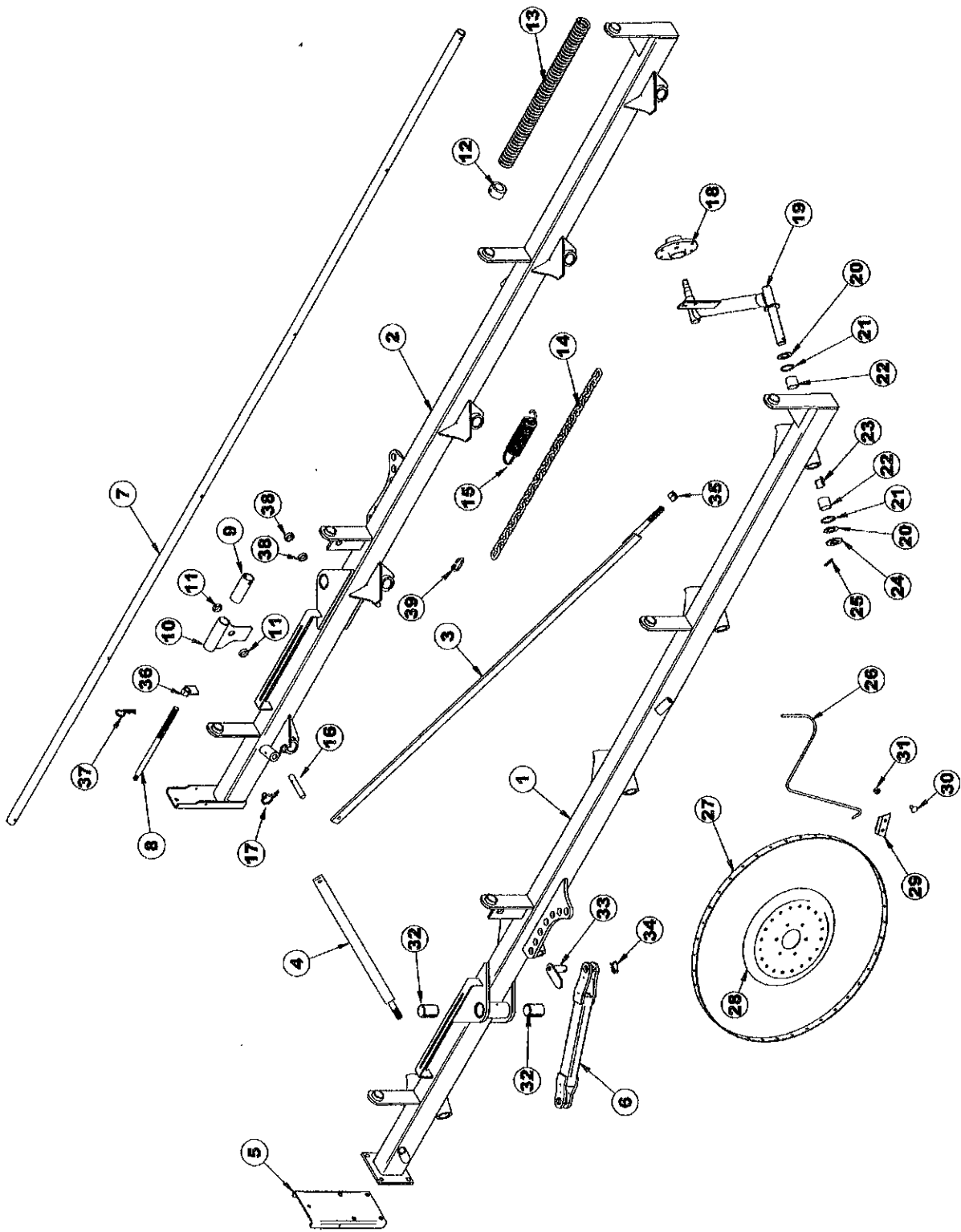
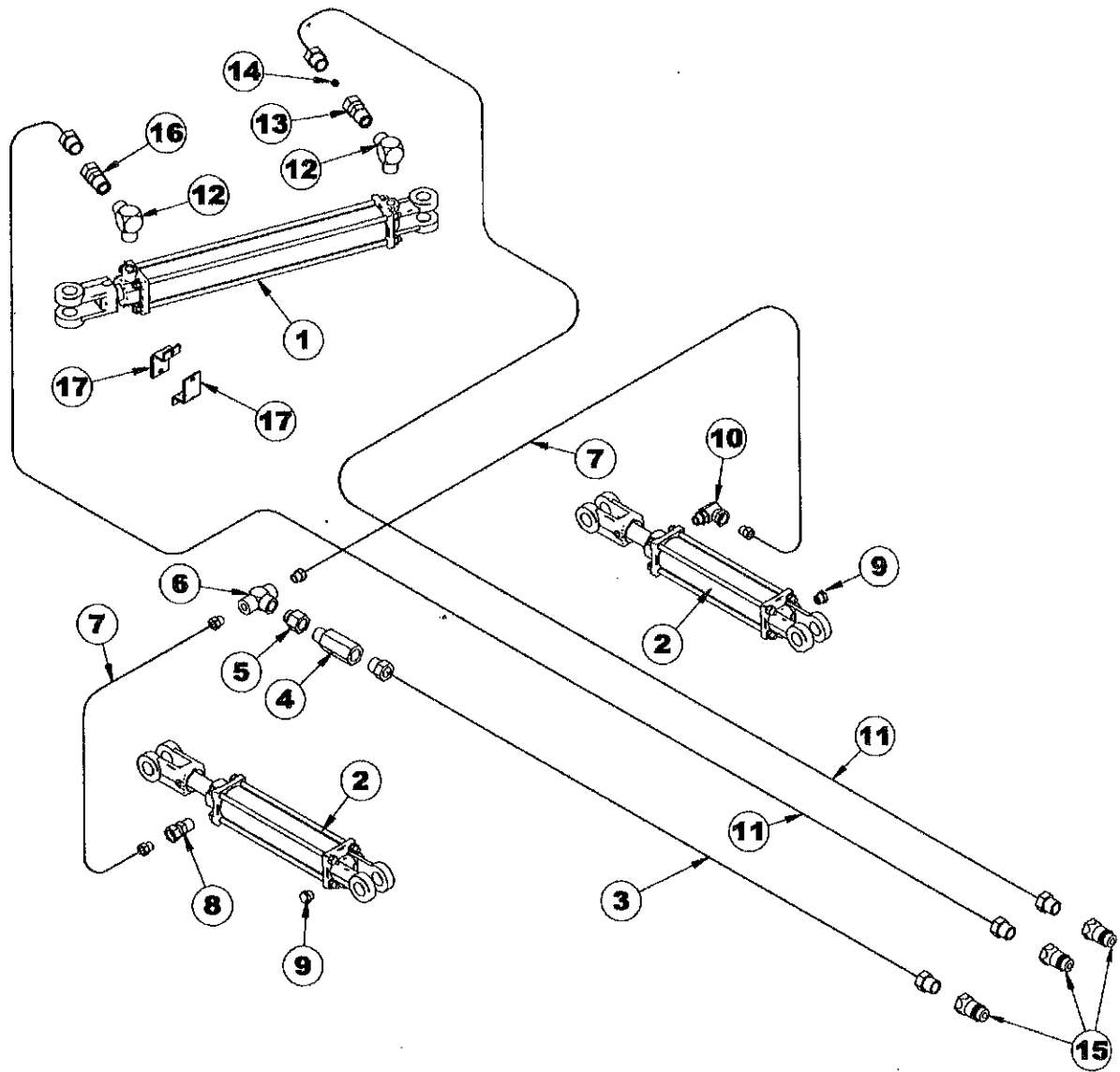


FIGURE 2
X SERIES RAKE
RAKE BEAMS

ITEM	PART NO.	DESCRIPTION
1.	XR18	Right Rake Beam
2.	XR19	Left Rake Beam
3.	XR20	Tension Stabilizer
4.	XR21	Short Tension Stabilizer
5.	XR22	Lift Pipe Stop
6.	XR23	Transport Arm
7.	XR24	Main Lift Pipe
8.	HD154	Acme Rod
9.	XR25	Long Lift Pipe Collar
10.	XR26	Lift Cylinder Slide
11.	K132	Pipe Spacer
12.	BFR82	Pipe Clamp
13.	XR27	Heavy Lowering Spring
14.	XR28	Rake Arm Chain
15.	BFR138	Rake Arm Spring
16.	XR29	Stop Pin
17.	DWM324	Safety Snap Pin
18.	BFR32	Rake Wheel Hub
*	T163	Seal
*	T164	Inner Bearing
*	T165	Inner Race
*	T171	Outer Race
*	T170	Outer Bearing
*	T172	Nut
*	T169	Cotter Pin
*	T173	Hub Cap
*	T168	10mm x 25mm Bolt
*	T166	10mm Nut
19.	BFR437	Rake Arm RH
*	BFR436	Rake Arm LH
20.	BFR221	Poly Washer
21.	S99	O-Ring
22.	G16	Bushing
23.	XR30	Wide Bearing Spacer
24.	BFR229	Rake Arm Washer
25.	3G22	5/16" x 1-3/4" Roll Pin
26.	T176	Rake Wheel Tooth
27.	T177	Outer Ring
28.	T179	Rake Wheel Center
29.	T178	Rake Tooth Clip
30.	T175	10mm x 25mm Carriage Bolt
31.	BFR625	10mm Lock Nut
*	T174	Rake Wheel LH
*	BFR31	Rake Wheel RH
32.	WM282	Split Bushing #175-150-125
33.	XR31	Transport Lock Pin
34.	F56	Lynch Pin
35.	T133	3/4" NF Lock Nut
36.	BFR426	Rake Pressure Handle
37.	BFR137	Hair Pin
38.	X94	5/16" Pipe Spacer
39.	XR65	1/4" Quick Link

NOTE: * (MEANS NOT SHOWN)

FIGURE 3



**FIGURE 3
X SERIES RAKE
HYDRAULICS**

ITEM	PART NO.	DESCRIPTION
1.	XR32	Hydraulic Cylinder 3-1/2" x 16"
2.	16SV171A	Hydraulic Cylinder 2" x 10"
3.	XR33	Hydraulic Hose 1/4" x 240" 1/2"MP & 1/2"MP
4.	BFR554	Flow Valve
5.	BFR555	Adapter
6.	BFR74	3/8" Female Tee
7.	XR34	Hydraulic Hose 1/4" x 180" 3/8"MP & 3/8"MP
8.	BFR122	3/8" Male Union Adapter
9.	BFR70	3/8" Vent Plug
10.	DWM110	3/8" Street Elbow w/90° Swivel
11.	XR35	Hydraulic Hose 1/4" x 270" 1/2"MP & 1/2"MP
12.	HE58	1/2" Street Elbow
13.	LW174	1/2" Male Union Adapter (Threaded)
14.	XR36	.062 Orifice .250 Pipe Plug
15.	DWM205	Male Quick Coupler
16.	WM174	1/2" Male Union Adapter (Unthreaded)
17.	XR47	1" Cylinder Spacer

FIGURE 4

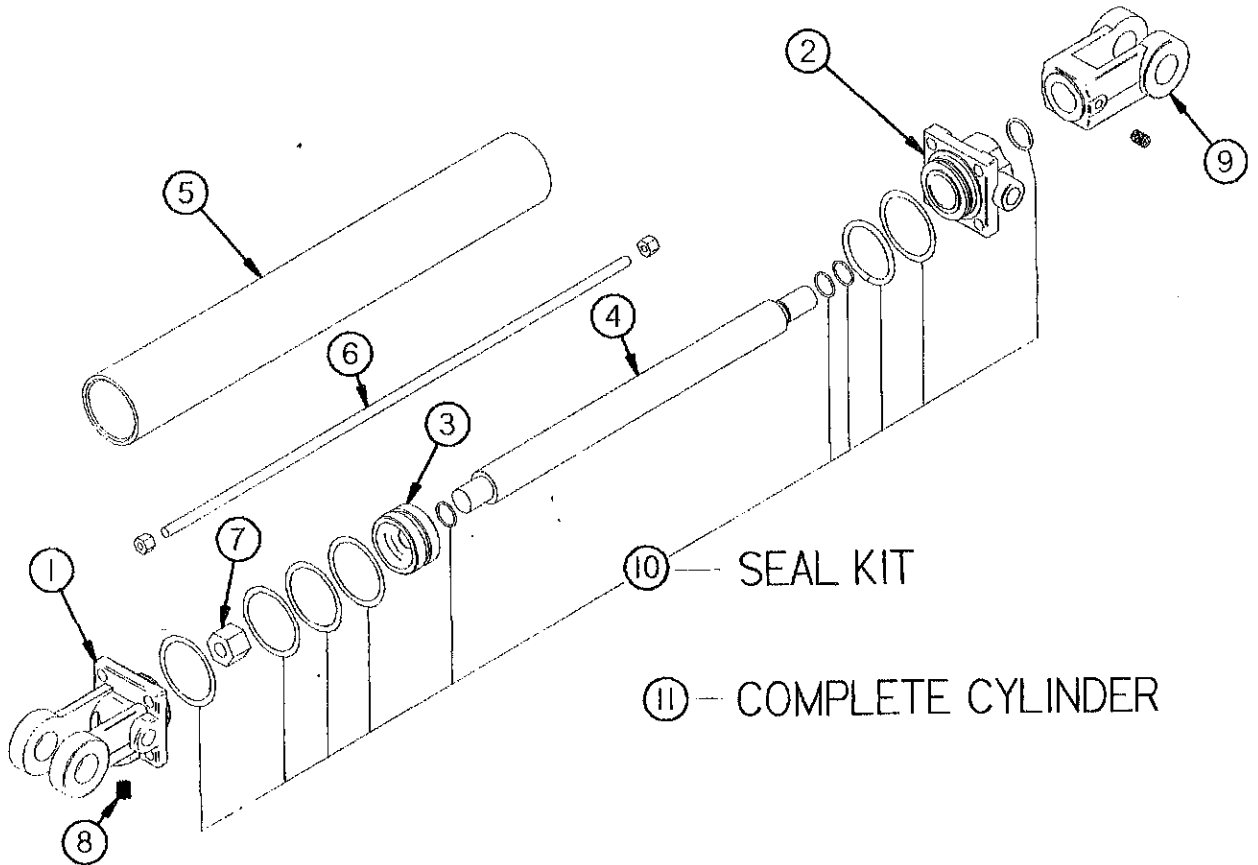


FIGURE 4
**X SERIES RAKE FRAME WIDTH ADJUSTMENT
 HYDRAULIC CYLINDER 3-1/2" X 16"**

ITEM	PART NO.	DESCRIPTION
1.	XR55	Clevis Cap
2.	XR56	Rod Cap
3.	XR57	Piston
4.	XR58	Rod
5.	XR59	Cylinder Tube
6.	XR60	Tie Rod
7.	XR61	Piston Nut
8.	XR62	Plug
9.	XR63	Rod Clevis
10.	XR64	Seal Kit
11.	XR32	Complete Cylinder

FIGURE 5

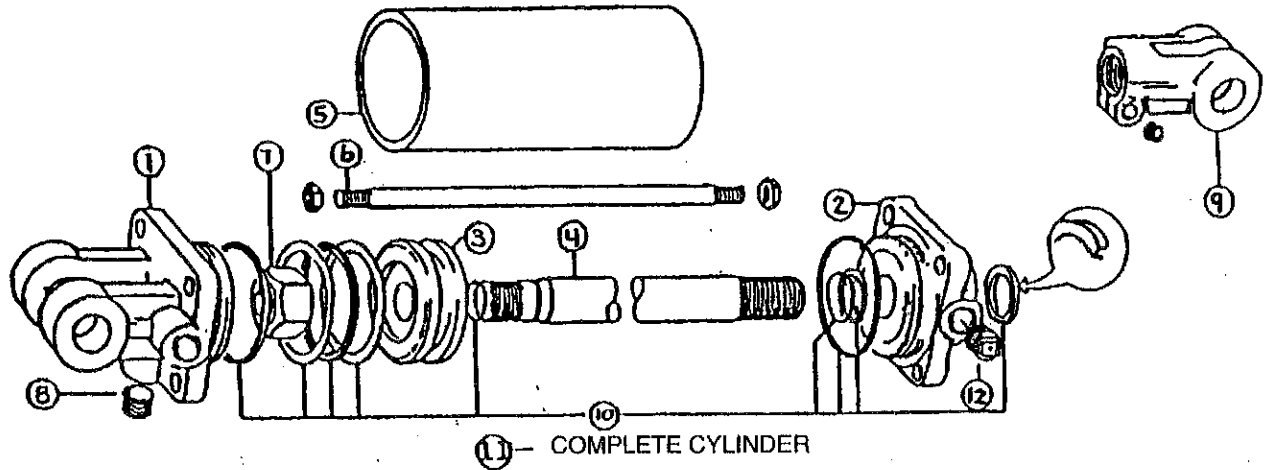


FIGURE 5
X SERIES RAKE (RAKING) WHEEL LIFT
HYDRAULIC CYLINDER 2" X 10"

ITEM	PART NO.	DESCRIPTION
1.	23N142A	Clevis Cap
2.	23N143A	Rod Cap
3.	23N144	Piston
4.	16SV168A	Rod
5.	16SV169	Cylinder Tube
6.	16SV170	Tie Rod
7.	23N148	Piston Nut
8.	23N149	Plug
9.	23N150A	Rod Clevis
10.	23N151	Seal Kit
11.	16SV171A	Complete Cylinder
12.	BFR70	Vent Plug

FIGURE 6

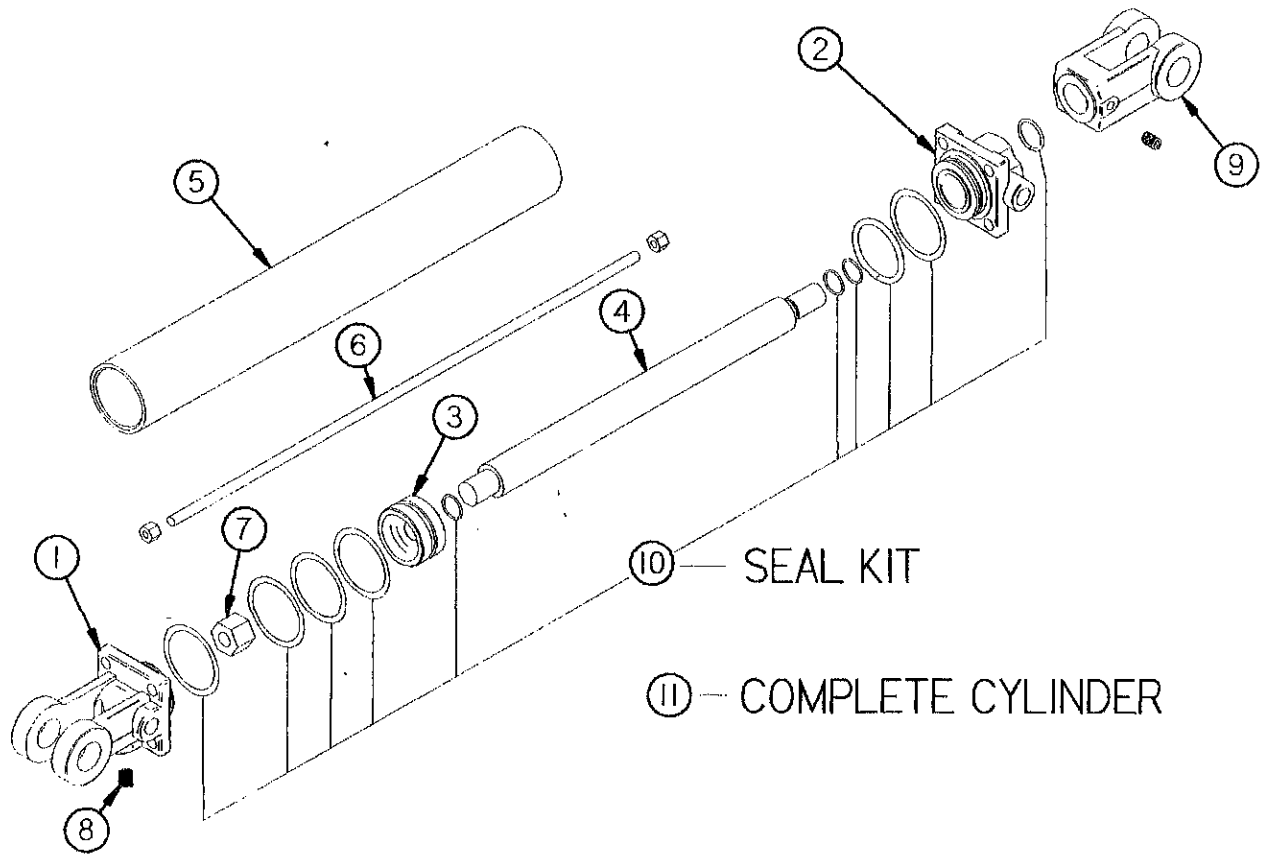


FIGURE 6
X SERIES RAKE OPTIONAL BEAM ANGLE
HYDRAULIC CYLINDER 2" X 8"

ITEM	PART NO.	DESCRIPTION
1.	23N142A	Clevis Cap
2.	23N143A	Rod Cap
3.	23N144	Piston
4.	T134A	Rod
5.	BFR68	Cylinder Tube
6.	T186	Tie Rod
7.	23N148	Piston Nut
8.	23N149	Plug
9.	23N150A	Rod Clevis
10.	23N151	Seal Kit
11.	BFR69A	Complete Cylinder

FIGURE 7

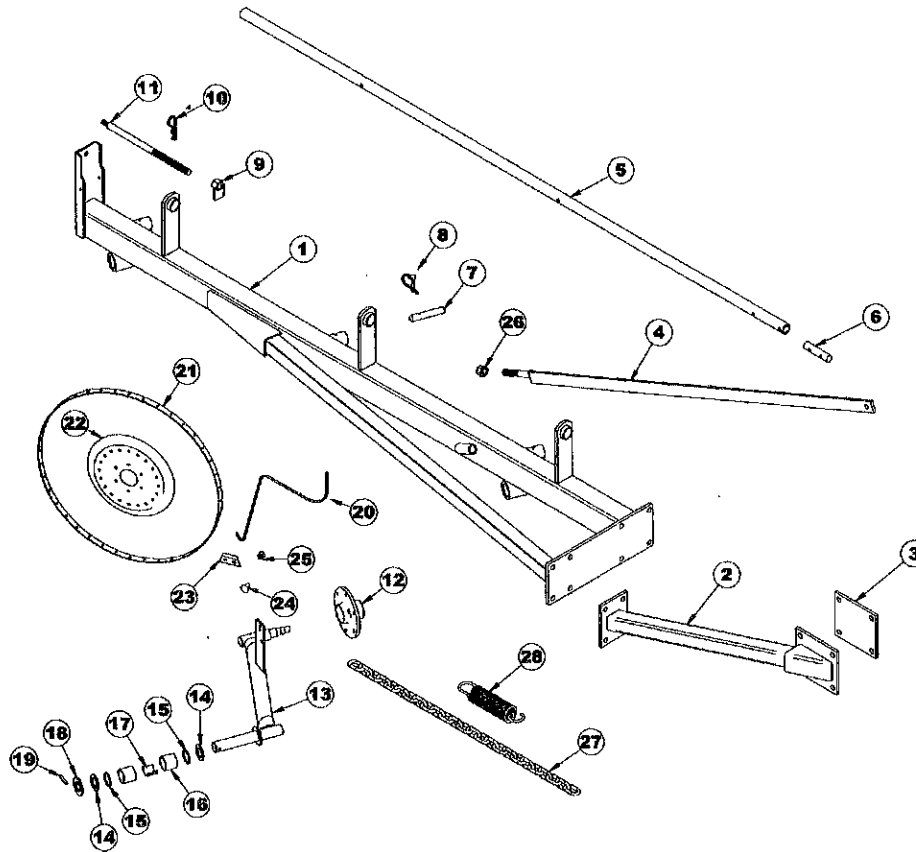


FIGURE 7
X SERIES RAKE
OPTIONAL EXTENSION

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1.	XR37	X-Rake Extension	*	T173	Hub Cap
2.	XR38	Forward Brace	*	T168	10mm x 25mm Bolt
3.	XR39	Forward Brace Front Bracket	*	T166	10mm Nut
4.	XR20	Tension Stabilizer	13.	BFR437	Rake Arm RH
5.	XR40	Extension Lift Pipe	14.	BFR221	Poly Washer
6.	XR41	Extension Lift Pipe Connector	15.	S99	O-Ring
7.	XR29	Stop Pin	16.	G16	Bushing
8.	DWM324	Safety Snap Pin	17.	XR30	Wide Bearing Spacer
9.	BFR426	Rake Pressure Handle	18.	BFR229	Rake Arm Washer
10.	BFR137	Hair Pin	19.	3G22	5/16" x 1-3/4" Roll Pin
11.	HD154	Acme Rod	20.	T176	Rake Wheel Tooth
12.	BFR32	Rake Wheel Hub	21.	T177	Outer Ring
*	T163	Seal	22.	T179	Rake Wheel Center
*	T164	Inner Bearing	23.	T178	Rake Tooth Clip
*	T165	Inner Race	24.	T175	10mm x 25mm Carriage Bolt
*	T171	Outer Race	25.	BFR625	10mm Lock Nut
*	T170	Outer Bearing	26.	T133	3/4" NF Lock Nut
*	T172	Nut	27.	XR28	Rake Arm Chain
*	T169	Cotter Pin	28.	BFR138	Rake Arm Spring

NOTE: * (MEANS NOT SHOWN)

FIGURE 8

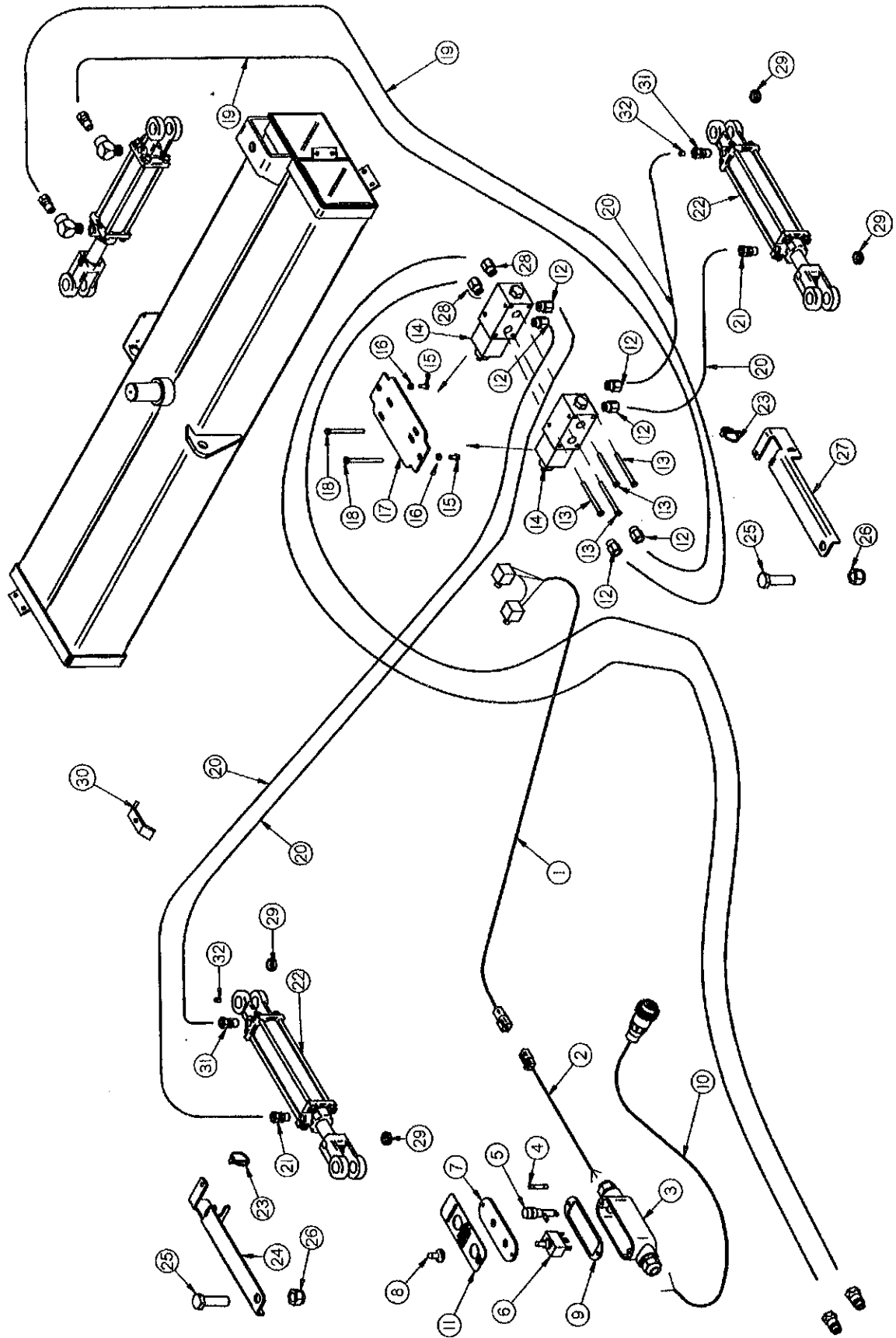


FIGURE 8
X SERIES RAKE
OPTIONAL HYDRAULIC BEAM ANGLE

ITEM	PART NO.	DESCRIPTION
1.	XR66	Pole Cord (18')
2.	WM284	Tractor Supply Cord (5'6")
3.	16SV316	Control Box
4.	16SV232	Fuse
5.	16SV231	Fuse Holder
6.	HD207	Switch SPDT
7.	16SV318	Control Box Cover
8.	16SV235	Switch Boot
9.	16SV317	Control Box Gasket
10.	16SV271	Control Box Power Supply w/Plug in Slots
11.	11806	Decal
12.	DWM269	3/4" O-Ring to 3/8" Pipe Swivel Adapter
13.	23N1	5/16" x 5" Bolt GR. 5
*	RGB39	5/16" Lock Washer
*	12V65	5/16" Nut
14.	FR81	Solenoid Valve
*	FR84	O-Ring Seal Kit
15.	80N57	3/8" x 3/4" Bolt GR. 5
16.	B68	3/8" Lock Washer
17.	XR44	Mounting Plate
18.	XR45	1/4" x 3" Socket Head Cap Screw
*	K84	1/4" Lock Washer
*	LW140	1/4" Nut
19.	DWM108	1/4" x 56" Hydraulic Hose 3/8"MP & 1/2"MP
20.	XR47	1/4" x 180" Hydraulic Hose 3/8"MP & 3/8"MP
21.	DWM233	3/8" Union Adapter
22.	BFR69A	2" x 8" Cylinder
23.	BFR443	Clip Pin
24.	XR49	Right Transport Lock
25.	BFR177	1" x 4" Bolt GR. 5
26.	BFR178	1" Lock Nut
27.	XR48	Left Transport Lock
28.	XR54	Female Union Adapter 3/4" O-Ring to 1/2" Pipe
29.	K132	Pipe Spacer
30.	HE42	Two Hose Clamp
31.	T244	3/8" Union Adapter w/.042 Orifice
32.	DWM250	.042 Orifice

NOTE: * (MEANS NOT SHOWN)

FIGURE 9

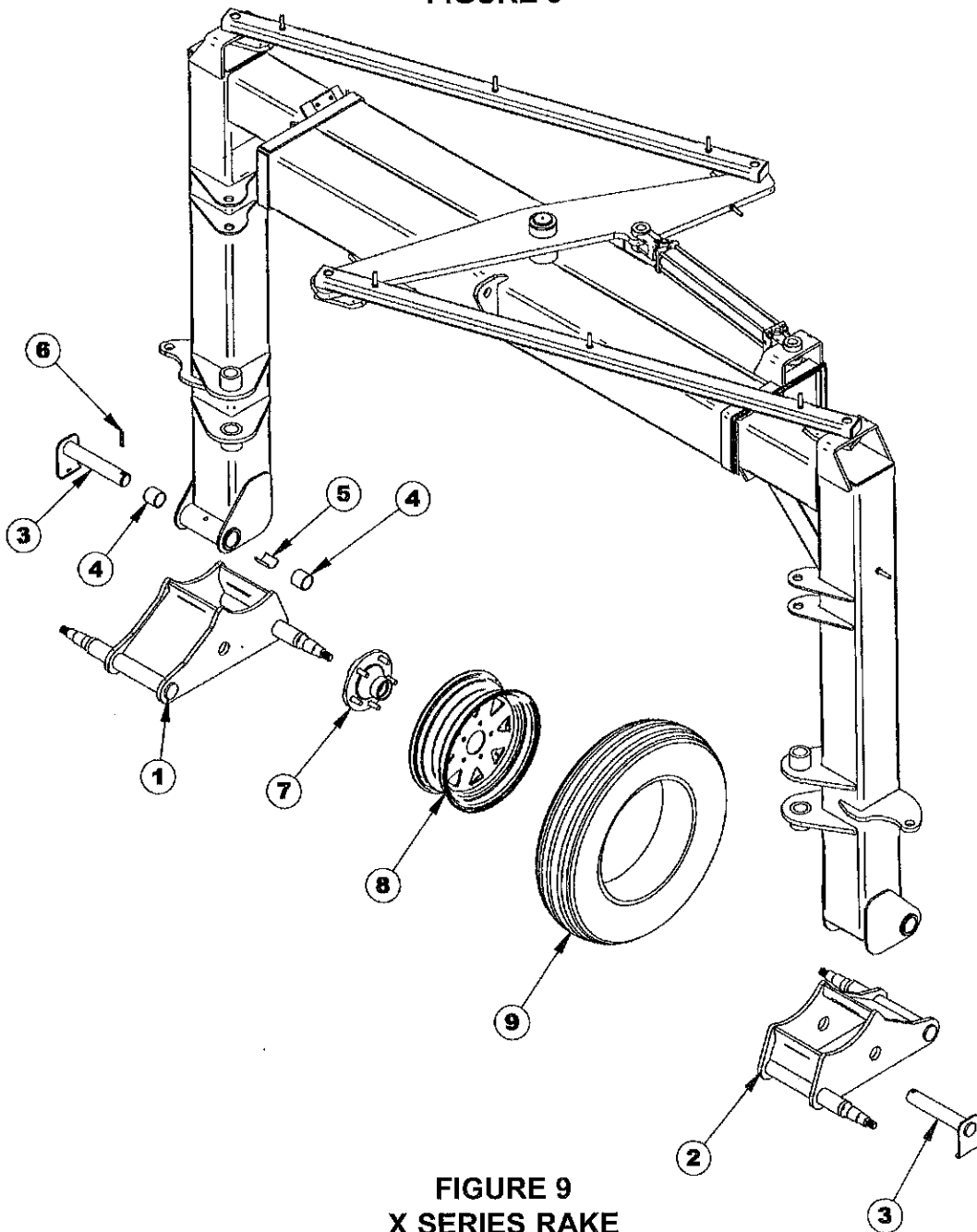


FIGURE 9
X SERIES RAKE
OPTIONAL TANDEM AXLE

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1.	XR50	Right X-Rake Tandem	*	CAT9	Outer Race
2.	XR51	Left X-Rake Tandem	*	CAT10	Outer Bearing
3.	XR52	Tandem Pivot Pin	*	BFR63	Washer
4.	BFR625	Bushing	*	T35	Nut
5.	XR53	Tandem Bushing Spacer	*	T37	Cotter Pin
6.	12V59	3/8" x 2-3/4" Roll Pin	*	CAT13	Hub Cap
7.	CAT8	Ground Wheel Hub	*	CAT128A	Hub Stud
*	CAT5	Seal	*	CAT14	Hub Nut
*	CAT6	Inner Bearing	8.	CAT195	13 x 4.5 Wheel
*	CAT7	Inner Race	9.	CAT198	ST175/80D13 Tire

NOTE: * (MEANS NOT SHOWN)

FIGURE 10

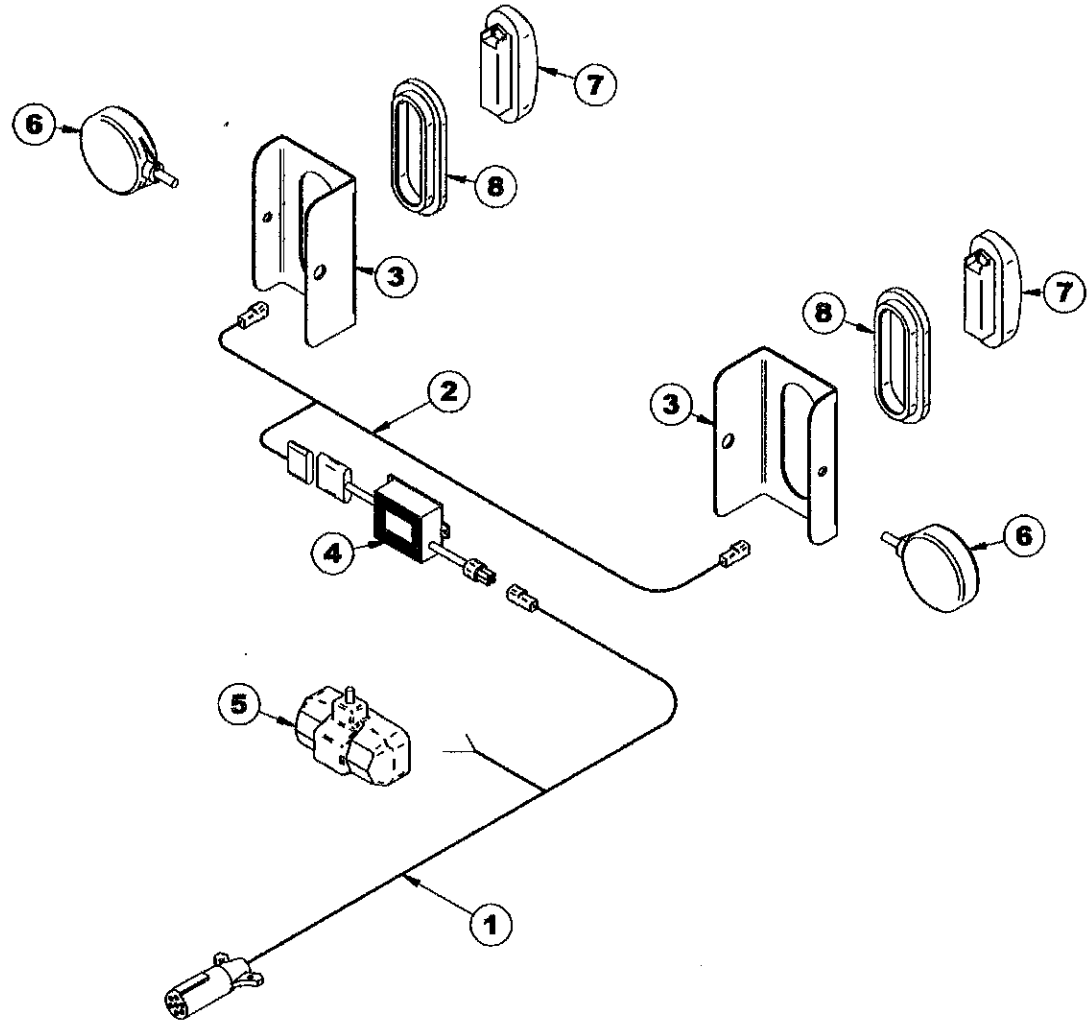


FIGURE 10
X SERIES RAKE
OPTIONAL TRANSPORT/WORK LIGHTING

ITEM	PART NO.	DESCRIPTION
1.	MHD1	Light Harness Pole Cord
2.	MHD2	Light Harness Frame Cord
3.	HD148	Light Bracket
4.	S441	Light Module
5.	DWM130	Work Light
6.	DWM129	Yellow Hazard Light
7.	S310	Red Tail Light
8.	S308	Rubber Light Mount

H&S X SERIES RAKE

Your new H&S X Series Rake has been manufactured of the finest quality materials and components. The performance you get from your machine is largely dependent upon how well you read and understand this manual and apply this knowledge. There is a right and a wrong way to do everything. Please do not assume that you know how to operate and maintain your X Series Rake before reading this manual carefully. Keep this manual available for ready reference.

X SERIES SPECIFICATIONS

	X10	X13
Number of Wheels.....	10.....	13
Wheel Diameter.....	55".....	55"
Teeth Per Wheel.....	40.....	40
Tooth Diameter.....	7mm.....	7mm
Transport Width.....	10'4".....	10'4"
Transport Length.....	19'10".....	28'4"
Maximum Raking Width.....	22'.....	22'
Weight.....	2290 lbs.....	2640 lbs.
Rake Wheel Hubs.....	Tapered Roller Bearings.....	
Hitch Jack.....	Standard.....	
Standard Transport Wheels.....	(2) 6.70 x15".....	
Optional Transport Wheels.....	(4) ST175/80D13.....	
Tail & Work Lights.....	Optional.....	
Rake Wheel Wind Guards.....	Optional.....	
Horsepower Requirements.....	40 H.P.....	

Warranty:

See Warranty on Page #1

NOTE:

Determine right or left side of X Series Rake by viewing it from the rear. If instructions or parts lists call for hardened bolts see page 9 to identify.

H&S MANUFACTURING CO. INC.

2608 S. Hume Ave.
P.O.Box 768 - Telephone (715) 387-3414
FAX (715) 384-5463
MARSHFIELD, WI 54449



H&S WAREHOUSE Rt #5 and 76
P.O. Box 1260 - Telephone (716) 736-7595
FAX (716) 736-7596
RIPLEY, NY 14775