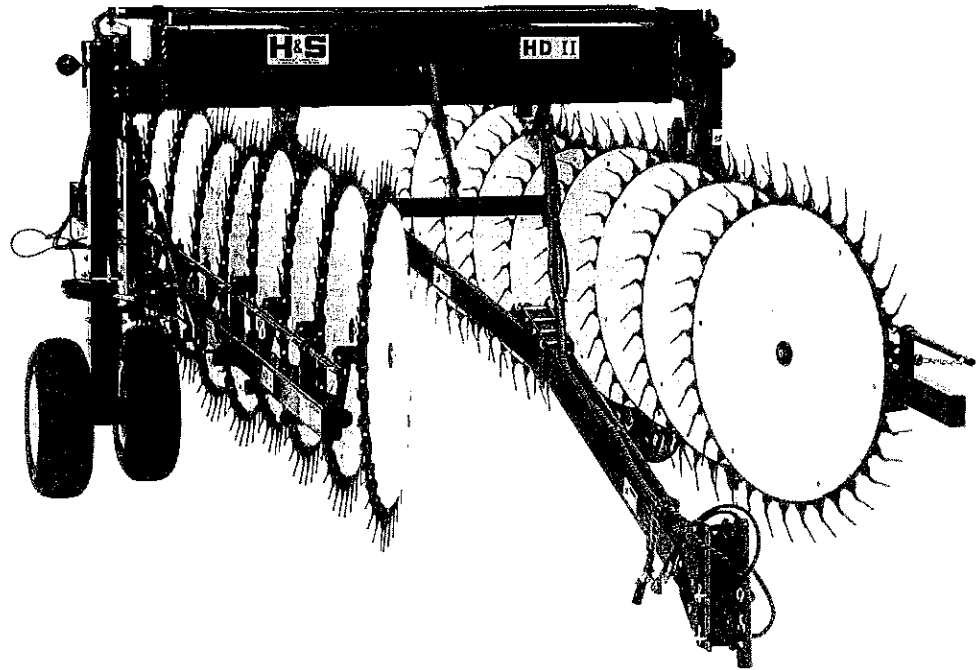


H&S

HD II 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

HSMFG20107

Manufactured By

H&S MANUFACTURING CO., INC.

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

H & S

HD II 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

IMPORTANT!

Tear on dotted line, provide the information requested on the card. The H&S Warranty is valid "**only**" after this card is received and recorded at H&S Mfg. Co. Mail at once. No postage is required in the U.S.A.



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL Permit No.195 Marshfield, WI 54449

POSTAGE WILL BE PAID BY ADDRESSEE

H&S Manufacturing Co., Inc.
PO Box 768
Marshfield, WI 54449-9963



AFTER COMPLETION, DEALER SHOULD REMOVE AND RETAIN FOR RECORDS

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

After the HD II 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.
- Control Box with mount accompanies rake.

(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 HD II 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 18 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



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



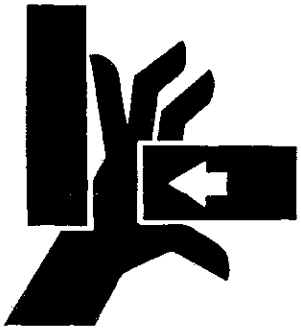
! DANGER

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



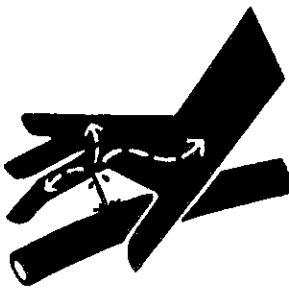
WARNING

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.

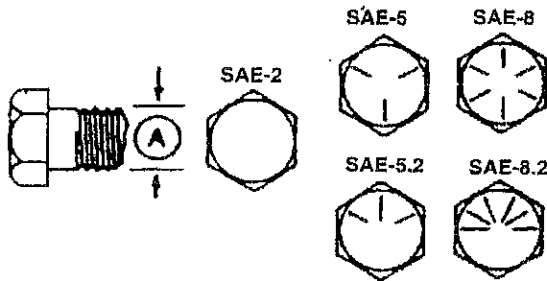
To reduce stress on rake arms, lift pipe, springs and spring brackets, reduce oil flow from tractor to lift cylinders whenever possible.

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.

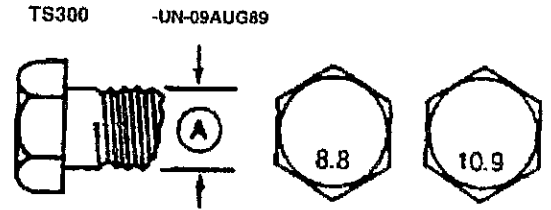
Study The Above Safety Rules
ATTENTION - BE ALERT - YOUR SAFETY IS INVOLVED

CAP SCREW TORQUE VALUES



Inch Cap Screw Head Markings

TS299 -UN-09AUG89



Metric Cap Screw Head Markings

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.

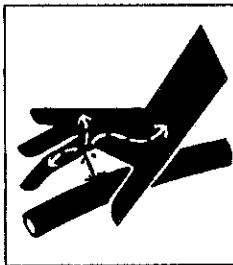
Make sure fastener threads are clean and you properly start thread engagement. This will prevent them from falling when tightening.

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 (9.5L x 15SL to 44 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 at the rear of the front pole assembly (See Picture Below).
5. Connect hydraulic hoses for all rake functions to a double acting valve on the tractor.
6. Check tractor hydraulic system, determine if tractor is closed or open center system. The rake is factory set-up for closed center (To change to open center, see instructions on page 33).
7. Mount control box in a convenient location on tractor. Plug 7-pin electrical connector on main harness of rake into tractor (This will power up the control box, work lighting and safety lighting). Plug control box into main harness. Note: If tractor is not equipped with a 7-pin connector the tractor must be outfitted with one.
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 HD II Rake by viewing it from the rear. If instructions or parts lists call for hardened bolts. See page # 9 to identify.

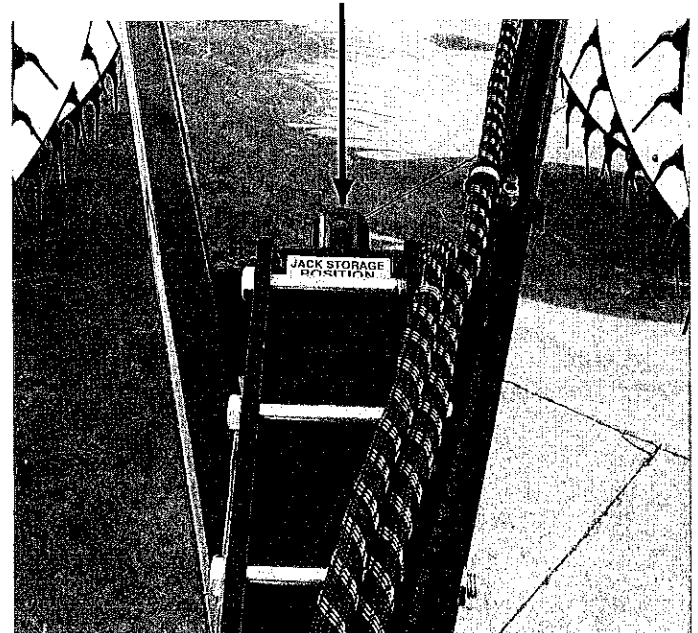


WARNING

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.

JACK STORAGE POSITION

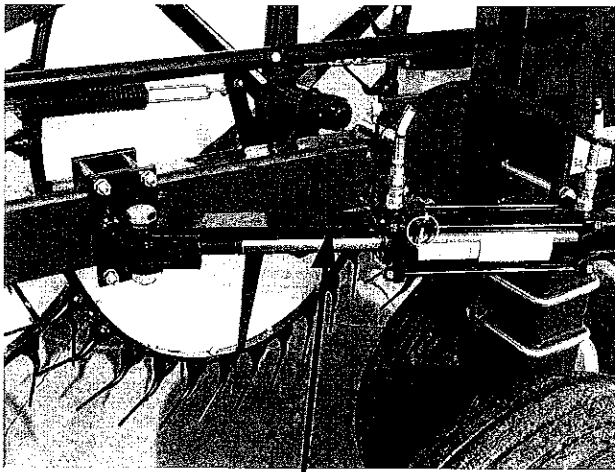


OPERATION *(Continued)*

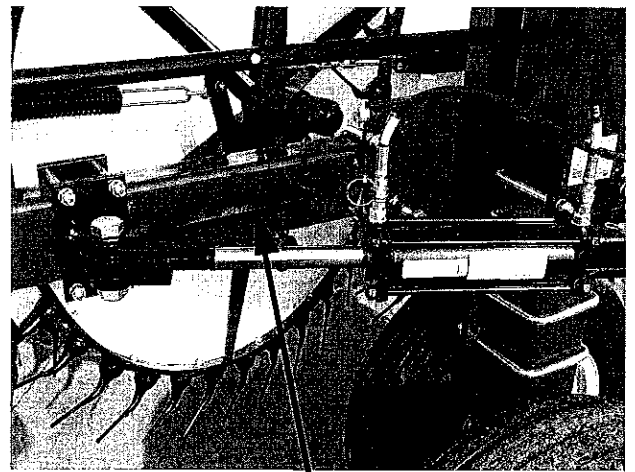
TRANSPORT LOCKS

RAKE BEAM LOCKS

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. (A) shows the transport lock in the engaged position. (B) shows the transport lock in the storage position, to be used when in the raking mode.



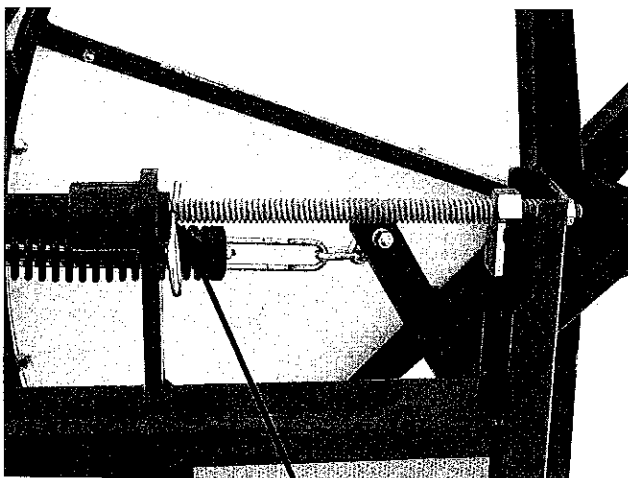
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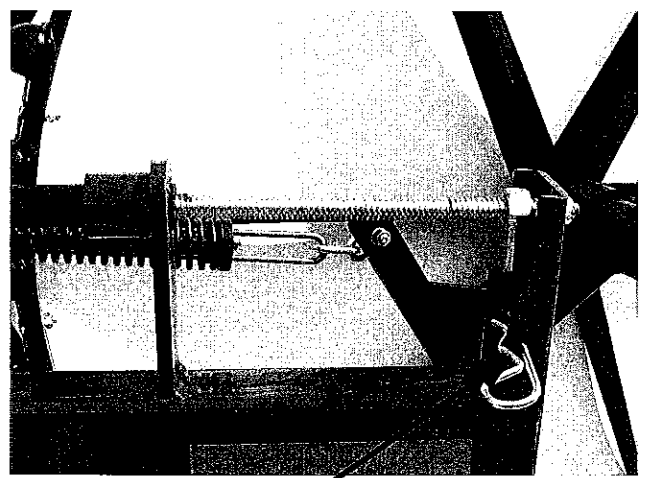
B

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 (C). When in the down, or raking position, place the locking hair pin in the convenient storage position as shown (D).



C



D

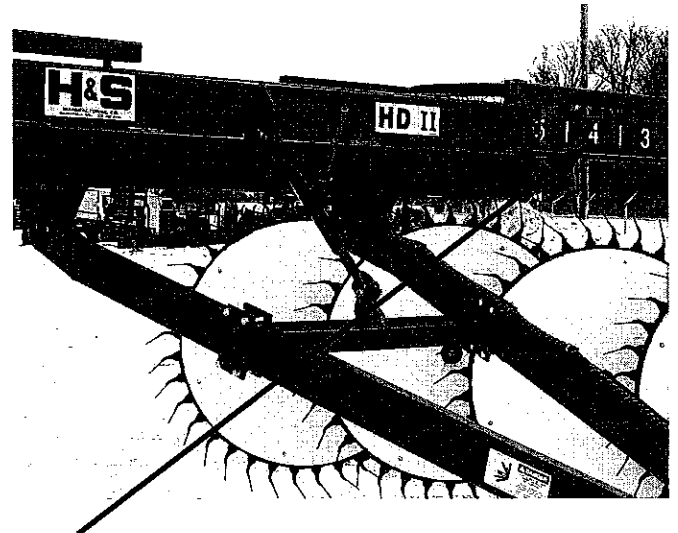
OPERATION (Continued)

NOTE: TRACTOR HYDRAULIC LEVER MUST BE ENGAGED TO PROVIDE OIL FLOW TO RAKE.

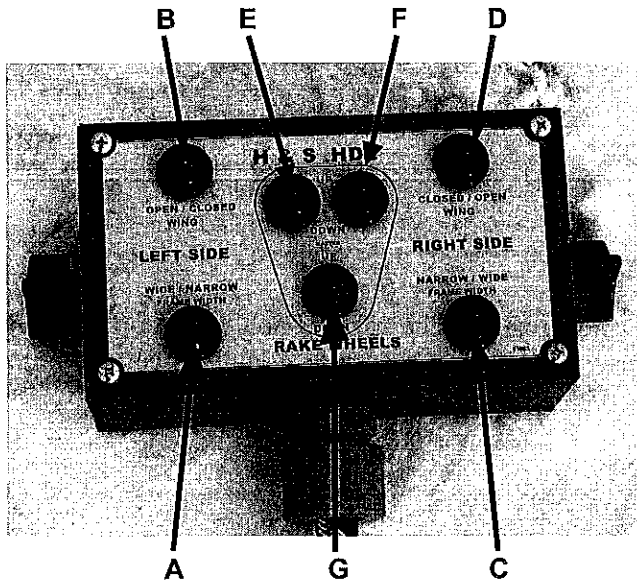
CENTER FRAME

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.** Each side has its own switch on the control box. There is a convenient number system on the two slider tubes to let the operator know where each side is located.

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.



NUMBERS

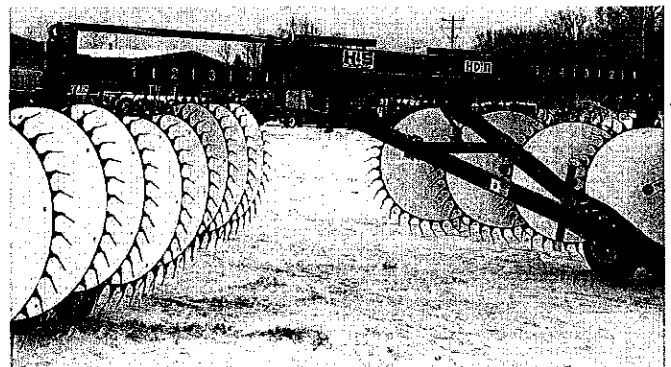


CONTROL BOX

The control box allows the operator to make many adjustments from the tractor seat. It is set up in three basic areas. The left side has two switches, one (A) for sliding the left center frame in or out, the other switch (B) controls the rake wheel beam angle. The right side also has two switches one (C) for sliding the right center frame in or out, the other switch (D) controls the rake wheel beam angle. In the center of the control box there are three switches. The switch on the left (E) will raise and lower the the left side rake wheels. The switch on the right (F) will raise and lower the right side rake wheels. The switch in the center (G) will raise and lower both left and right rake wheels.

RAKING ANGLE/WINDROW WIDTH

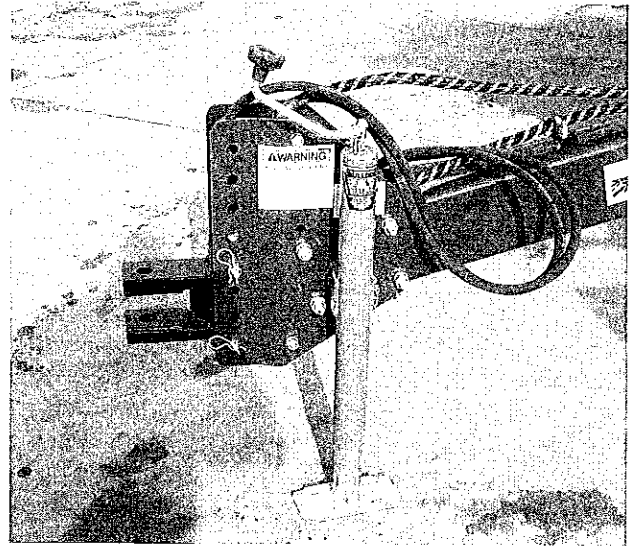
The right and left rake wheel beam can be angled separately by their own switch on the control box. By angling each side more or less the desired windrow width can be accomplished.




ADJUSTMENTS

HITCH

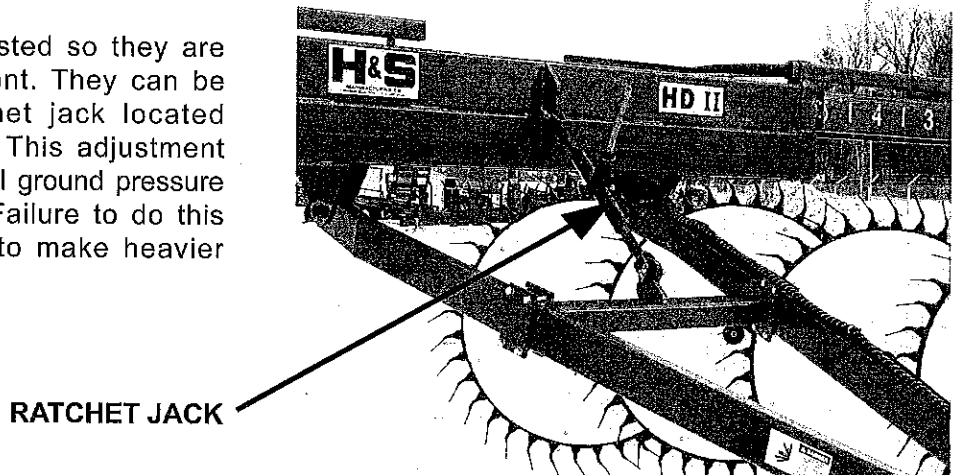
There are ten different positions to adjust the hitch on the HD II Rake. Hitch should be adjusted so rake beams are level or parallel to the ground.



	<p>⚠ DANGER</p> <p>STAY CLEAR OF RAKE WHEN OPENING OR CLOSING.</p> <p>FAILURE TO HEED THIS WARNING MAY RESULT IN PERSONAL INJURY OR DEATH</p> <p>KEEP CLOTHING, YOURSELF AND OTHERS WELL CLEAR.</p>
--	---

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 contact with the ground.

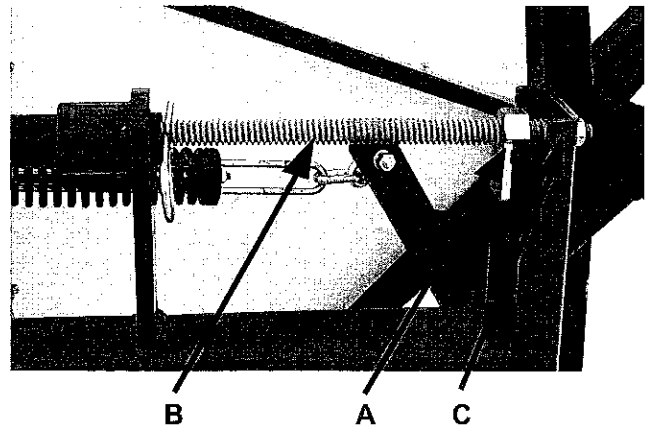


RATCHET JACK

ADJUSTMENTS (Continued)

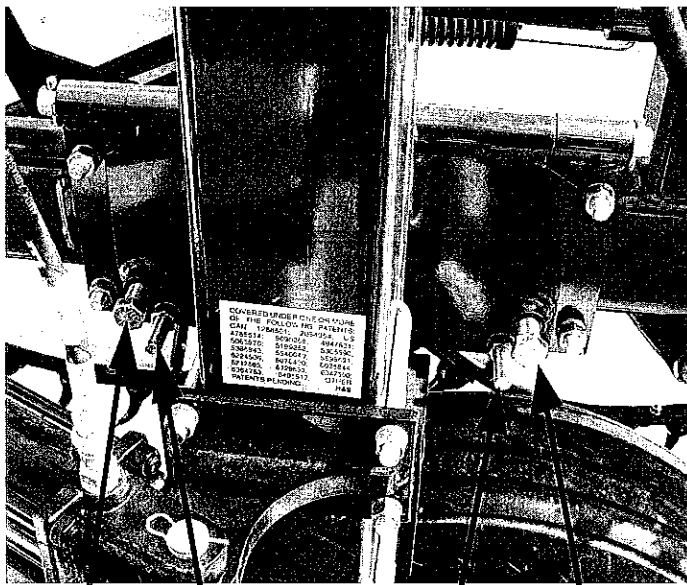
GROUND PRESSURE

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 TILT

The rake beam can be tilted from 0° to 10°. The 0° setting is to be used in normal conditions (dry and fluffy hay). The settings up to 10° are used in harsh conditions (heavy green hay or rained on hay that is matted into the stubble). To adjust the beam tilt, loosen the two Tension Bolts (A). Turn the two Adjustment Bolts (B) to desired tilt (make sure the two adjustment bolts are turned in evenly). Retighten the two Tension Bolts (A) securely. Repeat the same process on opposite rake beam.



B A A B



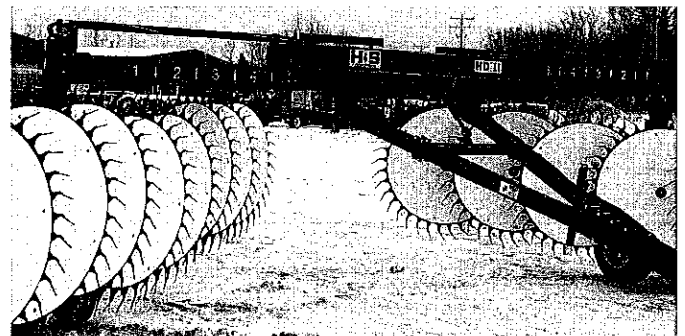
NO BEAM TILT



FULL BEAM TILT

RAKE BEAM ANGLE

Before the rake beams can be angled the center frame must be widened first (as described in the operation section), or the rear rake wheels will make contact. After the center frame has been widened, angle the rake beams to the desired angle by using the left and right switches located on the control box.



LUBRICATION GUIDE

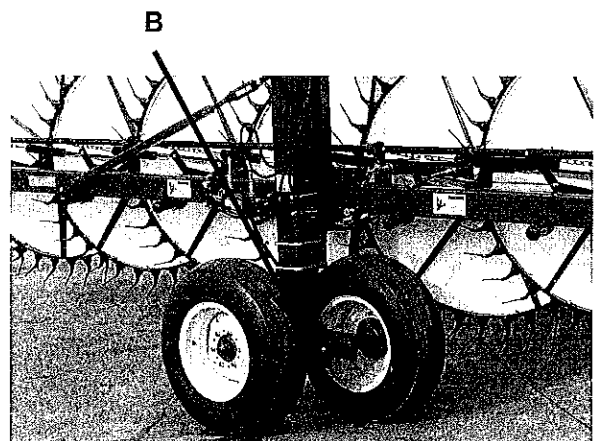
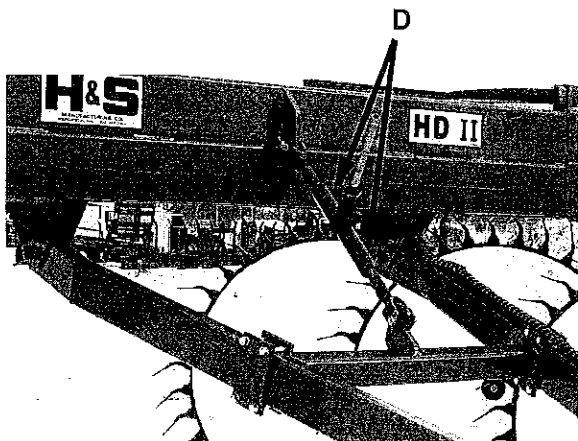
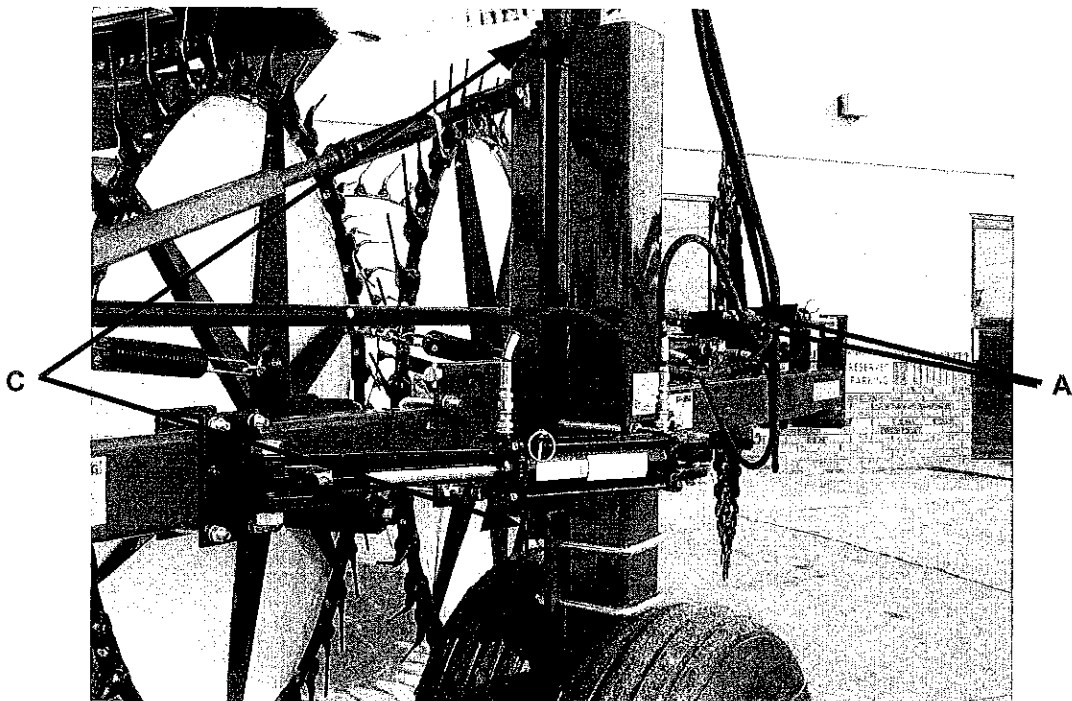
GREASE FITTINGS

There are twelve grease fittings on the HD II Rake. If lubricated properly and often enough, it will prolong the life of your HD II 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. (4) Two on each Lifting Cylinder Mount
- B. (2) One on each Tandem Pin
- C. (4) Two on each Beam Pivot (1) Top Pivot (1) Bottom Pivot
- D. (2) Ratchet Jack



DECAL LOCATION

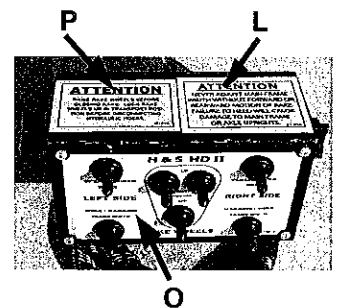
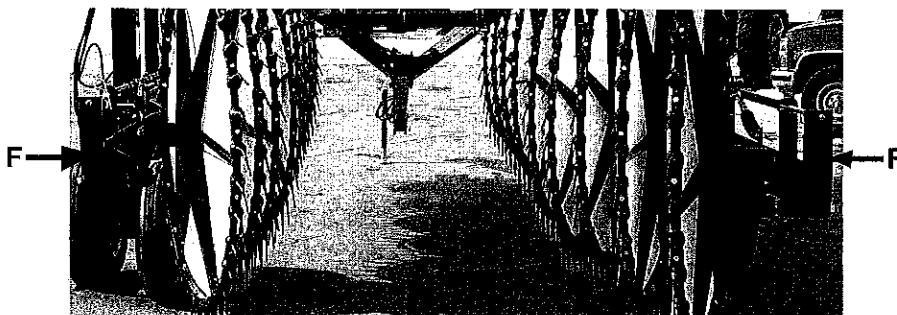
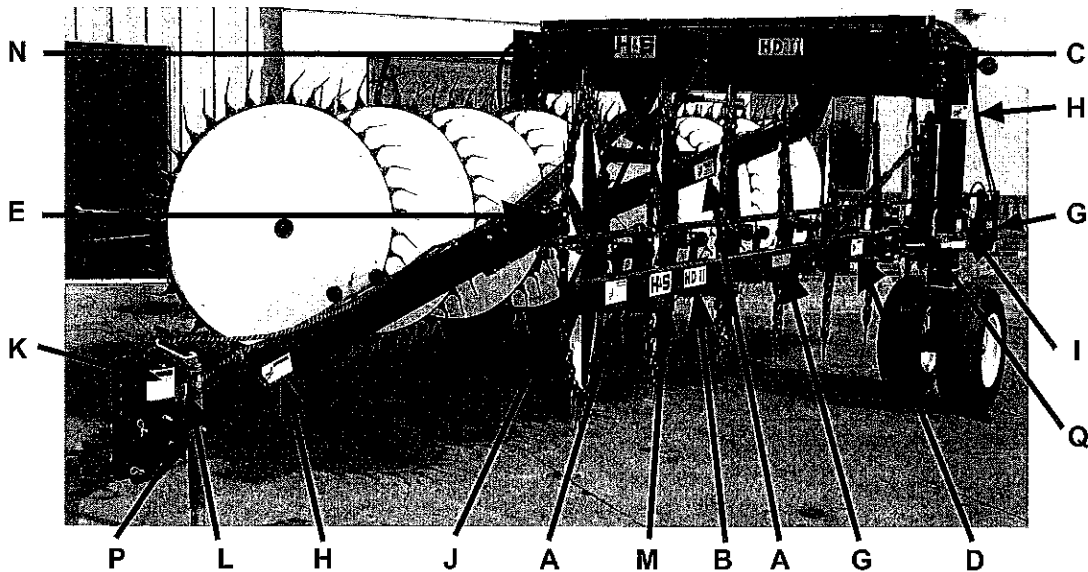
Your H & S HD II Rake was manufactured with operator safety in mind. Located on the HD II Rake are various decals to aid in operation, and warn of caution areas. Pay close attention to all decals.



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

Listed below are the decals on your HD II 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.	111903	(2) H & S HD II Decal
C.	111903A	(2) H & S HD II Decal
D.	2195	(4) WARNING - Stay Clear of Rake
E.	71188B	Jack Storage
F.	102-3185	(2) Red Reflectors (2x9)
G.		(4) Amber Reflectors
H.	11599	(4) WARNING - Do Not Go Near Leaks
I.	H&S	Patent Numbers
J.		Serial Number
K.	72203	(2) WARNING - Help Avoid Injury
L.	12197A	(2) ATTENTION - Raise Rake Wheels
M.	B-11T	(2) H & S Decal
N.		(2) H & S Decal (6x12)
O.	61003	Control Box Decal
P.	21804	(2) ATTENTION - Never Adjust Frame
Q.	22405	(2) WARNING - Install Transport Locks
	0204-HD II	Complete Set of Decals



TROUBLE SHOOTING



WARNING

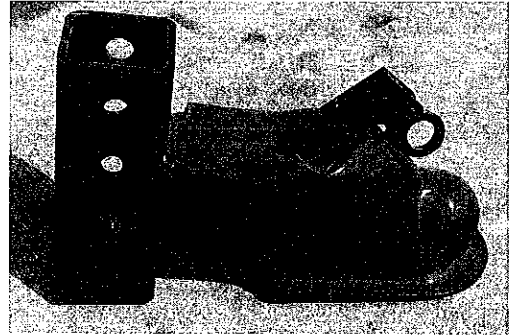
MAKE SURE THAT THE TRACTOR IS SHUT OFF AND THE RAKE CAN NOT MOVE BEFORE SERVICING THE HD II RAKE. MAINTENANCE AND REPAIR SERVICE WORK TO BE PERFORMED BY A QUALIFIED SERVICE PERSON ONLY.

<u>TROUBLE...</u>	<u>POSSIBLE CAUSE...</u>	<u>POSSIBLE REMEDY...</u>
Main Frame Will Not Open or Close	No Electrical Power to Control Box	Check and Make Sure There is Power to Control Box
	Blown Fuse or Circuit Breaker on Tractor	Check and Replace Fuse or Circuit Breaker
	Hydraulic Lever Not Engaged or Engaged in Wrong Direction	Engage Hydraulic Lever or Move Hydraulic Lever in Opposite Direction
	Hydraulic Hoses Not Connected to Tractor Properly	Check Hydraulic Hoses For Proper Connection
	Solenoid Valve Sticking or Not Working Properly	Check Solenoid and Valve
Rake Beams Will Not Open or Close	No Electrical Power to Control Box	Check and Make Sure There is Power to Control Box
	Transport Locks Still Engaged	Remove Clip Pin and Swing Self Storing Transport Locks Toward Frame (See Page # 11)
	Blown Fuse or Circuit Breaker on Tractor	Check and Replace Fuse or Circuit Breaker
	Hydraulic Lever Not Engaged or Engaged in Wrong Direction	Engage Hydraulic Lever or Move Hydraulic Lever in Opposite Direction
	Hydraulic Hoses Not Connected to Tractor Properly	Check Hydraulic Hoses For Proper Connection
	Solenoid Valve Sticking or Not Working Properly	Check Solenoid and Valve
Rake Wheels Will Not Raise or Lower	No Electrical Power to Control Box	Check and Make Sure There is Power to Control Box
	Transport Lock Hair Pins Still Engaged	Remove Transport Lock Hair Pins and Place in Storage Position (See Page #11)
	Blown Fuse or Circuit Breaker on Tractor	Check and Replace Fuse or Circuit Breaker
	Hydraulic Lever Not Engaged or Engaged in Wrong Direction	Engage Hydraulic Lever or Move Hydraulic Lever in Opposite Direction
	Hydraulic Hoses Not Connected to Tractor Properly	Check Hydraulic Hoses For Proper Connection
	Solenoid Valve Sticking or Not Working Properly	Check Solenoid and Valve

OPTIONAL EQUIPMENT

BALL HITCH

The ball hitch is an option that can be added at any time. It allows for smoother operation in the field, by eliminating the distance between the clevis hitch and the tractor drawbar. Simply remove the clevis hitch and replace it with the ball coupler and install a 2-5/16" ball to the tractor drawbar.



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

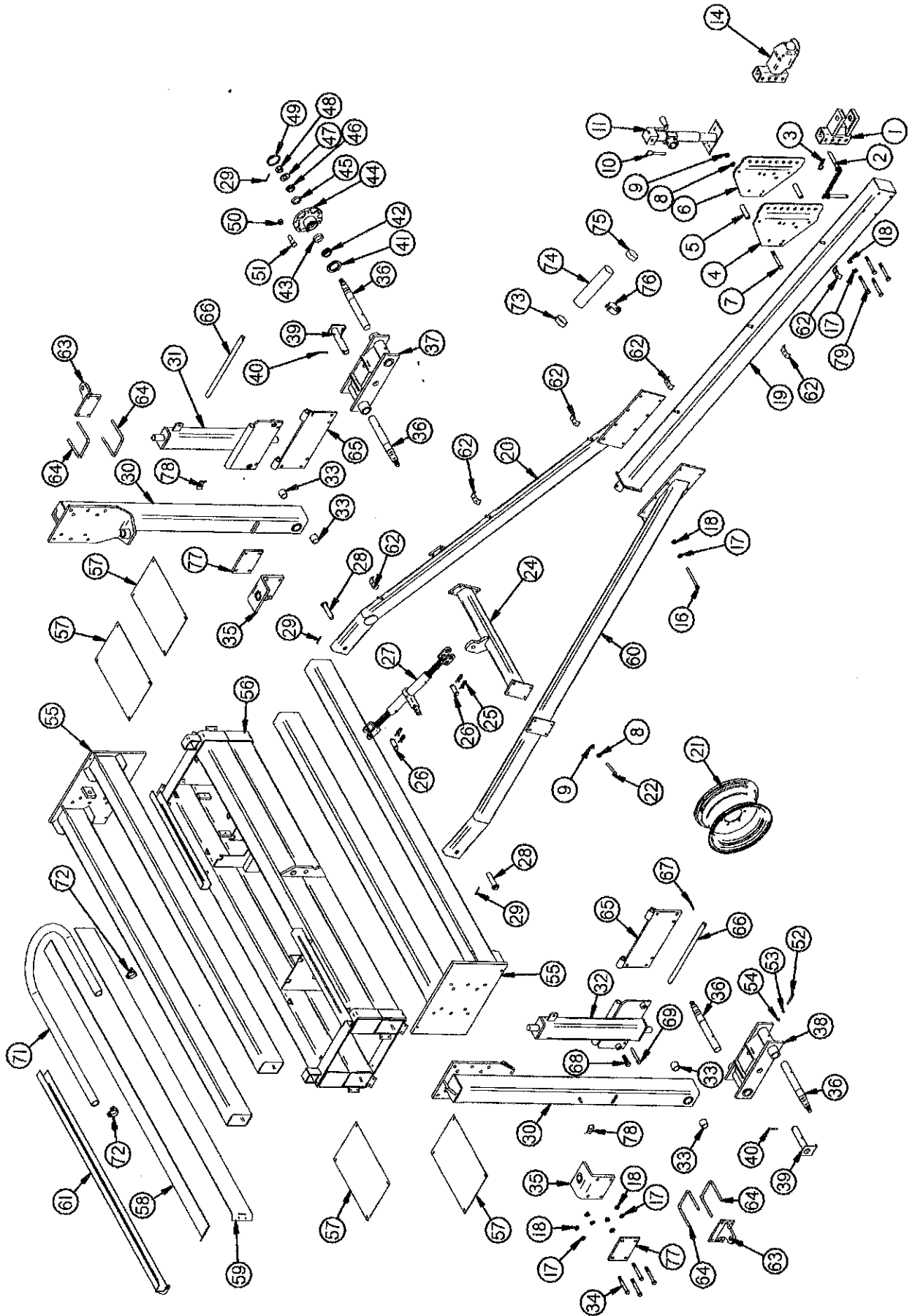


FIGURE 1
H & S HD II RAKE
MAIN FRAME

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1.	HD83	Hitch Clévis	44.	RG101	Hub
2.	BFR450	Hitch Pin	45.	RG47	Outer Race
3.	ES7	Hair Pin	46.	RG48	Outer Bearing
4.	HD84	Hitch Mount Right	47.	HD200	Washer
5.	HD85	Hitch Mount Spacer	48.	RG105	Nut
6.	HD86	Hitch Mount Left	49.	RG103	Dust Cap
7.	BFR405	1/2" x 5-1/2" Bolt GR.5	50.	BFR144	Lug Nut
8.	R35	Lock Washer	51.	RG102	Stud Bolt
9.	R29	1/2" Nut	52.	DWM172	3/8" x 3-1/2" Bolt GR.5
10.	BFR4	Jack Pin & Chain	53.	B68	3/8" Lock Washer
11.	BFR223	Jack	54.	K60	3/8" Nut
14.	HD172	Ball Coupler (Optional)	55.	HD103	Inner Slider LH
16.	HD88	5/8" x 6" Bolt GR.5	*	HD205	Inner Slider RH
17.	T69	5/8" Lock Washer	56.**	HD104	Center Slider Outside
18.	T68	5/8" Nut	***	HD183	Center Slider Outside
19.	HD89	Pole Front	57.	HD105	Shield
20.	HD90	Pole Back Left	58.	HD106	Poly Slide Narrow 1/4"
21.	12N24	Wheel 8 x 15	59.	HD107	Poly Slide Wide 1/4"
*	RG128	Tire 9.5L x 15	*	HD155	Poly Slide Narrow 3/16"
22.	LW123	1/2" x 3-3/4" Bolt GR.5	*	HD156	Poly Slide Wide 3/16"
24.	HD92	Jack Mount Tube	60.	HD108	Pole Back Right
25.	T144	Hair Pin	61.**	HD140	Hose Channel
26.	T143	Jack Pin	***	HD184	Hose Channel
27.	T138	Ratchet Jack	62.	23N67	Hose Bracket
28.	HD93	Pole Pivot Pin	63.	HD151	Cylinder Mount Upright End
29.	T72	5/32" x 1-1/2" Cotter Pin	64.	HD152	1/2" U-Bolt
30.	HD94	Axle Upright	65.	HD164	Beam Pivot Plate
31.	HD95	Beam Pivot Left	66.	HD165	Hinge Pin
32.	HD96	Beam Pivot Right	67.	3G22	5/16" x 1-3/4" Expansion Pin
33.	HD153	Bushing	68.	HD166	3/4" x 2-1/2" Bolt GR.5
34.	HD181	5/8" x 7" Bolt GR.5	69.	HD167	5/8" x 3-1/2" Bolt GR.5
35.	HD98	Upright Bottom Pivot	71.**	HD169	Hose Shield
36.	HD99	Spindle	***	HD185	Hose Shield
37.	HD100	Tandem Axle Left	72.**	HD170	Hose Clamp (Size 40)
38.	HD101	Tandem Axle Right	***	HD186	Hose Clamp (Size 48)
39.	HD102	Tandem Pin	73.	S414	Cap
40.	12V59	3/8" x 2-3/4" Roll Pin	74.	S415	Manual Holder Tube
41.	RG98	Seal	75.	S418	Cap w/hole
42.	RG99	Inner Bearing	76.	S416	Manual Hanger Clamp
43.	RG100	Inner Race	77.	HD182	Pivot Mount Plate
NOTE: * (MEANS NOT SHOWN)			78.	HE42	Hose Clamp
** (USED SERIAL #0032 AND BEFORE)			79.	HD208	5/8" x 5-1/2" Bolt GR. 5
*** (USED SERIAL #0033 AND AFTER)					

FIGURE 2

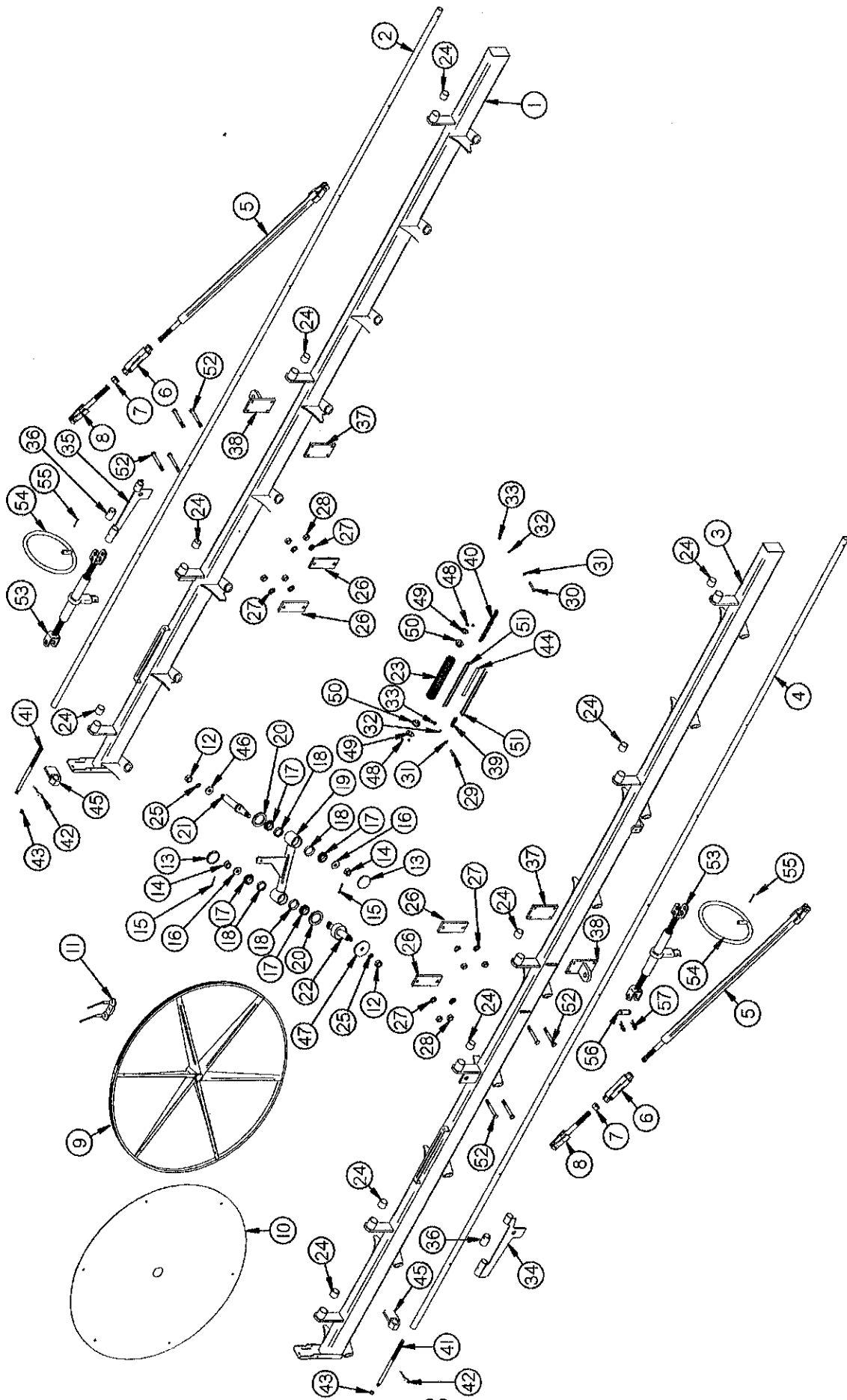


FIGURE 2
H & S HD II RAKE
RAKE BEAMS

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1.	HD109	Rake Beam Left	28.	T60	5/8" Lock Nut
2.	HD110	Lifting Pipe Left	29.	17G141	3/8" x 1-1/4" Bolt GR.5
3.	HD111	Rake Beam Right	30.	T123	3/8" x 2-1/4" Bolt GR.5
4.	HD112	Lifting Pipe Right	31.	X67	3/8" Flat Washer
5.	HD113	Stabilizer Tubing	32.	B68	3/8" Lock Washer
6.	HD114	Turnbuckle	33.	K93	3/8" Lock Nut
7.	HD115	Jam Nut	34.	HD130	Lifting Cylinder Mount Right
8.	HD116	Turnbuckle End	35.	HD131	Lifting Cylinder Mount Left
9.	HD117	Rake Wheel	36.	HD175	Lifting pipe Collar
*	HD203	Complete LH Rake Wheel	37.	HD91	Stand Off Mounting Plate
*	HD204	Complete RH Rake Wheel	38.	HD132	Cylinder Mount
10.	HD118	Wind Guard	39.	HD214	Rake Wheel Short Chain
11.	HD119	Rake Tooth	40.	HD210	Rake Wheel Chain
12.	HD120	3/4" Nut	41.	HD154	Acme Rod
13.	RG103	Dust Cap	42.	BFR137	Hair Pin
14.	RG82	7/8" Nut	43.	R29	1/2" Nut
15.	T172	5/32" x 1-1/2" Cotter Pin	44.	HD179	Spring Stopper
16.	HD121	7/8"ID x 1-3/4" OD Washer	45.	BFR426	Rake Pressure Handle
17.	HD122	Bearing	46.	HD157	Pivot Washer
18.	3G18	Bearing Race	47.	HD158	Spindle Washer
19.	HD123	Rake Arm	48.	D65	1/4" Lock Nut
20.	HD124	Seal	49.	HD176	Spring Holder Washer
21.	HD125	Pivot Spindle	50.	HD177	Poly Spring Holder
22.	HD126	Rake Wheel Spindle	51.	HD178	Torsion Bar
23.	HD127	Spring	52.	HD174	5/8" X 5" Bolt GR. 5
*	HD210	Complete Spring Assembly	ITEMS 53-57 USED ON MANUAL MODEL ONLY		
24.	HD128	Bushing	53.	T138	Ratchet Jack
25.	RG113	Star Washer	54.	HD213	Handle Band
26.	HD202	Beam Plate	55.	R70	3/16" x 2" Cotter Pin
27.	T69	5/8" Lock Washer	56.	T143	Jack Pin
NOTE: * (MEANS NOT SHOWN)			57.	T144	Hair Pin

FIGURE 3

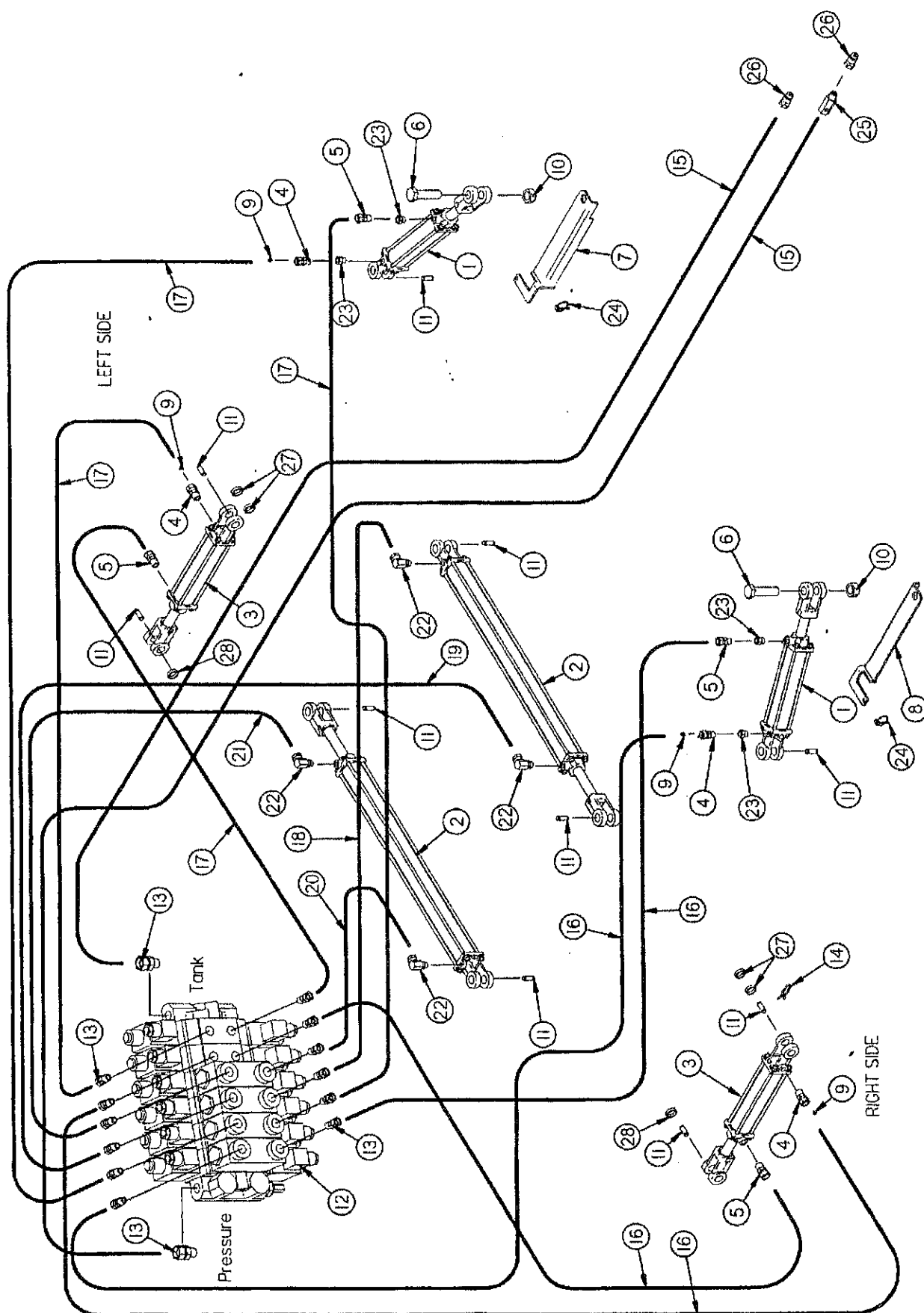


FIGURE 3
H & S HD II RAKE
HYDRAULICS

ITEM	PART NO.	DESCRIPTION
1.	HD135	Hydraulic Cylinder 3" x 8"
2.	HD136	Hydraulic Cylinder 3-1/2" x 60"
3.	16SV171	Hydraulic Lift Cylinder 2" x 10"
4.	BFR122	3/8" Union Adapter
5.	DWM233	3/8" Union Adapter
6.	BFR177	1" x 4" Bolt GR.5
7.	HD137	Transport Lock Left
8.	HD138	Transport Lock Right
9.	BFR120	.062 Orifice
10.	BFR178	1" Lock Nut
11.	T143	Hydraulic Cylinder Pin
12.	HD139	Hydraulic Valve
13.	DWM268	9/16" Male O-Ring to 3/8" Pipe Union Adapter
14.	T144	Cylinder Pin Clip
15.	HD141	Hydraulic Hose 3/8" x 288" 1/2"MP & 3/8"MP
16.	HD142	Hydraulic Hose 1/4" x 288" 3/8"MP & 3/8"MP
17.	HD143	Hydraulic Hose 1/4" x 210" 3/8"MP & 3/8"MP
18.	HD144	Hydraulic Hose 1/4" x 36" 3/8"MP & 1/2"MP
19.	HD145	Hydraulic Hose 1/4" x 96" 3/8"MP & 1/2"MP
20.	HD147	Hydraulic Hose 1/4" x 60" 3/8"MP & 1/2"MP
21.	HD146	Hydraulic Hose 1/4" x 20" 3/8"MP & 1/2"MP
22.	WM175	1/2" 90° Union Adapter
23.	JB82	Bushing 1/2" to 3/8"
24.	BFR443	Clip Pin
25.	DF18	1/2" Check Valve
26.	DWM205	1/2" Male Quick Coupler
27.	X94	Spacer 5/16" x 1"
28.	HD187	Spacer 3/4" x 1"

FIGURE 4

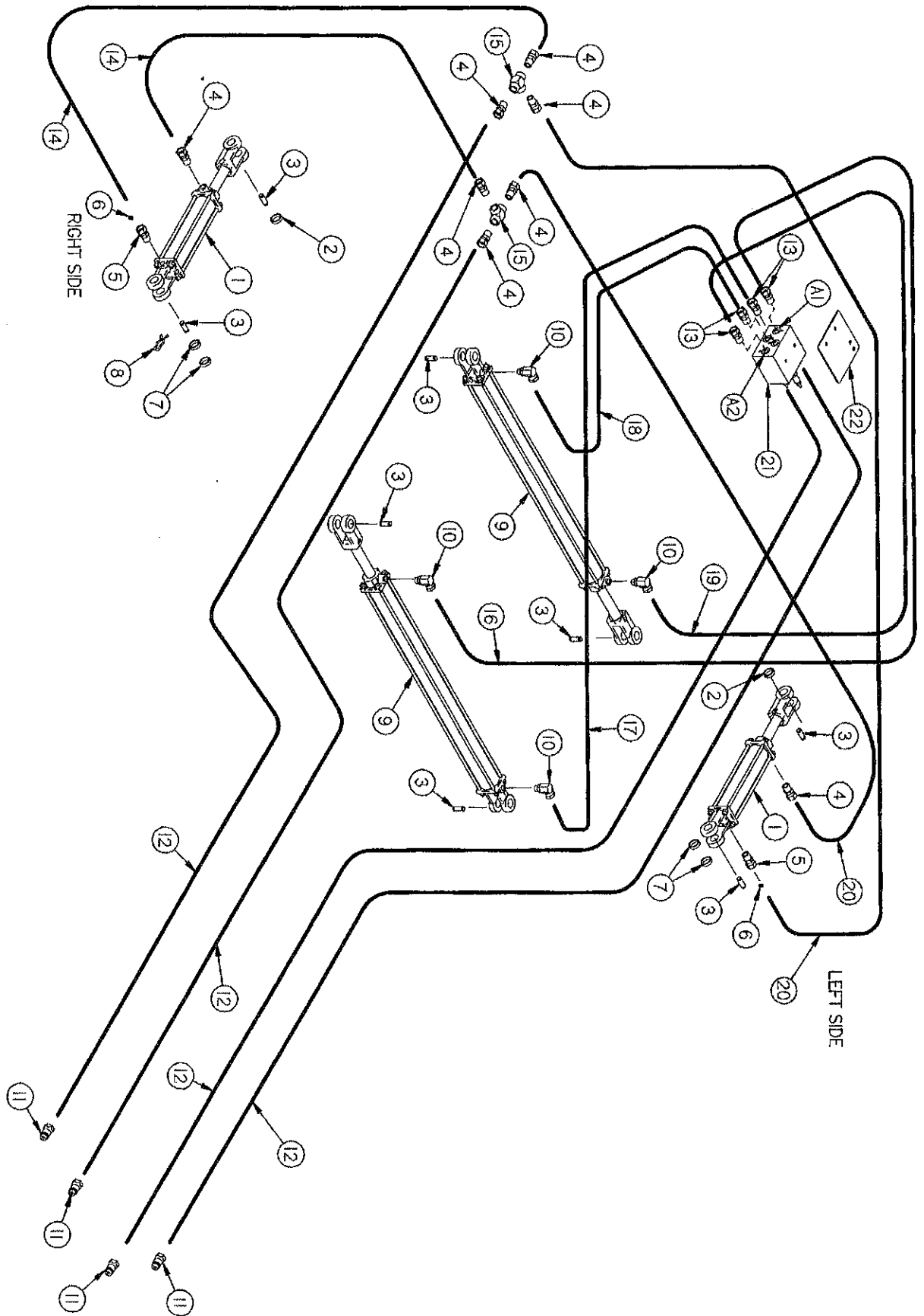
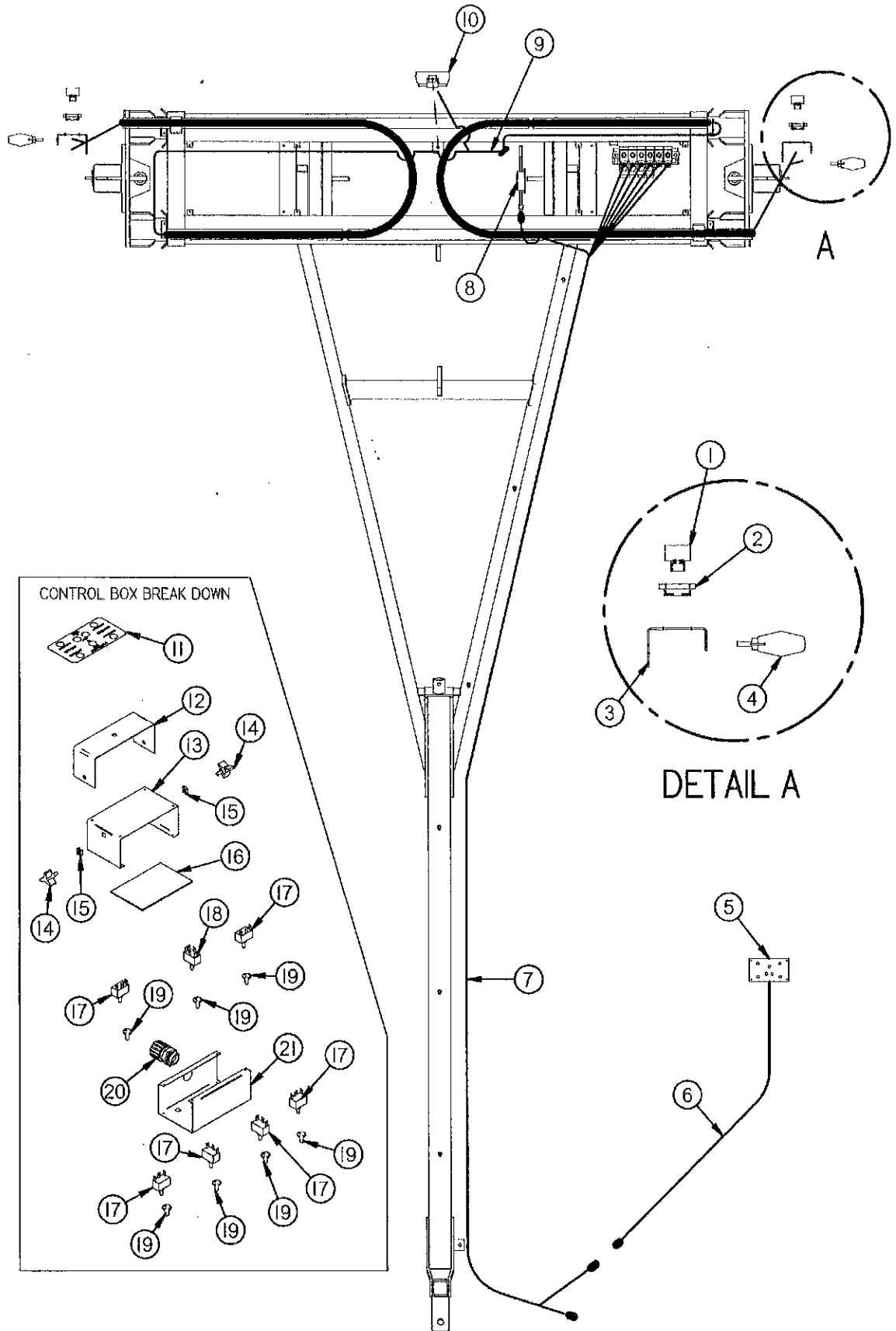


FIGURE 4
H & S HD II RAKE
HYDRAULICS (MANUAL MODEL)

ITEM	PART NO.	DESCRIPTION
1.	16SV171	Hydraulic Lift Cylinder 2" x 10"
2.	HD187	3/4" x 1" Spacer
3.	T143	Hydraulic Cylinder Pin
4.	DWM233	3/8" Union Adapter
5.	BFR122	3/8" Union Adapter
6.	BFR120	.062 Orifice
7.	X94	5/16" x 1" Spacer
8.	T144	Cylinder Clip Pin
9.	HD136	Hydraulic Cylinder 3-1/2" x 60"
10.	WM175	1/2" 90° Union Adapter
11.	DWM205	1/2" Male Quick Coupler
12.	HD141	3/8" x 288" Hose 1/2"MP & 3/8"MP
13.	DWM269	Boss Union Adapter
14.	HD142	1/4" x 288" Hose 3/8"MP & 3/8"MP
15.	BFR74	3/8" Female Tee
16.	HD145	1/4" x 96" Hose 3/8"MP & 1/2"MP
17.	HD144	1/4" x 36" Hose 3/8"MP & 1/2"MP
18.	HD147	1/4" x 60" Hose 3/8"MP & 1/2"MP
19.	HD146	1/4" x 20" Hose 3/8"MP & 1/2"MP
20.	HD143	1/4" x 210" Hose 3/8"MP & 3/8"MP
21.	XR100	Flow Divider Valve
22.	HD212	Valve Mount

FIGURE 5



**FIGURE 5
H & S HD II RAKE
WIRING**

ITEM	PART NO.	DESCRIPTION
1.	S310	Red Tail Light
2.	S308	Rubber Light Mount
3.	HD148	Light Bracket
4.	DWM129	Yellow Hazard Light
5.	HD149	Complete Control Box w/Harness
6.	HD160	Control Box Whip
7.	HD161	Main Harness
8.	S441	Light Module
9.	HD149	Tail Light Loom
10.	DWM130	Flood/Work Light
11.	61003	Control Box Decal
12.	DWM326	Control Box Mount
13.	DWM140	Control Box Bottom
14.	HD174	Knob
15.	HD173	Panel Nut
16.	HD163	Poly Shield
17.	HD207	Momentary Switch
18.	HD159	Master Switch
19.	16SV235	Switch Boot
20.	DWM175	Strain Relief (Cord Grip)
21.	HD150	Control Box Top

FIGURE 6

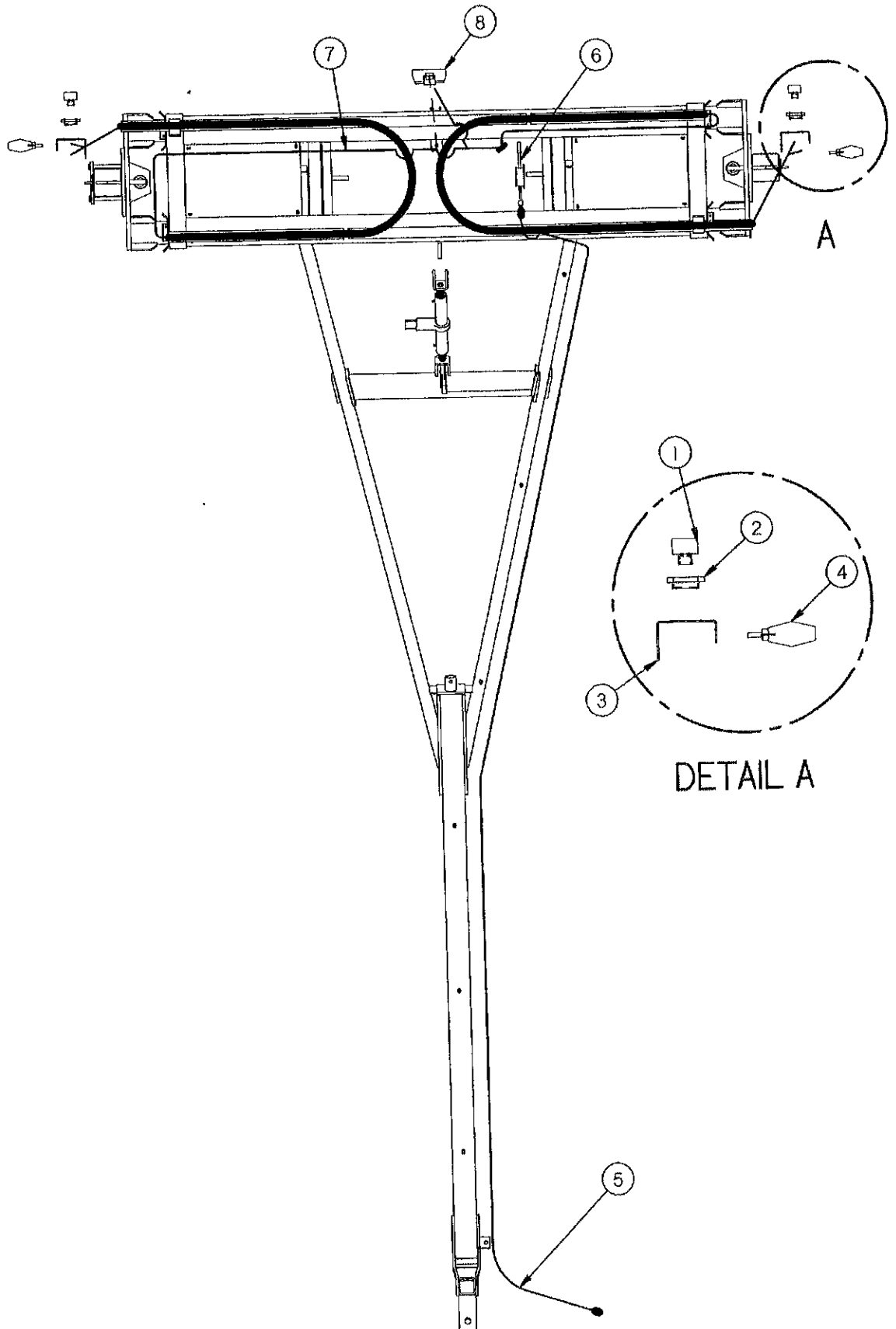
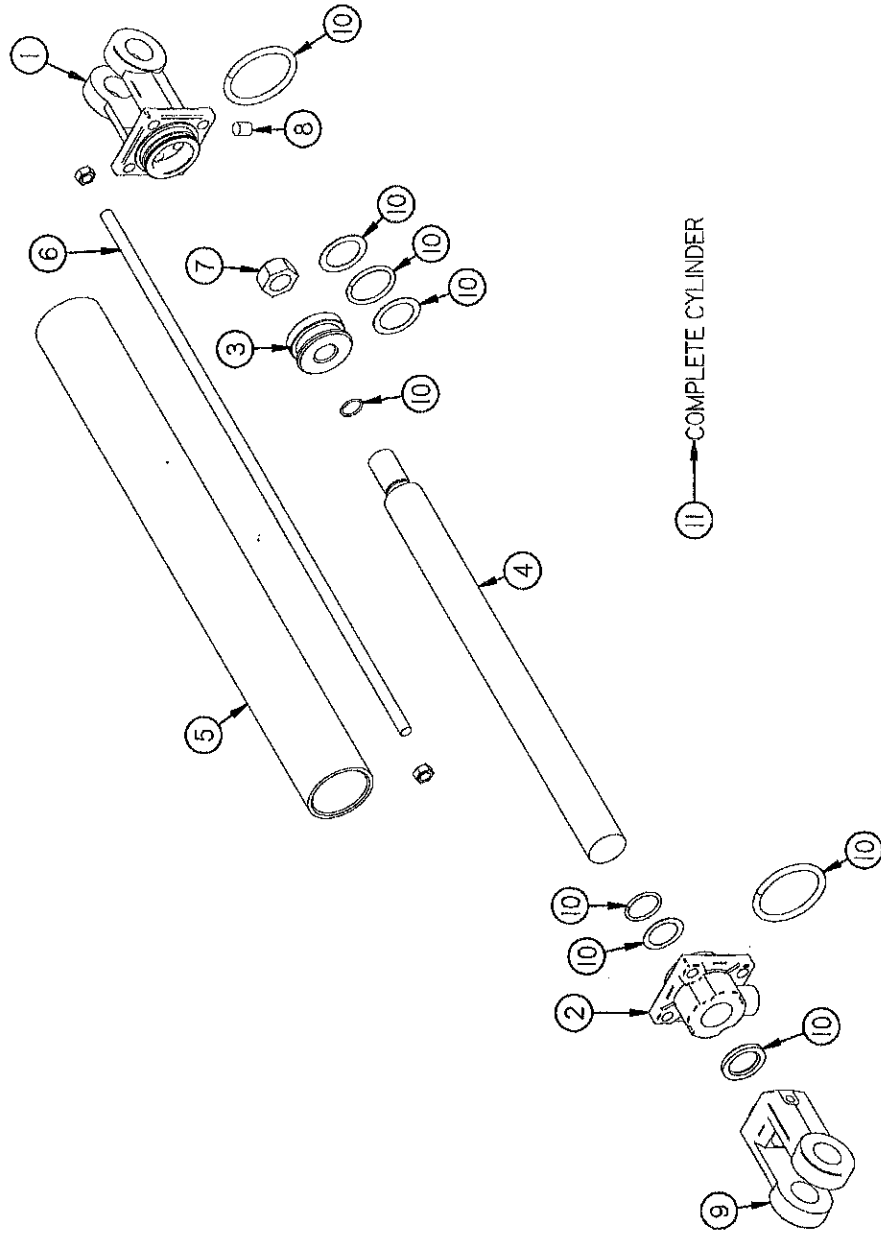


FIGURE 6
H & S HD II RAKE
WIRING (MANUAL MODEL)

ITEM	PART NO.	DESCRIPTION
1.	S310	Red Tail Light
2.	S308	Rubber Light Mount
3.	HD148	Light Bracket
4.	DWM129	Yellow Hazard Light
5.	MHD1	Front Light Loom
6.	S441	Light Module
7.	HD149	Tail Light Loom
8.	DWM130	Work Light

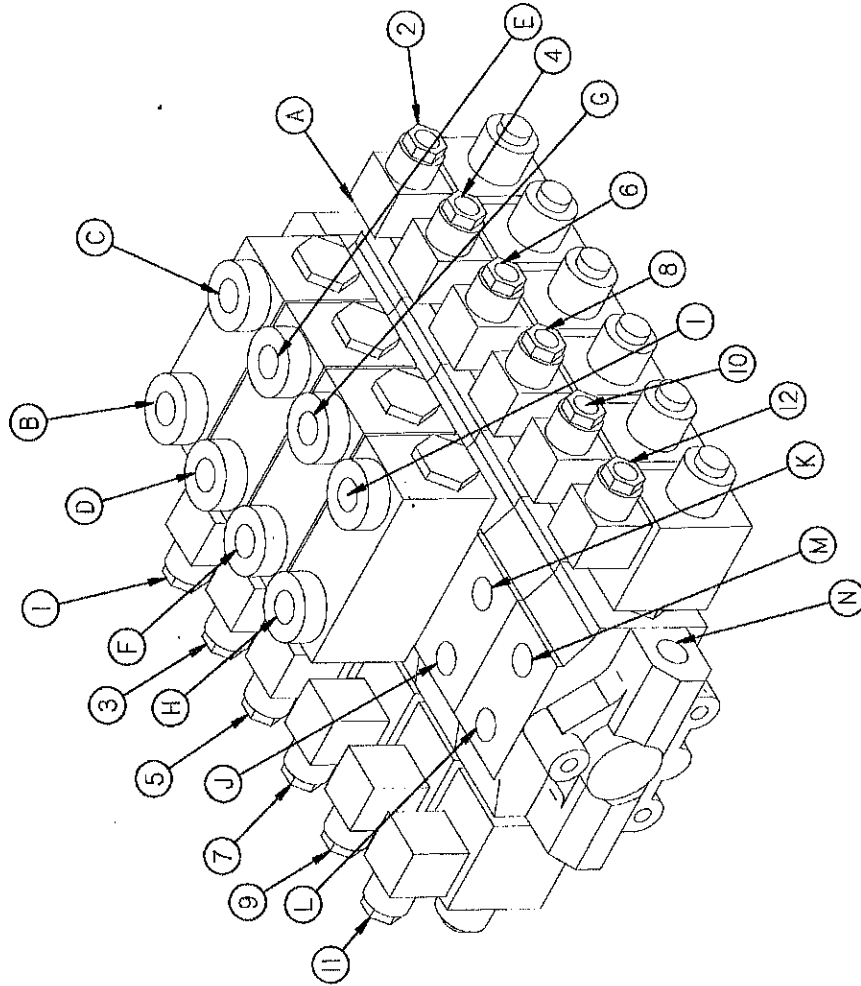
FIGURE 7



**FIGURE 7
H&S HD II RAKE
HYDRAULIC CYLINDERS**

	LIFT CYLINDER 2" x 10"	WING CYLINDER 3" x 8"	FRAME WIDTH 3-1/2" x 60"	
ITEM	PART NO.	PART NO.	PART NO.	DESCRIPTION
1.	23N142A	DWM192	16SV157A	Clevis Cap
2.	23N143A	HD188	HD189	Rod Cap
3.	23N144	DWM194	HD198	Piston
4.	16SV168A	HD190	HD191	Rod
5.	16SV169	HD192	HD193	Cylinder Tube
6.	16SV170	HD194	HD195	Tie Rod
7.	23N148	DWM198	DWM198	Piston Nut
8.	23N149	DWM199	DWM199	Plug
9.	23N150A	DWM200	DWM200	Rod Clevis
10.	23N151	HD196	HD197	Seal Kit
11.	16SV171	HD135	HD136	Hydraulic Cylinder

FIGURE 8



- | | |
|-----------------------|----------|
| PRESSURE PORT | DIN # 1 |
| RIGHT BEAM OPEN | DIN # 2 |
| RIGHT BEAM CLOSED | DIN # 3 |
| LEFT BEAM OPEN | DIN # 4 |
| LEFT BEAM CLOSED | DIN # 5 |
| RIGHT WIDTH OUT | DIN # 6 |
| RIGHT WIDTH IN | DIN # 7 |
| LEFT WIDTH OUT | DIN # 8 |
| LEFT WIDTH IN | DIN # 9 |
| RIGHT RAKE WHEEL UP | DIN # 10 |
| RIGHT RAKE WHEEL DOWN | DIN # 11 |
| LEFT RAKE WHEEL UP | DIN # 12 |
| LEFT RAKE WHEEL DOWN | |
| TAND PORT | |

FIGURE 9

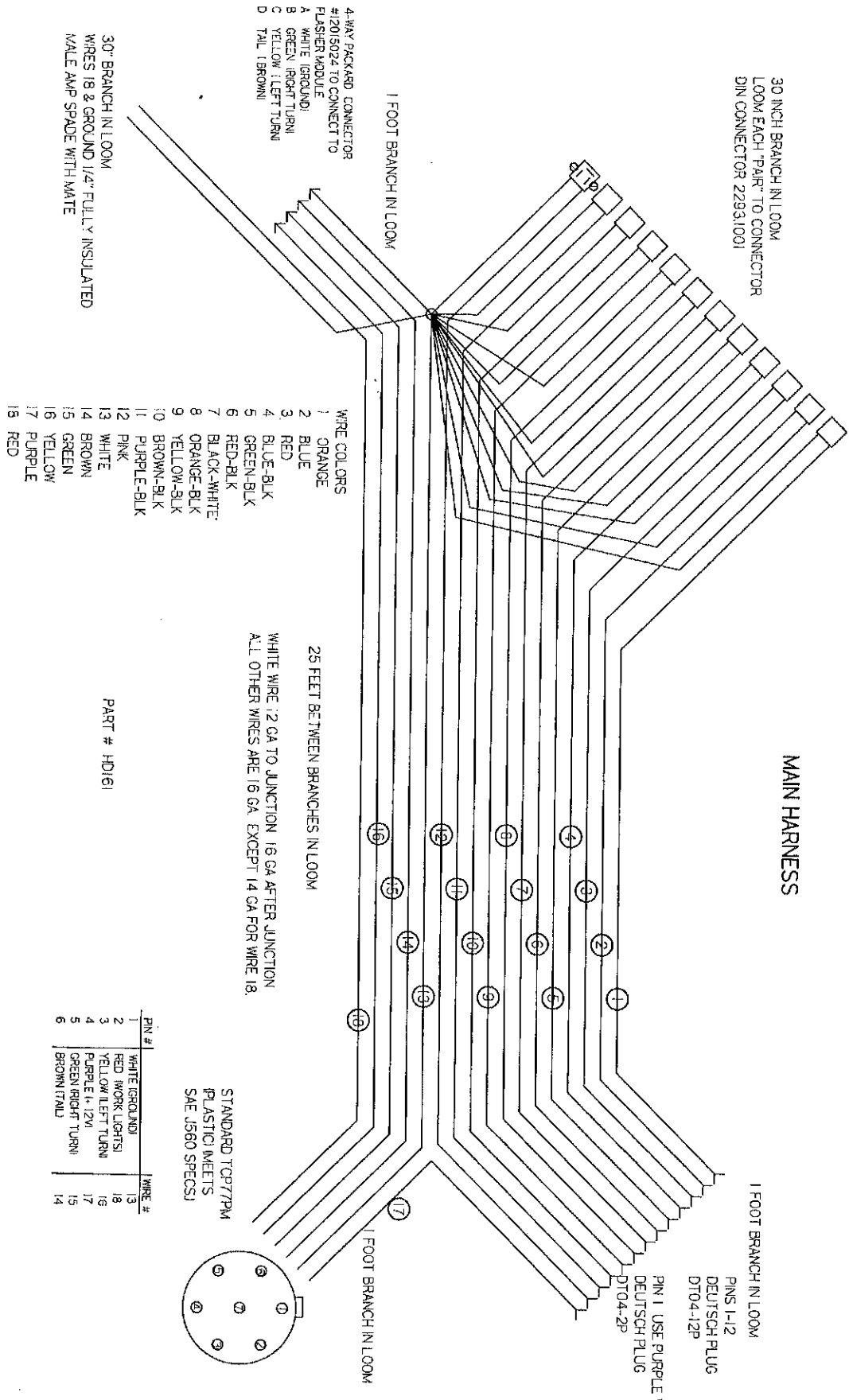


FIGURE 10

CONTROL BOX WHIP

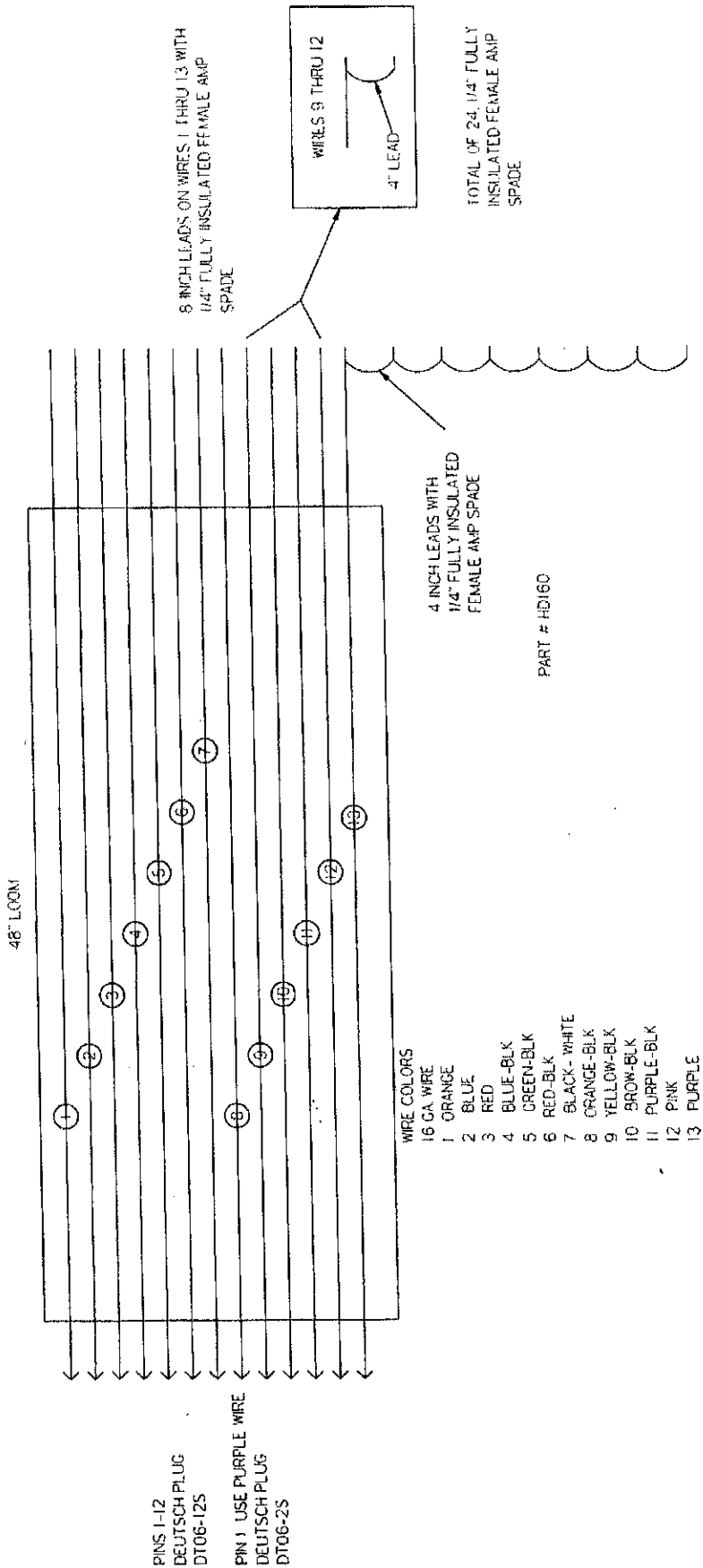
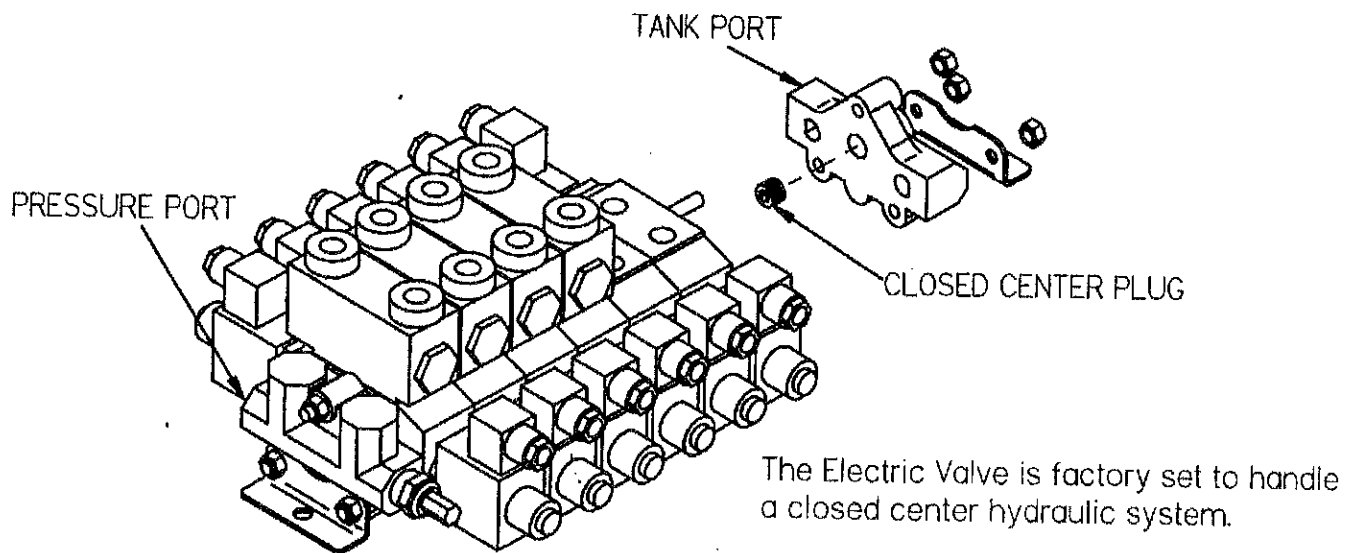


FIGURE 11



If closed center valve is used on a open center tractor it will cause the oil to heat because oil is dumping over relief.

Instructions for converting valve to open center:

1. Widen left side of rake using left frame width switch on control box (Remember to be moving forward or rearward when doing this).
2. Release all pressure in hydraulic system (Shut tractor OFF and remove ignition Key).
3. Support valve bottom.
4. Remove left mounting bolt.
5. Remove 3 tie rod nuts on tank port (the outward side of valve).
6. Remove end cap, (do not loose the o-rings that are between the sections).
7. Remove plug in end cap with allen wrench, (save for future use).
8. Re-Assemble end cap and mounting angle, (torque tie rod nuts to 140 in.lbs. (16 N-M)).
9. Install bolt in mounting angle.

H&S HD II RAKE

Your new H&S HD II 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 HD II Rake before reading this manual carefully. Keep this manual available for ready reference.

HD II RAKE SPECIFICATIONS

Number of Wheels	17
Wheel Diameter	.60"
Teeth per Wheel	36 (18 sets of 2)
Teeth	Rubber Mounted In A Set Of 2
Transport Width	12' 3"
Transport Length	28' 3"
Weight	5800 lbs.
Maximum Raking Width	30' 3"
Maximum Finished Windrow Width	72"
Rake Wheel Hubs	Tapered Bearings
Rake Beam Tilt	0° to 10°
Hitch Jack	Standard
Tail & Work Lights	Standard
Tires	9.5L x 15SL

Warranty:

See Warranty on Page #1

NOTE:

Determine right or left side of HD II 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