



# **Model 2970H Leveling System Operator Manual**

(D-082301DJC01C)



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## 2000 Series Operator's Manual Model 2970 Leveling Systems

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# WARRANTY POLICY



## **Statement of Limited Warranty** (North American Harvest Products)

Hillco Technologies, Inc. (Hillco) warrants its new products to be free from defects in material and workmanship for a period of twelve (12) consecutive months following the warranty start date.

The warranty start date for Hillco products invoiced by Hillco from October 1<sup>st</sup> through May 31<sup>st</sup> is the first day of June following the Hillco invoice date, or the first date of use, whichever is earliest. For Hillco products invoiced by Hillco from June 1<sup>st</sup> through September 30<sup>th</sup> the warranty start date is the date of invoice. Once the warranty period has begun, it cannot be stopped or interrupted.

Hillco's obligation under this warranty shall be limited to repairing or replacing, free of charge to the original purchaser, any part that, in Hillco's judgment, shows evidence of such defect. Hillco additionally agrees to repair, at no cost to the original purchaser, any physical damage to the product to which the Hillco product is directly attached provided that the damage is directly attributable to a defect in the design or manufacture of the Hillco product, as determined by Hillco, and that the damage occurs during the effective warranty period of the Hillco product.

Hillco warrants genuine Hillco replacement parts and components to be free from defects in material and workmanship for a period of ninety (90) consecutive days following the Hillco invoice date, or the remainder of the original equipment warranty period, whichever is longer.

### **Limitations to Warranty**

This warranty does not cover:

- 1) Any product damaged by accident, abuse, misuse, negligence, or improper maintenance.
- 2) Any unauthorized product alteration or modification.
- 3) Any unauthorized repairs made with parts other than genuine Hillco parts unless specifically authorized by Hillco.
- 4) Any repairs performed by anyone other than Hillco or an authorized Hillco dealer unless specifically authorized by Hillco.
- 5) Any claims directly resulting from improper installation, except those installations performed by Hillco.

### **Warranty Procedure**

A Hillco Warranty Registration Form must be fully completed and returned to Hillco within 30 days of sale of the product to the retail customer or the first day of use, whichever is earlier.

All warranty claims must be submitted on a fully completed Hillco Warranty Claim Form.

All warranty work must be performed, and claims submitted, within thirty (30) days of the occurrence of the claim and within the warranty period.

All parts removed during warranty repair should be held for a period of sixty (60) days after the warranty claim has been submitted to Hillco.

Hillco reserves the right to either inspect the product at the original retail purchaser's location, or the authorized Hillco dealer's location; or require it to be returned to Hillco, transportation charges prepaid, for inspection.

### **Limitation of Liability**

Hillco makes no express warranties other than those, which are specifically described herein. Any description of the goods sold hereunder, including any reference to buyer's specifications and any descriptions in circulars and other media published by Hillco is for the sole purpose of identifying such goods and shall not create an express warranty that the goods shall conform to such description.

**THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED.** There are no implied warranties of merchantability or fitness for a particular purpose. This warranty states Hillco's entire and exclusive liability and buyer's exclusive remedy for any claim for damages in connection with the sale or furnishing of Hillco products, their design, suitability for use, installation, operation, or for any claimed defects herein. **HILLCO WILL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, NOR FOR ANY SUM IN EXCESS OF THE PRICE RECEIVED FOR THE GOODS FOR WHICH LIABILITY IS CLAIMED.**

No representative of Hillco nor any dealer associated with Hillco has the authority to change the items of this warranty in any manner whatsoever, and no assistance to purchaser by Hillco in the repair or operation of any Hillco product shall constitute a waiver of the conditions of this warranty, nor shall such assistance extend or revive it.

Hillco reserves the right to make improvements in design or changes in specifications at any time, without incurring any obligation to owners of units previously sold.

## INTRODUCTION

Thank you for choosing the Hillco 2000 Series Leveling System to compliment your farming operation. This product has been designed and manufactured to meet the needs of a discriminating buyer for increasing the performance of a combine.

Safe, efficient and trouble free use of your Hillco 2000 Series Leveling System requires that you and anyone else who will be operating or maintaining the leveling system, read and understand the safety, operation, and maintenance information contained in the Operator's Manual.

**If extra copies of the operator's manual are needed, contact Hillco at 1-800-937-2461 or download it from Hillco Technologies' website at [www.hillcotechnologies.com](http://www.hillcotechnologies.com).**

### HILLCO MODEL 2970H LEVELING SYSTEM



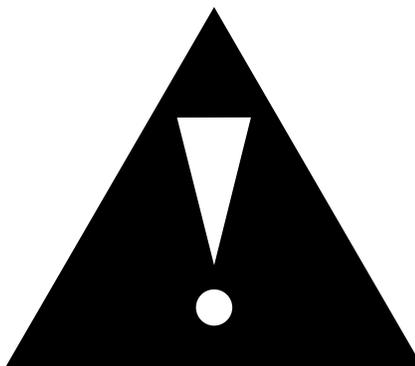
This manual covers the Hillco 2000 Series Model 2970H Leveling System built by Hillco. Use the Table of Contents as a guide when searching for specific information.

Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Hillco dealer or Hillco if you need assistance or information at 1-800-937-2461.

**OPERATOR ORIENTATION** – The directions left, right, front, and rear, as mentioned throughout this manual, are as seen from the combine operator's seat and facing in the direction of forward travel.

## SAFETY

### ***SAFETY ALERT SYMBOL***



This Safety Alert symbol means  
**ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**

The Safety Alert symbol identifies important safety messages on the Hillco 2000 Series Leveling System and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

## SIGNAL WORDS

Note the use of the signal words **DANGER**, **WARNING**, and **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guidelines:

**DANGER** - An immediate and specific hazard which WILL result in severe personal injury or death if the proper precautions are not taken.

**WARNING** - A specific hazard or unsafe practice which COULD result in severe personal injury or death if proper precautions are not taken.

**CAUTION** - Unsafe practices which COULD result in personal injury if proper practices are not taken, or as a reminder of good safety practices.

## **OPERATION SAFETY**

1. Read and understand the Operator's Manual and all safety labels before operating the leveling system.
2. Make sure that all controls are in the manual position before starting the combine.
3. Clear the area of all bystanders, especially children, before starting the leveling system and during operation.
4. Make sure all safety shields are in place before operating the combine. Never operate the machine with the shields removed.
5. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.
6. Stay seated in the cab during operation.
7. Operate controls only when sitting in the seat of the combine.
8. To avoid engine damage, do not run the machine for extended periods of time when it is in the leveled over position.
9. Always travel at a safe speed. Use caution when making turns or traversing ditches.
10. There are restrictions as to tread width and tire selection. Refer to "Tread Width Restrictions" for important information on these restrictions.
11. The use of after-market grain tank extensions is prohibited from use on combines equipped with the Model 2970H leveling system.

## **HYDRAULIC SAFETY**

1. Do not search for high-pressure hydraulic leaks without hand and face protection. A tiny, almost invisible leak can penetrate skin, thereby requiring immediate medical attention. Gangrene may set in, in as few as 3 hours!
2. Use cardboard or wood to detect leaks – never your hands!
3. Double check that all is clear before operating hydraulics.
4. Maintain proper hydraulic fluid levels.
5. Ensure all fittings and hoses are in good repair.
6. Do not make any repairs to the leveling system hydraulic system including: cylinders, valves, hydraulic hoses, adapters, pumps, manifolds, or reservoirs without first contacting you authorized Hillco dealer. These hydraulic components stabilize the chassis of the combine. Improper repair or replacement of these components could lead to uncontrolled leveling of the combine's chassis.



## **SERVICING AND MAINTENANCE SAFETY**

1. Review the Operator's Manual and all safety items before servicing or maintaining the leveling system.
2. Place the leveling system in the "Manual" mode (Auto/Manual Indicator not lit), stop the combine engine, wait for any moving parts to stop, block the tires, the header, and the cylinder areas before servicing, repairing, adjusting, or maintaining the leveling system.

3. Hydraulic oil is under pressure. Use caution when dealing with the hydraulic system.
4. Keep hands, feet clothing and hair away from all moving and/or rotating parts.
5. Clear the area of bystanders, especially children, when carrying out any maintenance, repairs or making any adjustments.

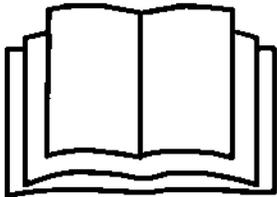
## **HIGHWAY OPERATION AND TRANSPORT SAFETY**

1. Check with local authorities regarding combine transport on public roads. Obey all applicable regulations and laws.
2. Check clearance elevations and widths of combine for travel near power lines, bridges, trees, etc.
3. Make sure the Auto Leveling Indicator is in “Manual” mode (not lit) for all transport and highway travel situations.
4. Always travel at a safe speed. Use caution when making corners or meeting traffic.

## **SAFETY LABELS**

Familiarize yourself with the location of all safety labels. Read them carefully to understand the safe operation of your machine.

### **“Read Operator’s Manual” Symbol**

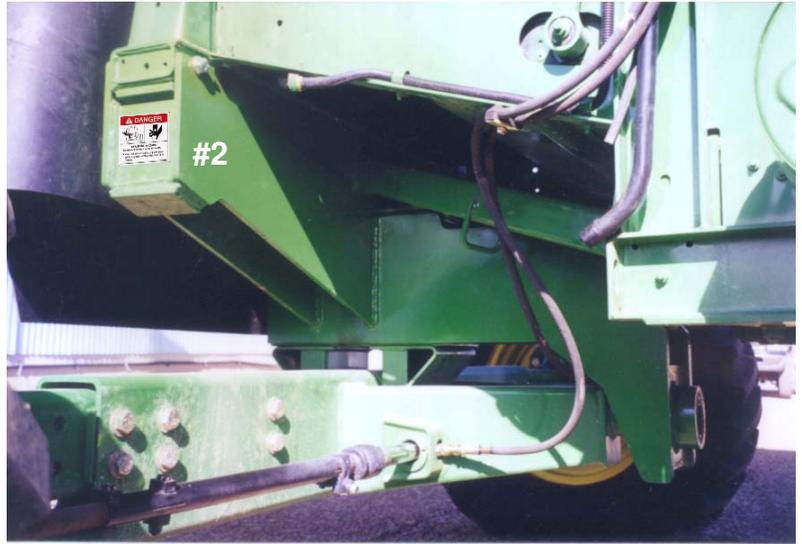


Decals, which display the “Read Operator’s Manual” symbol, are intended to direct the operator to the Operator’s Manual for further information regarding maintenance, adjustments and/or procedures for particular areas of the leveling system. When a decal displays this symbol refer to the Operator’s Manual for further instructions.

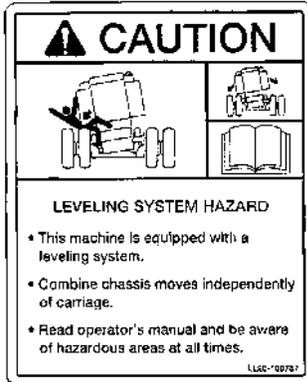
### **TO APPLY NEW OR REPLACEMENT LABELS:**

1. Make sure the label area is smooth by removing any debris such as dirt or old labels.
2. Wash the area with soap and water and then dry it thoroughly.
3. After the area has completely dried, peel the backing off the safety label and place it onto the cleaned area.
4. Make sure all areas of the label have adhered to the machine by pressing down on the entire face of the label, including the corners.

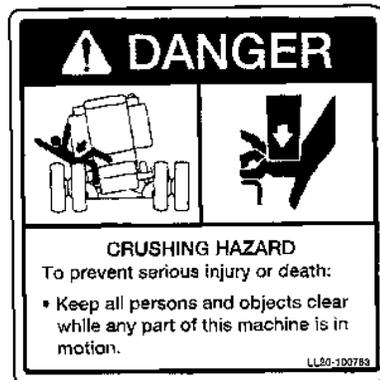
# SAFETY LABEL LOCATIONS



## SAFETY LABEL SPECIFICATIONS



Label #1  
Part number: LL20-100787  
Locations: 2 (left and right side of combine above front tires)



Label #2  
Part Number: LL20-100783  
Locations: 6 (front and rear of undercarriage and each side of drop axle assembly)



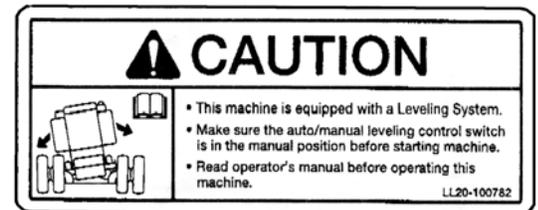
Label #3  
Part number: LL20-10784  
Locations: 2 (left and right side of upper transition face plate)



Label #4  
Part number: LL20-100788  
Locations: 3 (main cylinders and above leveling manifold)



Label #5  
Part number: LL20-100786  
Locations: 1 (front of electrical box)



Label #6  
Part number: LL20-100782  
Locations: 1 (inside cab window beyond console)



Label #7  
Part number: LL20-100785  
Locations: 1 (ladder well)

**These safety labels should be present and legible at all times. If new labels are needed, or you have any questions concerning safety, please contact Hillco at 1-800-937-2461.**

# OPERATION, SETUP, AND MAINTENANCE

## ELECTRICAL OPERATION

### LEVELING SYSTEM CONTROLS

#### MANUAL LEFT / RIGHT LEVELING SWITCH

**LEVEL LEFT:** Push down on the left side of the Manual Left/Right Leveling Switch.

**LEVEL RIGHT:** Push down on the right side of the Manual Left/Right Leveling Switch.

#### AUTO/MANUAL LEVELING BUTTON

**AUTO:** Push the Auto/Manual Leveling Button once to light the Auto Leveling Indicator Light and engage automatic leveling operation. The automatic leveling controller monitors changes in slope and corrects chassis position to maintain a level chassis position. The Manual Left/Right Leveling Switch will override the automatic leveling controller while the switch is depressed. Upon release of the switch, the leveling system will return to automatic leveling mode.

**MANUAL:** Push the Auto/Manual Leveling Button once to enter the Manual Leveling mode (Auto Leveling Indicator Light not lit). With the Auto Leveling Indicator Lamp not lit the Manual Left/Right leveling switch will level the combine left and right. When the switch is released the combine chassis will maintain the current chassis position.

#### HEADER TRIM SWITCH

The header trim switch is the four-position header control switch mounted in the combine's SR control lever. It is used to raise and lower the header as well as trim the header left and right.

**TILT LEFT:** Depress the left side of the switch to tilt the header counterclockwise.

**TILT RIGHT:** Depress the right side of the switch to tilt the header clockwise.

#### MAXIMUM LEVEL LAMP

The leveling system is equipped with a maximum level warning lamp. This lamp, located on the face of the steering column, indicates when the machine has reached its maximum leveling capability. Important tire and tread width restrictions apply to the use of combines equipped with the Model 2970H Leveling system that are intended for use on slopes exceeding the maximum leveling capability. See the "Slope Restrictions" section of this manual for important details of these restrictions.

Header Trim  
Switch

Auto Leveling Indicator Light  
Lit = Auto, Not Lit = Manual

Auto/Manual  
Leveling Button

Manual Left/Right  
Leveling Switch



## **ELECTRICAL SETTINGS**

### LIMIT SWITCHES

The leveling system is equipped with left and right level limit switches that disable the automatic leveling when the combine reaches its maximum leveling capability in either direction. These switches are preset by the installer at either the maximum leveling capability of the combine or in some cases at a lesser angle to provide for proper tire clearance. It is important to note that in the event of a limit switch failure the combine may continue to level to its maximum capability. Care should be taken to make sure tire clearances are adequate in the maximum level position to prevent damage to the tire or chassis in the event that a limit switch failure should occur. The operator should daily level the combine to its maximum level position, with the bulk tank empty, using the manual leveling switch to insure the limit switches are operational.

**IMPORTANT:** With certain tire selections mechanical cylinder stops can be purchased from Hillco to prevent damage to the combines side panels in the event a limit switch or leveling valve malfunctions.

To set the limit switches, first park the combine on level ground and block the tires. Then raise the feeder spout and lock the feeder lift cylinder. Place the leveling system in the Manual Leveling mode (Auto Leveling Indicator Light not lit). Using the Manual Left/Right Leveling Switch, lean the combine to the left to maximum level of the cylinders or to the maximum point that there is no sheet metal to tire interference. It may be a good practice to level a small distance, stop and check for clearance issues before continuing. Next, turn on the parking brake and shut down the machine. The limit switches are located on each side of the control box near the main pivot pin. Align the limit switch actuator bracket so that it is aligned with the left limit switch. Adjust the left limit switch actuator bolt one turn past the point where you can hear the contacts on the limit switch snap. Repeat this process for the right limit switch.

## **MECHANICAL ADJUSTMENTS**

### *WIDTH – Slope MODEL 2970H TREAD Restrictions*

The Model 2970H Leveling System is designed around a main undercarriage length of 114.5" or 122.5". The 114.5" undercarriage is designed for use with dual tire packages where 120-180" tread spacing is preferred for 30" rows. Use of the 114.5" undercarriage with duals will limit the leveling capability of the combine from 27% to 23%. The 122.5" undercarriage was designed to move the dual tires outward and allow for the maximum leveling capability of the combine or 27%. The final drives can be mounted directly to the 114.5" and 122.5" undercarriages.

On Model 2970H leveling systems the 145" tread width can be achieved by mounting the final drives directly to the undercarriage and dishing the stock combine single wheels inward on the 114.5" undercarriage. Check the tread width using a tape measure to insure your machine is not operating on less than the minimum 145" tread spacing.



**The minimum allowable tread width for use on a Model 2970H leveling system is 145". The 145" tread spacing is prohibited from use on slopes that exceed 27% or the maximum leveling capability of the combine.** Dual tires are required for combines intended for use on slopes greater than 27%.

### *TIRE SELECTION – Slope Restrictions*

*Model 2970 Single Tires* – Combines equipped with the Model 2970H Leveling System may be equipped with 30.5L-32 single tires with a 16 ply rating, 35.5L-32 with a 12 ply rating, 800/65R32, or 68x50-32 HF3 with a 16 ply rating provided the combine is operated at or below the 27% maximum leveling capability of the leveling system. **Use of these tire selections is prohibited on slopes greater than 27%.**

*Model 2970H Dual Tires for Slopes Less than 27%* - Combines equipped with the Model 2970H Leveling System may be equipped with 20.8R-38 one star rating, and 18.4R-42 two star rating dual tires provided that the combine is operated at or below the 27% maximum leveling capability of the leveling system. **Use of these tire selections is prohibited on slopes greater than 27%.**

*Model 2970H Dual Tires for Slopes Greater than 27%* - Combines equipped with the Model 2970H Leveling System must be equipped with 24.5-32 10 ply, 20.8-38 two star rating, or 20.8R-42 two star rating dual tires if the combine is intended for use on slopes exceeding 27% or the maximum leveling capability of the combine.

### *HEADER AND COMBINE CONNECTION*

Refer to the John Deere Combine STS Operator's Manual for instructions on connecting the header to the combine.

Note: Some headers may require lengthening of the hydraulic hoses that couple from the header to the combine to allow for maximum rotation of the header during the installation.

All John Deere headers require a HILLCO Header Kit to function properly during rotation of the transition.

### *REAR AXLE WEIGHTING*

The HILLCO Model 2970 Leveling System is designed to transfer enough weight to the rear axle of the combine for proper balance that no additional weight is needed. If the operator determines that additional weight is needed on the rear axle to ensure optimal down hill performance it can be accomplished by adding:

- 1) Calcium Chloride in Rear Tires
- 2) John Deere Rear Wheel Weights

Use caution when using individual turning brakes. Installation of a Hillco Leveling System transfers additional weight to the rear axle of the combine. Excessive braking to turn can damage your combine chassis.

**The responsibility for making the final determination of appropriate rear axle weighting lies with the operator.**

When first operating the Model 2970 Leveling System in hillside conditions, begin operation on gradual slopes and work up to more severe slopes only after you have determined that rear axle weighting is appropriate for downhill maneuvers. The first indication of insufficient rear axle weighting is sluggish or unresponsive steering while traveling down hill. This effect will worsen if the operator decelerates. Make sure rear axle weighting is sufficient for safe down hill maneuvers, under normal deceleration, in your most severe down hill conditions.

**Use of grain tank extensions is strictly forbidden. Use of such extensions voids both the Hillco and John Deere new equipment warranties.**

### *REAR AXLE EXTENSION POSITIONING*

The rear axle on the combine is designed so that the axle extensions may be bolted in two different positions to adjust the rear height of the combine. The rear axle extension position may need to be adjusted after the correct tires and header are installed on the combine. The combine should sit level to two inches high in the rear. If it does not, then the axle extension position will have to be adjusted and the tire size may have to be changed. Consult your combine's operator's manual for more information on the proper stub axle position.

## REAR AXLE TOE IN

If the rear tire and wheel size changed after the proper sized rear tires were installed the toe in should be checked. Consult your combine's operator's manual on the correct toe in for your tire and wheel size.

## TRANSITION DRIVE CHAIN

Check to see that the transition drive chain is in proper alignment and has proper tension. Misalignment of these sprockets will cause premature wear of the sprockets and chain. Chain tension is maintained with the tensioner that is bolted to the right side of the transition. Tensioner adjustment can be found in the following paragraph.

### CHAIN TENSIONER ADJUSTMENT INSTRUCTIONS

#### **Step 1**

Adjust the tensioner to the correct degree of tension by first placing a wrench on the square portion of the tensioner body and loosening the mounting bolt with a second wrench.

#### **Step 2**

Apply pressure to the tensioner body in the appropriate direction until the chain is properly tensioned. (See Figure 1) Note that the tensioner is designed to deflect up to 30 degrees either side of its normal position.

#### **Step 3**

While holding the tensioner body in position, torque the mounting bolt to 60 lb ft.

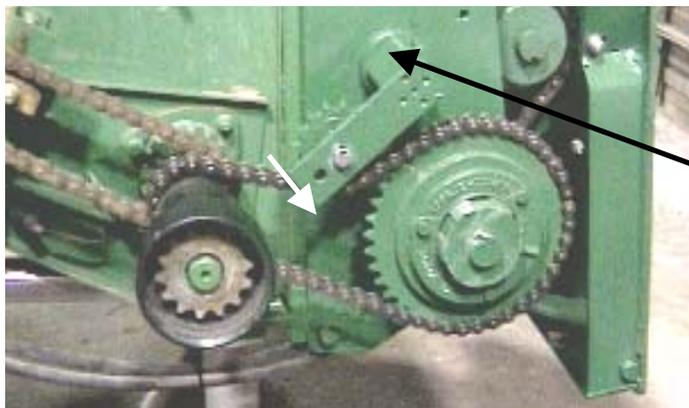
#### **Step 4**

Before starting the drive, check the nuts on the idler bolt for tightness.

#### **Step 5**

After the drive has been started, visually inspect the tensioner for alignment and proper tensioning.

**Figure 1**



Apply pressure with a wrench here in the direction denoted by the white arrow.

## *LADDER*

Run the ladder platform in the 45-degree position to maintain maximum header-to-driveline clearance and tire clearance. The bottom bi-fold section of the ladder is held in the retracted position with two gas-charged struts. If the ladder doesn't retract properly then check the tightness of all the bolts in the hinge positions and make sure that they are just snug. If all of the bolts appear to be at the correct tightness and the ladder still won't stay retracted then it is possible that one of the gas-charged struts has failed.

## *GENERAL SHIELDING*

Before operating the combine all shields must be in place and be in working condition.

Shield to tire clearance needs to be checked once the correct tires are installed on the combine. Check to see if the clearance is correct by having someone watch the tire and shields as the operator leans the combine to the far right and far left. Some tire selections require limit switches to be set slightly early to allow enough tire clearance between the left and right front side panels.

## *HYDRAULIC SETTINGS*

Refer to the Hydraulic Safety section for precautions regarding the hydraulic system.

The Model 2970H Leveling System uses an auxiliary pump and single station manifold for its leveling hydraulic requirements. It utilizes the combines original auxiliary hydraulic system for lateral header tilt control. Consult your combine's operator's manual or contact your John Deere dealer for diagnostic and maintenance support regarding the hydraulic system.

### **IMPORTANT:**



All adjustments on the hydraulic system are preset at the factory for optimal leveling and header trim performance. **DO NOT MAKE ANY ADJUSTMENTS TO THESE SETTINGS WITHOUT FIRST CONTACTING YOUR AUTHORIZED HILLCO DEALER.**

## *HYDRAULIC HOSES*

Inspect the hydraulic system for leaks, damaged hoses, improper routing, and loose fittings.

Hydraulic hoses that are not routed correctly could become worn from working against abrasive edges or moving parts. If abrasions or holes do occur, the hydraulic hoses can only be replaced, not repaired. **Do not attempt repairs with tape or cements.** High pressure will burst such repairs and cause system failure and possible injury.

Hydraulic Hose Connections – When tightening loose hoses on the cylinders, pump, etc., always use one wrench to keep the hose from twisting and another wrench to tighten the

union. Excessive twisting will shorten hose life and allow the fitting to loosen during operation. Do not over-tighten fittings or adapters.

Refer to the John Deere Combine's Operators Manual for information regarding hydraulic oil, check intervals, and reservoir fluid levels. High speed leveling, low speed leveling and header trim speeds are preset at the factory. If different speeds are desired please contact your Hillco dealer.

## **HYDRAULIC CYLINDERS**

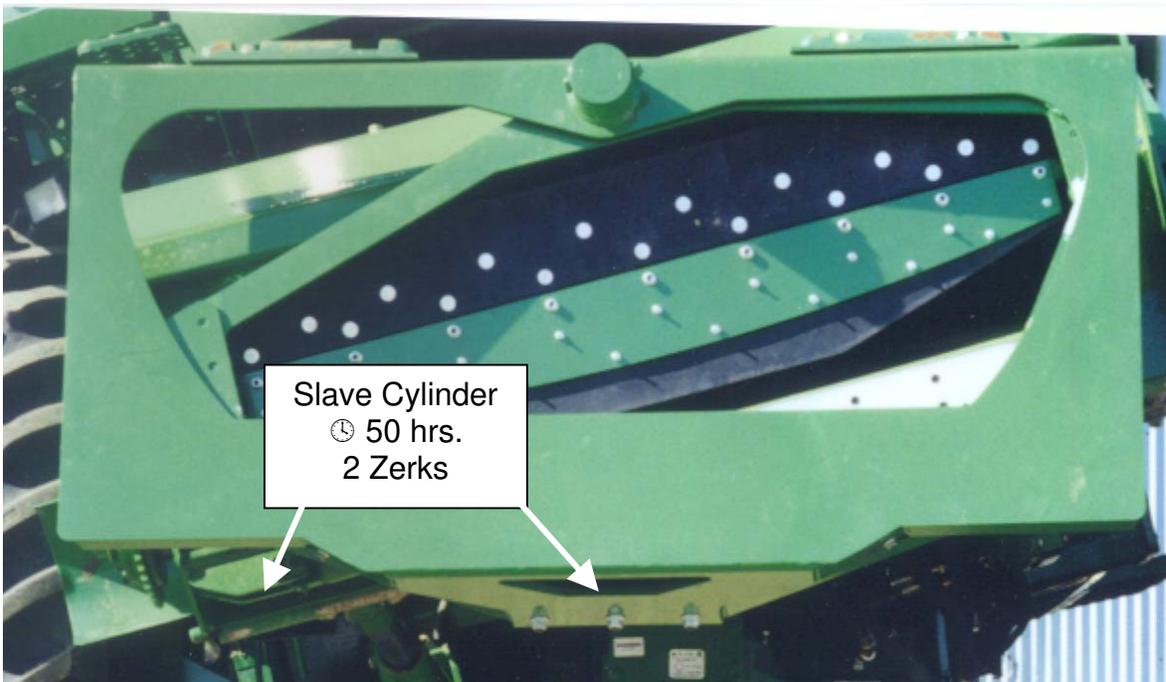
**IMPORTANT:** Each leveling cylinder is equipped with a safety valve that is in place to prevent unintentional leak down of the cylinder. These safety valves are preset at the factory, and should not be adjusted.



**DANGER:** Do not make any repairs to the cylinders, disconnect valves or any hoses connected to the cylinders, counterbalance valves, bulkhead mount or manifold without first contacting your authorized Hillco dealer. These hydraulic components stabilize the chassis of the combine. Improper repair or replacement of these components could lead to uncontrolled leveling of the combine's chassis.

## **GREASE LOCATIONS**

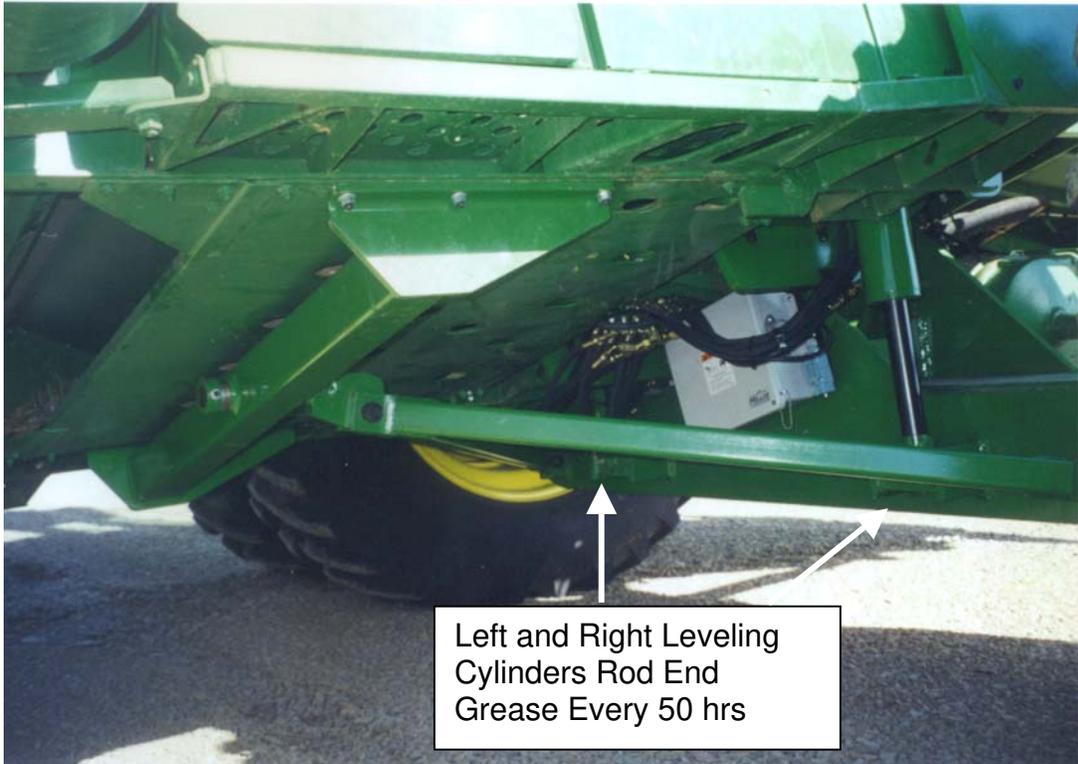
Use John Deere 251H EP grease or equivalent NLGI No. 2 Multi-Purpose Lithium Grease.



Grease Locations (continued)

GREASE BULKHEAD:  
Grease All Five Zerks  
Every 50 hrs. of Operation

These Zerks Lubricate the Main  
Pivot Pin, Master Cylinder Rod  
and Base End, and the Base  
End of the Leveling Cylinders



## ***FASTENERS***

### Check Bolt Tightness

- After the first 10 hours of operation
- Every season

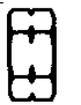
The following bolts are torqued to special specifications because of the application in which they are used.

Transmission Mount Bolts:	John Deere Torque specifications
Final Drive Housing Bolts:	John Deere Torque specifications
Drive Wheel Hub Bolts:	John Deere Torque specifications
Steering Wheel Hub Bolts:	John Deere Torque specifications
Rear Axle Extension Bolts:	John Deere Torque Specifications
Unloading Auger Drive Shaft Locknut:	John Deere Torque Specifications

**For all other leveling system fasteners use the bolt torque charts located on the following pages.**

**IMPORTANT:** Consult your John Deere 9650 & 9750 STS operator's manual to verify that correct bolts and spacers are used for the wheel application.

**Unified Inch Bolt and Cap Screw Torque Values**  
(for Hillco 2000 Series Leveling Systems Only)

SAE Grade and Head Markings	1 or 2 <sup>b</sup>	5	5.1	5.2	8	8.2
	NO MARK 					
SAE Grade and Nut Markings	2	5		8		
	NO MARK 					

Size	Grade 1 <sup>a</sup>				Grade 2 <sup>b</sup>				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated <sup>c</sup>		Dry <sup>d</sup>		Lubricated <sup>d</sup>		Dry <sup>d</sup>		Lubricated <sup>d</sup>		Dry <sup>d</sup>		Lubricated <sup>d</sup>		Dry <sup>d</sup>	
	N·m	lb-ft	N·m	lb-ft												
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	240	175	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	400	300	510	375	400	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

<sup>a</sup>Grade 1 applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length.

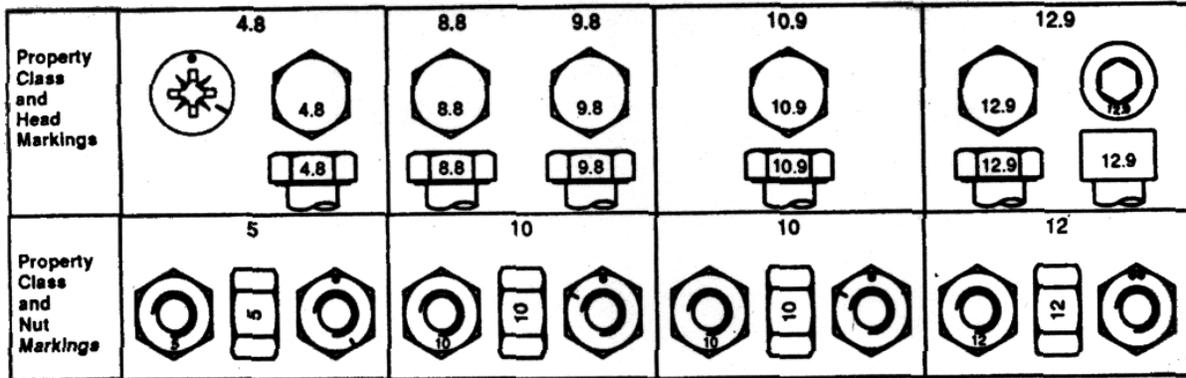
<sup>b</sup>Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6 in.) long.

<sup>c</sup>"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.

<sup>d</sup>"Dry" means plain or zinc plated without any lubrication.

**Torque specifications for certain fasteners may vary from this chart. Do not use any of the bolt torque specifications listed in this chart without first reading the "Fasteners" section in this manual.**

### Bolt and Cap Screw Torque Values (for Hillco 2000 Leveling Systems Only)



Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated <sup>a</sup>		Dry <sup>b</sup>		Lubricated <sup>b</sup>		Dry <sup>b</sup>		Lubricated <sup>b</sup>		Dry <sup>b</sup>		Lubricated <sup>b</sup>		Dry <sup>b</sup>	
	N·m	lb-ft	N·m	lb-ft												
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	255	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

<sup>a</sup>"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.

<sup>b</sup>"Dry" means plain or zinc plated without any lubrication.

**Torque specifications for certain fasteners may vary from this chart. Do not use any of the bolt torque specifications listed in this chart without first reading the "Fasteners" section in this manual.**

## TIRE INFLATION

Keep the tires properly inflated to the pressure shown in the inflation pressure tables for the front and rear tires. Both under-inflation and over-inflation are detrimental to tire life. Don't re-inflate a tire that has been run flat or when there is obvious or suspected damage to the tire or wheel components. Check the tire pressure weekly or after 50 hours of operation.



**WARNING:** When inflating tires, use a clip on air chuck and extension hose long enough to allow you to stand to one side and NOT in front or over the tire assembly.



**WARNING:** A tire can explode during inflation and cause serious injury or death. Never increase air pressure beyond 35 PSI to seat the bead on the rim. Replace a tire if it has a defect. Replace a wheel rim, which has cracks, wear or severe rust. Make sure that all the air is removed from a tire before removing the tire from the rim. Never use force on an inflated or partially inflated tire. Make sure the tire is correctly seated before inflating.

### TIRE PRESSURE CHART

Tire Size	Ply Rating	Tread Type	Tire Pressure	
			PSI	(kPa)
14.9-24	6	R1	20	138
16.9-26	6	R1	22	152
16.9-26	6	R2	22	152
18.4-16.1	6	R1	20	138
18.4-16.1	6	R3	20	138
18.4-26	6	R1	16	110
18.4-26	6	R2	16	110
600/65-R28	L1 147	R1W	13	90
18.4-38	8	R1	24	166
18.4-38	8	R2	24	166
18.4-38	1 Star	R1	24	166
20.8-38	8	R1	22	152
20.8-38	8	R2	22	152
18.4R42	2 Star	R1	28	193
20.8R42	2 Star	R1	24	166
24.5-32	12	R1	28	193
24.5-32	12	R3	24	166
30.5L-32	12	R1	24	166
30.5L-32	12	R2	24	166
30.5L-32	12	R3	24	166
30.5L-32	14	R1	24	166
30.5L-32	16	R3	26	179
35.5L-32	20	R3	28	193.103

**Refer to the John Deere 9650 & 9750 operator's manual for information on wheel mounting and hub bolt torque.**

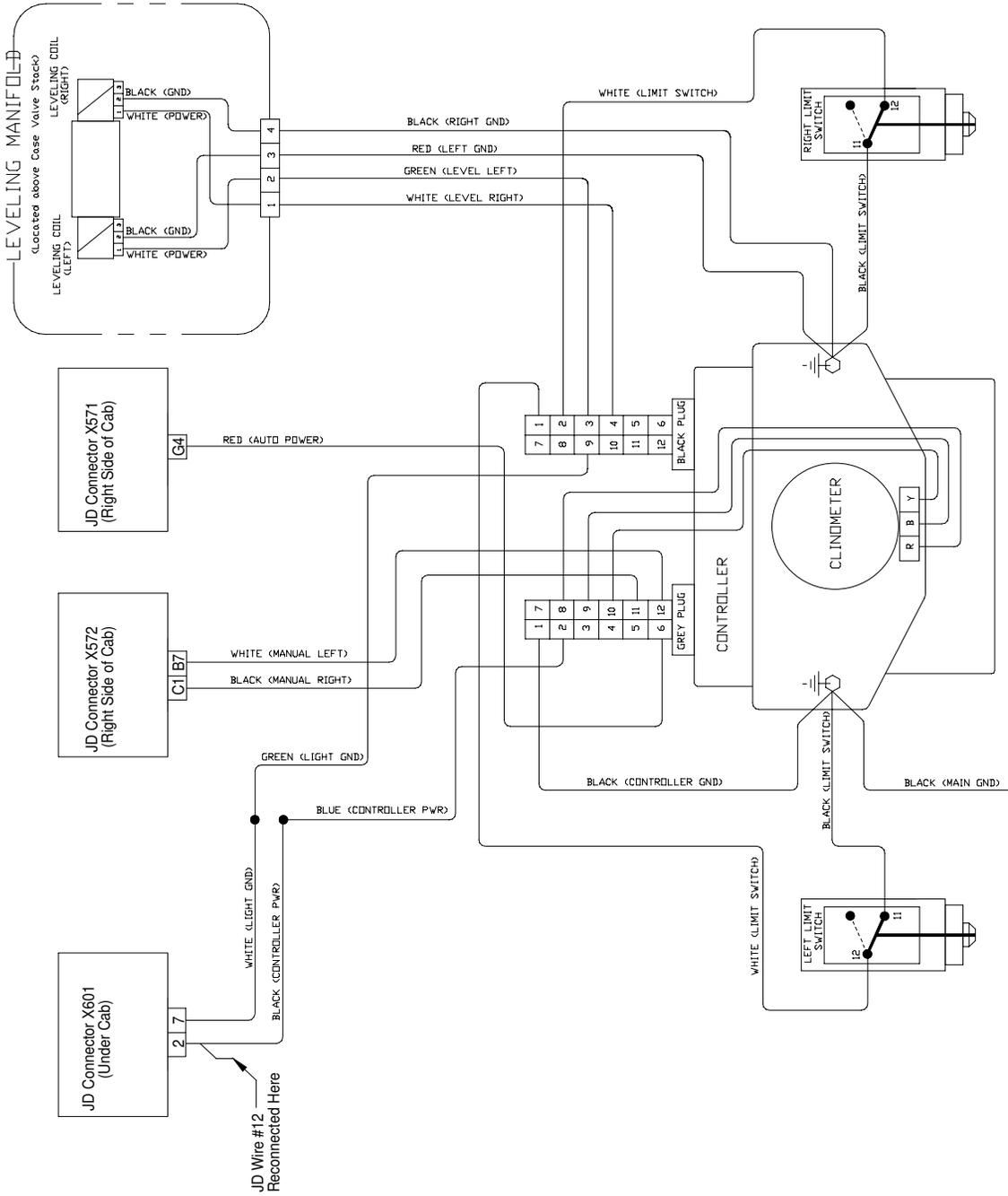
# 2970H ELECTRICAL CIRCUIT SCHEMATIC (EARLY SERIAL NUMBER)

## Model 2970H Electrical Circuit Schematic (Early S/N)

FOR STS COMBINES 9650 ( -695500); 9750 ( -695600)

S/N 2970-0029 thru Current

Header Trim Circuit - See STS Combine Electrical Schematics



CHASSIS GROUND

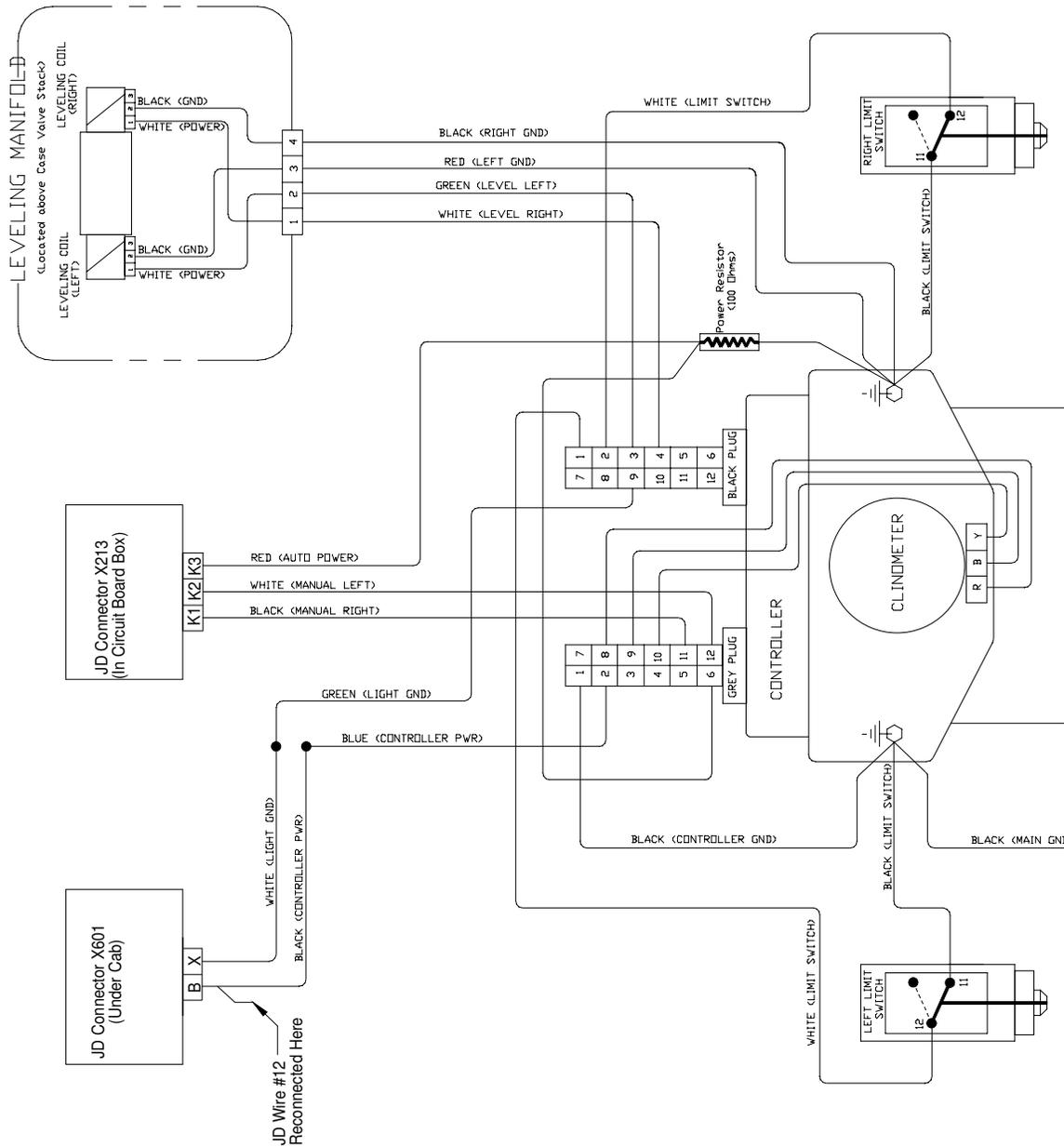
# 2970H ELECTRICAL CIRCUIT SCHEMATIC (LATE SERIAL NUMBER)

## Model 2970H Electrical Circuit Schematic (Late S/N)

FOR STS COMBINES 9650 (695501- ); 9660 (705501- ); 9750 (695601- ); 9760 (705601- ); 9860 (705701- )

S/N 2970-0029 thru Current

Header Trim Circuit - See STS Combine Electrical Schematics

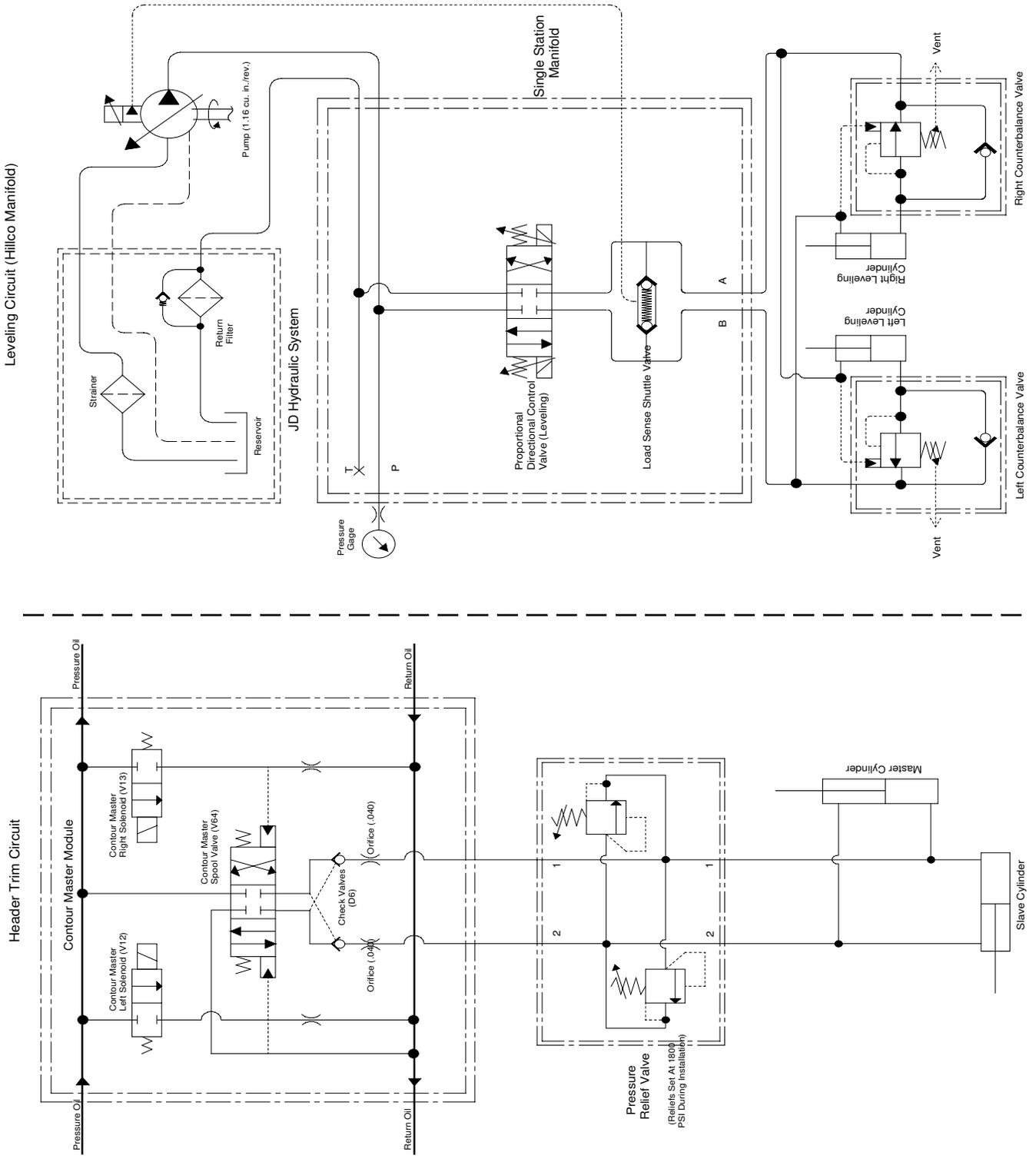


CHASSIS GROUND

# 2970H HYDRAULIC CIRCUIT SCHEMATIC

## Model 2970H Hydraulic Circuit Schematic

S/N 2970-0029 thru Current



**NOTES**

**NOTES**

