

Model 2955S-2970S Leveling System Operator Manual

(D-040820CLA01C)

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SERIAL NUMBER LOCATION



MODEL AND SERIAL NUMBER

Write the serial number and the model number of the Leveling System and combine on the lines provided. It is important to reference these numbers when ordering parts or requesting technical support. It is suggested that you give the leveling system serial number to your John Deere dealer to be kept with their combine serial number records.

Leveling System Model Number	2955S	2970S	(Circle One)
Leveling System Serial Number		-	
Combine Model Number			
Combine Serial Number			

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WARRANTY POLICY

Statement of Limited Warranty (North American Harvest Products) HILLCO

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 1st through May 31st 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 1st through September 30th 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. D-041201LJH01

Warranty Registration

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Fill out the Warranty Registration Card that accompanies this Operator's Manual and return it to Hillco Technologies, Inc.. Also fill out this form and retain it for your records.

Owner's Obligation

Warranty Registration – You must complete the Warranty Registrations Card and submit it to Hillco Technologies, Inc. within thirty (30) days of the date of the delivery to register the new equipment under Hillco's Warranty Policy.

Warranty Void if Not Registered!

Maintenance Service – The operator's manual furnished to you with the equipment at the time of delivery contains important maintenance and service information. You should read the manual carefully and follow all maintenance and service recommendations. Doing so will result in greater satisfaction with your equipment and help to avoid service and warranty problems. Please remember that failures due to improper maintenance of your leveling system will not be covered under Hillco's Statement of Limited Warranty.

INTRODUCTION

Thank you for choosing the Hillco Technologies' Sidehill 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 John Deere STS combines.

Safe, efficient and trouble free use of your Sidehill 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



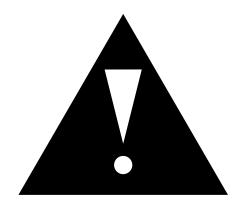
Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Hillco dealer or Hillco if you need assistance or information at 1-800-937-2461.

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.

<u>SAFETY</u>

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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. Level Limit Stops should be used on combines that rely on the limit switches to stop the leveling prematurely to prevent sheet metal damage.
- 11. The use of after-market grain tank extensions is prohibited from use on combines equipped with the Model 2955S-70S leveling systems.

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.



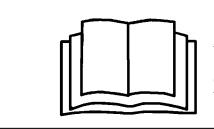
SERVICING AND MAINTENANCE SAFETY

- 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.

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.

SAFETY LABELS

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

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, peal 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.

SAFTEY LABEL LOCATIONS





PRODUCT DESCRIPTION

The Hillco Sidehill Leveling system, designed for John Deere STS combines, is a bolt-on design and is installed with little modification to the combine. This 2-way leveling system allows the combine to automatically compensate for slopes up to 18% as it moves across sloping terrain.

The leveling system's slope controller senses the combine chassis position relative to level. As the combine moves onto a slope, and the chassis begins leaning left or right, the leveling controller monitors



the chassis position and corrects for any chassis tilt exceeding 1.5 degrees. As the chassis exceeds this limit the controller sends a signal to the hydraulic leveling valve that sends pressurized oil to the main leveling cylinders. The cylinders tilt the combine chassis to correct for the un-level chassis position, bringing the chassis back within 1.5 degrees of level.

As the combine chassis is leveled, left or right, the leveling system's master/slave hydraulic header control system laterally counter-rotates the header to keep the header parallel to the ground. The operator can manually override header position or, using the combine's original Contour Master electronics and sensor-equipped header, it can automatically compensate for varying ground contours.

CONTROLS & COMPONENTS

LEVELING CONTROLS AND COMPONENTS

Leveling Control Switches

The leveling switches are located in the armrest console.

- A- Road Transport Disconnect Switch
- B- Road Transport Disconnect Indicator Light
- C- Automatic Leveling Control Switch
- D- Automatic Leveling Indicator Light
- E- Manual Leveling Control Switch

Leveling Control Valve

The leveling control valve is located in the hydraulic stack located on the left side of the combine. It is electronically activated by either the automatic leveling controller or by manual override by the operator.

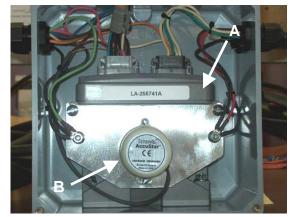
A- Leveling valve

Leveling Controller

The electronic leveling controller consists of a clinometer for slope sensing and a control module to process that information and output signals to the hydraulic leveling valve. When auto leveling in activated the leveling controller keeps the chassis within 1.5 degrees of level up to a maximum slope compensation of 18%.

A- Leveling Control Module B- Clinometer Slope Sensor









Leveling Limit Switches

The limit switches are utilized to deactivate the electrical control signal being sent to the hydraulic control valve when the combine reaches maximum leveling. The limit switch also serves to light the maximum level indicator on the steering column.

A – Limit Switches



(Note: If the limit switches are used to prevent tire contact with the combine chassis then cylinder stops are recommended to prevent chassis and tire damage in the event of a hydraulic or electrical failure. Cylinder stops are available from Hillco.)

Hydraulic Leveling Cylinders and Counter-Balance Valves

There are two main leveling cylinders located on the rearward side of the leveling system's undercarriage. These cylinders are pressurized by the leveling hydraulic valve to tilt the combine chassis to correct for slope changes. Both leveling cylinders are equipped with hydraulic counter-balance valves that positively lock the oil into the cylinders until a pressure signal is sent from the hydraulic leveling valve. These counterbalance valves lock the chassis position in the event of hydraulic hose failure or disconnection. Never repair or replace hydraulic leveling related components without first blocking between the overcarriage and undercarriage to prevent accidental tipping.

A- Leveling Cylinders B- Counter-Balance Valve





Leveling Cylinder Shipping and Storage Stops

While hauling the combine or during storage of the combine in the off-season, it is recommended that the cylinder shipping stops be installed on the leveling system's main leveling cylinders. These stops will prevent unexpected settling of the combine during storage.

A - Cylinder Shipping Stops



HEADER TILT CONTROLS AND COMPONENTS

Header Tilt Control Switches

The manual header tilt switch is located in the hydro handle and is used to manually control the header tilt angle. Consult your John Deere Operator's Manual for explanation of the other Contour Master control switches.

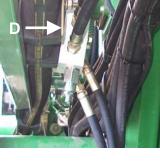
A - Manual Header Tilt Switch

Header Tilt System

The header tilt hydraulic circuit consists of the header tilt control valve, master cylinder, slave cylinder and relief valve.

As the combine levels left or right, the master cylinder is either retracted or extended sending oil to the slave cylinder, which rotates the header. No electronic function is required for this action to occur. When manually controlling the header angle from the header tilt switch on the hydro control handle or when in the automatic Contour Master mode header position can be overridden by activating the lateral tilt valve which is coupled to the master/slave circuit. To provide protection to the header and feeder house, an in-line relief valve prevents over pressurizing the slave cylinder.

- A- Header tilt valve
- B- Master cylinder
- C- Slave cylinder
- D- Trim Relief Valve







OPERATION

Field Operation - Manual Leveling

To manually level the combine, the road transport disconnect switch (B) must be off (the indicator light (A) next to the switch must be not lit). Press the left side of the manual leveling control switch (E) to level left, press the right side of the button to level right. In the auto-leveling mode the manual leveling control switch will override the automatic leveling control while depressed. As soon as the switch is released the leveling will resume in automatic mode.

Field Operation - Automatic Leveling

To enter the auto-leveling mode, depress the auto-leveling switch (C). The autoleveling indicator lamp (D) will light when in the auto-leveling mode. In auto-leveling mode the leveling system will automatically correct for slopes to 18%. When the leveling system reaches maximum level right, or left, the maximum level indicator lamp will light on the steering column.

Road Transport

When road transporting the combine the auto level switch (C) must be off and the road transport disconnect switch (B) should be on in the on position (the indicator lamp (A) will be lit).

- A- Road Transport Disconnect Switch Indicator light
- B- Road Transport Disconnect Switch
- C- Automatic Leveling Control Switch
- **D-** Automatic Leveling Indicator Light
- E- Manual Leveling Control Switch

Lateral Header Tilt / Contour Master

To tilt the header manually, depress the header tilt switch (A) on the left for tilt left, or on the right side for tilt right.

The Hillco leveling system is fully compatible with John Deere's Contour Master lateral tilt electronics.

To run the Contour Master functions refer to your combine operator's manual.

A- Header Tilt Switch





(Note: The Contour Master's Angle Sensor In-Cab Display will not function when the combine is equipped with a sidehill leveling system. When calibrating the header do not calibrate the Angle Sensor. Attempts to calibrate the sensor will cause the system to display error codes. The Contour Master functionality will not be affected by not calibrating the angle sensor.)

MAINTENANCE



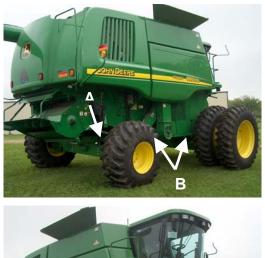
Prior to any maintenance, follow these procedures:

Park the combine on level ground, raise the header, turn off the ignition, block the tires, and lower the header lift cylinder safety stop.

Lubrication – Leveling System

All grease points on the Hillco Leveling System require a 50-hour grease interval. None of the lubrication points can be overgreased.

- A- Front pivot of JD rear axle
- B- Rod end of main leveling cylinders
- C- Rod end of the master cylinder
- D- Grease bulkhead
- E- 2955s ONLY- Base end of the master cylinder
- F- Base and rod end of the slave cylinder





Lubrication – Header Drive Shafts

Various header drive shafts are utilized for power transmission from the combine to the header.

Standard PTO Style Drive Shafts - These drive shafts utilize a single cross at each end of the drive shaft. Grease zerks on both crosses and the zerk on the outer profile tube (at the slip joint) should be greased on 50-hour intervals. The zerk on the outer profile tube can be accessed through the grease slot in the outer shield tube by fully collapsing the driveline. It is suggested to add an additional grease slot in the outer shield tube that aligns with the zerk when the drivelines are coupled to the combine's reverser shaft to improve ease of greasing.

Constant Velocity Drive Shafts - Due to the high working angles of the drive shafts on narrow headers, constant velocity drive shafts are used to transmit power to the header. These drive shafts utilize two universal joints and a ball-and-socket joint at each end of the drive shaft. There are a total of 7 grease zerks per drive shaft and they must be greased on 8-hour intervals. CV drive shafts will not tolerate a lack of grease.

Consult the lubrication label on each drive shaft for more details.

ADJUSTMENTS

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Prior to any adjustments, follow these procedures:

Park the combine on level ground, raise the header, turn off the ignition, block the tires, and lower the header lift cylinder safety stop.

Leveling Controller Adjustment

When operating properly, the leveling control system should maintain a chassis position within 1.5 degrees of level when returning to level from either the left or right. If this 3-degree dead band seems unevenly split between the left and the right sides then the clinometer requires adjustment.

To adjust the clinometer, loosen the top and bottom bolt on the clinometer. The bottom hole is slotted allowing for rotation of the clinometer. Move the bottom of the clinometer in the direction you wish the combine to level. Make small (1/16") adjustments due to

the sensitivity of the controller. If the combine is listing to the left at level, move the bottom of the controller to the right side of the combine. Move the clinometer to the left side of the combine if the combine lists to the right at level. It is best to perform the return to level test at low engine idle.

A- Leveling Controller



Limit Switch Adjustment

To set the limit switches, park the combine on level ground and set the parking brake. Then raise the feeder spout and drop the header lift cylinder safety stop. Locate the two limit switches that are mounted beside the gray controller box near the leveling system's main pivot pin. Loosen the two mounting screws on each limit switch and lift them up to the top of their slots, then slightly tighten the screws to hold the limit switches in place. Next, place the leveling



A – Limit Switches

system into manual mode and lean the combine to the left until either the maximum leveling capabilities of the leveling system are reached or there is approximately one inch of clearance between the tires and any portion of the combine's chassis. Next, shut off the machine. Loosen the two screws that mount the left limit switch to its mounting plate. Adjust the left limit switch downward until the undercarriage front plate activates the plunger. You will hear a click when the switch is activated. The plunger should be compressed 1/16-1/8" past the point that it clicks. Test the limit switch by manually leveling right, away from the switch, and then back to the left. The combine should stop leveling when the switch is activated and the maximum level indicator lamp on the steering column should illuminate. Repeat the process for the right limit switch.

(Note: If the limit switches are used to prevent tire contact with the combine chassis then cylinder stops are strongly recommended to prevent chassis and tire damage in the event of a hydraulic or electrical failure. Hillco is not responsible for chassis damage that occurs due to the lack of appropriate cylinder stops.)

Header Shims

Shims can be purchased from your JD dealer to raise the header in relation to the Hillco transition's header adapter. The floor of the header should sit level or slightly higher than the bottom of the opening of the header adapter, to allow for smooth crop flow. These are the same plates that are used on the original JD feeder house.

A- John Deere Header Shims

Feeder Chain Adjustment

Follow the original John Deere feeder chain adjustment instructions found on the under side of the inspection doors on the top of the combine's feeder spout.

Fore/Aft Header Angle and Feeder Drum Stop Adjustments

Fore/Aft Header Angle Adjustment

Adjust fore/aft header angle using the adjusting bolt on the leveling system's transition. Do not adjust the John Deere fore/aft adjustment linkage as it will interfere with feeder chain clearance. Always check the upper feeder drum stop setting after adjusting the fore/aft header angle. See the warning below.

Upper Feeder Drum Stop

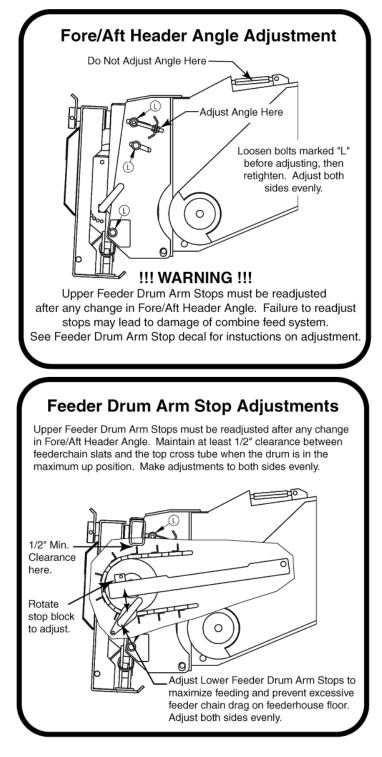
The upper feeder drum stop must be adjusted prior to the combine's first use and after any fore/aft header tilt adjustment. Adjust the stop by loosening the bolt and rotating the square stop block. The block provides for four different height settings. To tighten the fastener lift the drum up against the block and then tighten the bolt. Make sure that both left and right upper feeder drum stops are adjusted evenly.

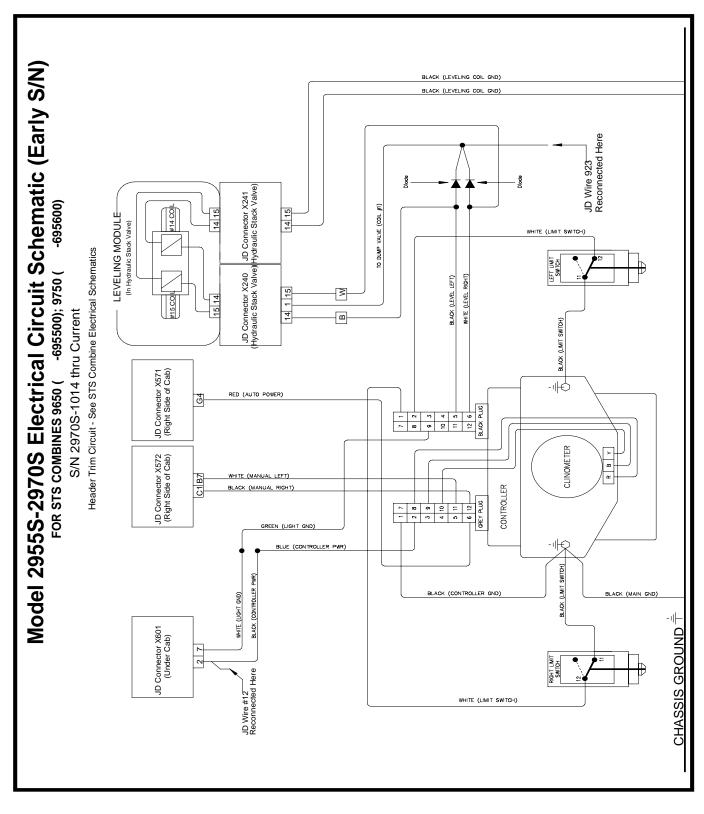
!!! Warning !!!

Failure to adjust the upper feeder drum stop to provide for adequate clearance between the feeder chain slats and the top cross tube may lead to extensive damage of the combine's feeder chain and threshing components. Maintain a minimum of ½" clearance between the feeder chain and the overhead cross tube when the drum is in the maximum up position (feeder drum arms strike the upper feeder drum stops).

Lower Feeder Drum Stop

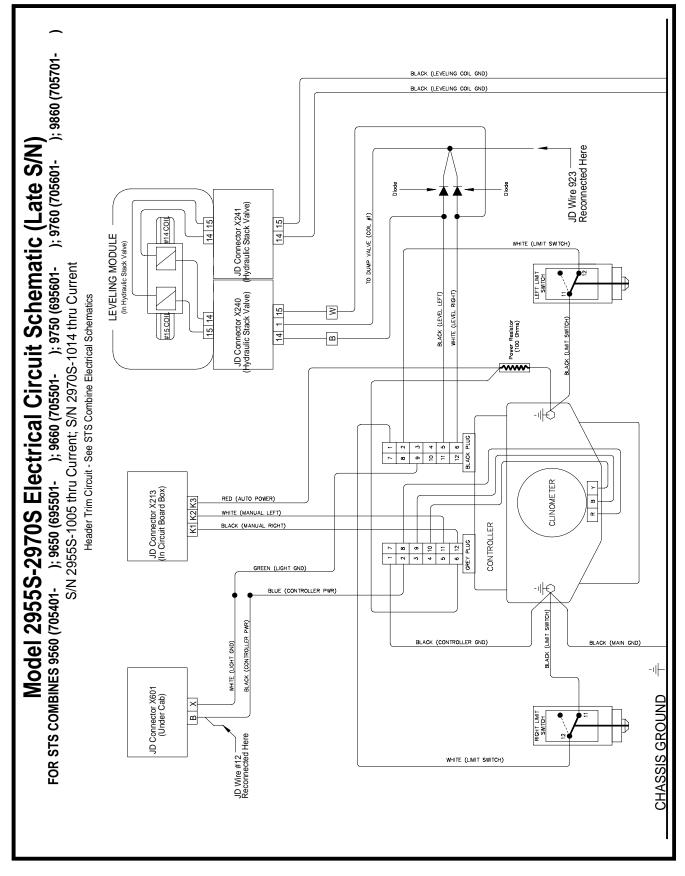
The lower feeder drum stop must be adjusted evenly on both the left and right sides of the feeder spout. Use the lower feeder drum stop to minimize feeder chain drag on the feeder house floor as well as to maximize feeding for varying crop conditions.



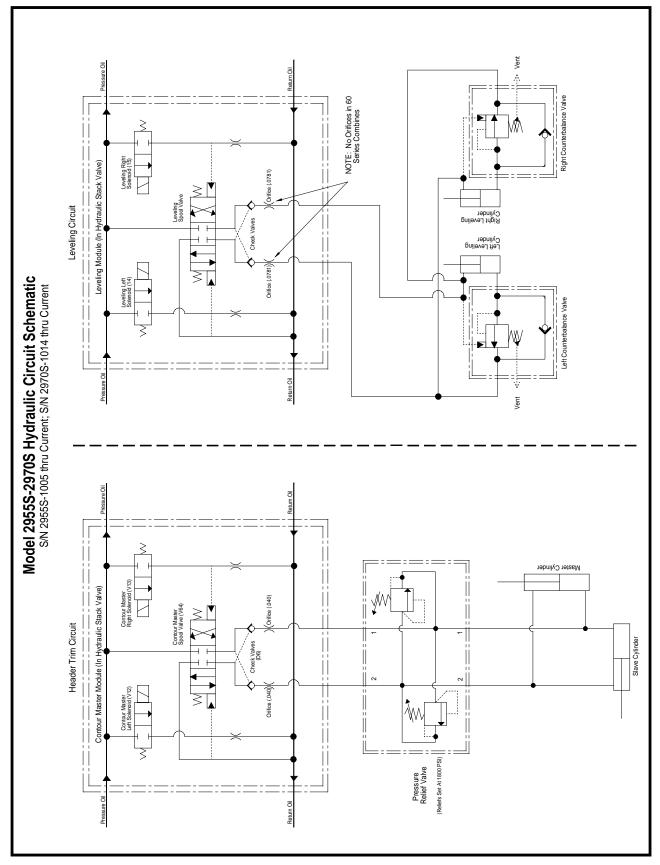


2955S-70S Electrical Circuit Schematic (Early Serial Number)

Schematics



2955S-70S Electrical Circuit Schematic (Late Serial Number)



2955S-70S Hydraulic Circuit Schematic

NOTES