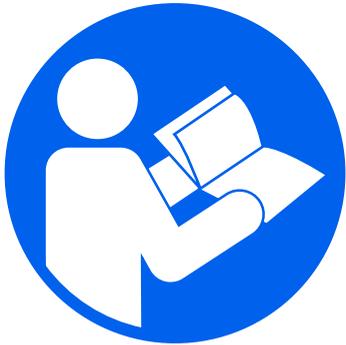


# Operator's Manual

(SN21001-21999)

**Model JH7020 & JH9020**  
**Hillside Leveling System**  
S660, S670, S680 & S690  
S760, S770, S780 & S790

D-180215CMA01C

	 <b>WARNING</b>
	<p>Read and understand operator's manual prior to operating this equipment.</p> <p>Failure to follow operation instructions could result in personal injury or damage to the equipment.</p>

# Contents

Model and Serial Number .....	1
Maximum Header Weights .....	1
Introduction .....	2
Safety .....	3
Signal Words .....	3
Operation Safety .....	4
Hydraulic Safety .....	4
Service and Maintenance Safety .....	5
Highway Operation and Transport Safety .....	5
Safety Labels .....	6
Product Description .....	10
Controls and Components .....	11
Leveling Control Switches & Monitor .....	11
Hydraulic Gear Pump .....	12
JH9020 Hydraulic Flow .....	12
Leveling Control Manifold .....	12
Leveling Controller .....	13
Header Tilt Manifold .....	13
Overcarriage Position Indicator .....	14
Slope Sensing Clinometer .....	14
Rear Wheel Assist Clinometer .....	14
Transition .....	14
Header Position Sensor .....	15
Retractable Ladder Step .....	15
Mechanical Leveling Cylinder Stops .....	16
Carriage .....	16
Hydraulic Leveling Cylinders and Counter-Balance Valves .....	16
Leveling Cylinder Safety Stops .....	17
Drop Axle .....	17
Header Tilt Control Switches .....	18
Header Tilt System .....	18
Header Tilt Controls and Components .....	18
Operation, Setup, and Maintenance .....	19
Leveling System Controls .....	20
Maximum Level .....	21
Header Trim Controls .....	21
Rear Wheel Assist Warning Alarm .....	22
Operator Adjustments .....	23
Storage .....	37
Transporting Combine on a Trailer .....	37
Maintenance .....	38
Hydraulic Filter .....	39
Driveline Maintenance .....	39
Transition Drive Chain .....	40
Transition Slip Clutch .....	40
Paddle Beater .....	40
Feeder House Removal .....	40
100 Hour - Annual Maintenance .....	41

Critical Joint inspection.....	42
Adjustments.....	44
Rear Axle Spacing .....	44
Rear Axle Position Chart.....	44
Over Rotation Stop .....	45
Transition Fore/Aft Adjustment Procedure .....	45
Lower Feeder Drum Stop Adjustment.....	45
Lateral Tilt Flow Control Adjustment .....	46
Mechanical Leveling Cylinder Stops.....	47
Header Tilt Setup .....	48
Tread Width .....	50
Tire Selection.....	50
Feeder Adjustment For Tire Size .....	50
Tire Inflation .....	50
Rear Axle Toe In .....	51
General Shielding .....	51
Drive Shaft and Couplers .....	51
Rear Axle Weighting .....	51
Hydraulic Settings.....	52
Hydraulic Hoses .....	52
Hydraulic Cylinder .....	52
Decal Placement .....	53
Header Compatibility Chart .....	55
Leveling System Specifications .....	56
Electrical Schematics .....	58
Hydraulic Schematics .....	64
Notes .....	71

## 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. We suggest 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	JH7020	JH9020
Leveling System Serial Number	-	
Combine Model Number		
Combine Serial Number		

(circle one)

## Maximum Header Weights

JH9020	9,500 lbs
JH7020	9,500 lbs

Hillco does not guarantee any non-John Deere header applications and will not be responsible for any damage incurred from improper header configurations.

Please call Hillco Technologies if you have any questions regarding the JH7020 & JH9020 or any other header configuration.

## Introduction

Thank you for choosing the Hillco Technologies' Hillside Leveling System to compliment your farming operation. This product has been designed and manufactured to meet the needs of farmers wanting to increase the performance of John Deere S Series combines.

Safe, efficient and trouble free use of your Hillside 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)



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 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**

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



**WARNING**

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



**CAUTION**

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

**NOTICE**

**NOTICE** - is used to address practices not related to physical injury.

## 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. The leveling system is equipped with a maximum level warning lamp. This lamp indicates when the machine has reached its maximum leveling capability. There are restrictions as to tread width and tire selection for combines used in harvesting slopes greater than the maximum leveling capability of the leveling system.
11. The use of after-market grain tank extensions is prohibited from use on combines equipped with Hillco Leveling Systems.
12. Level Limit Stops should be used on combines that rely on the limit switches to stop the leveling prematurely to prevent sheet metal damage.

## 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.
2. Use cardboard or wood to detect leaks – never your hands!
3. Before inspecting the hydraulic system of the leveling system, install the safety stops.
4. Before operating the leveling system, ensure that there are no obstructions between the chassis and the carriage.
5. Maintain proper hydraulic fluid levels.
6. Ensure all fittings and hoses are in good repair.
7. Do not make any repairs to the leveling system hydraulic system including: valves, hydraulic hoses, adapters, pumps, manifolds, or reservoirs without first contacting your authorized Hillco dealer.



## **Service and Maintenance Safety**

1. Review the Operator's Manual and all safety items before servicing or maintaining the leveling system.
2. Place the Auto/Off/Manual leveling switch in the "Off" position, 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.

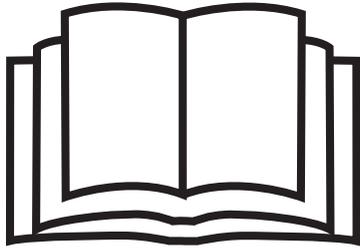
## **Highway Operation and Transport Safety**

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/Off/Manual leveling toggle switch is in the "Off" position 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

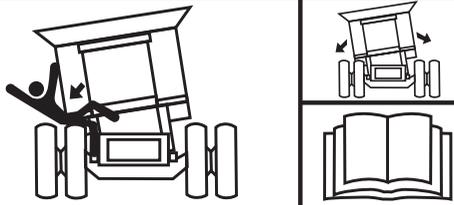


Decals, which display the Read Operator's Manual symbol, are intended to direct the operator to the Operator's Manual for further information regarding maintenance, adjustments and/or procedures for particular areas of the Leveling System. When a decal displays this symbol refer to the Operator's Manual 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.

**! DANGER**



**HYDRAULIC HAZARD**

- Loss of hydraulic pressure may cause combine to tip.
- Read operator's manual before disconnecting any hydraulic components.

LL20-100788



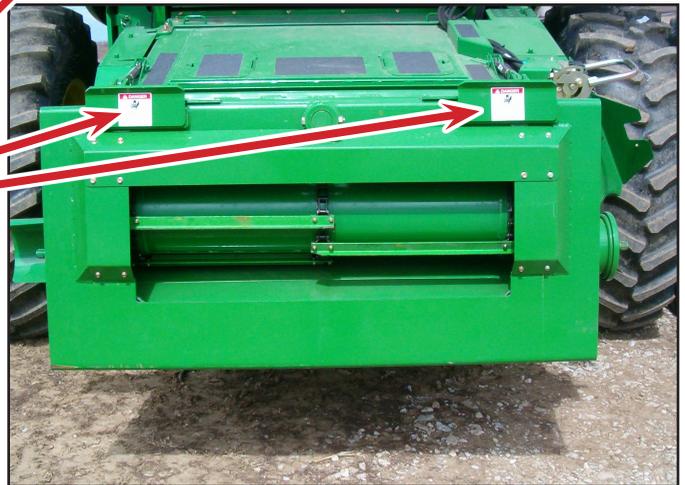
**! DANGER**



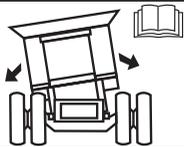
**PINCH POINT HAZARD**

- Keep hands, feet and body away from moving parts.
- Do not stand or climb on machine when operating.
- Hazard occurs during leveling and header trim.

LL20-100784

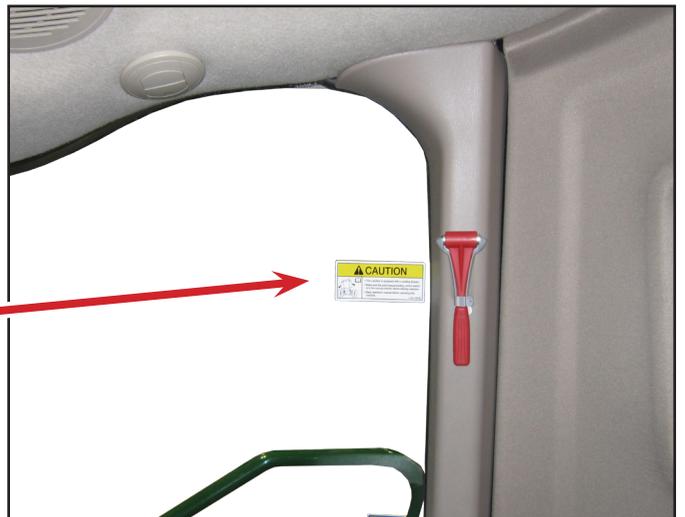


**! CAUTION**

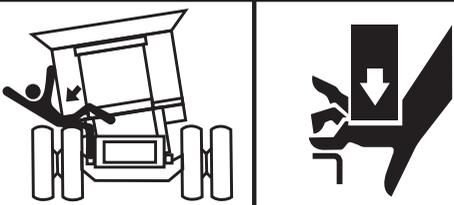


- This machine is equipped with a Leveling System.
- Make sure the Auto/Manual leveling control switch is in the manual position before starting machine.
- Read operator's manual before operating this machine.

LL20-100782



**! DANGER**



**CRUSHING HAZARD**  
To prevent serious injury or death:

- Keep all persons and objects clear while any part of this machine is in motion.

LL20-100783



**! CAUTION**

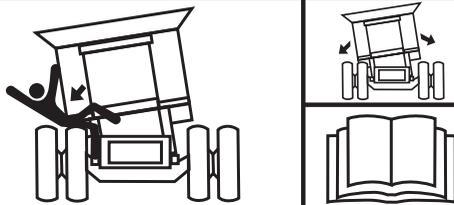


**MOVING STEP HAZARD**  
Bottom step lowers and retracts upward.  
Use caution when using ladder.

LL20-100785



**! CAUTION**

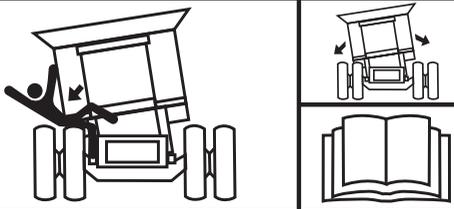


**LEVELING SYSTEM HAZARD**

- This machine is equipped with a leveling system.
- Combine chassis moves independent of carriage.
- Read operator's manual and be aware of hazardous areas at all times.

LL20-100787

**! DANGER**



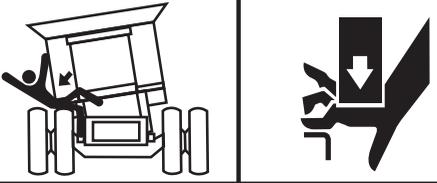
**HYDRAULIC HAZARD**

- Loss of hydraulic pressure may cause combine to tip.
- Read operator's manual before disconnecting any hydraulic components.

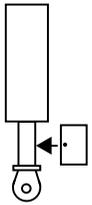
LL20-100788



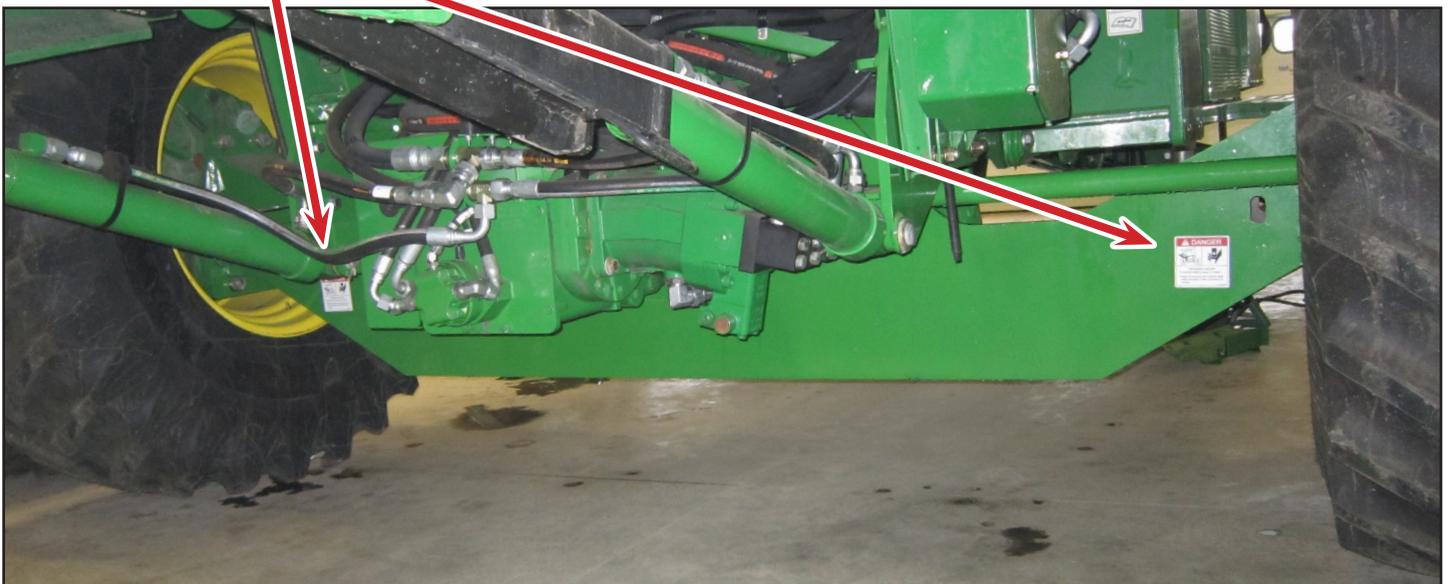
**! DANGER**



**AVOID CRUSHING INJURY**  
Install safety stops on the main leveling cylinders before performing repair or maintenance on the leveling system to prevent accidental tipping of combine chassis.



LL-143621



## Product Description



The Hillco Hillside Leveling System is designed for John Deere S Series combines. Hillco designed the Hillside Leveling System to maintain the combine's thrashing capacity and harvesting efficiency on contours of slopes up to 27%. This leveling system is designed to be installed with little modification to the combine.

The Hillside Leveling System tilts the combine's chassis laterally, automatically compensating for slopes up to 27% as it moves across sloping terrain. The thrashing platform remains level and allows both the combine and the operator to perform at maximum efficiency.

The leveling system uses a clinometer to sense the combine's chassis position in relation to "level". As the combine moves onto a slope, the chassis leans out of level and the clinometer senses the deviation and sends a signal to the controller. The controller opens the appropriate leveling valve. The leveling valve allows hydraulic oil to flow into the leveling cylinder. The cylinders tilt the combine's chassis to correct for the tilt, bringing the chassis back to level.

As the combine's chassis levels, the master header tilt cylinder pushes hydraulic oil to the header tilt cylinder, which counter-rotates the header to keep it parallel to the ground. The operator can manually adjust the header's position or, alternately, may use the combine's original lateral tilt electronics and sensor-equipped header to automatically compensate for varying ground contours.

# Controls and Components

## Leveling Control Switches & Monitor

The leveling control switches (A) and Leveling System Monitor (B) are located on the far side of the John Deere Monitor.

**Auto/Manual Leveling** — The Auto/Manual leveling button is used to toggle between the Automatic and Manual Modes. In Manual Mode the chassis will not rotate until initiated by the operator. In Automatic Mode, rotation of the chassis is initiated by the controller as dictated by changes in the slope. The operator can momentarily override the controller using the Manual Left and Right Buttons. The combine will return to level once the button is released.

On the lower right corner of the monitor the leveling mode (Auto or Manual) is indicated.

**Manual Tilt Left and Manual Tilt Right** — These buttons allow the operator to rotate the chassis to the left or right as desired.

The monitor gives the operator feedback such as:

- Current Slope
- Current Modes
- Diagnostics
- Alarms

The operator can adjust settings such as:

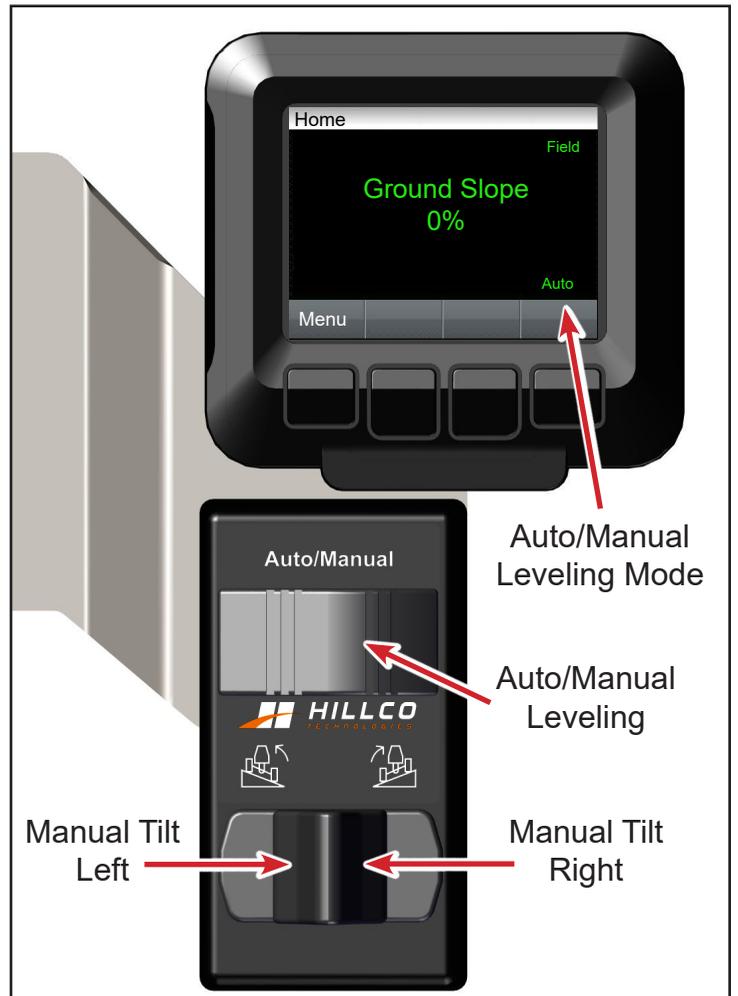
- Left/Right Limits
- Level Zero point
- Manual Leveling Speed
- Joystick calibrations

Detail description of the monitor and adjustable settings are later in this manual.

**For operation of the leveling system see the Operation section.**

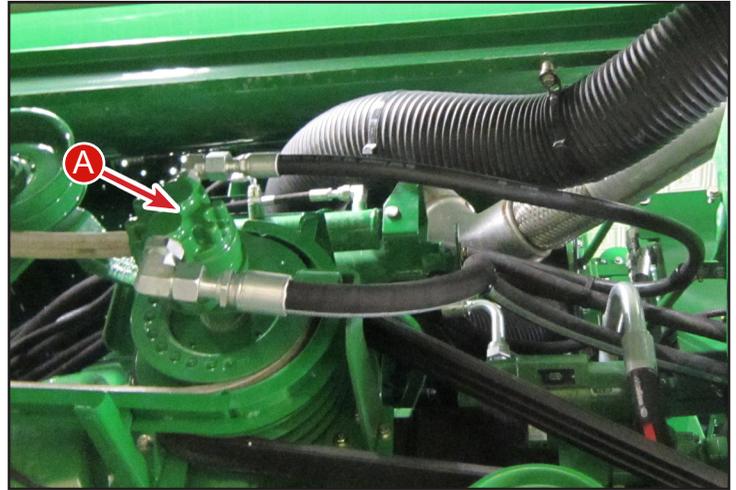


A - Leveling Control Switches  
B - Leveling System Monitor



## Hydraulic Gear Pump

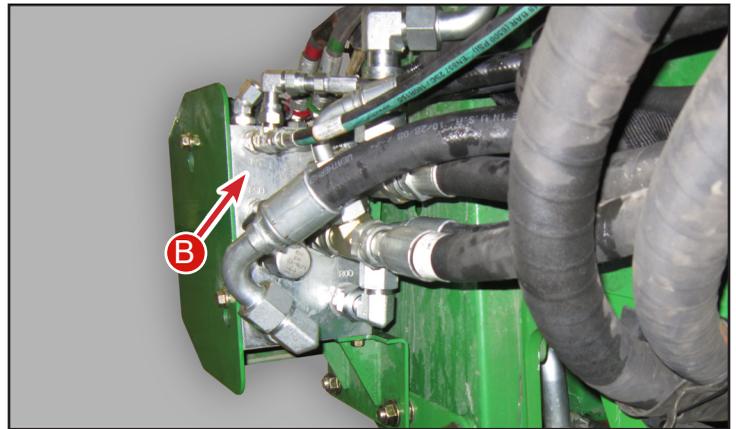
The JH7020 has a Hydraulic Gear Pump (A) that is mounted directly to the output shaft of the combine's rear engine housing. It provides the necessary hydraulic flow to operate the leveling system's functions. The gear pump isolates the leveling system's hydraulic flow from the remaining combine's hydraulics.



A - Gear Pump

## JH9020 Hydraulic Flow

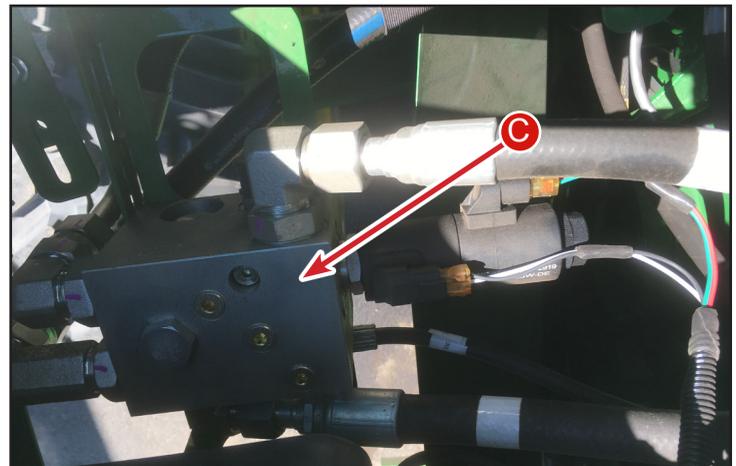
Hydraulic flow for the JH9020 leveling system is supplied from the Deere pressure supply line on the header height valve block (B). This valve is located on the left side of the combine below the cab. From this oil flows to the Hillco leveling valve located behind the inspection door on the operator's platform. Oil is returned from the leveling valve to header height valve block.



B - Header Height Valve Block

## Leveling Control Manifold

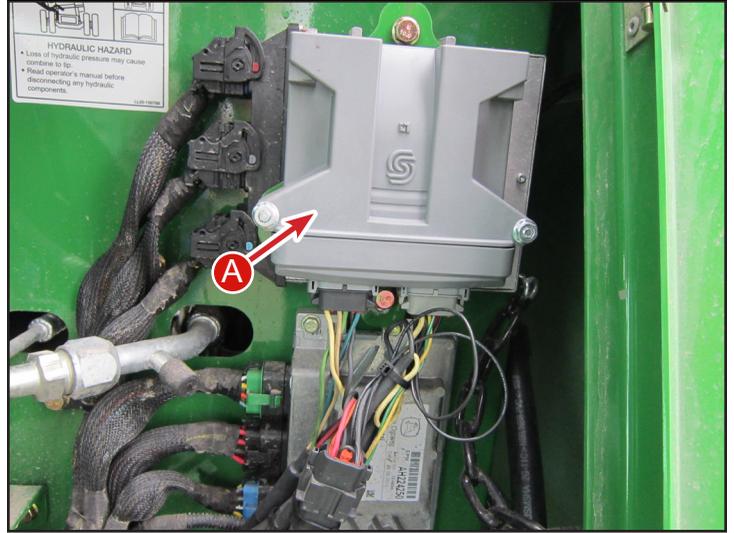
The leveling control manifold (C) is located behind the inspection door on the operator's platform. The operator electronically activates the manifold by either pushing the manual leveling buttons or having it in automatic mode. The manifold diverts hydraulic flow to the corresponding leveling cylinder to rotate the chassis.



C - Leveling Manifold

## Leveling Controller

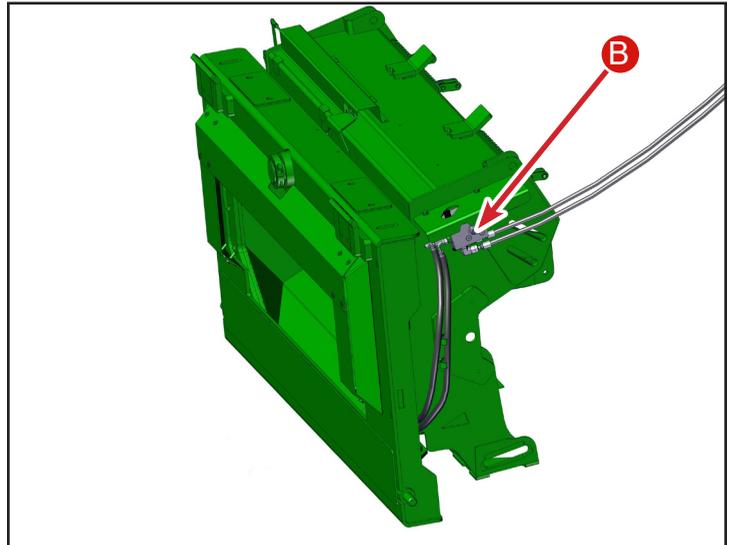
The electronic leveling controller (A) is located behind the inspection door on the operator's platform above the leveling manifold. The controller processes slope information and outputs signals to the hydraulic leveling valve. When auto leveling is activated the leveling controller levels the chassis up to a maximum slope of 27%.



A - Leveling Controller

## Header Tilt Manifold

Located on the left side of the feeder house is the header tilt manifold. This manifold diverts flow to the cylinder in the feeder house pivoting the header. The hydraulic valve fully integrates with the combine's electronics to provide auto lateral tilt. If the combine was originally equipped with Contour Master then the stock valve is used to control the header tilt.



B - Header Trim Manifold

## Overcarriage Position Indicator

Attached to the overcarriage and undercarriage is the position indicator (A). The position indicator outputs a signal to the controller of the overcarriage position relative to the undercarriage. This also acts as a maximum level indicator. When the combine is nearing maximum level the controller reduces the amps to the leveling valve decreasing the hydraulic flow. This provides for smooth leveling when achieving maximum level.

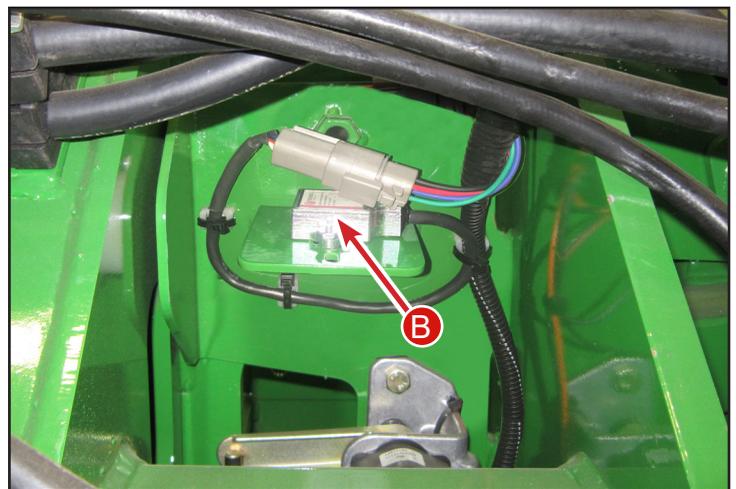


A - Overcarriage Position Sensor

## Slope Sensing Clinometer

Located on the overcarriage near the Overcarriage Position Indicator is the Slope Sensing Clinometer (B). This clinometer outputs a signal to the controller. This output is a value that tells the controller the chassis' position relative to level.

This same clinometer also outputs a fore/aft slope reading. This signals an alarm that is displayed on the monitor when the combine is pointed down a hill that is greater than 20% and the rear wheel assist is engaged.



B - Clinometer

## Transition

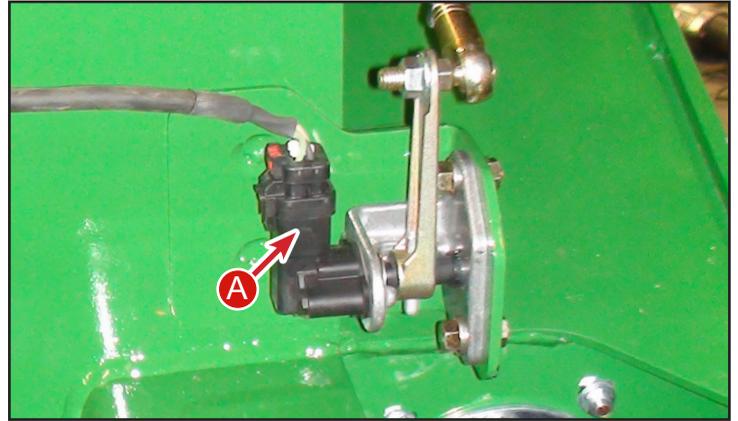
The transition is added to the front of the feeder house to pivot the header and allow it to follow the contour of the ground.



D - Transition

## Header Position Sensor

Located on the right side of the transition is the header position indicator. It utilizes a linkage between the face plate and the transition to indicate the header position relative to the combine. The position is then displayed in the corner post of the cab.



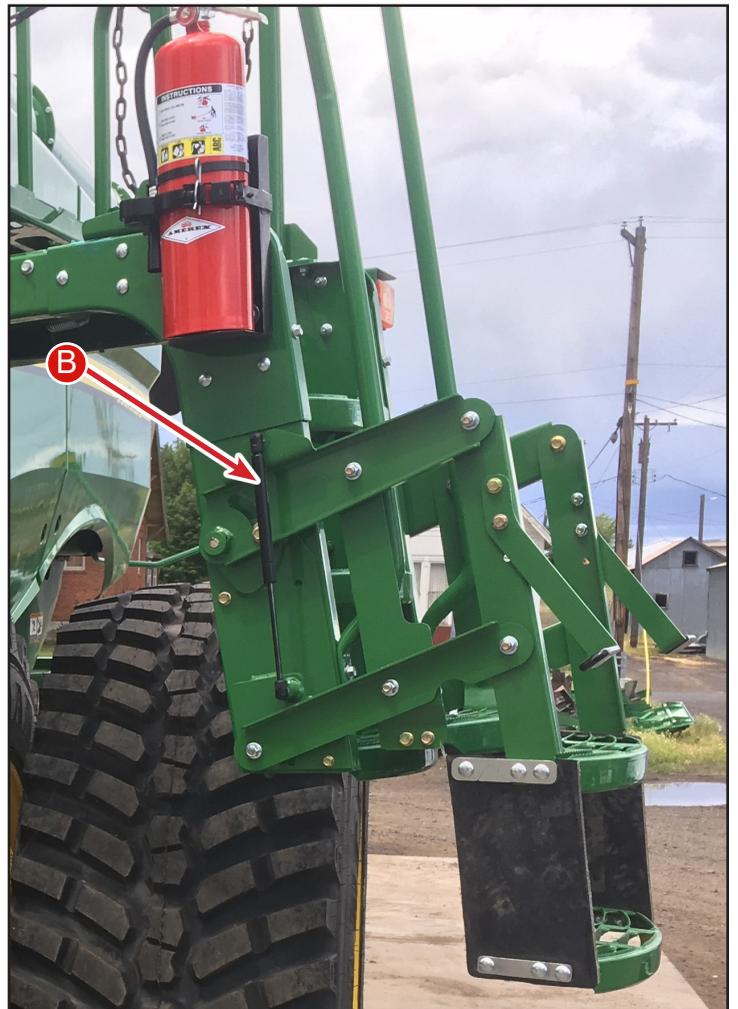
A - Transition Position Indicator

## Retractable Ladder Step

All Hillside combines are equipped with retractable bottom steps.

If the ladder does not extend and retract properly check the fasteners in all of the pivot locations and make sure they are not over tightened. Over tightening of these fasteners will cause the ladder to bind.

Make sure that the gas-charged struts (B) keep the ladder fully retracted. Replace the struts if they appear to be weak. If the ladder does not fully retract, permanent damage may occur during field operation.



B - Gas-charged Struts

## Mechanical Leveling Cylinder Stops

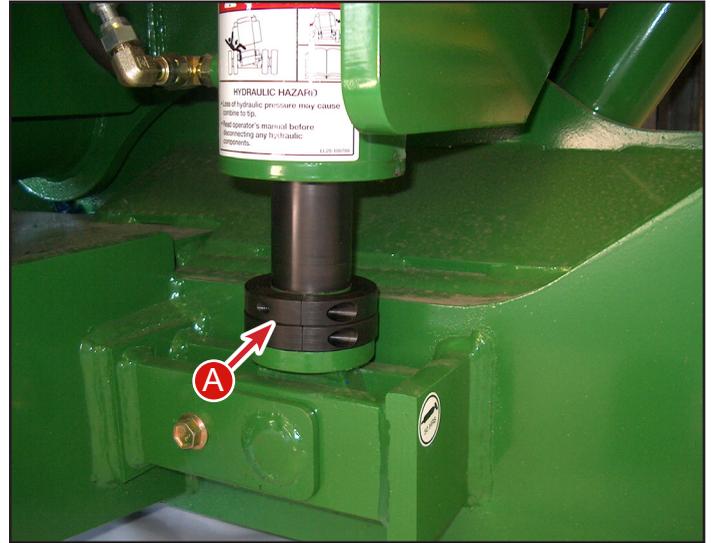
Some tire configurations may come into contact with the side panel when the combine is leveled over. The maximum leveling calibration must be properly set and cylinder stops inserted to fill the distance on the cylinder from max level to the collar. This will prevent damage in the event of hydraulic or electrical failure. To set the stops level the combine over both directions until there is 1" between the tire and the closest contact point or 3/16" between the drive axles and the chassis. Add cylinder stops to prevent the cylinder from over-leveling the combine. Contact Hillco for these cylinder stops.

## Carriage

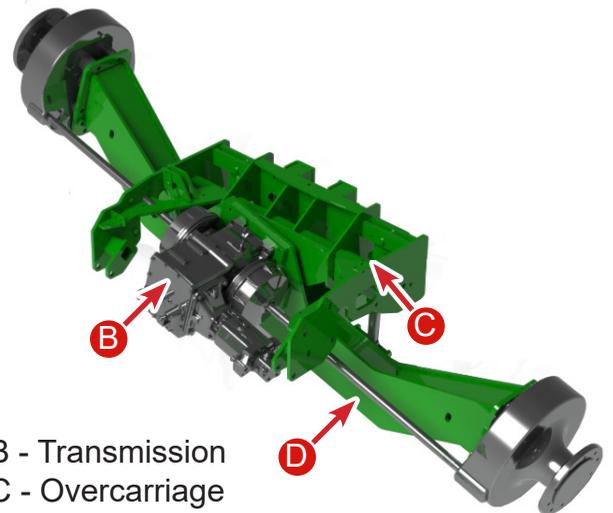
The carriage is designed to support the combine's chassis while allowing the combine to rotate through full range of motion. It consists of an undercarriage and an overcarriage. The drive wheels, final drives, and transmission are mounted to the undercarriage. The overcarriage bolts to the combine's axle and chassis. The leveling cylinders connect to the overcarriage and the undercarriage. The carriage raises the combine chassis eight inches to prevent the tires from coming into contact with the side panels.

## Hydraulic Leveling Cylinders and Counter-Balance Valves

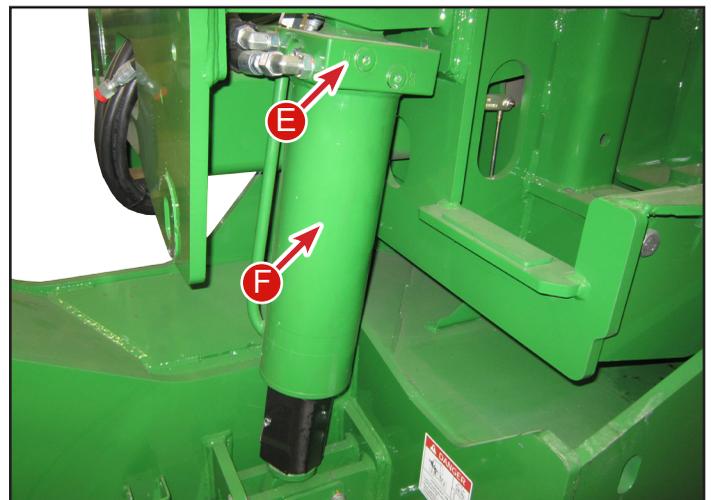
There are two leveling cylinders located on the rearward side of the leveling system's carriage. These cylinders are pressurized by the leveling hydraulic valve to tilt the combine chassis to correct for slope changes. Both leveling cylinders are equipped with built in hydraulic counter-balance valves that positively lock the oil into the cylinders until a pressure signal is sent from the hydraulic leveling valve. These counter-balance valves lock the chassis position in the event of hydraulic hose failure.



A - Mechanical Leveling Cylinder Stops  
5/8 inch - Part # MC-137251  
1/8 inch - Part # MC-137501



B - Transmission  
C - Overcarriage  
D - Undercarriage  
E - Counter-Balance Valve  
F - Leveling Cylinders



## Leveling Cylinder Safety Stops

When the leveling cylinder safety stops are installed on the leveling cylinders, the carriage cannot rotate. The stops must be installed before working on or around the leveling system and when hauling the combine. It is recommended that the stops be inserted during long-term storage. When the stops are not being used, they should be stored on the mount next to the leveling cylinder.



### WARNING!

Install the cylinder stops before working on or around the leveling system. Failure to install the cylinder stops before working on or around the leveling system may result in sudden chassis rotation.



A - Cylinder Safety Stops  
B - Cylinder Safety Stop Holder



## Drop Axle

The drop axle (C) raises the rear of chassis to match the height change due to the leveling carriage. The drop axle allows the rear axle to match the carriage's range of motion.

Drop axle wings (D) are installed for additional stability between the drop axle and the chassis.



### IMPORTANT!

Because of the increased rotation of the rear axle it is necessary to space the rear wheels out to avoid interference with shields. See the Rear Axle Spacing Chart for more information.



C - Drop Axle  
D - Drop Axle Wing

# 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 Contour Master operation.

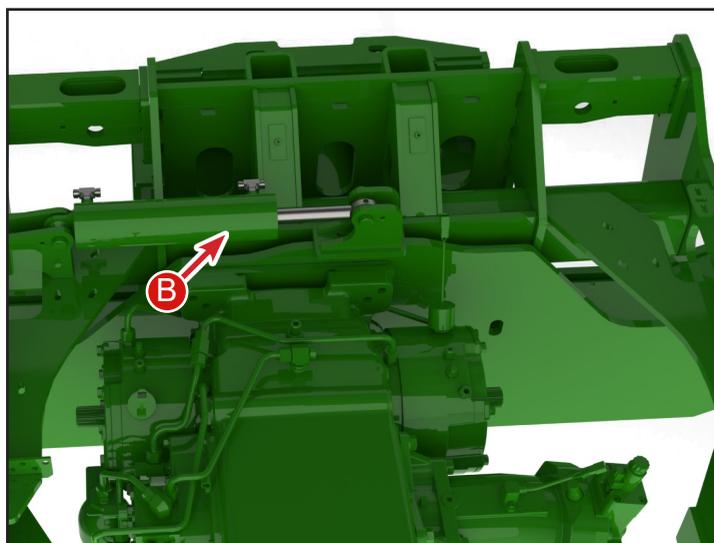


A - Header Trim Switch  
B - Master Cylinder

## Header Tilt System

The header tilt hydraulic system consists of the header tilt control valve, master cylinder, slave cylinder, flow control, and relief valve. As the combine levels, the carriage extends or retracts the master cylinder, which sends oil to the slave cylinder. The slave cylinder counter-rotates the header. No electronic function is required for this action to occur.

The operator can manually trim the header angle with the header trim switch on the hydro control handle. In the Contour Master mode, the header angle is automatically trimmed by activating the lateral tilt valve, which is coupled to the master/slave circuit. In case the header contacts the ground, a relief valve prevents damage to the header and feeder house.



C - Slave Cylinder

## Operation, Setup, and Maintenance



### **CAUTION!**

Before operating the leveling system, ensure that the leveling cylinder safety stops are not installed on the leveling cylinder. Operating the system with the safety stops installed may cause damage to the carriage, leveling cylinders, or stops.



### **CAUTION!**

Do not unload grain from the combine while operating the Leveling System in Automatic Mode. The chassis may tilt unexpectedly and cause damage to the unloading auger.

# Operation, Setup, and Maintenance

## Leveling System Controls

The leveling controls on the Home Screen are shown below. The monitor and controls are located to the right side of the CommandTouch Monitor.

The Road/Field Mode (A) must be in the Field selection for leveling functions to work. If it is in the Road Mode then the leveling functions are disabled. Pushing combine's Road/Field button toggles the leveling system between Road and Field.

**AUTO:** Pushing the Auto/Manual Leveling Button (B) once will toggle between Auto & Manual. When Auto is showing on the display (C), this means automatic leveling operation is engaged. The automatic leveling controller monitors changes in slope and corrects chassis position to maintain a level chassis position. The Manual Left/Right Leveling Buttons (D, E) 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 (B) once to enter the Manual Leveling mode (Manual will be displayed). In Manual mode the Manual Left/Right leveling switches will level the combine left and right. When the switch is released the combine chassis will maintain its current position.

- A - Road/Field
- B - Auto/Manual Switch
- C - Manual Left
- D - Manual Right



**IMPORTANT**  
Monitor defaults to Road Mode each time system is powered up. This is done to prevent any accidental leveling. The Road/Field mode is controlled by the combine's Road/Field switch.

**Leveling Controls:** Located on the right side of the CommandCenter Monitor. These switches allow for Auto/Manual control (B) and Left/Right leveling (C, D).



## Maximum Level

The leveling system is equipped with a maximum level warning indicator on the monitor. On the Main Control Screen Max Level will be displayed. This indicates when the machine has reached its maximum leveling capability.



## Header Trim Controls

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:** Push the switch to the left to tilt the header counterclockwise.

**TILT RIGHT:** Push the switch to the right to tilt the header clockwise

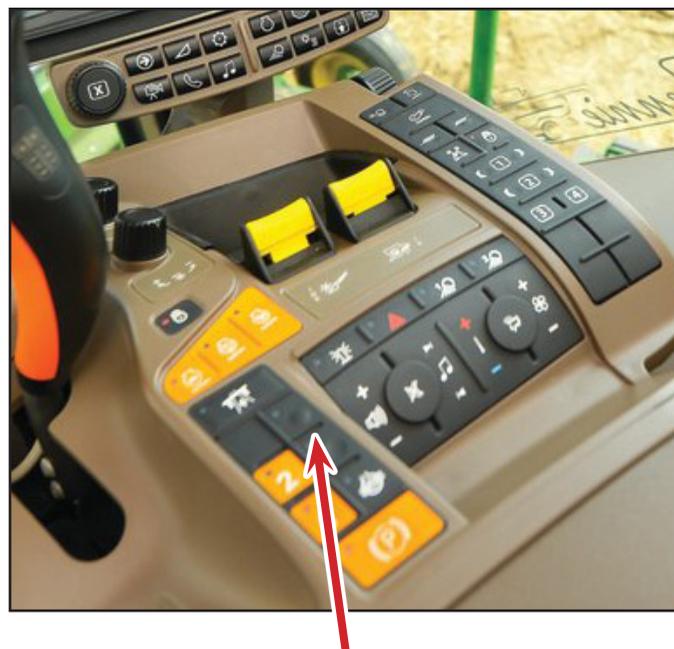


Header Trim Switch

## Rear Wheel Assist Warning Alarm

The Rear Wheel Assist (RWA) Warning Alarm is located in the Leveling System Control Monitor in the right corner of the cab. It will sound an alarm, a warning light will flash and RWA/SLOPE WARNING will be displayed on the monitor if the combine is traversing down a slope that is greater than 20% and the Rear Wheel Assist is engaged. Disengage the Rear Wheel Assist and the warning alarm and light will stop. On downhill slopes less than 20%, level ground or uphill slopes the alarm will never sound if RWA is engaged.

See your combine's Operator's Manual to understand how to operate the Rear Wheel Assist (RWA).



Rear Wheel Assist Engage/Disengage

RWA Slope Warning will be displayed.



## **WARNING!**

When the Rear Wheel Assist Warning Alarm Sounds and Warning Light Flashes **IMMEDIATELY DISENGAGE** the Rear Wheel Assist or Control of the Combine **COULD** be lost.

## Operator Adjustments

From the Home Screen, Push the Menu button to enter the Main Menu.



Push the up or down arrows to move to the desired function. Once the desired function is highlighted press the Enter button to go into that page. Press the Home button to go to the Home screen.



## Operator Settings Menu

Select the desired Function in the Operator Settings Menu. Scroll up and down using the up and down arrows. When the desired function is highlighted select the enter button. To go back to the main menu select the Back button.



## Manual Speed

The manual leveling speed can be sped up or slowed down. This setting only affects manual leveling and not auto leveling speed.

The current setting is displayed on the top. When you input a new setting it will be displayed in the white text. If you power off the unit the white text will always read 7000 however the Current Setting will always read was the user last inputted regardless if it was powered down.

The Range is from 3000-7000 with 3000 being the slowest and 7000 the fastest. These numbers represent what percentage the coil is opening the valve up. 3000 = 30% and 7000=70% of the valve open. Anything over 7000 is an invalid entry as it will level the combine too fast making it very jerky and unsafe.



## Invalid Entry

Invalid Entry appears when a value has been entered that is not within the acceptable range.



## Display Backlight

The brightness can be adjusted up and down. Use the up and down arrows to adjust the brightness and then hit Enter to save the setting.



## Smart Unload

Smart Unload is an optional safety feature that puts the leveling system in manual mode when unloading. This prevents the unloading auger from coming in contact with the grain cart while unloading on the go on changing terrain.

As soon as the unloading auger starts to swing out the system changes from Auto Leveling to Manual Leveling.

When the auger is in all the way the operator must cycle the auto manual switch to go back to auto leveling.

The setting is defaulted to OFF. If you wish to turn it on push the On button (A). The red OFF will turn to a green ON.



## Calibration

From the Main Menu select Calibration.

*Continued on next page.*



After you select Calibration the message to the right appears.

Press Enter (A)



### Joystick Calibration

Highlight Joystick and press Enter (B).

**WARNING**

When in the Calibration Menu screen all limits have been deactivated. The carriage can rotate until the cylinders bottoms out.



With the Joystick in the center position press the Enter button (C).



Push the Joystick lever all the way to the right and then press the Enter button (A).



Push the Joystick lever all the way to the left and then press the Enter button (B).



Joystick Calibration is now complete.



## Level Zero Point

From the Home Screen select Main Menu. Then select Calibration Menu.

Highlight Left/Right Clinometer and press Enter (A).



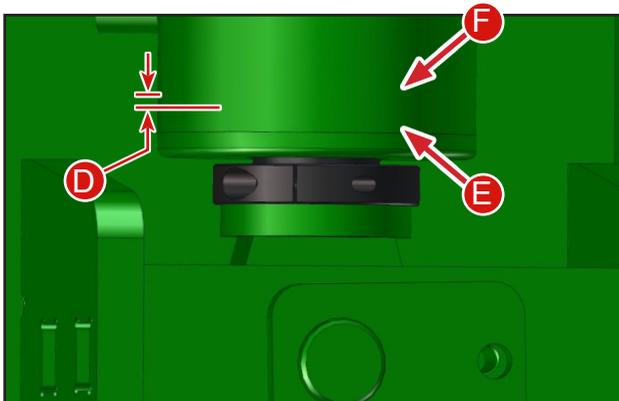
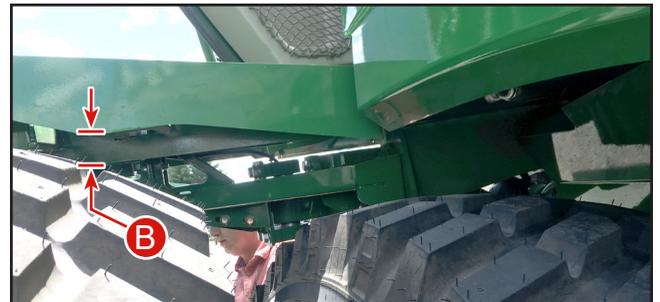
Follow the directions on the screen. When the combine is level side to side press Enter (A).



## Carriage Angle Left Limit

This setting sets the maximum tilt to the left.

1. Start the combine and park on level ground
2. Set the park brake
3. Raise the feeder spout and drop the header lift cylinder safety stop.
4. From the Home Select Menu
5. From Menu Select Calibration
6. From Calibration Select Carriage Angle Left Limit (A)
7. Manually tilt the combine to the left such that the cylinder bottoms out or so that the first contact point touches. (B) The software will adjust automatically to 1" of clearance.  
On the left side it is usually the ladder platform that comes in contact with the tires first.
8. Verify there is at least 1/4" clearance between the front axle and the frame.
9. Press Enter Button (C) when maximum level has been reached.
10. If the left cylinder is not bottomed out fill exposed rod area on the cylinder with the provided mechanical stops. Leave 1/8" gap (D) between the stop (E) and the rod cap (F). Hillco provides 5/8" and 1/8" stops (F). Do not use any other type of stop. The gap is there so that the electronics stop the leveling prior to the cylinder coming in contact with the stops. The stops are there to prevent damage in the event of an electrical or hydraulic failure.
11. Set Right Limit - See next page.



### IMPORTANT

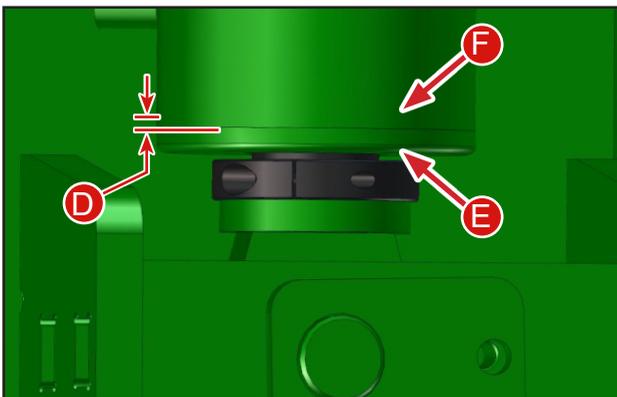
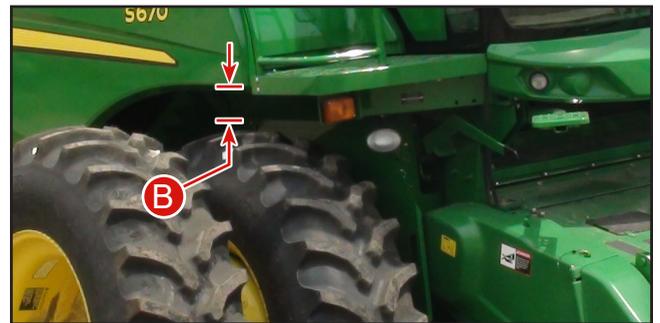
With certain tire selections the limit sensors can be used to prevent the need to modify the sheet metal on the left and right side panels of the combine. Installation of level limit stops is recommended to prevent sheet metal damage in the event of a limit switch failure. (See LEVEL LIMIT STOPS section)

If Level Limit Stops are used be sure that the limit sensor has been calibrated with that stop in place. Damage to the cylinders or other leveling system components may occur if sensor is not set properly.

## Carriage Angle Right Limit

This setting sets the maximum tilt to the right.

1. Start the combine and park on level ground
2. Set the park brake
3. Raise the feeder spout and drop the header lift cylinder safety stop.
4. From the Home Select Menu
5. From Menu Select Calibration
6. From Calibration Select Carriage Angle Right Limit (A)
7. Manually tilt the combine to the right such that the cylinder bottoms out or so that The first contact point touches. (B) The software will automatically adjust to 1" of clearance.  
On the right side it is usually the side panel that comes in contact with the tires first.
8. Verify there is at least 1/4" clearance between the front axle and the frame.
9. Press Enter Button (C) when maximum level has been reached.
10. If the right cylinder is not bottomed out fill exposed rod area on the cylinder with the provided mechanical stops. Leave 1/8" gap (D) between the stop (E) and the rod cap (F). Hillco provides 5/8" and 1/8" stops (F). Do not use any other type of stop. The gap is there so that the electronics stop the leveling prior to the cylinder coming in contact with the stops. The stops are there to prevent damage in the event of an electrical or hydraulic failure.
11. Verify max level appears on monitor home screen to both left and right.



### IMPORTANT

With certain tire selections the limit sensors can be used to prevent the need to modify the sheet metal on the left and right side panels of the combine. Installation of level limit stops is recommended to prevent sheet metal damage in the event of a limit switch failure. (See LEVEL LIMIT STOPS section)

If Level Limit Stops are used be sure that the limit sensor has been calibrated with that stop in place. Damage to the cylinders or other leveling system components may occur if sensor is not set properly.

## Fore/Aft Clinometer

Highlight Fore/Aft Clinometer and press Enter (A).



When the combine is level front to back press Enter (A).



## Diagnostics

From the Main Menu select Diagnostics.



The Diagnostics menu allows the operator to view output information from the electrical system on the leveling system.

Select Clinometers and press Enter (A) to view the output of the clinometers.



## Clinometers

Fore/Aft (B) shows the current clinometer output. By driving up or down a hill this value will change.

Left/Right (C) shows the current clinometer output. By leveling the combine back and forth the values will change.

The value for Level Zero Setpoint and 4WD Zero Setpoint (D) are the current calibration values. These values are set in the Calibration screen under Left/Right Clinometer and Fore/Aft Clinometer.

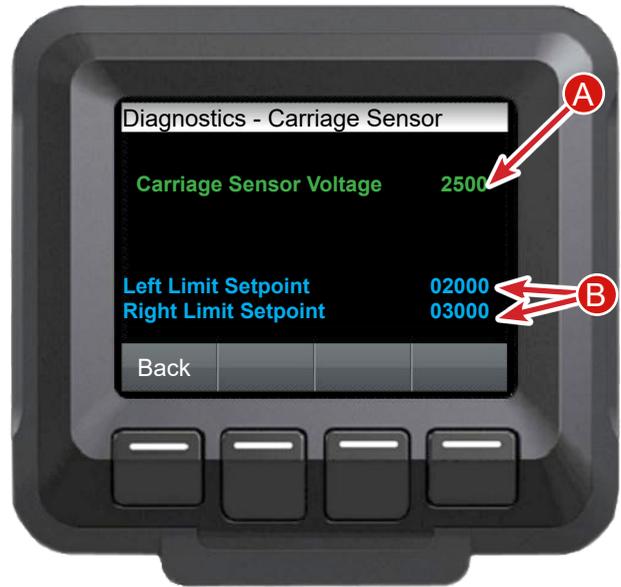


### Carriage Sensor

The Carriage Sensor Voltage is the current voltage output at a given carriage position.

Leveling the combine back and forth will change this value. Leveling to the right will increase the value.

The value for Left and Right Limit Setpoint (B) are the current calibration values for maximum level to both sides.



### Valve Coils

Range is from 0-18000.

Only one coil will be activated at a time.



### Joystick

Range is from 500-4500.



### Combine CAN

The Signal can be OFF, ON, or “ - - - “.

“ - - - “ means the display is not receiving the CAN message.



### Active Alarms

From the Main Menu select Active Alarms and press ENTER (B).



If you have an Active Alarm the warning icon will appear on the home screen in the upper left corner.



The Active Alarms that will appear are:

- Clinometer Fault
- Potentiometer Fault
- Joystick Fault

If any of the sensors output fall outside of the expected range an alarm will trigger on the screen listing the fault and the current output of the sensor in question. While the alarm screen can be cleared the automatic function of the leveling system may be disabled until the fault is corrected. Once an alarm screen has been cleared the fault condition is denoted by an alert icon in the top left of the screen. If the icon is displayed then the alarms screen in the system menu will show which sensors are in a fault condition.



Potentiometer Fault (Carriage Angle Sensor Fault)



Clinometer Fault



## Joystick Fault



## Dealer Settings

Dealer Settings is a password protected screen that is for dealers to make adjustments to the leveling system.



Password protected page:



## Storage

When storing the combine between seasons, Hillco strongly recommends that the leveling cylinder safety stops are installed on the leveling cylinders. This will ensure that the combine does not settle during storage.

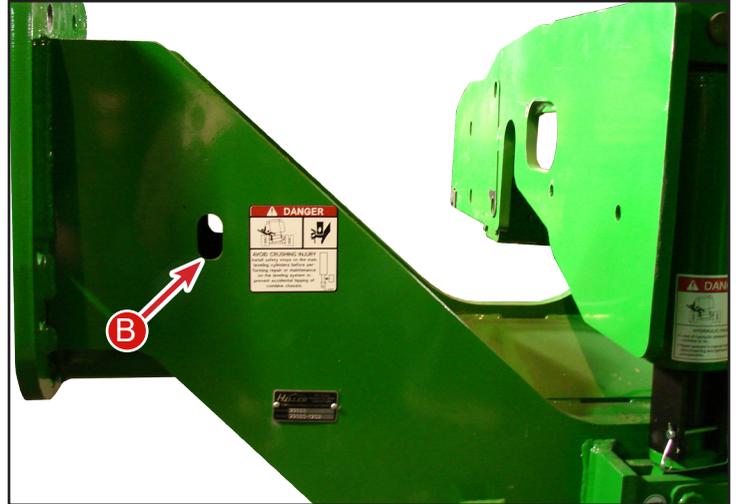


## CAUTION!

Before driving the combine into a building, ensure that the leveling system is in the road transport mode. This will ensure that the combine does not unexpectedly level. Unexpectedly leveling may cause damage to the building or the combine.

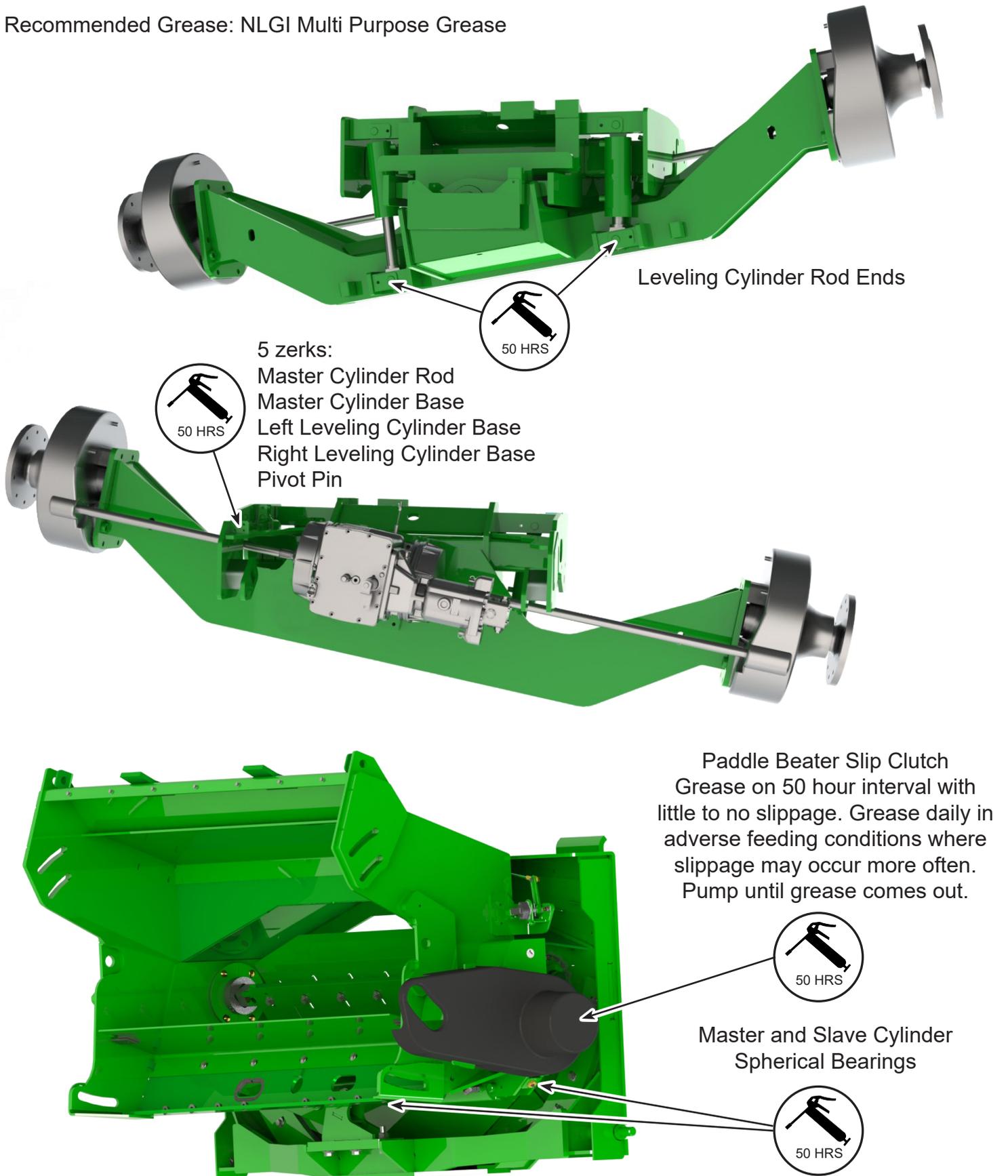
## Transporting Combine on a Trailer

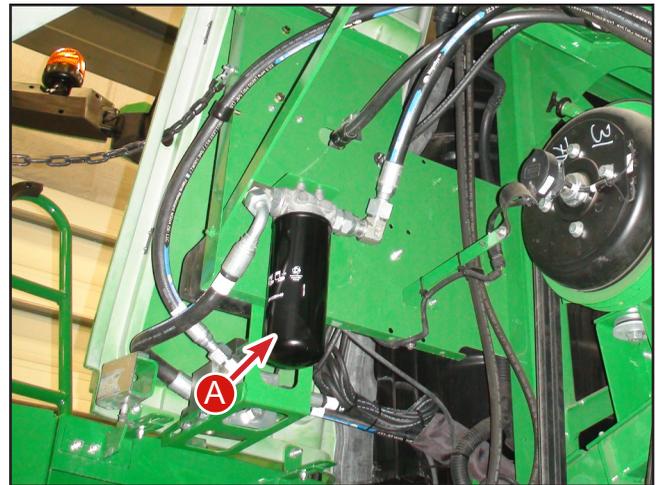
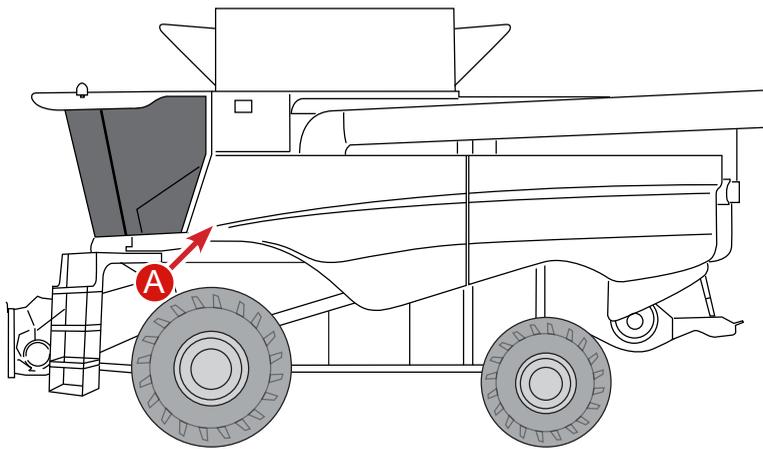
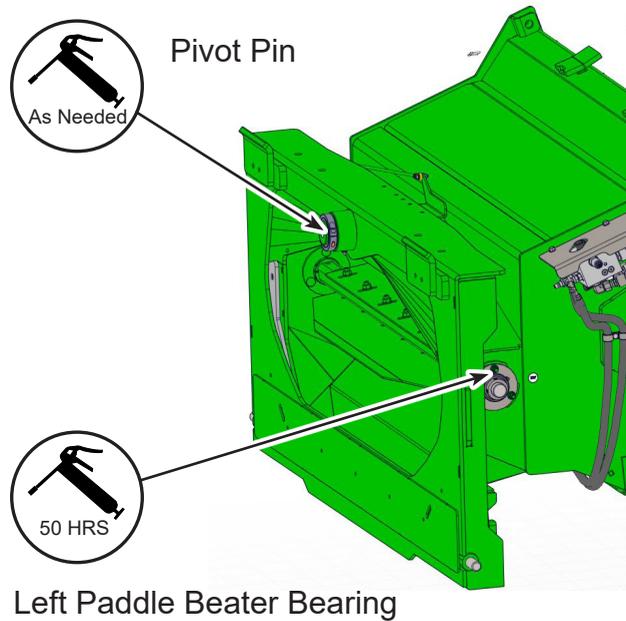
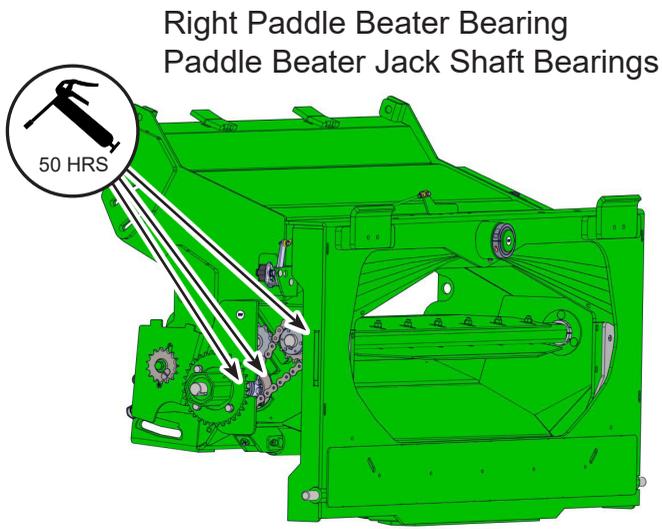
Before loading the combine, switch the leveling system into manual mode and install the cylinder stops. This will ensure that there are not any unexpected weight shifts during the loading process. In addition to the Tie Down locations on the combine, Hillco provides T-hook slots (B) on the undercarriage for securing combine to the trailer.



# Maintenance

Recommended Grease: NLGI Multi Purpose Grease





### Hydraulic Filter

On JH7020 models replace the filter (B) after the first 100 hrs of service, then 400 hr intervals. Replace with John Deere Filter Part No AH128449.

### Driveline Maintenance

Standard PTO Style Drive Shafts - These drive shafts utilize a single cross at each end of the drive shafts. Grease zerks on both crosses and the zerk on the outer profile tube (at the slip joint) should be greased on 50-hour intervals.

Constant Velocity Drive Shafts - See the Constant Velocity Driveline Maintenance Guide at the end of this manual. Greasing CV drivelines at the correct time intervals is very important.



## Transition Drive Chain

Tension transition drive chain so there is 1/2 inch deflection at A and B locations. Chain tension is maintained on both the 60-pitch (A) and 80-pitch (B) chains with idler sprockets. Both are located on the right side of the transition.

Check that the sprockets are all in proper alignment. Misalignment of these sprockets will cause premature wear of the sprockets and chain.

## Transition Slip Clutch

The transition slip clutch is preset at the factory so that damage will not occur to any of the transition drive components; it cannot be adjusted and will never require any adjustment.

Do not over tighten these sprockets or premature chain and sprocket wear will occur.

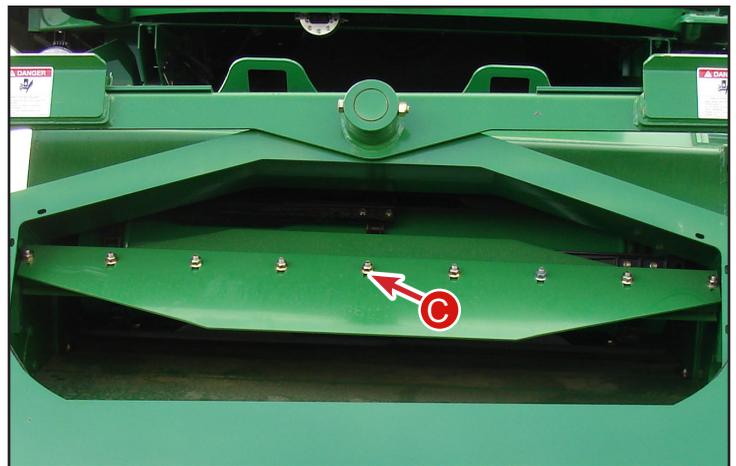
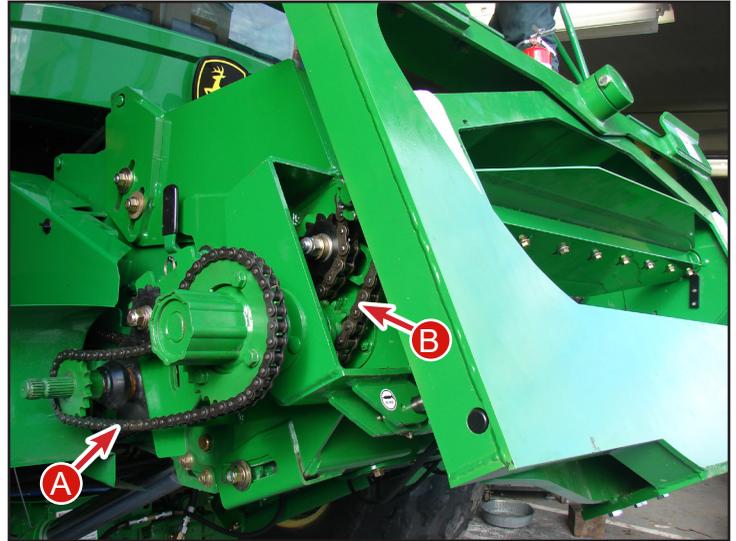
In tough conditions if slip clutch is slipping additional grease may be required.

## Paddle Beater

The paddle beater has 3 adjustments to where it can be extended or retracted depending on crop conditions. To adjust move paddles to desired slot (C). Make sure both paddles are adjusted to the same slot.

## Feeder House Removal

Refer to the John Deere S Series Technical Manual for steps on how to remove and re-install the feeder house.



## WARNING!

When removing the feeder house on S680 and S690 combines disconnect the hydraulic lines for the header tilt at the slave cylinder located below the feeder house. Make sure feeder house is properly locked in the up position when disconnecting the hoses. Connect these hoses together if the combine will be leveled without the feeder house. If this is not done and the lines are just capped oil from the master cylinder has no place to go when the combine is leveled and failure will occur.

## 100 Hour - Annual Maintenance

Inspect the following areas:

### REAR AXLE - See pictures on next page for location reference

- All bolts are properly tightened (combine to spacer 235lb-ft and spacer to rear axle are 153 lb-ft)
- Torque rear wheel bolts (150lb-ft + ¼ turn w/RWA, 232lb-ft w/o RWA)
- Steering hoses are properly routed and allow for rear axle rotation

### OVERCARRIAGE / UNDERCARRIAGE- See pictures on following pages for location reference

- Torque all mounting bolts properly
- Hydro hoses routed properly
- Brakes are adjusted properly and pedals should depress no more than ½ way
- Brake lines are routed properly, secured and free of pinch and abrasion points

Mounting Bolt Location	Torque
Carriage to Chassis	M16@235lb-ft; M20@450lb-ft
Axle Extensions	675 lb-ft
Final Drive Mounting Bolts	475 lb-ft (oiled)
Transmission Mounting Bolts	235 lb-ft

### HYDRAULICS

- Hoses cleanly and securely routed with no pinch or abrasion points
- Hydraulic Reservoir & Main Engine Gear Case are filled to the proper level
- Hydrostatic Hose 4-bolt flange cap screws are tightened to proper torque
- No leaks in the hydraulic system
- Torque gear pump coupler to 130lb-ft
- Hoses by header lift manifold do not come in contact with drive shaft on JH9020

Hose Size	Cap Screws Torque
-16	68lb-ft
-20	111lb-ft

### ELECTRICAL

- Harnesses are cleanly and properly routed and secured without pinch or abrasion points
- Mechanical Leveling Stops (bolt on lock collars) are installed so that there is no less than 3/4" clearance around the drive tires.
- Left and right limits are set so that there is no less than 1" clearance around the drive tires.

### TRANSITION

- Transition drive chains are properly tightened and sprockets are aligned.
- Feeder chain is properly tension according to JD specification

### FUNCTION CHECKS

- Combine responds properly to manual leveling switch (leveling direction matches button)
- Automatic Leveling System responds properly to changes in slope
- Clinometer has been zeroed and the combine returns to level in automatic mode
- Automatic Header Tilt system keeps the transition parallel to ground as the combine levels
- Manual Header Tilt system responds properly to switch and cycle time is set to 22 seconds
- Ladder pivots and locks into place
- Moving step retracts fully and operates smoothly
- Rear Wheels are properly spaced



## WARNING!

Failure to conduct these inspections may result in serious damage to the combine, leveling system or could result in injury.

## Critical Joint Inspection

The Hillco Leveling System depends on several critical joints integrating the Leveling System to the John Deere combine. These joints require specific torques for safe operation. Operational conditions can over time loosen these joints. Hillco strongly recommends checking these joints annually.

Failure to check these joints annually may result in critical damage to the combine and leveling system.

Please reference the following pages calling out the fasteners holding these critical joints.

### Rear Axle

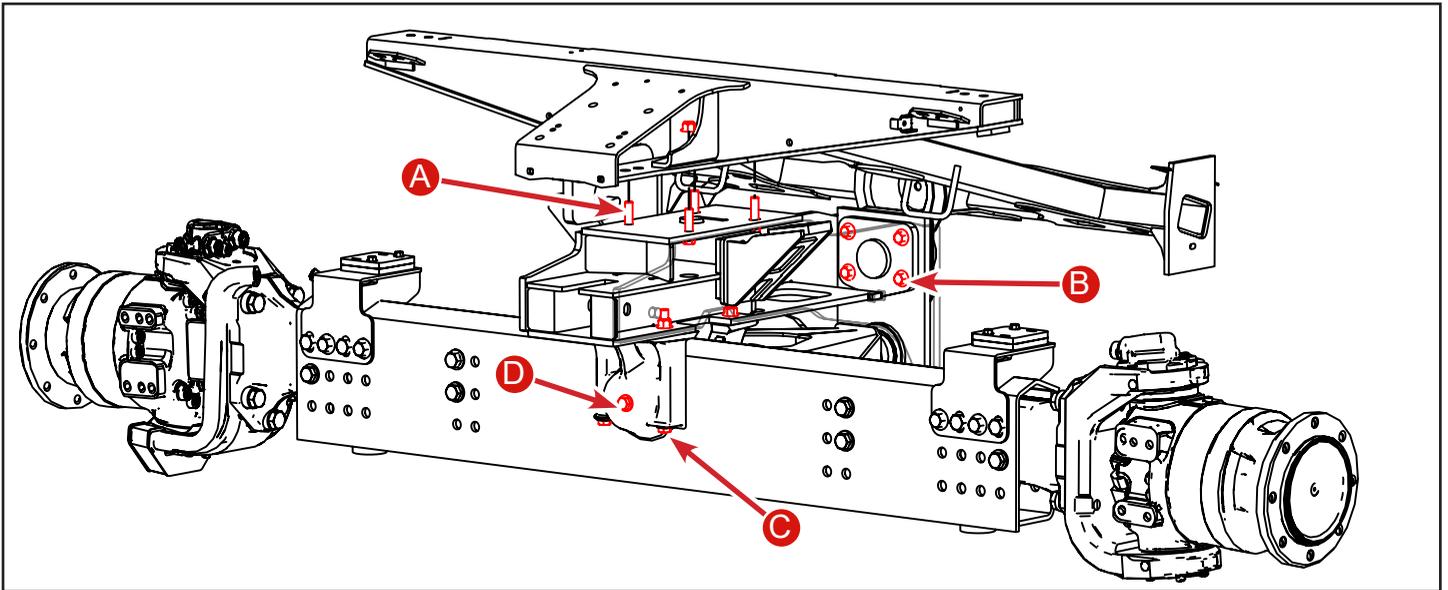
**A - Hillco Spacer to John Deere Chassis (4 bolts on MY15-18, 6 bolts MY14 and older) 235 lb-ft**

**B - Hillco Pin (4 bolts) 235 lb-ft**

**C - Cast Standoff to Hillco Spacer (4 Bolts) S600 ( -78500) 258 lb-ft, S600 (785001- ) & S700 236 lb-ft.**

**D - Cross Bolt (1 Bolt) 152 lb-ft**

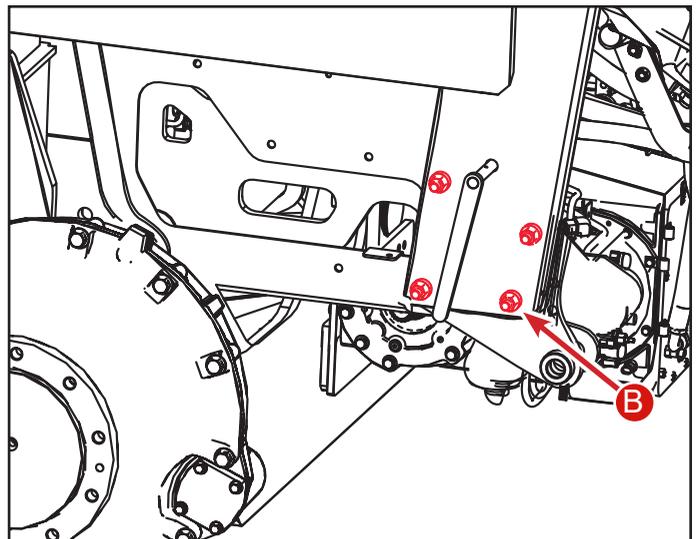
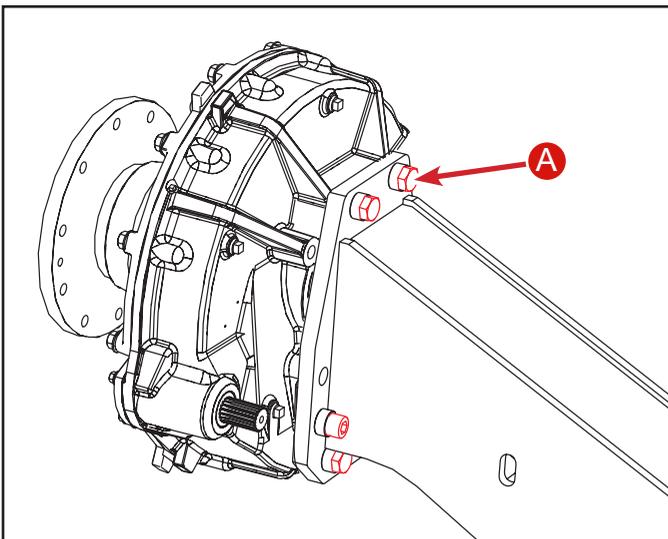
*Note: If any bolts are loose, remove bolt and apply Loctite 242 to threads, install and torque.*



### Carriage

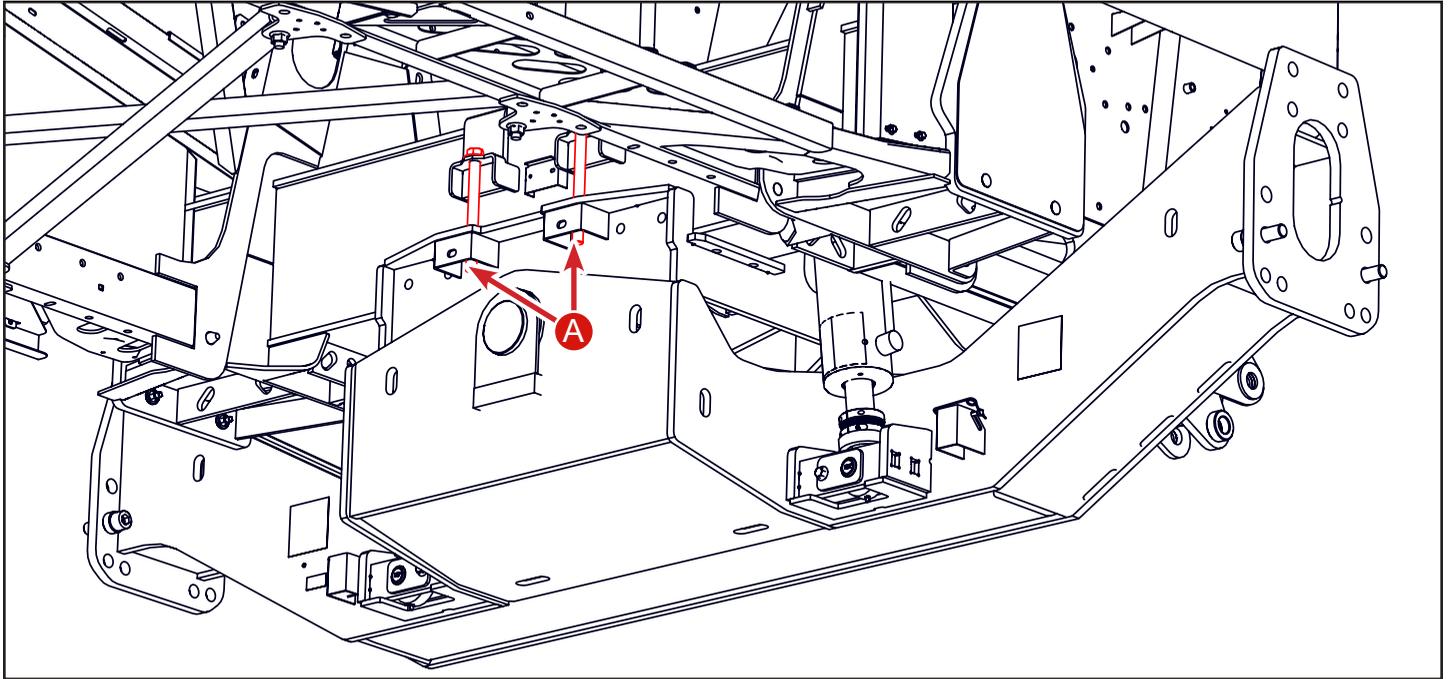
**A - Final Drives to Hillco Carriage (6 bolts on each side of the combine. Consult Combine's Operators Manual)**

**B - Carriage to corner post (4 bolts on each side of combine) 235 lb-ft**



## Carriage

**A - Axle Straps (2 bolts) 375 lb-ft**

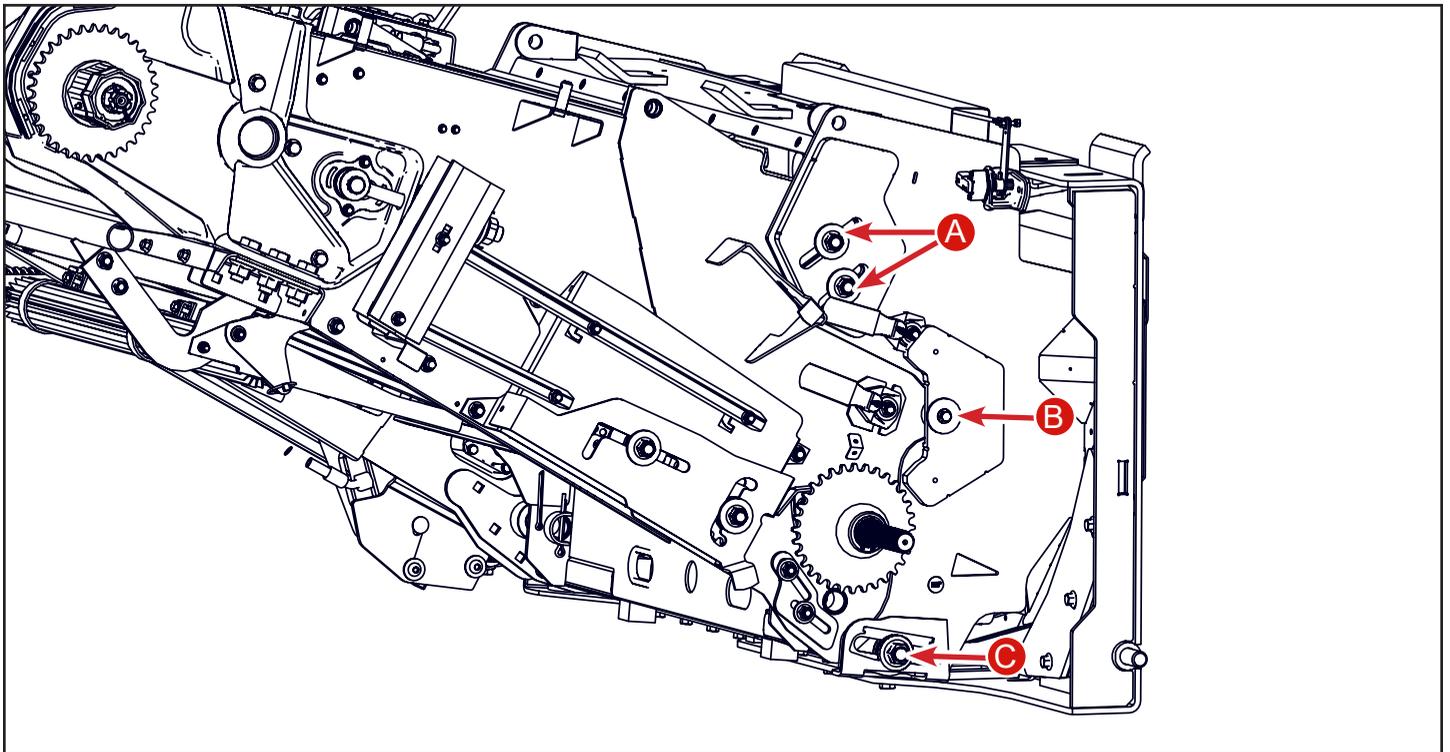


## Transition

**A - Mounting Bolts (4 bolts) 235 lb-ft**

**B - Pivot Bolts (2 bolts) 235 lb-ft**

**C - Bottom Lock Bolts (2 bolts) 460 lb-ft**



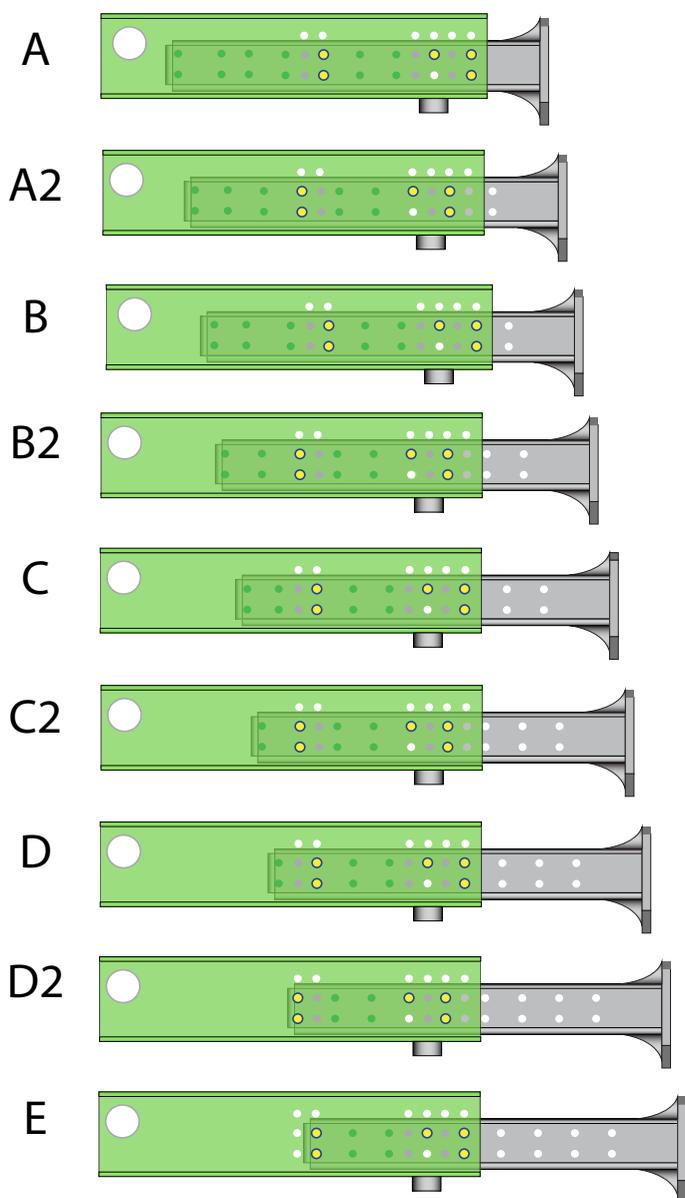
## Adjustments

### Rear Axle Spacing

On a combine equipped with a Hillco Leveler the rear axle has a greater rotation range. As a result the rear axle spacing must be changed to prevent shield interference. Refer to the diagram below and the following charts for Hillco's rear axle spacing recommendations. Hillco recommends operating the rear axle in the High Clearance Position on combines equipped with a hillside leveling system.

### Rear Axle Position Chart

#### High Clearance Rear Axle Position





## CAUTION!

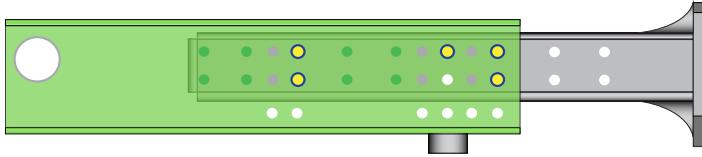
Hillco recommends operating the rear axle in the High Clearance Position on combines equipped with a hillside leveling system. Operating in the Standard Position may cause damage to the gull wing doors.

Extra Heavy Duty Rear Axle Spacing				
Rear Axle Tire	Rear Axle Position	Center to Center (in)	Outside to Outside (in)	Inside to Inside (in)
28L-26 (158A8) R1 or R3	A	Not allowed due to rear shielding interference		
	A2	Not allowed due to rear shielding interference		
	B	Not allowed due to rear shielding interference		
	B2	143.7	174.3	113.2
	C	147.7	178.3	117.2
	C2	151.7	182.3	121.2
	D	155.7	186.3	125.2
	D2	159.7	190.3	129.2
	E	163.7	194.3	133.2

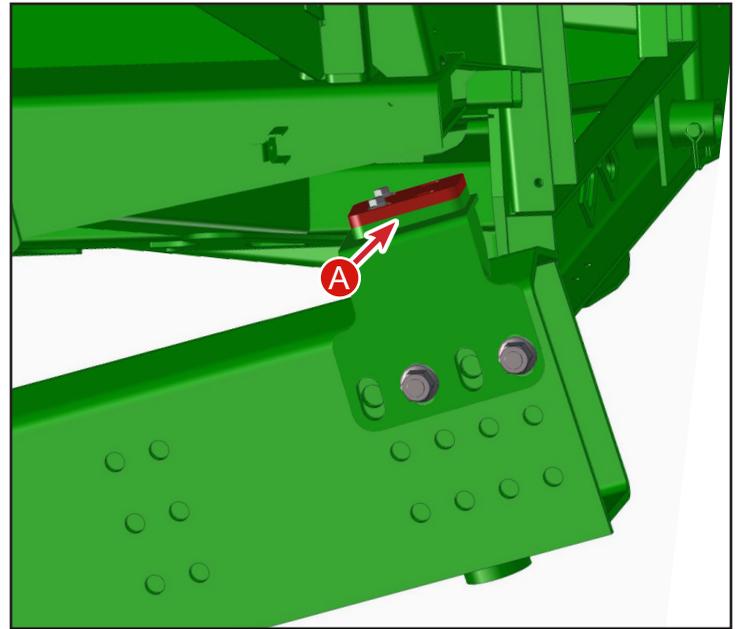
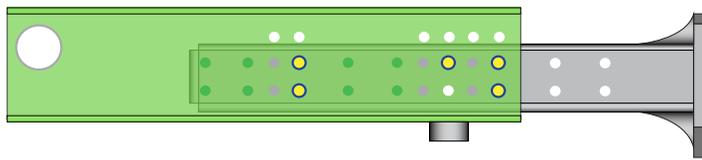
## Over Rotation Stop

If the rear axle is in the Standard Rear Axle Position an additional stop (A) must be added to the over rotation stop to prevent the tire from coming in contact with the gull wing doors. The additional stop is bolted in place.

Standard Rear Axle Position

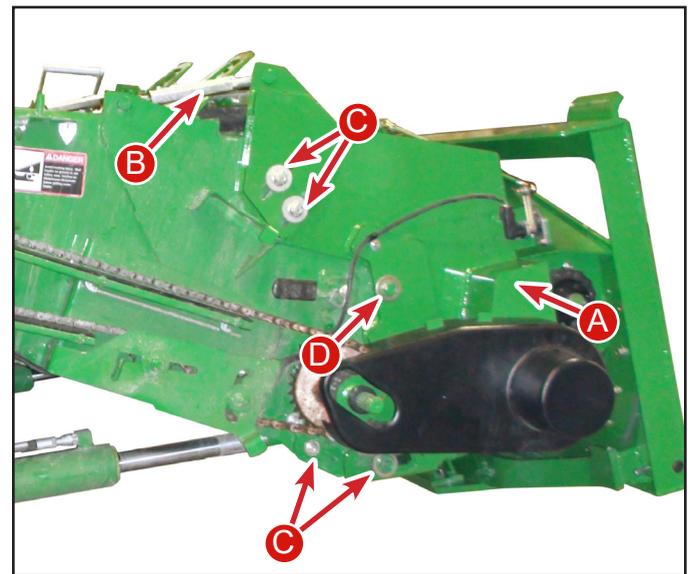
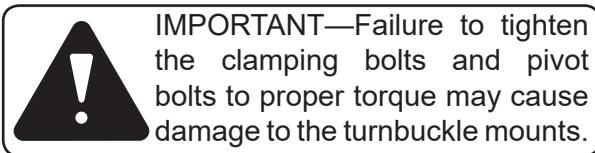
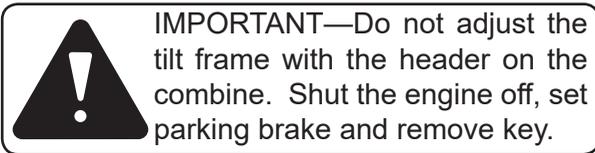


High Clearance Rear Axle Position



## Transition Fore/Aft Adjustment Procedure

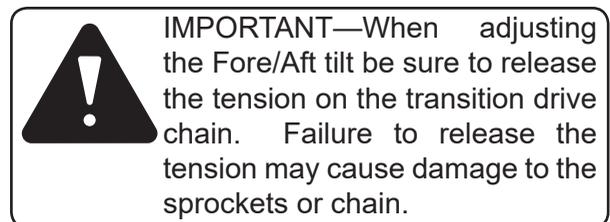
1. Loosen the clamping bolts and the pivot bolt on each side of the feeder house.
2. Loosen the jam nuts on the turnbuckles.
3. Loosen the chain tightener on the transition drive chain.
4. Adjust the turnbuckles until the desired header angle is achieved.
5. Tighten the jam nuts.
6. Tighten the clamping and pivot bolts to 153 lb-ft of torque.



- A - Transition
- B - Turnbuckle
- C - Clamping Bolts
- D - Pivot Bolts

## Lower Feeder Drum Stop Adjustment

The Hillco leveling system does not change the feeder drum stop adjustment. Refer to the John Deere Operator's Manual for your combine for the feeder drum stop adjustment.



## Lateral Tilt Flow Control Adjustment

For JH7020 & JH9020 Leveling Systems the lateral tilt flow control valve adjusts the speed at which the header rotates. The header should rotate at the chassis' rotation rate. The tilt speed is a compromise between manual tilt mode and automatic tilt mode. The rotation rate is set at the factory; however with larger header configurations it may be necessary to adjust the header's rotational rate.

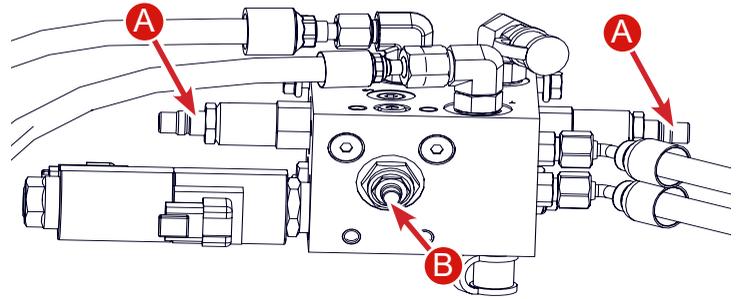
To test the header rotation rate, push the tilt button to the left until the tilt frame is rotated to the left limit. Push the tilt button to the right until the tilt frame reaches its right limit. The cycle time should meet the specification of 22 seconds.

### Specification

*Left-to-Right Cycle Time-22 seconds*

If the cycle time is shorter than the specification, turn the flow control set screw clockwise a quarter turn at a time until the cycle time meets the specification. If the cycle time is longer than the specification, turn the flow control screw counterclockwise a quarter turn at a time until the cycle time meets the specification. This specification ensures that tilt speed is adequate for manual operation. With some header configurations this tilt speed may cause the automatic mode to be unstable. Hillco recommends adjusting the Contour Master's sensitivity until it becomes stable. Refer to the combine's operators manual for Contour Master adjustments.

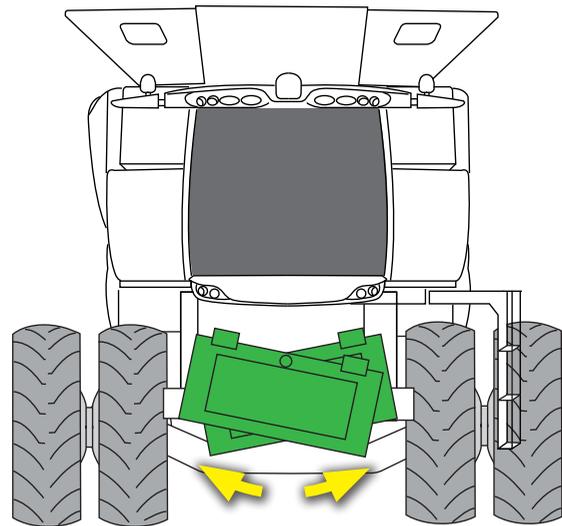
For changing the header tilt speed on a JH9020 Leveling System with factory Contour Master consult the John Deere Operator's Manual.



Located Below the Cab

A - Relief Ports

B - Flow Control



22 second rotation time from one side to other



### IMPORTANT!

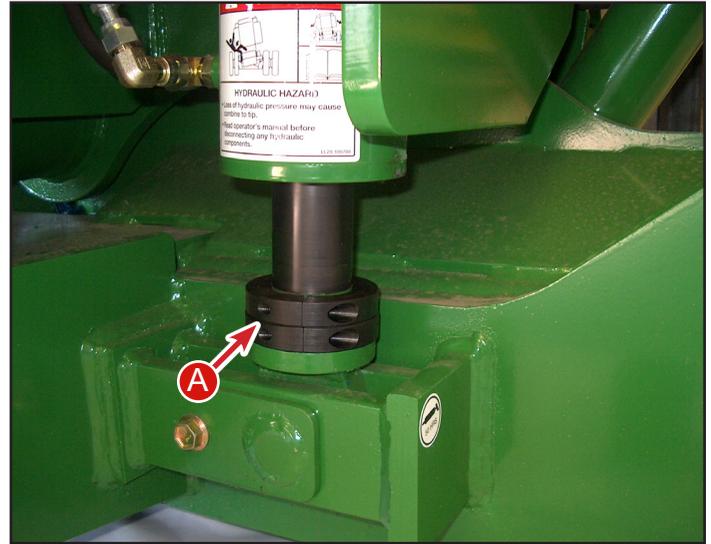
The pressure relief valve is pre-set at the factory. Changing the setting may cause damage to the tilt frame or hydraulic system. However, in very large header configurations, it may be necessary to change the setting. Contact your dealer to reset the relief valve.

## Mechanical Leveling Cylinder Stops

In the event of electrical controller or hydraulic failure Hillco requires installation of mechanical Leveling Cylinder Stops on combines equipped with oversized drive tires that limit leveling. With certain oversized tires leveling must be limited. The Leveling Cylinder Stops will prevent side panel or tire damage. Contact Hillco for further details.

Stops are available in two thicknesses, 5/8" and 1/8" for adequate adjustment. If additional stops are needed contact Hillco.

See the "Max Level Calibration" section for instructions on how to place the leveling cylinder stops.



A - Mechanical Leveling Cylinder Stops  
(5/8" thick Cylinder Stops Shown)

 **CAUTION**

Caution—In some tire configurations, the tire can contact the gull wing doors or the ladder. In this case, the maximum level must be adjusted to prevent tire contact with the combine chassis. However, to prevent chassis and tire damage in the event of a hydraulic or electrical failure, Hillco strongly recommends that cylinder stops be installed on the leveling cylinders. Hillco is not responsible for chassis damage that occurs due to the lack of appropriate cylinder stops.

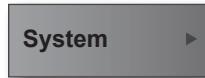
## Header Tilt Setup

Contour Master functionality should have been turned on during the installation process. If it is not functional follow the below instructions to activate the Contour Master function in the combine's Command Center.

1. Key switch on.

2. Select the Main Menu Icon  in the lower right corner of the "Harvesting" screen.

3. Select System Icon



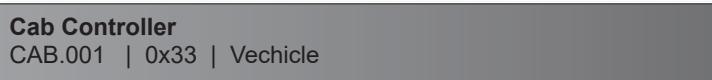
4. Select Diagnostics Center Icon



5. Select Controller Diagnostics Icon



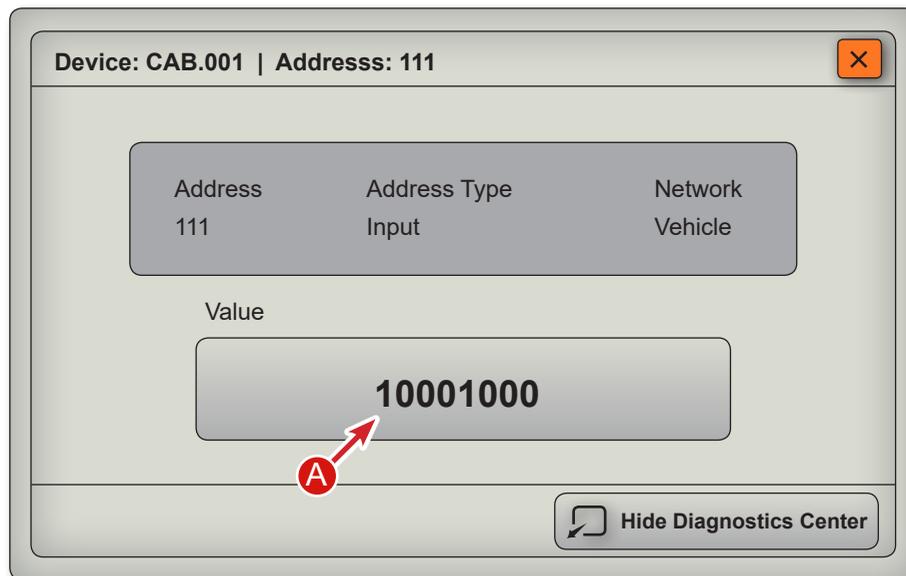
6. Scroll down and select Cab Controller



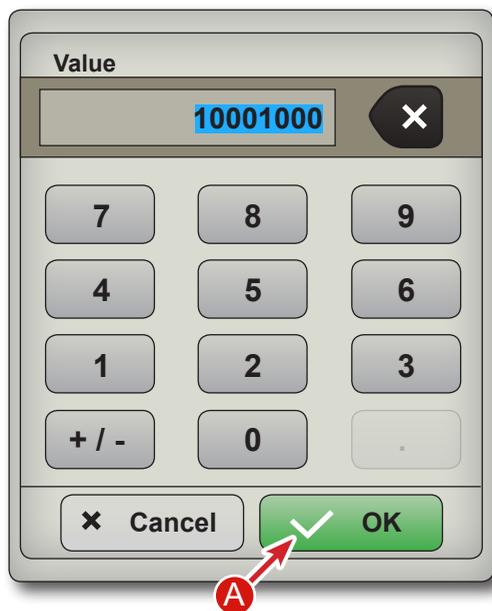
7. Scroll down and select address 111



8. This popup screen will appear. Select the Value (A).



9. Enter the value 10001000 and select OK (A).



10. You will get a popup that says "Calibration Procedures Problem". Select OK as this will be resolved when calibrated.

## Tread Width

The Model JH7020 & JH9020 Leveling Systems are designed around a main undercarriage length of 122.5". With the final drives mounted directly to the 122.5" undercarriage, the tread spacing is 128"-188" which allows for the maximum leveling capability of the combine or 27%.

## Tire Selection

**Model JH7020 & JH9020 Drive & Steer Tire Assemblies** – Combines equipped with the Model JH7020 or JH9020 Leveling System are required to use tires and wheels that meet or exceed Tire & Rim Association standards for Hillside Combine applications. Contact Hillco for more information.

## Feeder Adjustment For Tire Size

Adjust the feeder adapter to obtain the proper header angle and cutter bar height as shown in the John Deere® STS Operator's Manual. The chart shown in those manuals will no longer be a correct guide to adjust the feeder adapter due to the height increase created by the leveling system.

## Tire Inflation

Tire	Load Index	PSI
Drive (650/75R32) R1 & R3 Tread	175A8	46
Drive (650/65R38) 550 Tread	175A8	46
Steer (28LR-26) R1 & R3 Tread	173A8	36
Steer (28LR-26) 390 Tread	178A8	36
For all other steer tires see the combine's operator's manual for correct pressure		

The Calibration number for the 550 tires is 8450777

All Hillside combines are required to follow the Wheel and Tire Association Standards which states that the tire pressure must be such that the tire has adequate load carrying capability for the maximum possible weight (counting head weight and full grain tank). Both under-inflation and over-inflation are detrimental to tire life. Don't reinflate 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. Use a safety cage if available.

### **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.

When first operating the Model JH7020 or JH9020 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.

## **IMPORTANT**

Use of grain tank extensions other than those provided by the combine manufacturer is strictly forbidden. Use of such extensions voids both the Hillco and John Deere NEW Equipment Warranties.

### **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 John Deere combine operator's manual on the correct toe in for your tire and wheel size.

### **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.

### **Drive Shaft and Couplers**

## **DANGER**

Worn drive shafts and couplers may fail suddenly leaving the operator without brakes or drive. Check drive shafts and couplers annually for wear.

### **Rear Axle Weighting**

Operator is responsible in determining if combine has proper ballast. 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.

## **CAUTION**

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

## Hydraulic Settings

Refer to the Hydraulic Safety section for precautions regarding the hydraulic system. The Model JH7020 Leveling System uses an auxiliary gear pump and single-station manifold for its leveling and a separate header trim manifold. The Model JH9020 Leveling System uses hydraulic flow from the closed center hydraulics of the combine. If the combine was not originally equipped with Contour Master then a dual station manifold is installed controlling leveling and header trim. If the combine is equipped with Contour Master then a single station manifold controls the leveling and the John Deere Contour Master manifold controls header tilt. 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 Cylinder



**IMPORTANT**—Each leveling cylinder is equipped with a safety valve (counterbalance 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.

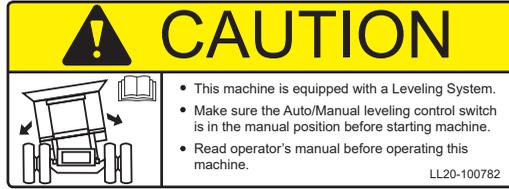


## WARNING

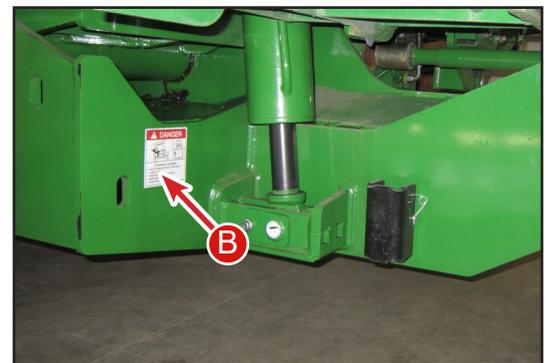
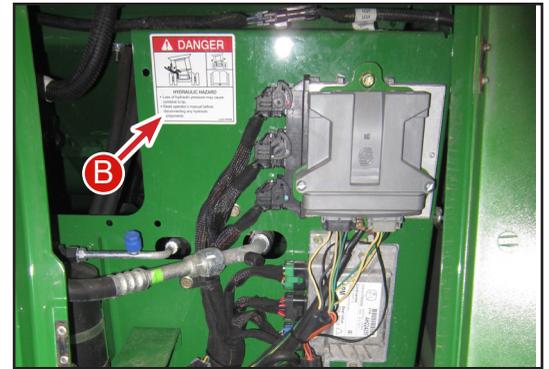
Do not make any repairs to the cylinders, disconnect valves, or disconnect any hoses connected to the cylinders, counterbalance valves, bulkhead mount or manifold without first contacting your authorized Hillco dealer. These hydraulic components stabilize the chassis of the combine. Improper repair or replacement of these components could lead to uncontrolled leveling of the combine's chassis. The leveling cylinder safety stops can be used to prevent accidental tipping of the combine during repair.

# Decal Placement

## A - Right cab window



## B - Leveling cylinder and manifold



## C - Leveling system hazard (Located between the second and third step)



D - Front of undercarriage and rear drop axle (left and right sides)

<b>! DANGER</b>	
	
<p><b>CRUSHING HAZARD</b> To prevent serious injury or death:</p> <ul style="list-style-type: none"> <li>• Keep all persons and objects clear while any part of this machine is in motion.</li> </ul>	
<small>LL20-100783</small>	



E - Transition header hooks

<b>! DANGER</b>

<p><b>PINCH POINT HAZARD</b></p> <ul style="list-style-type: none"> <li>• Keep hands, feet and body away from moving parts.</li> <li>• Do not stand or climb on machine when operating.</li> <li>• Hazard occurs during leveling and header trim.</li> </ul>
<small>LL20-100784</small>



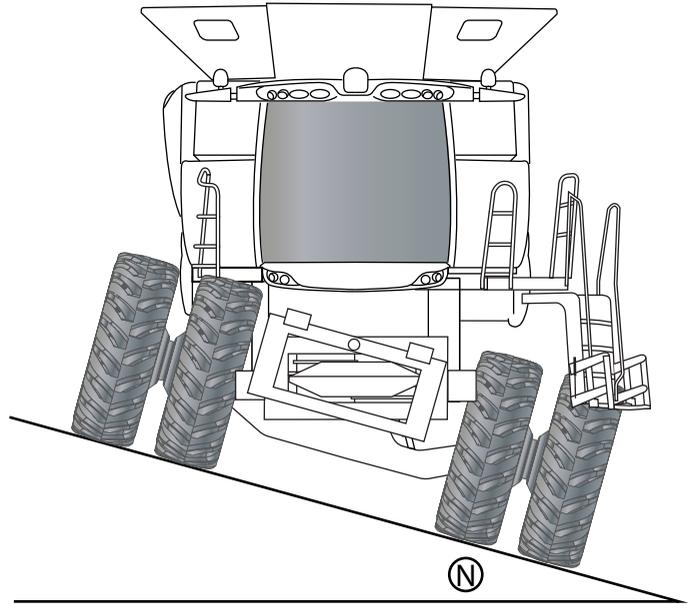
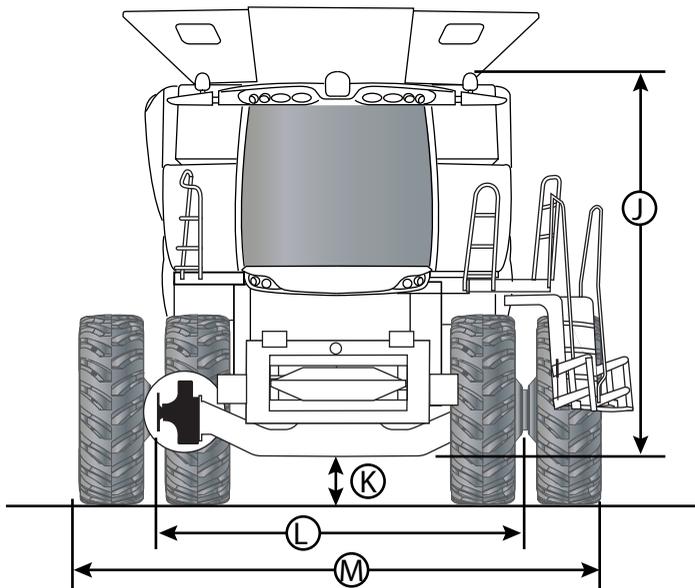
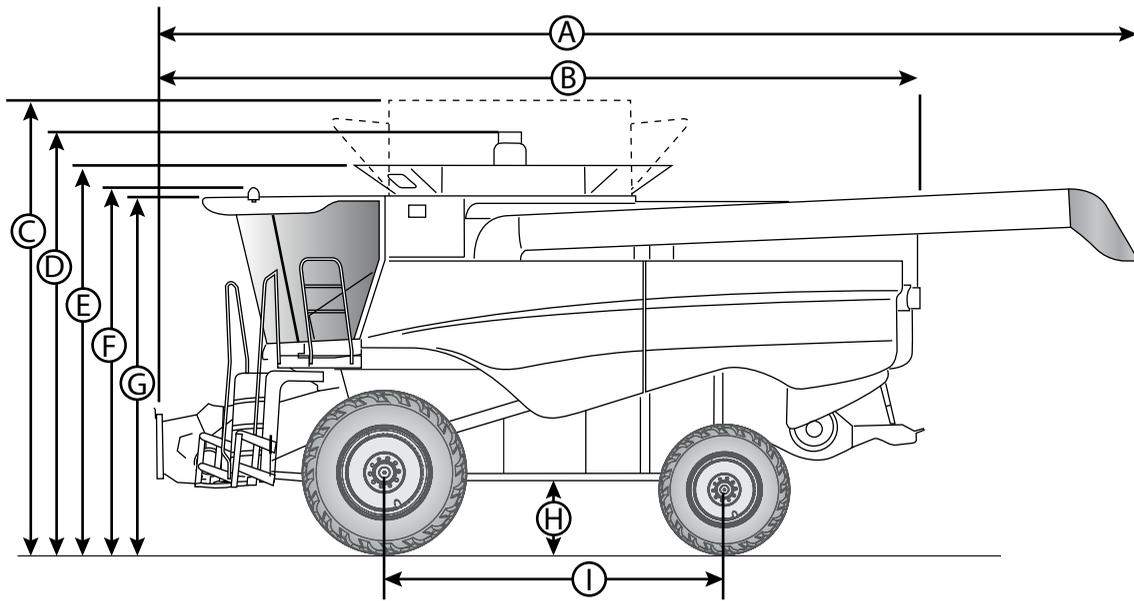
F - Side panel of combine (left and right)



## Header Compatibility Chart

To determine if a header kit is required or available for a specific leveling system model match the appropriate header with the corresponding leveling system model to determine availability. Contact Hillco for pricing as well as header kit availability for any John Deere header not listed below. Operator is responsible for ensuring that combine has proper ballast.		Hillco Leveling System Model			
		2975H Hillside	JH7020 Hillside	JH9020 Hillside	2965H Hillside
Max Header Weight		9,400 lbs.	9,500 lbs	9,500 lbs	6,500 lbs
PICKUP HEADS	615	Yes	Yes	Yes	N/A
	914	Yes	Yes	Yes	N/A
Platforms Rigid / Flex	618	N/A	N/A	N/A	N/A
	620	N/A	N/A	N/A	N/A
	622	Yes	Yes	Yes	N/A
	630	Yes	Yes	Yes	N/A
	635	Yes	Yes	Yes	N/A
	920 Early S/N	N/A	N/A	N/A	N/A
	920 Late S/N	N/A	N/A	N/A	N/A
	922 Early S/N	N/A	N/A	N/A	N/A
	922 Late S/N	N/A	N/A	N/A	N/A
	925 Early S/N	Yes	Yes	Yes	Yes
	925 Late S/N	Yes	Yes	Yes	Yes
930 Early S/N	Yes	Yes	Yes	Yes	
930 Late S/N	Yes	Yes	Yes	Yes	
Draper Heads	625D	Yes	Yes	Yes	N/A
	630D	N/A	N/A	N/A	N/A
	635D	Yes	Yes	Yes	N/A
	925D	Yes	Yes	Yes	N/A
	930D	Yes	Yes	Yes	N/A
	936D	Yes	Yes	Yes	N/A
Flex Draper Heads	630FD w/o top auger	N/A	Yes	Yes	N/A
	630FD w/ top auger	N/A	Yes	Yes	N/A
	635FD w/o top auger	N/A	Yes	Yes	N/A
	635FD w/ top auger	N/A	Yes	Yes	N/A
	640FD w/o top auger	N/A	Yes	Yes	N/A
	640FD w/ top auger	N/A	Yes	Yes	N/A
	645FD w/o top auger	N/A	Call Hillco	Call Hillco	N/A
	645FD w/ top auger	N/A	Call Hillco	Call Hillco	N/A
	MacDon D60/FD70 (30', 35', 40')	Yes	Yes	Yes	N/A
	MacDon D65/FD75 (30', 35', 40', 45')	Yes	Yes	Yes	N/A
	MacDon D1/FD1 (30', 35', 40', 45')	Yes	Yes	Yes	N/A
700 Series FD	Call Hillco	Call Hillco	Call Hillco	N/A	

# Leveling System Specifications



NOTE: Dimensions are approximate and subject to change without notice.  
Dimension Reference Points are on the previous page.

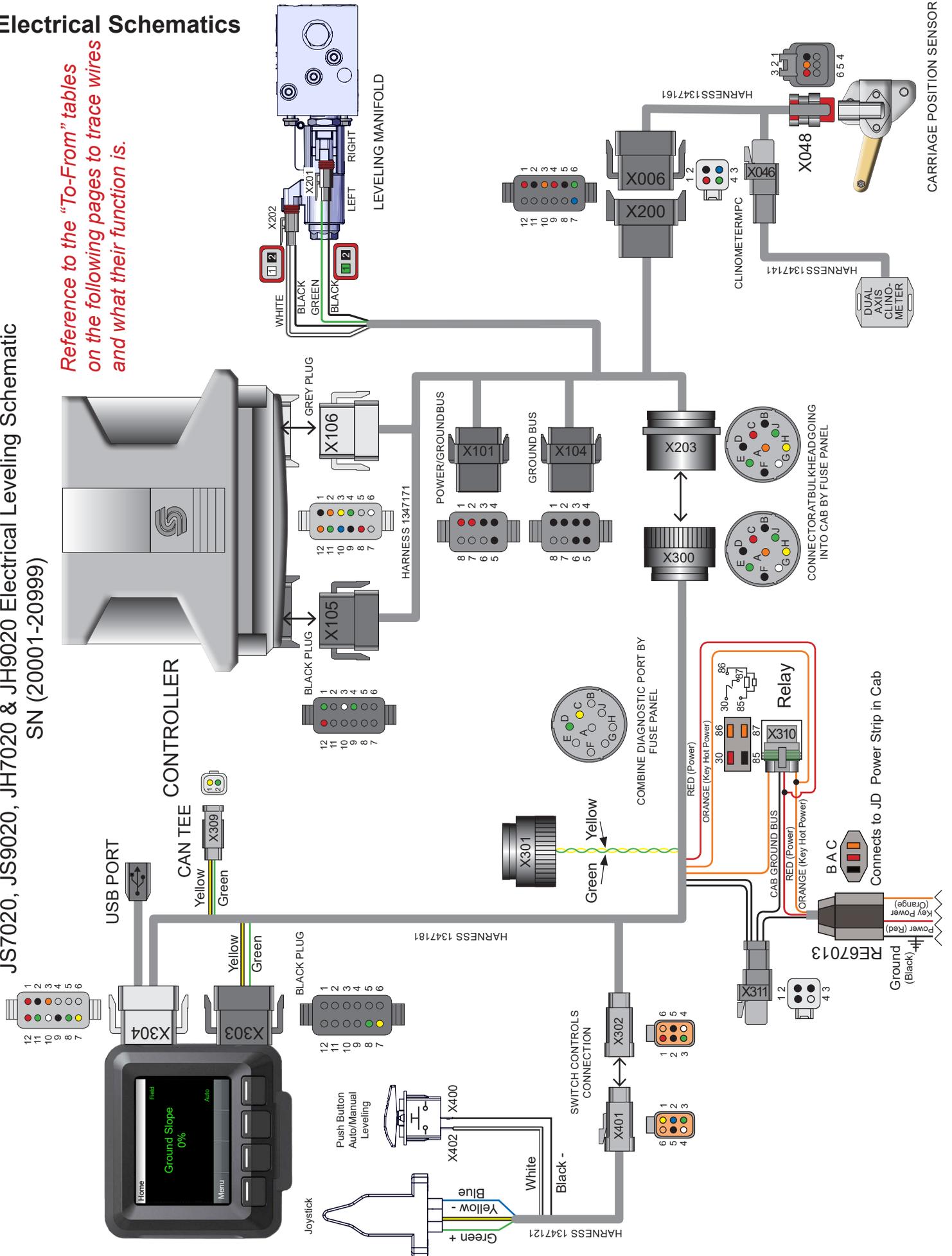
<b>Dimension</b>	<b>JH9020</b> 24.5x32 6* Front Tires 28LR26 Rear Tires 22'5" unloading auger	<b>JH7020</b> 24.5x32 6* Front Tires 28LR26 Rear Tires 22'5" unloading auger
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John Deere Models	S680, S690, S780, & S790	S660, S670, S760 & S770
A	37 ft 1 in,	33 ft 4 in,
B	28 ft 11 in	29 ft
C	16 ft 1 in	16 ft
D	15 ft 8 in	15 ft 7 in
E	14 ft 1 in (300 bu. extensions) 14 ft 11 in (400 bu. extensions)	14 ft 0 in (300 bu. extensions)
F	13 ft	13 ft 1 in
G	12 ft 10 in	12 ft 10 in
H	1 ft 11 in	1 ft 11 in
I	12 ft 9 in	12 ft 9 in
J	11 ft 8.5 in	11 ft 8.5 in
K	12 in	12 in
L	158 in	158 in
M	212.5 in	212.5 in
N	27% (15.4°)	27% (15.4°)
Leveling Controller	Clinometer (Accuracy +/- 3/4°)	
Leveling Speed	Proportional Control with Auto / Manual	
Leveling Hydraulic System	Integrated into Combine's Closed Center Hydraulics	Gear Pump
Header Lateral Tilt Control	Hydraulic Master / Slave Cylinder w/ Auto/Manual Override	
Feeder Transition	Paddle Beater	
Weight added to combine	4,100 lbs	4,100 lbs

# Electrical Schematics

JS7020, JS9020, JH7020 & JH9020 Electrical Leveling Schematic  
SN (20001-20999)

Reference to the "To-From" tables on the following pages to trace wires and what their function is.



JS7020, JS9020, JH7020 & JH9020 Electrical Leveling Schematic  
SN (20001-20999)

X006 - Sensor Package			To	
Pin	Wire Color	Description	Connector	Pin
1	Red	Carriage Sensor Power	X048	3
2	Black	Carriage Sensor Ground	X048	1
3	Orange	Carriage Sensor Signal	X048	2
4	Red	Clinometer Power	X046	1
5	Black	Clinometer Ground	X046	2
6	Green	Clinometer F/A Signal	X046	4
7	Blue	Clinometer L/R Signal	X046	3
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
12	-	-	-	-

X046 - Clinometer MPC			To	
Pin	Wire Color	Description	Connector	Pin
1	Red	Clinometer Power	X006	4
2	Black	Clinometer Ground	X006	5
3	Blue	Clinometer L/R Signal	X006	7
4	Green	Clinometer F/A Signal	X006	6

X046 - OC Position Sensor			To	
Pin	Wire Color	Description	Connector	Pin
1	Black	Carriage Sensor Ground	X006	2
2	Orange	Carriage Sensor Signal	X006	3
3	Red	Carriage Sensor Power	X006	1
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-

X101 - Sensor Power/Ground Bus			To	
Pin	Wire Color	Description	Connector	Pin
1	Red	Sensor Power Supply	X106	8
2	Red	Joystick Power	X203	3
3	Black	Sensor Ground Supply	X106	9
4	Black	Joystick Ground	X203	4
5	Black	UC Sensor Ground	X200	2
6	-	-	-	-
7	-	-	-	-
8	Red	UC Sensor Power	X200	1

X104 - Ground Bus			To	
Pin	Wire Color	Description	Connector	Pin
1	Black	Ground Bus	X203	2
2	Black	Controller Ground	X106	1
3	Black	Clinometer Ground	X200	4
4	Black	Left Valve Ground	X202	2
5	Black	Right Valve Ground	X201	2
6	Black	Auto Switch Ground	X203	6
7	-	-	-	-
8	-	-	-	-

X105 - Controller B Black Connector			To	
Pin	Wire Color	Description	Connector	Pin
1	Green	Joystick Signal	X203	5
2	-	-	-	-
3	White	Left Valve Power	X202	1
4	Green	Right Valve Power	X201	1
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
12	Red	Clinometer Power	X200	4

X106 - Controller A Grey Connector			To	
Pin	Wire Color	Description	Connector	Pin
1	Black	Clinometer Ground	X104	2
2	Orange	Controller Power	X203	1
3	Yellow	CAN High	X203	8
4	Green	CAN Low	X203	9
5	-	-	-	-
6	White	Auto Switch Signal	X203	7
7	-	-	-	-
8	Red	Sensor Power Supply	X101	1
9	Black	Sensor Ground Supply	X101	3
10	Blue	Clinometer Left/Right Signal	X200	7
11	Green	Clinometer Fore/Aft Signal	X200	6
12	Orange	UC Sensor Signal	X200	3

JS7020, JS9020, JH7020 & JH9020 Electrical Leveling Schematic  
SN (20001-20999)

X200 - Sensor Package			To	
Pin	Wire Color	Description	Connector	Pin
1	Red	UC Sensor Power	X101	8
2	Black	UC Sensor Ground	X101	5
3	Orange	UC Sensor Signal	X106	12
4	Red	Clinometer Power	X105	12
5	Black	Clinometer Ground	X104	3
6	Green	Clinometer F/A Signal	X106	11
7	Blue	Clinometer L/R Signal	X106	10

X201 - Right Valve			To	
Pin	Wire Color	Description	Connector	Pin
1	Green	Right Valve Power	X105	4
2	Black	Right Valve Ground	X104	5

X202 - Left Valve			To	
Pin	Wire Color	Description	Connector	Pin
1	White	Left Valve Power	X105	3
2	Black	Left Valve Ground	X104	4

X203 - Cab Bulkhead			To	
Pin	Wire Color	Description	Connector	Pin
A	Orange	Controller Power	X106	2
B	Black	Controller Ground	X104	1
C	Red	Joystick Power	X101	2
D	Black	Joystick Ground	X101	4
E	Green	Joystick Signal	X105	1
F	Black	Auto Switch Ground	X104	6
G	White	Auto Switch Signal	X106	6
H	Yellow	CAN High	X106	3
J	Green	CAN Low	X106	4

X300 - Cab Bulkhead			To	
Pin	Wire Color	Description	Connector	Pin
A	Orange	Key Power	X310	C
B	Black	Controller Ground	X311	3
C	Red	Joystick Power	X302	1
D	Black	Joystick Ground	X302	2
E	Green	Joystick Signal	X302	3
F	Black	Auto Switch Ground	X302	5
G	White	Auto Switch Signal	X302	4
H	Yellow	CAN High	X304	7
J	Green	CAN Low	X304	8

X301 Diagnostic MPC				To	
Pin	Wire Color	Description	Connector	Pin	Pin
A	-	-	-	-	-
B	-	-	-	-	-
C	Yellow	CAN1 High	X303	7	-
D	Green	CAN1 Low	X303	8	-
E	-	-	-	-	-
F	-	-	-	-	-
G	-	-	-	-	-
H	-	-	-	-	-
J	-	-	-	-	-

X302 - Switch Box				To	
Pin	Wire Color	Description	Connector	Pin	Pin
1	Red	Joystick Power	X300	C	-
2	Black	Joystick Ground	X300	D	-
3	Green	Joystick Signal	X300	E	-
4	White	Auto Switch Signal	X300	G	-
5	Black	Auto Switch Ground	X300	F	-
6	-	-	-	-	-

X303 - Display B				To	
Pin	Wire Color	Description	Connector	Pin	Pin
1	-	-	-	-	-
2	-	-	-	-	-
3	-	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	-	-	-	-
7	Yellow	CAN1 High	X301	C	-
8	Green	CAN1 Low	X301	D	-
9	-	-	-	-	-
10	-	-	-	-	-
11	-	-	-	-	-
12	-	-	-	-	-

JS7020, JS9020, JH7020 & JH9020 Electrical Leveling Schematic  
SN (20001-20999)

X304 - Display A			To	
Pin	Wire Color	Description	Connector	Pin
1	Red	Battery Power	X310	H
2	Black	Display Ground	RE67013	A
3	Orange	Keyed Power	X310	F
4	-	-	RE67013	C
5	-	-	-	-
6	-	-	-	-
7	Yellow	CAN0 High	X300	H
8	Green	CAN0 Low	X300	J
9	Black	USB Ground	USB	
10	White	USB Data +	USB	
11	Green	USB Data -	USB	
12	Red	USB Power	USB	

Note: Pin 1 Red wire T's and one leg goes to X310 pin H and the other leg goes to John Deere Power Strip Connector RE67013 pin A.  
Note: Pin 3 Orange wire T's and one leg goes to X310 pin F and the other leg goes to John Deere Power Strip Connector RE67013 pin C.

X309 - CAN Tee			To	
Pin	Wire Color	Description	Connector	Pin
1	Yellow	CAN O High Tee	X300	H
2	Green	CAN O Low Tee	X300	J
			X304	8

Yellow wire tees with legs going to X300 pin H and X304 Pin 7. Green wire tees with legs going to X300 pin J and X304 Pin 8.

X310 - Power Distribution Tee			To	
Pin	Wire Color	Description	Connector	Pin
A	Black	Relay Ground	X311	4
B	-	-	-	-
C	Orange	Controller Power	X300	A
D	-	-	-	-
E	-	-	-	-
F	Orange	Keyed Power	RE67013	C
G	-	-	-	-
H	Red	Battery Power	RE67013	A

X311 - Cab Ground Bus			To	
Pin	Wire Color	Description	Connector	Pin
1	Black	Ground	RE37013	B
2	Black	Display Ground	X304	2
3	Black	Controller Ground	X300	B
4	Black	Relay Ground	X310	A

RE67013 - John Deere Powerstrip Connector			To	
Pin	Wire Color	Description	Connector	Pin
A	Red	Power	X310	H
B	Black	Ground	X304	1
C	Orange	Key Power	311	1
			X310	F
			X304	3

Note: Red wire T's and one leg goes to X310 pin H and the other leg goes to X304 pin 1.

Note: Orange wire T's and one leg goes to X310 pin F and the other leg goes to X304 Pin 3

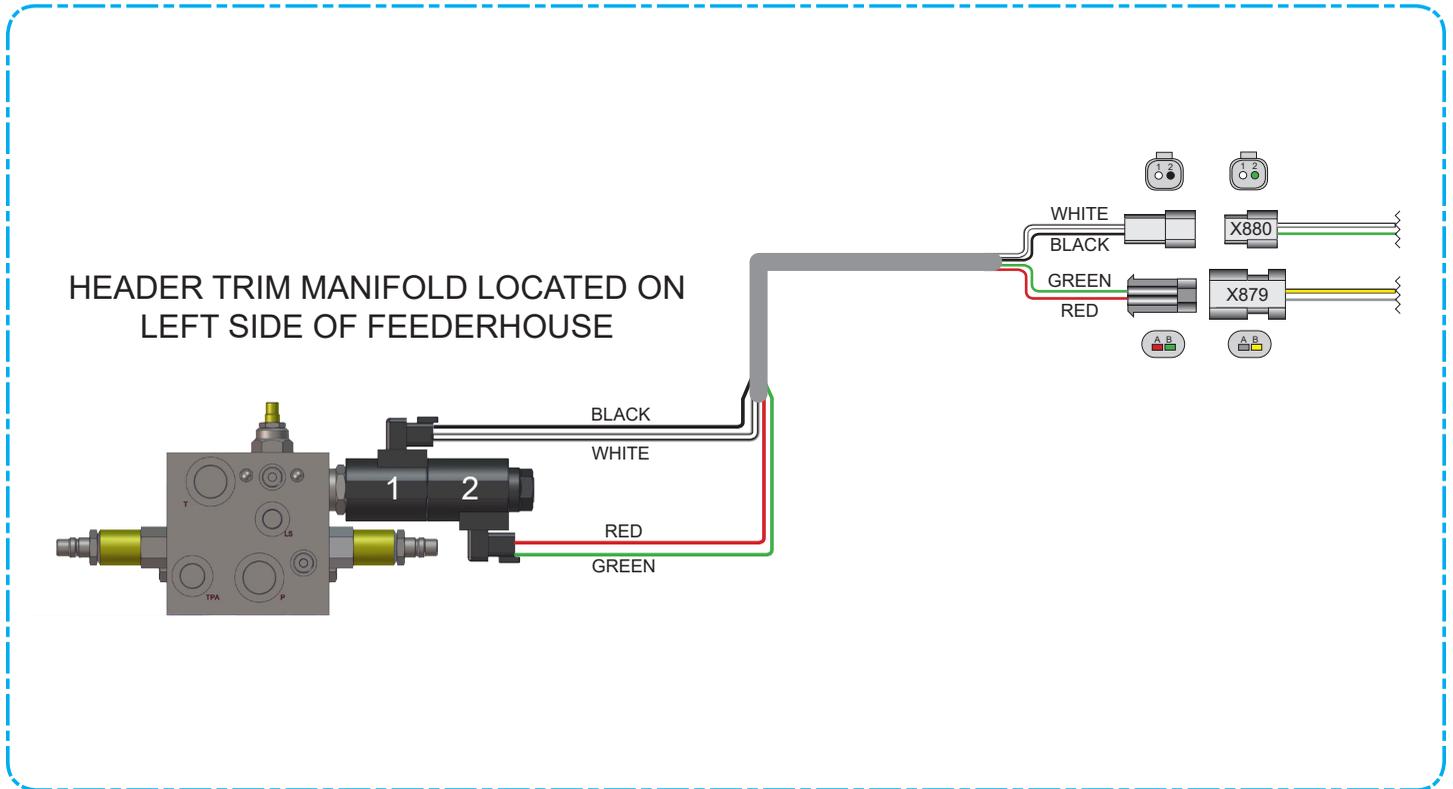
X400 - Auto Switch Signal			To	
Pin	Wire Color	Description	Connector	Pin
1	White	Auto Switch Signal	X401	4

X401 - Switch Box			To	
Pin	Wire Color	Description	Connector	Pin
1	Yellow	Joystick Power	Joystick Pigtail	
2	Blue	Joystick Ground		
3	Green	Joystick Signal		
4	White	Auto Switch Signal	400	1
5	Black	Auto Switch Ground	402	1
6	-	-	-	-

X402 - Auto Switch Ground			To	
Pin	Wire Color	Description	Connector	Pin
1	Black	Auto Switch Ground	X401	5

JS9020 Header Trim Electrical Schematic  
 SN 20001-20999  
 For Combines Equipped with Hillco Header Tilt Valve

WIRING HARNESS 1320731



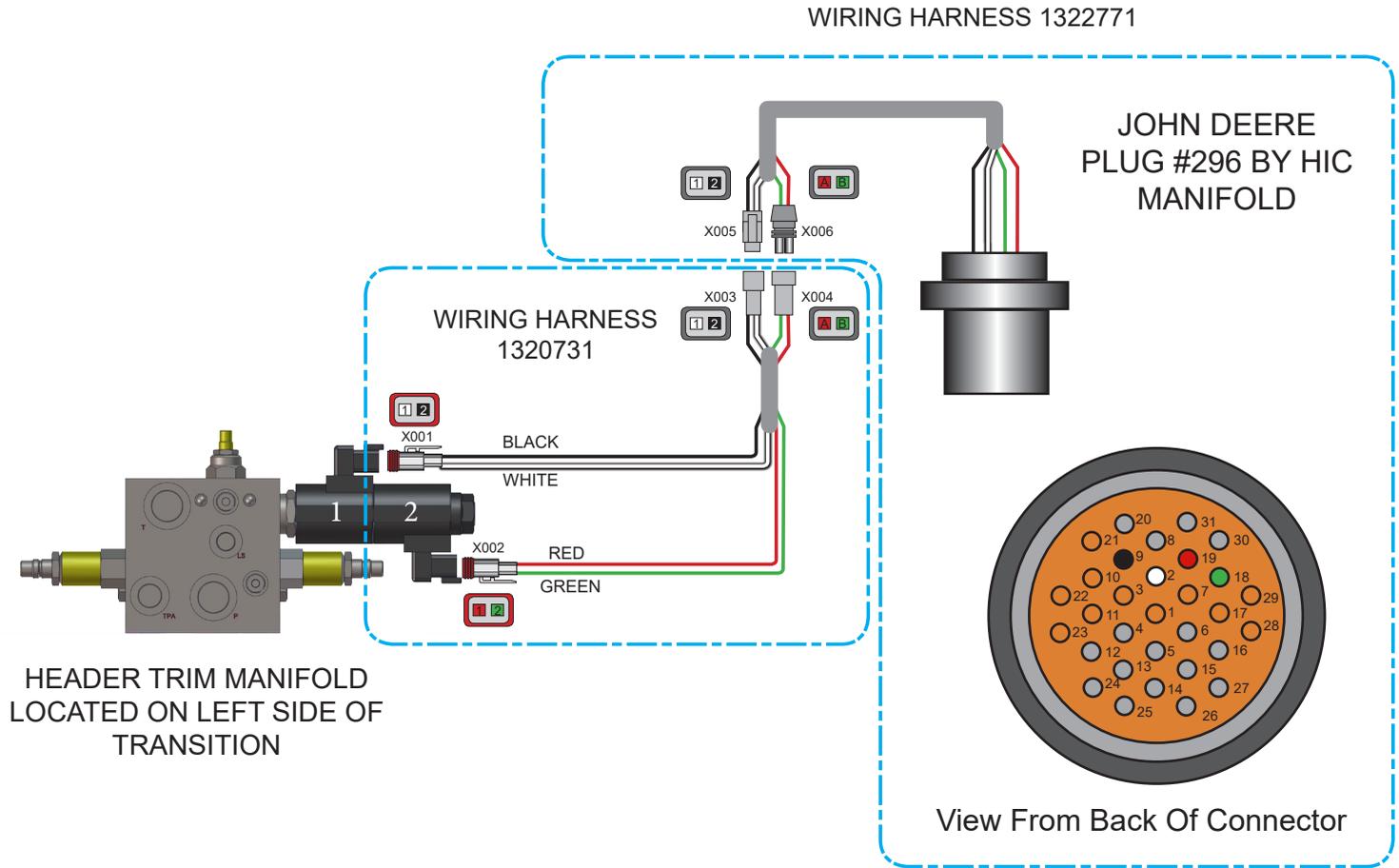
**JOHN DEERE PLUG X879**  
 LOCATION: Left side of Feederhouse

PIN	COLOR	FUNCTION	To
1	WHITE	Trim Left Power	Coil #1 Pin 1
2	BLACK	Trim Left Ground	Coil #1 Pin 2

**JOHN DEERE PLUG X880**  
 LOCATION: Left side of Feederhouse

PIN	COLOR	FUNCTION	To
A	RED	Trim Right Ground	Coil #2 Pin 1
B	GREEN	Trim Right Power	Coil #2 Pin 2

# JS5010, JS7010 & JH7010 Header Trim Electrical Schematic SN 20001-20999



X001			To	
PIN	Wire Color	Description	Connector	Pin
1	WHITE	Trim Left Power	X003	1
2	BLACK	Trim Left Ground	X003	2

X002			To	
PIN	Wire Color	Description	Connector	Pin
1	RED	Trim Right Ground	X004	A
2	GREEN	Trim Right Power	X004	B

X003			To	
PIN	Wire Color	Description	Connector	Pin
1	WHITE	Trim Left Power	X001	1
2	BLACK	Trim Left Ground	X001	2

X004			To	
PIN	Wire Color	Description	Connector	Pin
A	RED	Trim Right Ground	X001	1
B	GREEN	Trim Right Power	X001	2

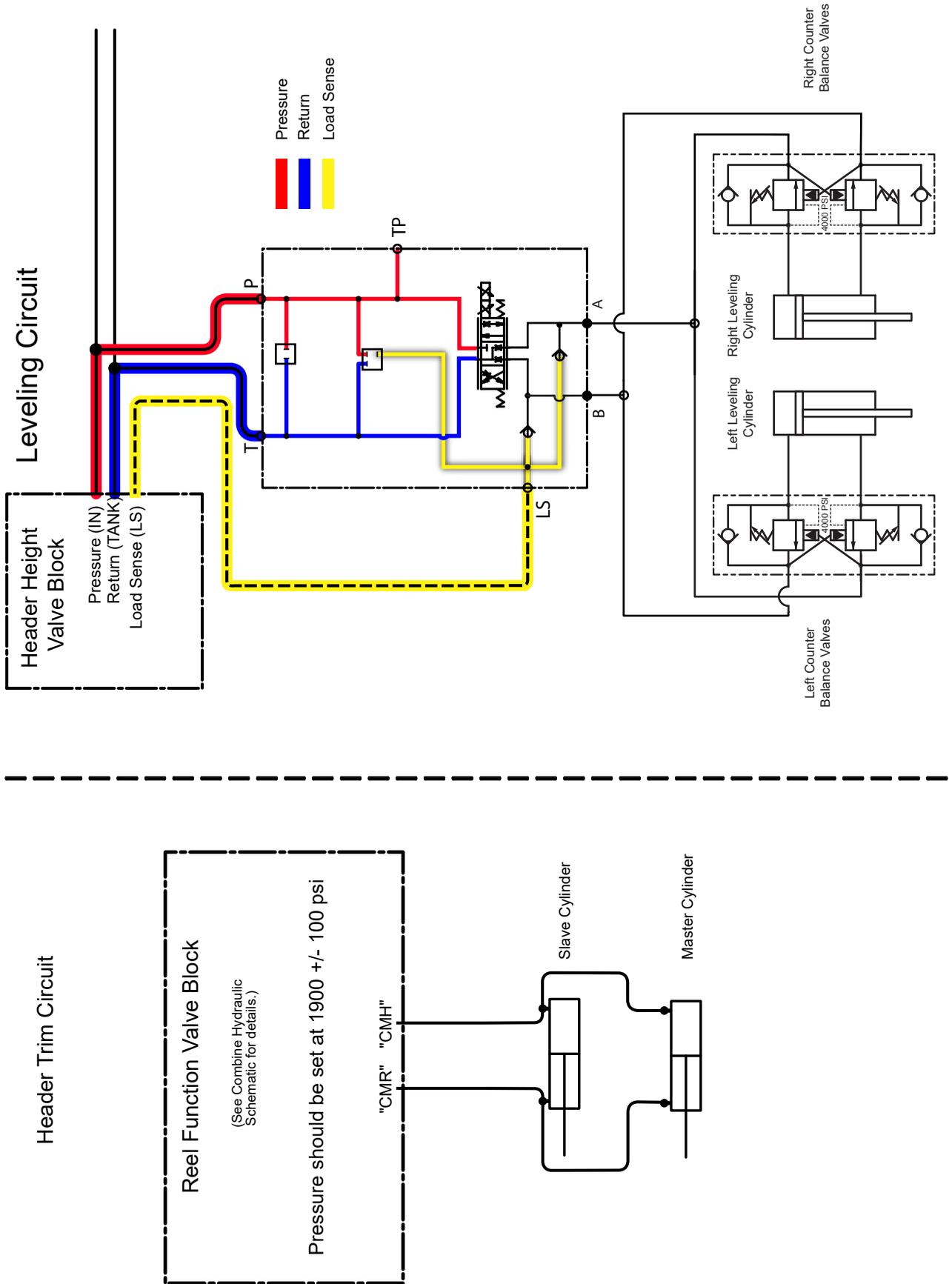
X005			To	
PIN	Wire Color	Description	Connector	Pin
1	WHITE	Trim Left Power	296	2
2	BLACK	Trim Left Ground	296	9

X006			To	
PIN	Wire Color	Description	Connector	Pin
A	RED	Trim Right Ground	296	19
B	GREEN	Trim Right Power	296	18

# Hydraulic Schematics

## JS9020 & JH9020 Hydraulic Circuit Schematic

For John Deere S680, S690, S780 & S790 Combines with Contour Master  
HILLCO Serial Number 20001 thru 20999

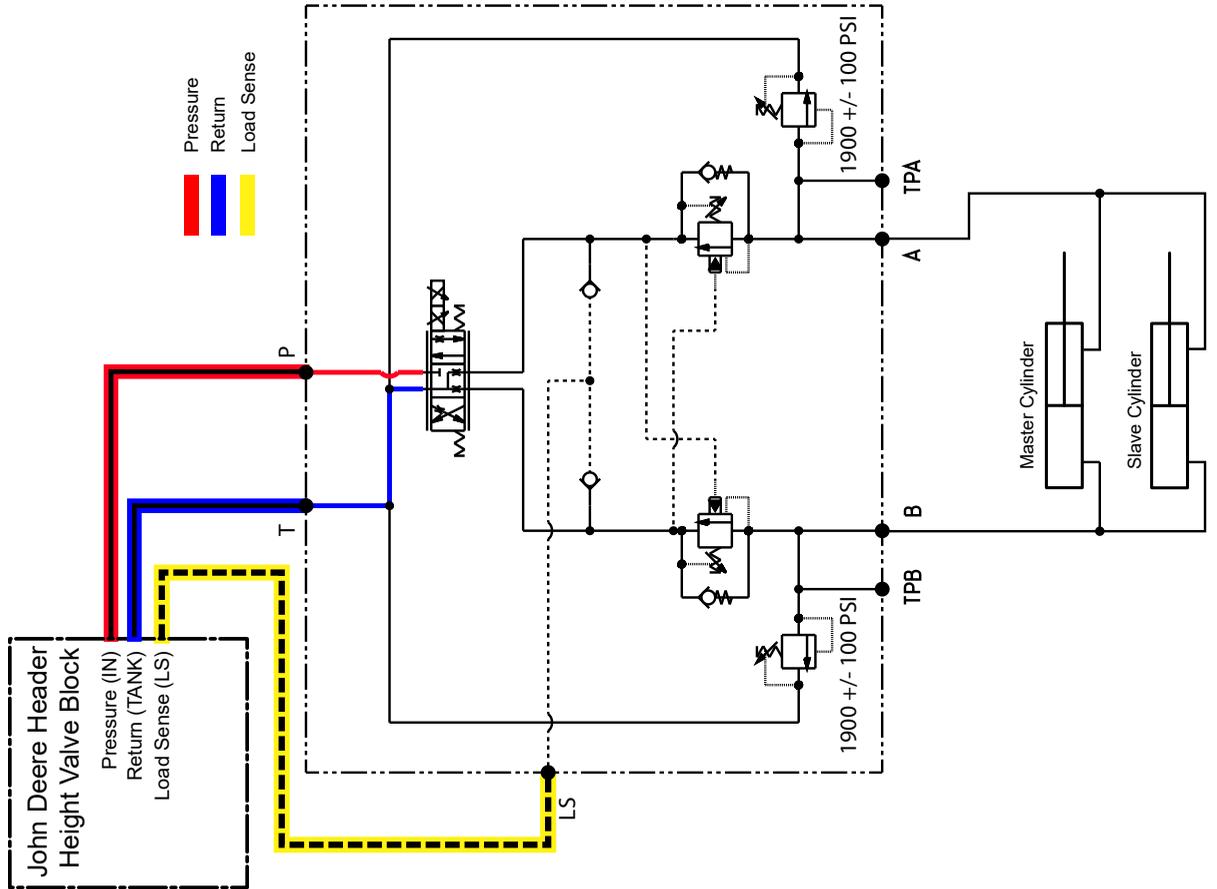


# JS9020 & JH9020 Hydraulic Circuit Schematic

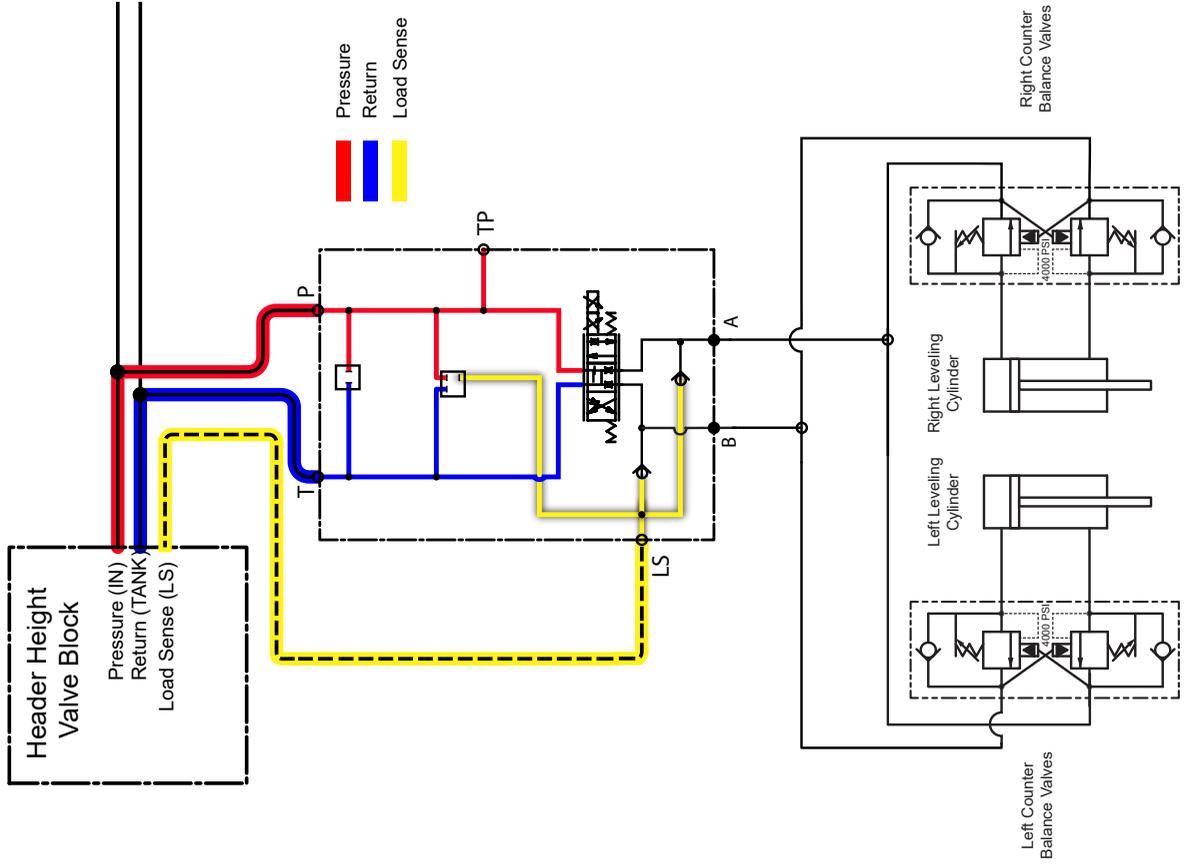
For John Deere S680, S690, S780 & S790 Combines with Hillco Lateral Tilt Valve

HILLCO Serial Number 20001 thru 20999

## Header Trim Circuit



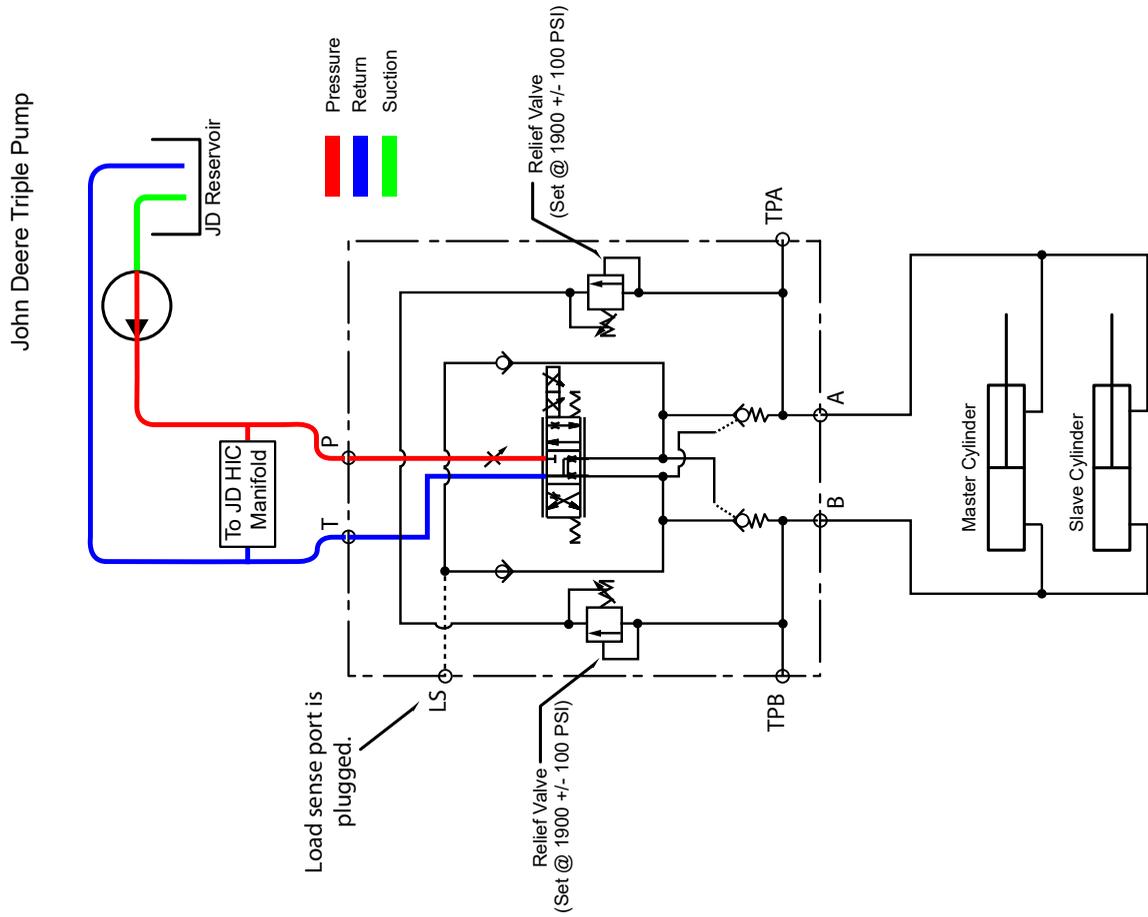
## Leveling Circuit



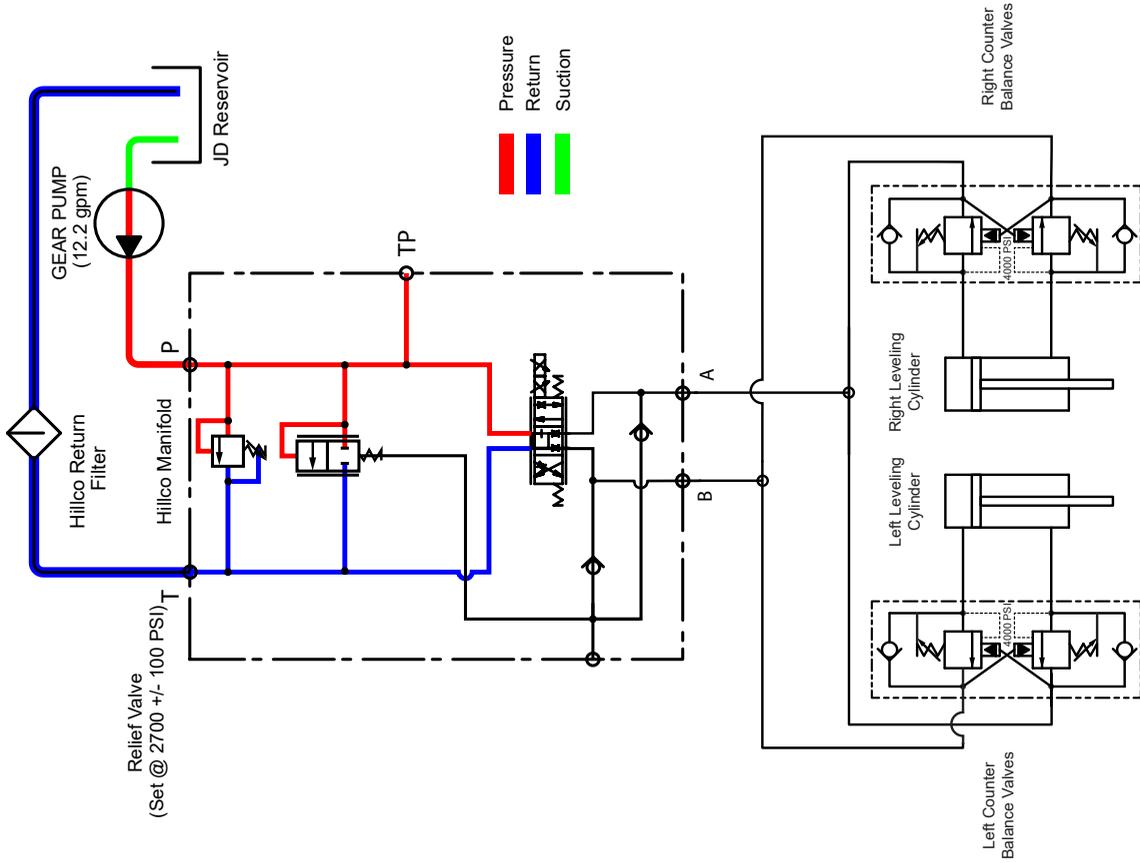
# JS5010, JS7020 & JH7020 Standard (Gear Pump) Hydraulic Circuit Schematic

For John Deere S550, S650, S660, S670, S760 & S770 Combines:  
Hillco Serial Number 20001-20999

## Header Trim Circuit



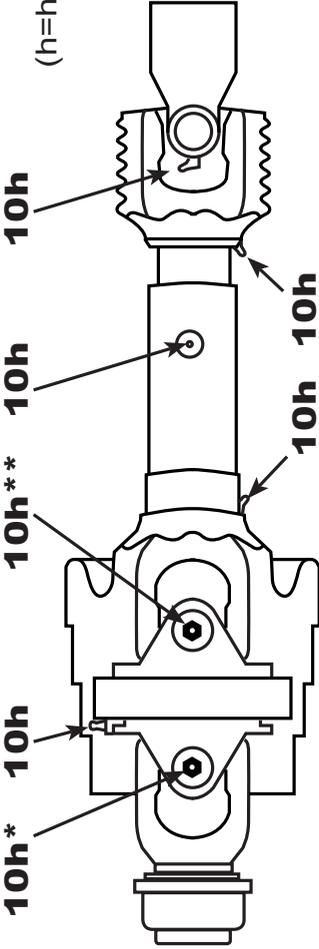
## Leveling Circuit



# IMPORTANT!

**PWE LUBE REQUIREMENTS**

(h=hours)



The diagram shows a cross-section of a drive assembly. It includes a central shaft with a double yoke on each end. There are several lubrication points indicated by arrows and labels: '10h\*' points to the outer cross kit on both ends; '10h\*\*' points to the inner cross kit on both ends; and '10h' points to the double yokes on both ends. A note '(h=hours)' is located at the top right of the diagram.

- \* lubricate outer cross kit with about 5 pumps of grease (about 15 grams).
- \*\* Inner cross kit also lubricates the double yoke. Lubricate with about 15 pumps of grease (about 45 grams). Consult operator's manual for additional information.

**Leave this manual attached to the driveline so the end user can see the Driveline Maintenance Guide.**



# 80 Degree Walterscheid Driveline Maintenance Guide

D-160831CMA01  
August, 2016

## Background

We are often asked about the frequency and type of grease to use when servicing drivelines. We believe a frequent and thorough greasing is more important than the type of grease you use. Dirt and grease make an excellent grinding compound; a proper greasing cleans out any contaminants. While greasing, pump grease until you see clean grease come out past all of the seals, this insures that debris is flushed out. Unlike most bearing seals, drivelines cannot be over greased as the seals are designed to let grease flow through. The initial greasing will take more grease pumps to purge the assemblies; after that, regular maintenance scheduling is required. Lack of proper lubrication is the most common cause of universal joint, center housings, and slip joint problems. Hillco works closely with driveline manufacturers to develop drivelines rated for the thrust load and angle demands of each different header. Properly sized center housings, universal joints, and slip joints, maintained at recommended intervals, will meet or exceed operation requirements. Inadequate lubrication is the leading cause of driveline failure. Failure to follow lubrication instructions for one interval may lead to total failure of the driveline. Inspecting and servicing your driveline on a scheduled, twice daily basis the first few days of service will help you develop a feel for your maintenance needs.

Lubricate all grease zerks with a high quality, lithium soap compatible, EP grease meeting the N.L.G.I. #2 specifications and containing no more than 1% molybdenum disulfide.

Zerk Location	Service Interval	Grease Gun Lever Action Pumps
Inner Cross, CV Balls & Sockets	10 hrs.	15
Telescoping Members	10 hrs.	2-3
Outer Crosses	10 hrs.	5
Shielding Bushings	10 hrs.	5



### CAUTION!

New drivelines and replacement parts are not lubricated. New drivelines and replacement parts must be lubricated at the time of assembly and during use per recommendations

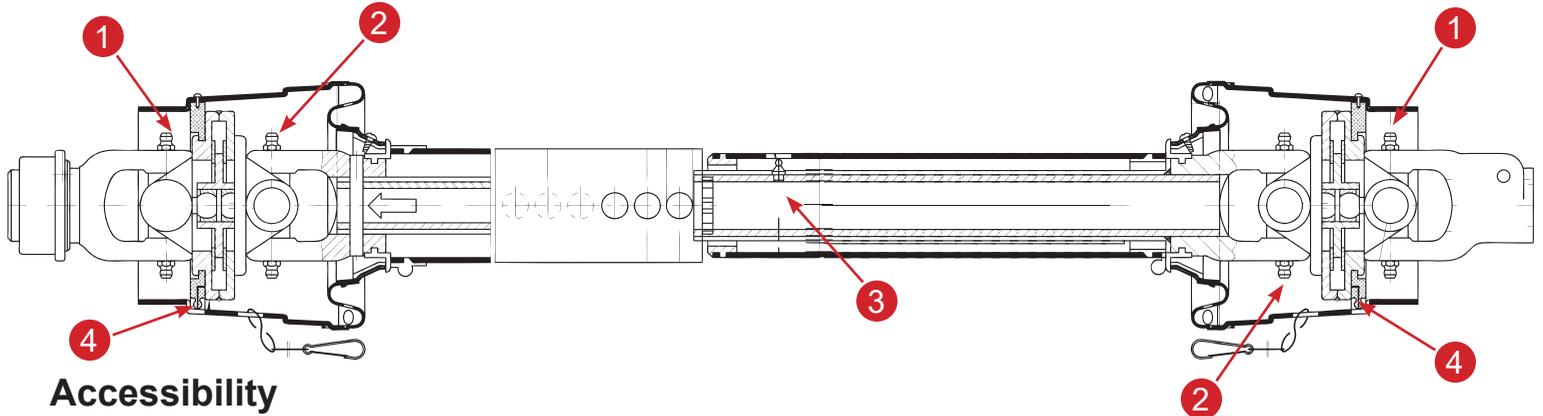


### IMPORTANT!

Drivelines not properly maintained will not be covered by warranty.

## Zerk Locations

1. Outer Cross (2 zerks) - Zerk is on caps it is necessary to only grease one cap.
2. Inner Cross, CV Ball and Socket (2 zerks) - Zerk is on caps it is necessary to only grease one cap.
3. Telescoping Members (1 zerk)
4. Stationary Shield Bushing (2 zerks)



## Accessibility

Each constant velocity driveline has at least 5 grease zerks (drivelines that have a stationary shield have at least 7 zerks). Due to various header/combine combinations some zerks may be inaccessible. Cutting a new hole in the profile shield is mandatory to access these zerks. Locate all zerks in your C.V. driveline and make sure there is access to properly grease each one. If the access hole is covered up due to the position of the driveline a new hole will need to be cut.

## Driveline Removal - Only for Driveline Part No 155310

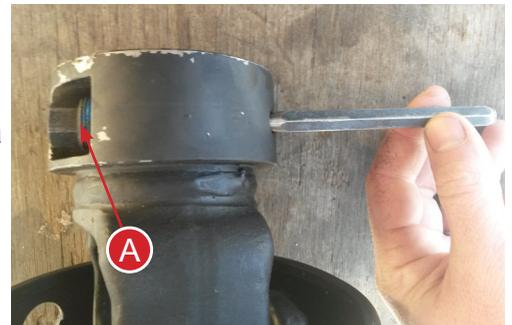
If the driveline is to be removed from the gear case input shaft, follow these steps:

Loosen the nut approximately 1/2 turn (A)

Insert a punch into the hole on the opposite side and tap with a hammer to loosen

Finish removing the retaining bolt.

If this procedure is not followed, the retaining bolt may break while removing.



## Decal Placement

