

**THE NEW 955 ROW CROP RIPPER -  
A TOOL THAT IMPROVES EFFICIENCY  
AND CROP YIELDS**

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**Abstract**

The new John Deere 955 Row Crop Ripper provides the strength, versatility, and functionality to break up soil compaction along with the ability to combine multiple tillage operations in a single pass for cotton, corn, soybeans, and other crops.

**Introduction**

Soil compaction, in some areas of the United States such as the Mississippi Delta and the Southeast, has been a chronic problem over the years due to the soil types present in those areas. However, soil compaction is becoming more of a widespread problem, not only in the chronic compaction areas of the U.S., but in other areas as well. What is causing this compaction? Soil texture (the proportion of sand, silt and clay in the soil), soil moisture, field traffic in wet conditions, and heavier farm equipment are just a few causes of compaction. Soil compaction can lower yields due to reduced water infiltration, reduced root growth due to restriction, and reduced porosity in the soil. How can we combat soil compaction? One popular approach is to rip a narrow slot through the layer of subsoil compaction. This allows the plant root to reach subsoil moisture and nutrients.

In the past, conventional tillage practice in cotton growing regions consisted of breaking up the subsoil compaction with a ripper in one operation and then follow with a bedding operation. Since tractor horsepower has steadily increased, and will continue, these two operations can be combined into one.

A new John Deere tillage machine, the 955 Row Crop Ripper has the strength and versatility required for performing multiple tillage operations, such as ripping and bedding, in one pass. The 955 can be configured to rip the ground, both on the row or between the row. In addition, a rear bar can be attached to carry optional tillage tools such as bedders, combining multiple tillage operations in one pass.

**Newly Designed Toolbar**

The 955 Row Crop Ripper's primary function is to deep till the ground. Ripper standards are mounted on a newly designed straight toolbar. The straight toolbar allows the 955 to be used in row crop applications. This single toolbar has the strength to accommodate tractor sizes from 85 horsepower up through 360 horsepower. This gives the 955 the versatility to be used with two wheel drive, MFWD, and four wheel drive tractors. This is important to the increasing number of farmers using four wheel drive tractors for row crop applications.

The 955 toolbar was designed with a multitude of different farming applications in mind. For this reason, the 955 will support 20 inch, 22 inch, and 30 - 44 inch (in 20 increments) row spacings, both on the row and between the row.

The toolbar is constructed with 7" X 7" cross-sectional structural tubing with 3/8" or 1/2" wall. The frame's unique hitch design allows easy standard spacing adjustment to any of the above mentioned row spacings (see Figure #1).

**Ripper Standards**

The 955 incorporates a new family of ripper standards.

**Straight Shear-Bolt Standards**

The new straight shear-bolt standard requires 8700 pounds of force to shear the shear-bolt. The angle of inclination of this standard is 80 degrees. This angle is quite steep and is intended to reduce the amount of soil surface disturbance (see Figure #2). This will be especially useful in stale bed or inter-row ripping operations when minimal disturbance is desired. The leading edge of this standard is protected with a replaceable and reversible chrome alloy wear shin designed to provide extended life as well as minimize soil surface disturbance (see Figure #2). The maximum ripping depth is 24 inches.

**Extended Straight Shear-Bolt Standards**

The extended straight shear-bolt standard shares the same shank design with the above mentioned standard, with the exception that it is offset rearward of the toolbar to allow room to mount a residue slicing coulter in front (see Figure #3). The maximum ripping depth is 24 inches without coulters and 16 inches with coulters. Shear-bolt and cushion-reset coulters are available with 18 or 20 inch coulter blade diameters to help manage residue.

**Spring-Reset Parabolic Standard**

The spring-reset parabolic standard provides adjustable trip force between 3200-5300 pounds. This standard has an automatic resetting shank that is useful where hidden field obstructions may exist. The toggle trip mechanism allows the standard to trip entirely out of the ground in order to clear field obstacles, such as stumps or rocks. Compared to

the straight standard, the parabolic shank design is more aggressive and disturbs more of the soil surface profile. Due to the lower angle of inclination inherent in the parabolic shape, less draft is required to pull this shank through the ground (see Figure #4). The maximum ripping depth is 22 inches without coulters and 16 inches with coulters.

### **Ripper Points and Subsoil Fracture**

To support the needs of the individual farmer, a family of points will be offered for the 955 to control the amount of subsoil fracturing. The 955 has four points available: 2.25", 2.25" capped, 2.25" double capped, 4", and 7" sweep. The 2.25" point requires the least amount of draft, disturbs the soil surface profile the least, and shatters the smallest zone of subsoil compaction. The capped 2.25" points shatter a slightly larger zone of subsoil compaction and have double or triple the wear life compared to regular 2.25" points. In contrast, the 7" ripper sweep requires the most draft, disturbs more of the soil surface profile, and shatters the largest zone of subsoil compaction.

### **Multiple Tillage Operations**

In order to reduce operating costs and increase efficiency, today's trend in agriculture is to reduce the number of trips across the field. Several approaches are possible in order to reduce the number of trips. One of which, is to combine multiple tillage operations in each pass. The 955 has been designed with a modular concept in mind. The main frame or toolbar can be used for ripping only. A rear bar can be added to perform additional tillage operations in one pass. The rear bar is attached to the toolbar by parallel linkages that allow the rear bar depth to be set independent of the toolbar depth (see Figure #5). Since the rear bar is releasibly attached to the toolbar, it can be attached or detached from the toolbar depending on what tillage operations are desired. In some conditions, the rear bar may simply be raised so rear tools are clear of the ground. This is a useful feature in crop rotations. For example, if soybeans are in rotation with cotton, the rear bar could be detached from the toolbar, and the 955 used as a ripping only type of tool. When cotton production comes into the rotation, the rear bar can be reattached and will allow the 955 to rip and bed, in one pass. Another option is to drop off the ripper standards from the toolbar and use the 955 as a bedding only type of tool.

### **Rear Bar**

Since the 955 was designed to integrate into many different types of tillage operations, the rear bar was attached with parallel (four-bar) linkages. Not only do the linkages allow the rear bar to be added or removed, they also allow the rear bar depth to be adjusted independently from the toolbar (see Figure #5).

The parallel linkage vertical range of motion is 15 inches. The depth setting for the rear bar can also be adjusted another 7.85 inches by moving the rear bar into another matched set of holes on the parallel linkages. This results in a total range of vertical motion of 22.85 inches. This large range of depth adjustment for the rear bar allows many different rear bar tillage tools to be compatible with the 955 Row Crop Ripper.

The parallel linkage vertical range of travel is controlled by means of a simple turnbuckle. The turnbuckle not only adjusts the depth of the rear bar, but it also provides downpressure to the rear bar. This same turnbuckle can be removed to allow the rear bar to float. In "float mode" rear stabilizer wheels are mounted to the rear bar to control depth and to allow the rear bar to follow the ground contour.

### **Rear Bar Attachments**

There are several rear bar tillage attachments that will be offered for the 955. For creating or reforming beds, the choice would be disk bedders or conservation standards with conservation sweeps and ridging wings. For primary types of tillage with broader tillage coverage, chisel plow Tru-Depth™ standards are also available.

### **Disk Bedders**

Disk bedders can be arranged in either an opposed fashion, which create a taller, more peaked type of bed; or a staggered fashion, which form a rounded, flatter type of bed (see Figure #6). The two blade disk gang uses a 20 inch disk blade for the outer disk and an 18 inch disk for the inner blade. The gang has three positions of angle adjustment to allow for varying levels of aggressiveness resulting in more or less soil being moved by the bedders. This adjustment gives the farmer the ability to maintain consistent bed shape in varying soil conditions and/or implement speeds. Disk scrapers are available for use in wet or sticky soil conditions.

### **Conservation Standards**

The conservation standard with conservation sweep and ridging wings is another choice for making beds (see Figure #7). The standard, sweep, and wings are the same parts offered on John Deere's 886 Row Crop Cultivator. This configuration is offered with either a rigid or spring reset standard. The spring reset standard provides 550 pounds of trip force and should be the standard of choice where hidden obstructions in the ground such as rocks and tree stumps may be found. Conservation sweeps consist of a share support assembly, Tru-Width™ reversible lay shares, and cast points. Pitch adjustments of 0°, 2°, and 4° are provided for the conservation sweep by attaching the sweep to the standard using a roll pin and bolt connection. As the pitch angle of the sweep is increased, a more aggressive angle between the sweep and soil provide improved penetration. A wear resistant high chrome alloy point on

the sweep features aggressive flat chisel style nose for enhanced penetration. The top surface of the point includes a raised edge that reduces slab size by breaking through the soil. Adjustable ridging/bedding wings are provided for the bedding operation. Ridging wing width is adjustable from 10" to 16" with infinite adjustment. Changing the width of the ridging wings results in varying bed shapes. By rotating the ridging/bedding wings up out of the way, a rip and cultivate operation could be performed rather than a rip and bed.

Wear resistant plastic covers are available for attachment to the outer surface of the conservation ridging wings. In sticky soil conditions, the plastic covers reduce soil adhesion to the wings.

### **Tru-Depth™ Standards**

The Tru-Depth™ chisel plow standard provides spring reset feature for protection and 1250 pounds of trip force. Tillage can be as deep as 12 inches and is designed to work in rocky ground and heavy draft conditions. A wide variety of tools such as sweeps, chisels, and twisted shovels are available. In primary tillage applications, the Tru-Depth™ standards mounted to the rear bar provide full width tillage.

### **Row Markers**

Row markers are used for bedding operations to mark out the bedded rows. They can also be used to lay the furrow for a row guidance system to track. Row markers are borrowed from our planter line and include features such as tension bolt breakaway protection (to protect the marker arm if an obstruction is hit) and manual transport locks.

## **955 Row Crop Ripper - Specifications**

(Specifications and design subject to change without notice)

<b>Frame</b>	
Size	7x7x1/2-inch & 7x7x3/8-inch
Width	120;174;254; and 334-inch
# of standards on-row	4,6,8,10
# of standards in-row	5,7,9,11
Spacing	20;22;30;32;34;36;38;40;42; and 44"
<b>Ripper Standards</b>	
Type	Straight Shearbolt
	Extended Straight Shearbolt
	Parabolic Spring Reset
Points	2-1/4-in. regular; 2-1/4-in. capped; 2-1/4-in. double capped; 4-in. regular; and 7-in. ripper sweep
Under frame clearance	36-inches
Maximum working depth with coulters	16-inches
Maximum working depth without coulters	24-inches
<b>Coulters</b>	
Type	Shearbolt
	Cushion
Blades	18O or 20O
<b>Gauge Wheels</b>	
Type	Single with 9.5L x 15, 8 PR
	Dual with 9.5L x 15, 8 PR
<b>Rear Bar</b>	
Size	4x4x3/8-inch
Attachments	Disk Bedders
	Conservation standard and sweep with ridging wings
	Tru-Depth Standards
<b>Tractor Horsepower Requirements</b>	Requires 25 to 45 PTO hp per standard, depending on soil, depth of operation, speed, and rear bar attachments being used. (Maximum compatible tractor engine horsepower is 360.)
<b>Three Point Hitch requirements</b>	Cat. II with/without Quik-Coupler; Cat. III and IIIN with Quik-Coupler (334" frame Cat III Q.C. only).

### **References**

Johnson, Richard R., and Jack C. Wiley. 1997. Managing Soil Compaction. Deere & Co. Technical Center. White Paper No. 26. Moline, IL.

Cox, Philip D. 1995. The New 886 Row Crop Cultivator - A tool for "Stale Seedbed" Cotton Production. Proceedings Beltwide Cotton Conferences. 29-33.

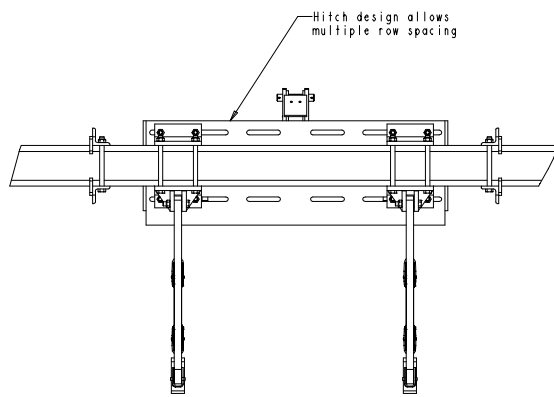


Figure 1. Hitch Design

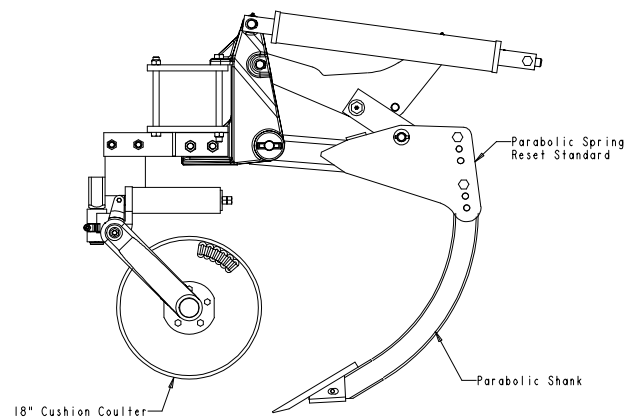


Figure 4. Parabolic Spring-Reset Standard

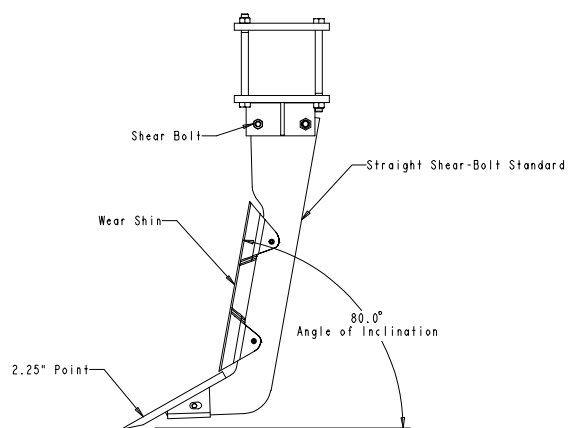


Figure 2. Straight Shear-Bolt Standard

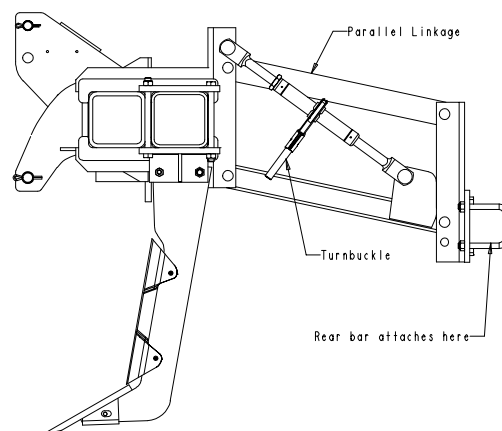


Figure 5. Parallel Linkage (shown on 955 toolbar)

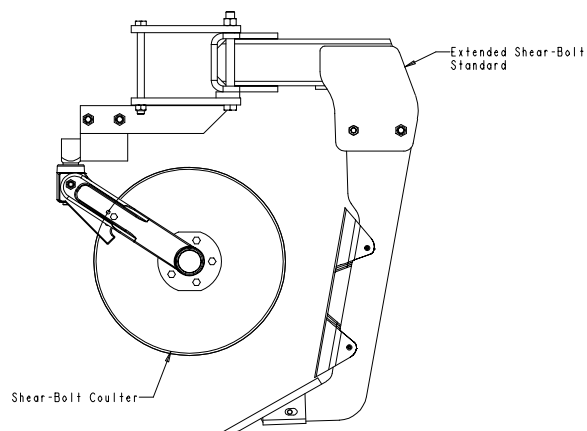


Figure 3. Extended Straight Shear-Bolt Standard

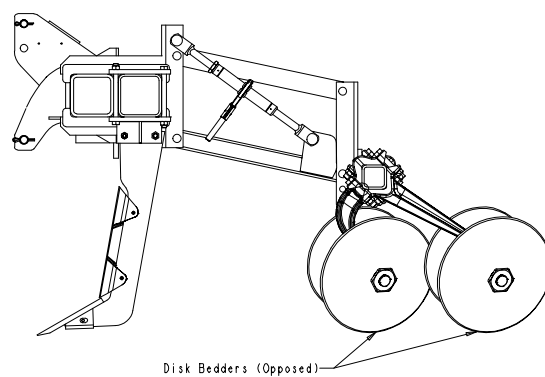


Figure 6. Disk Bedders

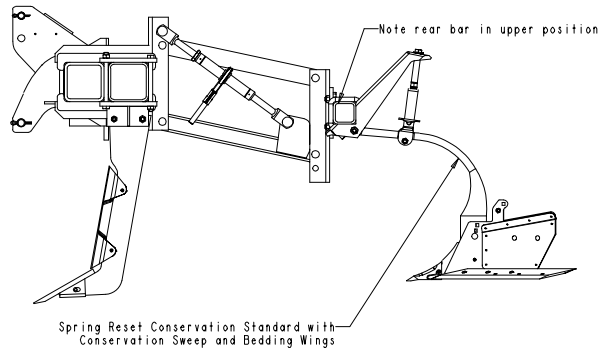


Figure 7. Conservation Standard