



BUCKEYE TRACTOR CO

Operation Manual

**Model 2121-D
BED SHAPER**

Version 3 • Serial No. 4401394 • Effective 4-13-07

Serial No: _____ Date Received: ___ / ___ / ___

Purchased From: _____

Order / Invoice No: _____



BUCKEYE TRACTOR CO

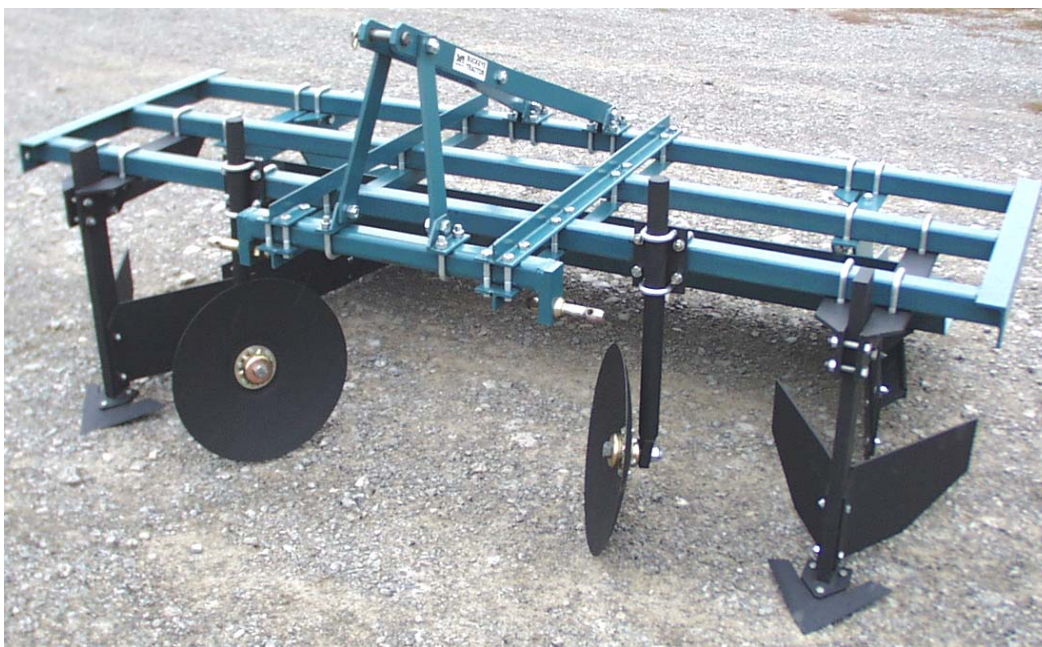
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GALLERY



APPLICATION

Buckeye Professional Series Models 1921-D, 2121-D and 4321-D are increasingly larger in size to use on increasingly larger tractors. 1921-D is rated at 35 HP to use on tractors up to 35 HP. 2121-D is rated at 45-HP to use on tractors from 30 to 45 HP. 4321-D is rated at 80 HP to use on tractors from 45 to 80 HP. Larger tractors may be used if that is what is available.

Using larger tractors is not a license to do more with bed shapers than what they are designed for. All models are under-rated to maximize customer satisfaction but common sense says to avoid using a tractor larger than 50 HP on 1921-D and avoid using a tractor larger than 65 HP on 2121-D and avoid using a tractor larger than 125 HP on 4321-D. Under no competent application should an over-size tractor ever be necessary to form beds each model is designed for. There is no excuse for exceeding any capacities. Do not buy lower-rated equipment only to save a dollar.

Models 1921-D and 2121-D include a Category-1 hitch, which is consistent with ASAE Category-1 standards for 20 to 45 HP tractors. 4321-D includes a Category-2 hitch, which is consistent with ASAE Category-2 standards for 45 to 125 HP tractors.

Bed shaper design and ratings are consistent with the maximum bed height they can form. Generally, at least 20 HP is needed for a 4" bed, at least 35 HP for a 6" bed, at least 50 HP for an 8" bed and at least 65 HP for a 10" bed. Bed width, as conventionally offered with these models, has only a minor effect on tractor power requirement.

Furrow shanks, furrow wings and shaping disks are standard equipment for one-pass bedding in loose seedbed soil. These shaping attachments effectively loosen wheel compaction, move soil from furrows and fill bed centers with minimal soil build-up in front of the pan, which levels and firms the bed without big tractor power. Soil type is less relevant since soil needs to be sufficiently dry and prepared to create easy-working soil for the bed shaper. This is conventional practice with *origins from growers* who farm in light easy-working soils.

Forming beds in hard soil may be possible but don't use a bigger tractor, as this can easily exceed the HP rating when trying to pull bed shapers in hard soil. However, there is no expectation by anyone for bed shapers to form beds in hard soil since beds like this would also likely be unfit to plant on. Bed shapers do not till the soil. They only shape it. Tillage and soil management is additional.

Soil with high organic content (muck soil) is the one soil type that is generally ill-suited for this bed shaper design, which features a sled-type shaper pan. Light pieces of dead plants and trees do not flow through it like regular soil does. Roller-type formers are often considered to form beds in muck soil.

Many specialty crop growers use fields with light soils for many reasons related to crops and equipment. Medium and heavier soils can be equally beneficial for specialty crops but moisture control and tillage practices may be more management-intensive, at least requiring patience and good timing. If bed shaping by conventional means in other soils is too demanding on time or energy, simply adapt bed shapers to reduce field work. Set-up bed shapers to form primary beds or equip with tillage attachments to finish primary beds. Primary beds can be formed in the fall to allow beds to over-winter.

APPLICATION

Conventional bed lay-out features one common furrow between bed tops, formed in consecutive rows. Adjust bed shaper for bed row spacing to match tractor wheel spacing. Soil behind the tractor wheels is turned into the beds. Bed row spacing is perfect by driving one side of the tractor in the half-furrow from previous bed.

One-pass bedding may result in sloped (but still flat and firmed) bed tops. The degree of effect depends on bed height. If sloped bed tops are not acceptable, bed tops can be formed level with each other with a plow-style driving pattern, forming every-other bed with a marker or using a narrower tractor to place all wheels on flat land. One-pass bedding sells but many operators discover two-pass bedding is more practical, the first to establish furrows and the second to finish beds with level tops. One-pass versus two-passes is about how good of a machinery operator you are.

Other less-common bed lay-outs include forming only the soil between the tractor wheels, leaving a drive space. Follow the previous wheel track for perfect spacing. This also leaves the appearance of two narrow furrows between bed tops, which has no real purpose. For wide-spaced beds, bed row spacing is independent from tractor wheel spacing, forming soil from the wheel track or not, possibly requiring row markers for bed spacing accuracy.

Bed width and bed height is exact, which is essential for later cultivation or application of plastic mulch. Coordinate bed size precisely with mulch width. Adjust for wide furrows for walking or narrow furrows for a guidance system. Beds and plastic mulch can be as wide as physically possible for maximum weed control. Bed top width and front opening width is independently adjustable. The angle is adjustable on the furrow shapers.

Some bed shapers are available with attached mulch layers to form beds and lay mulch at the same time. This assumes one-pass bedding and all that is involved for it since mulch immediately follows. Separate bed shapers and mulch layers tend to be more versatile and user-friendly for smaller growers and better adapt to primary bedding practices since the bed shaper needs to function without a mulch layer behind it. Add-on mulch layers can be added to bed shapers at a later time.

Maximum bed width for 1921-D is 48", for 2121-D and 4321-D is 56". Maximum bed height may be less with higher beds, which is inconsequential since higher beds naturally have relatively narrower bed tops for the same bed row spacing. Bed side angle is a nominal 60-degrees. Forms for 45-degree bed sides are available when dry soil won't hold a 60-degree shape. Growers have always tended to question 45-degree bed sides in favor of something straighter but always return after they see firsthand that it is physically impossible to compress dry soil to hold.

Bed tops can be as narrow as 24" with the provided adjustment holes but a bed can be too narrow for the machine weight. Add gauge wheels, if necessary, to avoid excess soil build-up in front of shaper pan.

APPLICATION

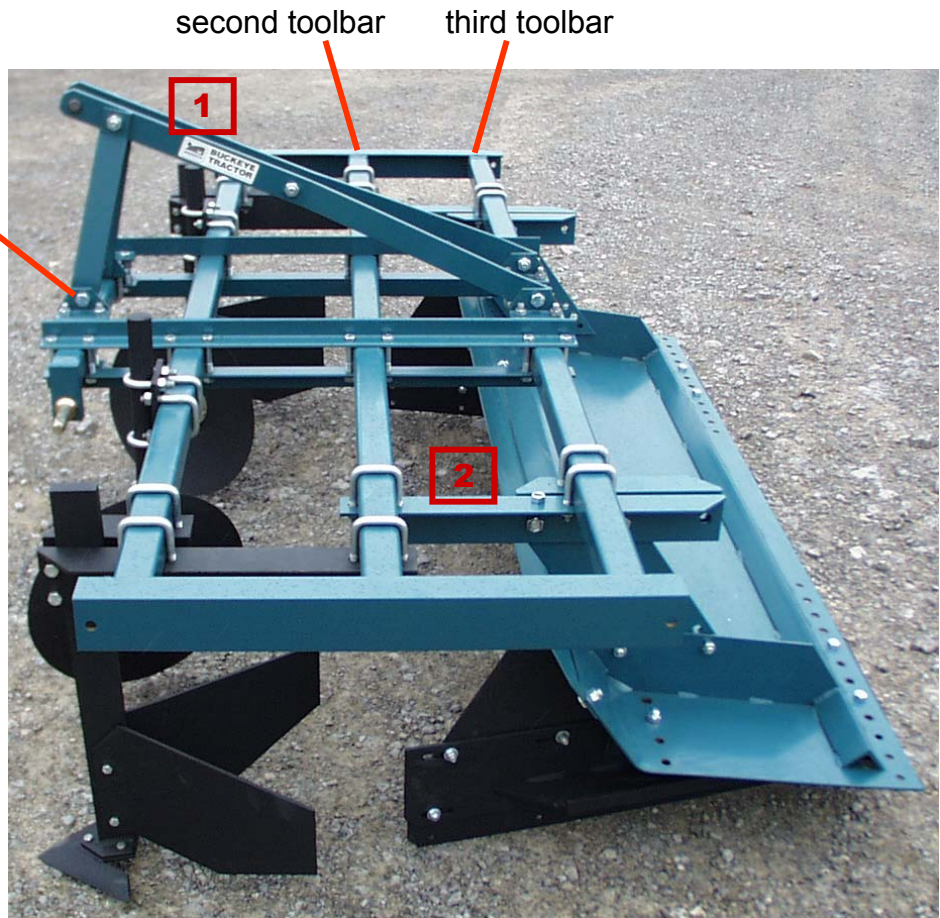
The shaper pan poly lining prevents wet soil from sticking under the shaper pan. The pan scours like on a moldboard plow but when soil is too wet, build-up tends to start at the front and work back. The poly lining can save a day or two but is not license to be in the field when too wet. Also, some soils simply do not flow as well to fill the bed when soil is too wet and one-pass bed shaping demands a lot of flow. If timing and moisture control is an issue, consider primary beds as previously discussed.

The crowned shaper pan is an option rarely chosen. Opinions vary on the benefit. Some growers intentionally want rainwater to roll off of beds covered with plastic mulch. The widest bed with a crown can prevent plastic mulch from buffeting in windy weather. There is no need to use a crown offset bed settling problems. Our competitors with plow-style designs can have settling problems, not Buckeye bedders.

SET-UP

1 Raise hitch mast. Parts are folded down on top of toolbar frame.

5/8 x 1-1/4 capscrews and 5/8 nuts (shipped on bed shaper)



2 Re-Install shaper pan assembly on 2nd and 3rd toolbars.

3 Re-install shaper pan to rear position. Front position is for shipping.

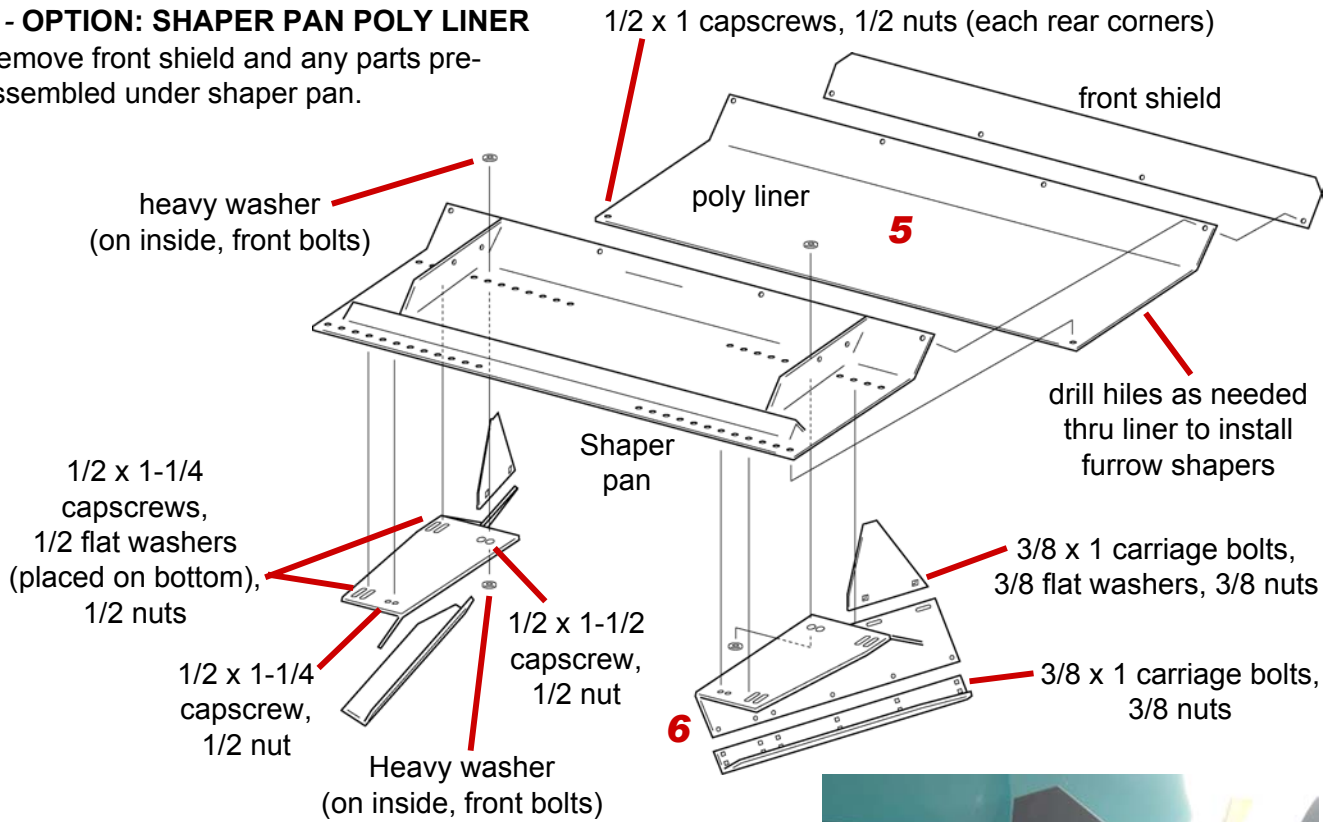


4 Crowned pan (optional). Pre-installed.

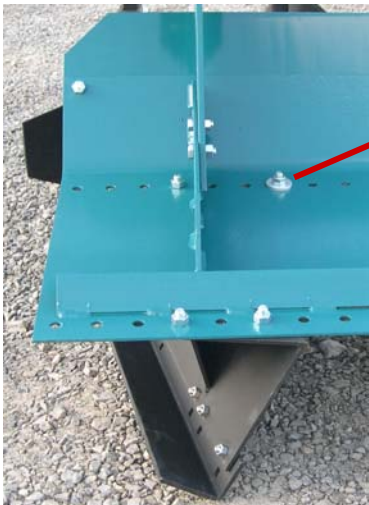
SET-UP

5 - OPTION: SHAPER PAN POLY LINER

Remove front shield and any parts pre-assembled under shaper pan.

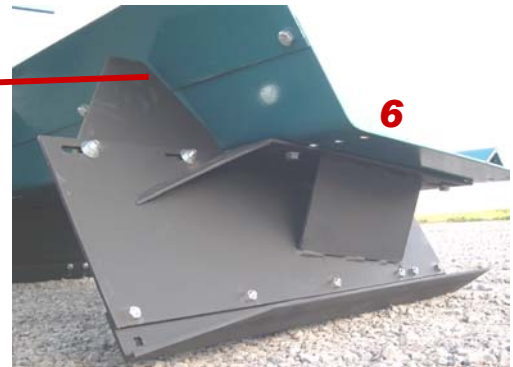
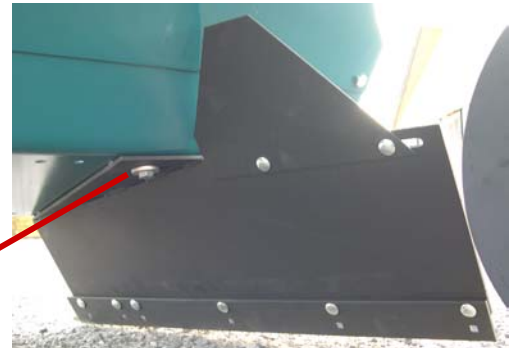


6 - Assemble furrow shapers. Parts for lower bed heights may be pre-installed. See ADJUSTMENTS to set-up for specific bed width.



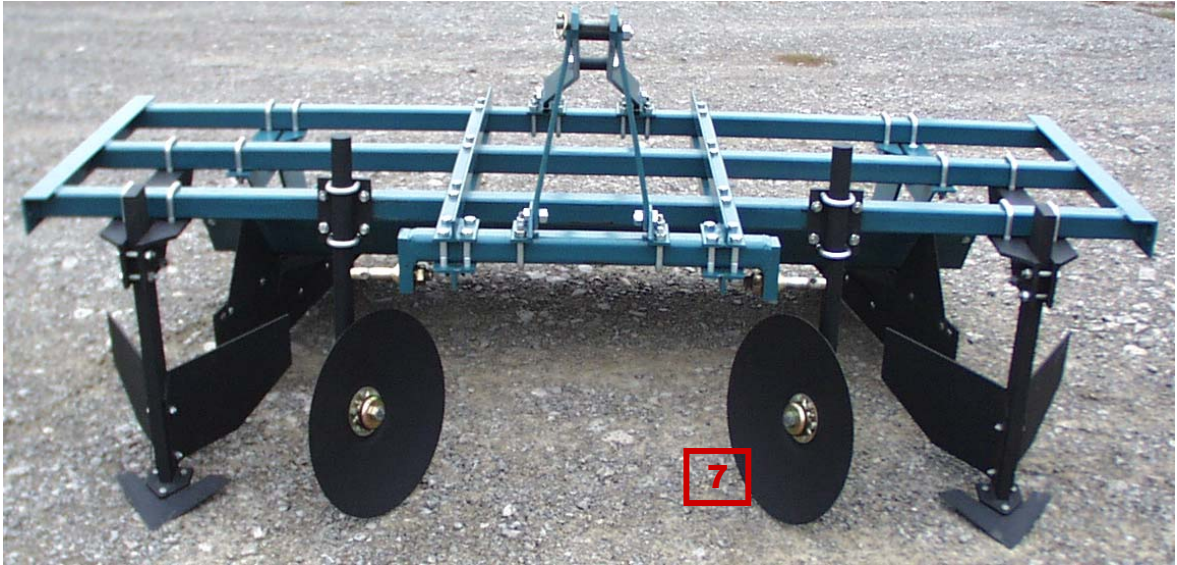
Heavy washers (on inside, front bolts, top and bottom)

Position side shield near or against shaper pan



SET-UP

7 - Re-Install shaping disks. Place on the front side of the first toolbar.



8 - OPTION: MANUAL-OPERATED ROW MARKERS

Markers may be fully assembled, partly assembled, in a box and/or partly installed on bed shaper.

1/2 x 3 capscrews,
1/2 nuts (shipped in bag)

tighten capscrew and lock
nut to secure each marker
arm segment



pin secures marker arm
in upright position

SET-UP

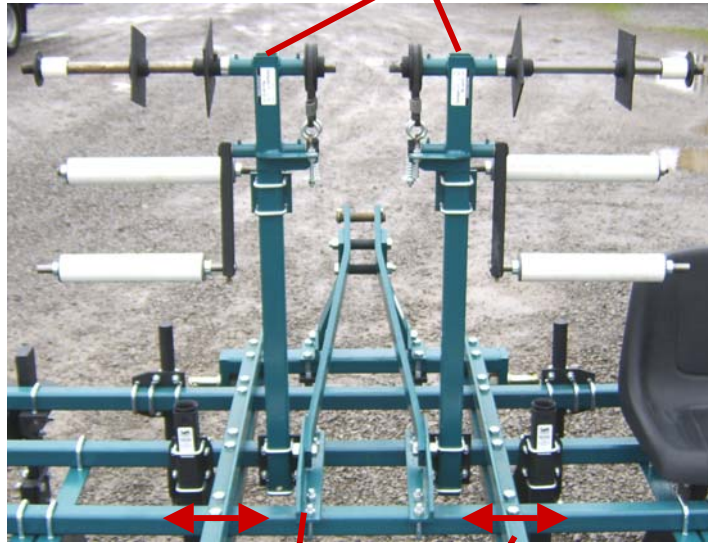
9 - OPTION: DRIP TAPE LAYERS

Typical installations shown. See TAPE LAYER MANUAL to set-up tape layer and install mounting hardware.

Right-hand tape layer installation with tape row in center



Right-hand and left-hand tape layer installation



hitch parts can be turned outward or inward

hitch parts can be moved laterally

Right-hand and left-hand tape layer installation with spool shafts pointing to the rear for close tape row spacing



SET-UP

10 - OPTIONAL EQUIPMENT - #13610 S-TINES AND #11557, #12804 SHOVELS

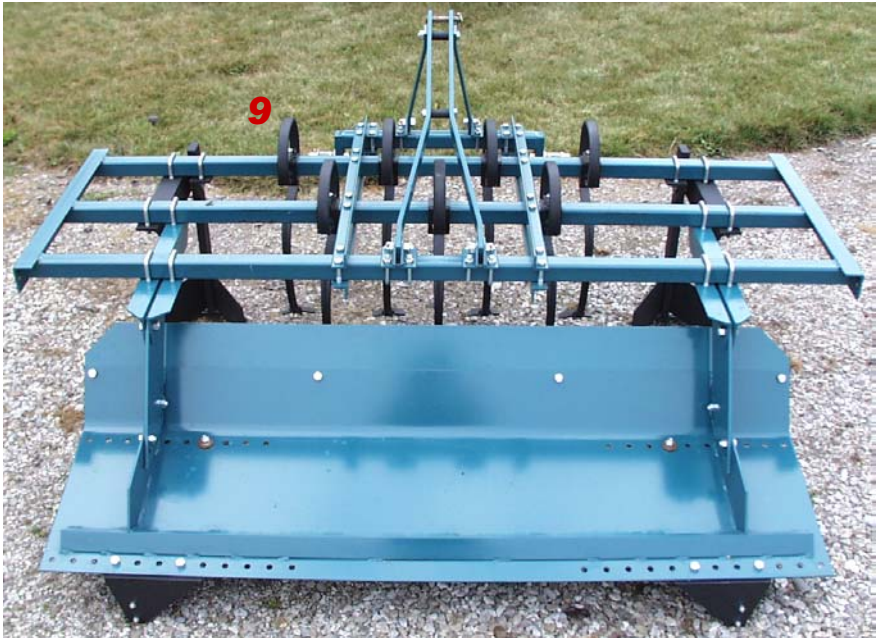
Remove disks, if equipped.

S-tine are typically staggered on the first and second toolbar. The center tine is conventionally placed on the 2nd bar, but this is not essential on a bed shaper since the shaper pan finished the bed. Also, an even number of tines can be used with no center tine.

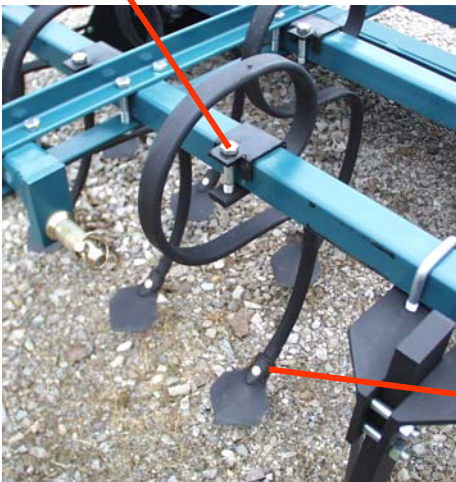
Tine spacing is typically 5" or 6", but can be any spacing that is effective as long soil does not bulldoze or clog. In reality, clogging is almost never a problem with bed shapers since this type of equipment, to date, is not designed for residue or heavy weeds.

The number of tines can vary, depending on bed top width. S-tines do not reach into the bed side well, but other types of attachments are available for this. Toolbar height is adjustable to adjust tine penetration. Adjusting the top link a little can change tillage depth but this can also affects soil flow in front of the pan. If adjusting the top link, re-adjust track loosener depth, if needed.

A typical installation of S-tines is shown below. The hitch bar are laterally adjustable for precise tine spacing.



1/2 x 3-1/4 capscrew and
1/2 nut - place 1/2 flat
washer under bolt head



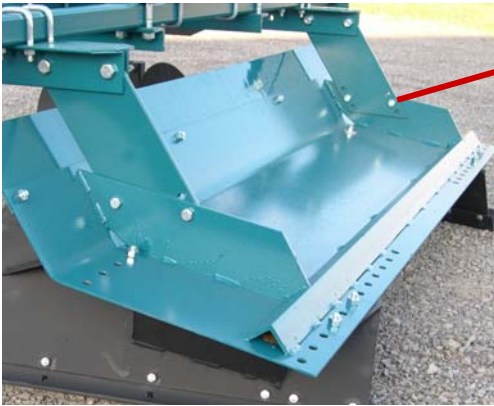
3/8 x 1-1/2 plowbolt, 3/8 flat washer, 3/8 nut

ADJUSTMENT

TOOLBAR HEIGHT

Toolbar height is not critical to function unless S-tines or possibly other tillage attachments are installed on the toolbar frame. This allows depth of these attachments to be adjusted in relation to shaper pan, which is the depth control. Adjusting the top link can provide minor depth adjustment. Toolbar should essentially be level during operation.

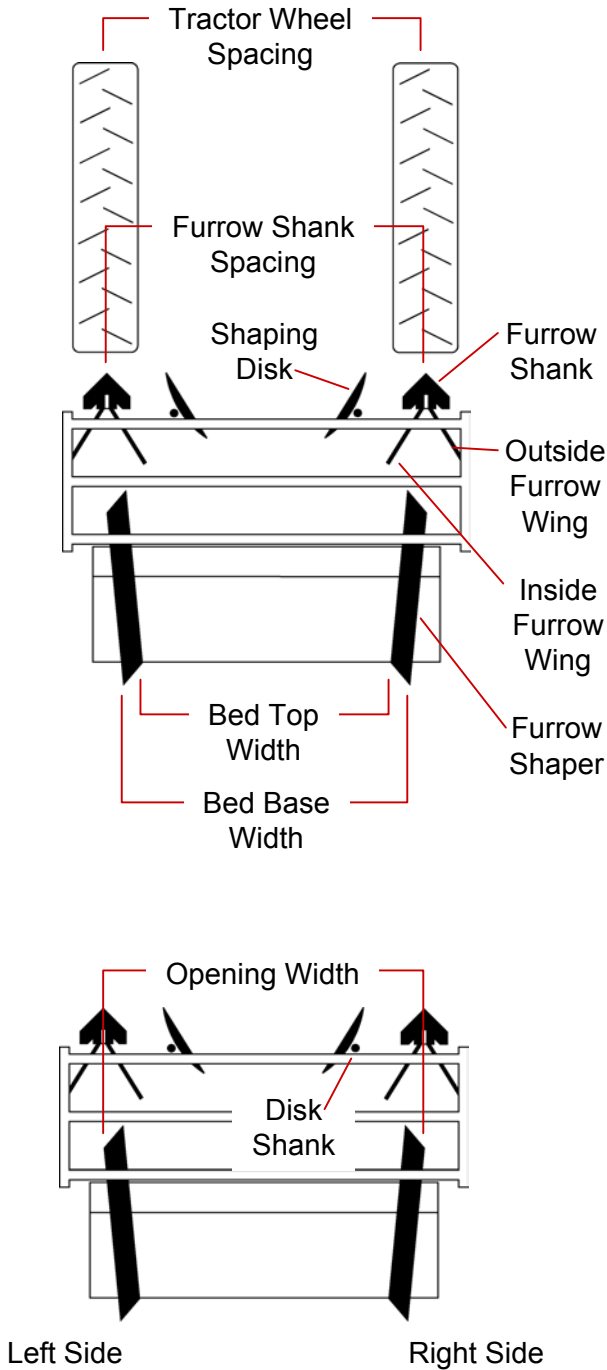
Toolbar height is relative to the bottom of the shaper pan and adjusted at the shaper pan. This is not necessarily an on-the-go adjustment, but should not need to be. On-the-go adjustment is possible for any or all components, which is priced accordingly.



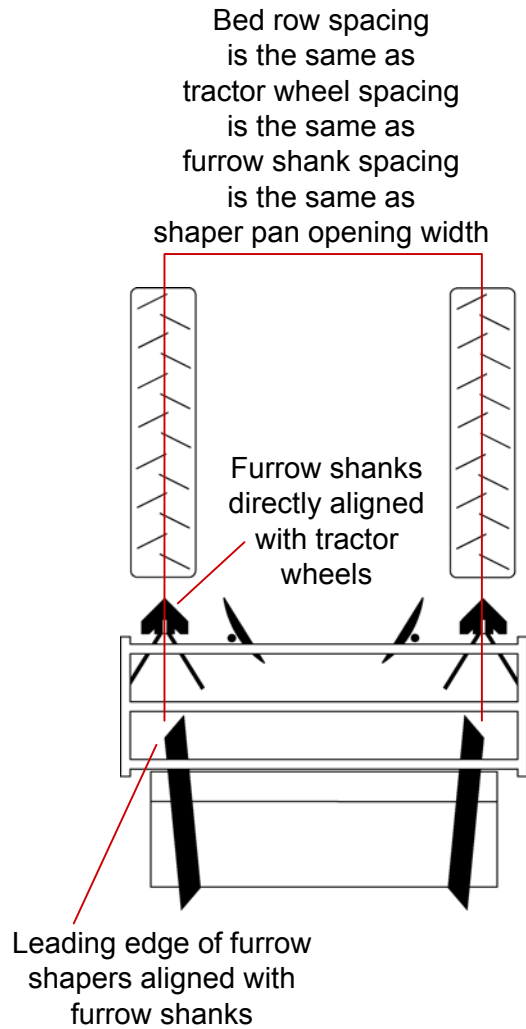
Adjust toolbar height here. Set at the MIDDLE HOLE for 16" toolbar height, which is considered standard. Additional holes are provided for 15-in and 17-in toolbar height, which is currently only useful for more or less tillage depth for S-tines. There is no benefit to adjust this when using shaping disks.

ADJUSTMENT

TRACTOR & BED ROW CONFIGURATIONS



Tractor & Bed Configuration #1
MOST COMMON & PRACTICAL
 This is for conventional beds with common-furrows. All soil in wheel track is turned into beds for a single furrow between bed tops. Tractors wheels drive in the furrow.

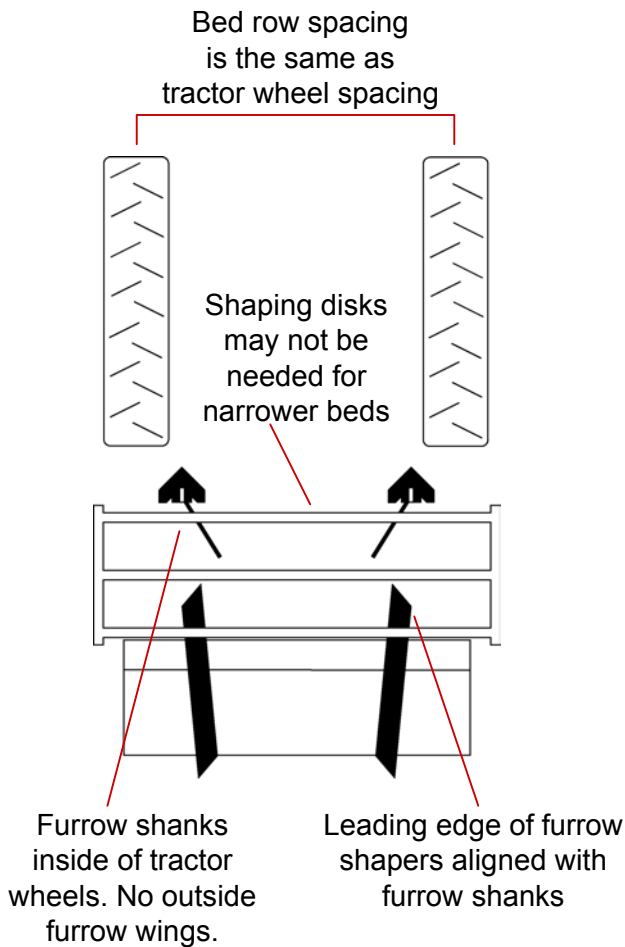


ADJUSTMENT

TRACTOR & BED ROW CONFIGURATIONS

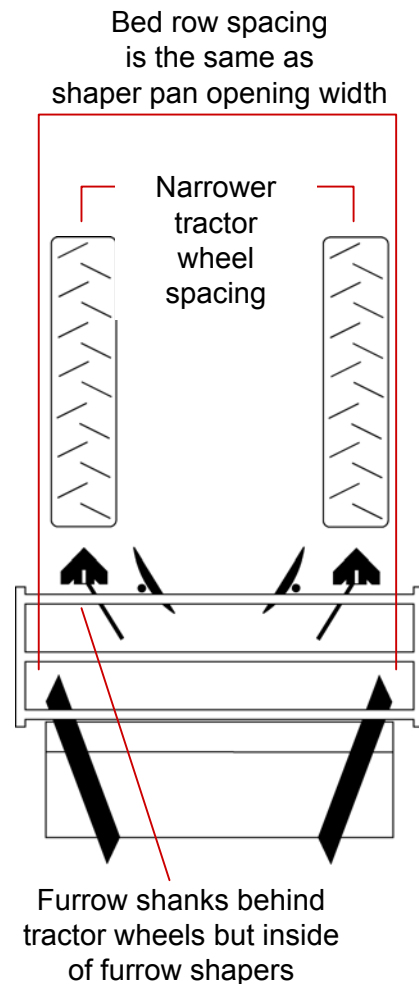
Tractor & Bed Configuration #2

Operators occasionally choose this, but for varied reasons that seem to prefer a narrow bed top. Bed furrows are inside of tractor wheels, leaving a drive space for tractor wheels. Soil in wheel track is not turned into beds.



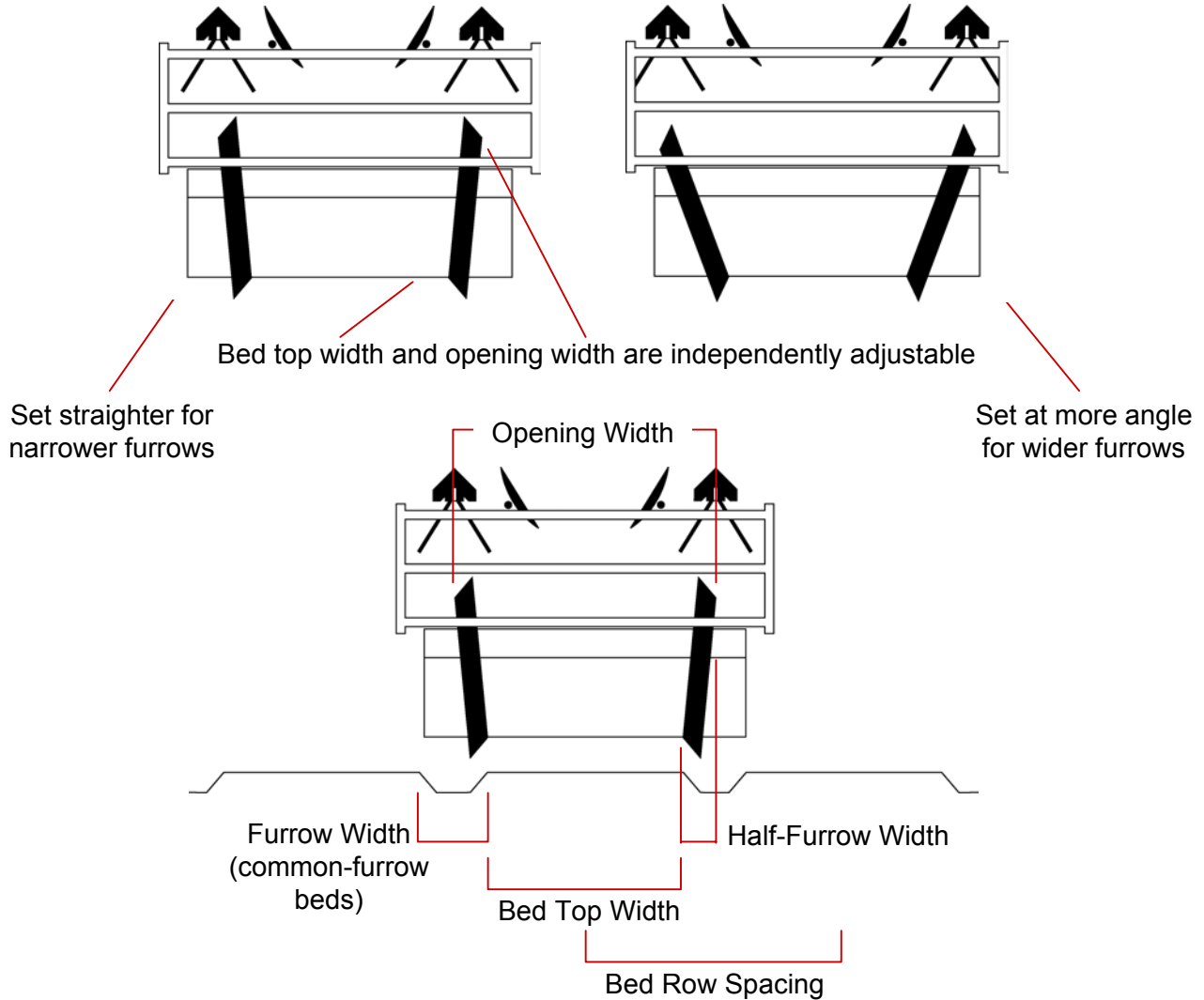
Tractor & Bed Configuration #3

This is a variation of Configuration #1. Tractor wheel spacing is narrower than shaper pan opening width for all tractor wheels to drive on flat land. This is often dismissed as too much hassle to adjust tractor wheels but illustrates one way to avoid peculiarities of one-pass bed shaping.



ADJUSTMENT

OPENING WIDTH -- BED TOP WIDTH -- FURROW WIDTH



Bed top width recommendations: This is actually beyond the purpose of this manual since the choices are endless. There are many pro and cons for narrower or wider furrows and narrower and wider bed tops. Connect with your agricultural community for direction, including Buckeye Service, if you don't already have an idea. This bed shaper meets most, if not all, expectations, which are usually reviewed at the time of sale. Frankly, if a desired bed size seems beyond the range of adjustment this model offers, it may be unusual or impractical to the point of warranting further analysis. Call Buckeye Service or participating dealer service any assistance.

ADJUSTMENT

OPENING WIDTH -- BED TOP WIDTH -- FURROW WIDTH

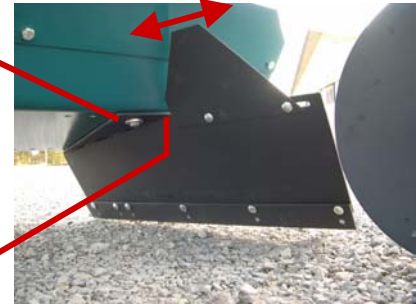
Two rows of adjustment holes

Be sure to install heavy washers on top and bottom



Be sure to install heavy washers on top and bottom

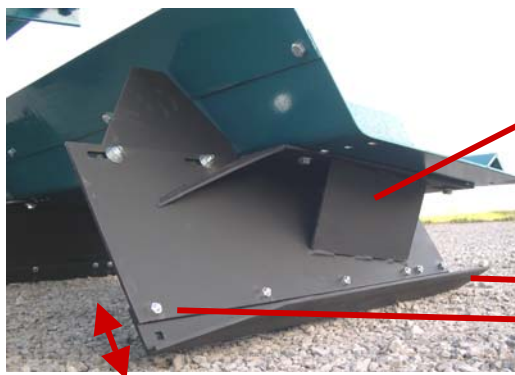
After setting furrow shaper angle, adjust side shields to minimize gap in front of pan



BED HEIGHT

A Bed Height Package is added to complete each Bed Shaper. Different Bed Height Packages allow the bed height to be changeable for a 3" to 6" range, however, each Bed Height Pkg is adjustable 1-inch. Fully adjustable furrow shapers have been designed, but these are complex and cost much more, so different furrow shapers for different bed heights are good, practical, and economical.

A Bed Height Package consists of (1) Left Furrow Shaper Bracket and (1) Right Furrow Shaper Bracket. Furrow shoes, side shields and fasteners are used with any Bed Height Pkg.



Left Furrow Shaper

Furrow Shoe

Adjust furrow shoe to change bed height by 1-inch. Install different furrow shapers for different bed heights

ADJUSTMENT

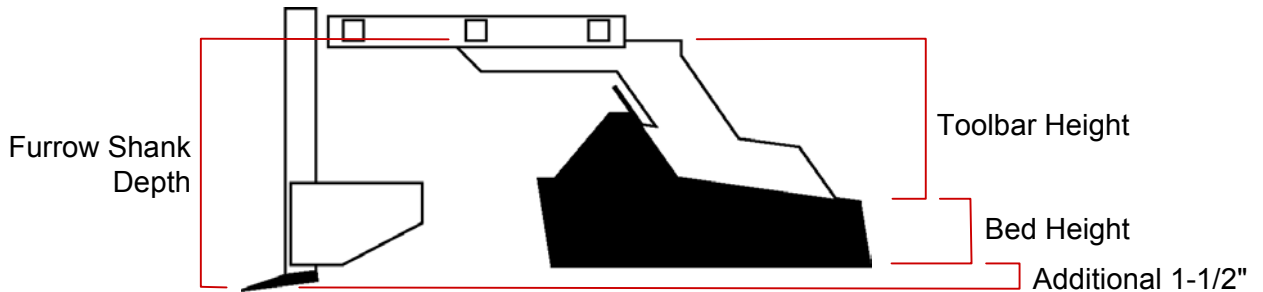
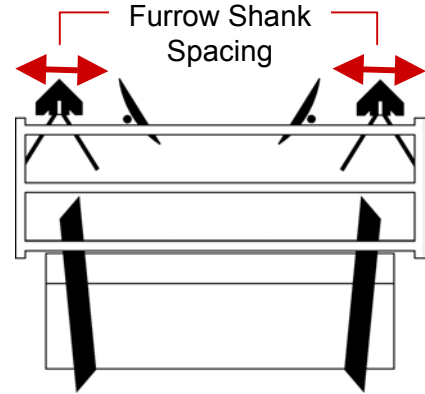
FURROW SHANKS

The toolbar frame allows a maximum furrow shank spacing of 74". This is intended to adjust for row tractors with 5-ft to 6-ft wheel spacing. Narrower wheel spacing is certainly possible if tractors matched with this bed shaper model are capable. Wider wheel spacing simply requires a wider frame and possibly two more shaping disks. A wider frame is optional since most specialty crop growers consider consecutive bed row spacing greater than 6-ft to be wasteful.

Each furrow shank assembly is independently adjustable. Set-up according to the desired tractor and bed-row configuration. Set-up must be symmetrical.

Furrow shank depth can be critical for effective bed shaper performance. **NEVER USE BED SHAPER WITHOUT FURROW SHANKS.** These are intended to loosen wheel compaction for furrow shapers to form loose soil. These may loosen soil below the tillage layer, within reason. Furrow shanks are not rippers and not an excuse to shape beds in poorly prepared soil.

Furrow shank depth must be set slightly below the furrow shapers to sufficiently loosen wheel compaction. Otherwise, furrow shapers may ride on hard soil. Furrow shanks are generally positioned in front of furrow shapers. If not, the need for a second set of furrow shanks is possible if compacted soil is a problem, but this is rare.



Furrow Shank Depth	Toolbar Height	Bed Height	Additional
21-1/2"	16"	4"	1-1/2"
22-1/2"	16"	5"	1-1/2"
23-1/2"	16"	6"	1-1/2"

ADJUSTMENT

SHAPING DISKS

Shaping disks fill the bed center. Good bed shaper performance largely depends on shaping disk adjustment. Frankly, since there are a few things to NOT DO, this leaves what TO DO to be fairly simple.

Don't set the disks too far apart and expect them to do all the work. The furrow wings actually tend to move twice as much soil as the shaping disks.

Don't set the shaping disks too close. Soil bulldozing between the blades is evidence of this. Grooves on each side of the bed top are possible.

Don't set the shaping disks too deep. This also can be from the attempt to have the shaping disks do all the work. Too much soil may be heaped in front of pan and sides of bed may not fill out.

DO set inside shaping disks between furrow shanks to lead the inside furrow wings to hill soil in front of shaper pan. The inside shaping disks fill the center. The furrow disks fill the cuts from the inside shaping disks. This bed shaping design is intended to minimize soil roll-over and keep seedbed soil on top.

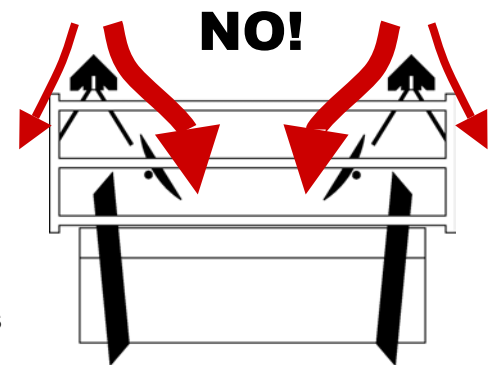
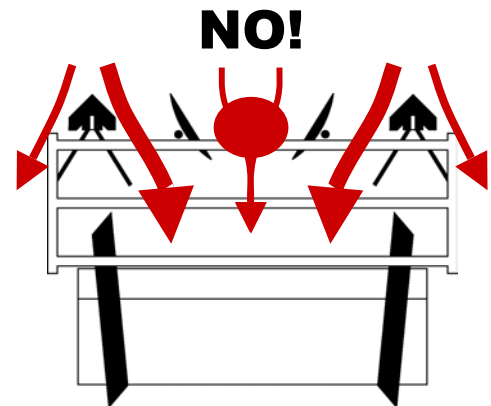
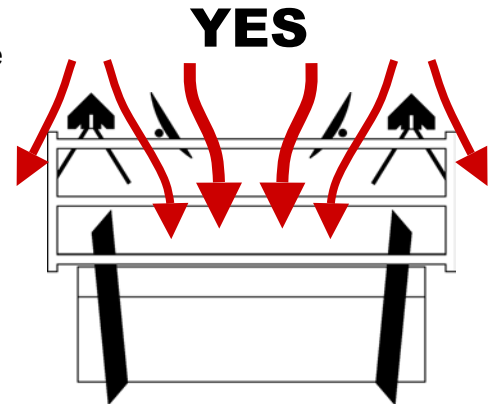
Even if disk depth is correct, these are not designed to cut into hard untilled soil. If soil is not tilled deep enough for the bed height, the furrow shanks may also be pulling hard or furrow shapers may also be riding on hard soil, causing an unfilled and unfirmed bed.

Frankly, it has been shown over and over that bent shanks and then blown bearings are because disks are set too deep or loose soil is not deep enough.

Are disks too light? No. Changing how disks are used changes the purpose of this bed shaper. Different shaper designs are available to work in hard ground, but such machines are usually not chosen for that purpose since hard soil does not make a good seedbed anyways.

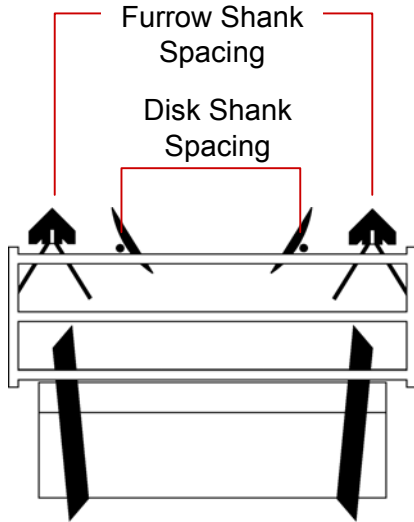
If circumstances are necessary and soil is workable, an option is available to equip this bed shaper with four furrow shanks to better work in untilled soil. But this is not an excuse to mismanage soil. Nearly all operators succeed with the bed shaper as it is.

Bed shaping requires moving a lot of soil so soil management is inherent. This bed shaper is easily adaptable to many management practices.



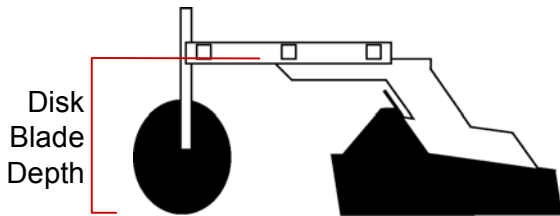
ADJUSTMENT

SHAPING DISKS



Furrow Shank Spacing	Disk Shank Spacing
60"	36"
62"	37"
64"	38"
66"	39"
68"	40"
70"	41"
72"	42"

Disk shank spacing is general in nature. The point is to proportionally space the disks with furrow shank spacing.



Disk Blade Depth	Bed Height
19 - 20"	4"
20 - 21"	5"
21 - 22"	6"

A range is given for disk blade depth. This is to illustrate that measurement does not have to be perfect. But NEVER adjust disks deeper than shown.

Operators tend to want to set disks deeper, thinking that more soil movement by the inside disks will solve a problem. As said in ADJUSTMENTS / FURROW SHANKS, the furrow wings and furrow disks typically move twice as much soil as the disks so more shaping with the two inside disks is folly, likely resulting in bent shanks and blown bearings, which is actually a good fail-safe from mis-using this machine.

Disk angle may be less (straighter) for faster tractor speed or more for slower tractor speed. Speed is usually not a factor to shape beds but avoid a very slow speed in first gear. Ground speed is typically 2 to 4 MPH. Some soils in some conditions may simply flow better at a faster tractor speed.

If there is any question about bed shaper adjustment, contact Buckeye Service or participating dealer service. Since bed shaping is cultural in nature, it is impossible to cover every point in a manual and expect it to be read. With a small learning curve and a little mechanical aptitude, this bed shaper is smart to meet your expectations.

If a problem seems unsolvable, call before adjusting other things that won't help or will make it worse and surely call before a bad attitude develops.

OPERATION

IMPLEMENT DRAFT & IMPLEMENT LIFT

Standards established by The American Society of Agricultural Engineers (ASAE) are intended to ensure that connecting points between tractor 3-point hitches and implement 3-point hitches are routinely compatible. However, ASAE standards do not necessarily standardize tractor hitch geometry for proper implement draft and lift. With the invention of the 3-point hitch system, Harry Ferguson established proper hitch geometry for implement draft, which generally also provides proper lift. Other design elements of hitch geometry can affect implement lift, which are largely at the discretion of the tractor manufacturers.

Poor hitch geometry affects implement draft and lift. Draft problems include implement side-sway or fish-tailing, inconsistent depth control between front and rear of implement or implement seeming to pull out of the ground or seemingly unwilling to penetrate the soil. Quick fixes like adding guide disks or more gauge wheels or adding weight may be considered when the true problem is poor tractor hitch geometry. Lift problems include limited lift height with heavier implements and long implements that won't raise on the back end. Quick fixes? Sorry.

Unfortunately, tractor manufacturers follow no hitch geometry standard except to not disappoint the customer, if anyone knows the difference. In retrospect, hitches on some brands of older tractors were nothing less than junk. Most newer tractors have been acceptable or worthy. Most problems originate on the tractor when the top link is anchored too high or the position of the lower arms, where pinned to the tractor, is too wide or too narrow.

Why not blame the implement? OK, but then it would be impossible to have any standards at all. However, implements are easier to modify if you don't mind using implements that can only be used the tractor with the bad hitch. Some implement manufacturers offer many top link pin holes, which is workable if it doesn't create more confusion. Adjusting the lower arm spread is also possible on many implements, but ease depends on design.

If there is any question on implement draft and lift, please contact Buckeye Service before making any modifications.

OPERATION

FURROW WINGS

Furrow wings and shaping disks hill soil in front of shaper pan. There is no adjustment provided for the furrow wings but none should be needed. If any adjustment of furrow wings is believed to be needed, first contact Buckeye Service.

Outside furrow wings move soil into the next bed row for the cleanest furrow shape after shaping the next bed row. One row bed shaping requires forming a half-furrow with the first bed then finishing the furrow with the next bed. Outside furrow wings also effectively widens the half-furrow to accurately drive the tractor for exact bed row spacing. Without outside furrow wings, tractor wheels tend to drive too close to the previous bed and bed row spacing can be a few inches less than the tractor wheel spacing. Then with good tractor driving, expect bed rows to be spaced perfectly. Your neighbors will think you are using 3-row equipment.

Outside furrow wings
move soil into the
next bed.

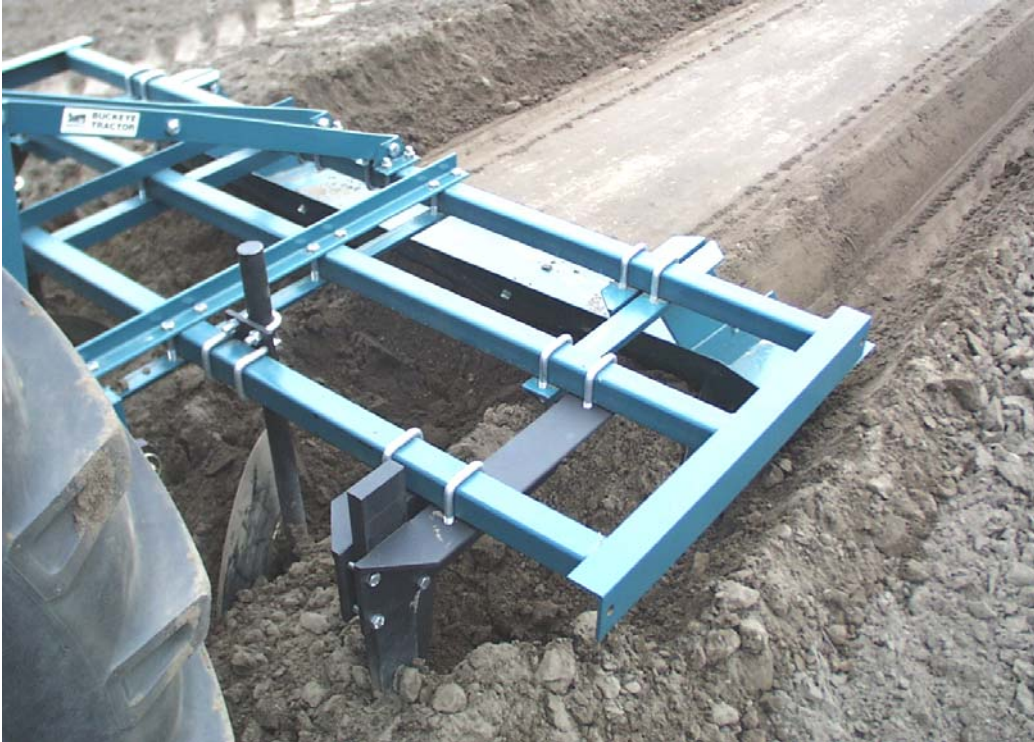


For expert one-pass bed shaping with narrow furrows, remove the outside furrow wing on ONE SIDE ONLY to avoid clipping the previous bed. This also requires shaping in a circular pattern instead of a consecutive pattern



With common-furrow beds,
tractor wheels drive in furrow

OPERATION



Expect perfect beds with one-pass bedding practices. But does this soil look better than yours? One-pass bedding originated in easy-working soils. If you want to do one-pass bedding the same way, your field needs to be worked to sandbox condition - *like theirs*. Is that too much field work or are you waiting too long in wet weather to get tillage work done. No problem. Multi-pass bed shaping practices simplify field work.



OPERATION



Photo is lightened to show typical soil build-up in front of pan