

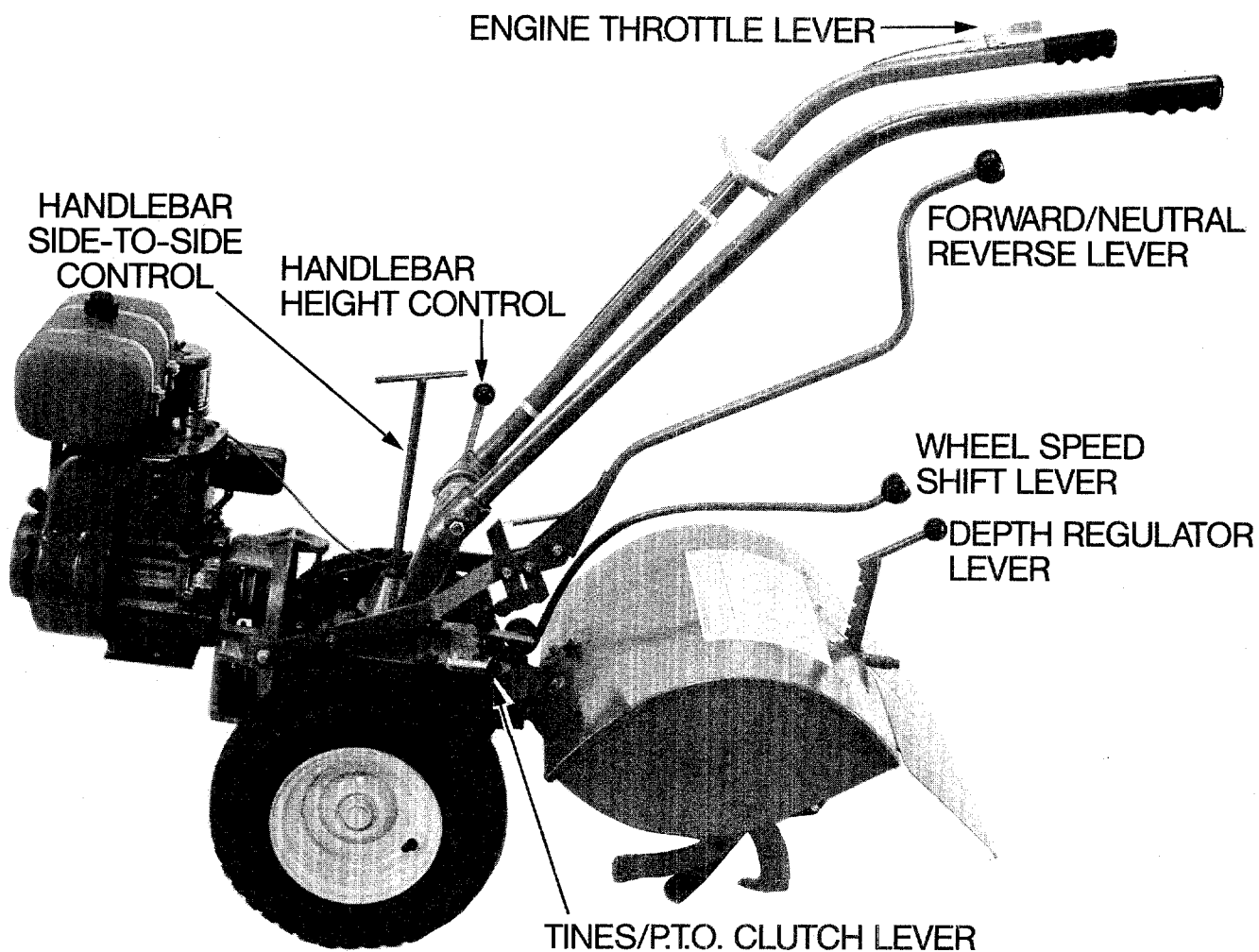
SECTION 3: TILLER CONTROLS

If you have never used a Horse Model Tiller before then you are in for a pleasant surprise. A combination of simple controls (see Photo 3/1), perfect machine balance, and power-driven wheels help to make your machine extremely easy to operate and handle.

In the following pages, you'll learn all about the controls that affect tiller operation. Practice

using these controls—WITH THE ENGINE OFF—until you become completely familiar with their location and function.

Most importantly, please take your time! These minutes spent now in familiarizing yourself with the proper operation of the tiller controls will greatly add to your understanding and full enjoyment of your new machine.



An Explanation of the Terms:

“Power Unit” and “Tine Attachment”

You will frequently see references in this manual to the terms “Power Unit” and “Tine Attachment.” The reason we use these terms is that the tiller end (the Tine Attachment) can actually be removed from the machine, leaving you with a self-contained power source (the Power Unit) that is capable of accommodating various powered and non-powered Troy-Bilt optional attachments (see Section 5 for information on attachments).

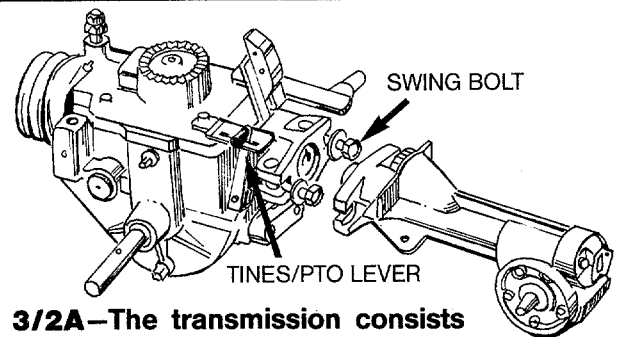
This ability to convert the tiller into a Power Unit is made possible by the unique design of the PTO HORSE Model transmission. As shown in the illustration on this page, the transmission is actually made up of two separate cast-iron housings that are held together by a locking collar, a dowel pin and two swing-bolts. Each housing has separate drive shafts that are joined by a tine clutch. This clutch can be engaged or disengaged by moving the Tines/PTO Clutch Lever that is located on the left side of the Power Unit transmission.

When the Tine Attachment is in place, the lever allows you to operate the tiller with the tines stopped (lever in Disengaged position), even when the wheels are in motion. This “tine disconnect” feature provides added safety and convenience when transporting the tiller, or when loading or unloading it into a trailer or pick-up. When the lever is in the Engaged position, the tine clutch connects the two drive shafts together, transmitting power to the tines for tilling.

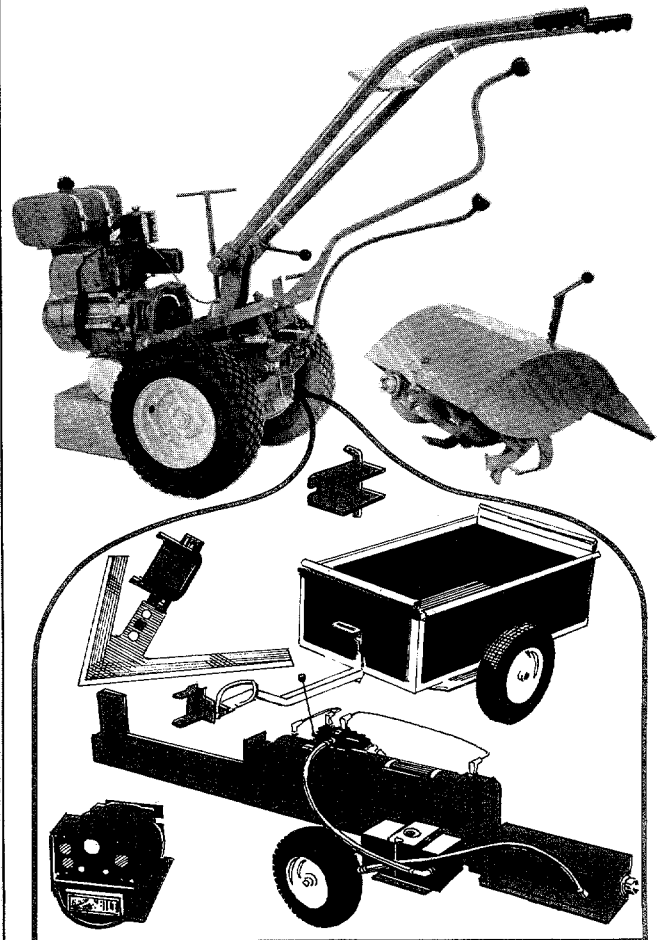
If the Tine Attachment is removed (by loosening the two-swing bolts and sliding the attachment off), the Power Unit can be used to tow moderate loads or drag-behind implements, or it can be used to operate PTO (Power Take-Off) driven attachments such as the Troy-Bilt Log Splitter or Electric Generator. Each PTO powered attachment has its own drive shaft that can be engaged or disengaged with the tine clutch on the Power Unit.

The following pages explain how to use the various controls on the Power Unit when the Tine Attachment is in place. There are also references for using the controls when other powered attachments are being used, but you should carefully read the Owner’s Manual supplied with each attachment before using them. For detailed instructions on how to convert your tiller into a Power Unit, see Pages 92 through 94.

IMPORTANT: Be sure to check the two swing-bolts for tightness after every 2½ hours of operation. See Pages 92-94 for instructions.



3/2A—The transmission consists of two housings, held together by swing-bolts. Separate “dog” clutches on each drive shaft are engaged and disengaged with the Tines/PTO Clutch Lever.



3/2B—The Tine Attachment can be removed . . . and pull-behind or powered attachments can be added to the Power Unit.

Forward/Neutral/Reverse Lever

This lever, located in the center of the operator's position, delivers engine power to the transmission. The wheels and tines (or any other powered attachment), will not be powered unless this lever is used.

Pushing the lever down engages power from the engine to the transmission by raising the engine and its mount upward, thus tightening the drive belt between the engine pulley and the transmission pulley. The transmission then rotates the wheels and the tines in the Forward direction. If the tines are removed and a stationary attachment is installed (such as a log splitter or a generator), the Forward position of the lever delivers power to the attachment. NOTE: Whether or not the wheels, tines, or other powered attachment will start moving also depends upon the positions of their separate controls, which are described further on in this Section.

Raising the lever from the Forward position puts the machine in Neutral, which stops all motion to the wheels, tines or other powered attachment.

IMPORTANT: Always place lever in NEUTRAL to stop wheels, tines or other powered attachment.

Shifting the lever up from the Neutral position causes the engine and its mount to move downward, creating slack in the forward drive belt. At the same time, the rubber reverse disc on the back of the engine pulley rubs against the transmission pulley below it, thus turning the transmission in the Reverse direction. As long as the lever is held up in the Reverse position, the wheels and tines, or any other powered attachment, will be powered in the Reverse direction.

Releasing the lever will automatically return the machine to Neutral, stopping all motion. The lever cannot be locked in Reverse, which is a safety feature for your protection.

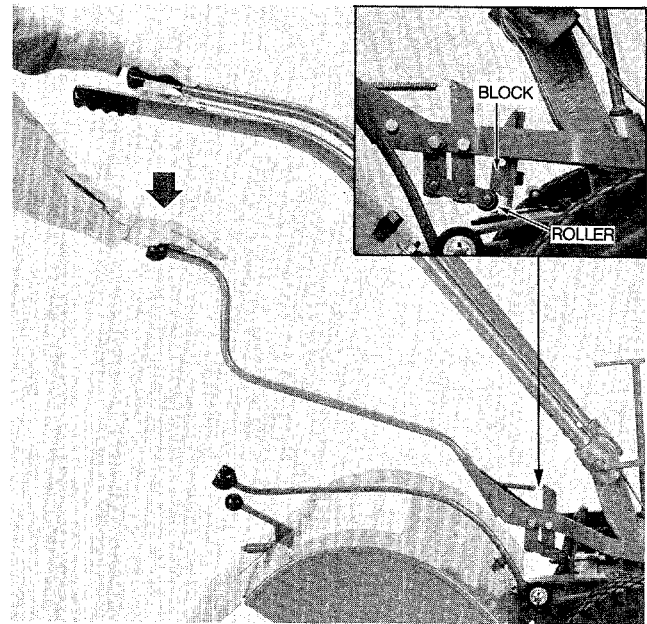
For safety, always place the lever in Neutral before starting the engine and before engaging the wheels, tines, or other powered attachments. Also, before shifting between Forward and Reverse, always return to Neutral and wait for all motion to stop. This neutral pause will avoid possible damage to the drive belt, reverse disc, or transmission.

TO OPERATE THE LEVER:

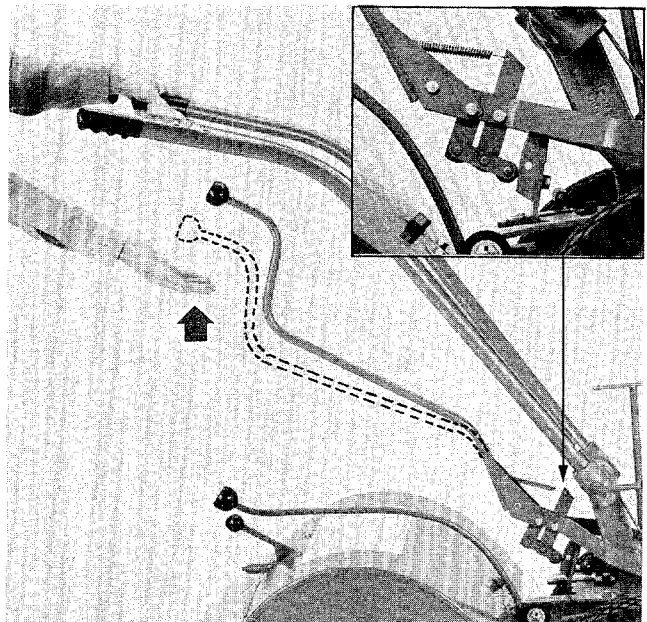
With the engine off, practice operating the lever as described next. As you do, note in the accompanying photos the various positions that the clutch roller takes on the belt adjustment block. Your roller should be similarly positioned when you shift your lever.

For Forward Wheel and Tine Motion (or to Apply Power to a Stationary Attachment): Push the lever all the way DOWN and LET GO—see Photo 3/3. The lever will stay in Forward until you return it to Neutral. To return to Neutral, tap or lift the lever UP and LET GO—see Photo 3/4.

NOTE: In Neutral, the clutch roller will rest anywhere on the face of the adjustment block, depending upon drive belt length and future adjustments for belt tension.



3/3—Push Forward/Neutral/Reverse Lever DOWN for Forward.



3/4—Tap or lift lever UP to stop Forward motion.

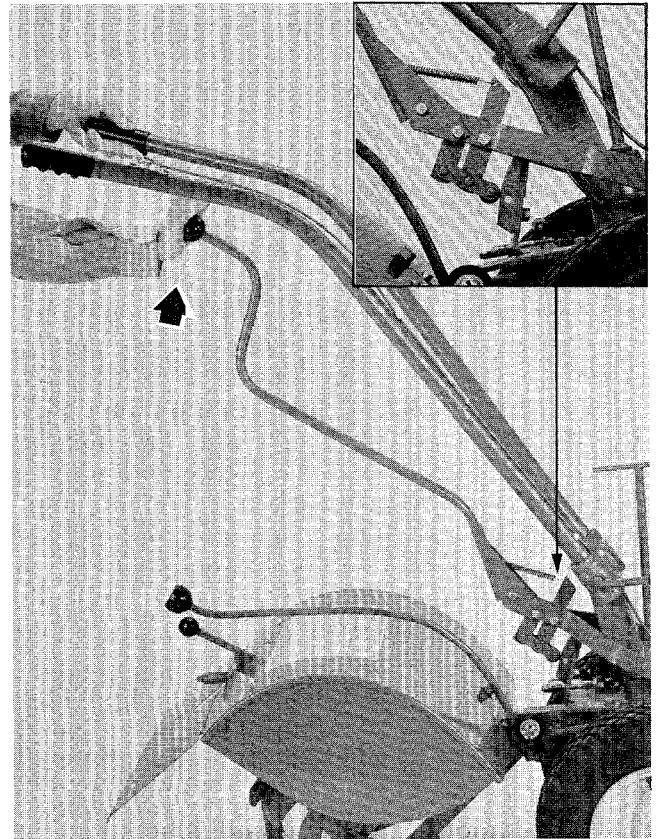
For Reverse Motion: Lift and hold the lever all the way UP—see Photo 3/5. The lever must be held in Reverse position for Reverse motion. To return to Neutral, simply LET GO of the lever—see Photo 3/6. (Note that the clutch roller doesn't move very far from Neutral to Reverse.)

Please remember that the primary function of Reverse is to provide you with extra maneuverability when you are in tight quarters, and for cleaning the bolo tines if they should get tangled with organic matter. You should never till in Reverse (always disengage the tines with the Tines/PTO Lever before reversing, and raise them out of the ground by lifting up on the handlebars). Also, to avoid premature wear to the reverse disc, try to avoid prolonged use of Reverse with any powered attachment.

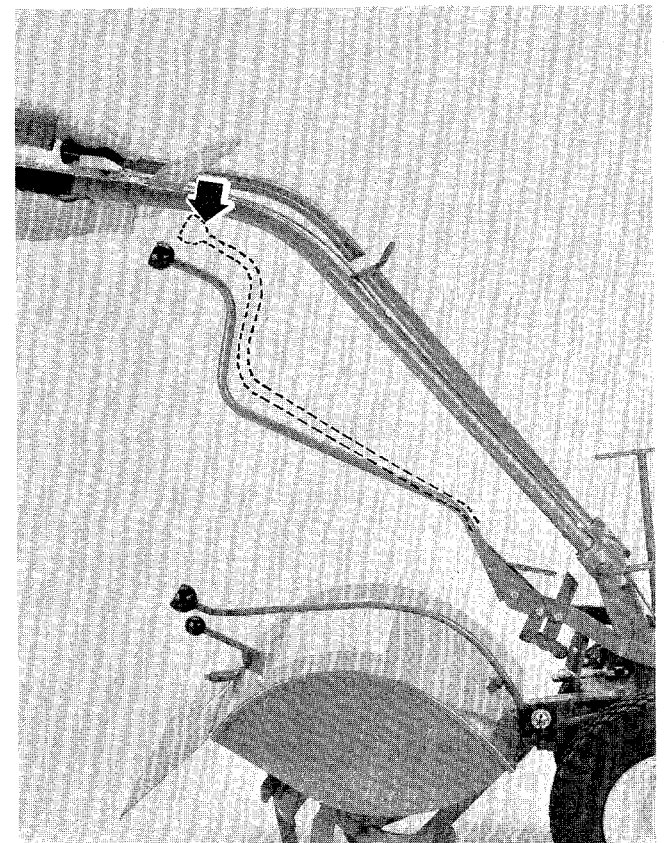
Until you are completely comfortable with handling the machine while it is travelling in Reverse, it's a good idea to use Reverse only at slower wheel and engine speeds. Many people never shift into Reverse while in high wheel speed. This is a good rule to follow.

SAFETY CAUTIONS

- Always place the lever in Neutral before starting the engine, and before engaging the wheels, tines or other powered attachments.
- Always make sure that the area immediately behind you is clear of any obstructions before moving in Reverse.
- Before using the lever with attachments other than the tines, carefully read the Owner's Manual provided with each attachment.
- The lever should automatically return to Neutral when you release it from Reverse. If it doesn't, then you should push it down into Neutral. Then refer to Section 6 for repair instructions.
- There should not be any Reverse motion if the lever is not held up in Reverse. If there is, the machine is badly out of adjustment and it should not be used until the condition is corrected. See Section 6 for repair instructions.



3/5—With tines off the ground lift and hold lever UP for Reverse.



3/6—Let go of lever to stop Reverse motion.

Wheel Speed Shift Lever

This lever, located to the right of the operator's position, lets you choose between two different engine powered wheel ground speeds: SLOW or FAST.

It also has a FREE WHEEL position, in which the wheels are free to turn without the engine running.

NOTE: By moving the Forward Drive Belt (discussed further on in this Section) into one of two different belt ranges, you can obtain a total of FOUR different Forward wheel speeds. However, there are only two wheel speeds for Reverse (Slow or Fast), because in Reverse the wheels are driven by the rubber Reverse Disc, not the Drive Belt.

When you shift the lever all the way down or up, it moves a sliding clutch inside the transmission to the left or right to engage a Slow Speed or a Fast Speed wheel drive gear. No power is provided to the wheels in either Forward or Reverse unless the clutch and one of these wheel speed gears is engaged.

Please note that the Slow Speed and Fast Speed wheel drive gears (inside the transmission) are always turning whenever the Forward/Neutral/Reverse Lever is placed in either Forward or Reverse. Therefore, always make your wheel speed selection BEFORE you shift out of Neutral. This will avoid damage to the gears or clutch that could occur if you try to engage the clutch with one of the turning gears.

Also, do not use the Wheel Speed Shift Lever to try and stop the wheels from turning. When the wheels are turning, the gear and clutch are locked together, and it is very difficult to move the lever out of gear. Instead, always place the Forward/Neutral/Reverse Lever in NEUTRAL to stop wheel motion.

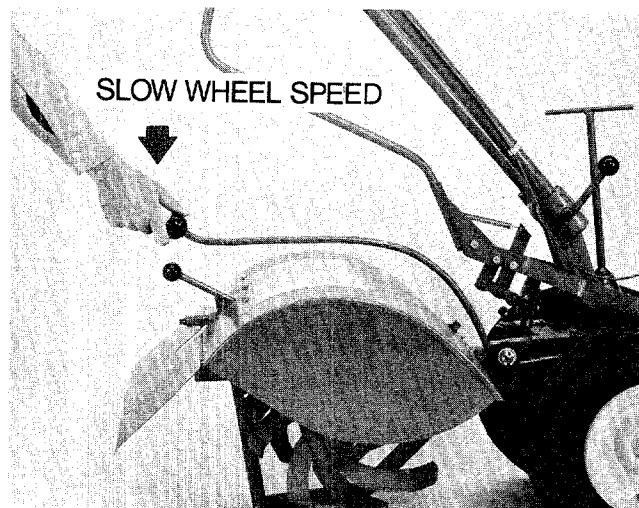
To Operate the Wheel Speed Shift Lever:

With the engine off, practice shifting the lever as described next. Note that whenever you shift the lever, you must roll the tiller a few inches (in either direction) to help align the clutch with the selected wheel gear. When the lever goes into gear, you will no longer be able to roll the tiller.

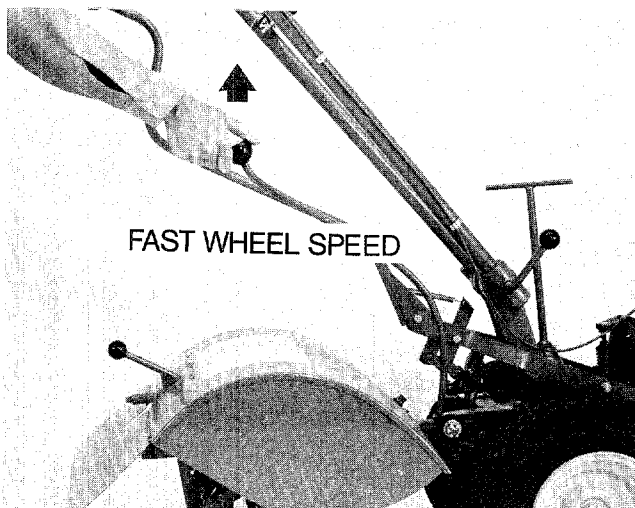
FOR SLOW WHEEL SPEED: With the Forward/Neutral/Reverse Lever in Neutral, roll the tiller a few inches while you push the Wheel Speed Shift Lever all the way DOWN (see Photo 3/7). If the lever is in gear, you will no longer be able to roll the tiller.

FOR FAST WHEEL SPEED: With the Forward/Neutral/Reverse Lever in Neutral, roll the tiller a few inches while you lift the lever all the way UP (see Photo 3/8). You will no longer be able to roll the tiller when the lever is in gear.

FOR FREE WHEELING: With the Forward/Neutral/Reverse Lever in Neutral, simply place the lever in-between the Slow and Fast wheel speed positions (see Photo 3/9). In the Free Wheel position the wheel gears are not engaged with the clutch and the wheels will turn freely when you roll the tiller.



3/7—Push Wheel Speed Shift Lever DOWN for Slow Wheel Speed.



3/8—Lift lever UP for Fast Wheel Speed.

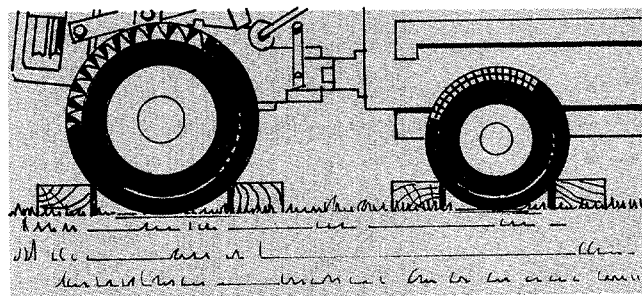
Note that there should not be any “clicking” noise when you’re completely out of gear. If there is, just shift the lever a little more to eliminate the noise—and the rubbing of the clutch and gear that causes it.

The Free Wheel position allows you to roll the tiller about without the engine running; a handy feature when you are “parking” your machine, or when you want to move it more quickly than is possible when the wheels are being driven by the engine.

You would also use Free Wheel when using the engine on the Power Unit to drive a Stationary Attachment, in which case you would not want the wheels on the Power Unit or Attachment to move. For safety, always place blocks around the wheels of the Power Unit and the Stationary Attachment to prevent the equipment from rolling away (see Sketch 3/10).



3/9—Place lever in middle for Free Wheel.



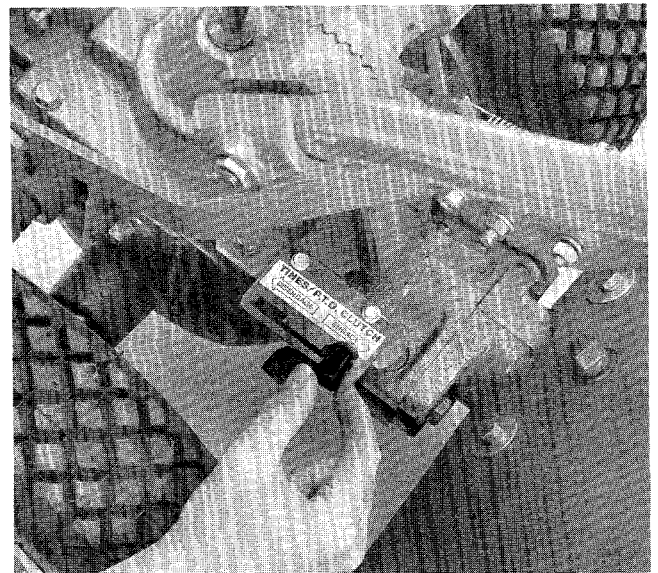
3/10—If using Free Wheel with Stationary Attachment, place blocks around all wheels to prevent equipment from rolling away.

● **CAUTION: DO NOT** engage REVOLVING TINES in the ground when the Wheel Speed Shift Lever is in FREE WHEEL. In Free Wheel, the wheels will not help to hold the tiller back, and the revolving tines could propel the tiller rapidly away from you—possibly causing loss of control. When using the tiller attachment, always make sure that the lever is engaged in either Slow Wheel Speed or Fast Wheel Speed before starting the engine or shifting into Forward or Reverse.

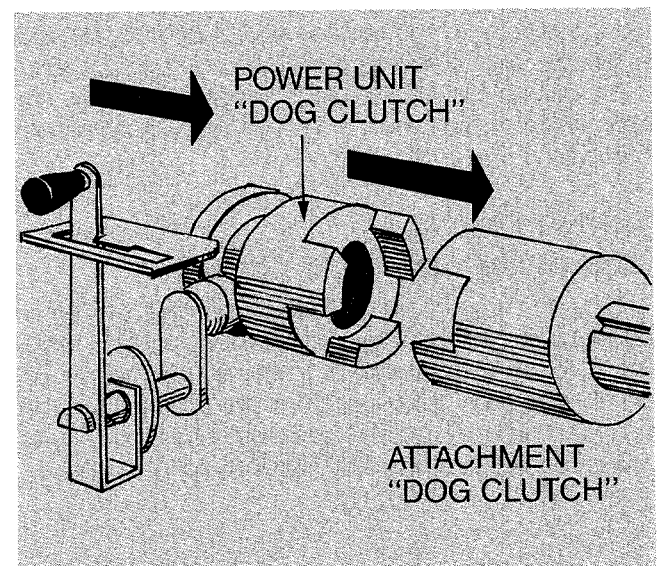
Tines/PTO Clutch Lever

This lever is located on the left side of the machine, as shown in Photo 3/11. Power driven attachments such as the tines, the log splitter and the generator are engaged with this lever.

If the lever is moved backward to the Engaged position (Photo 3/11), the Tines/PTO “dog” clutch inside the Power Unit transmission also moves backward until it engages the “dog” clutch of the attachment—see Sketch 3/12. With the clutches engaged, power will be applied to the attachment whenever the Forward/Neutral/Reverse Lever is shifted into either Forward or Reverse.

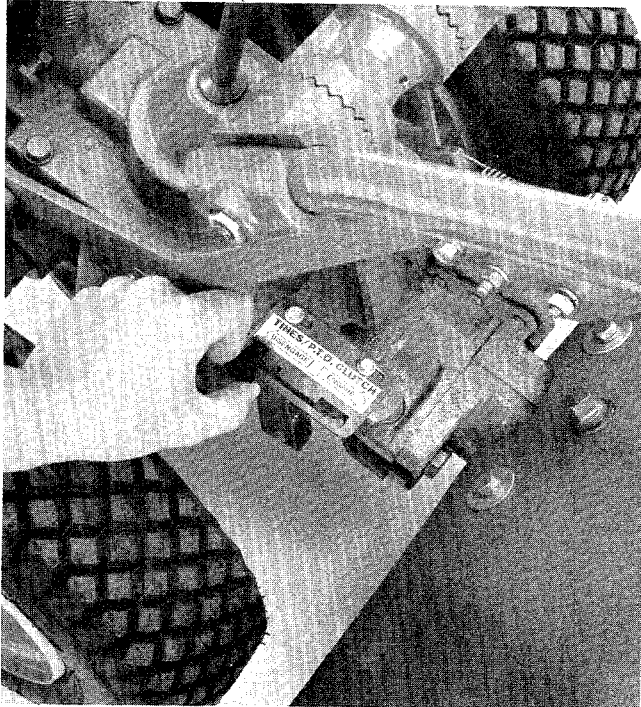


3/11—Tines/PTO Clutch Lever in Engaged position.



3/12—Drive shaft “dog” clutches are engaged and disengaged with Tines/PTO Clutch Lever.

If the lever is moved forward to the Disengaged position (Photo 3/13), the “dog” clutch also moves forward until it disengages the “dog” clutch on the attachment. With the clutches disengaged, power will not be applied to the attachment when the Forward/Neutral/Reverse lever is activated.



3/13—Tines/PTO Clutch Lever in Disengaged position.

IMPORTANT: Always place the Forward/Neutral/Reverse Lever in Neutral before engaging or disengaging any attachment. Doing so will prevent transmission damage that could occur if you try to engage or disengage the clutches while they are turning.

When using the tine attachment, the Disengaged position allows you to stop the tines from turning while the separately controlled tiller wheels continue to rotate—an important safety feature when moving the tiller to and from the garden, when loading or unloading it from a trailer or truck, when backing it up, or when turning it around. You should also disengage the PTO lever before transporting any attachment that, for safety reasons, should not be powered while it is being moved.

When the tines are removed and an attachment is installed that operates from a stationary position (such as a log splitter or a generator), the engaged position of the lever allows you to power the attachment while the wheels on the Power Unit are not moving.

To Operate the Lever:

With the engine off, practice moving the lever into the Engaged and Disengaged positions, as described next.

To Engage Tines or Other PTO Driven Attachments:

1. Place Forward/Neutral/Reverse Lever in Neutral.
2. Pull PTO Lever out and slide it into the Engaged slot—see Photo 3/11.

IMPORTANT: After selecting the Engaged position, do not immediately shift the Forward/Neutral/Reverse Lever into Reverse. Always use Forward first (for at least a few moments) to help align the drive shaft couplings inside the transmissions.

To Disengage Tines or Other PTO Driven Attachments:

1. Place Forward/Neutral/Reverse Lever in Neutral.
2. Pull PTO Lever out and slide it into the Disengaged slot—see Photo 3/13.

NOTE: The lever should move back and forth easily. If it doesn't, then the “dog” clutch inside the Power Unit transmission may need to be lubricated. See Section 6 for lubrication instructions.

SAFETY CAUTIONS

- Do not attempt to stop tines or attachments by Disengaging the Tines/PTO Lever. Always place the Forward/Neutral/Reverse Lever in Neutral to stop attachments.
- Disengage tines before transporting, loading or unloading, reversing, or turning tiller around.
- Carefully read the Owner's Manual provided with any powered attachment before attempting to use attachment.

Tiller Depth Regulator Lever

This lever, located at the rear of the tiller hood cover, controls the depth to which the tines penetrate the soil.

It also has a “travel” setting, which places the tines completely above the ground.

When you pull back on the lever, notches in the adjustment bar clear a pin and allow it to be moved up or down into any of eight positions, from the travel setting to full tilling depth of 8” or more—see Sketch 3/14.

IMPORTANT: When starting the engine, the Depth Regulator Lever should be placed in the Travel position so that the tines are clear of the ground—for safety.

One of the secrets of successful tilling is in using the Depth Regulator Lever properly. It’s usually impossible to get 4” or 5” deep on the first pass through untilled soil. So, start with a shallow cut and gradually increase the tilling depth by raising the lever to the remaining notches. If the tiller bounces or jumps in hard spots, then use a shallower setting until the soil is more thoroughly broken up. You’ll find more detailed information about using the Depth Regulator Lever in Section 5.

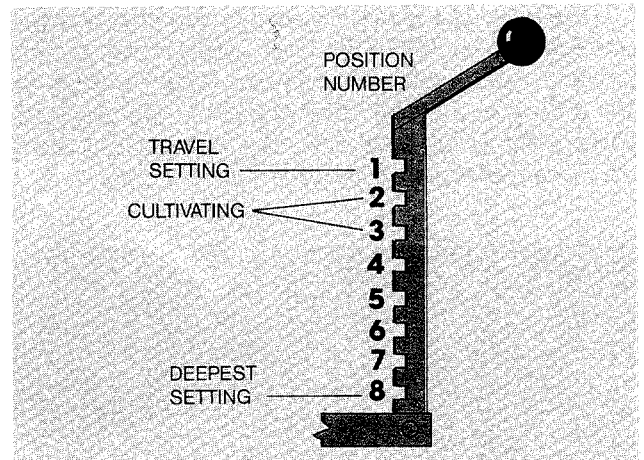
To Operate the Depth Regulator Lever:

With the engine off, practice moving the lever into the various positions described next. When actually tilling, you can adjust the lever even while the tiller is moving.

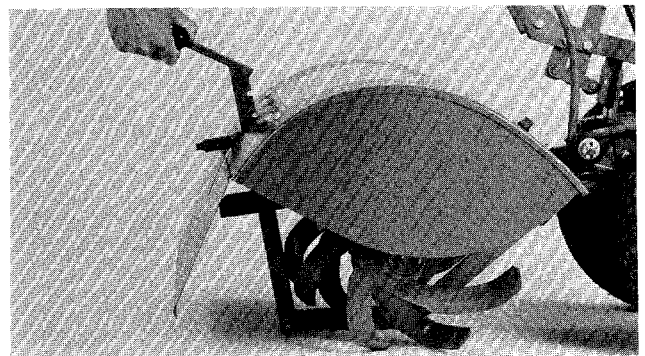
FOR SHALLOW TILLING: Pull the lever back and then push it down until it engages the second or third notch from the top—see Photo 3/15.

FOR DEEPER TILLING: Pull the lever back and then up to any of the deeper settings (notches four through eight)—see Photo 3/16.

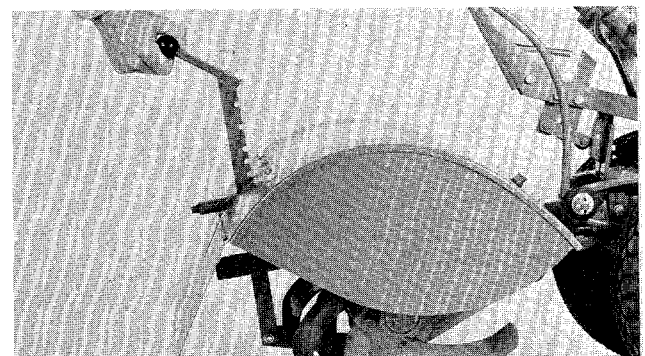
FOR TRAVEL SETTING: Pull the lever back and then push it all the way down until it engages the top notch—see Photo 3/17. This position is ideal when you are driving the tiller over lawns or driveways and you don’t want the tines—which should be Disengaged—to scrape the ground.



3/14—Notches in bar control tilling depths.



3/15—Lower lever for shallow tilling and cultivating.



3/16—Raise lever for deeper tilling depths.



3/17—Use travel setting to clear tines of ground.

Instant Handlebar Adjustments

The Handlebars can be adjusted Up, Down, and Sideways, without tools.

As a general rule, the handlebars should be at approximately waist level when the tines are 3" to 4" in the soil. However, you should, of course, adjust the height to whatever position you are most comfortable with.

As shown in Photo 3/18, height adjustments are easily accomplished by using the Height Adjustment Stud.

For special situations, your handlebars can also be adjusted to the left or right side of the tiller by using the T-Bar Adjustment—see Photo 3/19.

Positioning the handlebars off to one side usually isn't necessary because you can normally walk on either side of the tiller and control its movement with just one hand. However, if you are working up close to fences, fruit trees, or thorny bushes, and two hands are needed to control the tiller, then moving the handlebars to one side could be beneficial to you.

TO ADJUST THE HANDLEBARS UP OR DOWN: Simply wind out the Adjustment Stud enough so that the teeth in the Ratchets are disengaged. Then, move the handlebars up or down as needed—see Photo 3/18.

TO ADJUST THE HANDLEBARS FROM SIDE TO SIDE: Loosen the T-Bar Adjustment until the Handlebar Base can rotate from side to side—see Photo 3/19. Be careful not to overstretch the throttle cable when going to the left side of the tiller.

● **CAUTION:** Never operate your tiller on the side of a hill or slope if the handlebars are swung out to one side.

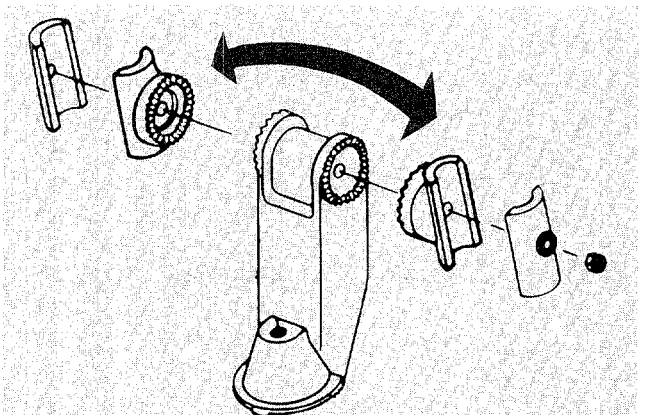
● **CAUTION:** Do not lower the handlebars so low as to interfere with the proper operation of the Forward/Neutral/Reverse Lever.



3/18—Loosen adjustment stud to raise handlebars up or down.



3/19—Loosen T-Bar to move handlebars from side to side.



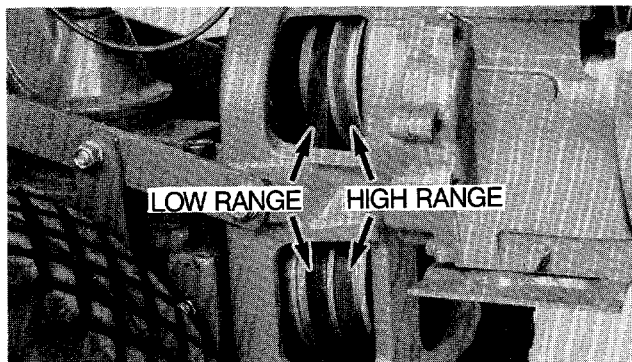
3/20—If you have difficulty finding that “just right” height position, in-between positions can be obtained by switching the inside ratchets, as shown above. This will change the handlebar height a few inches higher or lower than normal.

Low and High Range Belt Selections

You can obtain a total of four different forward wheel speeds, and two different tine speeds, by simply moving the Forward Drive Belt on your engine into one of two different belt grooves in the Engine and Transmission Pulleys.

These extra wheel and tine speed selections permit you to tailor your tiller's action to your specific needs in the garden, with less strain on the engine. In Section 5, we'll discuss which speeds to use for different applications. For now, though, let's concentrate on how you obtain the different speeds.

As shown in Photo 3/21, the Engine and Transmission Pulleys each have a Low Range groove and a High Range groove. You get the different speeds by placing the Drive Belt in either the Low Range or High Range grooves, and then shifting the Wheel Speed Shift Lever into either the Slow or Fast wheel speed positions.



3/21—Belt range positions.

Shifting into Fast or Slow with the belt in the Low Range position gives you two wheel speeds (.5 and 1.2 MPH). By moving the belt into the High Range position and then shifting gears you obtain two more wheel speeds (.7 and 1.72 MPH). Sketch 3/22 shows the belt and lever positions that result in the four different forward wheel speeds.

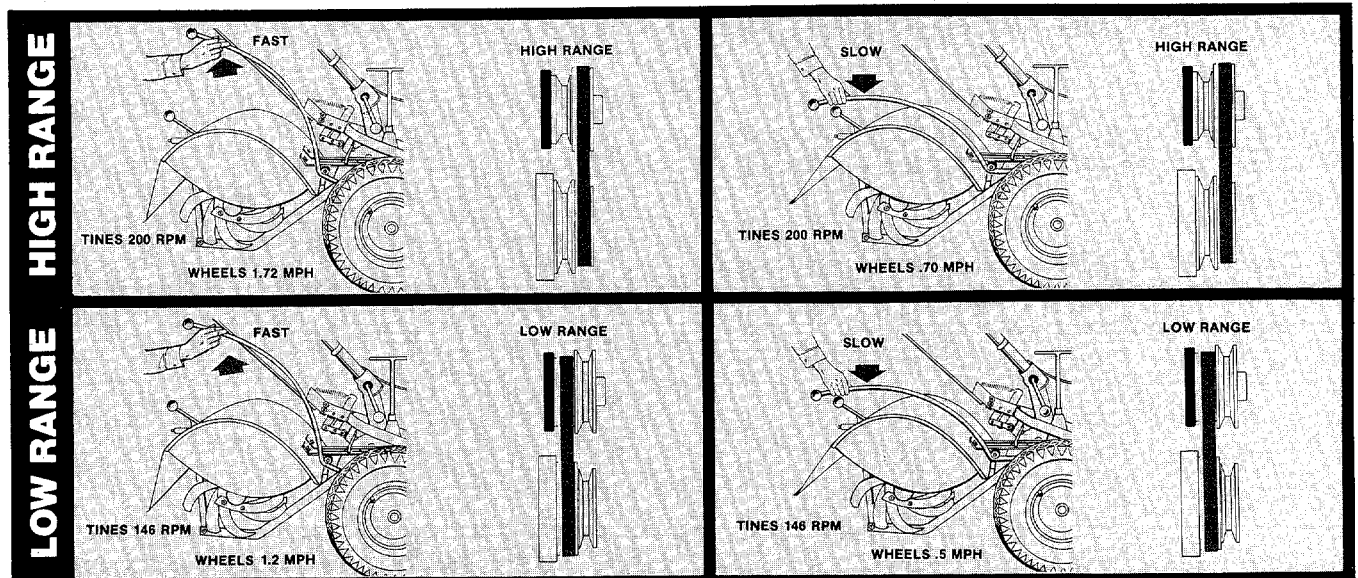
Engine speed and the position you select for the belt (Low or High Range) combine to determine the tine speed.

Putting the belt in Low Range results in a tine speed of 146 RPM (Revolutions Per Minute). In High Range, the tine speed is increased to 200 RPM. (Both tine speeds are based upon an engine speed of 3000 RPM, which is about as high an engine speed as you'd want to go.

NOTE: When the tiller is operating in Reverse, the wheels and tines are powered by the rubber Reverse Disc and not the belt. Therefore, you only have two Reverse wheel speeds as determined by the Fast or Slow positions of the Wheel Speed Shift Lever.

Moving the belt from one groove to another may seem a bit awkward at first, but it can be done in a minute or less with just a bit of practice. See the following pages for simple instructions on how to move the belt from one range to the other.

When first operating your tiller, we recommend that you keep the belt in the Low Range grooves, (as shipped from the factory), and the Wheel Speed Shift Lever in the Slow Wheel speed position. Later, when you are more familiar with tiller operation, you can move the belt and lever into the faster speed positions.



3/22—By using Low and High ranges of pulleys, and shifting Wheel Speed Shift Lever to Fast or Slow, four different forward wheel speeds, and two tine speeds can be obtained.

Belt Position	Wheel Speed Shift Lever Position	Wheel* Speed	Tine* Speed
LOW RANGE	SLOW	.5 MPH	146 RPM
LOW RANGE	FAST	1.2 MPH	146 RPM
HIGH RANGE	SLOW	.7 MPH	200 RPM
HIGH RANGE	FAST	1.72 MPH	200 RPM

*At engine speed of 3000 RPM

● Proper belt tension adjustment is critical to good performance. A loose belt will result in a squealing sound, or in a need to hold up the handlebars to keep the tiller moving in tough conditions. After the first 2 hours of new tiller operation, the belt tension will have to be adjusted due to initial wear and stretching. Thereafter, check the tension after every 10 hours of operation. See Section 6 for simple and complete belt tightening instructions.

● Keep the shifting mechanisms for the Forward/Neutral/Reverse Lever and the Wheel Speed Shift Lever well-lubricated at all times. See Section 6 for lubricating instructions.

Moving the Belt from Low Range to High Range:

CAUTION: Stop the engine and remove the spark plug wire from the spark plug. If the muffler is hot, wait until it cools down before moving belt.

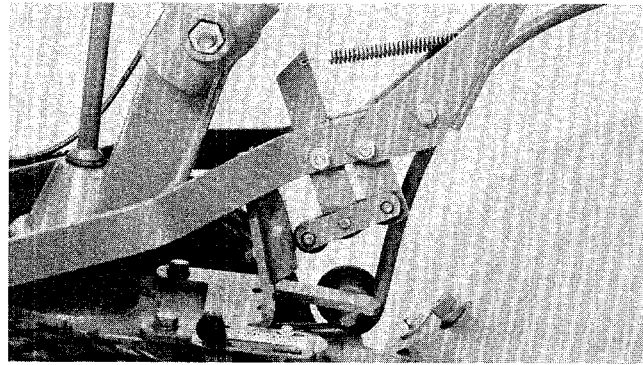
1. Shift the Forward/Neutral/Reverse Lever into Neutral—see Photo 3/23.

2. While standing on the Left side of the engine, reach over to the Right side of the pulleys and push the center of the belt in with your finger—see Photo 3/24. This will put some slack in the belt.

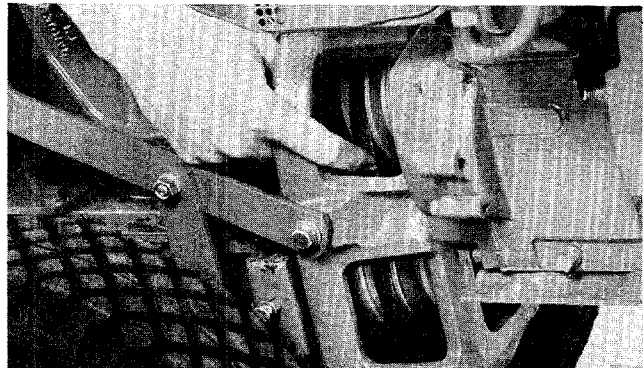
3. With your right hand still giving slack to the belt, use your left hand to move the belt on the Transmission Pulley (lower pulley) out of the bottom of the groove and into the next groove—see Photo 3/25. Do this first on the left side, and then on the right side.

4. On the Left side of the engine, move the belt out of the groove on the Engine Pulley (upper pulley) and seat it part way into the groove closest to the engine—see Photo 3/26. Now go to the other side and finish seating the belt in the groove. NOTE: If you need more room to fit the belt over the pulley, simply raise the Forward/Neutral/Reverse Lever into the Reverse position. This brings the pulleys closer together.

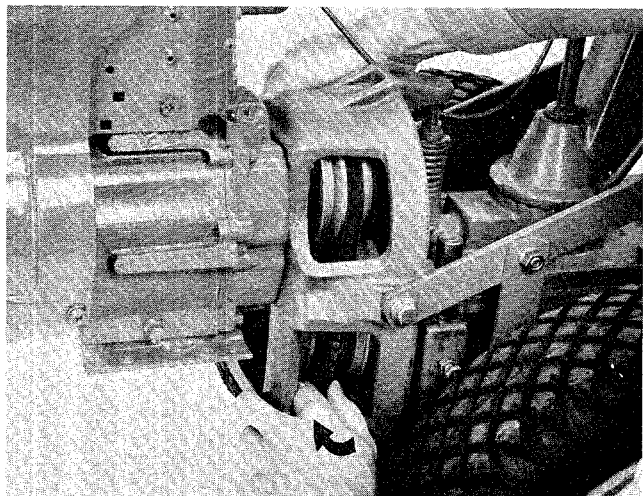
5. Check to make sure that the belt is fully seated on both sides of the High Range grooves.



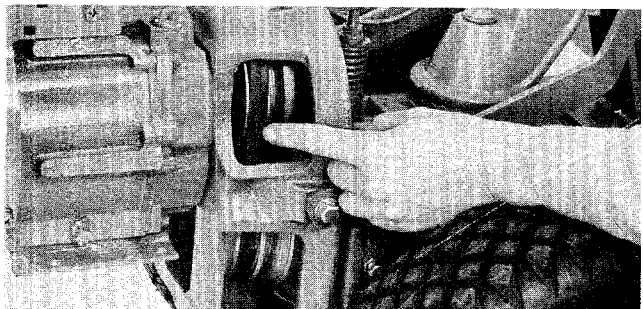
3/23—Shift into Neutral.



3/24—Push right side of belt in to create slack.



3/25—Move belt on lower pulley into groove closest to engine.



3/26—Move belt on upper pulley into groove closest to engine.

Moving the Belt from High Range to Low Range:

CAUTION: Stop the engine and remove the spark plug wire from the spark plug. If the muffler is hot, wait until it cools down before moving belt.

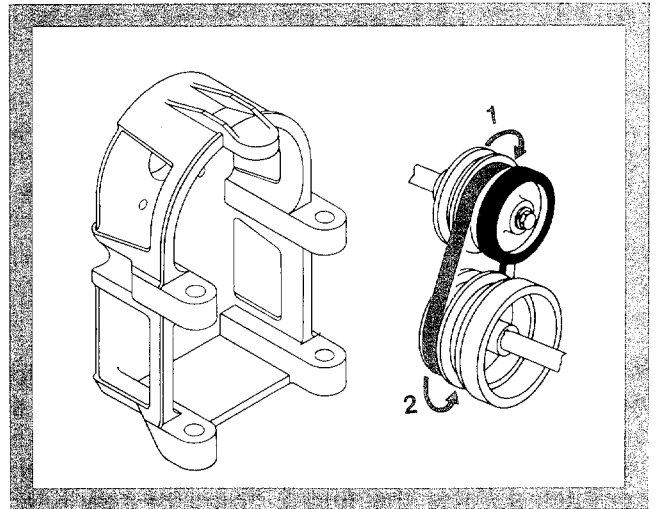
1. Stand on the Left side of the engine and hold the Forward/Neutral/Reverse Lever up in Reverse with one hand. With your other hand, move the belt on the engine pulley (top pulley) out of its groove and into the groove furthest away from the engine—see Photo 3/27. Do this on the left side and then on the right side—see Sketch 3/28.

2. With the lever still held in Reverse, move the belt out of the Transmission Pulley (lower pulley) groove and into the next groove (furthest away from the engine)—see Photo 3/29.

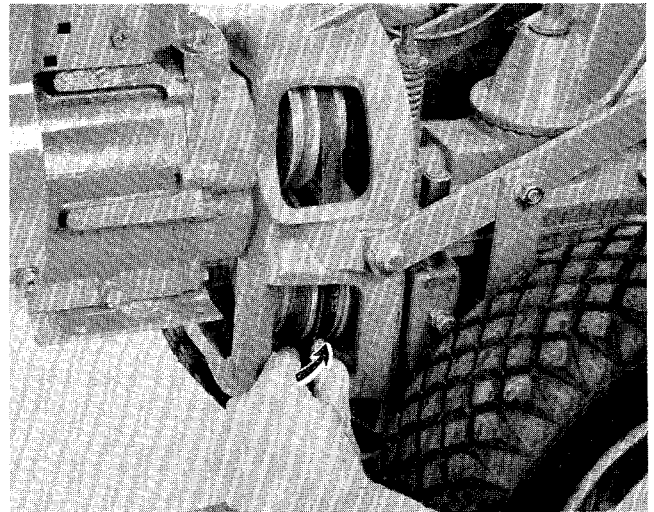
3. Check to make sure that the belt is fully seated on both sides of the Low Range grooves, as shown in Photo 3/30.



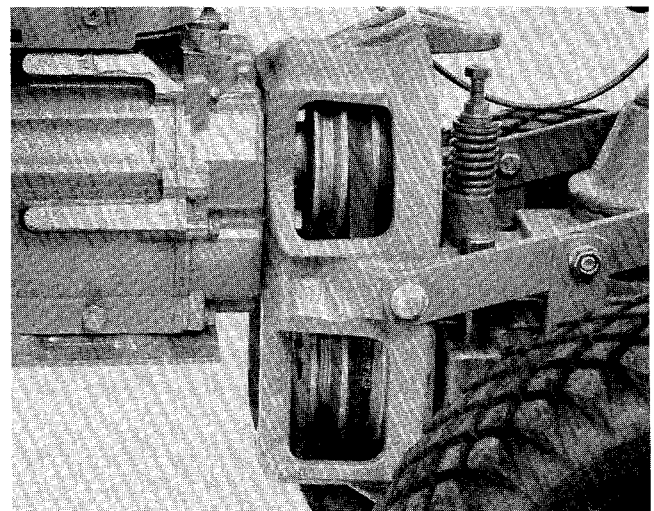
3/27—With lever in Reverse, move belt on upper pulley into groove furthest away from engine.



3/28—When going to Low Range, follow steps shown above.



3/29—Move belt on lower pulley into groove furthest away from engine.



3/30—Be sure belt is seated in upper and lower pulley grooves that line up with each other.