

# TILLER & ENGINE MAINTENANCE

## REGULAR MAINTENANCE SUGGESTIONS FOR THE TILLER

Lubrication points—please see Photo 7/1 and Photo 7/2 with the wheel removed to give you a closer view of some important lubrication points. The *numbered points* in Photo 7/1 show where you should apply some ordinary motor oil or other lubricating oil frequently; at least once a week if you are using your tiller quite often, or every two or three weeks if you are only using the tiller occasionally.

The *lettered points* indicate where you should apply a light grease occasionally to keep those parts well lubricated and working freely. The grease could be any general purpose grease, so long as it does the job of lubrication.

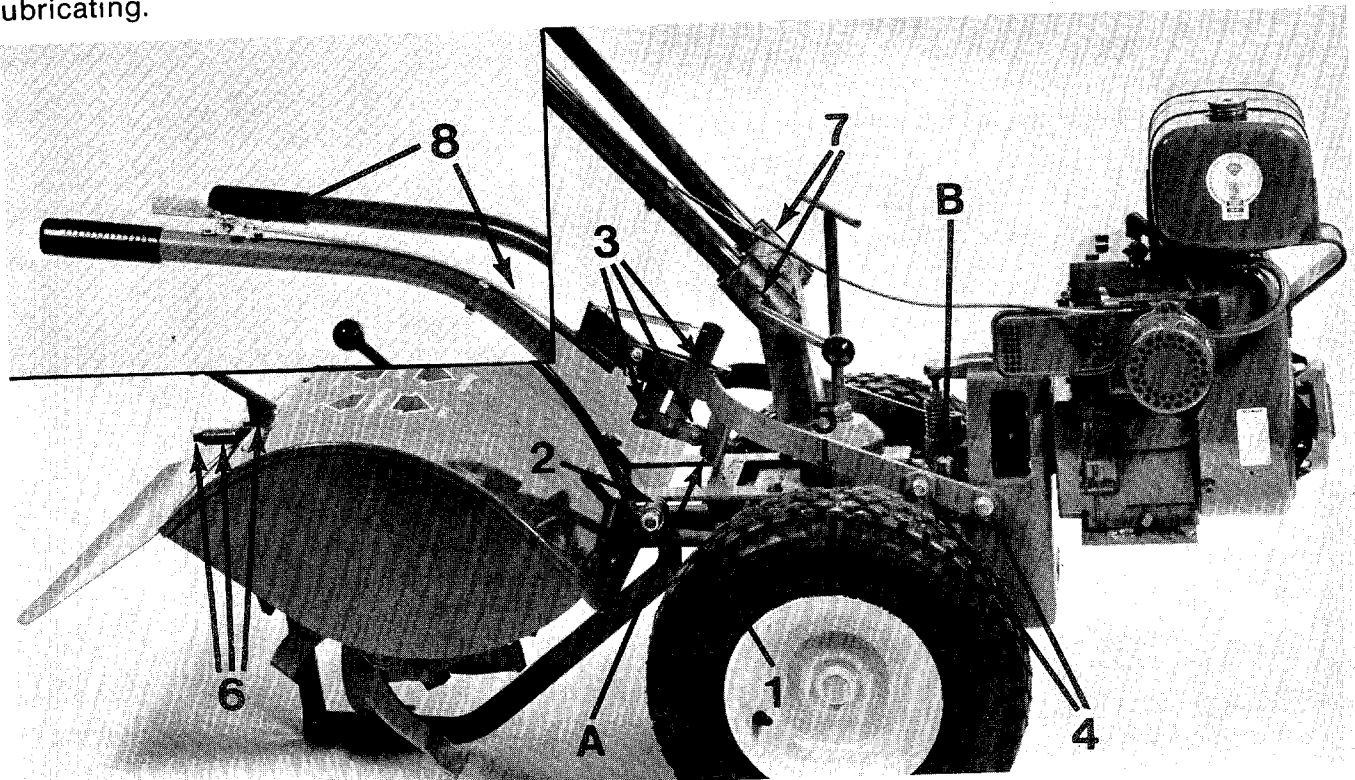
Next are descriptions listing those numbered points that need lubrication. Clean parts before lubricating.

### LUBRICATE WITH OIL

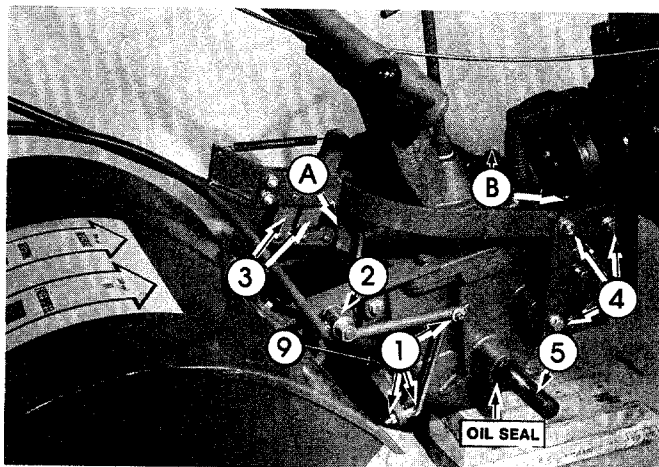
1. Wheel speed shifting linkage, part #1231 and part #1033.
2. Oil hole in speed shift lever pivot point, part #1230.
3. Forward/Reverse Lever linkage and roller, part #1134 and #1042.
4. Yoke linkage (clutch control), part #1037.
5. Wheel axle (occasional spray of oil), part #1235.
6. Depth regulator bar, plunger and spring, part #1076, #1119, and #1120.
7. Handlebar height adjustment stud, thread and nut, part #1150 and #9805.
8. Throttle cable and casing.
9. Eccentric Shaft (outside).

### LUBRICATE WITH GREASE

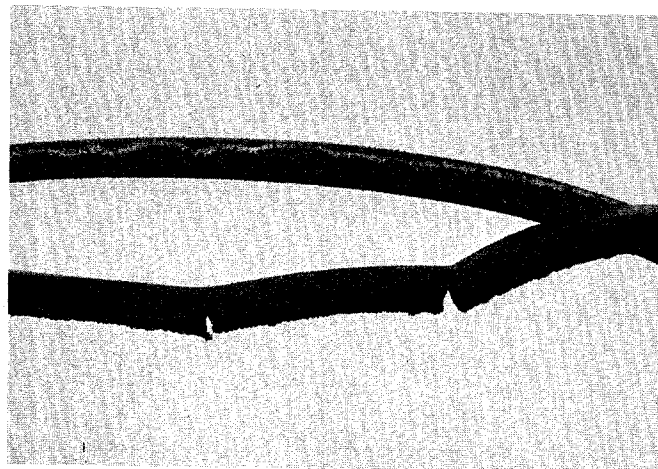
- A. Face of belt adjustment block, part #1133.
- B. Engine mounting bars, part #1034.



(Photo 7/1) Lubrication points on tiller.



(Photo 7/2) Close-up of lubrication points.



(Photo 7/3) Cracked and frayed belt.

## BELT TENSION AFFECTS PERFORMANCE

Proper belt adjustment is necessary for good tiller performance. Tiller belts transfer power from the engine to the tiller transmission in order to drive the tiller wheels and tines forward.

Loose belts can lead to disappointing results. It is important that you check belt tension regularly and you look for signs of cracks, fraying and overstretching of the belts—see Photo 7/3. With reasonable care, the belts should last three or four seasons, perhaps even more, based on forty to sixty hours of normal use each season by the average home gardener. Take good care of your tiller and its belts. Do not jam the clutch lever in and out of Forward. Keep the belts properly adjusted, as described on page 95.

## HOW TO TELL IF BELTS NEED TIGHTENING

Now, here's how to tell if the time has come when you must change your belts, or at least tighten them. If you put your engine under a load such as tilling deep, or chopping under thick heavy vegetation and notice that the tiller tines and wheels seem to slow down, seem to lose power, even though the engine continues to run smoothly and shows no loss of power, then this is a sign that the belts have stretched and begun to slip on the pulleys. For belt adjustment instructions, see page 95 of this section.

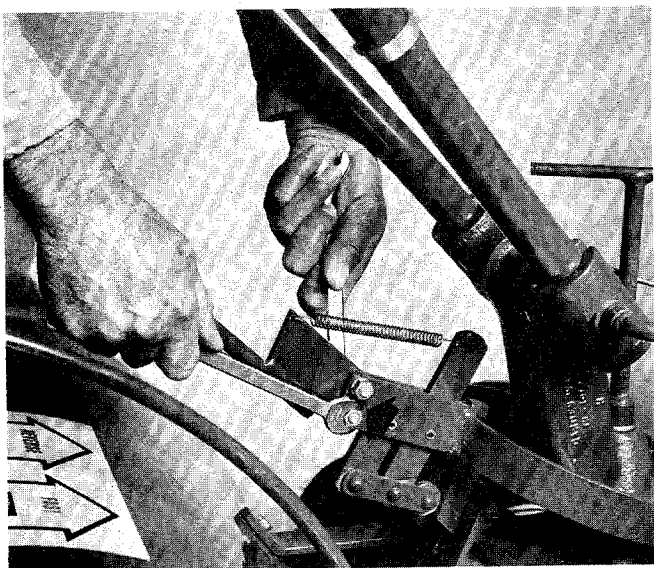
If you are in the process of adjusting belt tension and find that the previous belt adjustments have left the adjustment block (part #1133) as far down as it will go, and your belts are still too loose to do the proper job, then you definitely need a new set of belts.

Further evidence that the belts need tightening will be seen if the belts slip even during light or shallow cultivating, or *if you notice the belts slipping in Forward gear, but find tiller operation is perfectly normal in Reverse*. The tiller does not use the belts in Reverse. Instead, it uses the reverse disc to transfer engine power to the tiller transmission; therefore, *putting your tiller in Reverse will show you that the problem of slippage is not related to the gears, the engine, or the wheel drive, but to the belts alone*.

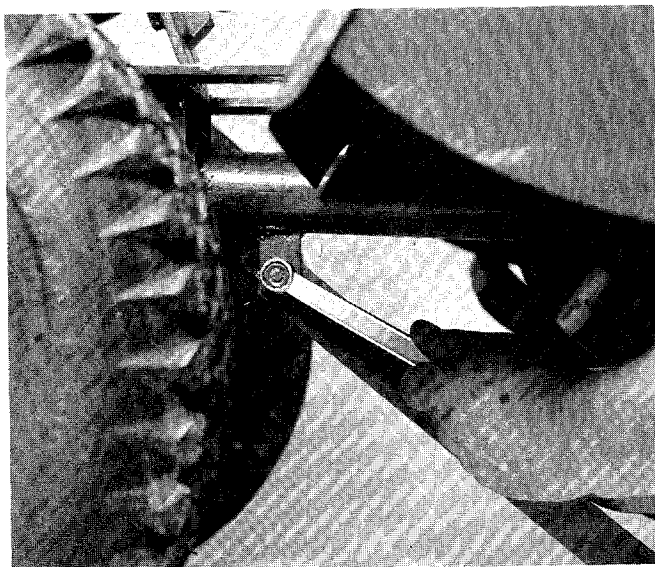
When the time to change belts comes, please order a matched set (one set) of belts (part #1128) from the factory. These belts are a special length, matched so that they will provide maximum transfer power from the engine to the tiller. They are also exceptionally durable belts made to last a long, long time (possibly as long as two or three tilling seasons). Please use a parts order form when ordering your belts.

## TIGHTENING BOLTS AND NUTS

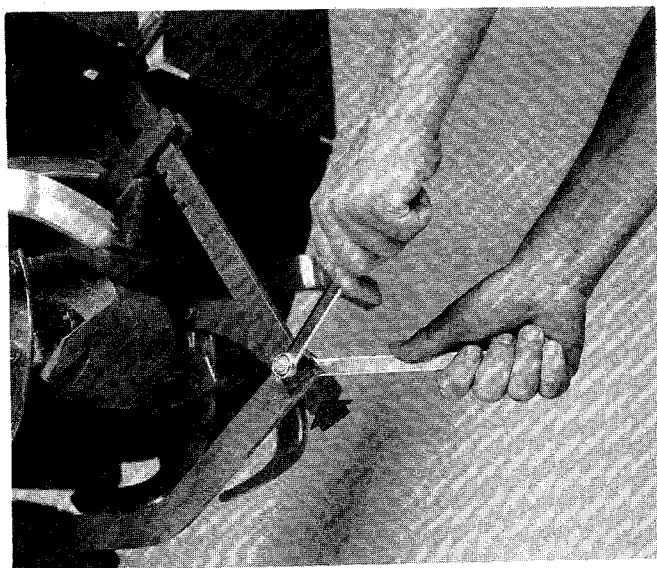
Troy-Bilt owners should make it a practice to regularly inspect and tighten bolts and nuts on their tiller. Please refer to the accompanying photos with arrows indicating nuts and bolts that should receive specific attention.



(Photo 7/4) Tighten Forward/Reverse Lever.



(Photo 7/5) Tighten drag bar to tiller.



(Photo 7/6) Tighten drag bar and depth regulator.

Fairly frequently, check the two bolts and nuts that you use to fasten the Forward/Reverse Lever (part #1134) to your tiller—see Photo 7/4. Make sure that they hold without any wobble of the lever, but don't over-tighten and break the bolts. Also, check the linkage to the yoke (part # 1037) and the wheel speed shift lever (part # 1230).

Check the bolts at both ends of the drag bar (Photos 7/5 & 7/6). Check the bolts fastening the front and rear hood bracket, and regularly tighten the nut on the curved Wheel Speed Lever - all shown in Photo 7/7.

In the Spring and Fall, at least, check the end cap bolts under the rear hood bracket—see Photo 7/8. And, check the 3 hex flange bolts for tightness. Look for evidence of oil seepage between the end cap and the transmission tube. This will indicate that the shaft might need to be shimmed or that the 3 bolts have been loose. You can visually check for this condition by tilting the tiller forward and looking closely for wetness of oil that would attract dirt. As long as it looks like a tight fit and you see no oil, you can be fairly sure things are O.K. back there.

Finally, occasionally check the nuts and bolts that fasten the tines. Make sure they are tight.

On occasion, remove the tine holder on the left side so that you can reach the tiller housing cover (part #1023) and check the five socket head screws holding that cover in place—see Photo 7/9.

You especially should make certain that those five socket head screws are tight and that the cover is snug and shows no sign of any appreciable oil leak. A small amount of "wetness" with oil at that point on the cover is nothing to get excited about. A genuine loss of oil should receive attention at once.

It is also a good idea to check the reverse fiber disc (part #1072) and make sure that the mounting bolt attaching it to the pulley is firmly threaded in—see Photo 7/10.

#### **CHECK THE PARTS FOR WEAR**

The following parts should be checked regularly to determine if there is any adverse wear in the first few hours of operation. Thereafter, they should be checked regularly to make sure that they have not worn out. Check for wear of belts (see Page 93), the reverse disc (see page 104), the drag bar for the depth regulator, tiller tines (see Photo 7/11), and oil seals

for the wheel shaft (see Photo 7/2), and tiller shaft and the front seal on the drive shaft in the front of the transmission.

### INSPECT THE TILLER AND TINES

Remove the tines and inspect the tiller housing cover on the left side for snugness of fit, the Allen screws for tightness, the keys in the tine shaft, the oil seal in the tiller housing cover, the oil seal on the right side, and the tines for excessive wear. Make sure that the tines are not bent so that any tines are touching the transmission housing.

When your Bolo tines become as badly worn as the tine shown on the right in Photo 7/11, you will begin to lose depth in tilling even though you adjust your depth regulator to the maximum depth. Also, when they become pointed, or sharpened, the tines will merely scratch the earth, but will not bury crop residues or sod like new ones. When this happens, it's then time to replace them. Also, as your tines become pointed and shorter with wear, they will leave a wide untilled middle section behind the tiller housing. Replace Bolo tines that have worn to a point.

When Pointed Pick tines become worn (see Photo 7/12), their pointed tips will wear and soon become much shorter. As a result, you will not get the digging capacity, nor the tilling depth. When the knife-like edge of the Cultivating tines become worn (see Photo 7/13), they will lose their ability to turn over soil. If the tines become as worn as those shown in Photo 7/12 and Photo 7/13, they should be replaced for more satisfying tilling results.

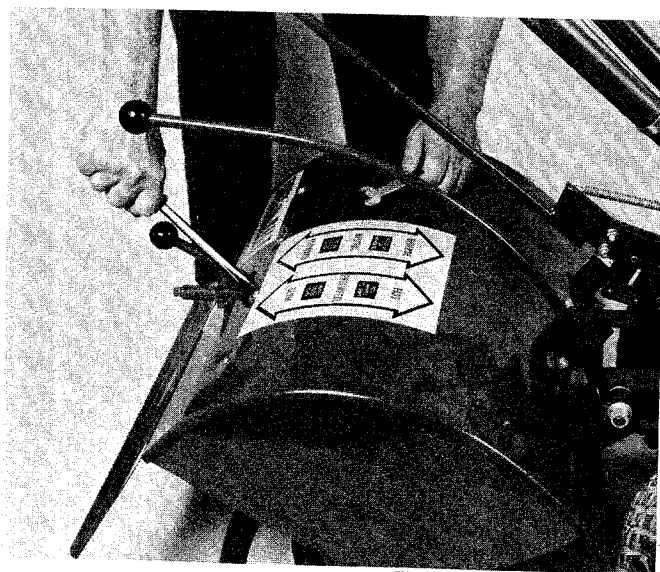
### PROPER BELT ADJUSTMENT

It is *necessary* for good tiller performance to check tiller belts *regularly*! There are three ways to tell if your belts need adjustment or replacement.

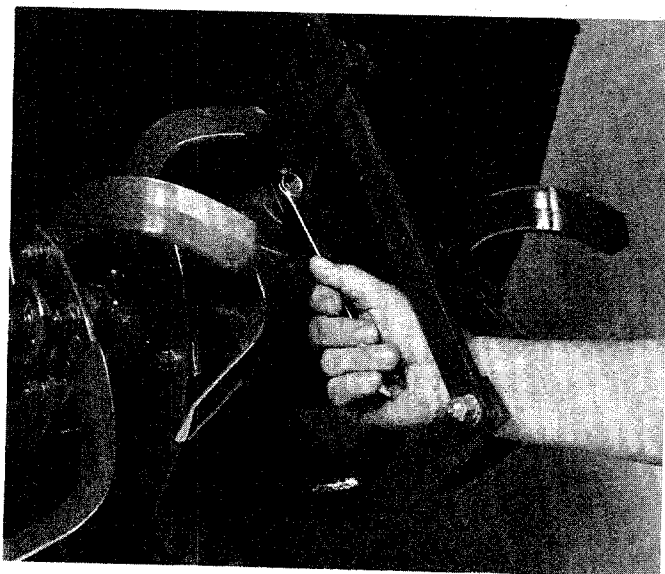
1. If tiller wheels seem to slip—or don't drive forward well—check belt tension.
2. Look at belts for wear or frayed edges.
3. Look to see if belts are stretched—you won't be able to move the adjustment block any lower and belts will still be loose.

Loose belts can lead to disappointing results. That's why it's important that you check *regularly* for belt tension and for cracks, stretching and fraying. If a few strands from outer belt covering fray and come loose, trim them off with scissors.

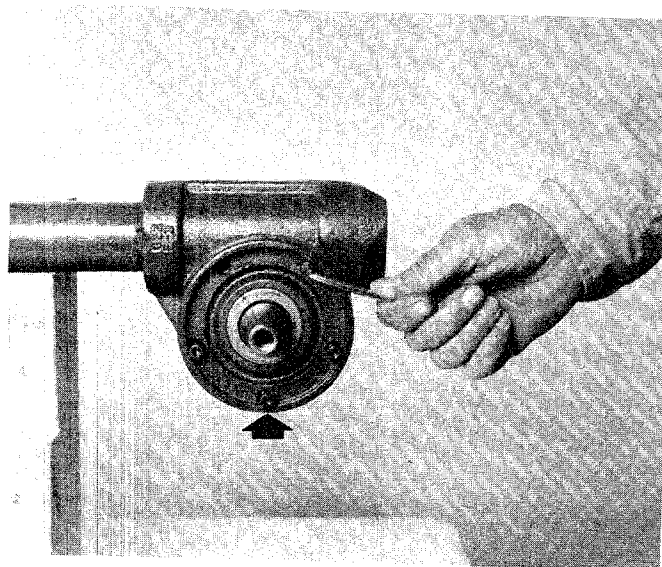
On a brand-new tiller, wait until you have had



(Photo 7/7) Tighten bolts on hood brackets.



(Photo 7/8) Tighten bolt at end cap.



(Photo 7/9) Check tiller housing cover screws.

5 hours or more of operation before you consider *loosening the belts*. Give the parts and linkage enough time to wear-in and free themselves up.

**If you take good care of your tiller and do not jam it hard in and out of forward, belts should last 3 to 4 seasons or more.**

Belt adjustment—to check for belt adjustment, shift the Forward/Reverse Lever into **forward** gear while the engine is shut down. (Please disconnect the spark plug wire for safety.)

While the lever is in the **forward** position, take a ruler and use it to measure the distance from each belt to the inner side of the engine mount (part #1002) (as shown in Photo 7/14). Then, use moderate force to push each belt inward with the ruler and remeasure the same distance. The belts should deflect inward about  $\frac{1}{4}$ ".

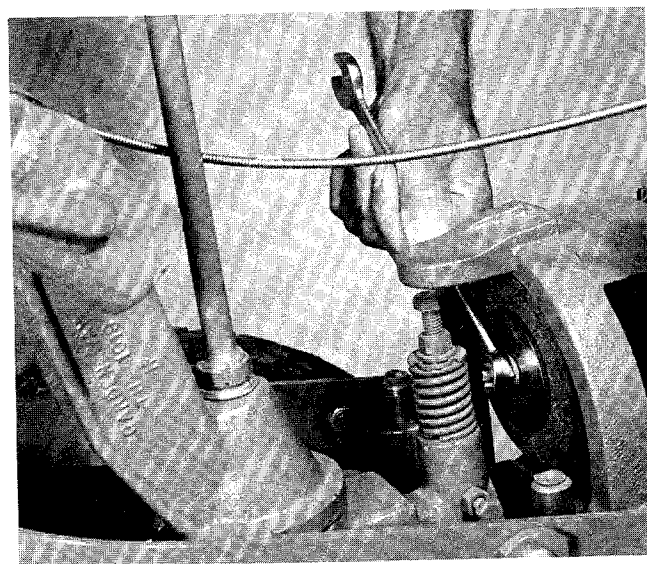
Please use the amount of belt deflection only as a guide. The performance of the tiller in the garden is a more reliable means of determining if belts are properly adjusted for the average gardener. Please refer to page 93 of this section under the heading, "How To Tell If Belts Need Tightening," for methods of detecting loose belts by tiller performance.

Belts should be an identical matched pair so that they both will transmit equal power to the pulleys. If the belts are so tight that you can't push them in with two fingers at all, or they are so loose that they go way in when you push them—while the Forward/Reverse Lever is engaged in the **forward** position, you'll have to make an adjustment.

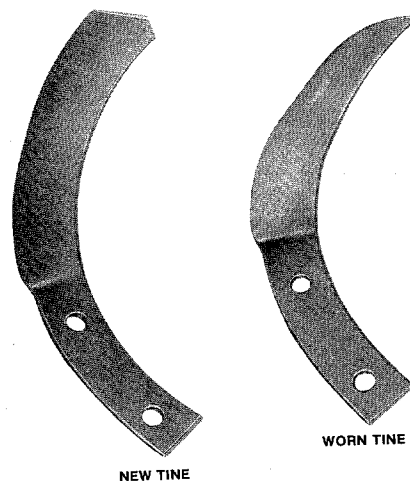
### TO ADJUST BELT TENSION

On the back of the adjustment block (part #1133) there is an adjustment bolt. Loosen the adjustment bolt, shift the Forward/Reverse Lever down into Forward position (as shown in Photo 7/15) and check the belt tension.

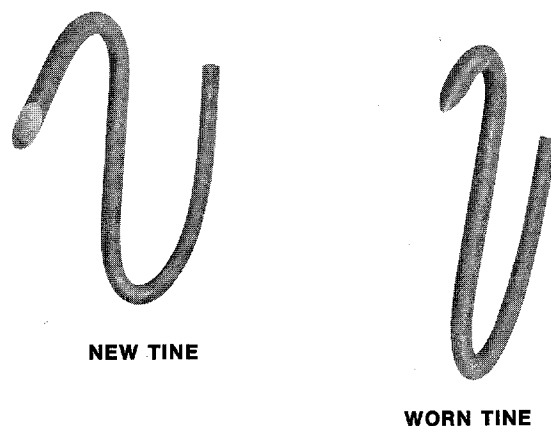
Stand alongside the tiller while holding the Forward/Reverse Lever down with your hand, and check the tension of the belts with your other hand by reaching through the hole on the side of the motor mount. Push the belts inward with two fingers—see Photo 7/16. (As a guide, the belts should deflect inward about  $\frac{1}{4}$ ".)



(Photo 7/10) Tighten reverse disc.

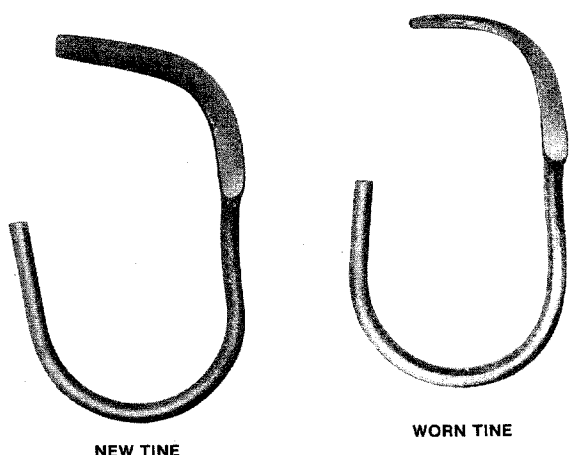


(Photo 7/11) Bolo Tines.



(Photo 7/12) Pointed Pick Tines.





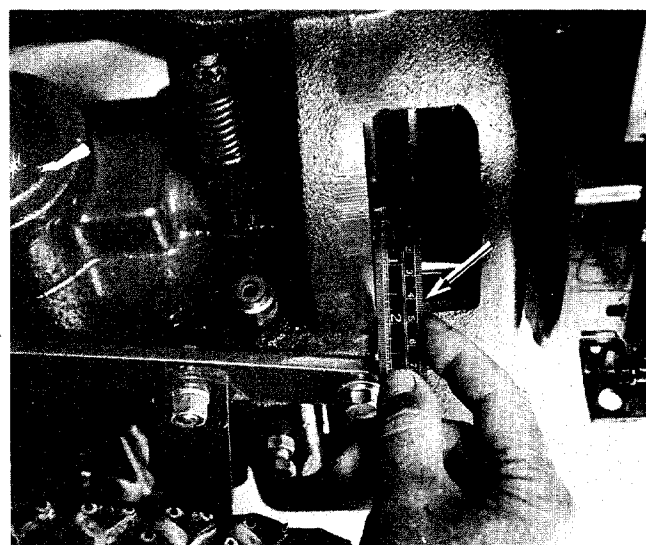
(Photo 7/13) *Cultivating Tines.*

If the belts are too loose, put the lever in Forward and slide the adjustment block down until the tension is enough to tighten them. Then, tighten the bolt a little more than finger tight. Put the lever in Forward and recheck the belt tension—see Photo 7/15. If you now have the right tension, tighten up the adjustment bolt and you are all set to go.

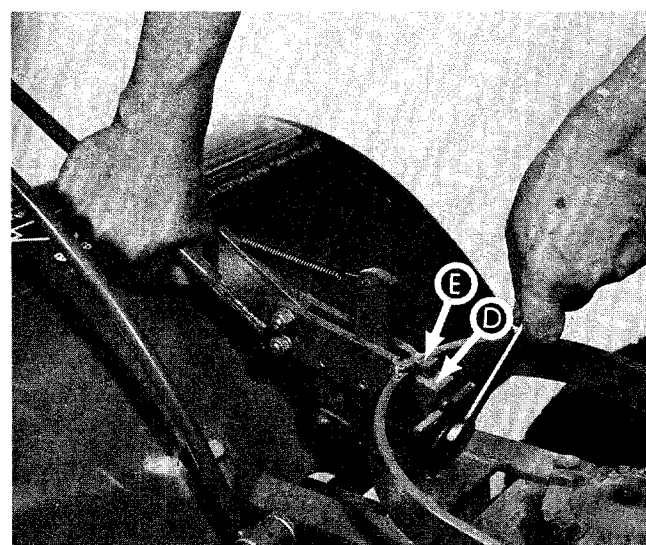
**CAUTION:** Do not set the belt *tension* too tight or your Forward/Neutral/Reverse Clutch Lever will keep jumping out of Forward. As you make succeeding adjustments in belt tension with the adjustment block (shown in Photo 7/15), the block will gradually be lowered in its mounting. Another reason for a tiller “jumping” out of Forward is a weak clutch pawl spring, part #1122. Replace a weak spring.

**NOTE:** The travel stop (arrow **E**) on the control yoke rests on top of the adjustment block (arrow **D**, shown in Photo 7/15). This prevents excessive belt stretching when shifting the clutch lever “in and out” of Forward.

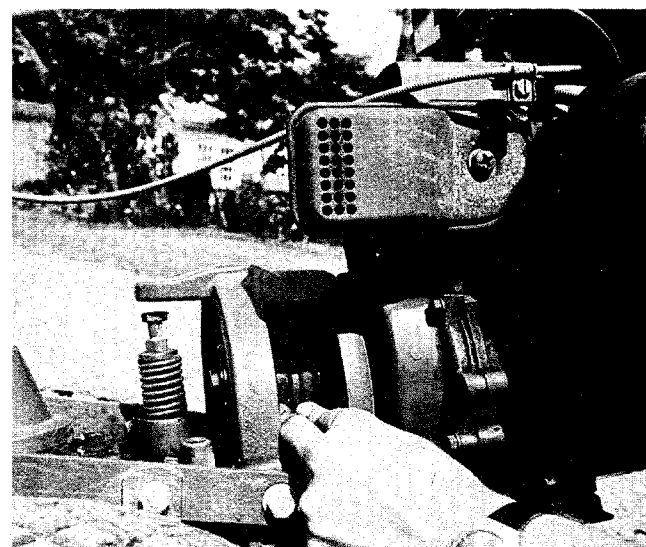
It is worthwhile noting that the position that the clutch *roller* takes on the clutch adjustment block for *Neutral* will gradually work itself upward on the block. This happens gradually with each belt adjustment. When the block is all the way down to the bottom and the belts are still loose, it is time for a new set of belts. Write to our Parts Department for a new set of matched belts (part #1128).



(Photo 7/14) *Measuring belt deflection.*



(Photo 7/15) *Adjusting tension of belts.*



(Photo 7/16) *Checking belt tension.*

## HOW TO CHANGE BELTS WITHOUT REMOVING THE ENGINE FROM YOUR TILLER

**CAUTION:** Before changing the belt, shut off the engine and disconnect the spark plug wire as a safety precaution.

It's easy to change belts on your tiller if you follow a few simple steps.

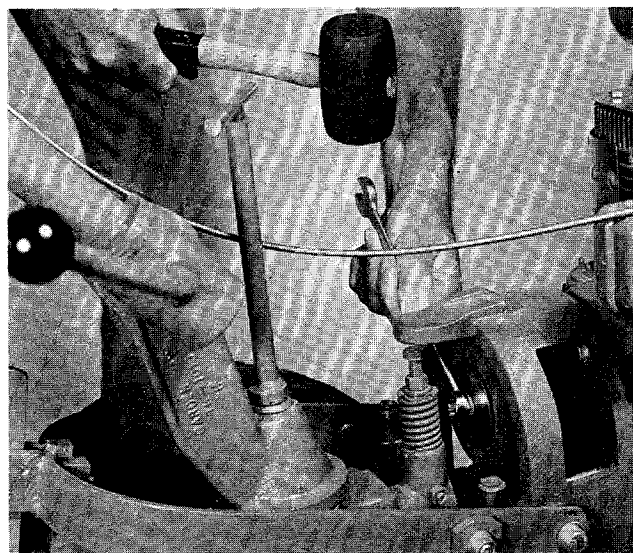
### TO REMOVE BELTS

1. Shift the Forward/Reverse Lever (part #1134) into *Forward* position. Remove the mounting bolt and the metal plate in front of the reverse disc (part #1072)—see Photos 7/17 and 7/18.

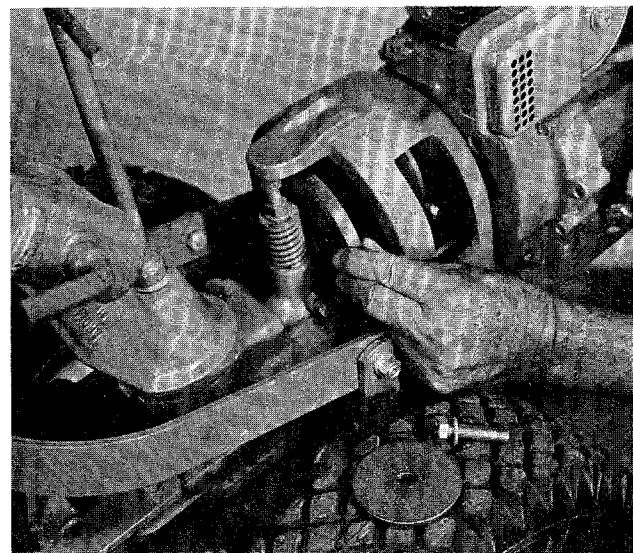
To remove the top pulley mounting bolt, use a 9/16" closed-end wrench and a hammer. Stand on the left of the tiller, put the wrench on the bolt and give the wrench a sharp **tap** downward. This should loosen the bolt enough for it to come out easily. If the bolt doesn't loosen easily, insert a large screwdriver or wood stick between the upper pulley and the hole in the side of the motor mount. Pull up to prevent the pulley from rotating while you tap down to loosen the mounting bolt.

On the back of the shifting block (part #1133), there is a bolt used to make adjustments of belt tension (shown in Photo 7/19). Loosen the bolt enough so that the block itself moves up freely when you use the shift lever. When the block has been raised, retighten the bolt finger tight. Do not remove the bolt or block entirely.

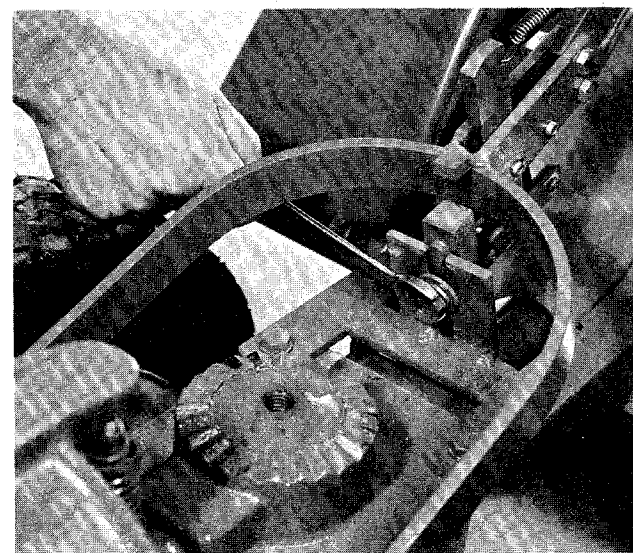
**NOTE:** On electric start tillers, at this point, you should disconnect first the bolt and cable from the positive terminal of the battery and then disconnect the negative cable from the lower end of the 9 inch bolt on the bracket. While the nut is off the 9 inch bolt on the right, loosen the left hold-down bolt. Remove the battery and place it aside to give you working room. Be careful to note that the battery goes back on with the positive terminal on the left side of the tiller (viewed from operator's position).



(Photo 7/17) Remove bolt in top pulley.

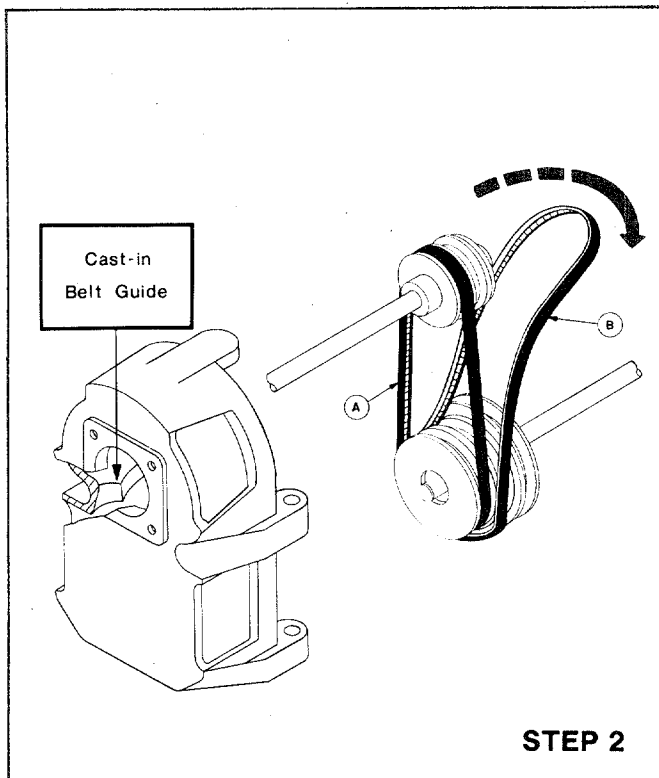


(Photo 7/18) Remove reverse disc.

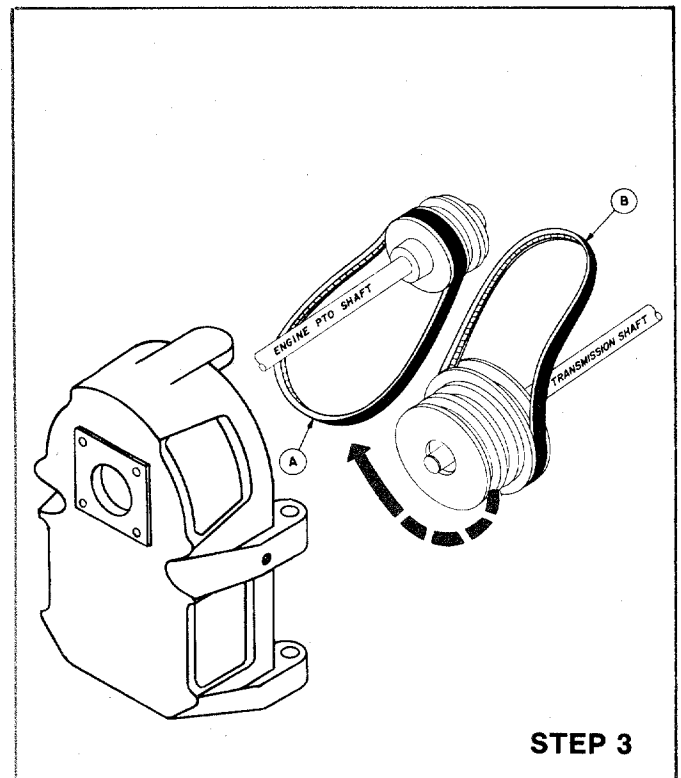


(Photo 7/19) Loosen bolt securing adjustment block.

## REMOVING BELTS



(Sketch 7/20-2)

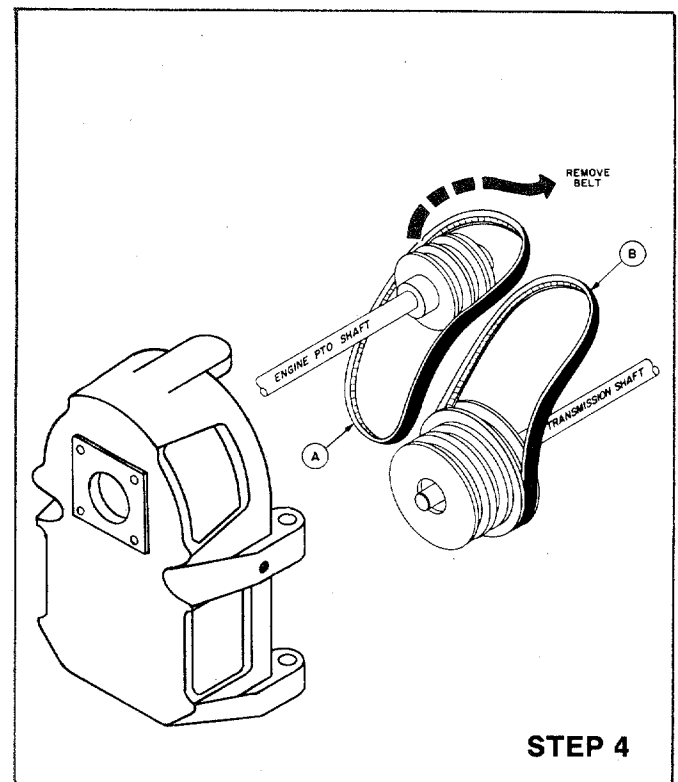


(Sketch 7/20-3)

2. Shift the Forward/Reverse Lever far enough toward *Reverse* to give slack to the belts. Move the belt marked **B** off the top pulley, in the direction of the handlebars. Let **B** remain there temporarily. (See step 2 in Sketch 7/20-2).

3. With the lever still in *Reverse*, free the belt marked **A** from the lower pulley and loop it under the lower pulley as shown. You may have to shift the lever toward *Forward* position to provide your hands clearance to work the belt upward over the pulley. (See step 3 in Sketch 7/20-3.)

4. Lift the belt marked **A** up over the top pulley and then shift the Forward/Reverse Lever into *Forward* position to provide clearance between the pulleys. (See step 4 in Sketch 7/20-4.) Now, you can pull belt **A** out between the pulleys. (Pull the belt toward the handlebars.)

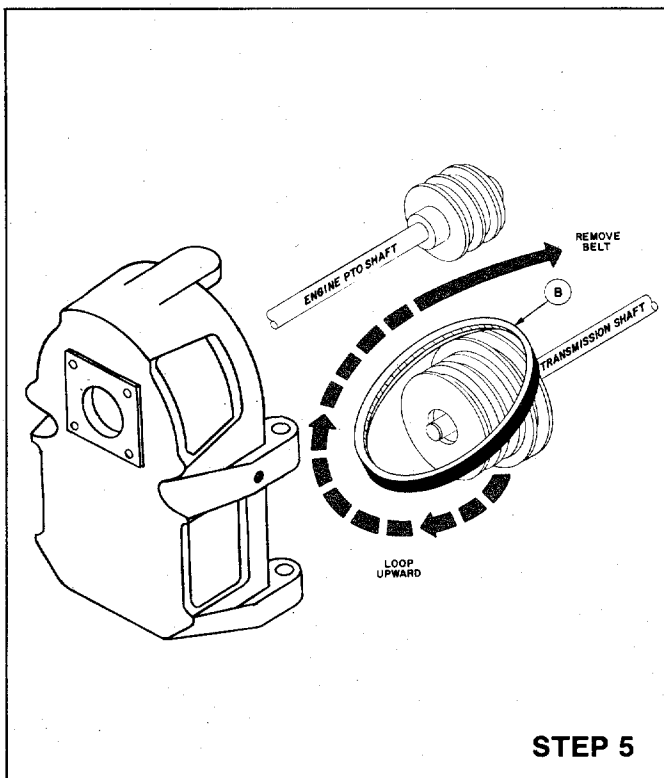


(Sketch 7/20-4)

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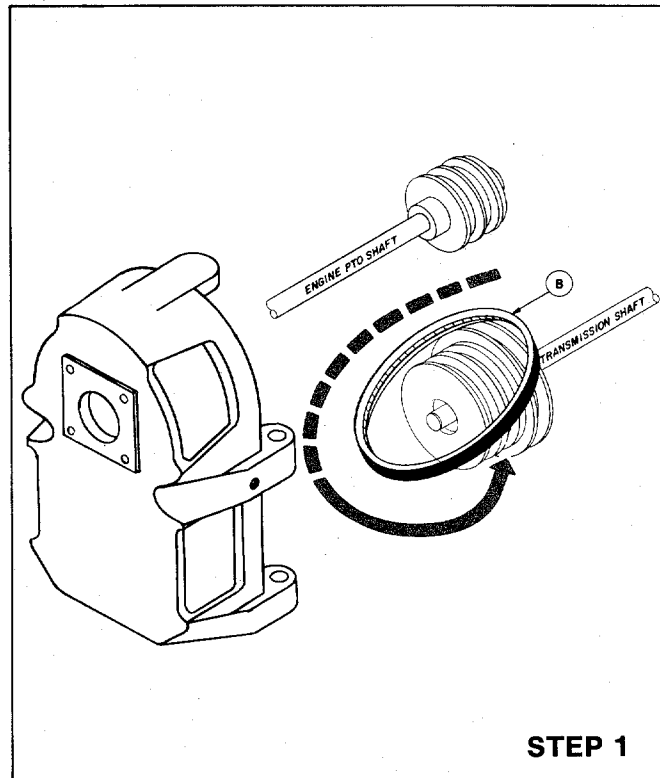
## REMOVING BELTS



STEP 5

(Sketch 7/20-5)

## INSTALLING BELTS



STEP 1

(Sketch 7/21-1)

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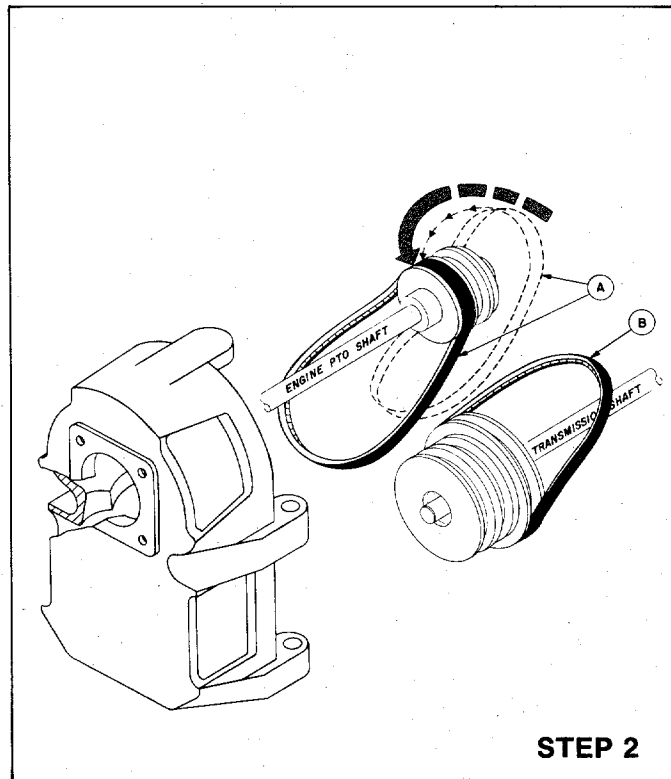
**5.** Bring the bottom of belt **B** under the lower pulley and loop upward. Pull the belt out between the two pulleys, as you did in Step 4. Now you are ready to install the new set of matched belts (part #1128). (See step 5 in Sketch 7/20-5.)

## TO INSTALL BELTS

To install new belts, use a matched set of belts only, because they deliver all of the engine power to your tiller. First, start with the shift block loosened and the reverse disc removed, as described in Step 1 of "To Remove Belts."

**1.** Shift the Forward/Reverse Lever into *Forward* position and move a new belt between the pulleys. Loop one end of the belt over the lower pulley. Bring the lower end of the belt toward the tiller—anywhere past the groove closest to the engine, as shown in Sketch 7/21-1. Let that belt lie there, out of your way.

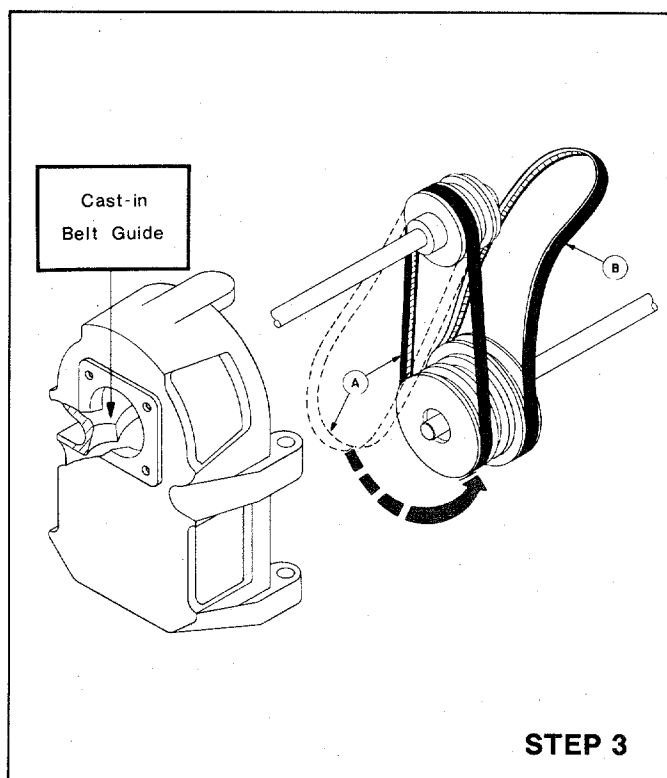
**2.** Take the second belt and move it over the top pulley into the groove closest to the engine. Be careful to keep the belts near the cast-in belt-guides (shown in Sketch 7/21-2). Keep the belts well inside the motor mount beyond the largest groove (for the Reverse Disc) of the lower pulley. This will avoid getting the belt jammed between the two pulleys.



STEP 2

(Sketch 7/21-2)

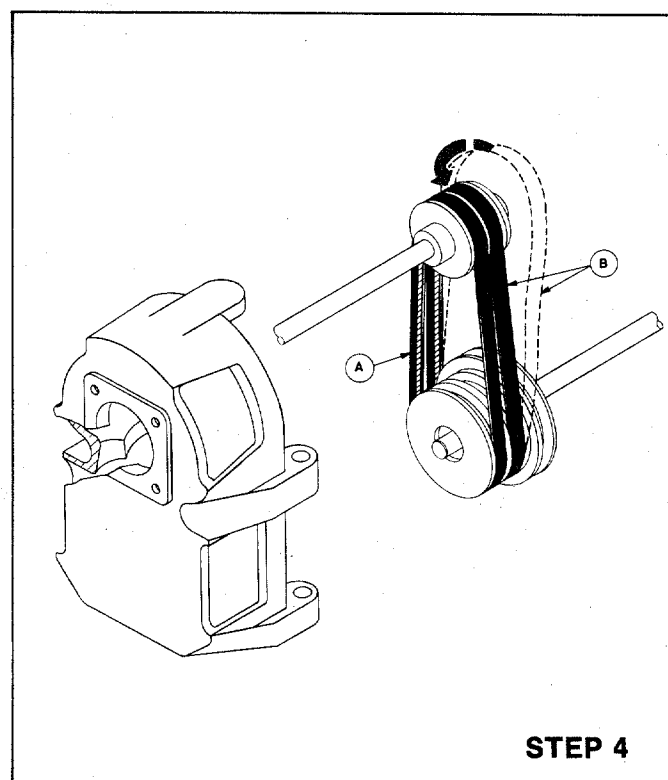
## INSTALLING BELTS



(Sketch 7/21-3)

**3.** Shift the Forward/Reverse Lever into *Reverse* position and move the belt marked **A** (in illustration) under the lower pulley. Place the belt in the grooves closest to the engine—see Sketch 7/21-3. To assist in seating the belt in the lower pulley, you can turn the lower pulley with your fingers. This will seat a belt that is almost in the grooves.

**4.** Seat belt **B** in the middle groove of the lower pulley and pull the top of the belt over the top pulley—see Sketch 7/21-4. To help get the second belt into the groove, you can put it in the lower pulley groove and then in the top pulley groove (on the carburetor and muffler side of



(Sketch 7/21-4)

the engine). When it is almost in the groove, pull the engine starter cord to seat the belt. (Remember, for safety, the spark plug wires should be disconnected).

**5.** Replace the reverse disc, the mounting plate and the large bolt. (Refer to Photos 7/17 and 7/18 under "To Remove Belts" for guidance.) Tighten bolt securely. Then, readjust the belt tension to  $\frac{1}{4}$ " belt deflection in *Forward* shift position as described in the preceding "Belt Adjustment Instructions." First, position the block (shown in Photo 7/19) and tighten the bolt a little more than finger-tight, then, adjust the belt tension.