

REMOVING THE ENGINE FROM THE TROY-BILT HORSE MODEL

Removing the engine from your tiller, to repair or replace the engine, or to repair internal tiller transmission parts, is not as complicated as it might seem. Briefly, here are the few simple steps that you will have to take. Below are more complete details of each step.

First, you will have to disconnect the throttle wire from the engine. Then, you will have to remove the reverse disc (part #1072). Then, you must remove the engine mounting bars (part # 1034). Finally, you will have to remove the engine by lifting it, and its mount, up and away to clear the lower pulley. Before you remove the engine, however, it is best to remove the belts, in accordance with the belt changing instructions in Section 7 of this manual.

REMOVE THROTTLE CABLE— 6HP TECUMSEH ENGINE

As shown in Photo 8/90, loosen the throttle cable mounting clip and lift the cable out of the clip. Then, disconnect the throttle wire from the speed control lever at the carburetor, without

bending the tip of the wire out of shape. Remember, it's extremely difficult to rebend the shape at the end of the throttle wire, so treat it accordingly. Be careful not to kink or bend the throttle cable when it is freed. Loop the cable backwards and tuck it out of the way.

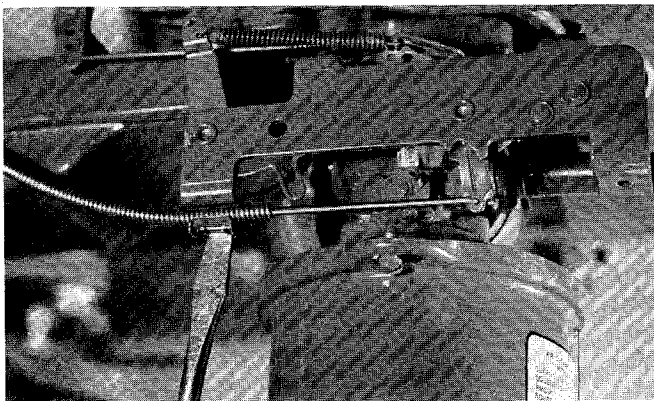
SKIP NEXT STEP IF IT DOES NOT APPLY TO YOUR TILLER

Only if your tiller has an electric Start Engine:

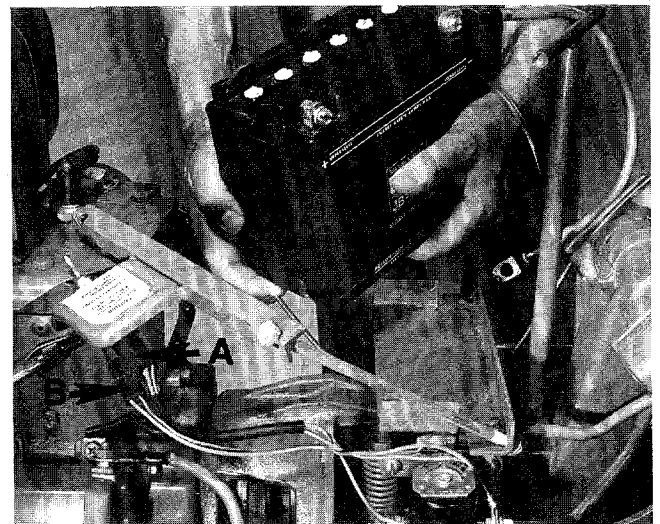
1. Disconnect the positive battery terminal from the cable on top of the battery and the negative terminal from the cable at the bottom of the 8¼" long bolt clamping the battery down. Remove the bolt and lift the battery out of the bracket, as shown in Photo 8/91.

2. Then disconnect the terminal at the bottom of the key switch (A in Photo 8/91.). Next, separate the terminals (B in Photo 8/91) that connect the green ground wire to the key switch and the diode and fuse to the solenoid. Do this as shown in Photo 8/92.

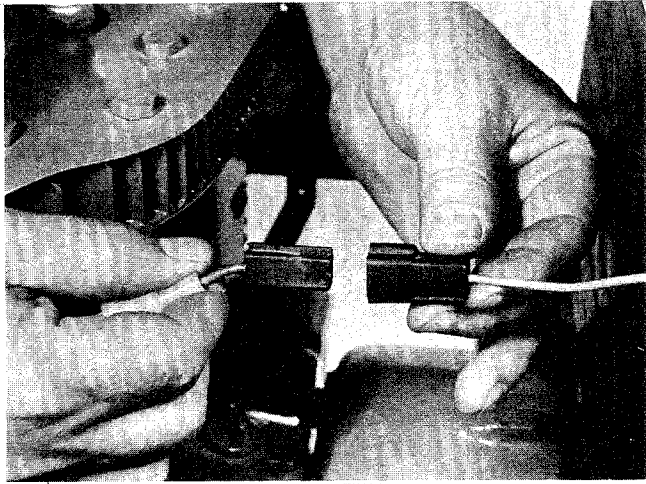
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(Photo 8/90) Throttle cable removal.

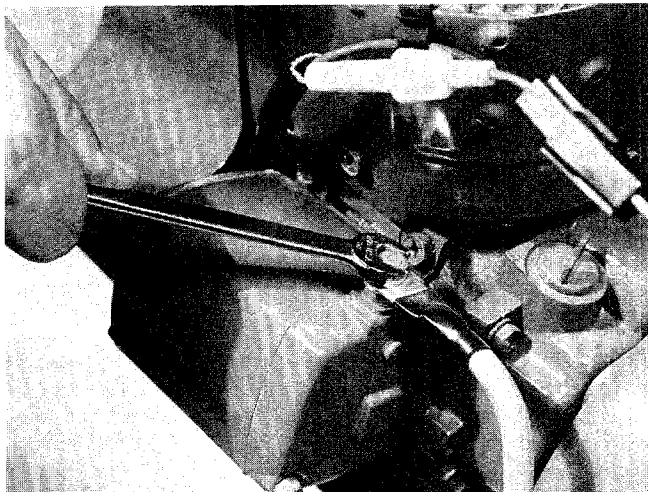


(Photo 8/91) Remove battery.



(Photo 8/92) *Disconnect recharging wire.*

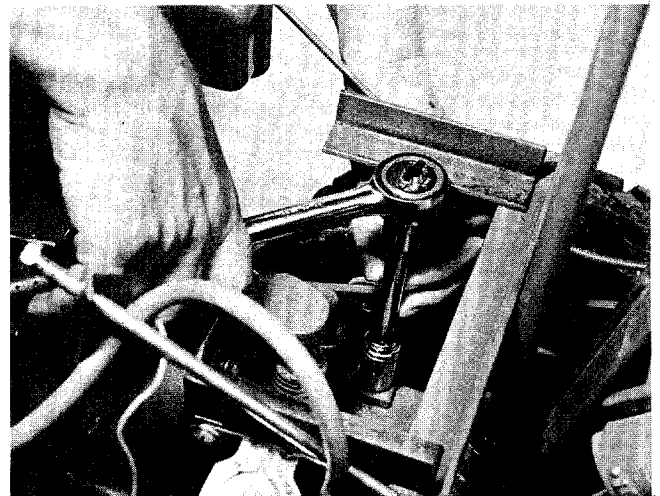
3. Next, disconnect the red cable from the top of the starter motor on the engine—replacing the nut for safekeeping—see Photo 8/93.



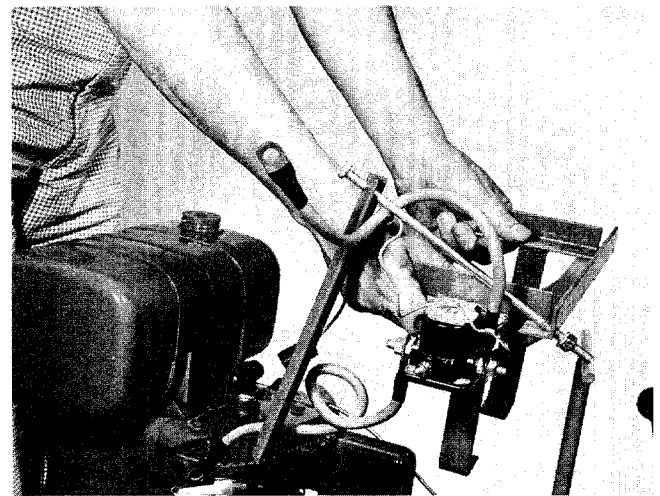
(Photo 8/93) *Cable to starter.*

4. Finally, remove the two screws (part #9713) from the bottom of the battery bracket (see Photo 8/94) and remove the battery bracket (cables and all) from the tiller—see Photo 8/95. Replace the two screws (part #9713) in the top of the transmission cover.

NOTE: Be careful not to let any wires or metal touch the battery terminals while putting the battery assembly safely aside.



(Photo 8/94) *Remove battery bracket.*



(Photo 8/95) *Bracket and all.*

ALL ENGINES

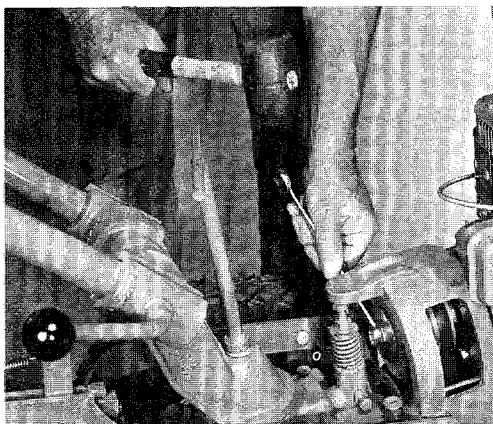
Remove the Reverse Disc—Shift the Forward/Reverse Lever into Forward position to raise the reverse disc. Remove the mounting bolt and plate—see Photo 8/96. Then, remove the reverse disc out the side between the reverse plunger and the front of the engine mount, as shown in Photo 8/97.

Remove the Belts—Remove the belts, in accordance with the belt changing instruction in Section 7 of this manual.

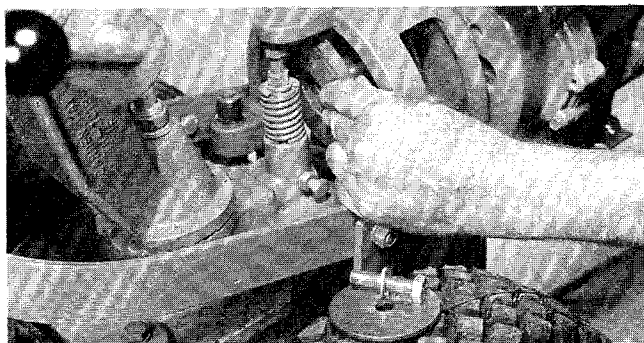
Detach the Yoke—Remove the bolts that fasten the control yoke (part #1037) to the engine mount—see Photo 8/98. Next, remove the engine mount bars. Remove the bolts that lock the engine mount bars (part #1034) into position—see Photo 8/99. First, loosen the jam nut and then unscrew the bolt almost all the way out. With a solid support placed under the engine, tap each mount bar down to remove the bar from the housing. A screwdriver and mallet can be used for this purpose—see Photo 8/100.

Now, the engine and its housing are free to be removed from the tiller.

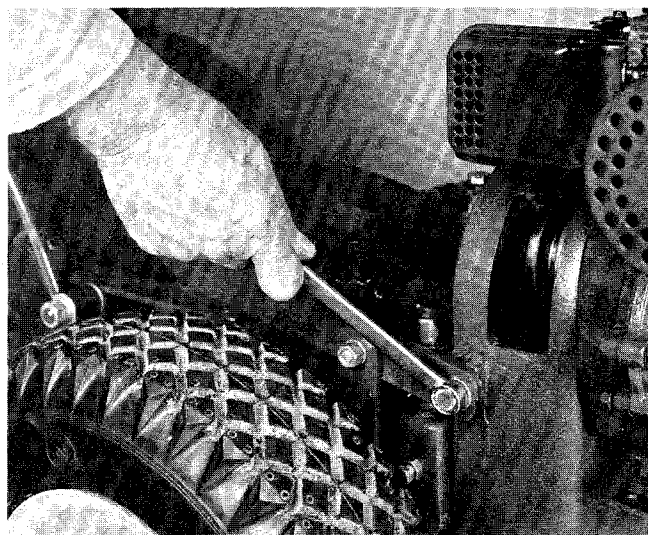
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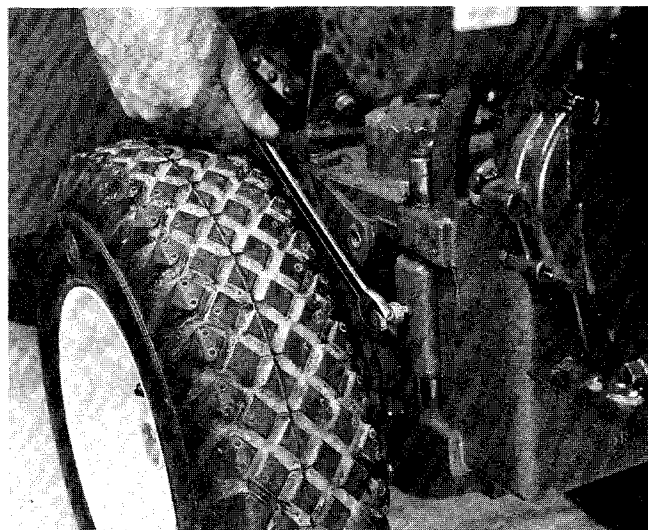
(Photo 8/96) Remove disc bolt.



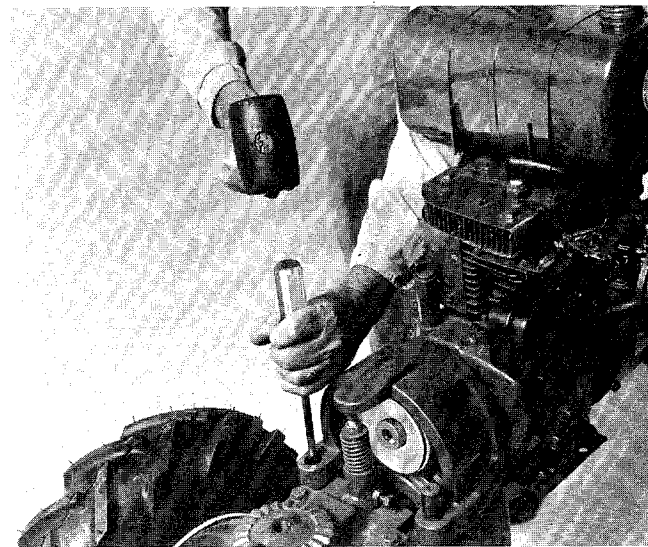
(Photo 8/97) Remove disc.



(Photo 8/98) Yoke is bolted to engine mount.



(Photo 8/99) Unlock engine mount bars.



(Photo 8/100) Drive bars out.

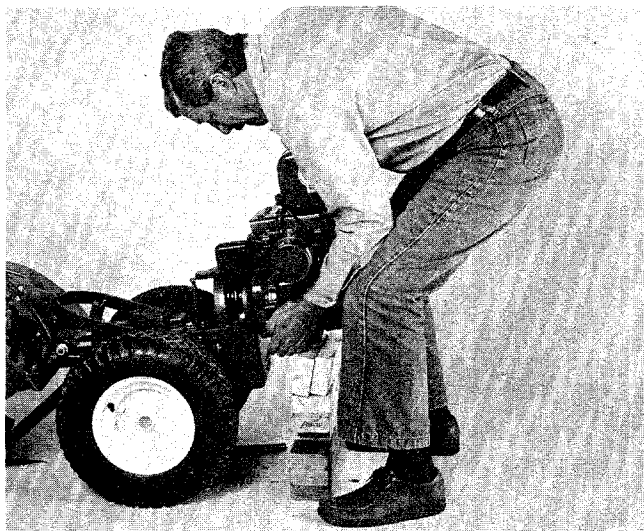
LIFT AND REMOVE ENGINE ASSEMBLY (ALL ENGINES)

Prepare for removal of the engine by having ready a cement block, or a box about 4½" to 12" high, or a clear place on a table ready upon which to place the engine when you take it off the tiller. The 6 H.P. standard engine and mount weigh about 67 lbs.

Lift the engine mount and engine assembly first up, and then towards the front, and away from the tiller. **CAUTION: When you lift up the engine, don't hold it by the air cleaner, or carburetor. You will almost certainly break the carburetor if you do.** Instead, pick the engine up by its steel base with your left hand and by the steel fuel tank mounting bracket with your right hand—see Photo 8/101

Once the engine pulley has cleared about ½" above the lower pulley, you can move the assembly away from the tiller.

With the engine removed, it is a good time to check how well the lower pulley (part #1008-1) floats back and forth on the tiller shaft and whether or not the shaft is lubricated. You can also easily check the play on the main drive shaft by removing the first snap ring retaining the lower pulley. Then, remove the pulley and pull the tiller drive shaft back and forth. Please refer to the shimming instructions about removing play from the tiller drive shaft in Section 8.

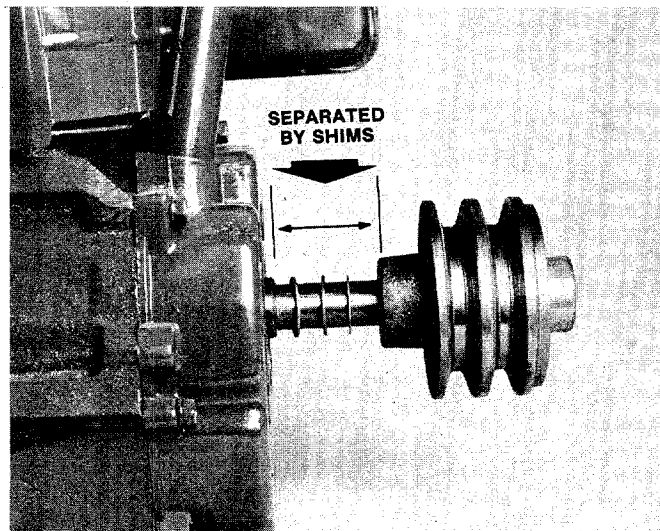


(Photo 8/101) Lift with care.

SEPARATION OF THE ENGINE AND ENGINE MOUNT

While the engine and its engine mount have been removed from the tiller, it's an ideal opportunity to check on the engine seal for oil leaks. Please remember that the location of the engine pulley is fairly critical. This pulley must align itself with the lower transmission pulley when mounted on the tiller. The location of the engine pulley also determines the critical alignment of the reverse disc with the transmission pulley below it.

So, be careful to measure the distance from the end of the engine crankshaft to the closest shim. In other words, one or more shims have been put on the engine power-take-off shaft before the engine pulley was installed—see Photo 8/102. So, when you replace the engine pulley, you should maintain the same distance from the engine oil seal to the shim closest to the end of the shaft. Generally speaking, the manner in achieving this is to replace the engine pulley with the same number of shims. Naturally, this may not be the situation if you are switching engines; that is, replacing one engine with another type engine. When replacement engines are supplied from the factory, they are accompanied by additional shims. Also, you may want to remove, or add, shims to get better alignment of the reverse disc with the transmission pulley. (See "All About Reverse" in Section 7 of this manual.)



(Photo 8/102) Shims between engine and pulley.

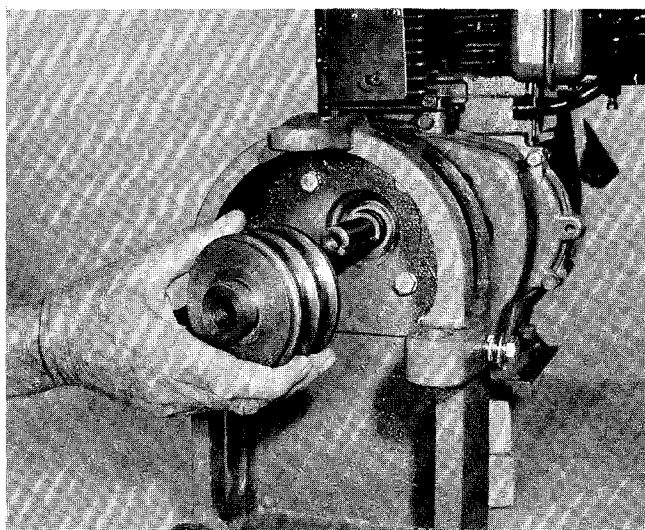
To remove the engine pulley, put a small pry bar or a stiff board behind the pulley and tap it loose. Then remove the pulley as shown in Photos 8/103 and 8/104. As mentioned before, carefully note what size and thickness shims are behind the pulley and the distance from those shims to the front edge of the pulley.

SEPARATING THE ENGINE FROM THE ENGINE MOUNT

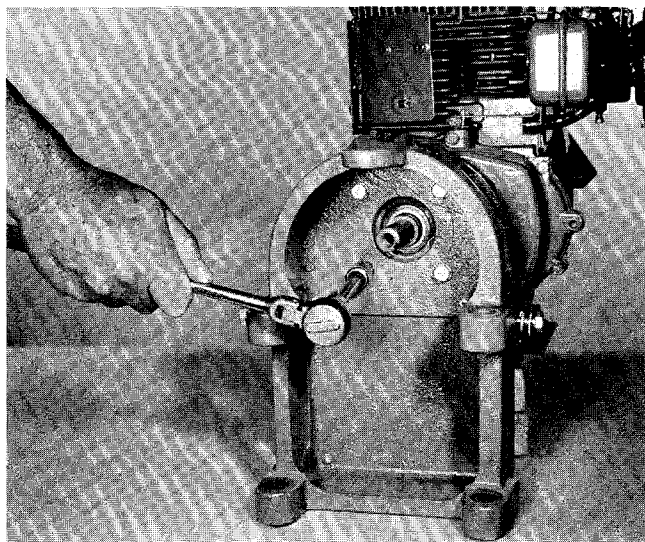
With the engine pulley removed, you can now remove the four 5/16" bolts that secure the engine mount (part #1002) to the engine—see Photo 8/105. Please consult your *Master Parts Catalog* for the Horse Model Tiller for the correct bolts and shims used to mount an engine if you are switching to a different type engine.

Let's say you are replacing a 6 H.P. Tecumseh-Lauson engine with a new 6 H.P. Tecumseh-Lauson engine. You can then expect that it will probably be all right to use the same shims behind the engine pulley that were there originally. A final check of alignment of the upper pulley and reverse disc with the lower pulley grooves is the absolute test.

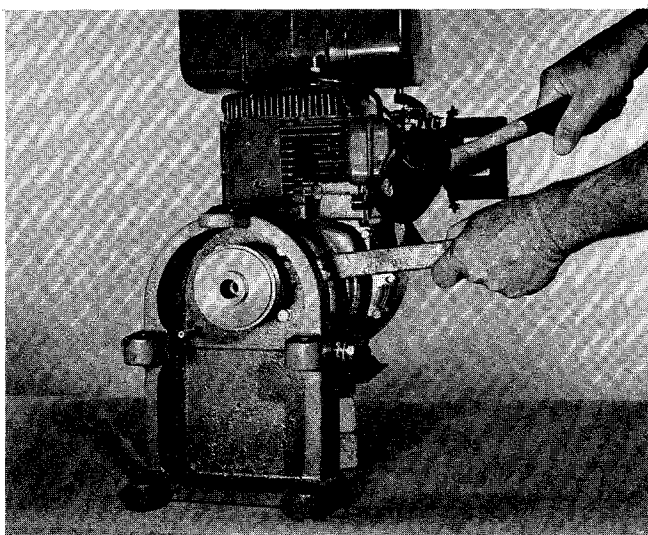
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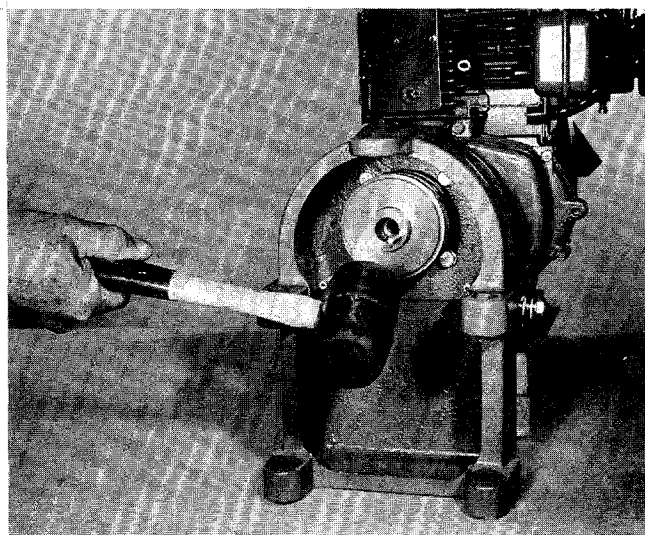
(Photo 8/104) Remove pulley.



(Photo 8/105) Four bolts on mount.



(Photo 8/103) Pry pulley out.



(Photo 8/106) Put on pulley, tap in key.

INSTALLING THE ENGINE ON ITS MOUNT

Reinstall the four 5/16" bolts into the engine mount (6 H.P. engines), shown in Photo 8/105. Then, replace the engine pulley shims and the engine pulley on the engine crankshaft. Insert the key in the keyway by tapping the key in with a mallet or hammer—see (Photo 8/106).

REPLACING THE ENGINE

With the engine pulley and engine mount in place, lift up the engine assembly and set it back in place on the tiller. Align the holes in the engine mount with those in the transmission so that you can replace one of the engine mount bars (part #1034), as shown in Photos 8/107 and 8/108.

REPLACING ENGINE MOUNT BARS

Make sure that each engine mount bar—after being cleaned and greased—has been placed in the engine mount with the threaded hole or red plastic cap on top.

When holes in the engine mount and the transmission are lined up, insert the engine mount bar and push it down on one side—see Photo 8/108. Then, insert the bar on the other side of the engine mount so that it holds the engine and mount in place for you temporarily.

Next, screw the holding bolt and the jam nut for each mounting bar partially into position. Don't let the bolt protrude into the hole far enough to prevent passage of the engine mount bar.

Tap the bars down lightly until they have penetrated the lowest hole of the transmission case—see Photo 8/109. Align the engine mount assembly as you do so. Momentarily, leave the bars right where they are. Then, screw in the locking bolt until the bar offers the slightest resistance. Using a wrench to maintain slight pressure on the bolt, while you continue to tap the bars in place, wait for the groove in the bar to reach the bolt—see Photo 8/110.

Pressure will be released from the bolt. Hold the bar in that position. Screw the bolt all the way in finger-tight, then back off one-half turn. Lock the bolt securely in place with jam nut using two wrenches—one to hold the bolt in position and the other to lock the jam nut. Test

the up and down play of the mounting bars by lifting up on the bar and pushing it back down. This test is only valid if someone supports the engine and aligns the holes, while you test the bars. Repeat the same process on the other side of the engine.

As you can see, the engine mounting bars need to be lubricated well so that the engine can be raised and lowered on the bars as you shift the Forward/Reverse Lever.

Next, reinstall the bolts that mount the yoke to the engine mount (part #1002)—see Photo 8/98. (Make sure the bushings are in the mounting holes of the yoke.

REINSTALLING THE MATCHED SET OF BELTS

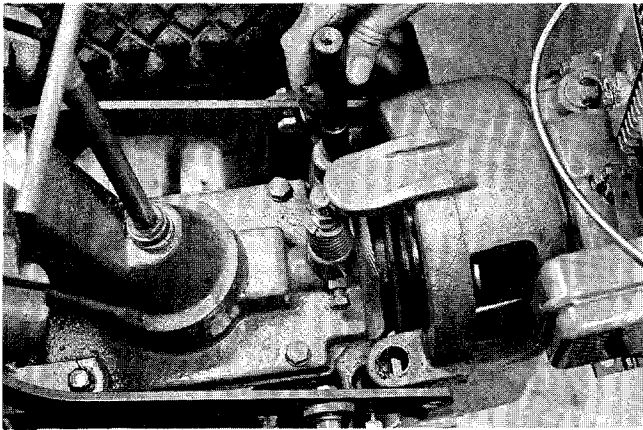
Now, it is time to reinstall a matched set of belts (part #1128) on your tiller. Please refer to the belt removal and installation instructions in Section 7 of this manual for illustrations and directions. Remember to do this before you reinstall the reverse disc and while you are installing the belts. Also, remember to keep the belts inside of the belt guide on the motor mount. After the belts are installed, then return to the next step.

REPLACING THE REVERSE DISC

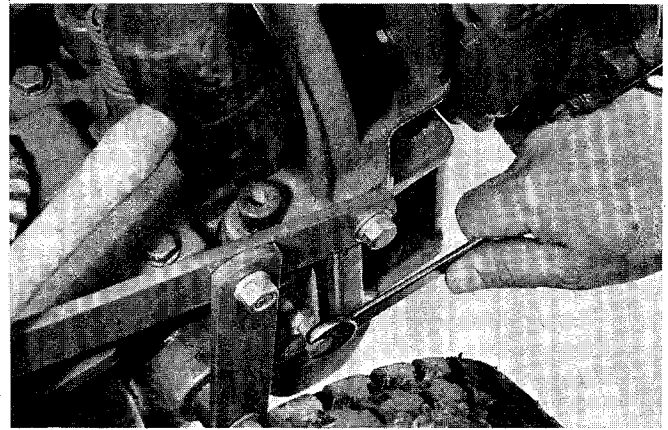
Before installing the disc, look at it to make sure the surfaces are not chipped or gouged out. Note whether there is excessive wear on



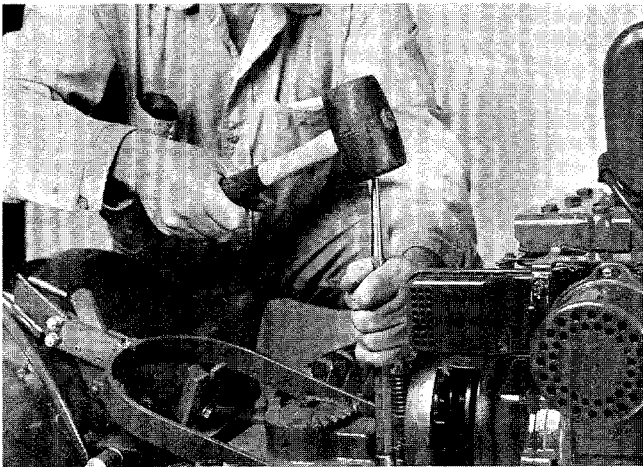
(Photo 8/107) Line up holes, put in bar.



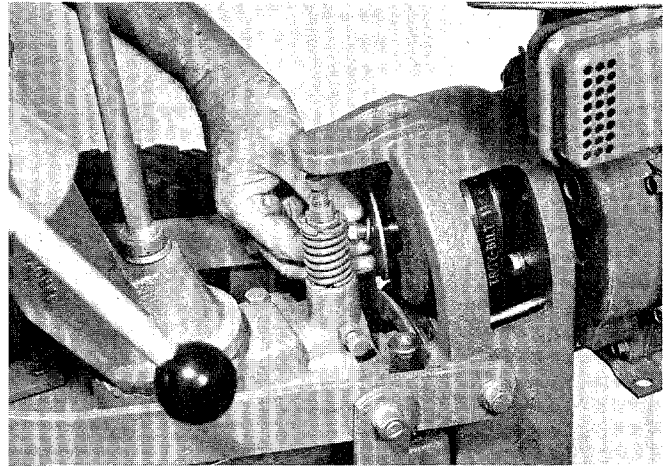
(Photo 8/108) Start bar in one side.



(Photo 8/110) Hold pressure on bolt and tap.



(Photo 8/109) Tap bars in place.



(Photo 8/111) Install bolt, washer, plate and Reverse disc.

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the bottom edge of one surface. (Excessive wear could mean misalignment of the upper and lower pulleys.) Now, put the reverse disc back on the engine pulley, followed by the disc mounting plate and bolt—see Photo 8/111. Tighten the reverse disc mounting bolt securely.

Now, with the reverse disc reinstalled, stand up along the right-hand side of the tiller while someone shifts the lever into and out of Reverse for you—or you can reach over with your left hand and shift the lever into Reverse and release it several times. Closely watch the reverse disc as it lowers toward the transmission pulley. Make sure that it is aligned properly, so that the disc lowers into the groove of the lower pulley. Also, make sure that the reverse disc is well centered over that groove in the lower pulley.

HOOK UP THE THROTTLE CABLE & CHECK THE CLUTCH CONTROL

Replace the throttle wire on the engine speed control assembly, taking care not to spoil the bend of the tip. Then, place the throttle cable in the holding clamp, but don't tighten the screw at this time. Move the throttle lever all the way to the right and then tighten the screw on the clamp. Please refer to the throttle cable and reverse disc instructions in Section 7 for information on making final adjustments to these important controls. Check the belt tension and action of the Forward/Reverse Lever in all positions.

After all bolts have been fastened and adjustments have been made, make sure that you have the proper amount of #30 SE motor oil in the engine. Make sure that the engine pulley mounting bolt is tight and that you have clean, fresh regular gasoline in your engine. When all this is done, you are ready to begin tilling again.