

## SECTION 6 - STARTERS



### PART A - REWIND STARTERS



A BRUNSWICK COMPANY

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# REWIND STARTER - MODELS 220 - 250

## REMOVAL

**NOTE:** If blower housing assembly on engine (Serial No. 2590651 and below) has to be replaced, it will necessary to order a new starter sheave assembly (D-50-54595A1).

1. Remove engine cowl.
2. Partially remove the dash by removing the following:
  - a. Bolt and nut from dash support bracket located under drive sheave on left side of engine.
  - b. Two mounting screws that hold dash to steering support.
  - c. Wiring harness from clamp located on front of blower housing.
  - d. Rubber grommet that holds the control cables to the dash.
  - e. On models equipped with dash mounted primer pump, it may be necessary to remove hoses.
  - f. Lift seat and untie seat retaining rope.
  - g. Pull dash up and back slightly and push starter handle and grommet thru hole in dash.
  - h. Continue to lift dash and pull back until it clears the blower housing assembly.
3. Remove 8 hex head screws from blower housing assembly.
4. Remove blower housing assembly.

## DISASSEMBLY

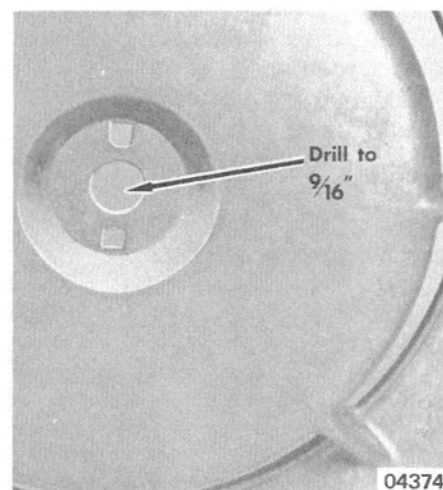
1. Pull starter handle out from housing cover and, with screwdriver, pry rope retainer out of rubber handle.
2. Remove starter rope from rope retainer and allow spring to unwind.
3. Bend lock tabs down from nut and remove nut which holds internal parts to inside of cover.
4. Place screwdriver in sheave shaft slot to hold while removing nut (right hand thread).

**NOTE:** Engines with Serial No. 2590651 and below, sheave shaft had left hand thread.

5. Remove starter rope from sheave and small spring from between starter pawl retainer plate and sheave assembly.

**NOTE:** On engines with Serial No. 2590651 and below, it will be necessary to enlarge sheave shaft hole to 9/16" (14mm). (Figure 1)

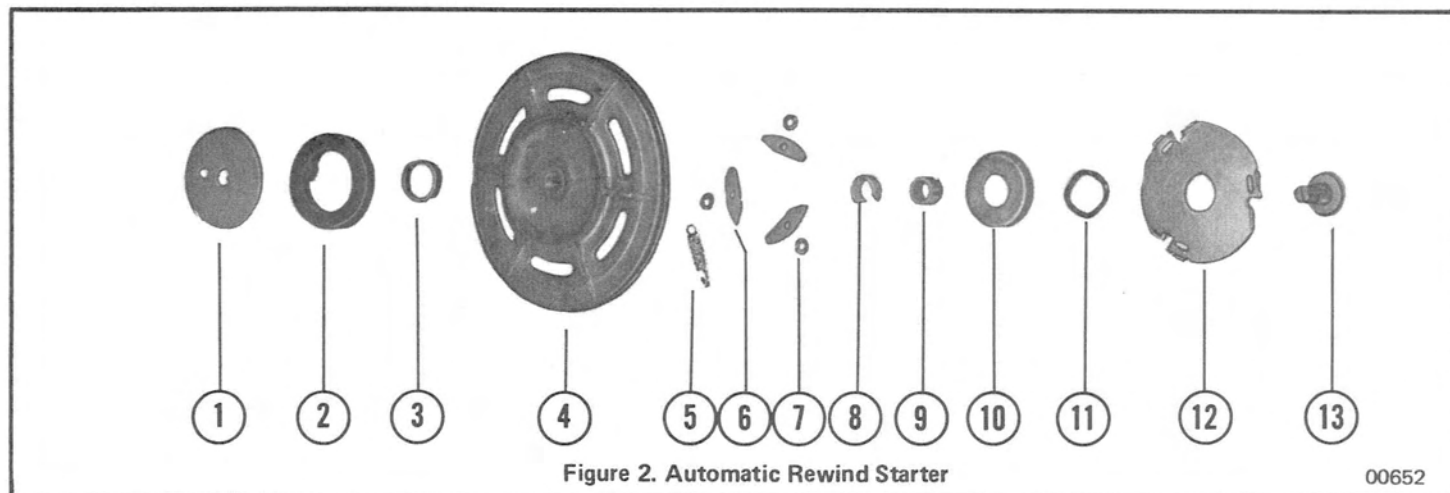
**Figure 1.**  
Enlarging  
Sheave Shaft  
Hole to 9/16"



## REASSEMBLY (Figure 2)

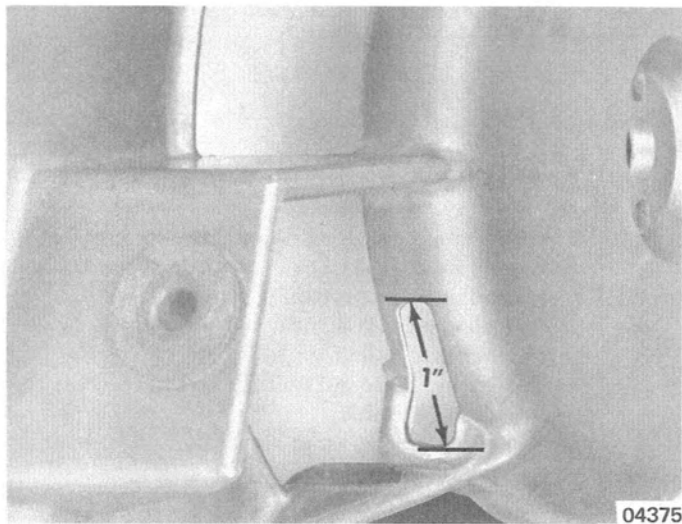
Before reassembly of starter sheave assembly, modify starter rope hole in blower housing assembly, if not as shown in Figure 3. Use round file and make sure that edges are rounded inside and out.

- |                                     |                              |
|-------------------------------------|------------------------------|
| 1 - Starter Spring Retainer         | 7 - Wave Washer              |
| 2 - Starter Rewind Spring           | 8 - Nylon Bushing            |
| 3 - Spring Guide Bushing            | 9 - Sheave Shaft Spacer      |
| 4 - Sheave                          | 10 - Retainer                |
| 5 - Retainer Plate to Sheave Spring | 11 - Wave Washer             |
| 6 - Starter Pawl                    | 12 - Ret. Starter Pawl Plate |
|                                     | 13 - Sheave Shaft            |



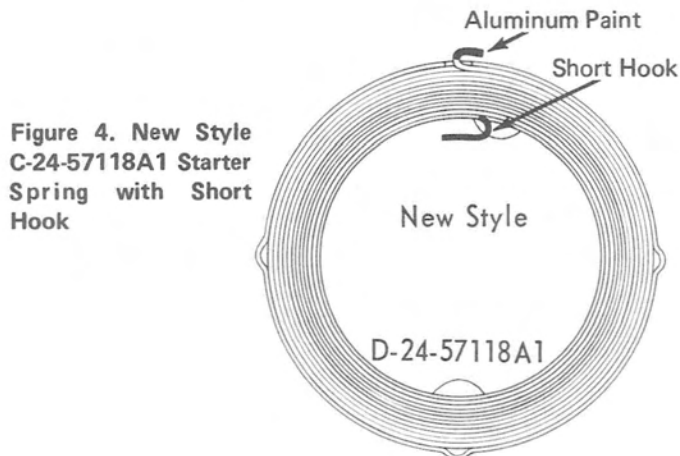
**Figure 2. Automatic Rewind Starter**

00652

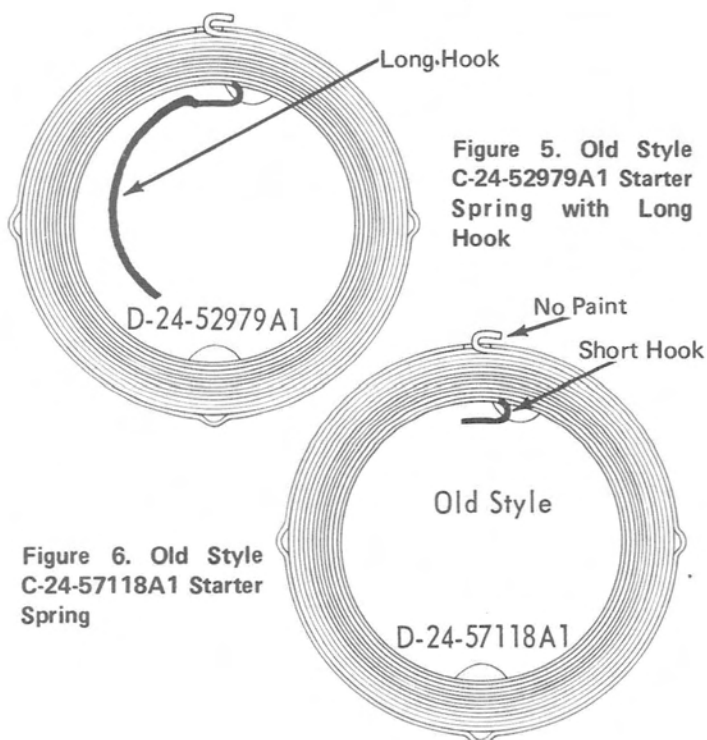


**Figure 3. Starter Rope Hole**

Replace a broken rewind spring on 220 and 250 Models with a new style rewind starter spring **ONLY**. Refer to following drawings (Figures 4-5-6) for proper identification. The **NEW STYLE** starter spring has aluminum paint on the outside end hook, as shown.

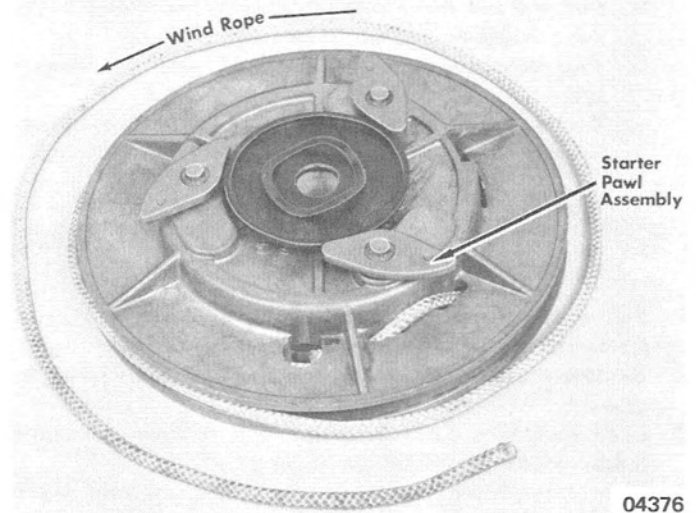


**Figure 4. New Style C-24-57118A1 Starter Spring with Short Hook**



**Figure 6. Old Style C-24-57118A1 Starter Spring**

1. Place sheave in vise and engage outer loop of spring into slot of spring recess in sheave. Wind counterclockwise (to left) until spring is in place.
2. Replace starter rope by pushing rope thru anchor holes located on inside diameter of sheave. Make sure that anchor pin is located in slot of first hole.
3. Wind rope on sheave in a counterclockwise (left hand) direction, working from bottom of sheave and allowing enough free end to insert later thru cover opening. Wind rope on sheave as shown in Figure 7.

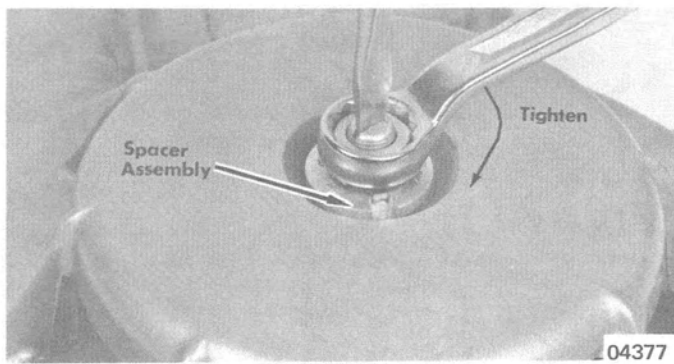


**Figure 7. Winding Rope on New Sheave**

4. Set nylon bushing and sheave shaft spacer in place in sheave hub.
5. Set wave washer retainer on with cup end up. Set wave washer into cup.
6. Mount the 3 starter pawl wave washers on anchor pins of sheave and follow with starter pawls on top of pins. Lubricate all parts with a very thin coating of low temperature lubricant or equivalent as they are installed.
7. Assemble starter pawl to sheave with identification mark side away from sheave and end, on which mark appears, toward rim of sheave. (Figure 7)

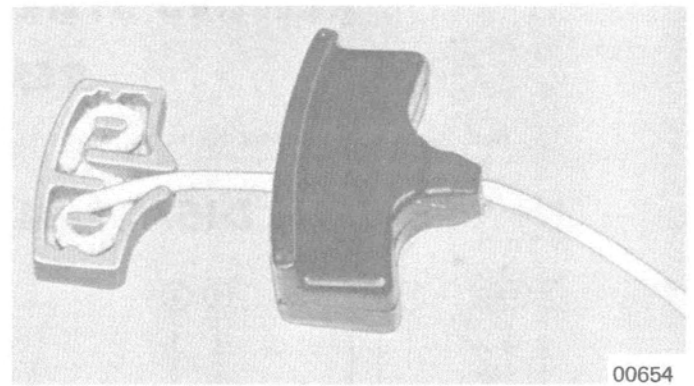
*NOTE: Be careful when replacing these pawls that they all are set the same way. Radii of pawls are to follow radius of pawl retainer plate. (Figure 7)*

8. Connect one end of small spring to sheave and other end to pawl retainer plate.
9. Set pawl retainer plate in position. Refer to Figure 2, items 11 and 12. Be sure that pawls extend thru slots in sides and insert sheave shaft so that keyway guides thru spring retainer notch.
10. Insert sheave shaft thru pawl retainer plate assembly and sheave.
11. Turn sheave over and place spring guide bushing on hub of sheave, chamfered end toward sheave.
12. Lubricate spring and spring guide bushing with a very thin coating of low temperature lubricant.
13. Set spring retainer on top of spring, engaging inner loop in anchor pin of spring retainer plate.
14. Insert free end of starter rope into rope outlet in starter cover and tie a loose, temporary knot about one foot from end of rope to hold.
15. Place sheave assembly, with sheave shaft up, into cover for tightening.



**Figure 8. Sheave Assembly Installed**

16. Place spacer assembly, lockwasher for sheave shaft with notch set in keyway and install nut (right hand thread) on sheave shaft. (Figure 8)
17. Untie temporary knot and insert thru rubber washer, dash grommet, starter rope handle and rope retainer.
18. Starter rope can be installed into new starter handle, as shown in Figure 9.
19. Pull rope and rope retainer into starter handle to complete assembly.
20. Turn sheave shaft counterclockwise with screwdriver until handle is against guide bushing, then turn in additional 2½-turns counterclockwise to wind spring to correct returning tension. (Figure 8)
21. With 7/8" open end wrench, turn down on sheave shaft nut until tight, while keeping screwdriver in slot in shaft to



**Figure 9. Installing Rope in New Starter Handle**

- prevent spring from unwinding.
22. Bend 2 tabs of washer down into slots of spacer assembly and 2 tabs up to flat side of nut.
23. Pull starter rope several times to see that pawls actuate correctly and that there is sufficient tension on starter spring.

*NOTE: Rope should be pulled out to full length to be sure that it does not stick when pulled out.*

24. Replace entire blower housing assembly on engine and torque 8 hex head screws. (Refer to torque specifications in Section 8.)
25. Check that starter pawls engage auxiliary starter plate for proper operation.

## INSTALLATION

1. Push dash forward and down until in place.
2. Reverse "a" thru "g" in Step No. 2 under "Removal", preceding, to mount dash to vehicle.
3. Reinstall engine cowl.

# REWIND STARTER - MODEL 200

## REMOVAL

Remove attaching screws, then note position of starter cable outlet and pull out recoil starter assembly.

### DISASSEMBLY (Figure 1)

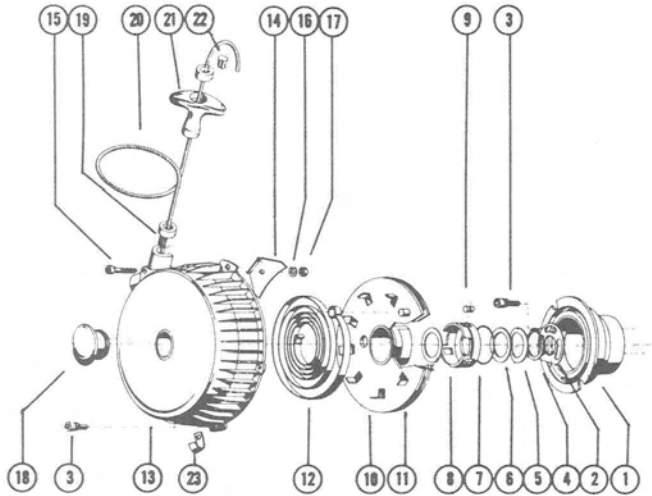


Figure 1. Rewind Starter Components

- |                                 |                                 |
|---------------------------------|---------------------------------|
| 1 - Recoil Starter Drive Hub    | 13 - Starter Housing            |
| 2 - Retaining Plate             | 14 - Cover - Starter Hsg. Plate |
| 3 - Screw                       | 15 - Screw                      |
| 4 - Snap Ring                   | 16 - Lockwasher                 |
| 5 - Tension Lockwasher          | 17 - Cover Plate Screw Nut      |
| 6 - Tension Washer              | 18 - Starter Housing Plug       |
| 7 - Roller Retaining Spring     | 19 - Rope Guide Bushing         |
| 8 - Roller - Starter Hub Cage   | 20 - Starter Rope               |
| 9 - Roller Cage Clamp           | 21 - Starter Rope Handle        |
| 10 - Starter Rope Pulley        | 22 - Starter Rope Clamp         |
| 11 - Starter Rope to Pulley Pin | 23 - Wiring Harness Leads Clip  |
| 12 - Starter Rewind Spring      |                                 |

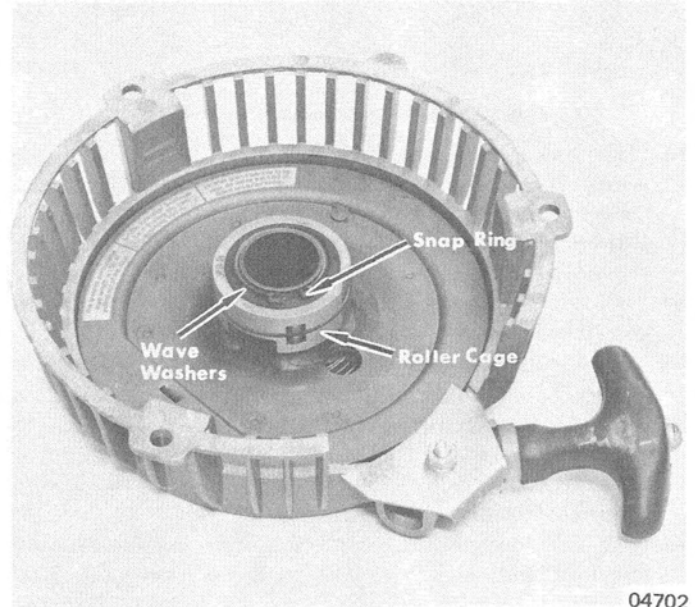
1. Place starter in vice and remove snap ring and wave washers. (Figure 2)
2. Hold sheave and remove roller cage, spring and rollers from center shaft.

**NOTE:** Be careful not to lose rollers when they fall out of cage.

3. Remove starter cable retainer and guide block from housing.
4. Place starter cable into notch on edge of sheave. (Figure 3)
5. Hold sheave in and slowly unwind spring tension.
6. Turn sheave until inner end of spring is seen thru sight hole. Insert a screwdriver thru sight hole and pry spring outward to dislodge it.
7. Carefully pull sheave assembly away from housing.

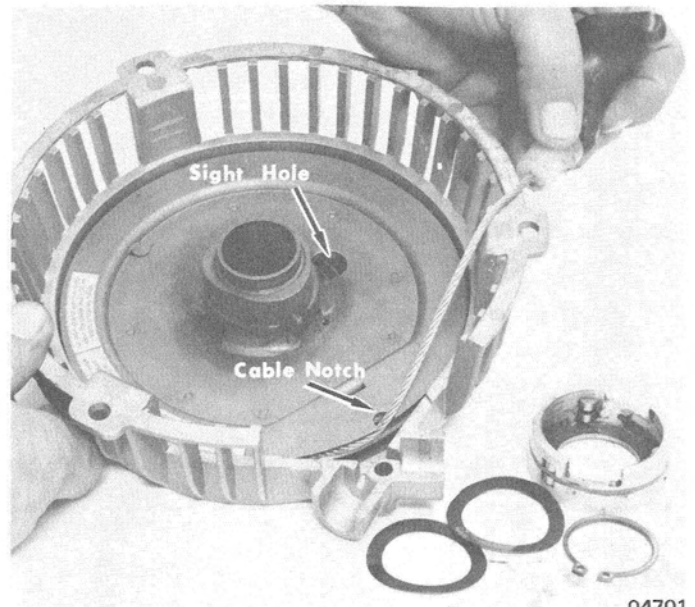
**CAUTION:** Be careful that spring does not come out of sheave.

8. Unwind starter cable from sheave. Note direction of winding for reinstallation.



04702

Figure 2. Rewind Disassembly



04701

Figure 3. Rewind Starter Spring

## REASSEMBLY

1. Clean all parts in solvent and replace any worn components.
2. Replace rewind spring in sheave (if removed). Spring is installed counterclockwise.

**CAUTION:** New springs are secured with wire to prevent snapping open. Do not remove wire until spring is inserted in starter sheave.

3. Insert starter cable into sheave.
4. Coat cam surface of sheave and roller with cold weather lubricant.
5. Install sheave assembly into housing and engage spring. If difficulty is encountered, locate spring on outside of 3 pins or nails inserted into holes around cam surface.
6. Rotate sheave clockwise until rewind spring snaps into place.
7. Rotate sheave counterclockwise until spring end can be seen thru sight hole. If spring is not located properly, pry spring down with a screwdriver.

8. With starter cable handle in recess, wind up spring 2 turns counterclockwise.
9. Place guide block into housing and secure with retainer plate, screw and nut.
10. Pull out cable and check measurement from handle to handle recess (50½" max.).

*NOTE: Recoil spring acts as stop, and cable can be pulled out if spring is not properly tensioned.*

11. Lubricate roller cage with cold weather grease and place 3 rollers inside roller cage.
12. Place roller recess over roll pin in center shaft of sheave.
13. Install wave washers on shaft with lubricant and secure with lock ring.
14. To check roller engagement, pull starter cable. Roller cage should not move until roll pin contacts forward nut of roller cage. If roller cage moves too soon, install another wave washer to increase tension.

## INSTALLATION

1. Slide recoil starter assembly into starter cup with outlet in same position as when removed.
2. Hand tighten with attaching screws.
3. Keep tension on cable and tighten screws.

# REWIND STARTER

## ROCKET, LIGHTNING, 440 MAX, 440 M/X and 440 S/R REMOVAL

1. Raise top cowl. Loosen air inlet baffle at bottom (if so equipped).
2. Remove attaching screws and lift off rewind starter assembly.

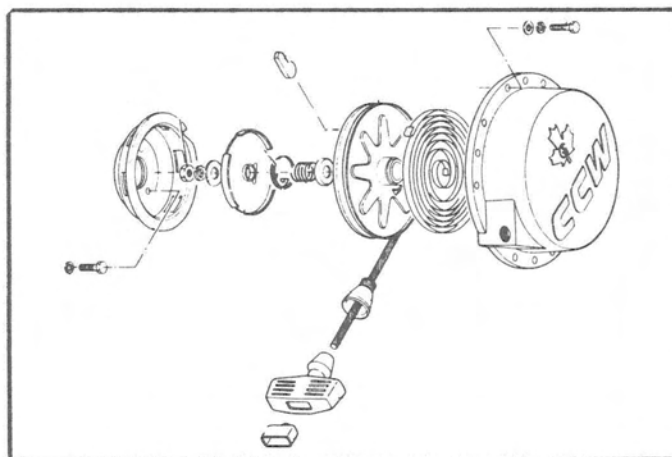
## DISASSEMBLY

1. Pull out starter rope and hold. Untie rope and remove starter handle. (Figure 1)
2. Carefully release rope, while holding sheave, and allow rewind spring to unwind.
3. Remove sheave assembly retaining nut and washers.
4. Remove friction plate, starter pawls and springs.
5. Carefully remove sheave from rewind starter housing.

**CAUTION:** Final tension of spring will uncoil when lifting sheave.

6. Remove rewind spring.

Figure 1. Rewind Starter Assembly



## REASSEMBLY

1. Clean all parts in solvent and replace any worn component.
2. Hook rewind spring on pin inside starter housing.
3. Carefully coil rewind spring into housing, as shown in Figure 2.
4. Remove rope guide from housing.
5. Align tang on sheave with hook on rewind spring and slide sheave into starter housing.
6. Rotate sheave counterclockwise until spring is properly hooked on rewind spring.
7. Place starter pawls into sheave. Place washer, springs and friction plate over housing shaft with loop of large diameter spring thru slot in friction plate.



Figure 2. Rewind Spring Installation

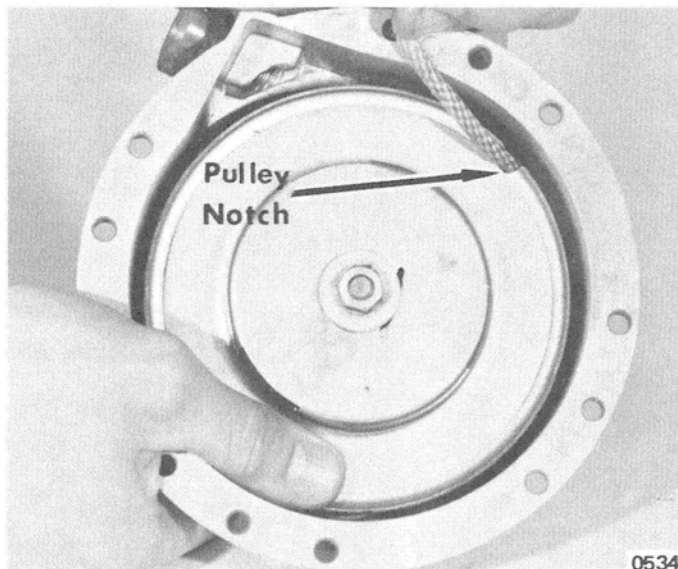


Figure 3. Rewind Spring Tension

8. Secure assembly with flat washer, lockwasher and nut.
9. Position starter rope thru notch in sheave and rotate sheave at least 2 turns clockwise to tension rewind spring. (Figure 3)
10. Hold sheave and guide starter rope thru outlet hole in housing.
11. Slide rope guide and starter handle over rope. Thread rope guide into housing and knot rope to secure handle.

## INSTALLATION

1. Place rewind starter assembly in position on flywheel housing with attaching screws.
2. Secure air baffle (if so equipped) and close top cowl.

# REWIND STARTER - HURRICANE, MARK I & MARK II

## REMOVAL

1. Raise top cowl.
2. Remove rubber shroud (located on fan housing), secured with 6 phillips head screws (if so equipped).

*NOTE: On Mark I and Mark II models, remove switch box,*

*rectifier (if necessary) and wires from fan housing and move out of way.*

3. Remove cover from fan housing, secured with 7 allen head screws.

## DISASSEMBLY

1. Pull starter handle out from housing, tie knot in rope and pry rope retainer out of rubber handle.
2. Remove starter rope from retainer, untie knot and release rope to allow spring to unwind.
3. Bend lock tabs down from nut on starter housing. (Figure 1)
4. Remove nut (right hand thread) which holds internal parts to inside top of housing with aid of sheave shaft. Component parts are removable.

**CAUTION:** When removing the following parts (Paragraph 5), be careful that rewind spring does not fly out of sheave and cause injury. Place cloth in hand and grasp spring firmly. Pull out, allowing spring to uncoil slowly in hand.

5. Remove retainer plate, shaft, starter pawls, wave washers, bushing, spring guide, retainer spring, sheave shaft spacer, wave washer and wave washer retainer.

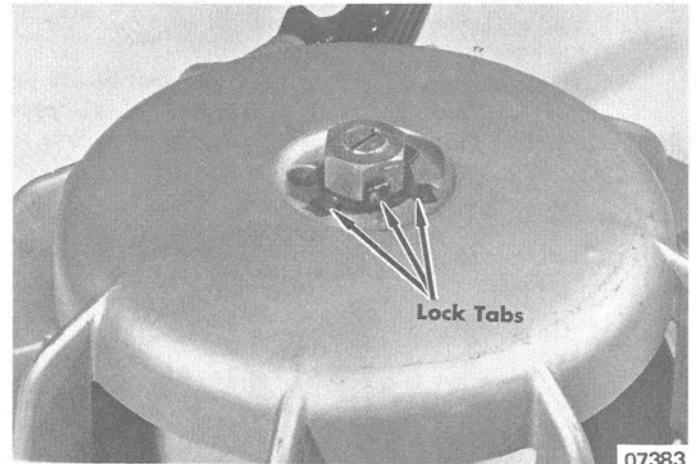


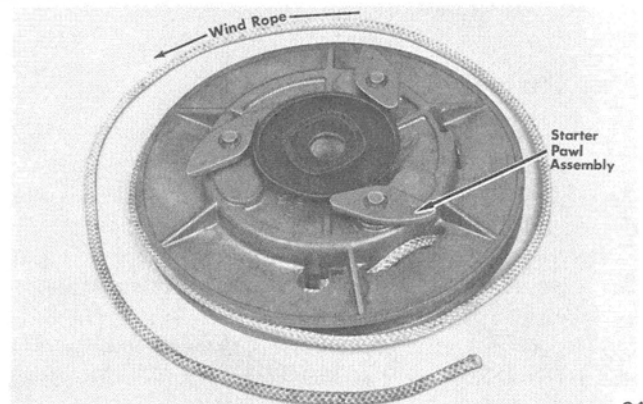
Figure 1. Lock Tab Location

6. Remove starter rope from sheave by unwinding and twisting end near anchor 1/2-turn.

## REASSEMBLY (Figure 2)

1. Install starter rope in starter sheave by attaching anchor end of rope in slot. Slide in sideways and twist 1/2-turn after anchor is in hole in sheave to lock.
2. Wind starter rope on sheave in counterclockwise (left hand) direction, working from bottom of sheave and leaving enough free end to insert later through starter housing opening. (Figure 3)
3. Place sheave in vise and engage outer loop of spring into slot of spring recess in sheave. Wind counterclockwise (left hand) until spring is in place.

Figure 3. Winding Rope on Sheave



04376

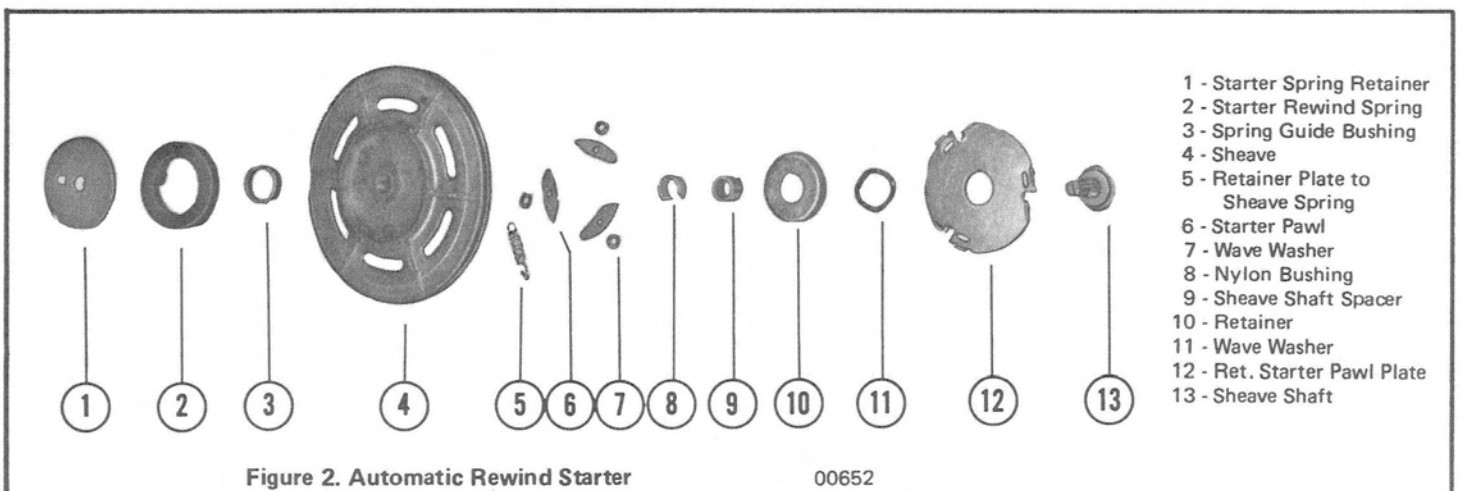
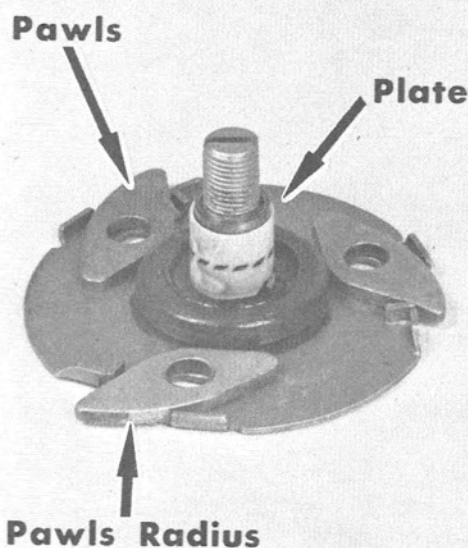


Figure 2. Automatic Rewind Starter

00652

4. Place spring guide bushing on hub of sheave, chamfered end toward sheave.
5. Lubricate spring and spring guide bushing with Low-Temperature Lubricant (C-92-59999).
6. Set spring retainer on top of spring, engaging inner loop in anchor pin of spring retainer plate.
7. Assemble starter pawl to sheave with identification mark side away from sheave and end (on which mark appears) toward rim of sheaves. (Figure 4)
8. Mount the 3 starter pawl wave washers on anchor pins on bottom of sheave and follow with starter pawls on top of pins. (Figure 4) Lubricate all parts with Low-Temperature Lubricant as they are being installed.

**NOTE:** When replacing pawls, make sure that all are set the same way. Radius of pawls is to follow radius of pawl retainer plate (flat angle end to inside) which follows to hold pawls in place. (Figure 4)



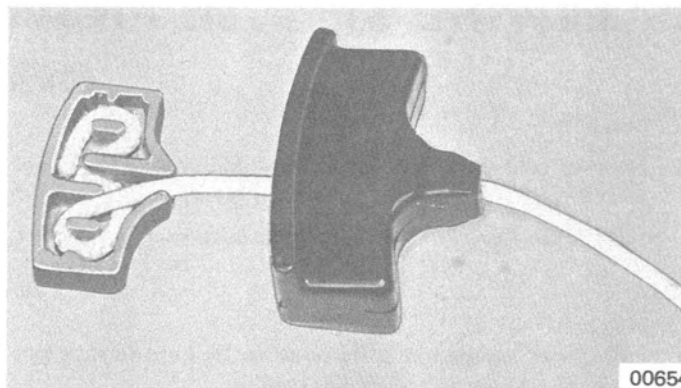
**Figure 4. Pawl Radius**

06511

9. Set nylon bushing and sheave shaft spacer in place in sheave hub.
10. Set wave washer retainer on sheave shaft with cup end up. Set wave washer into cup and place pawl retainer plate in position.

**NOTE:** Be sure that pawls extend through slots in sides and insert sheave shaft so that keyway guides thru spring retainer notch.

11. Insert sheave shaft through pawl retainer plate assembly and sheave.
12. Insert free end of starter rope into rope outlet in starter cover and tie temporary knot about one foot from end of rope to hold.
13. Place sheave assembly (with sheave shaft up) into starter housing.

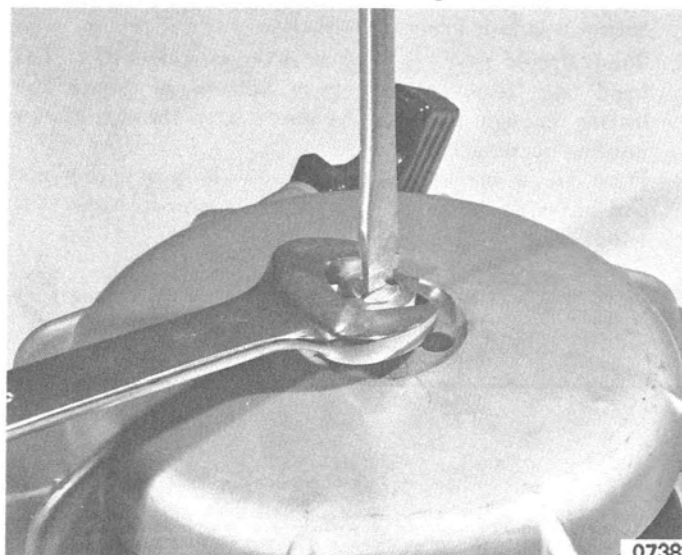


00654

**Figure 5. Install Rope in Retainer**

14. Place lockwasher on sheave shaft with notch set in keyway. Install nut (right hand thread) on sheave shaft.
15. Untie temporary knot and insert rope through rubber handle into rope retainer.
16. Install rope into retainer as shown in Figure 5.
17. Pull rubber handle onto retainer.
18. Turn sheave shaft counterclockwise with screwdriver until starter handle is against guide bushing, then turn an additional 2½-turns counterclockwise to wind spring to correct returning tension.
19. Tighten nut on sheave shaft with ¼" open-end wrench, while keeping screwdriver in shaft slot to prevent spring from unwinding. (Figure 6) Torque nut to specification.
20. Bend one tab of washer down into hole of cover and one tab up to flat side of nut.
21. Pull starter rope several times to see that pawls actuate correctly and that sufficient tension is exerted on starter spring.

**NOTE:** Rope should be pulled out to full length to be certain that it does not stick when pulled out.



07382

**Figure 6. Tightening Nut on Housing**

## INSTALLATION

1. Reinstall cover to fan housing with 7 allen head screws. Place a drop of Loctite Type "A" on each screw. Torque to specifications.
2. Reinstall rubber shroud with 6 phillips head screws (if so equipped).

**NOTE:** On Mark I and Mark II models, attach switch box, rectifier (if removed) and wires to fan housing.

3. Close top cowl.

# REWIND STARTER

## 340 S/R, 340 S/T, 400 S/T, 440 S/T, 340 T/T and 440 T/T

### REMOVAL

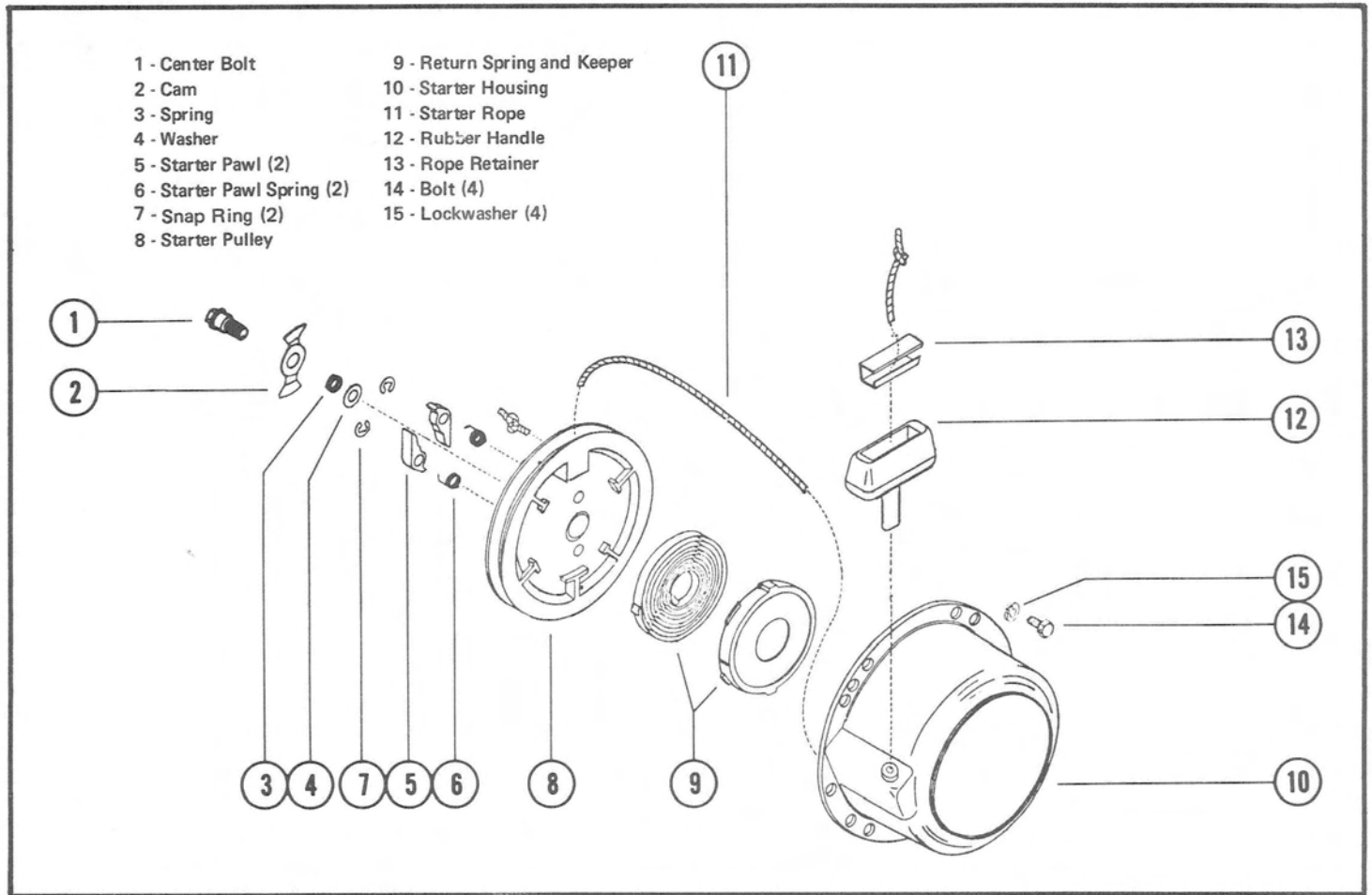


Figure 1. Rewind Starter Assembly

1. Raise top cowl.
2. On Twister models, remove starter rope from rope guide which is attached to chaincase. Allow rope to rewind on starter pulley.
3. Scribe an index mark on rewind starter and flywheel bell housing to aid in reassembly.
4. Remove attaching bolts and pull rewind starter assembly off flywheel bell housing.

## DISASSEMBLY (Figure 1)

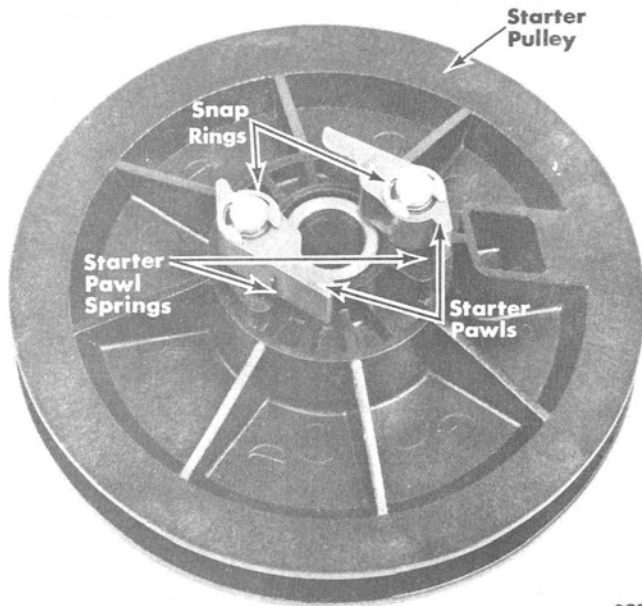
1. Pull starter rope out of starter assembly and tie a knot in rope.
2. Pry rope retainer out of rubber handle, remove starter rope from retainer and untie knot.
3. Remove rope retainer and handle from starter rope.
4. Untie knot in rope and carefully release rope to allow return spring to unwind.
5. Remove center bolt which secures starter components to starter housing.

**WARNING:** When removing the following parts, be careful that rewind spring does not fly out of housing and cause injury. Remove return spring and keeper as an assembly.

6. Lift cam, spring, washer, pulley and return spring from starter housing.
7. Remove starter rope from pulley.
8. Remove snap rings which secure starter pawls to starter pulley. Lift starter pawls and starter pawl springs from pulley assembly.

## REASSEMBLY (Figure 1)

1. Clean all parts in solvent and replace any worn or broken components.
2. Lubricate return spring, pulley assembly (center bushing and spring side of pulley) and center shaft of starter housing with low temperature grease.



08562

Figure 2. Installing Starter Pawls

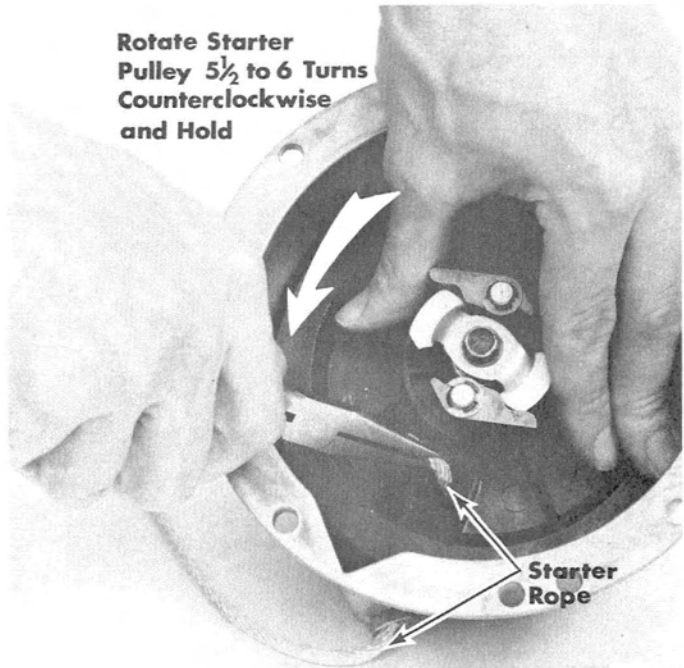
3. Install starter pawl springs and starter pawls in position on starter pulley pins. Secure with snap rings. (Figure 2)
4. Place return spring and keeper around center shaft of starter housing. Engage inner loop of return spring in notch on center shaft.
5. Install starter pulley on center shaft of starter housing. Rotate starter pulley counterclockwise until starter pulley engages return spring keeper and is installed all the way on center shaft.

*NOTE: Starter pulley is properly installed when edge of pulley center bushing is flush with center shaft of starter housing.*

6. Place washer, spring and cam on center shaft of housing

and secure with center bolt. Torque center bolt to specification. (Refer to "Specifications" Section 8.)

7. Fuse both ends of new starter rope with a match.
8. Thread new starter rope thru handle and rope retainer. Tie knot in end of rope and pull handle onto rope retainer.
9. Rotate starter pulley  $5\frac{1}{2}$  to 6 turns counterclockwise and hold. Thread starter rope thru rope guide in starter housing and hole in starter pulley. (Figure 3) Tie a knot in pulley end of rope and pull knot back into recess in pulley. Release spring tension by letting starter rope slowly rewind.



08563

Figure 3. Installing Starter Rope

10. Pull starter rope several times to be sure that starter pawls actuate properly and that return spring has sufficient tension to fully wind rope onto starter pulley.

*NOTE: Rope should be pulled out to full length to be certain that starter does not stick.*

## INSTALLATION

1. Align scribe marks (made during removal) and place rewind starter assembly in position on flywheel bell housing. Secure with lockwashers and attaching bolts.

2. On Twister models, pull starter rope from rewind starter and install in rope guide which is attached to chaincase.
3. Close top cowl.

*NOTE: Reattach wire(s), air intake spring and bracket (if so equipped) to rewind starter bolt(s).*