

SECTION 5

CORRECTIVE MAINTENANCE

5-1 GENERAL.

5-1.1 This section contains instructions necessary to identify and isolate problems, and to return the tractors or attachments to operating condition.

5-2 SECTION USE.

5-2.1 Corrective maintenance for each of the major components of the Series 2000 tractors and attachments covered on this manual is presented, as applicable, under the following headings: Removal, Disassembly, Inspection, Repair, Reassembly and Installation.

5-2.2 Corrective maintenance of a problem with a major component may or may not require carrying out the complete removal and disassembly sequence that is presented. Some individual components can be removed out of sequence. The technician should follow the corrective maintenance instructions to the degree needed to accomplish the necessary repair.

5-2.3 Unless specifically instructed to reference from another position, all references to LEFT, RIGHT, FRONT and REAR indicate that position on the tractor when seated in the operators position.

5-3 HOOD, GRILLE AND SIDE PANELS (All Models).

5-3.1 **General.** The hood, grille and side panels serve to protect the operator as well as the equipment. They should be replaced if damaged.



WARNING

Use extreme caution when handling sheet metal components, such as the hood and side panels. These parts may have sharp edges which could cause cuts to the skin.

5-3.2 Removal.

1. Remove the right and left side panels (4 and 5, Figure 5-1) as follows:
 - a. Open the hood and loosen the rear wing nuts (see Fig. 5-2).
 - b. Loosen the upper front wing nuts (Fig. 5-2) on each side of the grille.
 - c. Grasp the side panel just behind the grille (Fig. 5-2) and pull outward to release the side panel from the tapered bushings on the grille.
 - d. Slide the side panel forward and out of the slot in the dash panel.

2. Remove the hood (28, Fig. 5-1) and grille (6) as an assembly as follows:



CAUTION

Do not touch the glass portion of the head lamp bulb (28, Fig. 5-4). Touching the glass surface, or allowing contact with dirt or oil, will reduce the life of the head lamp bulbs.

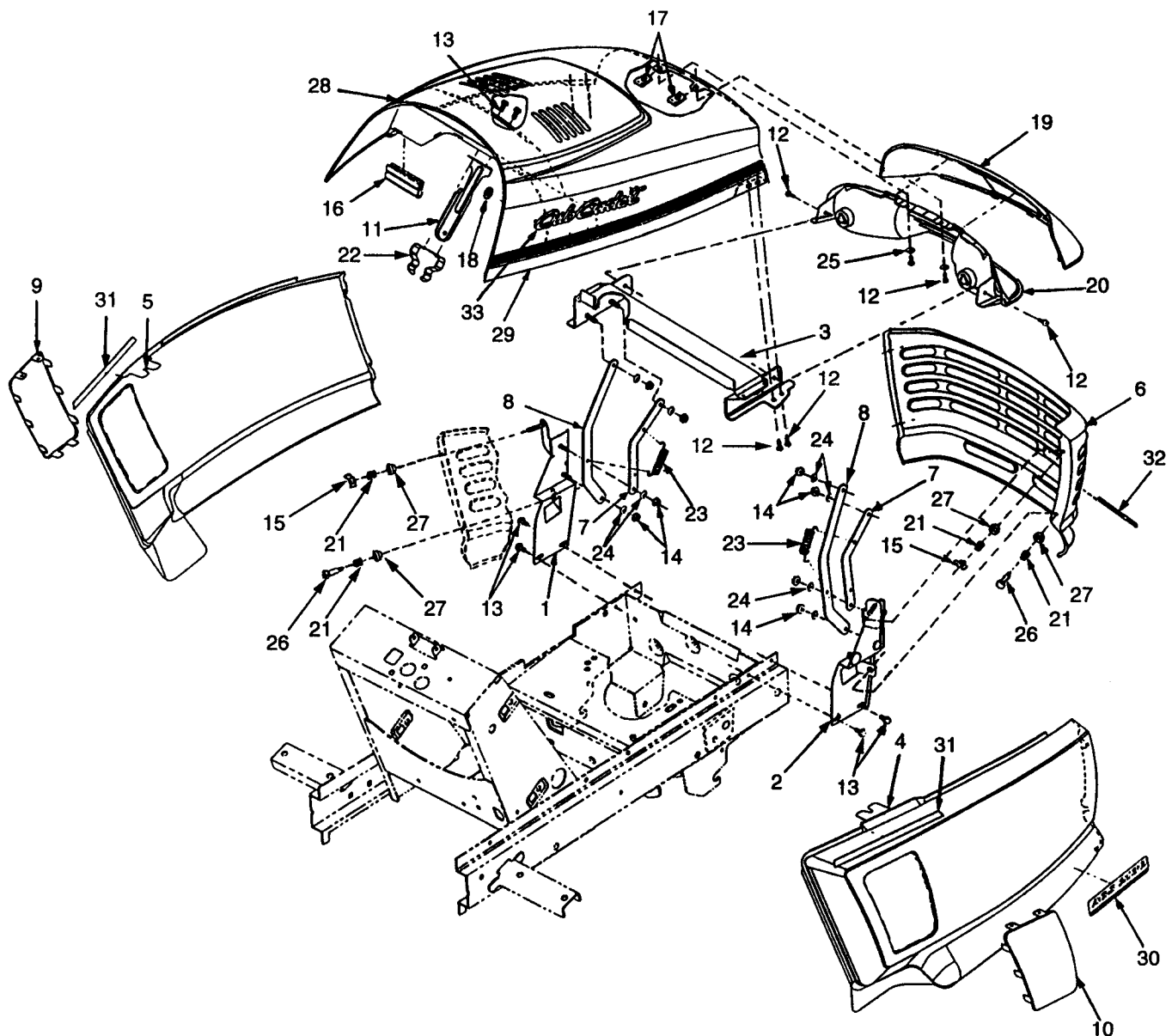
- a. Disconnect the wire harness and remove the head lamp bulbs from the back of the headlight reflector (20) per paragraph 5-4.2.
- b. Pinch the locking barbs to release, or cut the cable ties that secure the wire harness to the RH grille bracket (2).



WARNING

Before removing the hood and grille assembly, close the hood. Failure to do so will allow the hood and grille to flip off the tractor when the screws are removed in the following step c. This could cause damage or injury.

- c. Remove the hex wash. hd. tapp screws (13) which secure the LH and RH grille brackets (1 and 2) to the tractor frame.



- | | |
|------------------------------|-------------------------|
| 1. LH Grille Bracket | 18. Push Nut Retainer |
| 2. RH Grille Bracket | 19. Headlight Lens |
| 3. Upper Hood Bracket | 20. Headlight Reflector |
| 4. RH Side Panel | 21. Compression Spring |
| 5. LH Side Panel | 22. Hood Latch Spring |
| 6. Grille | 23. Extension Spring |
| 7. Short Hood Link | 24. Spring Washer |
| 8. Long Hood Link | 25. Flat Washer |
| 9. LH Panel Screen | 26. Shoulder Bolt |
| 10. RH Panel Screen | 27. Tapered Bushing |
| 11. Hood Guide | 28. Hood |
| 12. Truss Tap Screw | 29. Hood Graphic |
| 13. Hex Wash. Hd. Tapp Screw | 30. Model Graphic |
| 14. Hex Flange Lock Nut | 31. Protective Strip |
| 15. Wing Nut | 32. Warning Graphic |
| 16. Heat Baffle Seal | 33. Cub Cadet Script |
| 17. U-Type Speed Nut | |

Figure 5-1. Hood, Grille, and Side Panels (All Models).

- d. Lift the hood (28) and grille (6) assembly off the tractor frame and place in a work area that will prevent scratches or damage to the painted surfaces.

5-3.3 Disassembly.

1. Separate the hood (28) from the grille (6) by removing the hex flange lock nuts (14) and spring washers (24) which fasten the short and long hood links (7 and 8) to the upper hood bracket (3).
2. Disassemble the hood (28) as follows:
 - a. Remove the truss tap screws (12) fastening the upper hood bracket (3) to the hood (28).
 - b. Using a small screwdriver, carefully pry the side locking tabs of the headlight lens (19) to release them from the front flange of the hood (See Fig. 5-3).

- c. Remove the truss tap screws (12) and flat washers (25) securing the headlight reflector (20) to the hood.
- d. Remove the upper hood bracket (3) and headlight reflector (20) from the hood as an assembly by carefully spreading the hood sides enough to allow removal. Remove the U-type speed nuts (17) from the hood.
- e. Remove the truss tap screw (12) from each side of the headlight reflector (20) to separate the reflector from the upper hood bracket (3).
- f. Remove the headlight lens (19) from the reflector (20) by depressing either the upper or lower locking tabs of the lens to release them from the reflector slots (See Fig. 5-3).

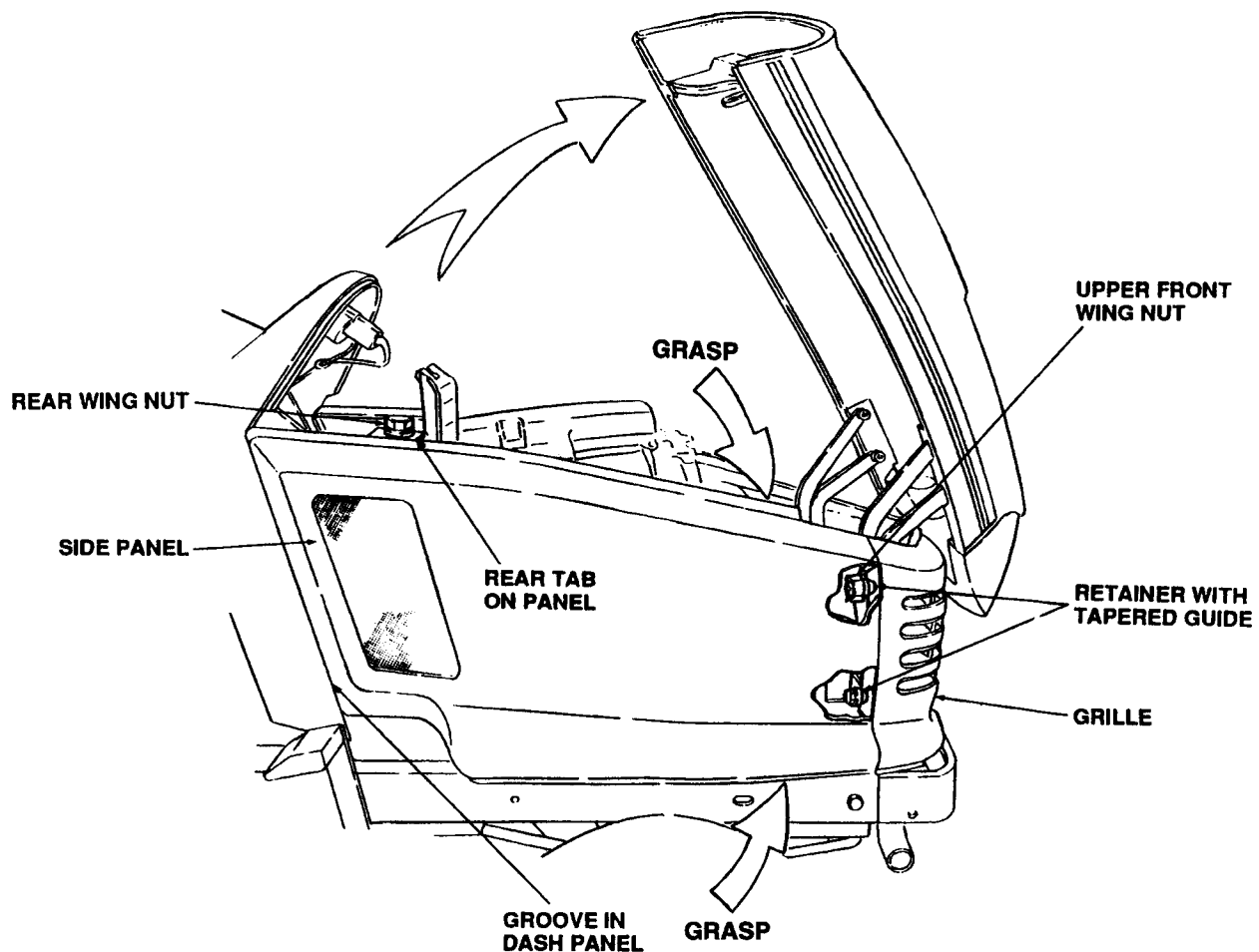


Figure 5-2. Side Panel Removal.

NOTE

Note the orientation of the hood guide (11) and hood latch spring (22) before removing from hood.

- g. Remove the hood guide (11) and hood latch spring (22) by removing the hex wash. hd. tapp screws (13).
 - h. Pull the heat baffle seal (16) off of the rear hood baffle.
 - i. Remove the Cub Cadet script (33) by carefully pulling the push nut retainers (18) from the posts of the script. Replace the retainers if necessary.
3. Disassemble the grille (6) as follows:

NOTE

Not all units were equipped with the hood link extension springs (23).

- a. Remove the extension springs (23) from the hood links (7 and 8).
 - b. After noting their position, remove the short and long hood links (7 and 8) from the grille brackets (1 and 2) by removing the hex flange lock nuts (14) and spring washers (24).
 - c. Remove the wing nuts (15), compression springs (21), and tapered bushings (27) from the upper studs of the grille brackets (1 and 2).
 - d. Remove the LH and RH grille brackets (1 and 2) from the grille (6) by removing the shoulder bolts (26), compression springs (21), and tapered bushings (27).
4. If necessary, remove the LH and RH panel screens (9 and 10) from the side panels (4 and 5) by unbending the tabs of the screen.

5-3.4 **Inspection.** Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.

2. Inspect all parts for cracks, scoring, distortion, corrosion and wear.
3. Inspect the hood links (7 and 8) for elongated holes.
4. Inspect the heat baffle seal (16) for cuts or deterioration.
5. Inspect for a missing or unreadable warning graphic (32) on the grille. Replace if either condition exists.

5-3.5 **Repair.**

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all excessively worn or damaged parts.
4. Replace missing, loose, or damaged labels (29 and 30) or protective strips (31).

5-3.6 **Reassembly.**

1. If previously removed, install the LH and RH panel screens (9 and 10) as follows:
 - a. Make certain all the tabs are perpendicular to the face of the screen.
 - b. Position the screen in the opening of the side panel.
 - c. Hold the screen snugly against the outer surface of the side panel and bend the tabs tightly against the inboard edges of the panel opening. Note that repeated bending of the tabs will cause them to break off.
2. Reassemble the grille (6) as follows:
 - a. Insert the upper screw stud of the LH grille bracket (1) through the upper hole of the left grille flange so that the stud points rearward.
 - b. Place the compression spring (21) and tapered bushing (27) on the shoulder bolt (26). The spring should nest in the recess of the tapered bushing, with the tapered surface toward the threaded end of the bolt.
 - c. Install the shoulder bolt through the lower grille hole and into the grille bracket.
 - d. Repeat the above procedure (a through c) for the RH grille bracket (2).
 - e. Install a tapered bushing (27), compression spring (21), and wing nut (15) onto both

upper grille bracket studs. Do not tighten the wing nuts at this time.

➡ NOTE

Note the letter G or H is stamped on the end of each hood link (7 and 8) for assembly purposes. The end marked G goes toward the grille; the H toward the hood.

- f. Install the proper end (shorter leg, if not marked) of the long hood links (8) onto the lower screw of the LH and RH grille brackets (1 and 2). Secure the links with spring washers [24,(crowned surface toward the nut)]

and hex flange lock nuts (14). Tighten the lock nuts only enough to slightly depress the spring washers.

- g. Install the proper end of the short hood links (7) on the upper screw of the grille brackets (1 and 2) and secure with the spring washers (24) and hex flange lock nuts (14). Do not overtighten the lock nuts.
- h. If applicable, install the extension spring (23) between the hood links on each side of the grille.

- 3. Reassemble the hood (28) as follows:

- a. Install the Cub Cadet script (33) using new push nut retainers (18).

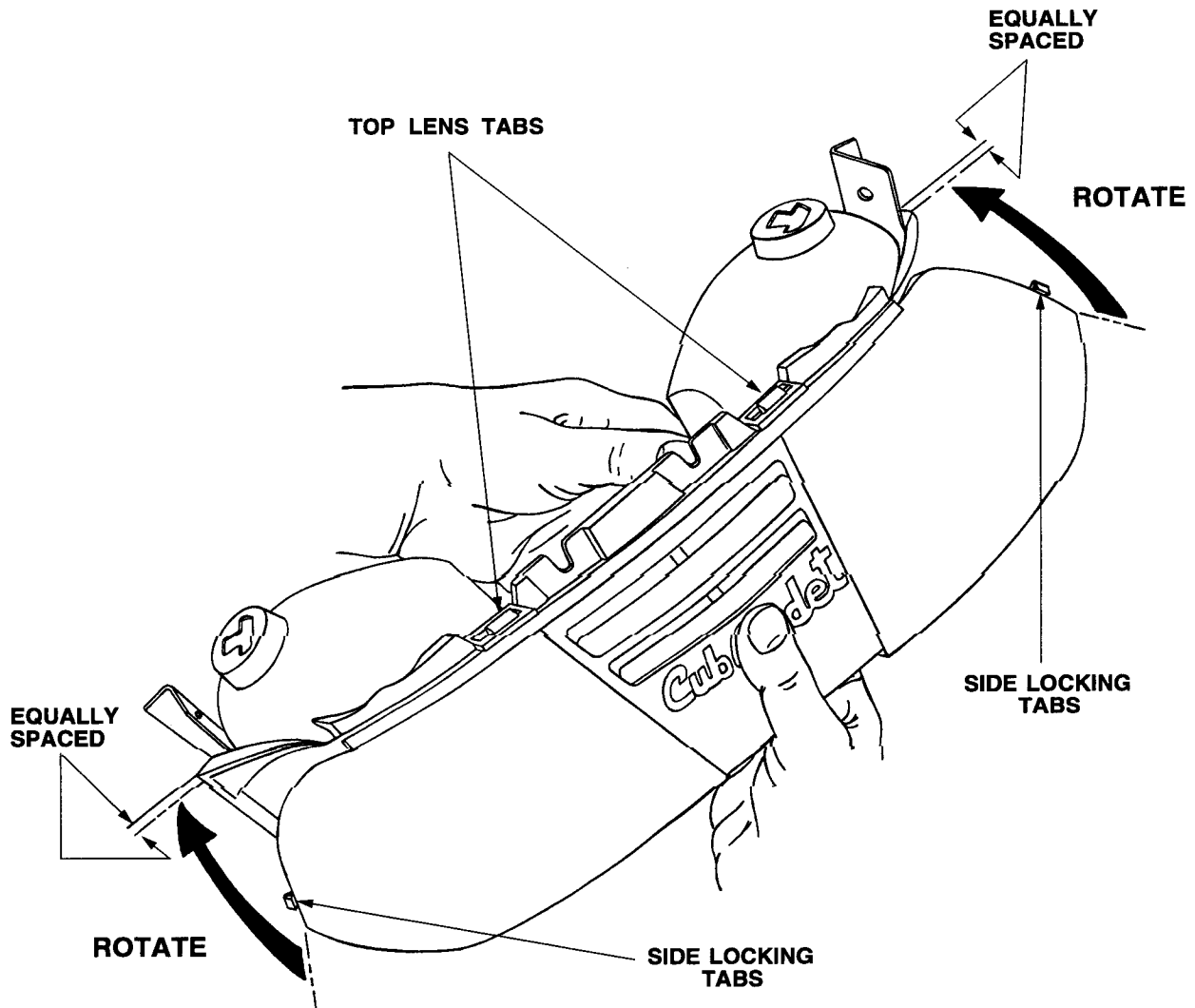


Figure 5-3. Headlight Reflector and Lens Assembly.

- b. Position the heat baffle seal (16) and press onto the rear hood baffle. The seal should completely cover the bottom edge of baffle.
 - c. Position the hood guide (11) in the hood, with the flat surface of the guide toward the front. Position the hood latch spring (22) on the mounting flange of the guide and secure both with the hex wash. hd. tapp screws (13).
 - d. Assemble the headlight lens (19) and reflector (20) as follows:
 1. Holding the lens (19) at approximately a right angle to the reflector (20), insert the top lens tabs into the slotted ears of the reflector (see Fig. 5-3).
 2. While maintaining pressure against the top lens tabs, rotate the lens downward into its normal position.
 3. Slide the lens in the direction necessary to center the lens on the reflector. The lens must be properly centered to enable the side locking tabs of the lens to engage the hood flange when assembled (see Fig. 5-3).
 4. Press the bottom lens tabs into the slots of the reflector until locked. Carefully using a pair of pliers is acceptable.
 - e. Install the headlight reflector/lens on the upper hood bracket (3), with bottom of reflector toward bracket mounting flange. Secure with truss tap screws (12).
 - f. Slide the U-type speed nuts (17) onto the flange of the hood.
 - g. Spread the hood sides to install the upper hood bracket/reflector assembly INSIDE the hood flanges. Make certain the upper ears of the reflector are also inside the front hood flange, and that the U-type nuts (17) have not been dislodged.
 - h. Secure the reflector to the hood using the flat washers (25) and truss tap screws (12).
 - i. Secure the upper hood bracket (3) to the hood with the truss tap screws (12).
 - j. Press the sides of the headlight lens rearward to snap the locking tabs onto the flange of the hood (It may be necessary to deliver a short rearward blow to the side of the lens with the heel of your hand).
4. Reassemble the grille to the hood as follows:
 - a. Attach the short hood links (7) to the front screws of the upper hood bracket (3) and secure with the spring washers (24) and hex flange lock nuts (14). Tighten the lock nuts only enough to slightly depress the spring washers.
 - b. Attach the long hood links (8) to the rear screws of the hood bracket and secure with the spring washers (24) and hex flange lock nuts(14). Do not overtighten the lock nuts.
- 5-3.7 Installation.**
1. Install the hood and grille assembly as follows:
 - a. Position the hood and grille on the tractor so that the slotted holes of the LH and RH grille brackets align with the frame holes, and the hood guide (11) engages the bulkhead slot.
 - b. Install the hex wash. hd. tapp screws (13), but do not completely tighten now.
 - c. Align the rear edge of the hood with the dash panel and close the hood.
 - d. Press the front of the hood down completely and recheck the rear edge alignment. Adjust the grille brackets as necessary to obtain an even spacing of approximately .100 inch.
 - e. While holding the hood in place, tighten the hex wash. hd. screws (13).
 - f. Secure the wire harness to the right hand side of the grille with the previously removed, or new, cable ties.
 - g. Install the head lamp bulbs and connect the wire harness per paragraph 5-4.7.
 2. Install the side panels as follows:
 - a. Slide the rear of the side panel into the slot of the dash panel; then swing the front toward the grille, making sure the rear tab is between the wing nut and the bulkhead.
 - b. Align the front side panel slots with the tapered bushings, and press the panel into place between the bushings and the grille. The tapered bushings should seat in the circular opening at the bottom of the slots.
 - c. Tighten the rear and upper front wing nuts and close the hood.

5-4 BATTERY and ELECTRICAL COMPONENTS (Models 2130, 2135, 2140, 2145 and 2185).

5-4.1 **General.** Refer to Appendix C for additional information about servicing electrical components.

5-4.1.1 Models 2130, 2135, 2140, 2145 and 2185 are equipped with a solenoid shift type starter. Refer to the appropriate Engine Service Manual (see Appendix A) for information regarding the solenoid on these models.



WARNING

The electrical system contains safety interlock switches that are essential for operator safety. These devices must be present on the tractor and must be in proper working order.

5-4.2 Removal.

1. Remove the side panels per paragraph 5-3.2.



WARNING

Battery cables must be disconnected in the proper order to avoid arcing. ALWAYS remove the negative battery cable from the battery before removing the positive cable.

2. Remove the battery (12, Fig. 5-4) as follows:
 - a. Remove the negative battery cable and main harness (1) ground lead from the battery by removing the battery bolt AND NUT (29).



NOTE

Some units have the main harness battery lead (small red wire) connected at the positive terminal of the battery, while on others the connection is made at the starter cable connection on the starter solenoid. Regardless of its location, the harness lead should be inside the red terminal cover (22) along with the battery cable.

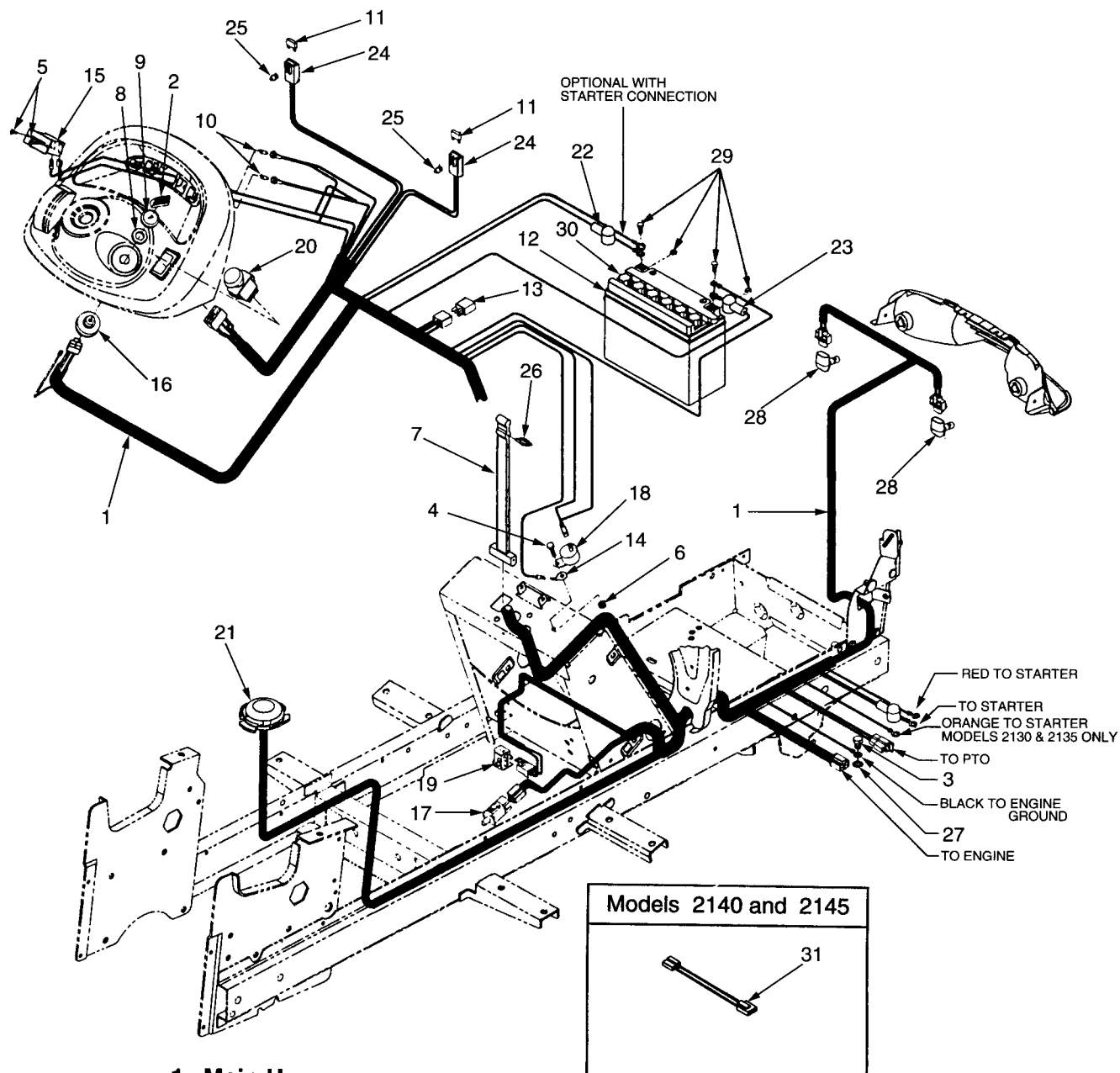
- b. Remove the positive battery cable and main harness lead (if applicable) from the battery by removing the battery bolt AND NUT (29).
 - c. Loosen the hose clamp and remove the drain tube from the battery vent nipple.



WARNING

Battery electrolyte is diluted sulfuric acid. Use extreme care to avoid spilling, and to avoid contact with the skin and eyes. Acid can destroy clothing and burn your skin.

- d. From underneath the battery, pull the bottom of the battery retainer strap (7) down and forward to release from the pedestal tab.
 - e. Lift the battery out of the tractor.
 - f. Remove the battery retainer strap (7) by pulling it down through the pedestal opening.
3. Unplug the reverse relay (13) from the main harness (1). Some relays have a silicone gasket on the terminals (See Service Bulletin CC-310).
4. Slide the fuse holders (24) off of the fuse holder mounting clips (25) and remove the fuses (11) from the holders.
5. Pinch the locking barbs of the fuse holder mounting clips (25) to remove them from their mounting location.
6. Disconnect the main harness connector and ground wire from the voltage indicator (18) and quick connect lug (14). Remove the indicator and quick connect lug by removing the hex cap screw (4) and hex sems nut (6).
7. Unplug the wire harness connector from the PTO switch (20); then remove the switch by pinching the locking tabs and pushing the switch up through the dash panel.
8. Unplug the harness connector and ground lead from the ignition switch (16), and remove the ignition switch by removing the ignition switch cap (9) and switch nut (8).
9. After unplugging the harness leads, remove the hour meter (15) and dash label by removing the truss hd. tapp screws (5) and pushing the meter outward from the underside of the dash panel.
10. From underneath the dash panel, turn the indicator bulb sockets counterclockwise and pull from the dash panel to remove the indicator bulbs (10).
11. Lift the retaining clip and unplug the harness connector from the reverse switch (19); then depress



- | | |
|---------------------------|----------------------------|
| 1. Main Harness | 17. Interlock Switch |
| 2. Ignition Key | 18. Voltage Indicator |
| 3. Hex Cap Screw | 19. Reverse Switch |
| 4. Hex Cap Screw | 20. PTO Switch |
| 5. Truss Hd. Tapp Screw | 21. Seat Switch |
| 6. Hex Sems Nut | 22. Red Terminal Cover |
| 7. Battery Retainer Strap | 23. Black Terminal Cover |
| 8. Ignition Switch Nut | 24. Fuse Holder |
| 9. Ignition Switch Cap | 25. Fuse Holder Mntg. Clip |
| 10. Indicator Bulb | 26. Rectangular Hook |
| 11. Fuse | 27. External Lock Washer |
| 12. Battery | 28. Head Lamp Bulb |
| 13. Relay w/Gasket | 29. Battery Bolt/Nut (Set) |
| 14. Quick Connect Lug | 30. Battery Cap |
| 15. Hour Meter | 31. PTO Harness Adapter |
| 16. Ignition Switch | |

Figure 5-4. Battery and Electrical Components (Models 2130, 2135, 2140, 2145, and 2185).

the locking tabs and push the switch outward from inside the frame pedestal.

12. Remove the interlock switch (17) as follows:



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

- a. Release the parking brake.



NOTE

To improve access to the interlock switch, remove the bottom internal cotter pin (see 20, Fig. 5-22) to temporarily move the brake lock rod. Also turn the steering wheel to the left.

- b. Disconnect the main harness connector from the interlock switch (17).
- c. Pinch the locking tabs, and remove the switch from the lower right frame pedestal.



CAUTION

Do not touch the glass portion of the head lamp bulb (28, Fig. 5-4). Touching the glass surface, or allowing contact with dirt or oil, will reduce the life of the head lamp bulbs.

13. Spread the locking clips of the harness connectors to disconnect from the sockets of the head-lamp bulbs (28). Turn the sockets (28) 1/4 turn counterclockwise to release from the headlight reflector and remove the bulb assemblies.
14. Remove the main harness (1) as follows:
- a. Disconnect the harness leads from the seat switch (21).
- b. Remove the fender and running boards per paragraph 5-12.2 or 5-13.2.
- c. Unplug the main harness connector from the PTO clutch and the engine harness.
- d. Remove the hex cap screw (3) and external lock washer (27) securing the engine ground, and remove the starter connections.
- e. Pinch the locking barbs to remove, or cut the

several cable ties holding the harness to the tractor frame.

- f. Note the routing of the harness and remove from the tractor.

15. Refer to paragraph 5-11.3 for instruction concerning the removal of the seat switch (21).

5-4.3 Disassembly.

1. For Models 2140 and 2145 only, disconnect the PTO harness adapter (31) from the main harness.
2. Align the opening in the rectangular hook (26) with the profile of its retainer strap hole and pull off to replace.



NOTE

Refer to Appendix E for information regarding replacement insulators available through Cub Cadet.

3. To release the terminals from the insulators, insert a small screwdriver into the opening in the face of the insulator and depress the terminal locking tab while pulling the wire from the back of the insulator. Tag all wires before removing.

5-4.4 Inspection. Clean all parts prior to inspection.

1. Inspect all wires for breaks, cuts, frays, and loose or corroded terminals.
2. Inspect all wires for burned or melted insulation.
3. Inspect all switches for proper operation. Refer to appendices C and D.
4. Using an ohmmeter, test the wire harness for internally broken or shorted wires.

5-4.5 Repair.

1. Repair all damaged wires, where possible.
2. Replace defective insulators.
3. Replace all inoperative electrical components.

5-4.6 Reassembly.

1. If necessary, bend the locking tab upward and push the terminals into the insulator until locked.
2. Push the rectangular hook (26) through the hole of the battery retainer strap (7).

3. For Models 2140 and 2145, connect the PTO harness adapter (31) to the main harness.

5-4.7 Installation.

1. Install the seat switch (21) per paragraph 5-11.6.
2. Install the main harness (1) as follows:
 - a. Position the harness in the frame of the tractor as noted prior to removal (Figure 5-4 gives a good representation of the normal routing).
 - b. Secure the wire harness to the frame using the previously removed, or new, cable ties.
 - c. Connect the harness leads to the starter, and install the engine ground wire using the hex cap screw (3) and external lock washer (27).
 - d. Connect the harness to the PTO clutch and engine wire harness.
 - e. Install the fender and running boards per paragraph 5-12.7 or 5-13.7.
 - f. Connect the yellow harness leads to the seat switch.



CAUTION

Do not touch the glass portion of the head lamp bulb (28, Fig. 5-4). Touching the glass surface, or allowing contact with dirt or oil, will reduce the life of the head lamp bulbs.

3. Connect the harness leads to the head lamp bulb assemblies (28). Align the left head lamp socket with the slots of the headlight reflector, then press in and turn the socket clockwise to lock in place. Repeat for right head lamp socket.
4. Install the interlock switch (17) in the lower right frame pedestal. Align the harness connector with the switch guide notch and press into the switch. If moved, reposition the brake lock rod.
5. Install the reverse switch (19) from the underside (left) of the frame pedestal. Press the harness connector onto the switch, making certain the clip of the connector engages the lug of the switch.
6. Install the indicator bulb sockets (10) into the outer holes of the dash panel and turn clockwise to lock. Note the oil pressure light (red & black wires) goes to the left and the amp light [green & red(brown)] to the right.

7. Install the hour meter (15) in the dash panel using the truss hd. tapp screws (5), and attach the harness leads. Note the dash label should be affixed to the hour meter with an adhesive and is also secured by the tapp screws. Slightly bend the ends of the label to insert the label tabs into the slots of the dash panel.
8. Install the ignition switch (16) using the ignition switch nut [8,(shoulder up)]. Press the ignition switch cap (9) onto the shoulder of the nut, and connect the wire harness and ground lead.
9. Press the PTO switch (20) into the dash panel, making certain it locks into place. Connect the main harness .



NOTE

Some units have an external tooth lock washer placed between the pedestal and the quick connect lug (14) of the voltage indicator.

10. Install the quick connect lug (14) and voltage indicator (18) onto the pedestal using the hex cap screw (4) and hex sems nut (6). Connect the harness connector to the indicator and the ground lead (green) to the lug.
11. Slide the fuse holders (24) onto the fuse holder mounting clips (25) and insert the mounting clips into the holes from which they were removed (i.e. the pedestal, bulkhead, or dash panel). Install the fuses (11).
12. Plug the reverse relay (13) into the main harness.
13. Install the battery (12) as follows:
 - a. Push the battery retainer strap (7) up through the square hole in the pedestal.
 - b. Place the battery in the pedestal with the terminals facing forward.
 - c. Pull the retainer strap down across the front of the battery and hook to the tab of the pedestal.



WARNING

Battery cables must be connected in the proper order to avoid arcing. ALWAYS connect the positive cable to the battery before connecting the negative cable.

- d. Place the battery nut (29) in the opening of the positive battery terminal. Position the positive cable (and wire harness lead, if applicable) on top of the terminal and secure with the battery bolt (29).
- e. Place the battery nut (29) in the negative terminal and connect the negative battery cable and ground lead using the battery bolt (29).
- f. Install the drain tube and hose clamp on the battery vent nipple.

14. Install the side panels per paragraph 5-3.7.

5-5 BATTERY and ELECTRICAL COMPONENTS (Models 2160 and 2165).

5-5.1 **General.** Refer to Appendix C for additional information about servicing electrical components.



WARNING

The electrical system contains safety interlock switches that are essential for operator safety. These devices must be present on the tractor and must be in proper working order.

5-5.2 Removal.

1. Remove the side panels per paragraph 5-3.2.



WARNING

Battery cables must be disconnected in the proper order to avoid arcing. ALWAYS remove the negative battery cable from the battery before removing the positive cable.

2. Remove the battery (15, Fig. 5-5) as follows:
 - a. Remove the negative battery cable and main harness (1) ground lead from the battery by removing the battery bolt AND NUT (35).



NOTE

Some units have the main harness battery lead (small red wire) connected at the positive terminal of the battery, while on others the connection

is made at the battery cable connection on the solenoid. Regardless of its location, this harness lead should be inside the red terminal cover (26) along with the battery cable.

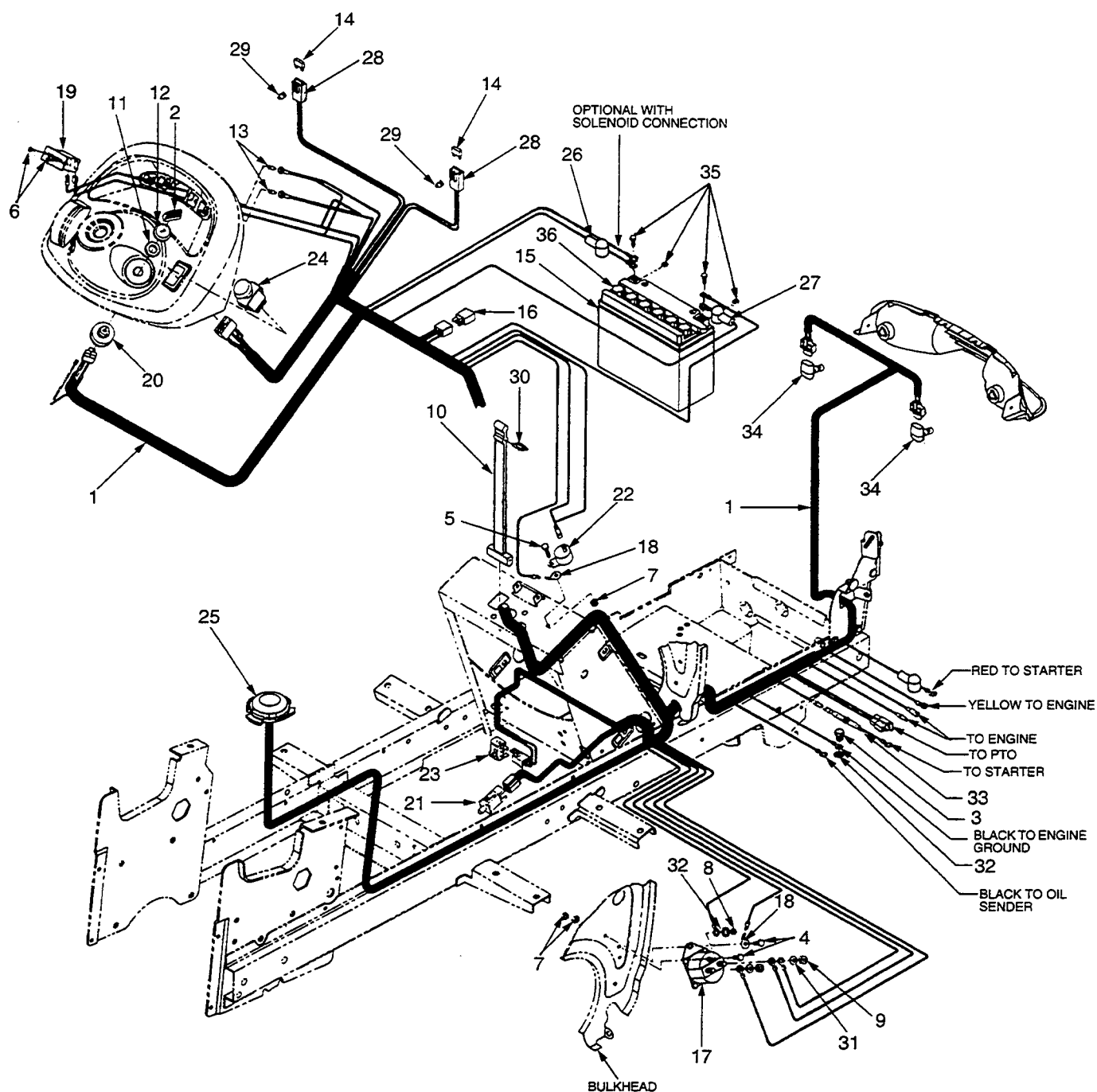
- b. Remove the positive battery cable and main harness lead (if applicable) from the battery by removing the battery bolt AND NUT (35).
- c. Loosen the hose clamp and remove the drain tube from the battery vent nipple.



WARNING

Battery electrolyte is diluted sulfuric acid. Use extreme care to avoid spilling, and to avoid contact with the skin and eyes. Acid can destroy clothing and burn your skin.

- d. From underneath the battery, pull the bottom of the battery retainer strap (10) down and forward to release from the pedestal tab.
- e. Lift the battery out of the tractor.
- f. Remove the battery retainer strap (10) by pulling it down through the pedestal opening.
3. Unplug the reverse relay (16) from the main harness (1). Some relays have a silicone gasket on the terminals (See Service Bulletin CC-310).
4. Slide the fuse holders (28) off of the fuse holder mounting clips (29) and remove the fuses (14) from the holders.
5. Pinch the locking barbs of the fuse holder mounting clips (29) to remove them from their mounting location.
6. Disconnect the main harness connector and ground wire from the voltage indicator (22) and quick connect lug (18). Remove the indicator and quick connect lug by removing the hex cap screw (5) and hex sems nut (7).
7. Unplug the wire harness connector from the PTO switch (24); then remove the switch by pinching the locking tabs and pushing the switch up through the dash panel.
8. Unplug the harness connector and ground lead from the ignition switch (20), and remove the ignition switch by removing the ignition switch cap (12) and switch nut (11).



- | | | |
|----------------------------|-----------------------|----------------------------|
| 1. Main Harness | 13. Indicator Bulb | 25. Seat Switch |
| 2. Ignition Key | 14. Fuse | 26. Red Terminal Cover |
| 3. Hex Cap Screw | 15. Battery | 27. Black Terminal Cover |
| 4. Hex Cap Screw | 16. Relay w/Gasket | 28. Fuse Holder |
| 5. Hex Cap Screw | 17. Solenoid | 29. Fuse Holder Mntg Clip |
| 6. Truss Hd. Tapp Screw | 18. Quick Connect Lug | 30. Rectangular Hook |
| 7. Hex Sems Nut | 19. Hour Meter | 31. Lock Washer |
| 8. Hex Nut | 20. Ignition Switch | 32. External Lock Washer |
| 9. Hex Nut | 21. Interlock Switch | 33. Diode Assy. |
| 10. Battery Retainer Strap | 22. Voltage Indicator | 34. Head Lamp Bulb |
| 11. Ignition Switch Nut | 23. Reverse Switch | 35. Battery Bolt/Nut (Set) |
| 12. Ignition Switch Cap | 24. PTO Switch | 36. Battery Cap |

Figure 5-5. Battery and Electrical Components (Models 2160 and 2165).

9. After unplugging the harness leads, remove the hour meter (19) and dash label by removing the truss hd. tapp screws (6) and pushing the meter outward from the underside of the dash panel.
10. From underneath the dash panel, turn the indicator bulb sockets counterclockwise and pull from the dash panel to remove the indicator bulbs (13).
11. Lift the retaining clip and unplug the wire harness connector from the reverse switch (23); then depress the locking tabs and push the switch outward from inside the frame pedestal.
12. Remove the interlock switch (21) as follows:



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

- a. Release the parking brake.



NOTE

To improve access to the interlock switch, remove the bottom internal cotter pin (see 20, Fig. 5-22) to temporarily move the brake lock rod. Also turn the steering wheel to the left.

- b. Disconnect the main harness connector from the interlock switch (21).
- c. Pinch the locking tabs, and remove the switch from the lower right frame pedestal.



CAUTION

Do not touch the glass portion of the head lamp bulb (34). Touching the glass surface, or allowing contact with dirt or oil, will reduce the life of the head lamp bulbs.

13. Spread the locking clips of the harness connectors to disconnect from the sockets of the head-lamp bulbs (34). Turn the sockets (34) 1/4 turn counterclockwise to release from the headlight reflector and remove the bulb assemblies.
14. Remove the solenoid (17) as follows:
 - a. Disconnect the starter cable and battery ca-

ble (and the main harness battery lead, if applicable) from the solenoid by removing the hex nuts (9) and lock washers (31).

- b. Disconnect the actuation lead from the solenoid by removing the hex nut (8) and external lock washer (32).
 - c. Pull the ground lead from the quick connect lug(18); then remove the solenoid (17) and quick connect lug from the bulkhead by removing the hex sems nuts (7) and hex cap screws (4).
15. Remove the main harness (1) as follows:
- a. Disconnect the harness leads from the seat switch (25).
 - b. Remove the fender and running boards per paragraph 5-13.2.
 - c. Unplug the wire harness connector from the PTO clutch.
 - d. Remove the hex cap screw (3) and external lock washer (32) securing the engine ground.
 - e. Remove the starter cable and diode assy. (33) from the starter. Tag the harness leads and unplug from all other engine components (see Fig. 5-5).
 - f. Pinch the locking barbs to remove, or cut the several cable ties holding the harness to the tractor frame.
 - g. Note the routing of the harness and remove from the tractor.
16. Refer to paragraph 5-11.3 for instruction concerning the the removal of the seat switch (25).

5-5.3 Disassembly.

1. Disconnect the diode assembly (33) from the main harness.
2. Align the opening in the rectangular hook (30) with the profile of its retainer strap hole and pull off to replace.



NOTE

Refer to Appendix E for information regarding replacement insulators available through Cub Cadet.

3. To release the terminals from the insulators, insert a small screwdriver into the opening in the face of the insulator and depress the terminal locking tab while pulling the wire from the back of the insulator. Tag all wires before removing.

5-5.4 **Inspection.** Clean all parts prior to inspection.

1. Inspect all wires for breaks, cuts, frays, and loose or corroded terminals.
2. Inspect all wires for burned or melted insulation.
3. Inspect all switches for proper operation. Refer to Appendices C and D.
4. Using an ohmmeter, test the wire harness for internally broken or shorted wires.
5. Using an ohmmeter, test the diode assy. (33) for continuity in one direction only.

5-5.5 **Repair.**

1. Repair all damaged wires where possible.
2. Replace defective insulators.
3. Replace all inoperative electrical components.

5-5.6 **Reassembly.**

1. Bend up the terminal locking tab, if necessary, and push the terminals into the new insulator.
2. Push the rectangular hook (30) through the hole of the battery retainer strap (10).
3. Connect the diode assy.(33) to the main harness.

5-5.7 **Installation.**

1. Install the seat switch (25) per paragraph 5-11.6.
2. Install the main harness (1) as follows:
 - a. Position the harness in the frame of the tractor as noted prior to removal (Figure 5-5 gives a good representation of the normal routing).
 - b. Secure the wire harness to the frame using the previously removed, or new, cable ties.
 - c. Connect the starter cable and diode assy. (33) to the starter. Connect the harness leads to the proper engine components.
 - d. Install the engine ground wire using the hex cap screw (3) and external lock washer (32).

- e. Connect the harness to the PTO clutch.
- f. Install the fender and running boards per paragraph 5-13.7.
- g. Connect the yellow harness leads to the seat switch.

3. Install the solenoid (17) as follows:

- a. Install the solenoid (17) and quick connect lug (18) onto the bulkhead with the hex cap screws (4) and hex sems nuts (7).
- b. Connect the actuation lead to the small terminal with the external lock washer (32) and hex nut (8).
- c. Connect the battery cable (and main harness lead, if applicable) and the starter cable using the lock washers (31) and hex nuts (9).



CAUTION

Do not touch the glass portion of the head lamp bulb (34, Fig. 5-5). Touching the glass surface, or allowing contact with dirt or oil, will reduce the life of the head lamp bulbs.

4. Connect the harness leads to the head lamp bulb assemblies (34). Align the left head lamp socket with the slots of the headlight reflector, then press in and turn the socket clockwise to lock in place. Repeat for right head lamp socket.
5. Install the interlock switch (21) in the lower right frame pedestal. Align the harness connector with the switch guide notch and press into the switch. If moved, reposition the brake lock rod.
6. Install the reverse switch (23) from the underside (left) of the frame pedestal. Press the harness connector onto the switch, making certain the clip of the connector engages the lug of the switch.
7. Install the indicator bulb sockets (13) into the outer holes of the dash panel and turn clockwise to lock. Note the oil pressure light (red & black wires) goes to the left and the amp light [green & red (brown)] to the right.
8. Install the hour meter (19) in the dash panel using the truss hd. tapp screws (6), and attach the harness leads. Note the dash label should be affixed to the hour meter with an adhesive and is also secured by the tapp screws. Slightly bend the ends

of the label to insert the label tabs into the slots of the dash panel.

9. Install the ignition switch (20) using the ignition switch nut [11, (shoulder up)]. Press the ignition switch cap (12) onto the shoulder of the nut, and connect the wire harness and ground lead.
10. Press the PTO switch (24) into the dash panel, making certain it locks into place. Connect the main harness.



NOTE

Some units have an external tooth lock washer placed between the pedestal and the quick connect lug (18) of the voltage indicator (22).

11. Install the quick connect lug (18) and voltage indicator (22) onto the pedestal using the hex cap screw (5) and hex sems nut (7). Connect the harness connector to the indicator and the ground lead (green) to the lug.
12. Slide the fuse holders (28) onto the fuse holder mounting clips (29) and insert the mounting clips into the holes from which they were removed (i.e. the pedestal, bulkhead, or dash panel). Install the fuses (14).
13. Plug the reverse relay (16) into the main harness connector.
14. Install the battery (15) as follows:
 - a. Push the battery retainer strap (10) up through the square hole in the pedestal.
 - b. Place the battery in the pedestal with the terminals facing forward.
 - c. Pull the retainer strap down across the front of the battery and hook to the tab of the pedestal.



WARNING

Battery cables must be connected in the proper order to avoid arcing. ALWAYS connect the positive cable to the battery before connecting the negative cable.

- d. Place the battery nut (35) in the opening of the positive battery terminal. Position the positive cable (and main harness lead, if ap-

plicable) on top of the terminal and secure with the battery bolt (35).

- e. Place the battery nut (35) in the negative terminal and connect the negative battery cable and ground lead using the battery bolt (35).
- f. Install the drain tube and hose clamp on the battery vent nipple.

15. Install the side panels per paragraph 5-3.7.

5-6 PTO CLUTCH (Models 2130, 2135, 2140, and 2145).

5-6.1 **General.** Refer to Section 4 for information regarding electrical troubleshooting of the PTO clutch.

5-6.1.1 Usage of impact tools is recommended when removing or installing the hex cap screw that secures the PTO clutch assembly to the engine crankshaft.

5-6.2 Removal.



WARNING

Set the parking brake and remove the battery ground cable for safety.

1. Remove the side panels and the hood and grille assembly per paragraph 5-3.2.
2. Disconnect the electrical connection from the PTO clutch.



WARNING

Do not attempt to remove the muffler or PTO clutch when the engine is hot.

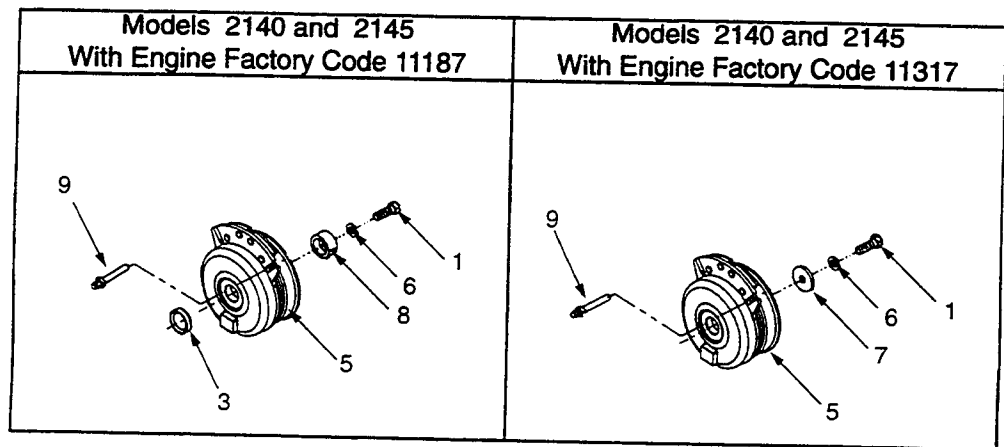
3. Remove the hex flange lock nuts (10, Fig. 5-6) securing the muffler to the tractor frame and remove the muffler.



NOTE

The following step 4 applies only to Models 2130 and 2135.

4. Remove the PTO clutch assy. (5) as follows:



1. Hex Cap Screw
2. Hex Cap Screw
3. Spacer
4. Hex Nut
5. PTO Clutch Assy.
6. Lock Washer
7. Flat Washer
8. Step Spacer End Cap
9. Torque Stud
10. Hex Flange Lock Nut

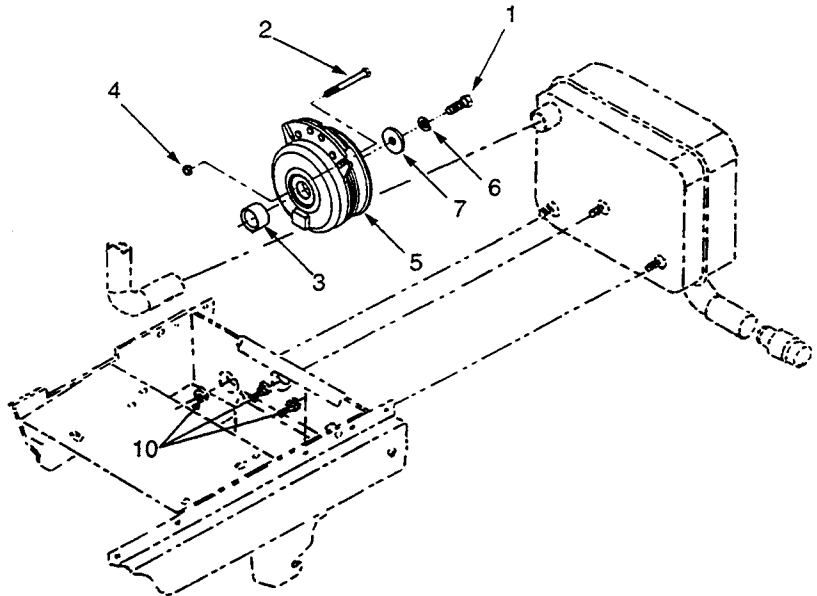


Figure 5-6. PTO Clutch (Models 2130, 2135, 2140 and 2145).

- a. Remove the hex cap screw (1), lock washer (6), and flat washer (7) from the engine crankshaft.
- b. Loosen the hex nut (4) and remove the hex cap screw (2) and hex nut (4) from the engine.
- c. Slide the PTO clutch assy. (5) and spacer (3) off the engine crankshaft. Note the position of the beveled I.D. of the spacer.
5. Remove the PTO clutch assy. (5) as follows:
 - a. Remove the hex cap screw (1), lock washer (6), and step spacer end cap (8) from the engine crankshaft.
 - b. Slide the PTO clutch assy. (5) and spacer (3) off of the engine crankshaft. Note the position of the beveled I.D. of the spacer.
 - c. Remove the torque stud (9) from the engine.

NOTE

The following step 5 applies only to Models 2140 and 2145 with Engine Factory Code 11187.

NOTE

The following step 6 applies only to Models 2140 and 2145 with Engine Factory Code 11317.

6. Remove the PTO clutch assy. (5) as follows:

- a. Remove the hex cap screw (1), lock washer (6), and flat washer (7) from the engine crankshaft.
- b. Slide the PTO clutch assy. (5) off of the engine crankshaft.
- c. Remove the torque stud (9) from the engine.

5-6.3 **Disassembly.** No disassembly should be performed on this PTO clutch assy.

5-6.4 **Inspection.** Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect for bent, nicked, or split pulley sheaves.
3. Inspect the armature plate leaf springs for cracks and broken or loose rivets.
4. Check the bearings for binding or excessive looseness, indicating internal wear.
5. Check the slot of the clutch brake plate and the torque stud (9) or hex cap screw (2) for cracks, distortion, and excessive wear.
6. Inspect the crankshaft spacer (3) for damage or wear.
7. Inspect the keyway of the PTO clutch and engine crankshaft for damage or wear.

5-6.5 **Repair.**

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or worn parts.
4. No service parts are available for the PTO clutch assy. (5). Replace if defective.

5-6.6 **Reassembly.** No reassembly procedures apply to the PTO clutch assy.

5-6.7 **Installation.**



NOTE

The following step 1 applies only to Models 2140 and 2145 with Engine Factory Code 11317.

1. Install the PTO clutch assy. (5) as follows:

- a. Install the torque stud (9) on the engine.
- b. Align the key of the PTO clutch (5) with the keyway of the crankshaft, and the slot of the clutch brake plate with the torque stud; then slide the PTO clutch onto the crankshaft.
- c. Secure the PTO clutch with the flat washer (7), lockwasher (6), and hex cap screw (1). Torque the hex cap screw to 50-60 ft. lbs.



NOTE

The following step 2 applies only to Models 2140 and 2145 with Engine Factory Code 11187.

2. Install the PTO clutch assy. (5) as follows:

- a. Install the torque stud (9) on the engine.
- b. With the beveled I.D. toward the engine, slide the spacer (3) onto the crankshaft.
- c. Align the key of the PTO clutch (5) with the keyway of the crankshaft, and the slot of the clutch brake plate with the torque stud; then slide the PTO clutch onto the crankshaft.
- d. Slide the step spacer end cap (8) onto the crankshaft and secure with the lockwasher (6) and hex cap screw (1). Torque the hex cap screw to 50-60 ft. lbs.



NOTE

The following step 3 applies only to Models 2130 and 2135.

3. Install the PTO clutch assy. (5) as follows:

- a. With the beveled I.D. toward the engine, slide the spacer (3) onto the crankshaft.
- b. Aligning the key of the PTO clutch (5) with the keyway of the crankshaft, and the *right* slot of the clutch brake plate with the threaded hole in the the engine, slide the PTO clutch onto the crankshaft.
- c. With the hex nut (4) threaded up on hex cap screw (2), position the screw (2) in the *right* clutch slot and tighten into the threaded hole of engine.
- d. Secure the hex cap screw (2) by turning the hex nut (4) to jam tightly against the engine.

- e. Secure the PTO clutch with the flat washer (7), lockwasher (6), and hex cap screw (1). Torque the hex cap screw to 50-60 ft. lbs.
4. Install the muffler and secure to the tractor frame with the hex flange lock nuts (10).
5. Connect the main harness connector to the PTO clutch.
6. Install the hood and grille assembly and the side panels per paragraph 5-3.7.

5-7 PTO CLUTCH (Models 2160, 2165, and 2185).

5-7.1 **General.** Refer to Section 4 for information regarding electrical troubleshooting of the PTO clutch.

5-7.1.1 Usage of impact tools is recommended when removing or installing the hex cap screw that secures the PTO clutch assembly to the engine crankshaft.

5-7.2 Removal.



WARNING

Set the parking brake and remove the battery ground cable for safety.

1. Remove the side panels and the hood and grille assembly per paragraph 5-3.2.
2. Disconnect the electrical connection from the PTO clutch.

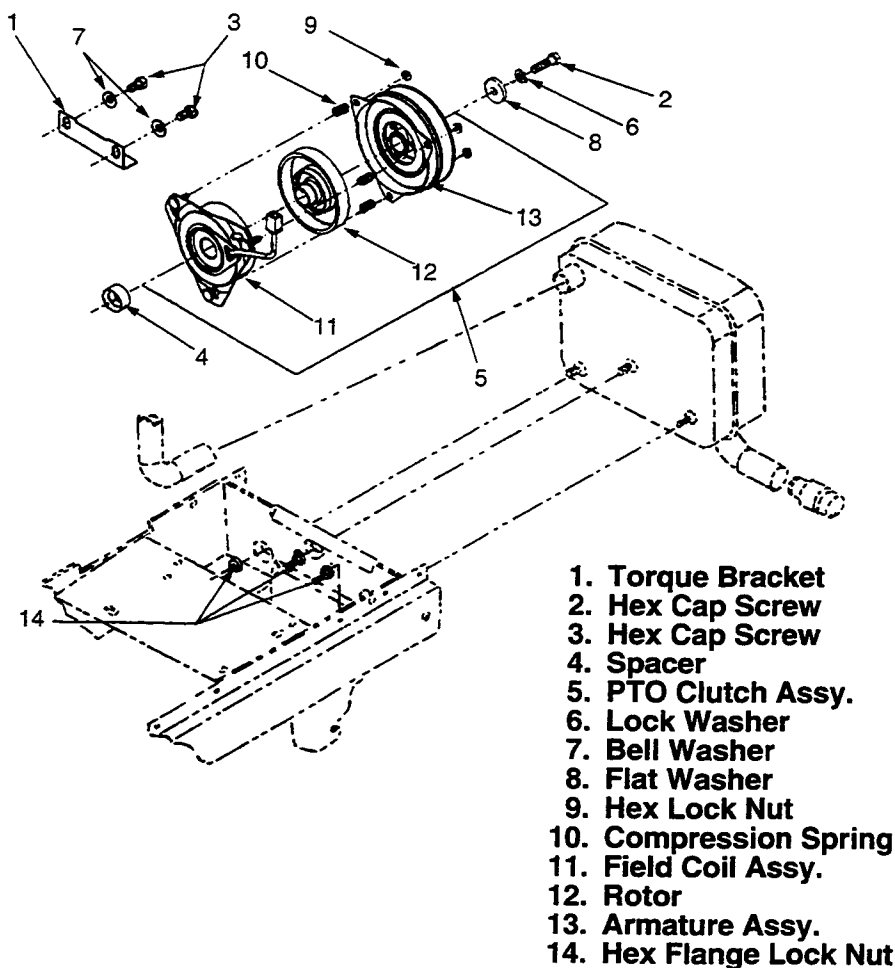


Figure 5-7. PTO Clutch (Models 2160, 2165 and 2185).



WARNING

Do not attempt to remove the muffler or PTO clutch when the engine is hot.

3. Remove the hex flange lock nuts (14, Fig. 5-7) securing the muffler to the tractor frame and remove the muffler.
4. Remove the PTO clutch assy. (5) from the engine crankshaft by removing the hex cap screw (2), lock washer (6), and flat washer (8). Note the position of the electrical lead wires before removing the clutch assy.
5. Slide the spacer (4) off of the crankshaft. Note the position of the beveled I.D. of the spacer.
6. Remove the torque bracket (1) from the engine by removing the hex cap screws (3) and bell washers (7).

5-7.3 Disassembly.

1. Remove the hex lock nuts (9) and slide the armature assembly (13) off of the rotor (12).
2. Remove the compression springs (10) from the field coil studs and separate the rotor (12) from the field coil assy.

5-7.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect the armature assy. (13) as follows:
 - a. Check for excessive scoring or wear of the armature drive plate. Some scoring is common.
 - b. Inspect the armature plate leaf springs for cracks, distortion, and broken or loose rivets.
 - c. Inspect for bent, nicked, or split pulley sheaves.
 - d. Check the brake plate for distortion or excessive wear.
 - e. Check the bearing for binding and for excessive looseness, indicating internal wear.
3. Inspect the rotor (12) drive surface for excessive wear or scoring. Some scoring is common.

4. Check the keyway of the rotor hub for damage or wear.
5. Inspect the field coil assy. (11) for cracks or damage to the insulation of the coil windings and the electrical lead wires.
6. Inspect the compression springs (10) for damage or distortion.
7. Check the torque bracket (1) for wear or distortion.

5-7.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or worn parts.

5-7.6 Reassembly.

1. Assemble the rotor (12) onto the field coil assy. (11), making certain the rotor hub is fully seated in the coil bearing.
2. Place the compression springs (10) on the field coil studs and install the armature assy. (13) onto the rotor and field coil. Secure with the hex lock nuts (9).

5-7.7 Installation.

1. Install the torque bracket (1) on the engine with the hex cap screws (3) and bell washers (7). Slide the torque bracket to its highest position and snug the screws.
2. With the beveled I.D. toward the engine, slide the spacer (4) onto the crankshaft.
3. Position the electrical lead as noted during removal and align the rotor key with the crankshaft keyway; then slide the PTO clutch assy. (5) onto the crankshaft.
4. Secure the clutch assy. with the flat washer (8), lock washer (6), and hex cap screw (2). For Models 2160 and 2165, torque the screw to 40 ft. lbs. On Model 2185, torque the screw to 50-60 ft. lbs.
5. Using a feeler gauge, adjust the air gap to .017 inch. Refer to Adjustments in Section 6 for a description of this procedure.
6. Adjust the torque bracket (1) evenly against the top edge of the field coil back plate and tighten the cap screws (3).

7. Install the muffler and secure to the frame with the hex flange lock nuts (14).
8. Connect the main harness connector to the PTO clutch.
9. Install the hood and grille assembly and the side panels per paragraph 5-3.7.

5-8 FRONT WHEELS (All Models).

5-8.1 General. Use tire changing equipment to remove and/or mount the tires. Usage of improper equipment can result in damage to the tire bead or rim flange.

5-8.2 Removal.



WARNING

Place the tractor on a firm and level surface before raising any part of the tractor off the ground.

1. Lock the parking brake and chock the rear wheels.
2. Remove the hub cap (3, Fig. 5-8) and loosen the hex patch bolt (2).
3. Raise and secure the front of the tractor.
4. Remove the tire and front rim assembly (1) by removing the hex patch bolt (2) and flat washers (5 and 6). Note the washer sequence for reassembly purposes.

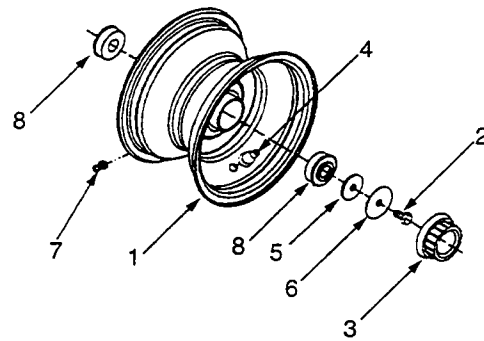
5-8.3 Disassembly.

1. Deflate and remove the tire.
2. Press the ball bearings (8) out of the front rim assembly (1).
3. If damaged or defective, remove the tubeless air valve (4) and grease fitting (7) from the rim assy.

5-8.4 Inspection.

Clean all parts prior to inspection.

1. Inspect the front rim assy. (1) for cracks, nicks, distortion, corrosion or poor welds.
2. Inspect the tire for excessive wear or damage.
3. Inspect the ball bearings (8) for binding or excessive looseness, indicating internal wear.



1. Front Rim Assy.
2. Hex Patch Bolt
3. Hub Cap
4. Tubeless Air Valve
5. Flat Washer
6. Flat Washer
7. Grease Fitting
8. Ball Bearing

Figure 5-8. Front Wheel (All Models).

5-8.5 Repair.

1. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
2. Replace all damaged or excessively worn parts.

5-8.6 Reassembly.

1. Press a new grease fitting (7) or tubeless air valve (4) into the rim assy.
2. Press the ball bearing (8) into each end of the rim assy. hub.
3. Install the tire onto the rim assy. and over-inflate (approximately 20 psi) the tire to seat the bead. Deflate the tire to 14 psi.

5-8.7 Installation.

1. Install the tire and front rim assy. with the flat washers (5 and 6) and hex patch bolt (2). The larger diameter washer should be to the outside.
2. Lower the front of the tractor to the ground and securely tighten the hex patch bolt.
3. Snap the hub cap (3) onto the large outer washer (6).
4. Apply Cub Cadet 251 HEP grease to the wheel bearings through the grease fitting (7).

5-9 REAR WHEELS (All Models).

5-9.1 General. Use tire changing equipment to remove and/or mount the tires. Usage of improper equipment can result in damage to the tire bead or rim flange.

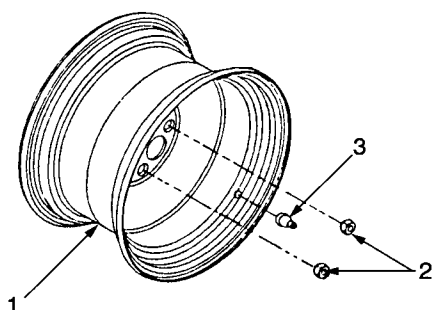
5-9.2 Removal.



WARNING

Place the tractor on a firm and level surface before raising any part of the tractor off the ground.

1. Chock the front wheels.
2. Loosen the lug nuts (2), but do not remove now.
3. Raise and secure the rear end of the tractor.
4. Remove the tire and rear rim assy. (1) by removing the lug nuts (2).



1. Rear Rim Assy.
2. Lug Nut
3. Tubeless Air Valve

Figure 5-9. Rear Wheel (All Models).

5-9.3 Disassembly.

1. Deflate and remove the tire.
2. If damaged or defective, remove the tubeless air valve (3).

5-9.4 Inspection. Clean all parts prior to inspection.

1. Inspect the rear rim assy. (1) for cracks, nicks, distortion, corrosion, or poor welds.
2. Inspect the tire for excessive wear or damage.

3. Inspect all threaded areas for damage.

5-9.5 Repair.

1. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
2. Replace all damaged or excessively worn parts.
3. Deburr and dress damaged threads.

5-9.6 Reassembly.

1. If previously removed, press a new tubeless air valve (3) into the rear rim assy. (1).
2. Install the tire onto the rim assy. and over-inflate (approximately 20 psi) the tire to seat the bead. Deflate the tire to 10 psi.

5-9.7 Installation.

1. Install the tire and rear rim assy. (1) on the axle; then, with the tapered surface toward the rim, snugly install the lug nuts (2).
2. Lower the rear end of the tractor and tighten the lug nuts.

5-10 FRONT AXLE AND CONNECTIONS (All Models).

5-10.1 General. Some Model 2160, 2165, and 2185 tractors may have a spacer on each limiter bolt (2, Fig. 5-10) and an added washer between the pivot axle (9) and steering knuckles (1), per Service Bulletin CC-277. Due to the limited number of units affected, and to avoid confusion, these parts are not included in Figure 5-10.

5-10.2 Removal.



WARNING

Place the tractor on a firm and level surface before raising any part of the tractor off the ground.



NOTE

Remove any PTO driven attachment before beginning front axle removal procedures.

1. Remove the side panels per paragraph 5-3.2.
2. Lock the parking brake and chock the rear

wheels; then raise the front of the tractor and secure with jackstands.

3. Remove the front wheels per paragraph 5-8.2.
4. Remove the tie rod (14, Fig. 5-10) assemblies from the left and right steering arms (15) by removing the hex lock nuts (4).
5. After noting whether they are installed in the inner or outer set of holes, remove the tie rod (14) assemblies from the lower steering arm assy.

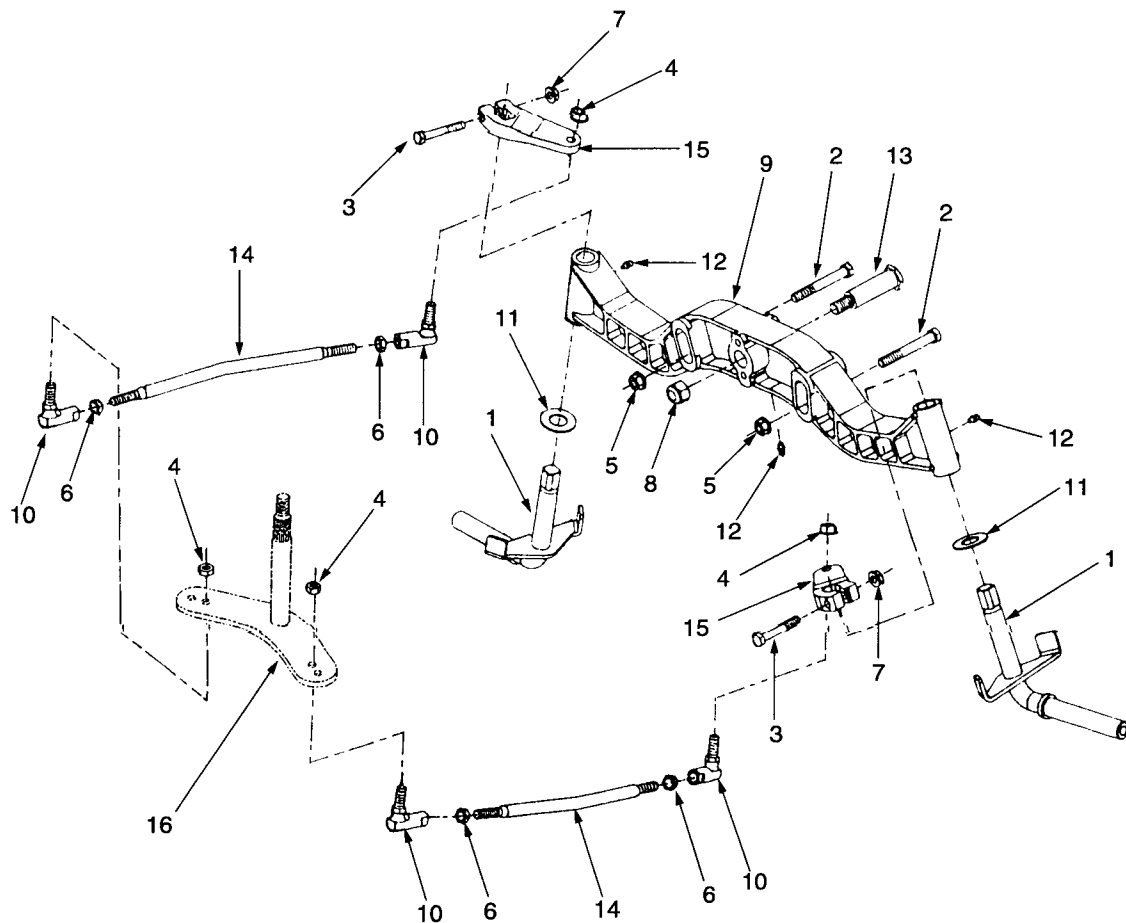
(16) by removing the hex lock nuts (4).

6. Remove the limiter hex cap screws (2) from the frame and front axle (9) by removing the hex flanged lock nuts (5).



WARNING

The completion of the following step 7 will free



1. Steering Knuckle Assy.
2. Hex Cap Screw
3. Hex Cap Screw
4. Hex Lock Nut
5. Hex Flanged Lock Nut
6. Hex Jam Nut
7. Hex Flange Top Lock Nut
8. Hex Nylon Top Lock Nut

9. Front Pivot Axle
10. Ball Joint
11. Flat Washer
12. Lube Fitting
13. Pivot Shoulder Bolt
14. Tie Rod
15. Steering Arm
16. Lower Steering Arm Assy.

Figure 5-10. Front Axle and Connections (All Models).

the front pivot axle (9) from the tractor. To prevent damage or injury, support the front axle before performing step 7.

7. Remove the front pivot axle (9) by removing the hex nylon top lock nut (8) and pivot shoulder bolt (13).

5-10.3 Disassembly.

1. Disassemble the tie rod (14) assemblies as follows:
 - a. Mark the location of the hex jam nuts (6) on the threads of the tie rod (14) and loosen the jam nuts.
 - b. Note the relationship of the ball joints to the form (bend) in the tie rods; then remove the ball joints (10) and hex jam nuts (6) from the tie rods (14).
2. Disassemble the front pivot axle (9) assembly as follows:
 - a. Note their position and remove the steering arms (15) from the steering knuckles (1) by removing the hex cap screws (3) and hex flange top lock nuts (7).
 - b. Slide the steering knuckles (1) and thrust flat washers (11) from the pivot axle.
 - c. If damaged or defective, remove and discard the lube fittings (12) from the axle.
 - d. If applicable, remove the spacers (not shown, see paragraph 5-10.1) from the limiter slots of the axle.

5-10.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect the ball joints (10) for wear, as indicated by looseness in the ball and socket area. Replace if worn.
3. Inspect the tie rods (14) for cracks or distortion.
4. Inspect the steering arms (15) for elongation of the ball joint holes and for cracks or wear in the square mounting holes.
5. Inspect the steering knuckles (1) for distortion, and for wear of the square steering arm surfaces.
6. Inspect the wheel bearing surfaces of the steering knuckles (1) for scoring or excessive wear. Replace if damaged.

7. Inspect the pivot axle (9) for cracks and for wear in the knuckle and pivot bolt bores. The knuckle bores should not exceed .760 inch in diameter.

5-10.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.

5-10.6 Reassembly.

1. Reassemble the front pivot axle (9) as follows:
 - a. If removed, drive new lube fittings (12) into the axle using a protective sleeve.
 - b. Place the flat washer(s) on the steering knuckles (1) and slide the knuckles up through the bottom of the pivot axle (9).
 - c. Position the steering knuckles so that their wheel surface is in line with the pivot axle (perpendicular to the tractor frame when mounted on the tractor).
 - d. Install the steering arms (15) on the knuckles in the position noted prior to removal (pointing inward and forward), and secure with the hex cap screws (3) and hex flange top lock nuts (7).
2. Reassemble the tie rods (14) as follows:
 - a. Thread the hex jam nuts (6) onto the tie rods to the marks made earlier. The thread location should be about equal on both ends of the tie rod. Adjust appropriately if necessary.
 - b. Turn the ball joints (10) onto the tie rods until they contact the jam nuts (6).
 - c. Position the tie rods and ball joints as noted during disassembly (with the threaded stud of the ball joints pointing upward, the form in the tie rod should be downward).
 - d. While holding the tie rod and ball joints in position, tighten the hex jam nuts (6).

5-10.7 Installation.

1. Apply a thin coating of 251 HEP grease to the machined faces of the limiter slot areas of the front pivot axle (9).
2. If applicable (see paragraph 5-10.1), insert the spacers into the limiter slots of the pivot axle.

3. Install the front pivot axle (9) in the frame channel and secure with the pivot shoulder bolt (13) and hex nylon top lock nut (8). The head of the bolt should be toward the front of the tractor.

➡ NOTE

If the spacers were installed in step 2 above, it will be necessary to pivot the axle to align each spacer with the frame channel hole before inserting the hex cap screw (2).

4. Install and adjust the limiter hex cap screws (2) as follows:
 - a. Insert the hex cap screws (2) through the frame channel and pivot axle (9), and secure with the hex flanged lock nuts (5).
 - b. Pivot the ends of the axle up and down to check for binding. If the axle is binding, loosen the lock nuts until binding is eliminated (see Fig. 5-11).
 - c. Grasp the ends of the axle and move forward and backward to check for side play between the axle and frame channel. If play is present, gradually tighten the lock nuts until play is minimized.
 - d. Repeat steps b. and c. until minimum play without binding is achieved.

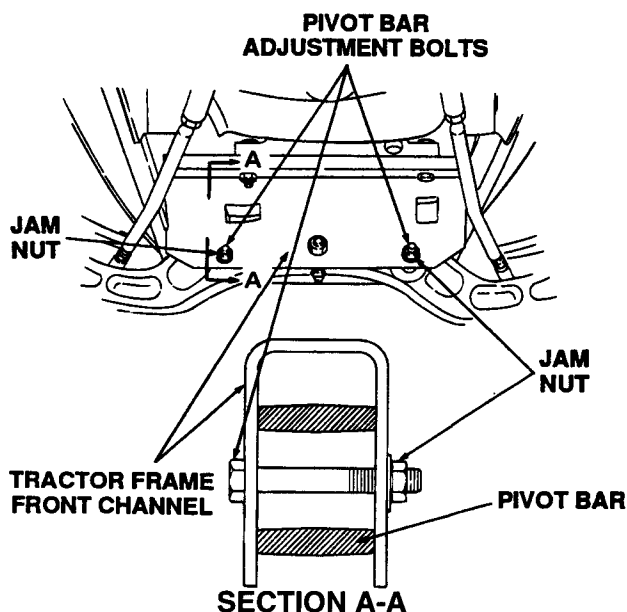


Figure 5-11. Pivot Axle Limiter Bolt Adjustment.

5. Install the tie rod assemblies (14) as follows:

➡ NOTE

Earlier Model 2130, 2135, 2140 and 2145 tractors were built with a fourteen tooth steering segment gear (See 1, Fig. 5-17), while later units used an eighteen tooth gear. If working on one of these Models, the segment gear teeth should be counted to determine the proper hole placement to be used when completing the following step a.

- a. Install the rear ball joints in the proper holes of the lower steering arm (16) and secure with the hex top lock nuts (4). Units with a fourteen tooth segment gear use the outer holes. Those with an eighteen tooth gear use the inner holes.
- b. Center the steering segment gear and insert a 1/4 inch dowel into the gear and steering housing per paragraph 5-15.7 (See Fig. 5-18). The lower steering arm (16) should be approx. perpendicular to the frame when fixed in position by the dowel. If necessary, reposition lower steering arm per 5-15.7.
- c. Position the steering knuckles (1) so they are perpendicular to the frame or very slightly forward of perpendicular.

➡ NOTE

Due to the form in the tie rods, the ball joints should be adjusted only in full turn increments. If adjustment requires two or more full turns, it is recommended that the adjustment be split between the front and rear ball joints.

- d. If necessary, adjust the ball joints to align with the mounting holes of the steering arms (15) and insert from beneath the steering arm. Secure with the hex lock nuts (4).
- e. Refer to Section 6 — Adjustments and perform the final toe-in adjustment. Remove the dowel from the segment gear.
6. Install the front wheels per paragraph 5-8.7 and lower the tractor to the ground.
7. Install the side panels per paragraph 5-3.7.
8. Apply 251 HEP grease to the lube fittings (12).

5-11 SEAT AND SEAT SUPPORT ASSEMBLY (All Models).

5-11.1 General. The seat switch is part of the safety interlock system that is essential to operator safety. The seat switch must be present, connected and in operating condition.

5-11.2 Removal.

1. Disconnect the two yellow wire harness leads from the seat switch.
2. Remove the seat (14, Fig. 5-12) and seat base (2) assembly from the fender by removing the hex flange top lock nuts (6) and shoulder bolts (12).



Models 2160, 2165 and 2185 are equipped with a tool tray (9) fastened to the fender, along with the RH and LH seat pivot brackets (1 and 3) and the seat compression springs (10). Removal of these items will allow removal of the tool tray.

3. Remove the RH and LH seat pivot brackets (1 and 3) from the fender as follows:
 - a. Place the lift handle in one of the lower positions.
 - b. Reaching through the front of the fender wheel wells, remove the hex flange lock nuts (6) from underneath the fender. Lift the carriage bolts (4) and seat pivot brackets (1 and 3) from the fender.



When the lock nuts (6) and compression springs (10) are removed, the carriage bolts (4) will partially fall back through the fender. Use of a rubber band stretched around the two bolts will help to keep them in the raised position.

4. Remove the compression springs (10) by removing the hex flange top lock nuts (6) from the carriage bolts (4).
5. If applicable, remove the tool tray (9).

5-11.3 Disassembly.

1. Remove the seat adjuster (11) and right rear

shoulder spacer (13) by removing the hex washer hd. tapp screw (5).

2. Remove the remaining three hex washer hd. tapp screws (5) and shoulder spacers (13) to separate the seat (14) from the seat base (2).
3. Pull the seat slides (8) from the slots of the seat base (2).
4. If necessary, pull the seat adjuster knob (7) off the seat adjuster (11). Discard and replace the knob.
5. Remove the seat switch (see 21, Fig. 5-4) from the bottom of the seat as follows:
 - a. While applying light counterclockwise pressure on the switch, release the switch locking fingers by inserting a small punch (or similar object) into each of the three small holes in the seat pan (see Fig. 5-13) and lightly depressing the fingers.
 - b. Turn the switch counterclockwise to align the switch lugs with the seat pan notches and remove the switch.

5-11.4 Inspection. Clean all parts prior to inspection.

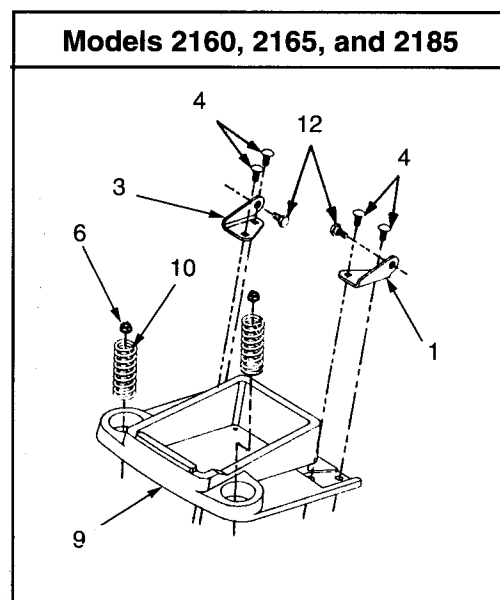
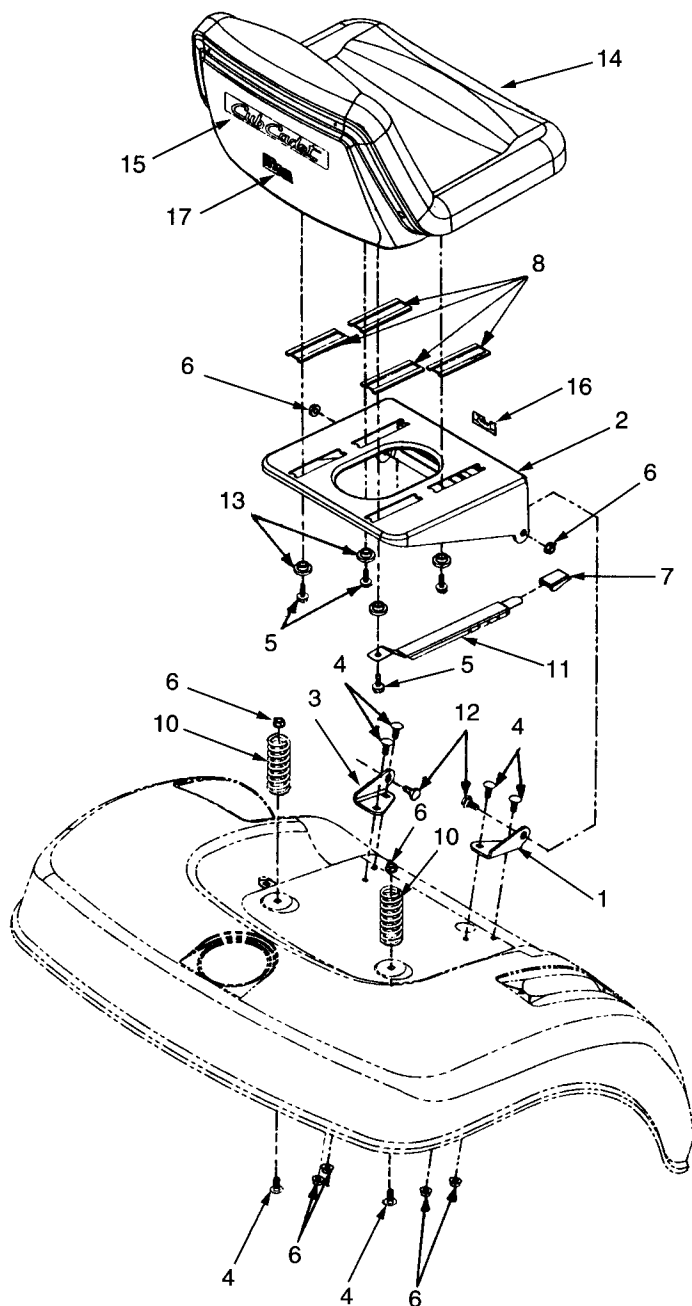
1. Inspect all threaded areas for damage.
2. Inspect parts for cracks, scoring, distortion, corrosion and wear.
3. Inspect the compression springs (10) for damage or distortion. Discard and replace damaged springs.
4. Inspect the seat slides (8) and shoulder spacers (13) for cracks or wear. Replace if damaged.
5. Check for elongated holes in the seat base (2) and the seat pivot brackets (1 and 3). Replace if excessively worn.
6. Inspect the seat adjuster (11) for distortion and for broken or worn index teeth.
7. Inspect the seat covering and the plastic retaining strip for cuts or cracks.

5-11.5 Repair.



CAUTION

Do not attempt to remove the plastic retaining



1. RH Seat Pivot Bracket
2. Seat Base
3. LH Seat Pivot Bracket
4. Carriage Bolt
5. Hex Washer Hd. Tapp Screw
6. Hex Flange Top Lock Nut
7. Seat Adjuster Knob
8. Seat Slide
9. Tool Tray

10. Compression Spring
11. Seat Adjuster
12. Shoulder Bolt
13. Shoulder Spacer
14. Seat
15. Script Graphic
16. Seat Adjuster Graphic
17. USA Graphic

Figure 5-12. Seat and Support Assembly (All Models).

strip from the back of the seat. This strip is factory installed and holds the seat cover in place.

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.
4. Replace loose or damaged labels (15, 16 and 17).

5-11.6 Reassembly.

1. Align the lugs of the seat switch with the notches of the seat pan and turn the switch clockwise to lock in position. The terminals of the switch should face the front of the seat.
2. Install the seat slides (8) in the slots of the seat base (2).
3. Position the seat (14) on the seat base (2). Install

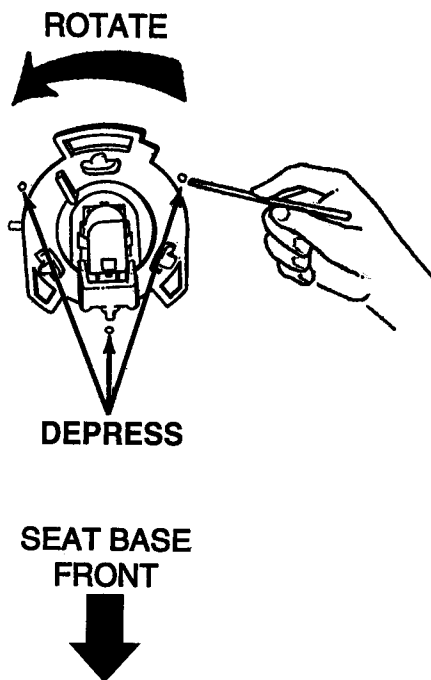


**Figure 5-13. Seat Switch Removal
(All Models).**

the front right and the two left shoulder spacers (13) in the seat base slots and secure all with the hex washer hd. tapp screws (5).

4. Insert the seat adjuster (11) through the slot in the front of the seat base (2) and install the right rear shoulder spacer (13). Align the adjuster and shoulder spacer with the hole of seat and secure with the hex washer hd. tapp screw (5).

5-11.7 Installation.

1. Install the compression springs (10) as follows:



The carriage bolts (4) can be raised, if necessary, by accessing them through the small opening between the front of the fuel tank and the fender supports of the frame.

- a. If applicable, position the tool tray (9) on the fender while guiding the carriage bolts (4) up through the rear holes of the tray.



Use of a *magnetic* socket or nut driver is recommended when installing the hex flange top lock nuts (6) on the carriage bolts (4).

- b. Holding the carriage bolts (4) upright (square neck of bolt must engage the square hole in fender), place the closed end of the springs (10) onto the bolts and install the hex flange lock nuts (6).
 - c. Make certain each spring is square with its fender mounting surface and tighten the hex flange top lock nuts.
2. Install the RH and LH seat pivot brackets (1 and 3) on the fender using the carriage bolts (4) and hex flange top lock nuts (6).
 3. With the seat/seat base assembly positioned to the outside of the pivot brackets, insert a shoulder bolt (12) through each pivot bracket and the seat base. Secure with the hex flange top lock nuts (6).
 4. Connect the two yellow wire harness leads to the seat switch.

5-12 FENDER AND RUNNING BOARD (Models 2130, 2135, 2140, and 2145).

5-12.1 **General.** Removal of the seat pivot brackets and seat compression springs may be skipped during seat removal (step 6 below) and completed after removal of the fender.

5-12.2 Removal.



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.



WARNING

Use extreme caution when handling sheet metal components, such as the fender and running board. These parts may have sharp edges which could cause cuts to the skin.

1. Release the parking brake.
2. Remove the forward drive pedal per paragraph 5-19.2
3. Remove the brake pedal per paragraph 5-19.2.
4. Remove the reverse pedal pad per paragraph 5-19.2.
5. Loosen the jam nut and remove the shifter knob per paragraph 5-20.2 or 5-21.2.
6. Disconnect the wire harness from the seat switch and remove the seat and seat base per paragraph 5-11.2.
7. Carefully pull the RH and LH foot pads (11 and 12, Fig. 5-14) from the running board (15) and fender (3). Use care to prevent damage to the rubber locking nibs of the pads.
8. Place the lift handle in a mid height position and remove the implement lift cover (2) by removing the hex tapp screws (6).
9. Remove the fender (3) and running board (15) together as an assembly as follows:
 - a. Secure the hex cap screws (7) and remove the hex flange lock nuts (8) from the six screws (7) fastening the fender and running board to the frame (three on each side).
 - b. Secure the isolators (9) to keep them from

turning and remove the hex cap screws (7) and flat washers (13) from the fender and running board. Remove the spacers (14) from the front isolators.



CAUTION

If the tractor serial number is 239,301 through 272,500 and the seat pivot brackets were removed with the seat (step 6), slide the fender reinforcement plates (4) out from underneath the fender to prevent them from falling when performing the following step c.

- c. Remove the fuel tank cap, lift the back of the fender off the neck of the fuel tank and replace the fuel tank cap. Use care to prevent debris from falling into the fuel tank.
- d. From beneath the fender, pull the wire harness leads down through the snap bushing.
- e. Place the lift handle in its highest position and place the shift handle about midway in its slot.



NOTE

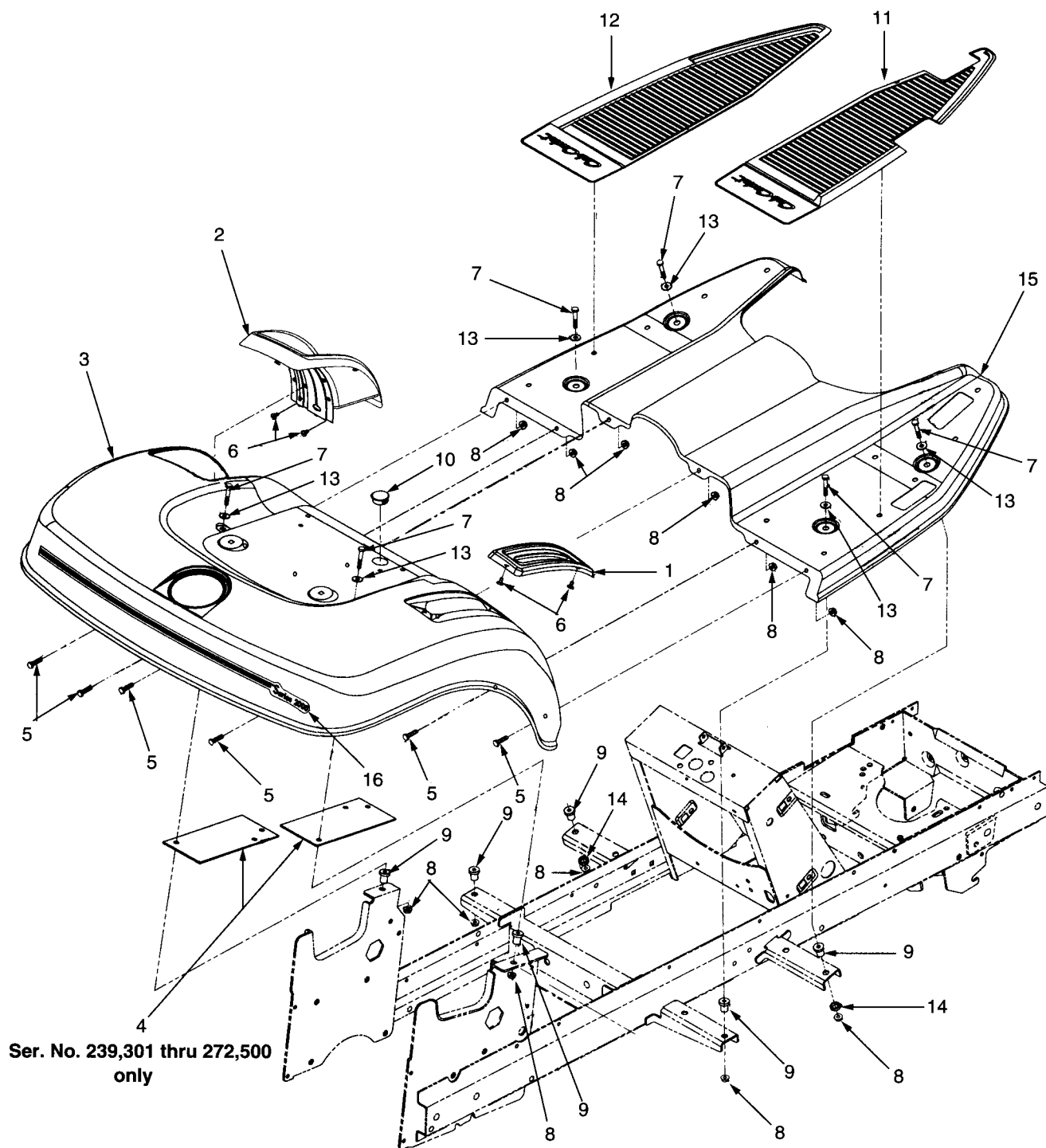
If assistance is available, it is recommended that two people lift the fender and running board assembly both off and onto tractor.

- f. Lift and pivot the back of the fender forward to clear the lift and shift handles; then lift the fender and running board assembly upward and rearward to remove from the tractor.

10. Remove the isolators (9) from the tractor frame.

5-12.3 Disassembly.

1. Separate the running board (15) from the fender (3) by removing the six hex flange lock nuts (8) and hex cap screws (5).
2. Remove the shifter cover (1) by removing the hex tapp screws (6) from the underside of the fender.
3. Remove the snap bushing (10) from the fender.
4. If not previously removed (see paragraph 5-12.1), remove the seat pivot brackets (and fender reinforcement plates (4) — if Serial No. 239,301 through 272,500), and remove the seat compression springs per paragraph 5-11.2.



- | | |
|-------------------------------|-------------------------|
| 1. Shifter Cover | 9. Isolator |
| 2. Implement Lift Cover | 10. Snap Bushing |
| 3. Fender | 11. RH Foot Pad |
| 4. Fender Reinforcement Plate | 12. LH Foot Pad |
| 5. Hex Cap Screw | 13. Flat Washer |
| 6. Hex Tapp Screw | 14. Spacer |
| 7. Hex Cap Screw | 15. Running Board |
| 8. Hex Flange Lock Nut | 16. Rear Fender Graphic |

Figure 5- 14. Fender and Running Board (Models 2130, 2135, 2140, and 2145).

5-12.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect parts for cracks, scoring, distortion, corrosion and wear.
3. Inspect the isolators (9) for cracks or wear. Replace if damaged.
4. Inspect the mounting holes of the fender and running board for elongation or cracks. Replace if excessively worn or damaged.
5. Inspect the seat pivot bracket and seat spring mounting holes of the fender for cracks or excessive wear.
6. Check the shifter cover (1) and implement lift cover (2) for cracks, broken mounting tabs, and loose or missing slot boots. Replace if damaged.
7. Check for a loose or missing rear fender label (16). Replace if necessary.
8. Check the RH and LH foot pads (11 and 12) for excessive wear and for torn or missing locking nibs.

5-12.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.

5-12.6 Reassembly.



It is recommended that the seat pivot brackets and seat compression springs be installed on the fender prior to the fender being installed on the tractor.

1. Install the RH and LH seat pivot brackets (and fender reinforcement plates — if Serial No. 239,301 through 272,500) per paragraph 5-11.7.
2. Install the seat compression springs on the fender per paragraph 5-11.7.
3. Press the snap bushing (10) into the top of the fender.

4. Position the shifter cover (1) in the fender and secure with the hex tapp screws (6).
5. Fasten the fender (3) and running board (15) together using the six hex cap screws (5) and hex flange lock nuts (8).

5-12.7 Installation.

1. Place the isolators (9) in the proper holes of the running board support brackets and fender support brackets of the frame.
2. Install the fender and running board assembly as follows:
 - a. With the back of the fender raised, position the front of the running board over the front support brackets and the brake and clutch shaft assemblies.
 - b. Remove the fuel tank cap and carefully lower the fender/running board into position on the frame. Replace the fuel tank cap.



There are threaded sleeves inside the isolators (9). Improper installation of the hex cap screws (7) and/or hex flange lock nuts (8) can result in over tightening the isolators.

- c. Install the hex cap screws (7) with flat washers (13) in the fender and running board. Tighten the screws until their threads appear at the bottom of the isolators (9).
- d. On both front isolators only, slide the spacer (14) onto the isolator and tighten the screw until the isolator has bulged enough to snugly retain the spacer, but still allow rotation of the spacer. Secure the head of the screw (7); then, turning only the hex flange lock nut (8), tighten the lock nut onto the screw until it just contacts the bottom of the isolator.
- e. For the rear isolators of the running board, tighten the hex cap screws (7) until the isolators have bulged sufficiently to be anchored in the support brackets. Secure the head of the screws (7); then, turning only the hex flange lock nuts (8), tighten the lock nuts onto the screws until they just contact the bottom of the isolators.

- f. Tighten the hex cap screws (7) into the fender isolators (9) until they are securely anchored in the fender support brackets. Secure the head of the screws (7); then, turning only the hex flange lock nuts (8), tighten the lock nuts onto the screws until they just contact the bottom of the isolators.
3. Route the wire harness lead up through the snap bushing in the fender.
4. Place the lift handle in a mid height position and install the implement lift cover (2) in the fender. Make certain the top and side tabs of the cover are inside the fender and secure with the hex tapp screws (6).
5. Position the RH and LH foot pads (11 and 12) on the tractor and pull the locking nibs through the holes of the fender and running board.
6. Install the seat and seat base assembly per paragraph 5-11.7. Connect the wire harness leads to the seat switch.
7. Install the shifter knob and tighten the jam nut per paragraph 5-20.7 or 5-21.7.
8. Install the reverse pedal pad, brake pedal, and forward drive pedal per paragraph 5-19.7
1. Release the parking brake.
2. Remove the forward drive pedal per paragraph 5-19.2
3. Remove the brake pedal per paragraph 5-19.2.
4. Remove the reverse pedal pad per paragraph 5-19.2.
5. Loosen the jam nut and remove the shifter knob per paragraph 5-20.2 or 5-21.2.
6. Disconnect the wire harness from the seat switch and remove the seat and seat base per paragraph 5-11.2.
7. Carefully pull the RH and LH foot pads (12 and 13, Fig. 5-15) from the running board (14) and fender (3). Use care to prevent damage to the rubber locking nibs of the pads.
8. Place the lift handle in a mid height position and remove the implement lift cover (2) by removing the hex tapp screws (6).
9. Remove the fender (3) and running board (14) together as an assembly as follows:
 - a. Remove the six hex washer hd. tapp screws (7) which secure the fender and running board to the frame.

5-13 FENDER AND RUNNING BOARD (Models 2160, 2165, and 2185).

5-13.1 **General.** Removal of the seat pivot brackets and seat compression springs may be skipped during seat removal (step 6 below) and completed after removal of the fender.

5-13.2 Removal.



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.



WARNING

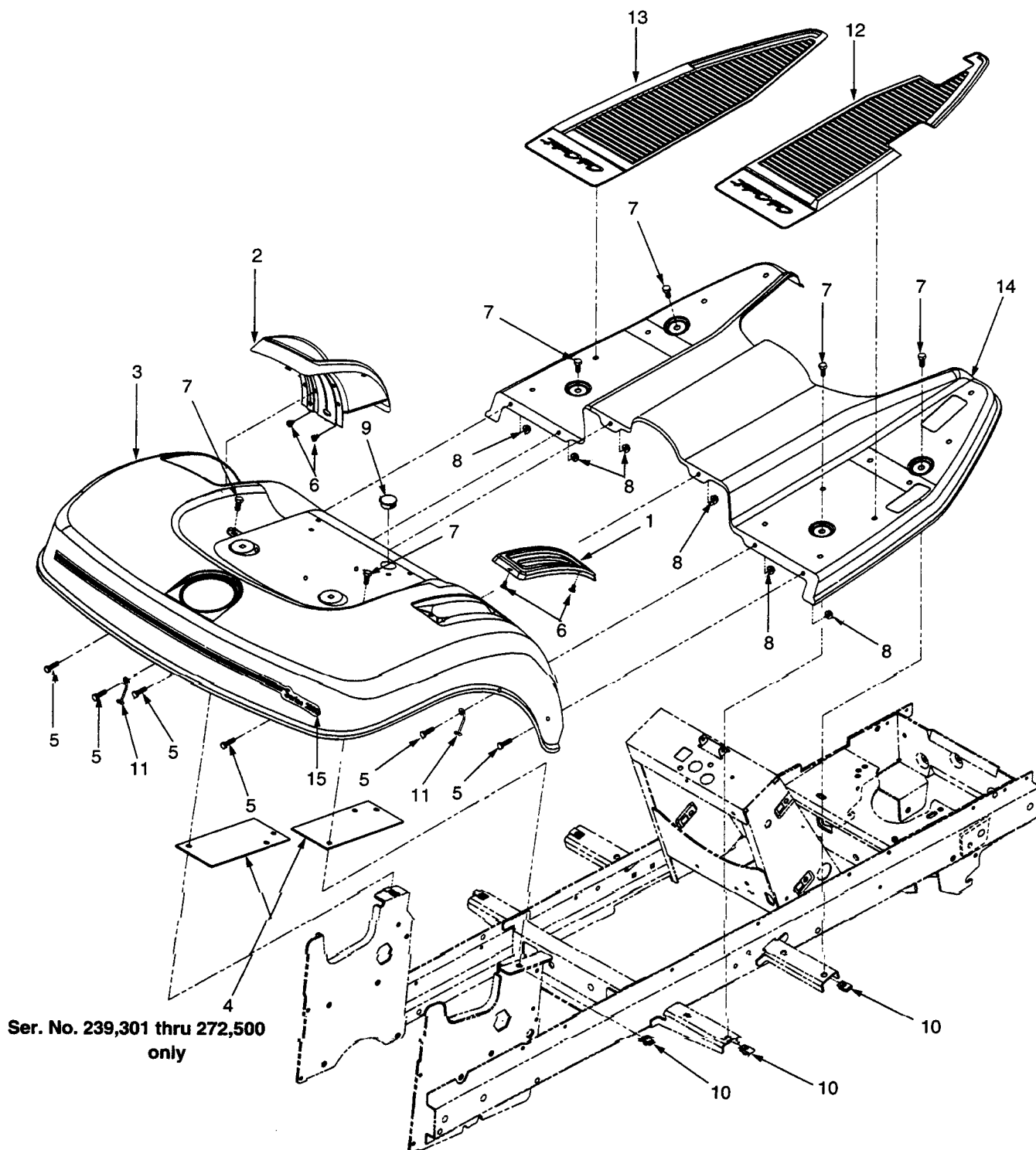
Use extreme caution when handling sheet metal components, such as the fender and running board. These parts may have sharp edges which could cause cuts to the skin.



CAUTION

If the tractor serial number is 239,301 through 272,500 and the seat pivot brackets were removed with the seat (step 6), the fender reinforcement plates (4) will be free to fall from the tractor when the fender is lifted. Lift the fender slightly and slide the reinforcement plates (4) out from underneath the fender.

- b. Remove the fuel tank cap, lift the back of the fender off the neck of the fuel tank and replace the fuel tank cap. Use care to prevent debris from falling into the fuel tank.
- c. From beneath the fender, pull the wire harness leads down through the snap bushing.
- d. Place the lift handle in its highest position and place the shift handle about midway in its slot.



- | | |
|-------------------------------|------------------------|
| 1. Shifter Cover | 8. Hex Flange Lock Nut |
| 2. Implement Lift Cover | 9. Snap Bushing |
| 3. Fender | 10. U-Nut |
| 4. Fender Reinforcement Plate | 11. Retainer Hook |
| 5. Hex Cap Screw | 12. RH Foot Pad |
| 6. Hex Tapp Screw | 13. LH Foot Pad |
| 7. Hex Washer Hd. Tapp Screw | 14. Running Board |
| | 15. Fender Graphic |

Figure 5-15. Fender and Running Board (Models 2160, 2165, and 2185).

NOTE

If assistance is available, it is recommended that two people lift the fender and running board assembly both off and onto tractor.

- e. Lift and pivot the back of the fender forward to clear the lift and shift handles; then lift the fender and running board assembly upward and rearward to remove from the tractor.

10. Remove the U-Nuts (10) from the fender support and running board support brackets.

5-13.3 Disassembly.

1. Separate the running board (14) from the fender (3) by removing the hex flange lock nuts (8), hex cap screws (5), and retainer hooks (11). Note the position of the retainer hooks before removing.
2. Remove the shifter cover (1) by removing the hex tapp screws (6) from the underside of the fender.
3. Remove the snap bushing (9) from the fender.
4. If not previously removed (see paragraph 5-13.1), remove the seat pivot brackets (and fender reinforcement plates (4) — if Serial No. 239,301 through 272,500), and remove the seat compression springs per paragraph 5-11.2.

5-13.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect parts for cracks, scoring, distortion, corrosion and wear.
3. Inspect the mounting holes of the fender and running board for elongation or cracks. Replace if excessively worn or damaged.
4. Inspect the seat pivot bracket and seat spring mounting holes of the fender for cracks or excessive wear.
5. Check the shifter cover (1) and implement lift cover (2) for cracks, broken mounting tabs, and loose or missing slot boots. Replace if damaged.
6. Check for a loose or missing rear fender label (15). Replace if necessary.
7. Check the RH and LH foot pads (12 and 13) for excessive wear and torn or missing locking nibs.

5-13.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.

5-13.6 Reassembly.

NOTE

It is recommended that the seat pivot brackets and seat compression springs be installed on the fender prior to the fender being installed on the tractor.

1. Install the RH and LH seat pivot brackets (and fender reinforcement plates — if Serial No. 239,301 through 272,500) per paragraph 5-11.7.
2. Install the seat compression springs on the fender per paragraph 5-11.7.
3. Press the snap bushing (9) into the top of the fender.
4. Position the shifter cover (1) in the fender and secure with the hex tapp screws (6).
5. Fasten the fender (3) and running board (14) together and install the retainer hooks (11) using the hex cap screws (5) and hex flange lock nuts (8).

5-13.7 Installation.

1. Install the U-Nuts (10) on the fender support and running board support brackets of the frame.
2. Install the fender and running board assembly as follows:
 - a. With the back of the fender raised, position the front of the running board over the front support brackets and the brake and clutch shaft assemblies.
 - b. Remove the fuel tank cap and carefully lower the fender/running board into position on the frame. Replace the fuel tank cap.
 - c. Make certain all six U-nuts are in place; then secure the fender/running board to the frame with the hex washer hd. tapp screws (7).
3. Route the wire harness lead up through the snap bushing in the fender.

4. Place the lift handle in a mid height position and install the implement lift cover (2) in the fender. Make certain the top and side tabs of the cover are inside the fender and secure with the hex tapp screws (6).
5. Position the RH and LH foot pads (12 and 13) on the tractor and pull the locking nibs through the holes of the fender and running board.
6. Install the seat and seat base assembly per paragraph 5-11.7. Connect the wire harness leads to the seat switch.
7. Install the shifter knob and tighten the jam nut per paragraph 5-20.7 or 5-21.7.
8. Install the reverse pedal pad, brake pedal, and forward drive pedal per paragraph 5-19.7

5-14 DASH PANEL, BULKHEAD, AND ENGINE CONTROLS (All Models).

5-14.1 General. If desired, the dash panel (11, Fig. 5-16) may be removed from the tractor prior to removing the electrical components and engine controls from the dash (step 7 below).

5-14.2 Removal.

1. Remove the side panels per paragraph 5-3.2.
2. Disconnect the battery per paragraph 5-4.2 or 5-5.2.
3. Remove the steering wheel and steering gasket per paragraph 5-15.2.
4. Disconnect the throttle control (15, Fig. 5-16) from the engine per paragraph 5-31.2.
5. Disconnect the choke control (16) from the engine per paragraph 5-31.2.
6. Remove the indicator bulbs and fuse holders (if applicable) from the dash panel per paragraph 5-4.2 or 5-5.2.
7. Remove the dash panel (11) as follows:
 - a. Disconnect and remove the PTO switch and ignition switch per paragraph 5-4.2 or 5-5.2.
 - b. Disconnect and remove the hour meter and dash label (19) per paragraph 5-4.2 or 5-5.2.
 - c. From underneath the dash panel, pinch the locking tabs of the choke control (16) to

release from the dash. Note the routing of the cable and withdraw the choke control from the top of the dash panel.

- d. Remove the throttle knob (12) by removing the truss hd. screw (4) and hex nut (5).
 - e. From underneath the dash panel remove the two truss hd. screws (4) securing the throttle control (15) to the dash. Note the routing of the cable and remove the throttle control.
 - f. Loosen the four hex cap screws (3) and flat washers (14) securing the sides of the dash panel.
 - g. Lifting upward and rearward to clear the steering shaft and parking brake lever, remove the dash panel from tractor.
8. Remove the wing nuts (6) from the RH and LH mounting rods (17 and 18).
 9. Remove the hex cap screws (3), flat washers (14), and RH and LH mounting rods (17 and 18). Note the LH mounting rod is plastic coated.
 10. Remove the U-clip nuts (10) from the pedestal.
 11. Remove the bulkhead (2) as follows:
 - a. Remove the drive shaft assembly per paragraph 5-22.2 or 5-23.2.



Model 2185 tractors use a foam sealing ring (21), which is adhesively affixed to the bulkhead, instead of the intake boot.

- b. Remove the two hex cap screws (3) that fasten the bulkhead to the frame; then remove the bulkhead (2) and intake boot (13) or foam seal (21).

5-14.3 Disassembly.

1. If necessary only, remove the dash intake screen (1) from the dash by unbending the screen tabs.
2. Pull the push-on seal trim (7) from the side flanges of the bulkhead (2).
3. After noting their location, remove the snap bushing (9) and button plugs (8) from the bulkhead.
4. Remove the U-type speed nuts (20) from the bulkhead.

5-14.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect the dash panel for cracks, scoring, distortion and wear.
3. Inspect the bulkhead for cracks, distortion, or corrosion.
4. Inspect the seal trim (7), intake boot (13), and/or the foam seal (21) for cuts, cracks and deterioration. Replace if damaged.

5. Check the throttle and clutch controls for kinks, conduit damage, and for ease of operation. Apply cable lubricant if necessary.

6. Check for cracks or holes in the intake screen (1). Replace if damaged.

5-14.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor metal surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.

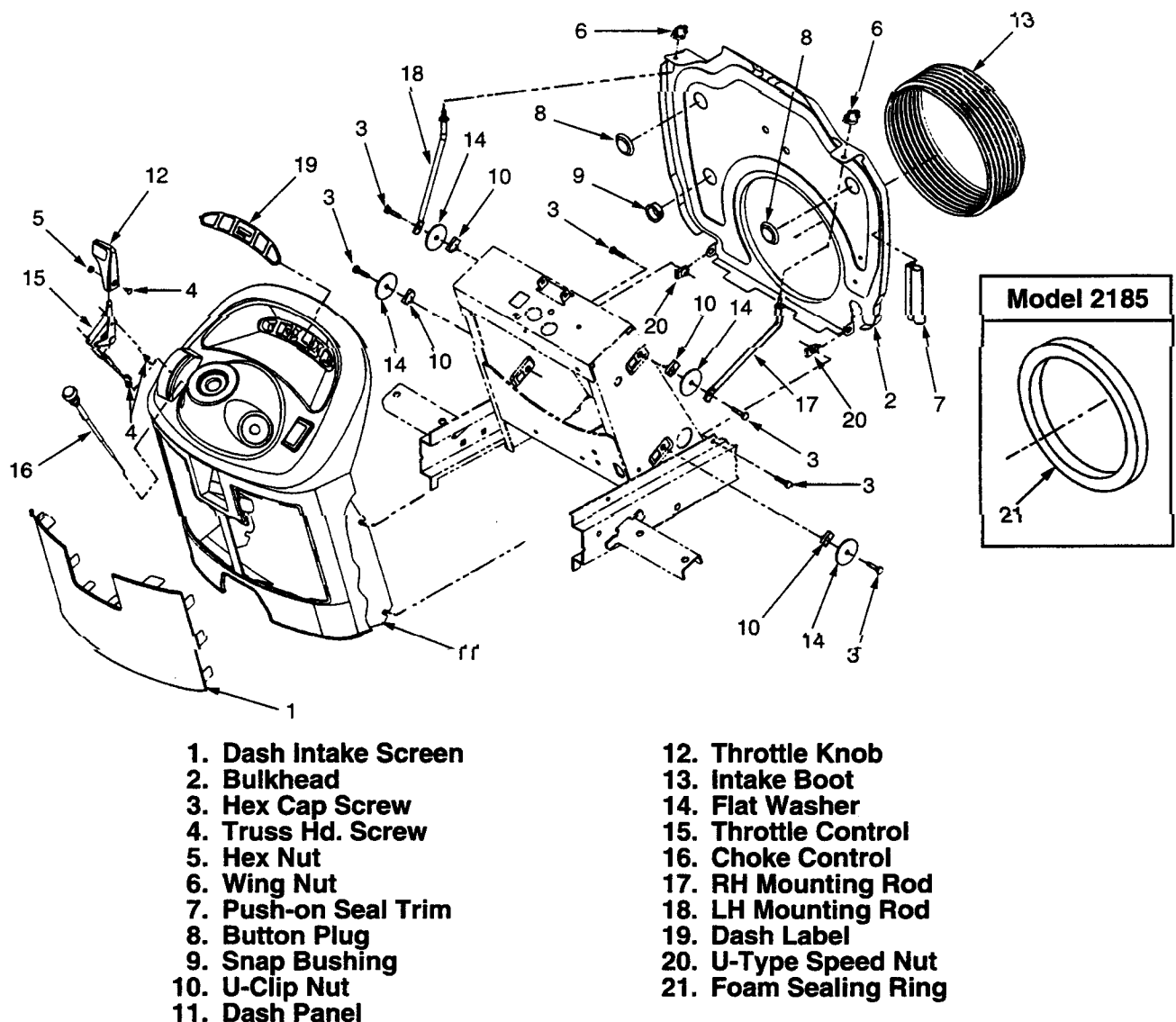


Figure 5-16. Dash Panel, Bulkhead, and Engine Controls (All Models).

5-14.6 Reassembly.

1. Push the U-type speed nuts (20) onto the bottom mounting tabs of the bulkhead (2).
2. Install the snap bushing (9) and button plugs (8) in the proper holes of the bulkhead.
3. Position the push-on seal trim (7) strips on the side flanges of the bulkhead and press into place.
4. If removed, position the dash intake screen (1) in the dash. While holding firmly in place, bend the screen tabs tightly against the inside edges of the dash panel. Note that repeated bending of the tabs will cause them to break off.

5-14.7 Installation.

1. Install the bulkhead (2) as follows:
 - a. Place the intake boot (13) or, if replaced, the new foam sealing ring (21) around the flange of the bulkhead opening.
 - b. Lower the bulkhead assembly into the tractor. It may be necessary to manually compress the bottom half of the intake boot.
 - c. Straighten the boot or sealing ring so that it seals tightly against the engine blower housing, and make certain the speed nuts (20) are still in place on the bulkhead mounting tabs.
 - d. Secure the bulkhead to the frame with the hex cap screws (3).
 - e. Install the drive shaft assembly per paragraph 5-22.7 or 5-23.7.
2. Install the U-clip nuts (10) in the pedestal.
3. Install the upper flat washers (14) and the RH and LH mounting rods (17 and 18) on the pedestal using the hex cap screws (3). The LH mounting rod is plastic coated. DO NOT tighten the screws.
4. Insert the threaded end of the mounting rods through the upper bulkhead tabs and install the wing nuts (6). DO NOT tighten the wing nuts.

5. Install the dash panel (11) as follows:

- a. Lower the dash panel over the steering shaft and parking brake lever.
 - b. Position the upper slots of the dash panel on the hex cap screws (3), between the flat washers (14) and pedestal .
 - c. Align the lower slots of the dash panel with the U-clip nuts (10) on the pedestal and install the lower flat washers (14) and hex cap screws (3). DO NOT tighten screws.
 - d. Position the dash panel to eliminate any binding on the steering shaft and tighten the four hex cap screws (3).
 - e. Route the throttle control (15) cable as noted when removed; then position the throttle control in the underside of the dash and secure with the truss hd. screws (4).
 - f. Install the throttle knob (12) with the truss hd. screw (4) and hex nut (5).
 - g. Insert the choke control (16) cable into the top of the dash panel and snap the control into the dash. Route the cable as noted when removed.
 - h. Install the dash label (19) and hour meter per paragraph 5-4.7 or 5-5.7.
 - i. Install the ignition switch and PTO switch per paragraph 5-4.7 or 5-5.7.
6. Install the indicator bulbs and fuse holders (if applicable) in the dash panel per paragraph 5-4.7 or 5-5.7.
 7. Connect the throttle control (15) and choke control (16) to the engine. Refer to Section 6—Adjustments for adjustment procedures.
 8. Install the steering gasket and steering wheel per paragraph 5-15.7.
 9. Connect the battery per paragraph 5-4.7 or 5-5.7.
 10. Install the side panels per paragraph 5-3.7.

5-15 STEERING ASSEMBLY (All Models).

5-15.1 **General.** Refer to Service Bulletin CC-272 for information concerning modifications made to the steering assembly of Model 2135 tractors with Serial No. 239,301 to 242,243. Some units within this serial no. range may not have required the modification, and consequently will differ slightly from the descriptions given in this paragraph. The modifications included:

- a. Removal of the lower steering shaft bearing from the steering housing (3, Fig. 5-17).
- b. Addition of the rubber flat washer (24, Fig. 5-17).
- c. Substitution and re-arrangement of the flat washers on the steering shaft.

5-15.1.1 Models 2130, 2135, 2140 and 2145 with Serial No. 272,500 and below were equipped with a 14 tooth steering segment gear (1). On these tractors the rear tie rod ball joints (16) should be installed in the outer holes of the lower steering arm (2).

5-15.2 Removal.

1. Remove the side panels per paragraph 5-3.2.
2. Remove the battery per paragraph 5-4.2 or 5-5.2.



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

3. To improve access to the upper bearing flange assy. (27, Fig. 5-17), release the parking brake, then remove the internal cotter pin and clevis pin (20 and 16, Fig. 5-22) securing the parking brake lever (24) to the pedestal.
4. Remove the steering wheel insert (17, Fig. 5-17) by pulling straight upward from the steering wheel (4).
5. Remove the steering wheel (4) as follows:
 - a. Loosen the hex center lock nut (7) until it is flush with the top of the steering shaft (26).



NOTE

It may be necessary to apply penetrating oil to

the splines of the steering wheel hub and the steering shaft. It should not be necessary to use excessive force when performing the following step b.

- b. While pulling upward on the steering wheel, strike the top of the steering shaft (w/nut) with a mallet to dislodge the steering wheel from the shaft splines.
 - c. Remove the hex center lock nut (7), bell washer (18), steering wheel (4), and steering gasket (15).
6. Remove the steering shaft (26) as follows:
 - a. Loosen, but do not remove, the hex cap screws (5) and hex flange lock nuts (10) that secure the bearing flange assy. (27) to the pedestal.
 - b. From underneath the tractor, remove the cotter pin (12) and flat washer(s) (23) from the bottom of the steering shaft (26).
 - c. Raise the steering shaft (26) out of the steering housing (3); then slide the flat washer (23), steering pinion gear (14), rubber flat washer (24), and flat washer (21) off the bottom of the steering shaft.
 - d. Carefully withdraw the steering shaft from the top of the dash panel.
 7. Remove the bearing flange assy. (27) from the pedestal by removing the hex flange lock nuts (10) and hex cap screws (5).
 8. After noting whether they are installed in the inner or outer set of holes, remove the tie rod (28) assemblies from the lower steering arm (2) by removing the hex lock nuts (11).
 9. Remove the tie rod (28) assemblies from the front axle steering arms by removing the hex lock nuts (11).



WARNING

Upon removal of the hex slotted nut (9) in the following step 10, the lower steering arm (2) will be free to fall from the tractor. To prevent damage or injury, support the lower steering arm when removing the slotted nut.

10. Remove the cotter pin (13), hex slotted nut (9), lock washer (22), and flat washer (19) from the

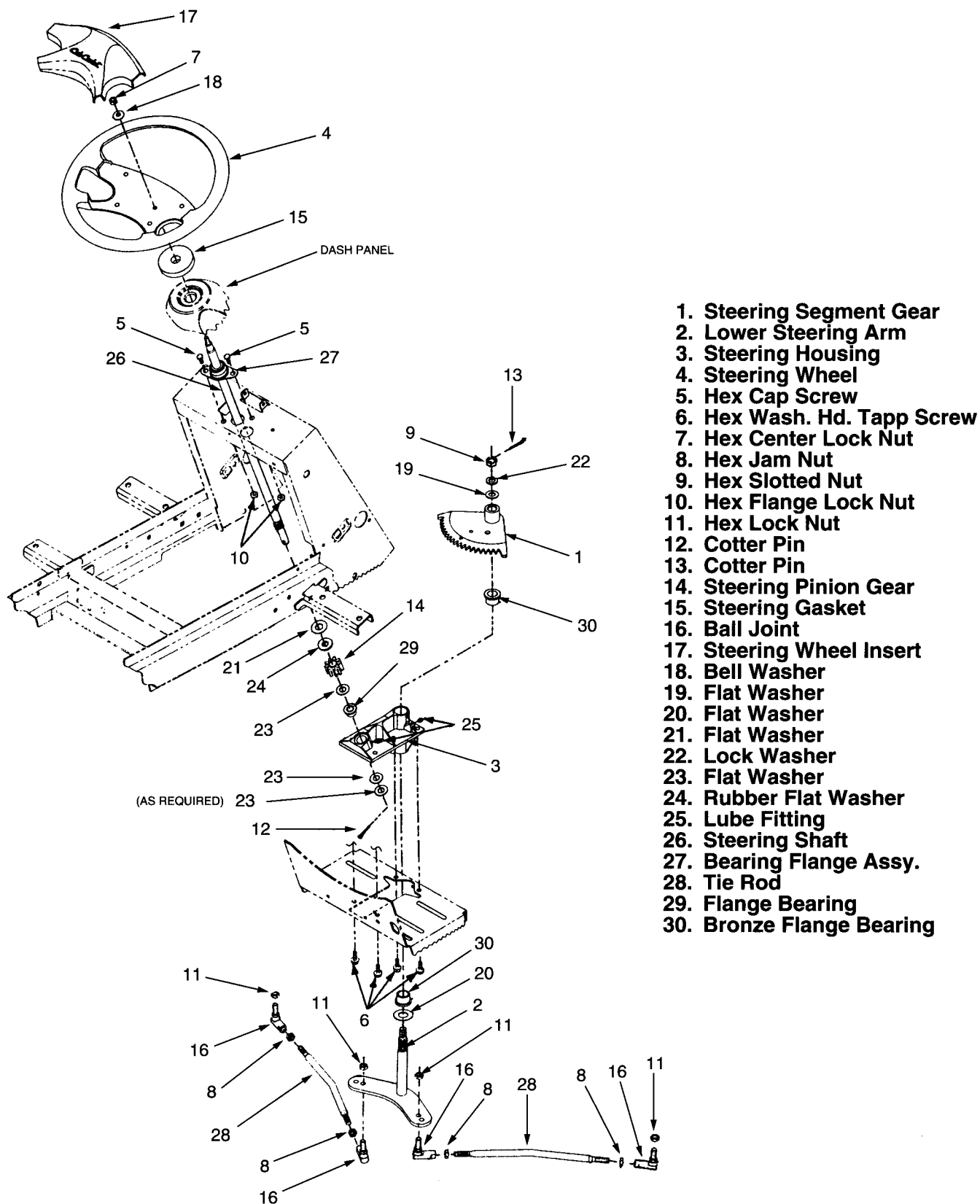


Figure 5-17. Steering Assembly (All Models).

top of the lower steering arm (2); then remove the steering arm and flat washer (20) from beneath the frame.

11. Lift the steering segment gear (1) out of the tractor.
12. Remove the steering housing (3) from the frame by removing the four hex wash. hd. tapp screws (6) from underneath the tractor.

5-15.3 Disassembly.

1. Press the upper and lower bronze flange bearings (30) from the steering housing (3).
2. Press the steering shaft flange bearing (29) from the steering housing (3).
3. If necessary, carefully remove the lube fittings (25) from the steering housing (3). Discard and replace the fittings.
4. Disassemble the tie rod assemblies per paragraph 5-10.3.

5-15.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect the ball joints (16) for wear, as indicated by looseness in the ball and socket area. Replace if worn.
3. Inspect the tie rods (28) for cracks or distortion.
4. Inspect the lower steering arm (2) for elongation of the ball joint holes and for wear or damage to the splines.
5. Using the lower steering arm (2) as a gauge, check the bronze flange bearings (30) for wear, as indicated by excessive side play.
6. Inspect the steering housing (3) for cracks, damage or wear.
7. Using the steering shaft to gauge, check the flange bearing (29) for excessive side play.
8. Check the steering shaft (26) for distortion, and inspect the splined areas for wear or damage.
9. Inspect the steering segment gear (1) and steering pinion gear (14) for wear or damage to the inner splined areas and for worn, damaged, or broken teeth.
10. Inspect the bearing flange assy. (27) for wear of the bearing and for cracks in the housing.

11. Inspect the steering wheel (4) for cracks and for wear of the hub splines.

5-15.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor metal surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.

5-15.6 Reassembly.

1. Reassemble the tie rod assemblies per paragraph 5-10.6.
2. If removed, carefully drive new lube fittings (25) into the steering housing using a protective sleeve.
3. Press a new flange bearing (29) into the top of steering housing.
4. Press new bronze flange bearings (30) into the top and bottom of the steering housing.

5-15.7 Installation.

1. Install the steering housing (3) in the frame and secure with the hex wash. hd. tapp screws (6).
2. Install and align the lower steering arm (2) and the steering segment gear (1) as follows:
 - a. With the teeth angled downward, position the segment gear (1) on the upper bearing of the steering housing.
 - b. Insert a 1/4 inch dowel through the center hole of the gear, into the alignment hole of the steering housing (See Fig. 5-18).
 - c. Place the flat washer (20) onto the lower steering arm.
 - d. With the arms angled rearward and positioned perpendicular to the frame (Fig. 5-18), slide the steering arm up into the steering housing.
 - e. Holding the segment gear in position, align the splines and install the steering arm in the gear.
 - f. Install the flat washer (19), lock washer (22), and hex slotted nut (9). Tighten the slotted nut to eliminate play, but do not overtighten.
 - g. Install the cotter pin (13) in the appropriate slot of the nut.

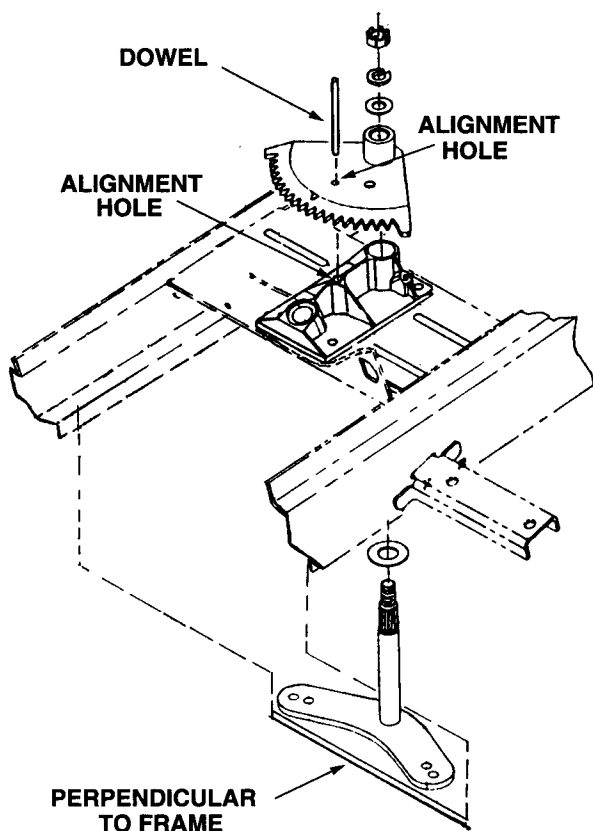


Figure 5-18. Aligning Steering Gear With Lower Steering Arm.

NOTE

Earlier Model 2130, 2135, 2140 and 2145 tactors were built with a fourteen tooth steering segment gear (1), while later units used an eighteen tooth gear. If working on one of these Models, the segment gear teeth should be counted to determine the hole placement to be used when completing the following step 3.

3. Install the rear ball joints in the proper holes of the lower steering arm (2) and secure with the hex lock nuts (11). Units with a fourteen tooth segment gear use the outer holes. Those with an eighteen tooth gear use the inner holes.

4. Adjust and install the tie rod (28) assemblies in the front steering arms per paragraph 5-10.7. Remove the dowel from the segment gear once the tie rods are adjusted and installed.
5. Install the bearing flange assy. (27) on the pedestal using the hex cap screws (5) and hex flange lock nuts (10). DO NOT tighten the screws now.
6. Install the steering shaft (26) as follows:
 - a. Insert the non-threaded end of the shaft (26) through the dash panel, parking brake lever, bearing flange assy. (27) and pedestal.
 - b. Install the flat washer (21), rubber flat washer (24), steering pinion gear (14), and thin flat washer (23) onto the bottom of the shaft.
 - c. Align the steering gears and install the shaft in the steering housing (3).
 - d. Place one flat washer (23) on the bottom of the shaft and insert, but do not bend, the cotter pin (12).
 - e. Using a feeler gauge inserted between the washer and the housing, measure the end play of the shaft. Add washers (23) as required to obtain an end play of .030 to .060 inch; then install and bend the cotter pin.
7. Position the bearing flange assy. (27) to eliminate any binding on the steering shaft and tighten the hex cap screws (5) and hex flange lock nuts (10).
8. Install the steering gasket (15); then, after making certain the steering segment gear is centered, position and install the steering wheel (4).
9. Secure the steering wheel with the bell washer (18) and hex center lock nut (7), and press the steering wheel insert (17) into place.
10. Re-position the parking brake lever in the pedestal and secure with the clevis pin and internal cotter pin.
11. Apply 251 HEP grease to the lube fittings of the steering housing.
12. Install the battery per paragraph 5-4.7 or 5-5.7.
13. Install the side panels per paragraph 5-3.7.

5-16 IMPLEMENT LIFT HANDLE (All Models).

5-16.1 **General.** Remove the mower deck or any attachment connected to the lift system before beginning this procedure.

5-16.2 Removal.

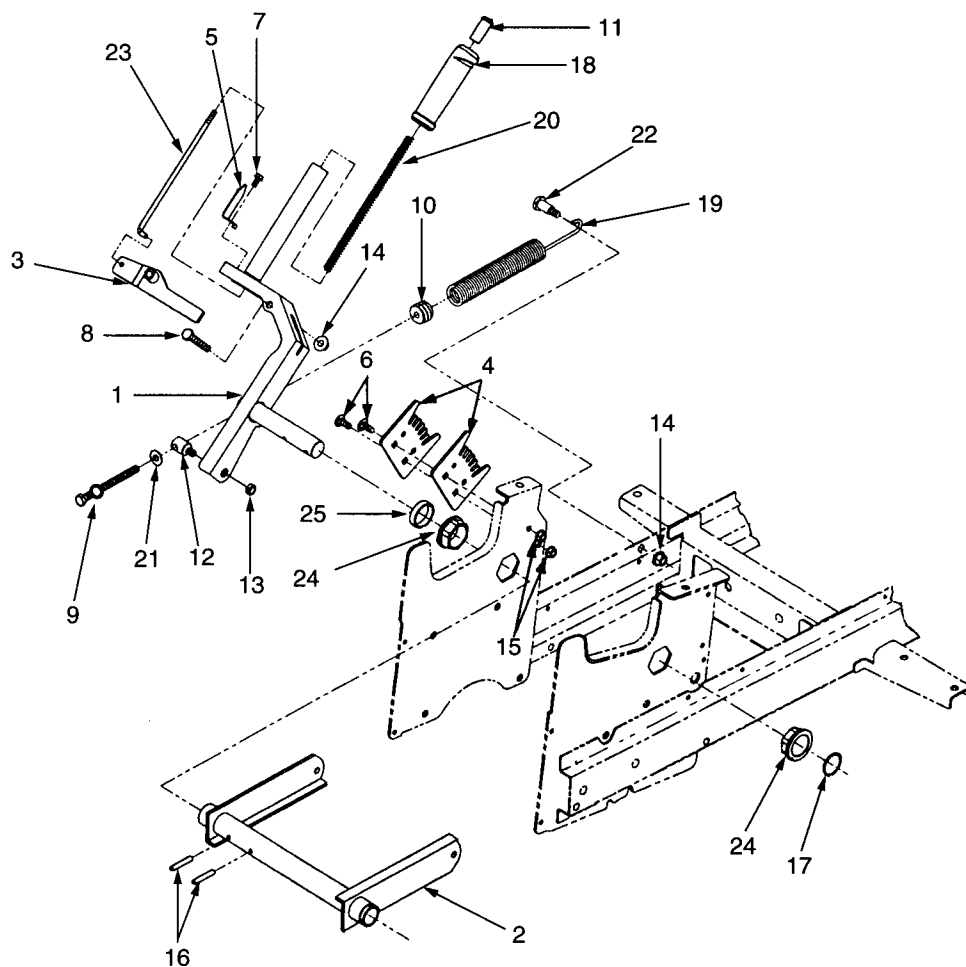
1. Remove the seat per paragraph 5-11.2.

2. Remove the fender per paragraph 5-12.2 or 5-13.2.



WARNING

Fuel vapors are extremely flammable. Remove all sources of ignition when servicing the fuel



- | | |
|-----------------------------|-----------------------------|
| 1. Lift Handle Assy. | 14. Hex Flanged Lock Nut |
| 2. Lift Shaft Assy. | 15. Hex Flange Top Lock Nut |
| 3. Lift Index Fork | 16. Spiral Spring Pin |
| 4. Lift Index Bracket | 17. Snap Ring |
| 5. Lift Height Indicator | 18. Lift Handle Grip |
| 6. Carriage Bolt | 19. Extension Spring |
| 7. Hex Wash. Hd. Tapp Screw | 20. Compression Spring |
| 8. Hex Cap Screw | 21. Flat Washer |
| 9. Hex Cap Screw | 22. Shoulder Bolt |
| 10. Spring Insert | 23. Index Rod |
| 11. Handle Button | 24. Hex Flange Bearing |
| 12. Adjustment Ferrule | 25. Spacer |
| 13. Hex Center Lock Nut | |

Figure 5-19. Implement Lift Handle (All Models).

tank. Use a suitable container to catch the fuel when draining the fuel tank or disconnecting the fuel lines.

3. Remove the fuel tank per paragraph 5-18.2.



WARNING

Place the tractor on a firm and level surface before raising any part of the tractor off the ground.

4. Chock the front wheels, raise and secure the rear of tractor, and remove the left rear wheel per paragraph 5-9.2.
5. Place the lift handle in the highest position and remove the hex cap screw (9, Fig. 5-19) and flat washer (21) from the adjustment ferrule (12) and extension spring (19).
6. Remove the extension spring (19) from the frame by removing the shoulder bolt (22) and hex flanged lock nut (14). Note the position of the spring hook before removing



CAUTION

Use care when removing the spiral spring pins (16) from the lift shaft assy. (2). Do not drive the spiral pins into the transmission housing.

7. Carefully drive the spiral spring pins (16) from the lift shaft assy (2).
8. While depressing the handle button (11), pull the lift handle assy. (1) and spacer (25) from the lift shaft assy (2).
9. Remove the two lift index brackets (4) by removing the hex flange top lock nuts (15) and carriage bolts (6).
10. Remove the lift shaft assy. (2) as follows:



NOTE

The following step a. applies only to Models 2130, 2140, and 2160.

- a. Disconnect the gear shift rod (see 21, Fig. 5-23) from the transmission shifter arm by removing the internal cotter pin and flat washer.

- b. Pull the hex flange bearing (24) from the left fender support bracket.
- c. Remove the snap ring (17) from the right end of the lift shaft assy. (2) and pull the flange bearing (24) from the right fender support bracket.
- d. Remove the hex flanged lock nuts and shoulder bolts (see 7 and 18, Fig. 5-20) fastening the LH and RH hanger brackets (1 and 3, Fig. 5-20) to the lift shaft assy.



NOTE

Loosening the upper transmission mounting screws on each side of the frame will facilitate removal of the lift shaft assy. It may be necessary to slightly spread the fender support brackets while performing the following step e.

- e. Rotate the arms of the lift shaft upward and slide the shaft to the right as far as possible. Pivot the left end of the shaft rearward and upward toward the fuel tank slot to maneuver out of the frame.

5-16.3 Disassembly.

1. Disassemble the lift handle assembly as follows:
 - a. Remove the adjustment ferrule (12) and hex center lock nut (13).
 - b. Remove the lift height indicator (5) and hex wash. hd. tapp screw (7).
 - c. Unscrew the handle button (11) from the index rod (23).
 - d. Remove the hex flanged lock nut (14) and hex cap screw (8) securing the lift index fork (3); then slide the fork, index rod (23), and compression spring (20) from the handle.



NOTE

The lift handle grip (18) is glued to the lift handle when assembled. Do not attempt to remove the grip unless replacement is necessary.

- e. Cut the lift handle grip (18) to remove from the lift handle.



NOTE

The spring insert (10) is screwed into the coils of the extension spring (19). Removal should not be attempted unless absolutely necessary.

2. Using a 3/8-16 bolt with double nuts jammed tightly against the insert, unscrew the spring insert (10) from the extension spring.

5-16.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect the lift handle assy. (1) and lift shaft assy. (2) for broken welds or distortion of the arms.
3. Check the index rod (23) for distortion.
4. Inspect the lift index fork (3) and lift index brackets (4) for elongated holes, distortion, and for worn or broken teeth.
5. Inspect the hex flange bearings (24) and mating surfaces of lift shaft assy. for excessive wear.

5-16.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor metal surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.
4. Where possible, reweld broken welds.

5-16.6 Reassembly.

1. If removed, screw the spring insert (10) into the extension spring (19) using a 3/8-16 bolt.
2. If removed, apply adhesive (such as weather strip cement) to the inside of the handle grip (18). Position the grip protrusion forward and press onto the lift handle (1).
3. Reassemble the lift handle assembly as follows:
 - a. Insert the index rod (23) in the offset of the index fork (3) so that it aligns with the tooth engagement finger of the fork; then install both in the lift handle with the hex cap screw (8) and hex flanged lock nut (14). DO NOT over-tighten the lock nut.
 - b. Through the hole in the handle grip, slide the

compression spring (20) onto the index rod, compress the spring, and screw the handle button (11) completely onto the rod.

- c. Install the lift height indicator (5) with the hex wash. hd. tapp screw (7).
- d. Install the adjustment ferrule (12) with the hex center lock nut (13). DO NOT over tighten the lock nut. The ferrule should be able to pivot.

5-16.7 Installation.

1. Working through the fuel tank slot of the left fender support, insert the right end of the lift shaft (w/ snap ring groove) into the hole of the right fender support; then maneuver the left end of the shaft into place. If loosened, tighten the upper transmission mounting screws.
2. Apply a light coating of lubricating oil on the hex flange bearings (24) and install the bearings onto each end of the lift shaft assy.
3. Install the snap ring (17) in the groove of the right end of the lift shaft assy.
4. Fasten the LH and RH hanger brackets (1 and 3, Fig. 5-20) to the arms of the lift shaft using the shoulder bolts and hex flange lock nuts.



NOTE

The following step 5 applies only to Models 2130, 2140, and 2160.

5. Connect the gear shift rod (21, Fig. 5-23) to the transmission shifter arm with the flat washer and internal cotter pin.
6. Making certain the locating projection of each bracket engages the hole of the other, stack the two lift index brackets (4); then install on the left fender support using the carriage bolts (6) and hex flange top lock nuts (15).
7. Place the spacer (25) on the lift handle assy. (1) and, while depressing the handle button (11), slide the lift handle into the lift shaft assy. (2). Make sure the index fork engages the index bracket.
8. Position the lift shaft assy. (2) to align with the holes of the lift handle assy. (1) and drive the spiral spring pins (16) into the lift shaft and lift handle.

9. With the eyelet hook of the extension spring (19) facing upward, insert the shoulder bolt (22) through the eyelet and install on the frame with the hex flanged lock nut (14).
10. Placing the lift handle in the highest position, install the hex cap screw (9) and flat washer (21) into the adjustment ferrule (12) and spring (19).
11. Adjust the hex cap screw (9) until medium tension is felt when moving the lift handle to its lowest position. Spring tension may be readjusted after installation of the mower deck or other attachment.
12. Install the left rear wheel per paragraph 5-9.7 and lower the rear of the tractor.
13. Install the fuel tank per paragraph 5-18.7.
14. Install the fender per paragraph 5-12.7 or 5-13.7.
15. Install the seat per paragraph 5-11.7.

5-17 IMPLEMENT LIFT HANGER (All Models).

5-17.1 General. Remove the mower deck or any attachment connected to the lift system before beginning this procedure.

5-17.1.1 Models 2160, 2165 and 2185 are standardly equipped with the RH lift assist rod (17, Fig. 5-20). Tractors equipped with a 48 inch deck (Model 190-301-100) will also have a LH lift assist rod installed.

5-17.2 Removal.

1. Place the tractor on a firm and level surface and chock the wheels for safety.
2. Place the lift handle in its highest position.
3. Reaching through the front of the fender wheel well, remove the hex flanged lock nuts (7, Fig. 5-20) and shoulder bolts (18) fastening the LH and RH hanger brackets (1 and 3) to the arms of the lift shaft assy.
4. From each side of the frame, remove the hex flange top lock nuts (8) and carriage bolts (5) securing the lift bracket (4) to the frame; then remove the lift bracket (4), lift link (2), and hanger bracket (1 or 3) from the tractor as an assembly.



NOTE

The following steps 5 through 7 apply only to models 2160, 2165 and 2185.

5. If not removed with the deck, remove the internal cotter pin (11) and extension spring (13) from the RH lift assist rod (17).
6. From inside the right rear frame, remove the hex flanged lock nut (7) to remove the RH lift assist rod, shoulder bolt (15), and compression spring (12).
7. If the tractor is equipped a 48 inch deck, repeat the above procedure (steps 5 and 6) for the LH lift assist rod.

5-17.3 Disassembly.

1. Note the position of the offset form of the lift brackets (4), and remove the hex flanged lock nuts (7), shoulder bolts (16), and flat washers (14) fastening them to the lift links (2).
2. Separate the LH hanger bracket (1) from the lift link (2) by removing the internal cotter pin (11).
3. Mark the thread location of the hex jam nut (9) and remove the hex nylon lock nut (10), adjustment ferrule (6), and hex jam nut from the LH hanger bracket.
4. Remove the hex flanged lock nut (7), shoulder bolt (16), and flat washer (14) to separate the RH hanger bracket (3) and lift link (2).

5-17.4 Inspection. Clean all parts prior to inspection.

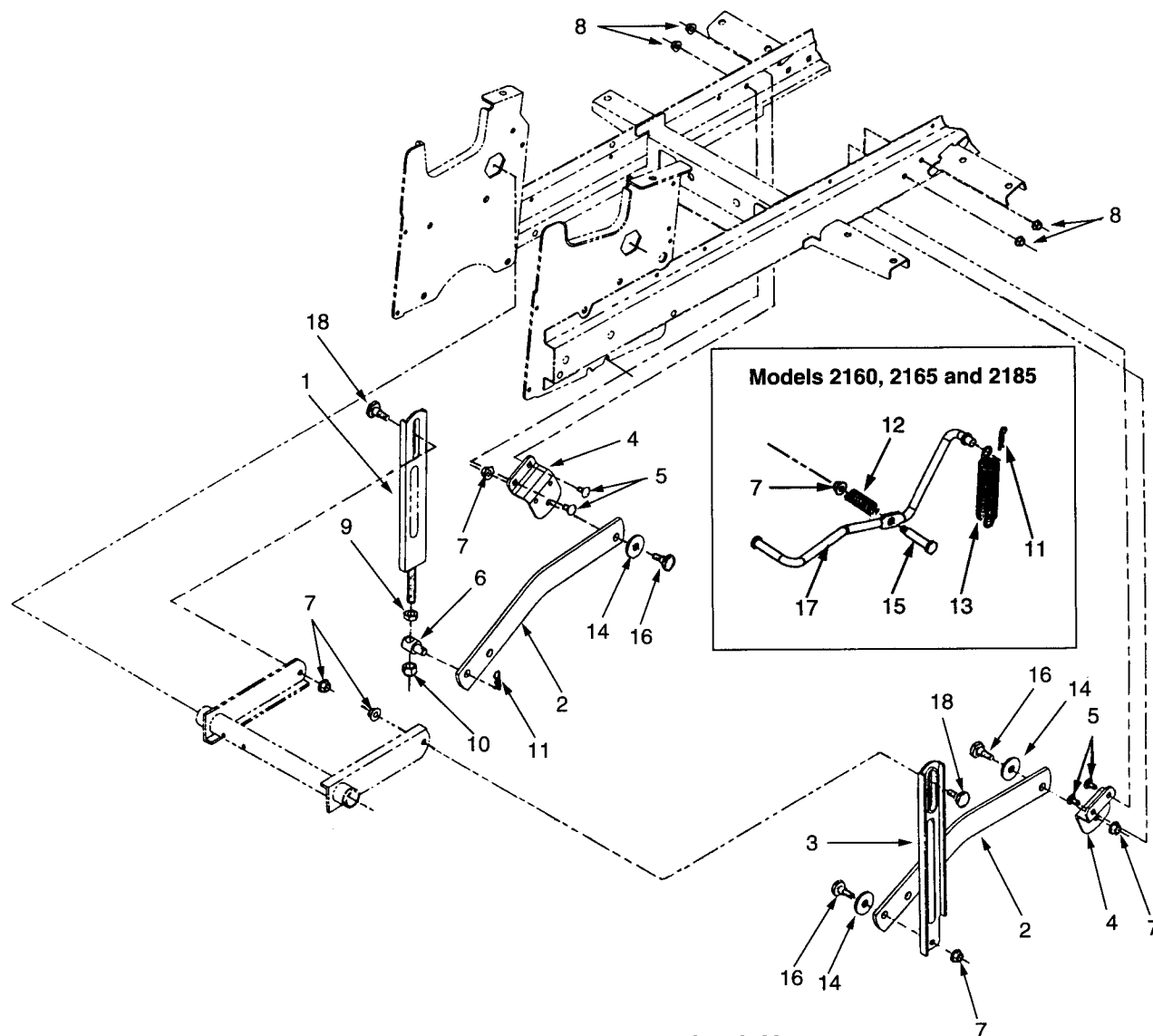
1. Inspect all threaded areas for damage.
2. Inspect the lift links (2) and lift brackets (4) for distortion or elongated holes.
3. Inspect the LH and RH hanger brackets for distortion, wear, or damage to the lift float slots.
4. If applicable, check the LH and/or RH lift assist rod (17) for distortion or damage, and check the extension spring(s) (13) for damage or loss of tension, as indicated by irregular spacing between the coils.

5-17.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor metal surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.

5-17.6 Reassembly.

1. Attach the lift link (2, form pointing upward) to the inside of the RH hanger bracket (3) with the shoulder bolt (16), flat washer (14), and hex flanged lock nut (7).
2. Turn the hex jam nut (9) onto the threads of the



1. LH Hanger Bracket
2. Lift Link
3. RH Hanger Bracket
4. Lift Bracket
5. Carriage Bolt
6. Adjustment Ferrule
7. Hex Flanged Lock Nut
8. Hex Flange Top Lock Nut
9. Hex Jam Nut

10. Hex Nylon Lock Nut
11. Internal Cotter Pin
12. Compression Spring
13. Extension Spring
14. Flat Washer
15. Shoulder Bolt
16. Shoulder Bolt
17. RH Lift Assist Rod
18. Shoulder Bolt

Figure 5-20. Implement Lift Hanger (All Models).

LH hanger bracket (1) stud to mark made earlier; then install the adjustment ferrule (6) and hex nylon lock nut (10). Make certain the pin surface of the ferrule is perpendicular to the flat surface of the hanger bracket.

3. Place the lift link (2, form upward) on the hanger bracket ferrule and secure with the internal cotter pin (11).
4. With the offset of brackets facing outward, assemble the lift brackets (4) to the outside of the lift links (2) using the shoulder bolts (16), flat washers (14), and hex flanged lock nuts (7).

5-17.7 Installation.



The following steps 1 and 2 apply only to models 2160, 2165 and 2185.

1. Insert the shoulder bolt (15) through the RH lift assist rod (17), slide the compression spring (12) onto the bolt, and install on the right rear frame with the hex flanged lock nut (7).
2. If the tractor is equipped with a 48 inch deck, repeat the above procedure for the LH lift assist rod.



The extension spring (13) and internal cotter pin (11) should be attached to the lift assist rod(s) after installation of the deck.

3. On each side of the tractor, install the lift bracket on the frame using the carriage bolts (5) and hex flange top lock nuts (8).
4. Working through the front of the right fender wheel well, slide the RH hanger bracket up along the inside surface of the frame channel. Insert the shoulder bolt (18) in the hanger bracket slot and secure to the lift shaft arm with the hex flanged lock nut (7).
5. Repeat the above procedure (step 4) for the LH hanger bracket.

5-18 FUEL TANK (All Models).

5-18.1 General. Gasoline is extremely flammable. Never allow the tractor to be operated while leaking fuel. At the first indication of a fuel leak, all components of the fuel system should be inspected and repaired or replaced as necessary.

5-18.2 Removal.

1. Remove the side panels per paragraph 5-3.2.
2. To prevent arcing, disconnect the battery per paragraph 5-4.2 or 5-5.2.
3. Remove the seat per paragraph 5-11.2.
4. Remove the fender per paragraph 5-12.2 or 5-13.2.



WARNING

Perform services in a well ventilated area. Fuel vapors are very flammable. Do not service the fuel system immediately after operating the tractor. Allow all tractor components to cool and remove all sources of ignition before servicing.



CAUTION

Use a suitable container to catch the fuel when draining the fuel tank.

5. Disconnect the fuel line (4, Fig. 5-21) at the engine fuel filter (not shown) by removing the hose clamp (3). Drain all fuel from the tank.
6. Remove the hose clamp (3) to disconnect the fuel line (4) from the fuel tank (5), then lift the fuel tank from the tractor.
7. While noting the routing of the fuel line, either pinch the locking barbs to release, or cut the cable ties to remove the fuel line from the frame.
8. Remove the fuel filter by removing the second hose clamp.

5-18.3 Disassembly.

1. Remove the fuel tank cap (6) from the fuel tank.
2. If necessary, remove and discard the foam tape (2) and/or the foam blocks (1).

5-18.4 Inspection. Clean all parts prior to inspection.

1. Inspect the fuel tank for cracked mold seams, holes, or wear.
2. Inspect the tank fill neck for nicks or damage to the gasket sealing surface and for damaged or worn threads.
3. Inspect the fuel tank cap (6) gasket for cracks, damage, or deterioration.
4. Check the fuel line (4) for cracks, damage, or deterioration.
5. Check the fuel filter for clogging or damage.
6. Check the foam blocks (1) and foam tape (2) for damage or deterioration.

7. Inspect the hose clamps (3) for damage, distortion, or loss of tension.

5-18.5 Repair. There are no repairable parts. Replace all defective parts.

5-18.6 Reassembly.

1. If removed, clean the fuel tank of residue from the old foam blocks (1) and press new blocks into place.
2. Clean the fender supports of residue from the old foam tape (2) and carefully stick the new tape in the fuel tank cradle of the fender supports.
3. To prevent debris from entering the fuel tank, screw the fuel tank cap (6) onto the tank.

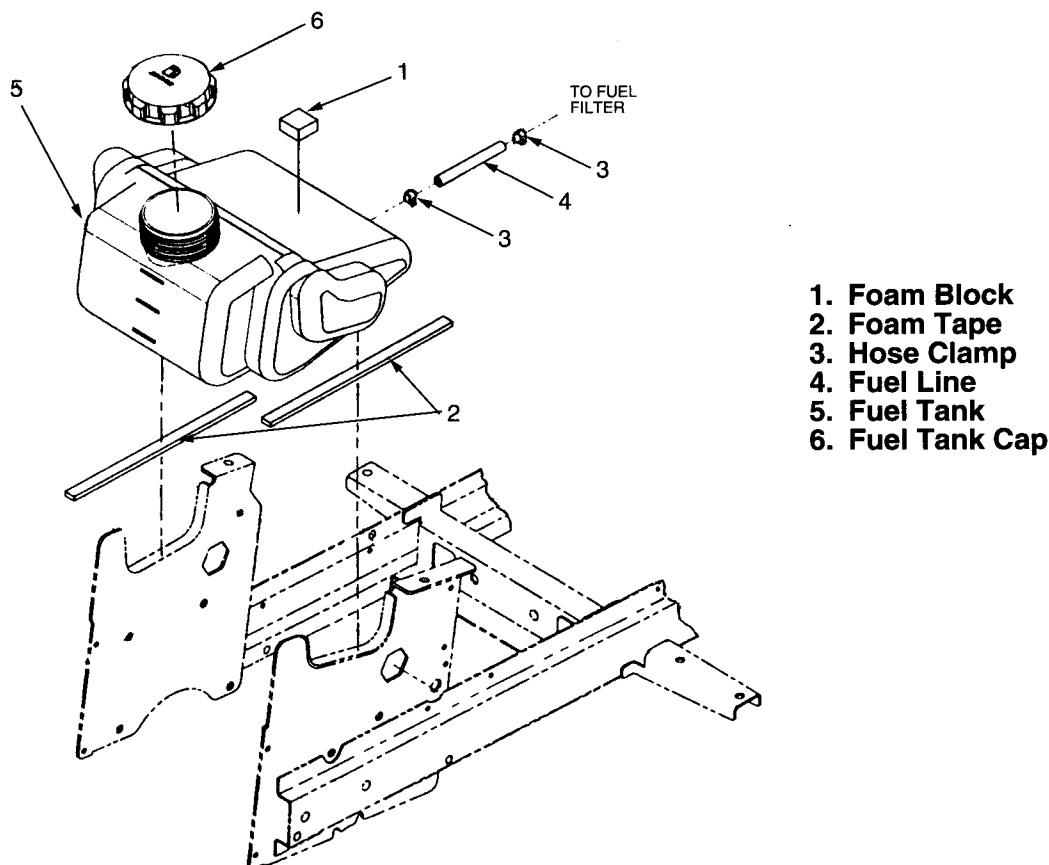


Figure 5-21. Fuel Tank (All Models).

5-18.7 Installation.

1. Connect the fuel filter to the engine fuel line using the hose clamp.
2. Route the fuel line (4) along the frame channel as noted earlier and secure with either new, or the existing cable ties.
3. Position the fuel tank (5) in the fender support brackets and connect the fuel line (4) using the hose clamp (3).
4. Connect the fuel line (4) to the fuel filter using the hose clamp (3).



WARNING

Fuel vapors are extremely flammable. Perform services in a well ventilated area and remove all sources of ignition.

5. Fill the fuel tank with fuel and carefully inspect the entire fuel system for leaks. If leakage is found, repeat the steps necessary to replace the defective part(s).
6. Install the fender per paragraph 5-12.7 or 5-13.7.
7. Install the seat per paragraph 5-11.7.
8. Connect the battery per paragraph 5-4.7 or 5-5.7.
9. Install the side panels per paragraph 5-3.7.

5-19 CONTROL PEDALS AND BRAKE LINKAGE (All Models).

5-19.1 General. The *Removal* and *Installation* procedures of this section are described as being performed from underneath the tractor, and do not require fender removal. If the brake linkage is being removed in conjunction with brake assembly service (see Paragraph 5-27), the fender and running board should be removed.

5-19.2 Removal.



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

1. Remove the side panels per paragraph 5-3.2.

2. Remove the battery per paragraph 5-4.2 or 5-5.2.
3. Release the tractor parking brake.
4. Remove the forward pedal (7, Fig. 5-22) from the clutch shaft (2) by removing the hex wash. hd. tapp screw (11).
5. Remove the brake pedal (8) from the brake shaft (1) by removing the hex wash. hd. tapp screw (11).
6. Remove the reverse pedal pad (25) by removing the truss hd. tapp screw (12).
7. Remove the brake shaft (1), clutch shaft (2), and the mounting plates (6) together as one assembly as follows:
 - a. Disconnect the brake rod (37) and adjustment ferrule (15) from the brake cam (3) by removing the internal cotter pin (20).
 - b. Disconnect the extension spring (27) from the brake arm and slide the spring and brake rod (37) out from the rear of the tractor. Note the rod passes through the frame reinforcement bracket.



NOTE

The following step c. applies only to Models 2130, 2140, and 2160.

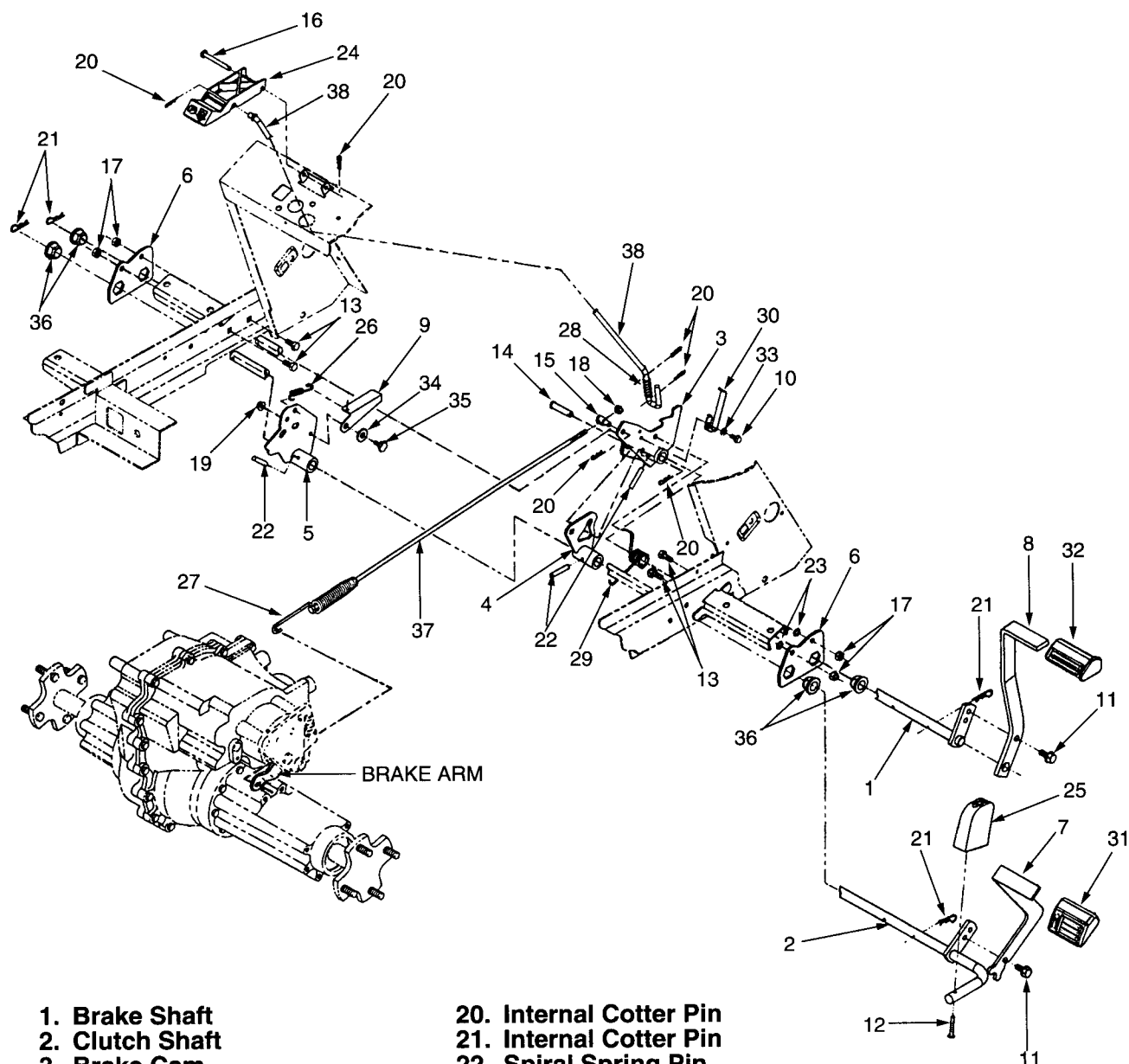
- c. Unhook the extension spring (15, Fig. 5-23) and disconnect the clutch adjustment rod from the clutch cam per paragraph 5-20.2.



NOTE

The following steps d. through f. apply to Models 2135, 2145, 2165, and 2185.

- d. Unhook the extension spring (23, Fig. 5-24) and disconnect the hydro adjustment rod from the clutch cam per paragraph 5-21.2.
- e. Disconnect the damper cylinder (21, Fig. 5-24) from the clutch cam per paragraph 5-21.2.
- f. Remove the clevis pin (14) from the cruise return bracket (see 1, Fig. 5-24), brake cam (3), and neutral return bracket (4) by removing the internal cotter pin (20).



- | | |
|------------------------------|-------------------------------|
| 1. Brake Shaft | 20. Internal Cotter Pin |
| 2. Clutch Shaft | 21. Internal Cotter Pin |
| 3. Brake Cam | 22. Spiral Spring Pin |
| 4. Neutral Return Bracket | 23. Push Speed Nut |
| 5. Clutch Cam | 24. Park Brake Lever |
| 6. Pedal Mounting Plate | 25. Reverse Pedal Pad |
| 7. Forward Pedal | 26. Extension Spring |
| 8. Brake Pedal | 27. Extension Spring |
| 9. Reverse Switch Actuator | 28. Compression Spring |
| 10. Hex Wash. Hd. Tapp Screw | 29. Torsion Spring |
| 11. Hex Wash. Hd. Tapp Screw | 30. Neutral Switch Actuator |
| 12. Truss Hd. Tapp Screw | 31. Forward Pedal Pad |
| 13. Hex Cap Screw | 32. Brake Pedal Pad |
| 14. Clevis Pin | 33. Flat Washer |
| 15. Adjustment Ferrule | 34. Flat Washer |
| 16. Clevis Pin | 35. Shoulder Bolt |
| 17. Hex Sems Nut | 36. Hex Flange Bearing |
| 18. Hex Sems Nut | 37. Brake Rod |
| 19. Hex Flange Lock Nut | 38. Park Brake Engagement Rod |

Figure 5-22. Control Pedals And Brake Linkage (All Models).

- g. Remove the hex sems nuts (17, Fig. 5-22) and hex cap screws (13) securing the pedal mounting plate (6) to the left side of the frame.
 - h. From the right side of the frame, remove the internal cotter pins (21) from both the brake and clutch shafts (1 and 2).
 - i. While supporting the shafts, remove the hex sems nuts (17) that secure the right hand pedal mounting plate (6) to the frame. Slide the mounting plate off the hex cap screws (13) and remove the complete assembly from underneath the tractor.
8. If necessary, remove the push speed nuts (23) to remove the hex cap screws (13) from the frame.
 9. Remove the park brake engagement rod (38) from the pedestal as follows:
 - a. From underneath the frame, remove the internal cotter pin (20) from the bottom of rod.
 - b. Remove the internal cotter pin (20) and withdraw the clevis pin (16) from the pedestal and park brake lever (24).

NOTE

The park brake lever (24) cannot be removed without raising the the steering shaft. If replacement of the lever is necessary, refer to paragraph 5-15.2.

- c. Tilting the brake lever upward, remove the internal cotter pin (20) from the underside of the lever, and separate the brake engagement rod from the lever.
- d. Raise the engagement rod (38) in the pedestal and remove the internal cotter pin (20) and compression spring (28) from the lower end of the rod.

NOTE

Turn the steering wheel fully to the left to facilitate removal of the engagement rod.

- e. Moving the lower end of the engagement rod toward the right side of the lower pedestal opening, maneuver the rod out of the pedestal.

5-19.3 **Disassembly.**

1. Unhook the extension spring (26), and remove the reverse switch actuator (9) from the clutch cam (5) by removing the hex flange lock nut (19), shoulder bolt (35), and flat washer (34).
2. Remove the neutral switch actuator (30) from the brake cam (3) by removing the hex wash. hd. tapp screw (10) and flat washer (33).
3. Unhook the torsion spring (29) from the brake cam (3).

NOTE

The following step 4 applies only to Models 2130, 2140, and 2160. (This step was completed for Models 2135, 2145, 2165, and 2185 in step 7-f. of the removal procedures.)

4. Remove the clevis pin (14) from the brake cam (3) and neutral return bracket (4) by removing the internal cotter pin (20).
5. Disassemble the brake and clutch shaft (1 and 2) assembly as follows:
 - a. Supporting the brake and clutch shafts to prevent bending, use a drift punch to drive the spiral spring pins (22) from the brake cam (3), neutral return bracket (4), and clutch cam (5).
 - b. Remove the internal cotter pins (21) from the left end of the shafts, and slide the hex flange bearings (36), left mounting plate (6), clutch cam, brake cam, neutral return bracket, torsion spring (29), right mounting plate (6) and hex flange bearings (36) off the shafts.
6. Disassemble the brake rod (37) from the extension spring (27) by removing the hex sems nut (18) and adjustment ferrule (15).
7. If replacement is needed, pull the pedal pads (31 and 32) from the forward pedal (7) and/or the brake pedal (8).

5-19.4 **Inspection.** Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect all welded parts for broken or poor welds.
3. Inspect the brake rod (37) and park brake engagement rod (38) for distortion.

4. Check the brake (3) and clutch (5) cams for distortion and for elongated holes.
5. Inspect the brake (1) and clutch (2) shafts and the hex flange bearings (36) for damage or wear.
6. Inspect all springs for distortion or loss of tension as indicated by irregular spacing between the coils.
7. Inspect all other parts for cracks, scoring, distortion, corrosion, and wear.

5-19.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor metal surface damage or corrosion with a fine honing stone or emery cloth.
3. Where possible, reweld broken or poor welds.
4. Replace all damaged or excessively worn parts.

5-19.6 Reassembly.

1. Press new pedal pads (31 and 32) onto the forward and/or brake pedals (7 and 8).
2. Slide the brake rod (3) through the extension spring (27) and install the adjustment ferrule (15) and hex sems nut (18).
3. Assemble the brake and clutch shaft (1 and 2) assembly as follows:
 - a. Slide a hex flange bearing (36), flange first, onto each shaft and slide the right mounting plate (6) onto both shafts.
 - b. Slide the torsion spring (29) and brake cam (3) onto the brake shaft (1). The notched arm of the brake cam and longer leg of the spring should be toward the right.
 - c. Slide the neutral return bracket (4) and then the clutch cam (5) onto the clutch shaft (2).
 - d. Install the mounting plate (6), hex flange bearings (36), and internal cotter pins (21) onto the left end of the shafts.

NOTE

Before securing with the spiral spring pins, make certain the brake cam, clutch cam, and neutral return bracket face upward (relative to the top of the mounting plates (6) and the pedal mounting brackets of the brake and clutch shafts).

- e. Align the holes and secure the brake cam, clutch cam, and neutral return bracket with the spiral spring pins (22).

NOTE

The following step 4 applies only to Models 2130, 2140, and 2160.

4. Insert the clevis pin (14) through the left arm of the brake cam, the triangular opening of the neutral return bracket, and the notched arm of the brake cam. Secure with the internal cotter pin (20).
5. Hook the longer leg of the torsion spring (29) under the clutch shaft; then load the spring by turning the other leg in the direction of the coil windings and hooking into the top/center hole of the brake cam.
6. Inserting the tab in the upper hole, install the neutral switch actuator (30) on the brake cam with the hex wash. hd. tapp screw (10) and flat washer (33).
7. Install the reverse switch actuator (9) on the clutch cam with the shoulder bolt (35), flat washer (34), and hex flange lock nut (19). Hook the extension spring (26) to the actuator and cam.

5-19.7 Installation.

1. Install the park brake engagement rod (38) as follows:
 - a. Maneuver the engagment rod up into the pedestal, making certain it is positioned to the right of the drive shaft.
 - b. Lifting the rod up inside the pedestal, push the compression spring (28) onto the lower end of the rod and install the internal cotter pin (20) above the spring.

NOTE

If previously removed, install the park brake lever (24) by raising the steering shaft per paragraph 5-15.2.

- c. Install the engagement rod in the park brake lever (24) and secure with the internal cotter pin (20).

- d. Aligning the rod with the slot in the frame, push and hold the rod downward in the slot. From underneath the frame, install the internal cotter pin (20) in the bottom of the rod.
 - e. Position the brake lever in the pedestal and install the clevis pin (16) and internal cotter pin (20).
2. If removed, install the hex cap screws (13) in the right side of the frame and secure in position with the push speed nuts (23).
 3. Install the brake and clutch shaft assembly onto the frame as follows:
 - a. Loosely install the left pedal mounting plate (6) on the frame using the hex cap screws (13) and hex sems nuts (17). Make certain the hex flange bearings (36) are seated in the mounting plate.
 - b. Raise the right end of the shaft assembly and slide the mounting plate (6) onto the hex cap screws (13). Secure with the hex sems nuts (17).
 - c. Press the flange bearings (36) into the mounting plate and install the internal cotter pin (21) in each shaft. Tighten the hex cap screws and sems nuts on the left side of the frame.

NOTE

The following steps d. through f. apply only to Models 2135, 2145, 2165, and 2185.

- d. Insert the clevis pin (14) through the cruise return bracket (1, Fig. 5-24), brake cam, and neutral return bracket per paragraph 5-21.7.

- e. Connect the damper cylinder (21, Fig. 5-24) to the clutch cam per paragraph 5-21.7.
- f. Connect the hydo adjustment rod and extension spring to the clutch cam per paragraph 5-21.7.

NOTE

The following step g. applies only to Models 2130, 2140, and 2160.

- g. Connect the clutch adjustment rod (22, Fig. 5-23) and extension spring (15, Fig. 5-23) to the clutch cam per paragraph 5-20.7.
 - h. Route the brake rod/spring assembly (37 and 27) through the frame reinforcement bracket and hook the spring to the inside of the transaxle brake arm.
 - i. Holding the brake rod forward to remove any slack, turn the adjustment ferrule (15) as necessary to align with the hole in the brake cam, then tighten the hex sems nut (18). Insert the ferrule into the brake cam and secure with the internal cotter pin (20).
4. Install the reverse pedal pad (25) on the clutch shaft with the truss hd. tapp screw (12).
 5. Install the brake pedal (8) on the brake shaft (1) using the hex wash. hd. tapp screw (11).
 6. Install the forward pedal (7) on the clutch shaft (2) using the hex wash. hd. tapp screw (11).
 7. Install the battery per paragraph 5-4.7 or 5-5.7.
 8. Install the side panels per paragraph 5-3.7
 9. Test and, if necessary, adjust the brakes per the instructions found in Section 6— Adjustments.

5-20 SIX SPEED TRANSMISSION CONTROLS (Models 2130, 2140, and 2160).

5-20.1 **General.** The correct installation and adjustment of the clutch adjustment rod (22, Fig. 5-23) is essential to proper operation of the transmission. Check the hole locations and adjustment of the rod prior to beginning any clutch or transmission repairs. This inspection can be performed from underneath the tractor.

5-20.2 Removal.

1. To prevent arcing, disconnect the battery per paragraph 5-4.2 or 5-5.2.
2. Remove the seat per paragraph 5-11.2.
3. Turn the hex jam nut (11, Fig. 5-23) clockwise to loosen, then remove the shifter knob (2) and jam nut from the speed control lever (20).



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

4. Remove the fender and running board per paragraph 5-12.2 or 5-13.2.



WARNING

Fuel vapors are extremely flammable. Remove all sources of ignition when servicing the fuel tank. Use a suitable container to catch the fuel when draining the fuel tank or disconnecting the fuel lines.

5. Remove the fuel tank per paragraph 5-18.2.
6. Remove the clutch adjustment rod (22) and its assembled parts as follows:
 - a. Unhook the extension spring (15) from the notch of the clutch cam.
 - b. Remove the internal cotter pin (13), extension spring (15), and flat washer (16) to disconnect the clutch rod assembly from the clutch cam.
 - c. Remove the internal cotter pin (13) to disconnect the clutch rod assembly from the control arm.

- d. Slide the clutch rod forward to clear the frame reinforcement bracket and remove the rod assembly from the tractor.

7. Remove the gear shift rod (21) from the transmission shifter arm and the gear shift bracket (3) by removing the internal cotter pin (13) and flat washer (16) from each end.
8. Remove the hex flange top lock nut (10) and the carriage bolt from the gear shift bracket (3).
9. Remove the hex lock nut (8), bell washers (18), and gear shift bracket (3) from the speed control lever (20).
10. Remove the speed control lever (20) and flat washer (17) from the fender support bracket.
11. Remove the hex sems nuts (7) and hex cap screws (5) to remove the control lever bushing (23) from the fender support bracket.

5-20.3 Disassembly.



NOTE

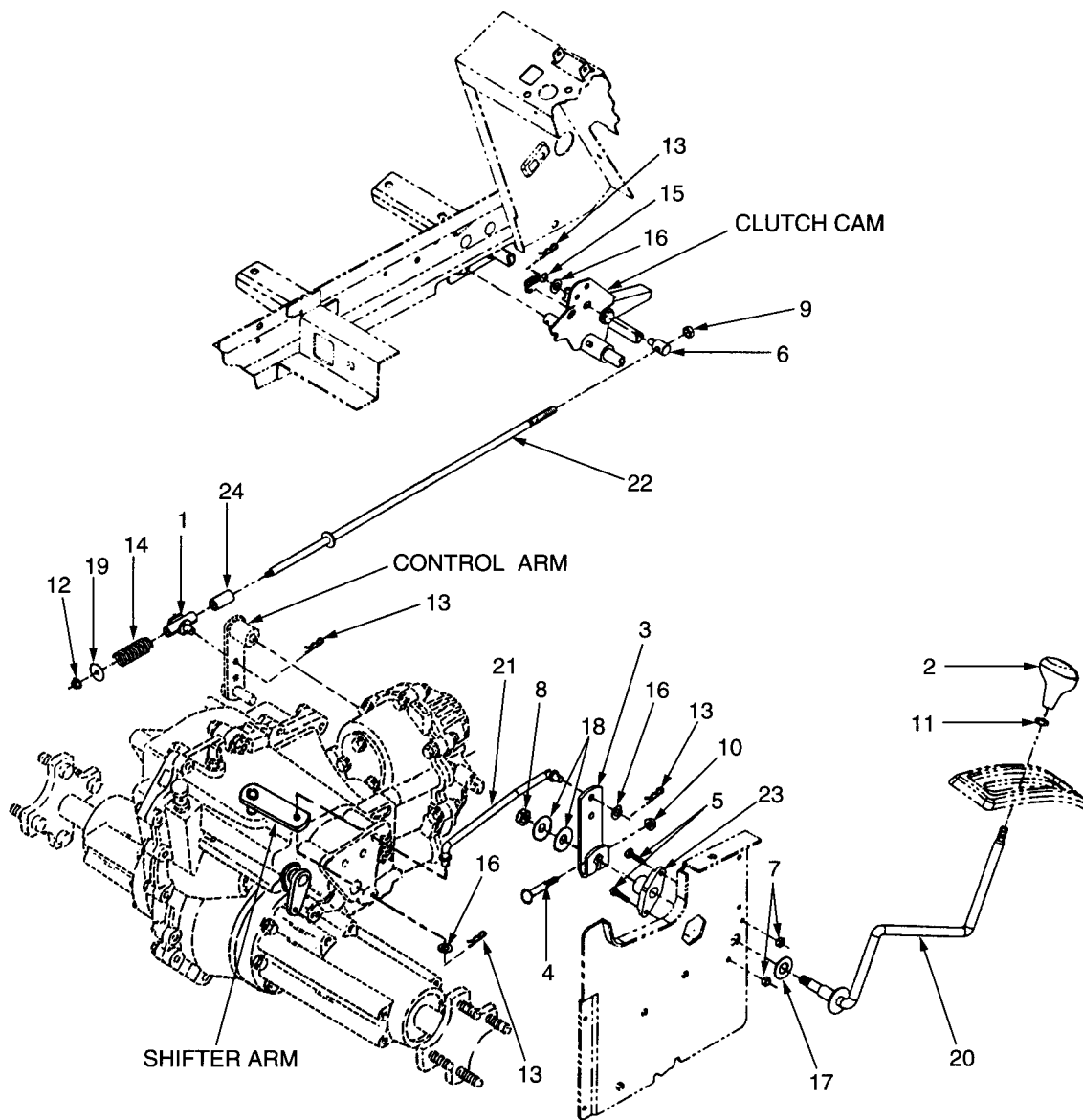
A redesigned clutch adjustment rod is used on tractors with Serial No. 272,501 and above. The new rod eliminates usage of the spacer (24).

1. Remove the hex flange lock nut (12), flat washer (19), compression spring (14), pivot sleeve (1), and spacer (24, if applicable) from the clutch rod (22) assembly.
2. Loosen and remove the hex jam nut (9) and adjustment ferrule (6) from the clutch rod (22).

5-20.4 Inspection.

Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect the clutch rod (22) and shift rod (21) for distortion or wear.
3. Inspect the pin surfaces of the pivot sleeve (1) and adjustment ferrule (6) for wear.
4. Check the gear shift bracket (3) for damage or wear.
5. Check the control lever bushing (23) and mating surface of the control lever (20) for scoring or wear.



- | | |
|-----------------------------|---|
| 1. Pivot Sleeve | 13. Internal Cotter Pin |
| 2. Shifter Knob | 14. Compression Spring |
| 3. Gear Shift Bracket | 15. Extension Spring |
| 4. Carriage Bolt | 16. Flat Washer |
| 5. Hex Cap Screw | 17. Flat Washer |
| 6. Adjustment Ferrule | 18. Bell Washer |
| 7. Hex Sems Nut | 19. Flat Washer |
| 8. Hex Lock Nut | 20. Speed Control Lever |
| 9. Hex Jam Nut | 21. Gear Shift Rod |
| 10. Hex Flange Top Lock Nut | 22. Clutch Adjustment Rod |
| 11. Hex Jam Nut | 23. Control Lever Bushing |
| 12. Hex Flange Lock Nut | 24. Spacer (Serial No. 272,500 and Below) |

Figure 5-23. Six Speed Transmission Controls (Models 2130, 2140, and 2160).

6. Inspect the springs (14 and 15) for distortion or loss of tension as indicated by irregular spacing between the coils.

5-20.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor metal surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.

5-20.6 Reassembly.

1. Screw the adjustment ferrule (6) and hex jam nut (9) onto the clutch adjustment rod (22). Do not tighten the jam nut now.



A redesigned clutch adjustment rod is used on tractors with Serial No. 272,501 and above. The new rod eliminates usage of the spacer (24).

2. Slide the spacer (24, if applicable), pivot sleeve (1), and compression spring (14) onto the clutch rod and secure with the flat washer (19) and hex flange lock nut (12). Make certain the lock nut and flat washer are tightened completely against the shoulder of the rod.

5-20.7 Installation.

1. Install the control lever bushing (23) on the fender support with the hex cap screws (5) and hex sems nuts (7).
2. Place the flat washer (7) on the speed control lever (20) and insert the lever through the lever bushing.
3. Install the gear shift bracket (3), arm pointing upward, onto the square shoulder of the control lever.
4. With the cupped surfaces together, install the two bell washers (18) and the hex lock nut (8) on the control lever. Tighten the lock nut to eliminate side play, but do not overtighten. There should be minimal to no drag on the control lever for six speed transmissions.

5. Install the carriage bolt (4) and hex flange top lock nut (10) in the bottom of the gear shift bracket (3). Tighten the lock nut to securely clamp the bracket onto the control lever, but do not overtighten.

6. Install the gear shift rod (21) in the transmission shifter arm and in the TOP hole of the gear shift bracket (3). Secure with the flat washers (16) and internal cotter pins (13).

7. Install the clutch adjustment rod (22) assembly as follows:

- a. Position the rod through the opening in the frame reinforcement bracket.
- b. Insert the pin of the pivot sleeve (1) into the UPPER hole of the control arm and secure with the internal cotter pin (13).
- c. Without moving the control arm, adjust the ferrule (6) as necessary to align with the back radius of the FRONT slotted hole of the clutch cam. Tighten the hex jam nut (9) against the ferrule.
- d. Insert the adjustment ferrule (6) through the front hole of the clutch cam, and install the flat washer (16), extension spring (15), and internal cotter pin (13).
- e. Hook the extension spring (15) in the notch on the edge of the clutch cam.

8. Install the fuel tank per paragraph 5-18.7.

9. Install the fender and running board per paragraph 5-12.7 or 5-13.7.

10. Install the hex jam nut (11) and shifter knob (2) on the control lever (20) and tighten the jam nut against the knob.

11. Install the seat per paragraph 5-11.7.

12. Connect the battery per paragraph 5-4.7 or 5-5.7.

13. Referring to the instructions found in Section 6—Adjustments, check the tractor for proper neutral adjustment and re-adjust the clutch rod (22), if necessary.

5-21 HYDRO TRANSMISSION CONTROLS (Models 2135, 2145, 2165, and 2185).

5-21.1 General. The correct installation and adjustment of the hydro adjustment rod (34, Fig. 5-24) is essential to proper operation of the Transmission. Check for the proper hole locations and adjustment of the rod prior to beginning any hydro pump or transmission repairs. This inspection can be performed from underneath the tractor.

5-21.2 Removal.

1. To prevent arcing, disconnect the battery per paragraph 5-4.2 or 5-5.2.
2. Remove the seat per paragraph 5-11.2.
3. Turn the hex jam nut (17, Fig. 5-24) clockwise to loosen, then remove the shifter knob (3) and jam nut from the speed control lever (33).



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

4. Remove the fender and running board per paragraph 5-12.2 or 5-13.2.



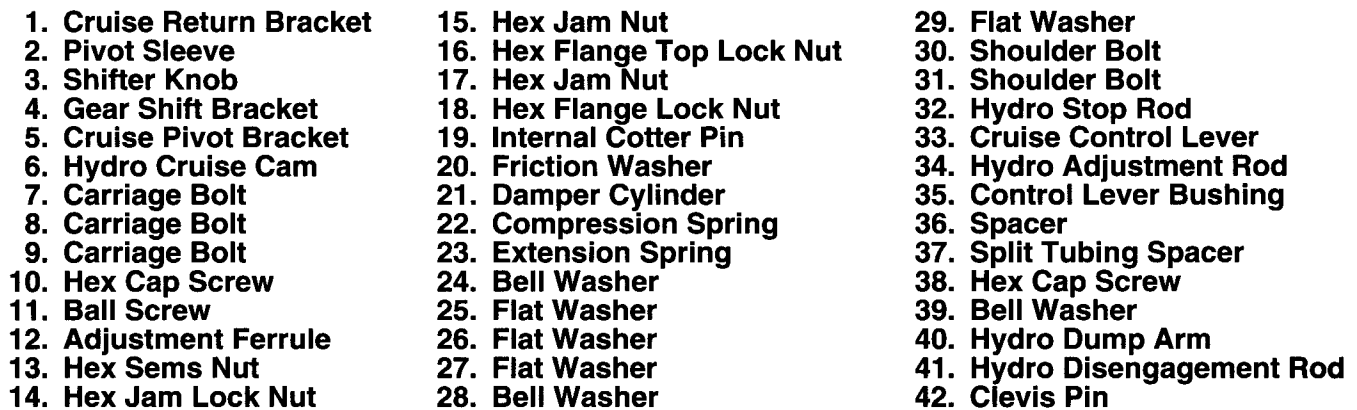
WARNING

Fuel vapors are extremely flammable. Remove all sources of ignition when servicing the fuel tank. Use a suitable container to catch the fuel when draining the fuel tank or disconnecting the fuel lines.

5. Remove the fuel tank per paragraph 5-18.2.
6. Remove the hydro adjustment rod (34) and its assembled parts as follows:
 - a. Unhook the extension spring (23) from the notch of the clutch cam.
 - b. Remove the internal cotter pin (19), extension spring (23), and flat washer (25) to disconnect the hydro rod assembly from the clutch cam.
 - c. Remove the internal cotter pin (19) to disconnect the hydro rod assembly from the control arm.

- d. Slide the hydro rod forward to clear the frame reinforcement bracket, and remove the rod assembly from the tractor.

7. Disconnect the damper cylinder (21) from the clutch cam by removing the hex flange top lock nut (16).
8. Remove the damper cylinder (21) and split tubing spacer (37) from the frame by removing the hex sems nut (13) and shoulder bolt (31).
9. Remove the hydro stop rod (32) and adjustment ferrule (12) as follows:
 - a. Remove the internal cotter pin (19) to disconnect the rod (32) from the shift bracket (4).
 - b. Disconnect the rod (32) and ferrule (12) from the hydro cruise bracket (6) by removing the internal cotter pin (19) and flat washer (24).
 - c. Slide the rod back through the frame reinforcement bracket to remove from tractor.
10. Remove the cruise control lever (33) assembly from the fender support as follows:
 - a. Remove the carriage bolt (8) and hex flange top lock nut (16) from the gear shift bracket (4).
 - b. Remove the hex jam lock nut (14), bell washers (28), and gear shift bracket (4) from the control lever (33).
 - c. Withdraw the control lever (33) from the fender support and remove the friction disc (20) from the lever.
 - d. Remove the control lever bushing (35) by removing the hex sems nuts (13) and hex cap screws (10).
11. Remove the internal cotter pin (19) and withdraw the clevis pin (42) from the cruise return bracket (1), brake cam, and neutral return bracket.
12. Remove the internal cotter pin (19), flat washer (27), two flat washers (26), and the cruise return bracket (1) from the hydro cruise cam (6).
13. Remove the hydro cruise cam (6) from the cruise pivot bracket (5) by removing the shoulder bolt (30) and hex flange top lock nut (16).
14. Remove the cruise pivot bracket (5) from the pedestal by removing the hex flange top lock nuts (16) and carriage bolts (9).



5-57

15. Remove the hex flange top lock nut (16) to remove the spacer (36) and carriage bolt (7) from the neutral return bracket.
16. Disconnect the hydro disengagement rod (41) from the hydro dump arm (40) by removing the internal cotter pin (19), and remove the rod from the rear drawbar plate.
17. Remove the hydro dump arm (40) from the shift yoke of the transmission by removing the hex cap screw (38) and bell washer (39).

5-21.3 Disassembly.

1. Disassemble the hydro adjustment rod (34) assembly as follows:
 - a. Remove the hex flange lock nut (18), flat washer (29), compression spring (22), and pivot sleeve (2).
 - b. After noting the approximate position of the ferrule, remove the hex jam nut (15) and adjustment ferrule (12) from the rod.
2. Remove the ferrule (12) from the hydro stop rod (32).
3. If necessary, remove the ball screw (11) from the damper cylinder (21) by prying the retainer cap from the back of the cylinder's ball socket.

5-21.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect the hydro adjustment rod (34) and hydro stop rod (32) for distortion or wear.
3. Inspect the pin surfaces of the pivot sleeve (2) and adjustment ferrules (12) for wear.
4. Check the gear shift bracket (4) for damage or wear.
5. Check the control lever bushing (35) and mating surface of the cruise control lever (33) for scoring or wear.
6. Inspect the springs (22 and 23) for distortion or loss of tension as indicated by irregular spacing between the coils.
7. Check the damper cylinder (21) for damage or wear, and for proper operation of the cylinder piston.

8. Check the ball screw (11) for wear, as indicated by excessive looseness in the ball socket.
9. Inspect the cruise return bracket (1), cruise pivot bracket (5), and hydro cruise cam (6) for corrosion, distortion, or elongated holes.

5-21.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor metal surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.

5-21.6 Reassembly.

1. If removed, press the ball screw (11) into the damper cylinder (21) socket and press the retainer cap into place.
2. Screw the adjustment ferrule (12) onto the hydro stop rod (32).
3. Screw the adjustment ferrule (12) and hex jam nut (15) onto the hydro adjustment rod (34). Do not tighten the jam nut now.
4. Slide the pivot sleeve (2) and compression spring (22) onto the hydro adjustment rod (34) and secure with the flat washer (29) and hex flange lock nut (18). Make certain the lock nut and flat washer are tightened completely against the shoulder of the rod.

5-21.7 Installation.

1. Position the hydro dump arm (40) on the square shoulder of the transmission shift yoke, and secure with the bell washer (39) and hex cap screw (38).
2. Insert the hydro disengagement rod (41) through the slot of the rear drawbar plate, and then into the underside of the hydro dump arm. Secure the rod with the internal cotter pin (19).
3. Install the carriage bolt (7) and spacer (36) on the neutral return bracket and secure with the hex flange top lock nut (16).
4. Install the cruise pivot bracket (5) on the pedestal using the carriage bolts (9) and hex flange top lock nuts (16).
5. Install the hydro cruise cam (6) on the cruise pivot bracket (5) with the shoulder bolt (30) and hex flange top lock nut (16).

6. Place the two flat washers (26) on the pin of the cruise return bracket (1); then insert the pin through the slotted hole of the hydro cruise cam (6) and secure with the flat washer (27) and internal cotter pin (19).
7. In this order, insert the clevis pin (42) through the cruise return bracket (1), the straight arm of the brake cam, the triangular opening of the neutral return bracket, and finally the notched arm of the brake cam. Secure with the internal cotter pin (19).
8. Install the cruise control lever (33) as follows:
 - a. Install the control lever bushing (35) on the fender support with the hex cap screws (10) and hex sems nuts (13).
 - b. Place the friction washer (20) on the control lever and insert the lever through the lever bushing.
 - c. Install the gear shift bracket (4), arm pointing upward, onto the square shoulder of the control lever.
 - d. With the cupped surfaces together, install the two bell washers (28) and the hex jam lock nut (14) on the control lever. Tighten the lock nut to obtain a 5-6 lb. drag on the lever, as measured with a pull scale placed immediately below the knob threads of the lever.
 - e. Install the carriage bolt (8) and hex flange top lock nut (16) in the bottom of the gear shift bracket (4). Tighten the lock nut to securely clamp the bracket onto the control lever, but do not overtighten.
9. Install the hydro stop rod (32) and adjustment ferrule (12) assembly as follows:
 - a. Slide the stop rod through the frame reinforcement bracket, to the inside of the brake rod. Make certain neither rod interferes with the movement of the other.
 - b. Insert the back end of the stop rod into the LOWER hole of the gear shift bracket (4) and secure with the internal cotter pin (19).
 - c. Adjust the ferrule as needed to insert in the hole of the hydro cruise cam (6), and secure with the flat washer (24) and internal cotter pin (19).
10. Slide the damper cylinder (21) and split tubing spacer (37) onto the shoulder bolt (31), and install in the frame using the hex sems nut (13).
11. Connect the damper cylinder to the upper/rear hole of the clutch cam with the hex flange top lock nut (16).
12. Install the hydro adjustment rod (34) assembly as follows:
 - a. Position the rod through the opening in the frame reinforcement bracket.
 - b. Insert the pin of the pivot sleeve (2) into the BOTTOM hole of the control arm and secure with the internal cotter pin (19).
 - c. Without moving the control arm, adjust the ferrule (12) as necessary to align with the back radius of the REAR slotted hole of the clutch cam. Tighten the hex jam nut (15) against the ferrule.
 - d. Insert the adjustment ferrule (12) through the REAR hole of the clutch cam, and install the flat washer (25), extension spring (23), and internal cotter pin (19).
 - e. Hook the extension spring (23) in the notch on the edge of the clutch cam.
13. Install the fuel tank per paragraph 5-18.7.
14. Install the fender and running board per paragraph 5-12.7 or 5-13.7.
15. Install the hex jam nut (17) and shifter knob (3) on the control lever (33) and tighten the jam nut against the knob.
16. Install the seat per paragraph 5-11.7.
17. Connect the battery per paragraph 5-4.7 or 5-5.7.
18. Adjust the hydro stop rod (32) per the instructions found in Section 6—Adjustments.
19. Referring to the instructions found in Section 6—Adjustments, check the tractor for proper neutral adjustment and re-adjust the hydro adjustment rod (34), if necessary.

5-22 DRIVE LINE (Models 2130, 2140, and 2160).

5-22.1 **General.** Usage of impact tools is recommended when removing or installing the drive line.

5-22.1.1 Two different length clutch input shafts and clutch adapters (3, Fig. 5-25) were used during early production of these Models. When servicing the drive line or the clutch assembly, use the following guidelines to determine that an appropriate match is installed:

- a. Push the input shaft inward to completely seat in the clutch assembly.
- b. Measuring the distance from the clutch housing to the end of the shaft's tapered surface, determine whether the short (5/8 inch) or long (3/4 inch) shaft is installed.
- c. Laying the clutch adapter (3) on a flat surface, measure the height to determine whether it is the short (1 inch) or long (1 1/8 inch) adapter.
- d. The short adapter (1 inch), which is the only adapter available from the Service Parts Depot, CAN be used with either length shaft.
- e. The long adapter (1 1/8 inch) can ONLY be used with the long shaft. DO NOT use the long adapter on the short shaft.

5-22.2 Removal.

1. To prevent arcing, disconnect the battery per paragraph 5-4.2 or 5-5.2.
2. Remove the seat per paragraph 5-11.2.



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

3. Remove the fender and running board per paragraph 5-12.2 or 5-13.2.
4. Remove the steering wheel per paragraph 5-15.2.
5. Loosen the four hex cap screws and large flat washers (3 and 14, Fig. 5-16) securing the dash panel to the pedestal.

6. Remove the drive shaft assy. (1, Fig. 5-25) as follows:



NOTE

Do not remove the hex patch bolts (6) when completing the following step a. The bolts will support the rear end of the drive shaft and may be used to prevent rotation of the shaft while loosening the front bolts.

- a. Remove the fan nuts (7) from the rear hex patch bolts (6) and slide the cooling fan (4) rearward.
- b. Remove the hex patch bolts (6) from the front of the drive shaft assy.
- c. Lift and rotate the bottom of the dash panel rearward to create an opening large enough to allow removal of the drive shaft assy.



NOTE

The drive shaft spacer plate (5) is used on an 'as needed' basis in the production of these Models. Not all units are equipped with the spacer plate .

- d. While supporting the drive shaft, remove the rear hex patch bolts (6) and slide the drive shaft spacer plate (5, if applicable) from the drive line.
 - e. Moving the rear end of the shaft to the left and then angling upward, slide the drive shaft rearward to remove from the tractor.
7. Remove the clutch adapter (3) from the input shaft of the clutch as follows:
 - a. Loosen the hex center lock jam nut (8) until just beyond flush with the end of the shaft.
 - b. Use a wheel puller (positioned against the hex jam nut) to break the adhesion between the tapered surfaces of the shaft and adapter.
 - c. Remove the hex center lock jam nut (8), bell washer (9), clutch adapter (3), and cooling fan (4) from the clutch assembly.

NOTE

Model 2140 does not use the drive shaft adapter (2), hex cap screws (10), and flat washers (11).

8. Remove the drive shaft adapter (2) from Model 2130 tractors by removing the hex cap screws (10) and flat washers (11).
9. Remove the drive shaft adapter (2) from Model 2160 tractors as follows:
 - a. Remove the four screws, flywheel screen, and spacers from the engine. Use care to avoid losing the spacers.
 - b. Remove the hex cap screws (10) and flat washers (11). Then, using care to avoid dropping the pin into the engine blower housing, remove the adapter and locating pin (12).

5-22.3 Disassembly. The drive shaft should be disassembled only if inspection of the roller barrels indicate replacement is necessary. Replacement barrel kits for each coupler are available as Part No. 759-3764.

1. Disassemble the drive shaft assy. (1) by pulling the outer coupler from each end of the shaft.

5-22.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Check the cooling fan (4) for damaged or missing blades.
3. Inspect the drive shaft assy. for missing, spilt, or damaged roller barrels. Check for excessive wear by sliding each barrel back and forth within the couplers. The barrels should be snug.
4. Check the drive shaft assy. for distortion, damage, or broken welds.

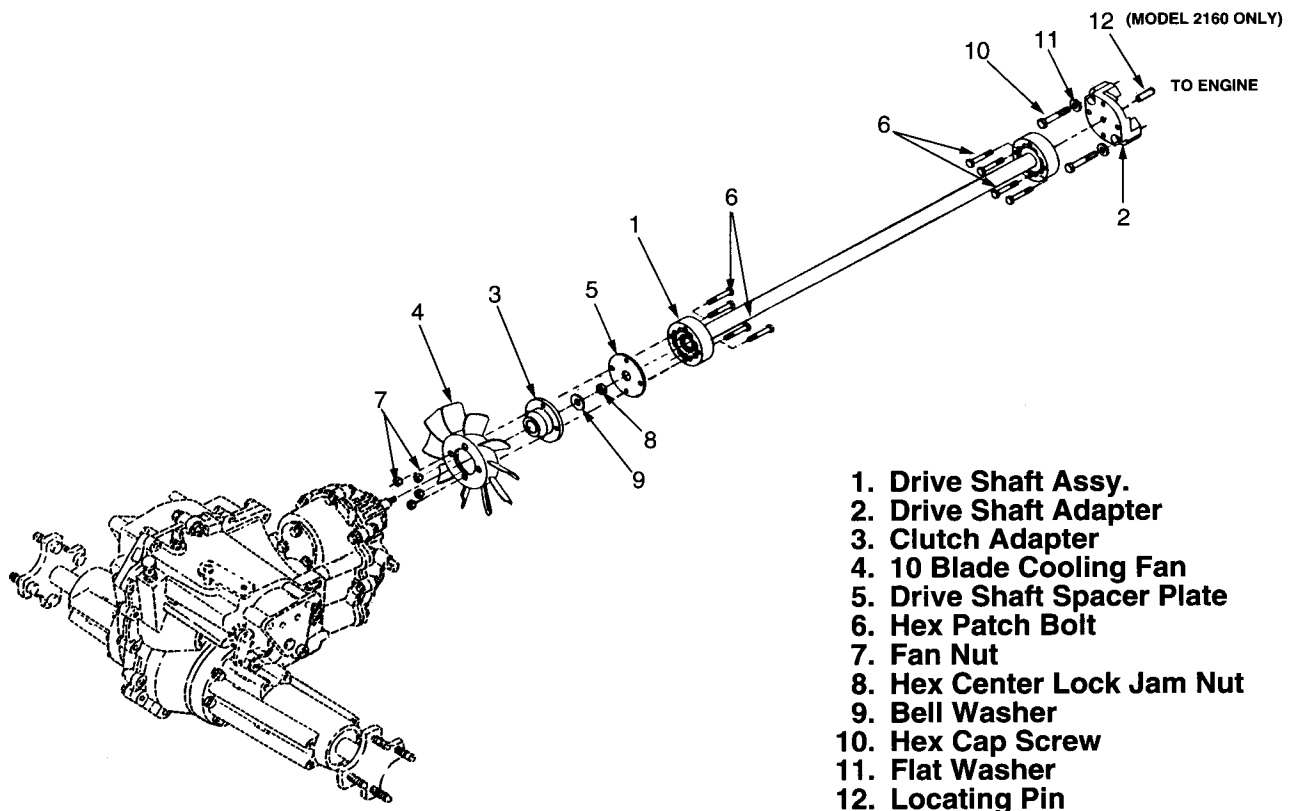


Figure 5-25. Drive Line (Models 2130, 2140 and 2160).

5. Referring to paragraph 5-22.1.1, check that the proper length clutch adapter (3) is installed.
6. Inspect the clutch adapter (3) for cracks, elongated holes, and for wear or damage to the tapered I.D.
7. On Models 2130 and 2160, inspect the drive shaft adapter for cracks, damage, or elongated holes.

5-22.5 **Repair.**

1. Deburr and dress damaged threads.
2. Repair minor metal surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.

5-22.6 **Reassembly.** Reassemble the drive shaft assy. as follows:

1. With the shaft projecting down between your fingers, hold the inner coupler hub cradled in your hand.
2. Holding the outer coupler hub between the thumb and finger tips of the same hand, position the outer coupler approximately half way down on the inner coupler.
3. Working successively around the coupler, press a barrel into each opening. The outer coupler will have to be tipped slightly when inserting the final barrels.
4. While maintaining your hold on the outer coupler, press or tap the outer coupler squarely and completely onto the assembly.
5. If disassembled, repeat this procedure (1 through 4) for the other end of the shaft assy.

5-22.7 **Installation.**

1. Install the drive shaft adapter (2) on Model 2160 tractors as follows:
 - a. Place the locating pin (12) in the recess of the engine crankshaft. Position the adapter (2) on the engine, making certain the center hole

engages the locating pin. Secure with the hex cap screws (10) and flat washers (11).

- b. Assemble the flywheel screen and spacers on the four screws and fasten to the engine.
2. Install the drive shaft adapter (2) on Model 2130 tractors by positioning the adapter on the raised boss of the flywheel and securing with the hex cap screws (10) and flat washers (11).
3. Install the cooling fan (4, recessed surface facing forward) and clutch adapter (3) on the clutch assembly using the bell washer (9) and hex center lock jam nut (8). Torque the nut to 35 - 40 Ft. Lbs.



CAUTION

If a spacer (5) was removed with the drive shaft, one should be re-installed, regardless of whether or not other drive line components were replaced.

4. Position the drive shaft assy (1) in the tractor and, if applicable, slide the drive shaft spacer (5) into place.
5. Align the holes of the rear drive coupler, spacer plate (5), clutch adapter (3), and cooling fan (4); then install the hex patch bolts (6) and fan nuts (7). Note the smaller diameter shoulder of the fan nuts must be positioned in the holes of the fan.
6. Secure the front of the drive shaft to the engine adapter using the hex patch bolts (6).
7. Position the dash panel on the pedestal and tighten the four hex cap screws and large flat washers.
8. Install the steering wheel per paragraph 5-15.7.
9. Install the fender and running board per paragraph 5-12.7 or 5-13.7.
10. Install the seat per paragraph 5-11.7.
11. Connect the battery per paragraph 5-4.7 or 5-5.7.

5-23 DRIVE LINE (Models 2135, 2145, 2165 and 2185).

5-23.1 **General.** Usage of impact tools is recommended when removing or installing the drive line.

5-23.2 Removal.

1. To prevent arcing, disconnect the battery per paragraph 5-4.2 or 5-5.2.
2. Remove the seat per paragraph 5-11.2.



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

3. Remove the fender and running board per paragraph 5-12.2 or 5-13.2.
4. Remove the steering wheel per paragraph 5-15.2.

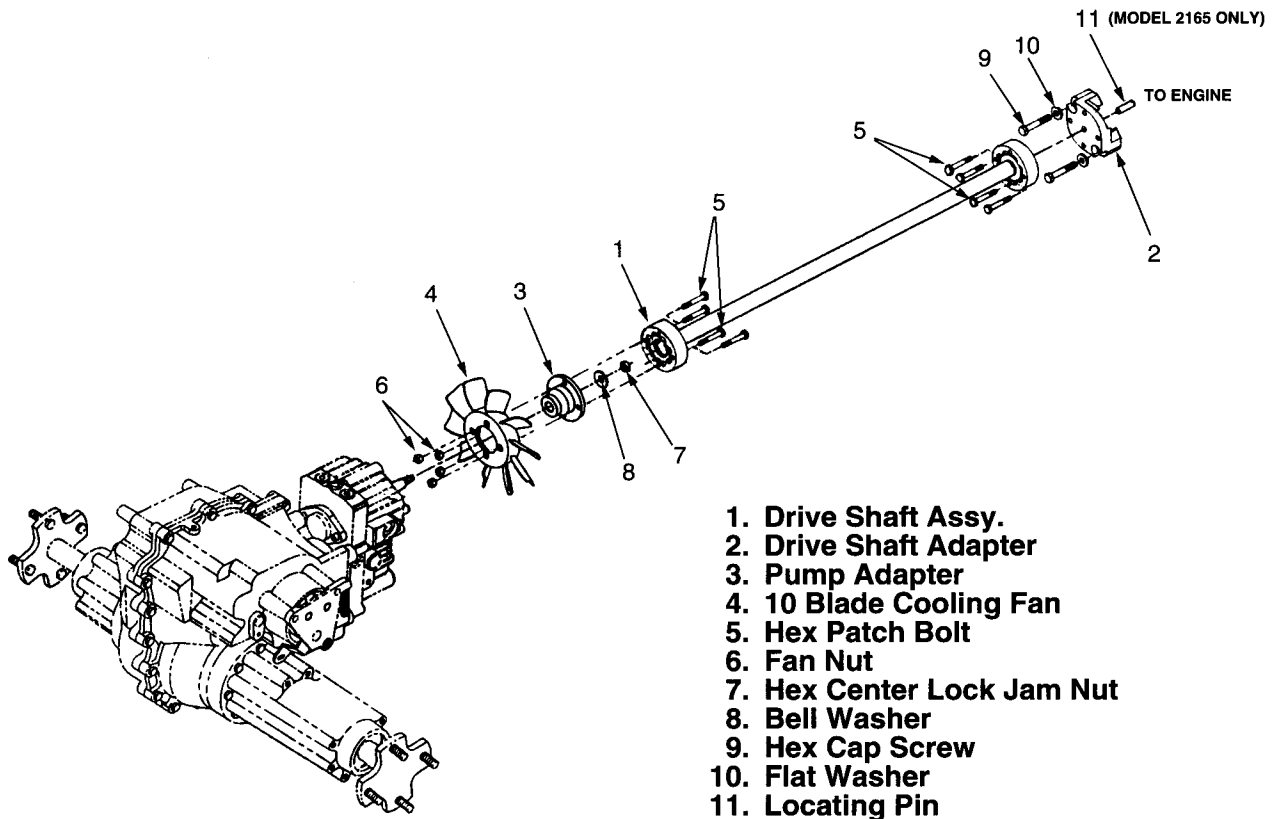
5. Loosen the four hex cap screws and large flat washers (3 and 14, Fig. 5-16) securing the dash panel to the pedestal.
6. Remove the drive shaft assy. (1, Fig. 5-26) as follows:



NOTE

Do not remove the hex patch bolts (5) when completing the following step a. The bolts will support the rear end of the drive shaft and may be used to prevent rotation of the shaft while loosening the front bolts.

- a. Remove the fan nuts (6) from the rear hex patch bolts (5) and slide the cooling fan (4) rearward.
- b. Remove the hex patch bolts (5) from the front of the drive shaft assy.



1. Drive Shaft Assy.
2. Drive Shaft Adapter
3. Pump Adapter
4. 10 Blade Cooling Fan
5. Hex Patch Bolt
6. Fan Nut
7. Hex Center Lock Jam Nut
8. Bell Washer
9. Hex Cap Screw
10. Flat Washer
11. Locating Pin

Figure 5-26. Drive Line (Models 2135, 2145, 2165 and 2185).

- c. Lift and rotate the bottom of the dash panel rearward to create an opening large enough to allow removal of the drive shaft assy.
 - d. While supporting the drive shaft, remove the rear hex patch bolts (5).
 - e. Moving the rear end of the shaft to the left and then angling upward, slide the drive shaft rearward to remove from the tractor.
7. Remove the pump adapter (3) from the input shaft of the hydro pump as follows:
- a. Loosen the hex center lock jam nut (7) until just beyond flush with the end of the shaft.
 - b. Use a wheel puller (positioned against the hex jam nut) to break the adhesion between the tapered surfaces of the shaft and adapter.
 - c. Remove the hex center lock jam nut (7), bell washer (8), pump adapter (3), and cooling fan (4) from the hydro transmission.

NOTE

Model 2145 does not use the drive shaft adapter (2), hex cap screws (9), and flat washers (10).

- 8. Remove the drive shaft adapter (2) from Model 2135 tractors by removing the hex cap screws (9) and flat washers (10).
- 9. Remove the drive shaft adapter (2) from Model 2165 tractors as follows:
 - a. Remove the four screws, flywheel screen, and spacers from the engine. Use care to avoid losing the spacers.
 - b. Remove the hex cap screws (9) and flat washers (10). Then, using care to avoid dropping the pin into the engine blower housing, remove the adapter and locating pin (11).
- 10. Remove the drive shaft adapter (2) from Model 2185 tractors as follows:
 - a. Unsnap the flywheel screen from the pins of the flywheel fan.
 - b. Remove the hex cap screws (9) and flat washers (10) and remove the adapter from the raised boss of the flywheel.

5-23.3 Disassembly. The drive shaft should be disassembled only if inspection of the roller barrels indicate replacement is necessary. Replacement barrel kits for each coupler are available as Part No. 759-3764.

- 1. Disassemble the drive shaft assy. (1) by pulling the outer coupler from each end of the shaft.

5-23.4 Inspection. Clean all parts prior to inspection.

- 1. Inspect all threaded areas for damage.
- 2. Check the cooling fan (4) for damaged or missing blades.
- 3. Inspect the drive shaft assy. for missing, spilt, or damaged roller barrels. Check for excessive wear by sliding each barrel back and forth within the couplers. The barrels should be snug.
- 4. Check the drive shaft assy. for distortion, damage, or broken welds.
- 5. Inspect the pump adapter (3) for cracks, elongated holes, and for wear or damage to the tapered I.D.
- 6. On Models 2135, 2165 and 2185, inspect the drive shaft adapter for cracks, damage, or elongated holes.

5-23.5 Repair.

- 1. Deburr and dress damaged threads.
- 2. Repair minor metal surface damage or corrosion with a fine honing stone or emery cloth.
- 3. Replace all damaged or excessively worn parts.

5-23.6 Reassembly. Reassemble the drive shaft assy. as follows:

- 1. With the shaft projecting down between your fingers, hold the inner coupler hub cradled in your hand.
- 2. Holding the outer coupler hub between the thumb and finger tips of the same hand, position the outer coupler approximately half way down on the inner coupler.
- 3. Working successively around the coupler, press a barrel into each opening. The outer coupler will have to be tipped slightly when inserting the final barrels.

4. While maintaining your hold on the outer coupler, press or tap the outer coupler squarely and completely onto the assembly.
5. If disassembled, repeat this procedure (1 through 4) for the other end of the shaft assy.

5-23.7 Installation.

1. Install the drive shaft adapter (2) on Model 2185 tractors as follows:
 - a. Position the adapter (2) on the engine, making certain the legs of the adapter engage the raised boss of the flywheel. Secure with the hex patch bolts (9) and flat washers (10).
 - b. Snap the flywheel screen onto the flywheel fan.
2. Install the drive shaft adapter (2) on Model 2165 tractors as follows:
 - a. Place the locating pin (11) in the recess of the engine crankshaft. Position the adapter (2) on the engine, making certain the center hole engages the locating pin. Secure with the hex cap screws (9) and flat washers (10).
 - b. Assemble the flywheel screen and spacers on the four screws and fasten to the engine.
3. Install the drive shaft adapter (2) on Model 2135 tractors by positioning the adapter on the raised boss of the flywheel and securing with the hex cap screws (9) and flat washers (10).
4. Install the cooling fan (4, recessed surface facing forward) and pump adapter (3) on the hydro transmission using the bell washer (8) and hex center lock jam nut (7). Torque the nut to 35 - 40 Ft. Lbs.
5. Position the drive shaft assy (1) in the tractor.
6. Aligning the holes of the rear drive shaft coupler, pump adapter (3), and cooling fan (4), install the hex patch bolts (5) and fan nuts (6). Note the smaller diameter shoulder of the fan nuts must be positioned in the holes of the fan.
7. Secure the front of the drive shaft to the engine adapter using the hex patch bolts (5).
8. Position the dash panel on the pedestal and tighten the four hex cap screws and large flat washers.
9. Install the steering wheel per paragraph 5-15.7.
10. Install the fender and running board per paragraph 5-12.7 or 5-13.7.
11. Install the seat per paragraph 5-11.7.
12. Connect the battery per paragraph 5-4.7 or 5-5.7.

5-24 CLUTCH ASSEMBLY, CONTROL ARM, AND INTERLOCK LINKAGE (Models 2130, 2140 and 2160).

5-24.1 General. The clutch assembly may be removed from the tractor without removing the complete transaxle assembly. If the transaxle is to be removed, refer to paragraph 5-26.2 for removal instructions before beginning the procedures described in this paragraph.

5-24.2 Removal.

1. To prevent arcing, disconnect the battery per

paragraph 5-4.2 or 5-5.2.

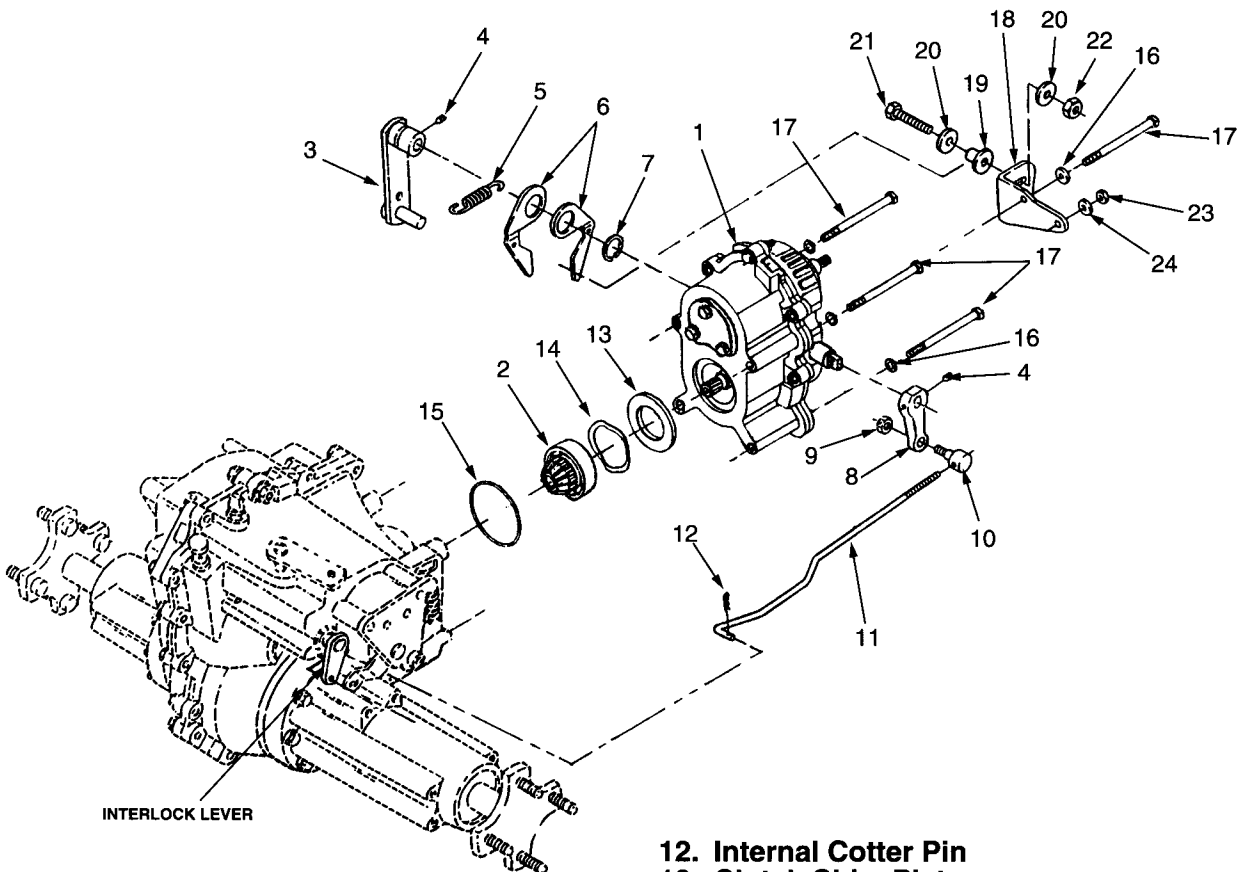
2. Remove the seat per paragraph 5-11.2.



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

3. Remove the fender and running board per paragraph 5-12.2 or 5-13.2.



1. Clutch Assembly
2. Input Pinion
3. Control Arm
4. Set Screw w/patch
5. Extension Spring
6. Neutral Arm
7. Snap Ring
8. Interlock Arm
9. Hex Center Lock Jam Nut
10. Ferrule
11. Interlock Rod

12. Internal Cotter Pin
13. Clutch Shim Plate
14. Spring Wave Washer
15. O-Ring
16. Lock Washer
17. Hex Cap Screw
18. Neutral Bracket
19. Centering Spacer
20. Flat Washer
21. Hex Cap Screw
22. Hex Top Lock Nut
23. Hex Top Lock Nut
24. Flat Washer

Figure 5-27. Clutch, Control Arm, and Interlock Linkage (Models 2130, 2140 and 2160).

4. Disconnect the transmission linkage from the control arm (3, Fig. 5-27) per paragraph 5-20.2.
5. Remove the drive line per paragraph 5-22.2.
6. Drain the transmission oil from the transaxle per paragraph 5-26.2.
7. Disconnect the interlock rod (11, Fig. 5-27) from the interlock lever of the transaxle by removing the internal cotter pin (12).
8. Remove the set screw (4) securing the interlock arm (8) to the clutch assembly, and remove the arm, rod (11), and ferrule (10) as one assembly.
9. Remove the set screw (4) securing the control arm (3) to the clutch assembly. Slightly spreading the neutral arms (6), remove the control arm, spring (5), and neutral arms as an assembly.



CAUTION

When completing the following step 10, the input pinion will be free to fall from the tractor. Use care to avoid dropping, and possibly damaging, the input pinion assembly.

10. While supporting the clutch assembly (1), remove the four hex cap screws (17) and lock washers (16) fastening the clutch assembly to the transaxle. Carefully lift the clutch assembly from the tractor.
11. Remove the input pinion (2), spring wave washer (14), clutch shim plate (13), and O-ring (15). Discard and replace the O-ring.

5-24.3 Disassembly.

1. Disassemble the interlock arm (8) assembly by removing the hex center lock jam nut (9) and unscrewing the ferrule (10) from the interlock rod.
2. Disassemble the control arm (3) assembly as follows:
 - a. Noting the orientation of the spring hooks, remove the extension spring (5) from the neutral arms (6).
 - b. Remove the snap ring (7) and slide the neutral arms off the control arm.
3. After marking the position of the centering spacer (19) on the neutral bracket (18), remove the spacer from the bracket (18) by removing the hex

top lock nut (22), flat washers (20) and hex cap screw (21).

4. Disassemble the clutch assembly as follows:



CAUTION

Thoroughly clean the exterior of the clutch assembly before beginning disassembly.



NOTE

A holding fixture, made from a piece of 2" x 6" wood with a drilled hole large enough to insert the input shaft, will facilitate disassembly of the clutch assembly.

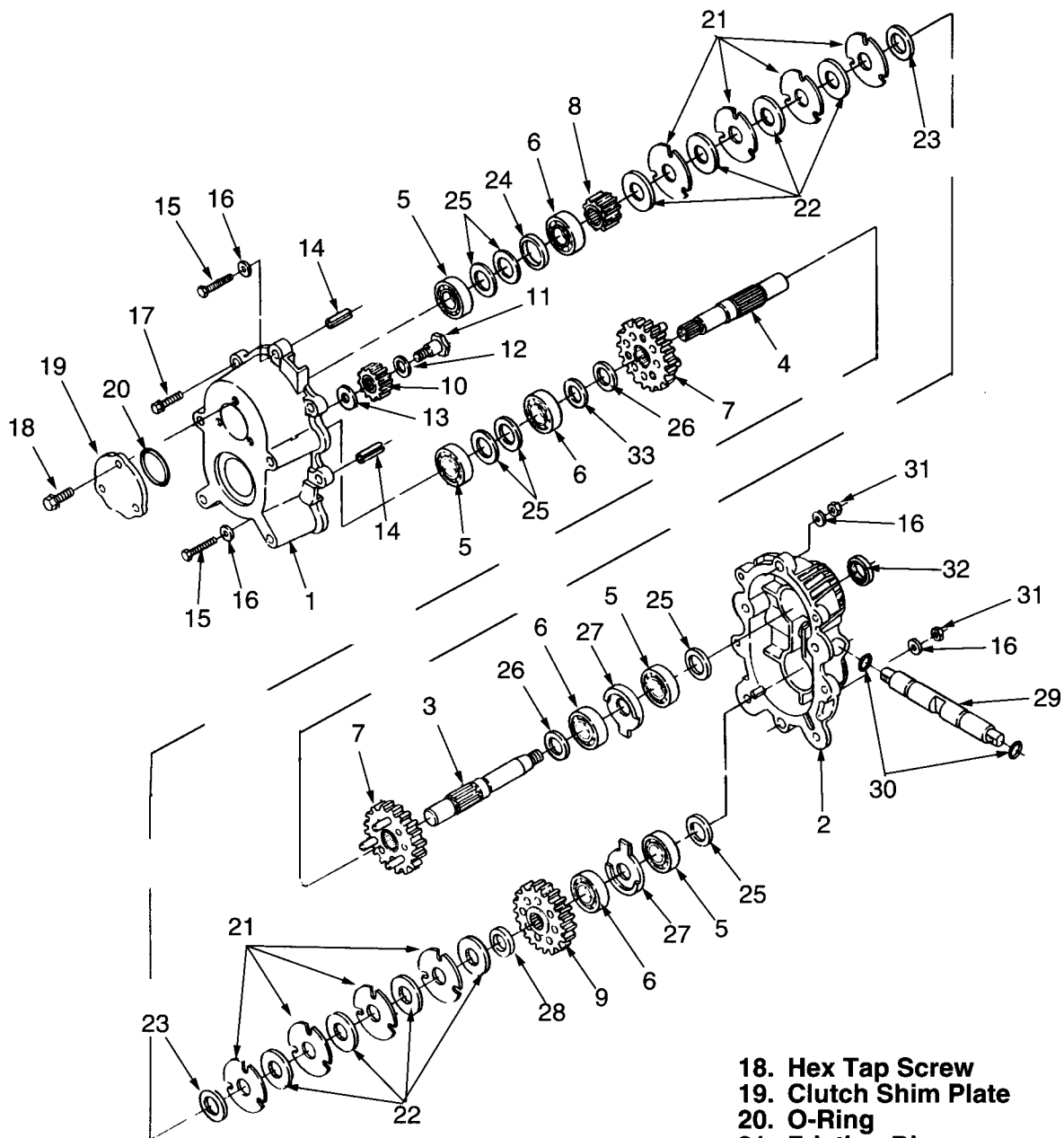
- a. Remove the hex cap screws (15, Fig. 5-28), flat washers (16), and hex top lock nuts (31) from the top and bottom of the clutch assembly. Note the neutral bracket (18, Fig 5-27) is also fastened with the bottom screw.
- b. Place the clutch assembly in the holding fixture with the front housing (2, Fig. 5-28) facing downward.
- c. Using a drift punch, drive the spring pins (14) from the top and bottom of the clutch housing.
- d. Remove the clutch shim plate (19) and O-ring (20) by removing the hex tap screws (18). Discard and replace the O-ring.
- e. Using a hook tool, lift the ball bearing (5), shim washer(s) (25), clutch input spacer (24), and angular contact bearing (6) from the input shaft (3). It is not necessary to remove the bearings from the output shaft at this time.
- f. Remove the four hex wash. hd. tapp screws (17) fastening the front and rear housings.



CAUTION

Do not attempt to pry apart the clutch housings. This could damage the machined sealing surfaces of the housings.

- g. Using a drift punch, tap in the three knock out slots of the rear housing to loosen the seal between the front and rear housings.



- 1. Rear Housing
- 2. Front Housing
- 3. Input Shaft
- 4. Output Shaft
- 5. Ball Bearing

- 6. Angular Contact Bearing
- 7. Clutch Carrier
- 8. 18T Spur Gear
- 9. 36T Gear
- 10. Reverse Idler Gear
- 11. Reverse Idler Shaft
- 12. Flat Washer
- 13. Flat Washer
- 14. Spring Pin
- 15. Hex Cap Screw
- 16. Flat Washer
- 17. Hex Wash Hd. Tapp Screw

- 18. Hex Tap Screw
- 19. Clutch Shim Plate
- 20. O-Ring
- 21. Friction Disc
- 22. Clutch Plate
- 23. Flat Washer
- 24. Clutch Input Spacer
- 25. Shim Washer
- 26. Flat Washer .060 Thk.
- 27. Clutch Fulcrum
- 28. Spacer
- 29. Clutch Actuator Shaft
- 30. O-Ring
- 31. Hex Top Lock Nut
- 32. Input Seal
- 33. Flat Washer .108 Thk.

Figure 5-28. Clutch Assembly (Models 2130, 2140 and 2160).

- h. Through the opening in the housing, hold the output shaft ball bearing (5) down while carefully lifting the rear housing (1) from the clutch assembly.

NOTE

Depending on the machining required to finish the reverse idler gear mounting surface, one or two washers (13) may be used between the idler gear and rear housing. For reassembly purposes, note the number of washers removed. In most cases, and if the rear housing is replaced, two washers should be used.

- i. Remove the reverse idler shaft (11), flat washer (12), reverse idler gear (10), and flat washer(s) (13) from the rear housing (1).
- j. Remove the ball bearing (5), shim washer(s) (25), angular contact bearing (6), .108 thk. flat washer (33), and .060 thk. flat washer (26) from the output shaft (4).
- k. Grasping the 36T gear (9), output shaft (4) and clutch carrier (7), lift the complete output shaft assembly from the front angular contact bearing (6).
- l. Slide the 36T gear (9), spacer (28), four clutch plates and friction discs (22 and 21), and the flat washer (23) from the non-splined end of the output shaft (4).
- m. Slide the clutch carrier (7) from the splined end of the output shaft (4).
- n. Grasping the clutch carrier (7), input shaft (3) and 18T spur gear (8), lift the complete input shaft assembly from the front angular contact bearing (6). Use care to avoid losing the .060 thk. flat washer (26) underneath the carrier.

NOTE

Early production units used a flat thrust washer between the 18T spur gear (8) and the adjacent clutch plate (22). The thrust surface is built into the revised 18T gear used on later models. The new style gear (.875 in. wide) is the only one available from the Service Parts Depot. If replacing an old gear with the new style, DO NOT use the flat thrust washer.

- o. Slide the 18T spur gear [(8), and thrust washer if applicable], four clutch plates and friction discs (22 and 21), and the flat washer (23) from the non-threaded end of the input shaft (3).
- p. Slide the .060 thk. flat washer (26) and clutch carrier (7) from the threaded end of the input shaft (3).
- q. Remove the angular contact bearings (6) from the front housing (2).
- r. Remove the two clutch fulcrums (27) from the front housing.
- s. Remove the ball bearings (5) and shim washers (25).
- t. Pull the clutch actuator shaft (29) from the front housing. Remove and discard the O-rings (30) from the actuator shaft.
- u. Remove the input seal (32) from the front housing. Discard and replace the seal.

5-24.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect the front and rear housings for cracks, damage, and for scoring or wear of the bearing surfaces.
3. Inspect the input and output shafts for damaged splines, and for scoring or wear of the bearing journals.
4. Inspect all gears for chipped, broken, or worn teeth.
5. Inspect the bearings of the clutch carriers (7) and reverse idler gear (10) for damage or wear.
6. Check the ball bearings (5) for binding or excessive looseness, indicating internal wear.

NOTE

Note the outer race of the angular contact bearings (6) has a tapered inside diameter, with a wider flange on the load bearing side (usually containing the manufacturer's marking).

7. Pressing the inner race toward the load bearing (wider) side of the outer race, check the angular contact bearing for rough spots or binding.

8. Check the friction discs (21) and clutch plates (22) for wear or heat discoloration (indicating slippage). Check clutch plate splines for damage.
9. Inspect the mating surfaces of the actuator shaft and the clutch fulcrums for wear.
10. Inspect the clutch carriers (7) for worn or loose drive pins.
11. Inspect the interlock rod (11, Fig. 5-27) for damage or distortion.
12. Check the interlock arm (8, Fig. 5-27) and control arm (3) for cracks or elongated holes.
13. Check the neutral arms (6, Fig. 5-27) and centering spacer (19) for wear.
14. Inspect the extension spring (5, Fig. 5-27) for damage or loss of tension, as indicated by irregular spacing between the coils.

5-24.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace all damaged or excessively worn parts.

5-24.6 Reassembly.

1. Reassemble the clutch assembly as follows:
 - a. Install a new input seal in the front housing.
 - b. Install new O-rings (30) on the clutch actuator shaft (29). Lubricate the O-rings and carefully press (while twisting) the actuator shaft into the front housing.
 - c. Install the shim washers (25) and the ball bearings (5) in the front housing. To determine that the proper size shim washer is installed, perform the measurements described in the following step d.
 - d. Rotating the actuator shaft, position the fulcrum notch of the shaft as close to the neutral (level) position as visually possible. Through the channel in the housing, set a straight edge across the top of the ball bearings. Using a feeler gauge, measure for a .002 -.007 in. clearance between the straight edge and the upper (toward input shaft) edge of the actuator shaft notch. If necessary, slightly rotate the shaft to obtain this clearance. Then, making certain the shaft does not rotate, measure

the clearance between the straight edge and the lower (toward output shaft) edge of the notch. If the sum of the measured clearances is between .004 and .014, the shimming is correct. For example, if the upper edge is .004 in. and the lower edge .010 in., a slight (.003) rotation of the shaft will bring both measurements within tolerance. However, if the upper edge is .004 in. and the lower edge .012 in., replacing both shims with the .005 in. thinner shim will be necessary to bring the measurements within tolerance. Replace shims as required to obtain this measurement. The same size shim must be used under each bearing.

- e. Install the two clutch fulcrums (27) in the front housing with their flat surface facing down.
- f. Install the angular contact bearings (6) in the front housing. The load supporting (wider) side of the bearing's outer race **MUST** face downward toward the fulcrum.
- g. Slide the clutch carrier (7) and .060 thk. flat washer (26) onto the threaded end of the input shaft (3).
- h. Install the large flat washer (23) between the three drive pins of the clutch carrier.
- i. Beginning with a friction disc (21), alternately install the four friction discs and clutch plates (22) on the input shaft and clutch carrier.
- j. Install the 18T spur gear [(8), and thrust washer if applicable] on the input shaft.
- k. Lubricate the input seal (32). Then, holding the assembly together, insert the input shaft assembly through the angular contact bearing, fulcrum, ball bearing, and input seal of the front housing.
- l. Slide the clutch carrier (7) onto the splined end of the output shaft and install the large flat washer (23) between the three pins of the carrier.
- m. Beginning with a friction disc (21), alternately install the four friction discs and clutch plates (22) on the output shaft and clutch carrier.
- n. Slide the spacer (28) and 36T gear (9) onto the output shaft. Then, while holding the assembly together, insert the output shaft into the angular contact bearing, fulcrum, and ball bearing in the front housing.

- o. Install the .060 thk. flat washer (26) on the output shaft next to the carrier, then install the .108 thk. flat washer (33) on the shaft.
- p. Install the flat washer (12) and reverse idler shaft (11) in the recess of the reverse idler gear (10). Place the flat washer(s) on the idler shaft (see NOTE before step i. of the disassembly instructions). Apply Loctite 242 to the threads of the shaft and install in the rear housing.
- q. Apply a 1/8 inch bead of ultra grey sealant (Part No. 759-3746) around the sealing surface of the rear housing (1).
- r. Position the rear housing ABOVE the front housing (2) so that the reverse idler gear engages both the 18T spur gear (8) on the input shaft and the clutch carrier gear on the output shaft. Reposition the rear housing to align with the front housing and lower into place. Install the four hex wash. hd. tapp screws (17) and tighten only until snug.
- s. Drive the spring pins (14) into the top and bottom holes of the clutch housing, then tighten the four tapp screws (17) completely.

NOTE

For alignment purposes, insert one of the clutch mounting screws (17, Fig. 5-27) through the neutral bracket and lower left clutch housing hole before tightening the bottom hex cap screw in the following step t.

- t. Position the neutral bracket (18, Fig. 5-27) on the clutch housing and install the hex cap screws (15, Fig. 5-28), flat washers (16), and hex top lock nuts (31) in the top and bottom of the clutch housing.
- u. Through the opening in the rear housing, slide the angular contact bearing (6) onto the output shaft. The load supporting (wider) side of the bearing's outer race MUST face upward.
- v. Determine the correct shim requirement and install the ball bearing (5) as follows:
 - 1. Install the ball bearing (5) on the output shaft.
- 2. Place a straight edge across the inner recessed surface in the output shaft opening of the rear housing.
- 3. Lightly pressing downward on the bearing, use a feeler guage to measure the clearance between the straight edge and the bearing race.
- 4. Determine the shims (25) needed to reduce the clearance to .002 -.007 in. Remove the ball bearing, install the shim(s) and re-install the bearing.
- w. Slide the angular contact bearing (6) and clutch input spacer (24) onto the input shaft. The load supporting (wider) side of the bearing's outer race MUST face upward.
- x. Determine the correct shim requirement and install the input ball bearing (5) as follows:
 - 1. Install the ball bearing (5) on the input shaft.
 - 2. Place a straight edge across the opening of the rear housing.
 - 3. Lightly pressing downward on the bearing, use a feeler guage to measure the clearance between the straight edge and the bearing race.
 - 4. Determine the shims (25) needed to reduce the clearance to .002 -.007 in. Remove the ball bearing, install the shim(s) and re-install the bearing.
- y. Install the clutch shim plate (19) and new O-ring (20) with the hex tap screws (18).
- 2. Install the hex cap screw (21, Fig. 5-27), flat washer (20), and centering spacer (19) on the neutral bracket (18) in the position marked during disassembly. Secure with the second flat washer (20) and hex top lock nut (22).
- 3. Reassemble the control arm (3, Fig. 5-27) assembly as follows:
 - a. Slide the neutral arms (6) onto the hub of the control arm (3) and secure with the snap ring (7).
 - b. Hook the extension spring (5) into the inner surfaces (surfaces facing each other) of the neutral arms (6).

4. Turn the ferrule (10) onto the interlock rod (11), then insert the ferrule into the interlock arm (8). Secure the ferrule with the hex center lock jam nut (9) tightened to eliminate side play, but not over tightened. The ferrule must be free to pivot in the arm.

5-24.7 Installation.

1. With the shouldered surface facing outward, install the clutch shim plate (13) in the recess of the rear clutch housing.
2. Place the spring wave washer (14) on the shoulder of the shim plate and install the input pinion (2) on the clutch output shaft.
3. Install the new O-ring (15) in the groove of the transaxle assembly.
4. While holding the input pinion in place, position the clutch assembly so that the input pinion gear engages the bevel gear inside the transaxle (it may be necessary to slightly rotate the clutch assembly to align the pinion and bevel gears). DO NOT force the clutch assembly into position on the transaxle.
5. Install the four hex cap screws (17) and lock washers (16) to secure the clutch assembly.
6. Spreading the neutral arms (6) to straddle the centering spacer (19), install the control arm assembly on the clutch actuator shaft.
7. Apply a small patch of Loctite 242 on the threads of the set screw (4) and install in the control arm. Make certain the point of the set screw engages the hole in the actuator shaft.
8. Route the interlock rod (11) over the RH axle housing, and install the interlock arm (8) on the actuator shaft. Apply a small patch of Loctite 242 on the threads of the set screw (4) and install in the interlock arm.
9. Making sure the transaxle interlock lever is in the disengaged (center detent) position, adjust the interlock rod to align with the hole in the interlock lever and install with the internal cotter pin (12).
10. Install the drive line per paragraph 5-22.7.
11. Connect the transmission linkage to the control arm per paragraph 5-20.7.
12. Fill the transaxle with Cub Cadet Drive System Oil (Appendix B). Refer to Service Bulletin CC-286 to verify the correct dipstick is installed.

13. Install the fender and running board per paragraph 5-12.7 or 5-13.7.
14. Install the seat per paragraph 5-11.7.
15. Connect the battery per paragraph 5-4.7 or 5-5.7.
16. Referring to the instructions found in Section 6—Adjustments, check the tractor for proper neutral adjustment. If necessary, re-adjust the centering spacer, clutch rod, and interlock rod.

5-25 HYDROSTATIC TRANSMISSION, NEUTRAL LINKAGE, AND HYDRAULIC LINES (Models 2135, 2145, 2165 and 2185).

5-25.1 General. The hydrostatic transmission can be removed from the tractor without removing the complete transaxle assembly. However, if the transaxle is to be removed, refer to paragraph 5-26.2 for removal instructions before beginning the procedures described in this paragraph.

5-25.1.1 The original hydro transmission, Model BDU-10L-219, has been replaced in production AND SERVICE by the Model BDU-10L-221. The new model (221) does not use the external return tube (25, Fig. 5-29) and is not equipped with the bypass valve assembly (47 through 51, Fig. 5-30). If replacement of a complete BDU-10L-219 transmission is necessary, refer to Service Bulletin CC-295.

5-25.1.2 Referring to Fig. 5-30, note that some component parts are enclosed in brackets. With the exception of the gerotor assembly (36) and the O-rings, these parts are available only in the assembly kits denoted by the brackets.

5-25.2 Removal.

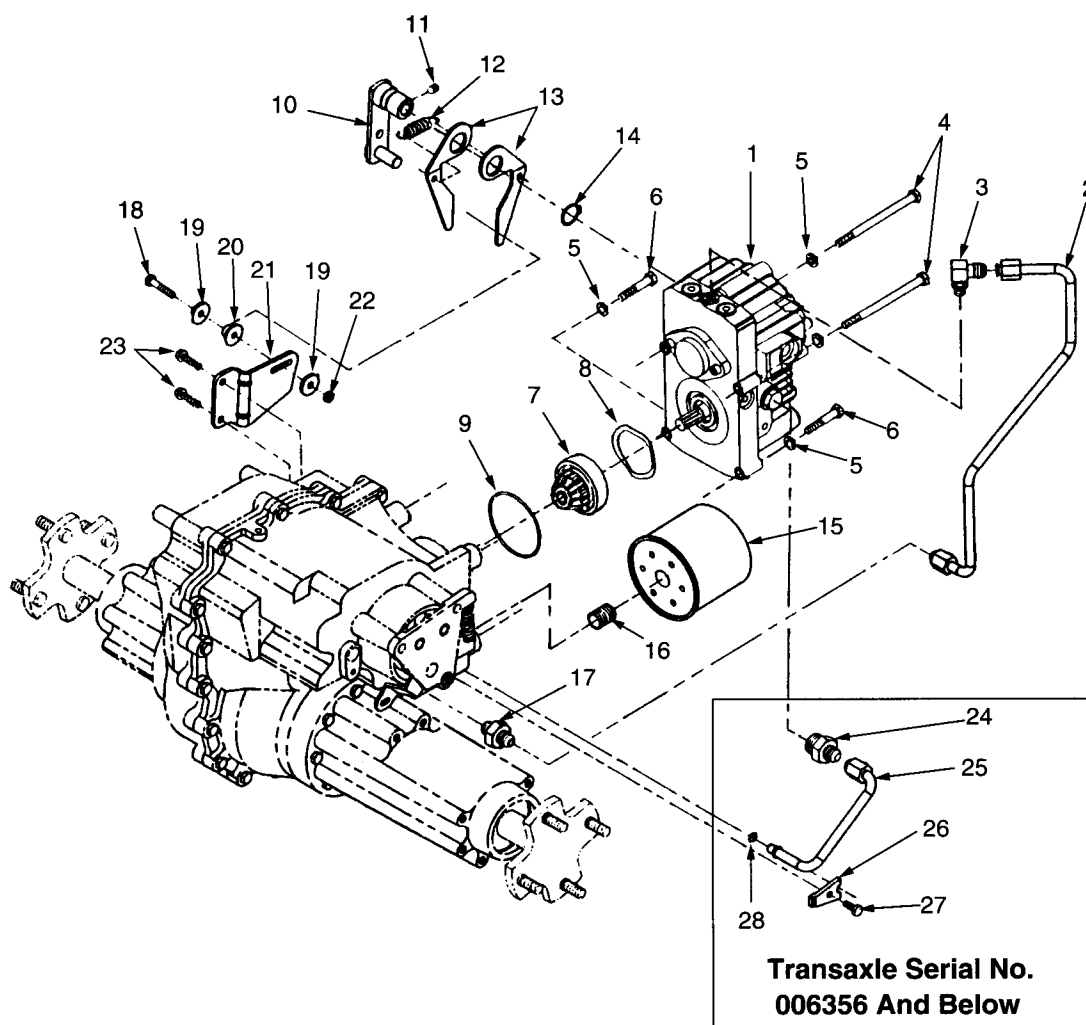
1. To prevent arcing, disconnect the battery per paragraph 5-4.2 or 5-5.2.
2. Remove the seat per paragraph 5-11.2.



WARNING

Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

3. Remove the fender and running board per paragraph 5-12.2 or 5-13.2.



- | | |
|-----------------------------|---------------------------------|
| 1. Hydrostatic Transmission | 15. Oil Filter |
| 2. Pickup Tube | 16. Oil Filter Nipple |
| 3. Elbow w/O-Ring | 17. Tube Connector w/O-Ring |
| 4. Hex Cap Screw | 18. Hex Cap Screw |
| 5. Lock Washer | 19. Flat Washer |
| 6. Hex Cap Screw | 20. Centering Spacer |
| 7. Input Pinion Assembly | 21. Neutral Bracket |
| 8. Spring Wave Washer | 22. Hex Top Lock Nut |
| 9. O-Ring | 23. Hex Wash. Hd. Tapp Screw |
| 10. Control Arm | 24. Straight Connector w/O-Ring |
| 11. Set Screw w/patch | 25. Return Tube |
| 12. Extension Spring | 26. Tube Clamp |
| 13. Neutral Arm | 27. Hex Cap Screw |
| 14. Snap Ring | 28. O-Ring |

**Figure 5-29. Hydro Pump, Neutral Linkage, and Hydraulic Lines
(Models 2135, 2145, 2165 and 2185).**

4. Disconnect the transmission linkage from the control arm (10, Fig. 5-29) per paragraph 5-21.2.
5. Remove the drive line per paragraph 5-23.2.
6. Drain the transmission oil from the transaxle per paragraph 5-26.2.
7. Remove the set screw (11, Fig. 5-29) securing the control arm (10) to the hydro transmission (1). Slightly spreading the neutral arms (13), remove the control arm, extension spring (12), and neutral arms as one assembly.

NOTE

The neutral bracket (21) is fastened to the transaxle by two of the transaxle housing closure screws. The bracket should be removed only if necessary.

8. After marking the position of the centering spacer on the neutral bracket, remove the hex top lock nut (22) and flat washer (19) to remove the hex cap screw (18), flat washer (19), and centering spacer (20) from the bracket (21). If necessary, remove the neutral bracket from the transaxle by removing the hex wash. hd. tapp screws (23).
9. Placing the pan used to drain the transaxle underneath the oil filter (15), unscrew the oil filter from the oil filter nipple (16); then remove the nipple from the transaxle.
10. Loosen the top and bottom coupling nuts of the pickup tube (2) and carefully remove the tube (2) from the elbow (3) and tube connector (17).
11. Remove the elbow w/O-ring (3) from the hydro transmission (1). Remove and discard the O-ring.
12. Remove the tube connector w/O-ring (17) from the transaxle. Remove and discard the O-ring.

NOTE

The following steps 13 and 14 apply only to units equipped with the Model BDU-10L-219 hydro transmission and Serial No. 006356 or below transaxle.

13. Loosen the upper coupling nut of the return tube (25) and remove the hex cap screw (27) and tube

clamp (26) from the transaxle. Rotate the top of return tube (25) down below the frame and pull the tube and O-ring (28) from the transaxle. Discard and replace the O-ring.

14. Remove the straight connector w/O-ring (24) from the hydro transmission (1). Remove and discard the O-ring.



CAUTION

When completing the following step 15, the input pinion assembly (7) will be free to fall from the tractor. Use care to avoid dropping, and possibly damaging, the input pinion assembly.

15. While supporting the hydro transmission (1), remove the four hex cap screws (4 and 6) and lock washers (5) fastening the hydro to the transaxle. Carefully lift the transmission assembly from the tractor.
16. Remove the input pinion (7), spring wave washer (8), and O-ring (9). Discard and replace the O-ring.

5-25.3 Disassembly.

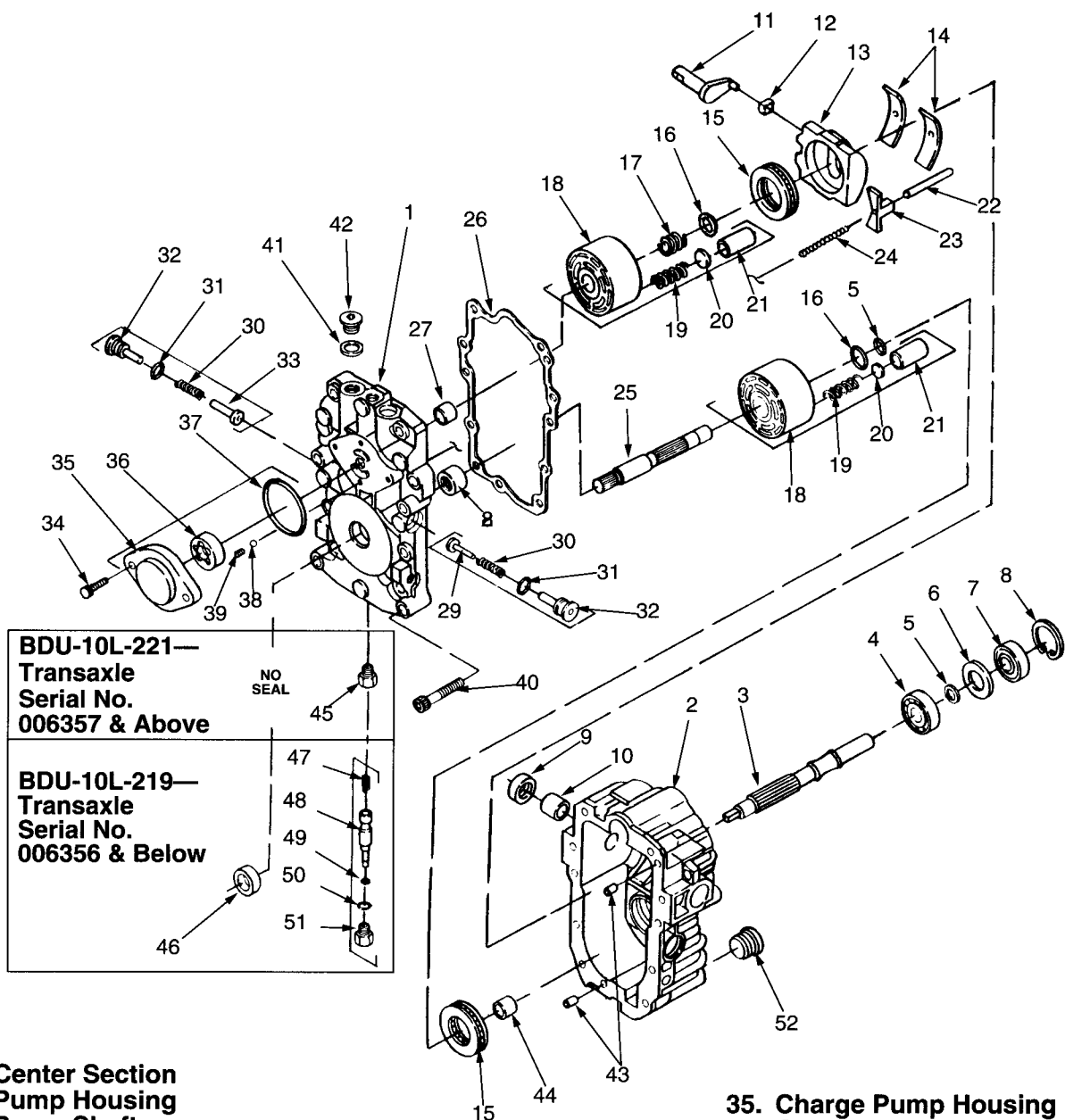
1. Disassemble the control arm (10) assembly as follows:
 - a. Noting the orientation of the spring hooks, remove the extension spring (12) from the neutral arms (13).
 - b. Remove the snap ring (14) and slide the neutral arms (13) off the control arm.



CAUTION

Cleanliness is a primary means of ensuring satisfactory hydro transmission life. As with any precision equipment, all parts must be kept free of foreign materials. Clean the outside surfaces of the hydro pump thoroughly before beginning disassembly. Perform the work in a clean area, free of metal shavings, grinding dust or similar foreign matter. Protect all critical high tolerance surfaces from damage.

2. Disassemble the hydrostatic transmission (Fig. 5-30) as follows:
 - a. Remove the plug (52, Fig. 5-30) from the pump housing (2) to drain the remaining oil.



- | | | |
|-----------------------------|--------------------------|--------------------------|
| 1. Center Section | 20. Piston Thrust Washer | 35. Charge Pump Housing |
| 2. Pump Housing | 21. Piston | 36. Gerotor Assembly |
| 3. Pump Shaft | 22. Leveler Pin | 37. O-Ring |
| 4. Ball Bearing | 23. Swashplate Leveler | 38. Charge Relief Ball |
| 5. Retaining Ring | 24. Leveler Spring | 39. Charge Relief Spring |
| 6. Spacer | 25. Motor Shaft | 40. Socket Hd. Screw |
| 7. Lip Seal | 26. Gasket | 41. O-Ring |
| 8. Retaining Ring | 27. Bearing | 42. Plug |
| 9. Lip Seal | 28. Needle Bearing | 43. Pin |
| 10. Bearing | 29. Orificed Check Valve | 44. Bearing |
| 11. Trunnion Arm | 30. Valve Spring | 45. Plug |
| 12. Slot Guide | 31. O-Ring | 46. Lip Seal |
| 13. Swashplate | 32. Valve Plug | 47. Bypass Spring |
| 14. Cradle Bearing | 33. Check Valve | 48. Bypass Spool |
| 15. Thrust Bearing Assembly | 34. Socket Hd. Screw | 49. O-Ring |
| 16. Thrust Washer | | 50. O-Ring |
| 17. Block Spring | | 51. Bypass Plug |
| 18. Piston Block | | 52. Plug |
| 19. Piston Spring | | |

Figure 5-30. Hydrostatic Transmission (Models 2135, 2145, 2165 and 2185).



CAUTION

The correct charge pump orientation is determined by the rotation of the pump shaft (tractor drive shaft). Incorrect orientation of the charge pump housing (35) will cause a priming failure. Before removal, mark the housing with either an arrow indicating direction of rotation, or with matching marks on the housing and center section (1).

- b. Remove the socket hd. screws (34) and lift the charge pump housing (35) directly upward to remove. Twisting or turning the housing may cause damage to the charge relief spring (39).
- c. Remove the charge relief spring (39), charge relief ball (38), gerotor assembly (36), and O-ring (37). Discard and replace the O-ring.



CAUTION

Use care to prevent the check valve poppets (29 and 33) from falling into the closed loop passages of the center section when removing them. Removal from the closed loop may be difficult but can be accomplished with a magnet and removal of the center section end plugs (42).

- d. Remove the valve plugs w/O-ring (32 and 31), valve springs (30), and check valves (29 and 33) from the center section. NOTE the orificed check valve (29, with hole) is removed from the right hand side.



NOTE

The following step e. applies only to those units equipped with the Model BDU-10L-219 hydro transmission.

- e. Loosen the bypass plug (51) and remove the plug, bypass spool (48), and bypass spring (47) from the center section. Separate the the spool from the plug and remove the O-ring (49) from the bypass spool. Discard and replace the O-rings.

- f. With the pump housing facing downward, secure the transmission in a soft jawed vise, or in a holding fixture made from a block of wood with a drilled hole large enough to protect the pump shaft.



NOTE

The internal piston springs (19) should separate the center section from the pump housing as the socket hd screws are removed.

- g. Using a 6mm hex wrench, remove the eight socket hd. screws (40) that secure the center section (1) to the pump housing (2).



CAUTION

The cylinder blocks (18) will likely stick to the surface of the center section. When removing the center section, exercise caution to prevent damage to the internal components.

- h. Reaching through the opening created by the piston springs, separate the piston blocks from the center section. Then, while holding the motor shaft (25) down, lift the center section directly upward and off the pump (3) and motor (25) shafts.
- i. Remove the gasket (26) and locating pins (43) from the housing. Discard the gasket.
- j. Tilting the housing to the side, slide the motor shaft (25) and piston block assembly out of the housing. Take care to retain the pistons (21) in their piston block bores.
- k. Remove the pump piston block assembly from the pump shaft (3). Again taking care to retain the piston in their bores.
- l. Remove the block spring (17) and thrust washer (16) from the pump shaft.
- m. Remove the leveler spring (24) and swash-plate leveler (23) from the leveler pin (22) of the pump housing.
- n. Remove the motor thrust bearing assembly (15) from the the fixed swashplate of the pump housing.

- o. Slide the swashplate (13), with the pump thrust bearing assembly (15), off of the pump shaft, then remove the cradle bearings (14) from the housing. Separate the thrust bearing assembly from the swashplate.
 - p. Remove the slot guide block (12) from the trunnion arm (11).
 - q. Remove the retaining ring (8) and pull the pump shaft lip seal (7) from the pump housing. Use care to avoid damage to the housing bore and shaft sealing surface. Discard and replace the seal.
 - r. Remove the bearing spacer (6) and tap the pump shaft and ball bearing (4) assembly out of the housing, using a soft hammer.
 - s. Remove the retaining ring (5) to remove the ball bearing from the pump shaft.
 - t. Slide the trunnion arm (11) out through the inside of the housing.
 - u. Remove the retaining ring (5) to remove the thrust washer (16) and motor piston block assembly from the motor shaft.
 - v. Pull the trunnion arm seal (9) and the motor shaft lip seal [(46), Model BDU-10L-219 only] from their respective bores. Use care to avoid damage to the bores. Discard and replace the seals.
 - w. The plugs w/O-rings [42 and 45 (Model BDU-10L-221 only)] of the center section should be removed only if necessary.
4. Inspect the bypass spool [(48), Model BDU-10L-219 only], bypass spring (47), and spool bore of the center section for damage or wear. The spool must move freely in the bore with very little side clearance.
 5. Inspect the gasket surface of the center section and pump housing for deep scratches or nicks.
 6. Check the pump shaft ball bearing (4) for binding or excessive looseness, indicating internal wear.
 7. Inspect the trunnion arm (11) bearing and seal surfaces for damage or wear.
 8. Inspect the slot guide (12) and mating surface of the trunnion arm (11) for wear or burrs. The slot guide should pivot freely on the pin, but have little or no side play.
 9. Check the seal surface of all shafts for corrosion, nicks, or scratches.
 10. Inspect the cradle bearings (14) for distortion, nicks, or wear.
 11. Check the cradle bearing pilot pins and locating ridges of the pump housing for wear or damage.
 12. Inspect the slot and bearing contact surfaces of the swashplate (13) for damage or wear.
 13. Inspect the thrust bearing assemblies (15) for worn or rough bearings, and for grooved or dimpled piston running surfaces, which indicate possible sticking of the pistons.
 14. Check the swashplate leveler (23), leveler spring (24), and leveler pin (22) for damage, wear or distortion. If the guide pin is bent or loose, replace the housing.
 15. Inspect the journal bearings (10 and 44) of the pump housing, and the journal bearing (27) and needle bearing (28) of the center section for damage or wear. If damage is found replace the complete assembly.
 16. Inspect the block spring (17) and thrust washers (16) for damage or distortion.
 17. Inspect the pump and motor piston block assemblies as follows:
 - a. Individually remove each piston (21) from its bore and check the piston and block bore for scoring, discoloration, or excessive wear. The piston must slide freely in the bore, but have very little side clearance (a maximum of 0.0015 clearance).

NOTE

If the pressed fit bearings (10 and 44) of the pump housing or bearings (27 and 28) of the center section are worn or damaged, the respective complete assembly should be replaced.

5-25.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect the splines and bearing journals of the pump and motor shafts for damage or wear. Replace if damaged or worn.
3. Inspect the check valve poppets (29 and 33) and mating seats in center section for damage or wear. Replace as necessary.

- b. Check the condition of the piston thrust washer (20).
 - c. Check for a broken or distorted piston spring (19).
 - d. Re-install the washer, spring, and piston in its piston block bore.
 - e. Inspect the inner diameter splines of the piston block for damage or excessive wear.
18. Inspect the running surfaces of the piston block and center section for wear or scratches. The surfaces **MUST** be flat and free of scratches. The running surfaces may be polished, provided flatness can be maintained and no more than 0.0004 in. of material needs to be removed.
 19. Inspect the pump housing for cracks or broken cooling fins.
 20. Inspect the charge pump housing (35), gerotor assembly (36) and running surface of the center section for damage, scratches or excessive wear. Check gerotor gear lobes for wear.
 21. Inspect the charge relief ball (38) and mating seat of center section for damage or wear. Check the relief valve spring (39) for damage.
 22. Inspect the input pinion assembly (7, Fig. 5-29) for broken or worn gear teeth. Check the bearing for wear or binding.
 23. Inspect the hydraulic tube(s) (2 and 25) for cracks, crimped areas, or splits at the tube ends.
 24. Check the control arm (10) for broken welds and elongated holes.
 25. Check the neutral arms (13) and centering spacer (20) for wear.
 26. Inspect the extension spring (12) for damage or loss of tension, as indicated by irregular spacing between the coils.

5-25.5 **Repair.**

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. If necessary, polish the seal surfaces of the shafts, center section and pump housing.
4. If necessary, polish the running surfaces of the piston block and center section per the specifications given in step 18 of Inspection (5-25.4).

5. Replace all damaged or excessively worn parts or assemblies.

5-25.6 **Reassembly.** Lightly coat all internal parts with Cub Cadet Drive System Oil as they are being reassembled.



CAUTION

Most parts have critical high tolerance surfaces. Use care to protect all surfaces when reassembling the hydro transmission. Do not force parts together. If parts are properly aligned and correctly installed, the components can be assembled with little effort. Protect all ports or openings from the entry of foreign materials.

1. If not already installed, check the O-rings and install all of the transmission plugs (42, 45 and 52).
2. Reassemble the hydro transmission as follows:



NOTE

The pistons (21), piston thrust washers (20) and piston springs (19) should have been reinstalled in the piston blocks (18) when completing the inspection procedure. If not done during inspection, reassemble the piston block assemblies.

- a. If previously removed, install the motor piston block assembly, thrust washer (16), and retaining ring (5) on the motor shaft (25).
- b. Install the trunnion arm (11) through the inside of the pump housing.
- c. Install the ball bearing (4) on the pump shaft and secure with the retaining ring (5).
- d. Install the pump shaft assembly in the housing and place the spacer against the bearing.
- e. Lubricate the new lip seal (7); then, using care to avoid damage to the seal, press the seal into the housing with a suitable seal driver. Secure the seal with the retaining ring (8).
- f. Install the slot guide (12) onto the trunnion arm, and install the cradle bearings (14) in the pump housing. Make certain the bearings engage the pilot pins and are within the locating ridges of the housing.

- g. Install the thrust bearing assembly (15) in the swashplate (13).
- h. Using a small screwdriver to hold the slot guide (12) in position, install the swashplate assembly in the housing. The slot guide must engage the swashplate slot.
- i. Holding the swashplate in position, measure for the proper trunnion arm end play of 0.020 to 0.060 in. Using a suitable sleeve, press the trunnion arm bearing (10) into the housing as necessary to achieve this measurement.
- j. Install the thrust washer (16) and block spring (17) on the pump shaft.
- k. Position the swashplate leveler (23) so that it engages the corners of the swashplate and slide it onto the leveler pin (22).
- l. Install the thrust bearing assembly (15) in the fixed swashplate of the pump housing.

NOTE

To simplify the installation of both the pump and motor piston block assemblies, temporarily wrap a rubber band snugly around the pistons of each assembly. This will help to retain the pistons in their block bores.

- m. With the swashplate in the neutral (0 angle) position, tip the housing to the side and install the piston block assembly onto the pump shaft. Cut and remove the rubber band if used.

CAUTION

Use caution to prevent damage to the journal bearing (44) when installing the motor shaft/piston block assembly in the housing. Spring resistance will be felt, but excessive force should not be needed to seat the shaft in the bearing. Remove any oil puddled in the bearing to prevent hydraulic lock.

NOTE

Because of piston spring tension against the fixed angle of the motor swashplate, once the

motor shaft/piston block assembly has been installed, it will be necessary to hold the assembly in position until the center section has been installed.

- n. Install the motor shaft/piston block assembly in the pump housing and **CONTINUE TO HOLD THE PISTON BLOCK IN PLACE**. Cut and remove the rubber band if used.

NOTE

The piston springs should be centered in their piston block bores. Using a small screwdriver, center the springs through the valve openings in the face of the piston blocks.

- o. Positioning the pump housing with the opening facing upward, install the locating pins (43) and new gasket (26), and slide the leveler spring (24) onto the leveler pin (22).

CAUTION

Because the motor shaft/piston block must be continuously held in position, it will be necessary to slide the center section (1) far enough onto the pump and motor shafts to allow the motor shaft to be held from the outside, before releasing your hold from inside the center section. If for any reason the motor shaft is allowed to 'pop' free from the bearing (44), **DO NOT** install the center section until making certain all the pistons are correctly positioned in the motor piston block and the shaft is reseated in the bearing.

- p. Lubricate the running surfaces of the piston blocks and center section. Position the center section on the pump and motor shafts, and make certain the leveler spring engages the recess in the center section. Then, using care to avoid displacing the gasket, switch your hold on the motor shaft and press the center section downward.
- q. Align the center section with the locating pins and firmly press into place on the housing. Excessive force should not be needed or used. Secure with the eight socket hd. screws (40), alternately tightening the screws to 18-21 ft. lbs.



CAUTION

To prevent damage to the seals, wrap or sleeve any splines or sharp edges on the shaft before installing the lip seals.

- r. Lubricate the lip seal (9) and slide onto the trunnion arm. Press the seal into the pump housing using a suitable seal driver.



NOTE

The following steps s. through u. apply only to the Model BDU-10L-219 hydro transmission.

- s. Lubricate the motor shaft seal (46) and press into the center section.
- t. Install new O-rings (49 and 50) on the bypass spool (48) and plug (51), then carefully press the spool into the plug. Place the bypass spring (47) in the recess of the spool. A small dab of clean petroleum jelly in the recess will help to retain the spring.
- u. Install the bypass valve assembly in the center section and torque the plug to 7-10 ft.lbs. Depress the valve several times to ensure smooth operation and that the valve button extends approximately 0.22 in. from the plug when fully released.



NOTE

When installing the check valve assemblies, make certain the check valve poppets (28 and 33) do not fall into the closed loop passages of the center section.

- v. Place new O-rings (31) on the valve plugs (32). Position the transmission so that the right side check valve port faces upward and install the orificed check valve (29), valve spring (30), and plug w/O-ring into the center section. To prevent damage and/or failure, make sure the plug stem is inserted into the poppet. Torque the plug to 15-35 ft. lbs.
- w. Turn the transmission over and repeat the above procedure for the other check valve assembly.

- x. Place a new O-ring (37) in the groove of the charge pump housing (35). Install the charge relief ball (38) and spring (39) in the proper center section port (below lower 'kidney' opening), and install the gerotor assembly (36) on the pump shaft. Positioning the charge pump housing as marked when removed, rotate the gerotor as necessary to align with pump housing, and install the housing with the socket hd. screws (34). NOTE the relief spring must enter the recessed hole in the pump housing. Torque the screws to 7-10 ft. lbs.

- y. Rotate the shafts to assure correct assembly. The pump shaft should require minimal effort, while the motor shaft will require more due to the fixed swashplate and piston springs.

- 3. Reassemble the control arm (10, Fig. 5-29) assembly as follows:

- a. Slide the neutral arms (13) onto the hub of the control arm (10) and secure with the snap ring (14).
- b. Hook the extension spring (12) into the inner surfaces (surfaces facing each other) of the neutral arms (13).

5-25.7 Installation.

- 1. Install the new O-ring (9, Fig. 5-29) in the groove of the transaxle assembly.
- 2. Install the input pinion assembly (7) in the transaxle and position the spring wave washer (8) against the outer race of the bearing.
- 3. While holding the input pinion/wave washer in place, align the splines of the hydro transmission output shaft with those of the input pinion gear (it may be necessary to slightly rotate the hydro transmission to align the splines) and install the hydro transmission on the transaxle. DO NOT force the hydro transmission into position on the transaxle.
- 4. Secure the transmission with the hex cap screws (4 and 6) and lock washers (5).



NOTE

The following steps 5 and 6 apply only to units equipped with the Model BDU-10L-219 hydro transmission and Serial No. 006356 or below transaxle.

5. Place a new O-ring on the straight connector (24) and install the connector in the side of the hydro transmission pump housing.
6. Install a new O-ring (28) on the the return tube (25). Lubricate the O-ring and carefully press the lower end of the return tube into the transaxle. Position the tube's upper flange over the taper of the straight connector (24) and tighten the tube coupling nut. Install the tube clamp (26) and hex cap screw (27) to secure the lower end of tube in the transaxle housing.
7. Place a new O-ring on the tube connector (17) and install the connector in the transaxle.
8. Connect the lower end of the pickup tube (2) to the tube connector (17), position, but do not connect, the tube's upper end, then tighten the lower coupling nut.
9. Install the oil filter nipple (16) in the transaxle, making sure to not install too deeply (half length is maximum). Lubricate the seal ring of the new oil filter (15) and install on the transaxle.
10. If previously removed, install the neutral bracket (21) on the transaxle with the hex wash. hd. tapp screws (23).
11. Place the flat washer (19) and centering spacer (20, flange away from screw head) on the hex cap screw (18) and install on the neutral bracket (21) in the position marked during disassembly. Secure with the second flat washer (19) and hex top lock nut (22).
12. Spreading the neutral arms (6) to straddle the centering spacer (20), install the control arm assembly onto the trunnion arm of the transmission.
13. Apply a small patch of Loctite 242 on the threads of the set screw (11) and install in the control arm. Make certain the point of the set screw engages the hole in the trunnion arm.
14. Fill the transaxle with Cub Cadet Drive System Oil (Appendix B).
15. To help prime the system, pour oil into the pickup tube port of the hydro transmission center section, then install the elbow (3, with a new O-ring) into the port.
16. Connect the upper end of the pickup tube (2) to the elbow (3) and tighten the tube coupling nut.
17. Install the drive line per paragraph 5-23.7.
18. Connect the transmission linkage to the control arm per paragraph 5-21.7.
19. Install the fender and running board per paragraph 5-12.7 or 5-13.7.
20. Install the seat per paragraph 5-11.7.
21. Connect the battery per paragraph 5-4.7 or 5-5.7.
22. Chock the front wheels, then raise the rear of the tractor so that the wheels are off the ground and secure with jack stands. Depress and lock the brakes
23. To prime the hydro charge pump system, jog the engine a few times by turning the ignition key.
24. Sitting in the seat, start the engine and run at approximately 3/4 throttle. Release the parking brake.
25. Alternately depress the forward and reverse pedals to bleed any air pockets from the pistons and closed loop passages of the hydro transmission. Stop the engine and lower the tractor to the ground.
26. Referring to the instructions found in Section 6—Adjustments, check the tractor for proper neutral adjustment. If necessary, re-adjust the centering spacer and hydro linkage.

5-26 TRANSAXLE REMOVAL (All Models).

5-26-2 Removal.

5-26.1 General (All Models).

Troubleshooting information regarding poor performance of the transaxle can be found in Section 4. All possible external causes of poor performance should be checked prior to disassembly of the transaxle. Complete removal or disassembly of unit is seldom required and is not recommended. Remove or disassemble the unit only to the extent necessary to accomplish the goals of the maintenance procedure. Except where noted, force should not be used in disassembly or assembly procedures. If components do not fit together or do not come apart as described, examine the operation and the orientation of components to determine the cause of the problem. Review the procedures to ensure that the methods employed follow the prescribed procedures. Use common sense to alleviate the problem.



WARNING

Observe all applicable local and federal laws regulating the proper disposal of the drained oil.

1. Place a suitable container below the transaxle oil drain plug (9), located on the bottom of the LH transaxle housing. Remove the oil drain plug (9), and allow the oil to completely drain into the container below.
2. Disconnect the battery cables from the battery terminals per paragraph 5-4.2 or 5-5.2 .
3. Remove the seat from the tractor per paragraph 5-11.2.
4. Remove the fender and running boards from the tractor per paragraph 5-12.2 or 5-13.2.

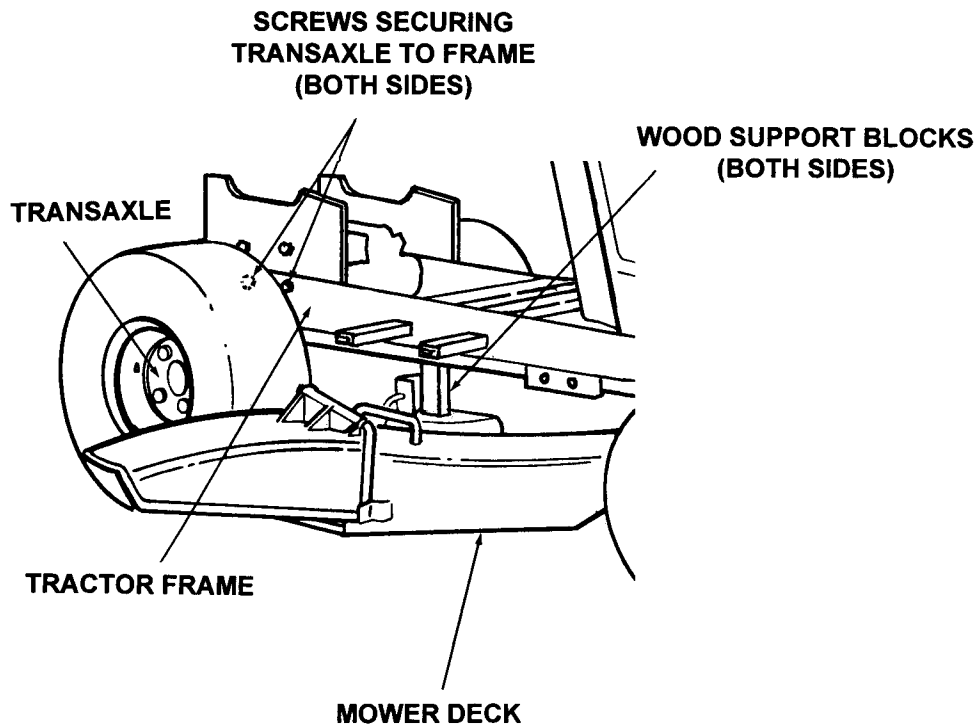


Figure 5-31. Blocking the Deck.



WARNING

Gasoline is flammable. Do not expose to sparks or open flame.

5. Drain the fuel tank per paragraph 5-18.2. Lift the drained fuel tank and move it forward, and to the left side of the tractor, to allow full access to the transaxle.
6. Disconnect the brake linkage from the transaxle per paragraph 5-19.2.



NOTE

The following step 7. applies only to Models 2130, 2140, and 2160.

7. Disconnect the gear shift and clutch adjustment rods from the transaxle and clutch assemblies per paragraph 5-20.2.



NOTE

The following step 8. applies only to Models 2135, 2145, 2165, and 2185.

8. Remove the hydro disengagement rod and dump arm from the transaxle, and disconnect the hydro adjustment rod from the hydro transmission per paragraph 5-21.2.
9. Disconnect the drive shaft from the transaxle per paragraph 5-22.2 or 5-23.2.



NOTE

If the mower deck is installed, it can be used to support the rear of the tractor and facilitate its movement after removal of the transaxle.

10. Fully lower the mower deck to its lowest position and measure the space between the bottom of the frame and the top of the mower deck.
11. Cut two blocks of wood to the measured length. Wedge one of the two wood support blocks on each side of the tractor, between the frame and the mower deck (see Figure 31).

12. Remove the four screws securing the hitch plate to the rear of the tractor frame, then remove the hitch plate per paragraph 5-32.2.
13. From the rear of the tractor, slide a floor jack under the transaxle. Place a solid wood block on the floor jack lift cradle, then raise the jack until the wood block contacts and supports the front of the transaxle.
14. Remove the four screws (7 and 8, Fig. 5-32) securing the right side of the transaxle to the frame.
15. Remove the three screws (7) securing the left side of the transaxle to the frame.
16. Cut and remove the self-clinch cable tie (2, Fig. 5-32) securing the transaxle breather tube to the tractor frame.
17. With the aid of an assistant, lift the rear of the tractor frame upward, then roll it forward, clear of the transaxle. Once clear of the transaxle, lower onto the deck wheels (if applicable) and roll it to a nearby temporary storage area. If the deck was not blocked, support the rear of the tractor with jack stands.

5-26.3 Disassembly.

1. To prevent the transaxle from tipping during the removal of the wheels, support the transaxle using two jack stands placed just inside both wheels.
2. Remove the four wheel lug nuts securing each wheel to the threaded studs of each axle hub. Remove both wheels.
3. Unscrew the elbow fitting (4) from the transaxle housing (6) and remove breather tube (1), vent (5), and elbow (4) as one assembly.
4. Pull the vent (5) from the breather tube (1), then release tension from the hose clamp (3) to remove it, and the breather tube (1), from the elbow fitting (4).
5. Refer to paragraphs 5-27; 5-28; 5-29 and 5-30 for information regarding further disassembly of the different transaxle components.

5-26.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect all parts for cracks, scoring, distortion, corrosion, wear, or other damage.

3. Inspect the vent (11) for dirt, paint, corrosion, or other damage.
4. Inspect the breather tube (1) for brittleness, deterioration, or other damage.

5-26.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Remove paint or dirt buildup from the vent (11).
4. Replace any non-repairable component with a new component.

5-26.6 Reassembly.

1. Install the vent (11) into the breather tube (1). Release tension from the hose clamp (3) to install it on the breather tube (1). Insert the ribbed end of the elbow fitting (4) fully into the open end of the breather tube (1). Release tension from the hose clamp (3), slide it over the ribbed end of the elbow fitting (4).
2. Screw the elbow fitting (4) into the corresponding threaded port of the transaxle (6). Position so that the elbow fitting is pointing toward the left and rearward.

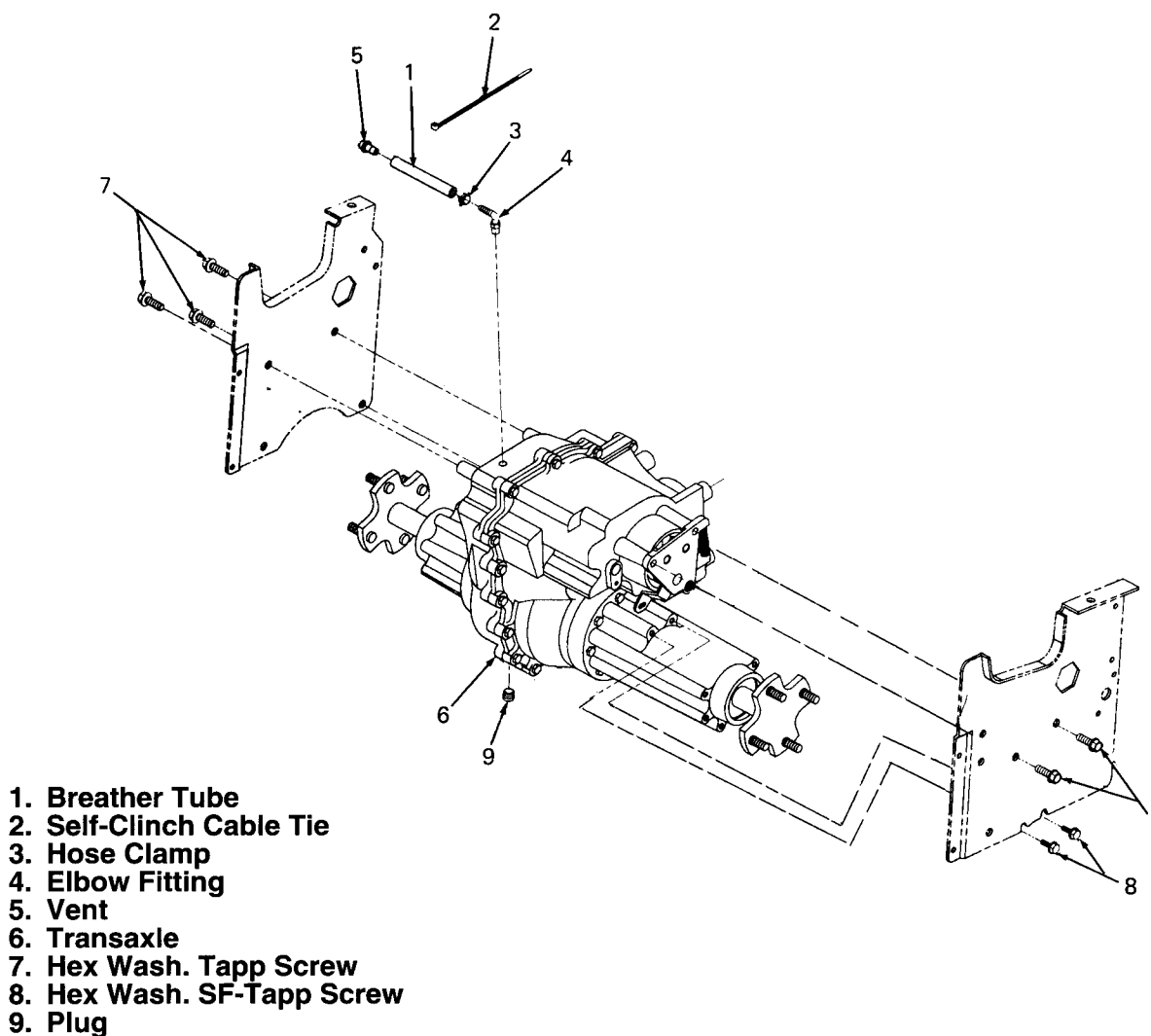


Figure 5-32. Transaxle Removal (All Models).

3. Support the transaxle in an upright position, with the floor jack and wood block used when removing the transaxle. Place jack stands at the end of each axle housing to prevent the transaxle from tipping during the following installation of the wheels.
4. Install the wheels onto the axle hubs, then secure each wheel using the four previously removed wheel lug nuts.

5-26.7 Installation.

NOTE

To aid in aligning the transaxle in the frame, partially install the two lower hex wash sf-tapp screws (8) in the right axle housing.

1. With the aid of an assistant, lift the rear of the tractor frame upward, then roll it rearward, over the transaxle. Align the screw notches of the right frame channel with the two sf-tapp screws, and lower the frame onto the transaxle.
2. Aligning the mounting holes of the frame and the transaxle, secure the left side of the transaxle to the frame using the three previously removed screws (7).
3. Aligning the mounting holes of the frame and the transaxle, secure the right side of the transaxle to the frame using the four previously removed screws (7 and 8).
4. Remove the floor jack and wood block supporting the transaxle.
5. Install the hitch plate onto the rear of the tractor frame, then secure in place using the four previously removed screws.
6. If the deck was blocked, remove both wood support blocks from between the frame and the mower deck.
7. Secure the transaxle breather tube to the tractor frame using a new self-clinch cable tie (2, Figure 5-32). Do not over tighten the cable tie.
8. Connect the drive shaft to the transaxle per paragraph 5-22.7 or 5-23.7.

NOTE

The following step 9. Applies only to models 2135, 2145, 2165, and 2185.

9. Install the hydro dump arm and disengagement rod on the transaxle, and connect the hydro adjustment rod to hydro transmission per paragraph 5-21.7.

NOTE

The following step 10 applies only to Models 2130, 2140, and 2160.

10. Connect the gear shift and clutch adjustment rods to the transaxle and clutch assemblies per paragraph 5-20.7.
11. Connect the brake linkage to the transaxle per paragraph 5-19.7.
12. Lift the fuel tank and position it in place at the rear of the tractor. If not previously connected, connect the fuel line separated earlier when draining the fuel tank.
13. Install the fender and running board onto the tractor per paragraph 5-12.7 or 5-13.7.
14. Install the seat onto the tractor per paragraph 5-11.7.
15. Connect the battery cables to the battery terminals per paragraph 5-4.2 or 5-5.2.
16. If not previously installed, replace the transaxle oil drain plug into the corresponding threaded bore in bottom of the LH transaxle housing (21).
17. Fill the transaxle to the proper level with Cub Cadet Drive System Oil (see Appendix B).
18. Operate the tractor in both the forward and reverse direction to ensure proper operation. Refer to Section 6 - Adjustment, and make the adjustments necessary to achieve proper operation.

5-27 BRAKE ASSEMBLY (All Models).

5-27.1 General.

Some early production tractors experienced an intermittent chatter or scraping noise coming from the brake assembly. This was caused by sporadic contact between the brake drum and brake actuator arm. Refer to Service Bulletin CC-275 for information concerning the necessary modifications.

5-27.2 Removal.

1. Remove the transaxle from the tractor per paragraph 5-26.2.
2. Remove the low head cap screw (4, Fig. 5-33) securing the brake assembly components (2, 3, 5, 6, 7, and 8) to the transaxle (10), then remove the brake assembly.
3. Remove the brake drum (9) from the transaxle (10).
4. If leaking oil, or otherwise damaged, pry the shift shaft seal (1) out of the transaxle (10).

5-27.3 Disassembly.

1. Remove the two brake shoes (2), with brake spring (8), from the pins of the brake plate (6). Use care to avoid pinching fingers between brake shoes.
2. Remove the brake spring (8) from the brake shoes (2) to separate the two brake shoes (2).
3. Remove the compression spring (3) from the brake plate (6) and the brake arm (7).
4. Remove the brake arm (7) and brake shoe actuator (5) from the brake plate (6).

5-27.4 Inspection. Clean all parts prior to inspection.

1. Inspect all parts for cracks, scoring, distortion, corrosion, wear, or other damage.
2. Inspect the shift shaft seal (1), installed in the transaxle housing (10), for oil leakage, wear, or other damage.
3. Inspect the brake drum (9) and transaxle shift shaft (14, Fig. 5-35) for damage or worn splines.

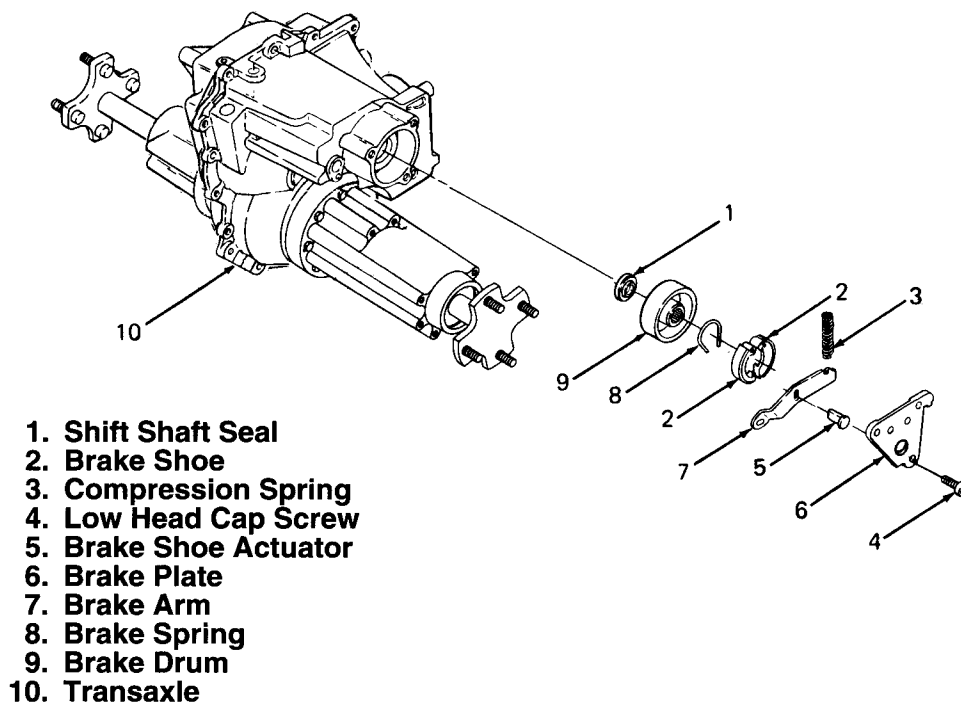


Figure 5-33. Brake Assembly (All Models).

4. Inspect the brake drum (9) for excessive wear or damage.
5. Inspect the brake shoes (2) for excessive wear or damage.
6. Check the mating surfaces of the brake arm (7) and actuator (5) for excessive side play caused by wear.

5-27.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace a leaking, worn, or damaged shift shaft seal (1).
4. Replace an excessively worn or damaged brake drum (9).
5. Replace excessively worn or damaged brake shoes (2) as a paired set.
6. Replace any non-repairable component with a new component.

5-27.6 Reassembly.

1. Place the smooth, flat side of the brake plate (6) on a work bench.
2. Insert the head of the brake shoe actuator (5) into the corresponding (large) hole of the brake plate (6).
3. Install the central elongated hole of the brake arm (7) onto the brake shoe actuator (5), so the flat surface of the brake arm (7) rests on the brake plate (6). When properly installed, the curved end of the brake arm (7), having the hole, curves upward.
4. Compress the compression spring (3) by hand, then install it onto the spring engagement tabs of the brake plate (6) and the brake arm (7).

5. After first locating the ends of the spring coil wire, turn the compression spring (3) so that the lower end of the spring's coil wire rests on the edge of the brake arm (7), just ahead of the spring tab. This properly positions the compression spring (3) to prevent sideways or forward deflection of the spring when it is compressed.
6. Secure both brake shoes (2) together using the brake spring (8).
7. Install the brake shoes (2) just onto the ends of the pins of the brake plate (6). Separate the lower (unpinned) ends of the brake shoes (2) to straddle the brake shoe actuator, then press the shoes firmly downward onto the plate.

5-27.7 Installation.

1. If the shift shaft seal (1) was removed, wrap or sleeve the splines of the shaft, then press the new seal into the corresponding bore of the transaxle (10). Use care to prevent damage to the seal.
2. Install the brake drum (9) on the splines of the shift shaft (14, Fig. 5-35) in the corresponding bore of the transaxle (10). Ensure that the recessed surface of the brake drum (9) faces outward.
3. Inserting the assembled brake shoes (2) into the brake drum (9), press the brake assembly (2, 3, 5, 6, 7, and 8) into the transaxle (10) and loosely install the low head cap screw (4).
4. Align the upper holes of the brake plate (6) with the holes of the transaxle and tighten the screw (4). *To install the transaxle in the tractor frame, the upper holes of the brake plate (6) **must** remain aligned with the transaxle when tightening the screw (4).*
5. Install the transaxle in the tractor per paragraph 5-26.7.

5-28 AXLE HOUSING AND AXLE ASSEMBLIES (All Models).

5-28.1 General.

The axle housing and axle assemblies can be removed without splitting the transaxle housings.

5-28.2. Removal.

1. Remove the transaxle from the tractor per paragraph 5-26.2.



WARNING

Observe all applicable local and federal laws regulating the proper disposal of the drained oil.

2. If not previously removed, remove the transaxle oil drain plug (10) from the bottom of the transaxle housing (11). Allow the oil to completely drain into a suitable container.
3. Secure the transaxle in a bench vise (or equivalent device), with the axle housing to be removed facing upward.



NOTE

Transaxle assemblies with serial number 005792 and below used hex cap screws and bell washers to fasten the axle housings. Transaxles with the serial numbers 005793 and above use hex washer head tapp screws.

4. Remove the hex cap screws (7) and bell washers (8), or the hex washer head tapp screws from the axle housing.
5. Using a soft-headed mallet, tap outward on the axle (1 or 13) to loosen the axle housing seal, then remove the axle housing (6 or 12) and axle assembly from the transaxle (11).

5-28.3 Disassembly.

1. Place the axle housing assembly, threaded studs down, on a workbench.
2. Reach inside the axle housing (6 or 12) to remove the external retainer ring (5) from the axle (1 or 13). Discard the retaining ring.
3. Place the axle housing (6 or 12) on its side on a workbench.

4. Using a soft-headed mallet or wood block, tap the splined end of the axle (1 or 13) to force it out of the oil seal (3), installed in the outside end of the axle housing (6 or 12).
5. Remove the inverted retainer ring (2) from the inside circumference groove of the outside end of the axle housing (6 or 12).
6. Place a nylon or wood dowel of suitable diameter into the axle housing (6 or 12), and against the bearing (4). Using a soft-headed mallet, tap the dowel to drive the oil seal (3) and bearing (4) out of the outside end of the axle housing (6 or 12). Discard the oil seal (3).

5-28.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect all parts for cracks, scoring, distortion, corrosion, wear, or other damage.
3. Inspect the axle (1 or 13) for damaged splines, broken welds, and for wear or damage to the retaining ring groove.
4. Inspect the bearing (4) for scoring, seizing, wear, or other damage.
5. Inspect the oil seal and bearing surface of the axle housing (6 or 12) for damage or wear.
6. Inspect the two dowel bushings (9), installed in each axle housing (6 or 12), for distortion or other damage.
7. Inspect the axle housing (6 or 12) for cracks or other damage.

5-28.5 Repair.

1. Deburr and dress damaged threads or splines.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace an excessively worn or damaged axle (1 or 13). Where possible, reweld broken welds.
4. Replace an excessively worn or damaged bearing (4).
5. Replace a distorted or damaged dowel bushing (9) by pulling the bushing straight out from the axle housing (6 or 12). Do not twist to remove. Carefully tap a new dowel bushing (9) into the corresponding alignment hole of the axle housing (6 or 12).

6. Replace a cracked or damaged axle housing (6 or 12).
 7. Remove all sealant from the mating surfaces of the axle housing (6 or 12) and transaxle housing (11), then clean all mating surfaces.
 8. Replace any non-repairable component with a new component.
- 5-28.6 Reassembly.**
1. Place the large, flanged end of the axle housing (6 or 12) on a clean workbench. Use care to avoid damage to the machined sealing surface of the housing.
 2. Insert the bearing (4), then squarely position the new oil seal (3) in the outside end of the axle housing (6 or 12).
 3. Using a soft-headed mallet and a nylon or wood dowel, of equal or larger diameter than the seal, squarely drive the oil seal (3) and bearing (4) into the outside (up) end of the axle housing (6 or 12). Use care to prevent damaging the seal on the retaining ring groove of the axle housing.
 4. Using a dowel of slightly smaller diameter than the seal, fully drive the seal into the axle housing until the ring groove is completely visible.
 5. Install the inverted retainer ring (2) into the inside circumference groove in the outer end of the axle housing (6 or 12) to secure the oil seal (3) and bearing (4).

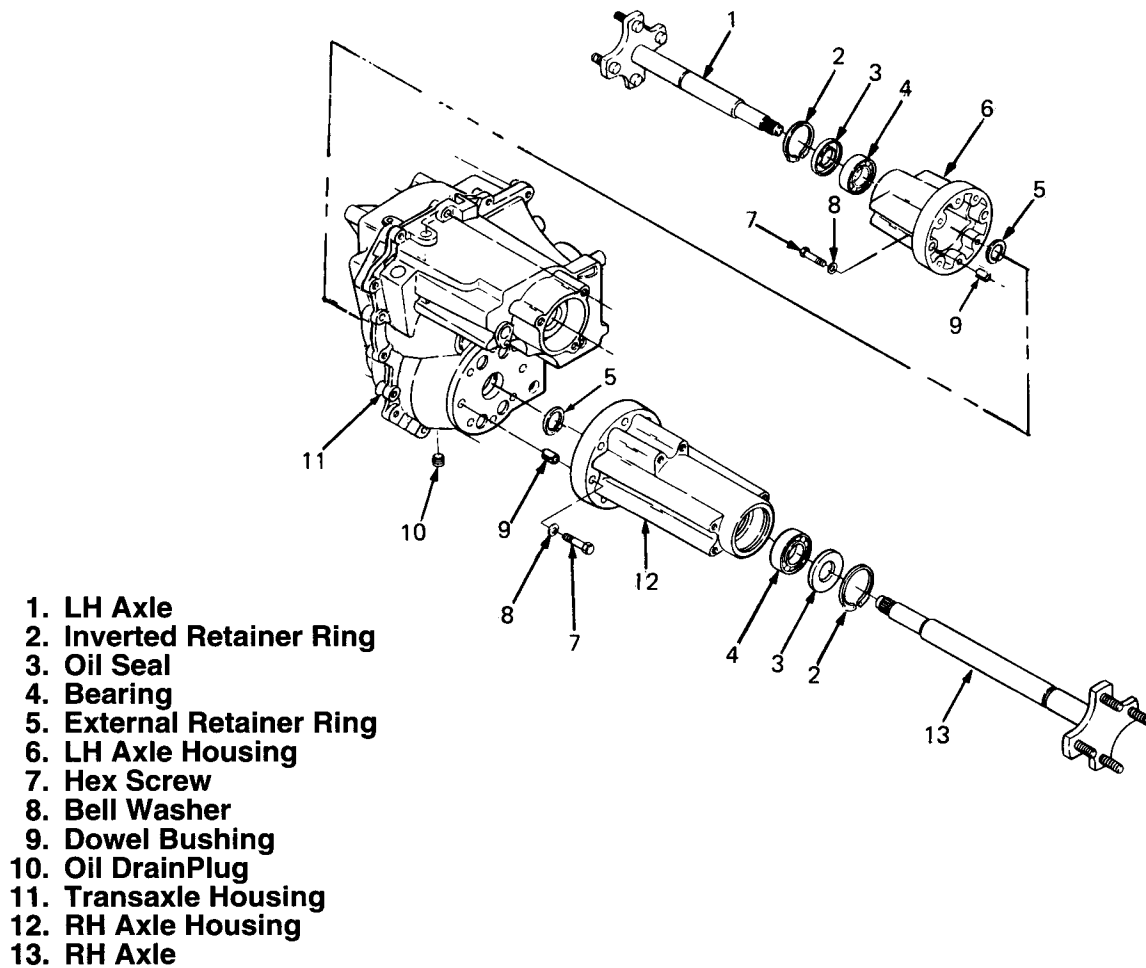


Figure 5-34. Axle Housing and Axle Assemblies (All Models)

6. Lubricate the oil seal, then insert the axle (1 or 13) through the oil seal (3) and bearing (4) in the outer end of the axle housing (6 or 12). Use caution to avoid clipping the seal when passing the retaining ring groove of the axle through the seal.



CAUTION

Because of limited access (especially in the right axle housing), special care must be taken to ensure the retaining ring (5) is completely seated in the axle groove. Failure to do so can allow the axle to walk out of the housing when operating the tractor.

7. Reaching inside the axle housing (6 or 12), install a new external retainer ring (5) over the axle (1 or 13) and into the retaining ring groove of the axle.

5-28.7 Installation.

1. Apply a 1/8-inch bead of ultra grey sealant on the clean mating surface of the axle housing (6 or 12).
2. Slide the axle shaft (1 or 13) fully into the corresponding central bore of the transaxle housing (11). If required, slightly rotate the axle (1 or 13) to ensure full engagement of the splines.
3. Align the two dowel bushings (9) in the axle housing (6 or 12) with the two counter-bored alignment holes in the transaxle housing (11), then press the housings firmly together.



CAUTION

Transaxle assemblies with serial number 005792 and below use hex cap screws and bell washers to fasten the axle housings. Transaxles with the serial numbers 005793 and above use hex wash. head tapp screws. If the original screws are being re-used, apply Loctite 242 to the threads.

4. Secure the axle housing with the hex cap screws (7) and bell washers (8) or the hex wash. head tapp screws. Torque screws to 180-200 in. lbs.
5. Install the transaxle in the tractor per paragraph 5-26.7.

5-29 SIX-SPEED TRANSAXLE (Models 2130, 2140, and 2160).

5-29.1 General.

A modification was made to the design of the shift shaft and neutral spacer used in the six speed transaxle. Early production transaxles were equipped with a single neutral spacer which was secured to the shift shaft with a set screw. The new design features a shift shaft with a neutral slot machined into its circumference, and dual neutral spacers, which have three internal teeth that lock into the neutral slot. When servicing an early production transaxle, replace the shift shaft and neutral spacer with the new design. Refer to Service Bulletin CC-288.



NOTE

It is not necessary to remove the axle and axle housing assemblies prior to disassembly of the transaxle.

5-29.2 Removal.

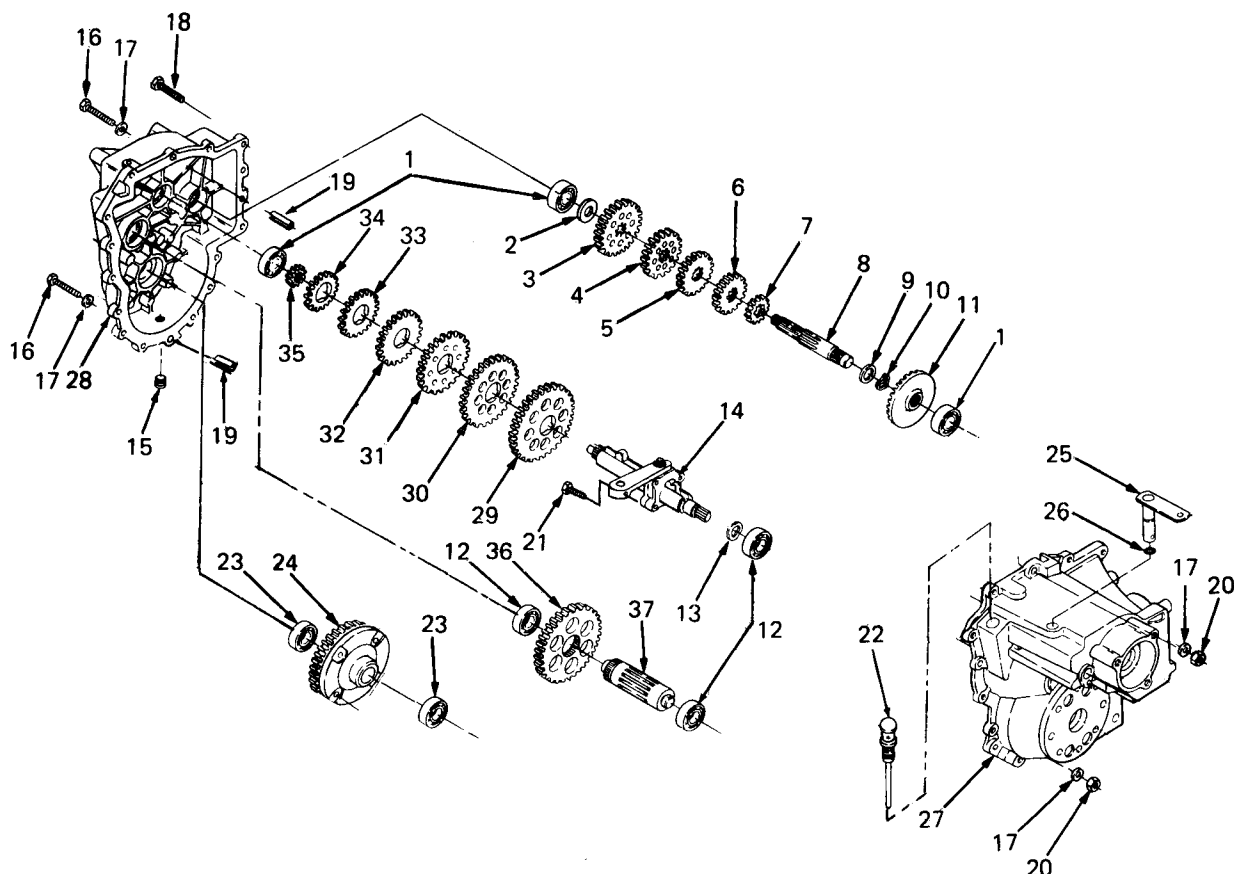
1. Remove the transaxle from the tractor per paragraph 5-26.2, and remove the brake assembly from the transaxle per paragraph 5-27.2.



WARNING

Observe all applicable local and federal laws regulating the proper disposal of the drained oil.

2. If not previously removed, remove the oil drain plug (15, Fig. 5-35) from the bottom of the LH transaxle housing (28). Allow the oil to completely drain into a suitable container.
3. Remove the clutch assembly, interlock linkage, and input pinion from the transaxle per paragraph 5-24.2.
4. If the axle housings have *not* been removed, secure the transaxle in a bench vise (or equivalent device), with the shorter axle housing facing upward. If the axle housings *have* been previously removed, place the transaxle on a workbench, with the LH transaxle housing (28) facing upward. Support the housing using a wood block (or equivalent support).



- | | |
|---------------------------------|----------------------------------|
| 1. Ball Bearing | 20. Hex Top Lock Nut |
| 2. Flat Washer | 21. Hex Head Cap Screw |
| 3. Drive Gear, 27-Tooth, Sixth | 22. Dipstick |
| 4. Drive Gear, 23-Tooth, Fifth | 23. Ball Bearing |
| 5. Drive Gear, 20-Tooth, Fourth | 24. Differential Gear Assembly |
| 6. Drive Gear, 17-Tooth, Third | 25. Shift Arm |
| 7. Drive Gear, 15-Tooth, Second | 26. O-Ring |
| 8. Drive Shaft w/First | 27. RH Transaxle Housing |
| 9. Flat Washer | 28. LH Transaxle Housing |
| 10. Spring Wave Washer | 29. Shift Gear, 58-Tooth, First |
| 11. Bevel Gear, 36-Tooth | 30. Shift Gear, 40-Tooth, Second |
| 12. Ball Bearing | 31. Shift Gear, 27-Tooth, Third |
| 13. Spring Wave Washer | 32. Shift Gear, 24-Tooth, Fourth |
| 14. Shift Shaft Assembly | 33. Shift Gear, 22-Tooth, Fifth |
| 15. Oil Drain Plug | 34. Shift Gear, 18-Tooth, Sixth |
| 16. Hex Cap Screw | 35. Reduction Gear, 14-Tooth |
| 17. Flat Washer | 36. Reduction Gear, 44-Tooth |
| 18. Self-Tapping Screw | 37. Output Shaft, 9-Tooth |
| 19. Slotted Spring Pin | |

Figure 5-35. Six Speed Transaxle (Models 2130, 2140 and 2160).

NOTE

To facilitate disassembly, shift the transaxle into neutral by rotating the shift arm (25) to the rear-most detent position.

5. Remove the two through hex cap screws (16), four flat washers (17), and two hex top locknuts (20) from the two alignment holes of the transaxle housings (27 and 28).
6. Using a drift punch (or equivalent tool) and a soft-headed mallet, drive both slotted spring pins (19) into the RH transaxle housing (27). It is not necessary to remove the slotted spring pins (19) completely.
7. Remove the fifteen self-tapping hex screws (18) securing the LH transaxle housing (28) to the RH transaxle housing (27).

CAUTION

When separating the two transaxle housing halves, use care to avoid damage to the machined mating surfaces.

8. Using a nylon or wood dowel (or equivalent tool) and a soft-headed mallet, carefully tap the recessed knock-off areas of the LH transaxle housing (28), adjacent to the two alignment holes, to separate it from the RH transaxle housing (27).
9. Remove the LH transaxle housing (28). If the LH axle was not removed, lift the transaxle housing directly upward to free the axle from the differential gear assembly (24). Use care to avoid dropping the differential gear assembly (24).
10. Remove the oil dip stick (22) from the RH transaxle housing (27).
11. Remove the bearing (12) and the 44-tooth reduction gear (36) from the 9-tooth output shaft (37).
12. Remove the 9-tooth output shaft (37) from the RH transaxle housing (27).
13. If the ball bearing (1) was not removed with the LH housing, remove the bearing from the drive shaft (8).

14. Lifting the drive shaft (8) upward, remove the shaft, flat washer (2), gear cluster (3 through 7), flat washer (9), and wave washer (10) as one assembly. Note the flat washer (9) and/or wave washer (10) may fall from the shaft during removal. Slide all washers and gears off the shaft.
15. If necessary, remove the flat washer (9) and spring wave washer (10) which may have fallen from the lower end of the drive shaft (8), and may now rest on top of the 36-tooth bevel gear (11).
16. If the ball bearing (1) was not removed with the LH housing, remove the bearing from the shift shaft assembly (14).

WARNING

The edges of the keyways in the shift shaft are sharp and can cause cuts to the skin. Use care when sliding parts off the shift shaft.

NOTE

If the transaxle was not shifted into neutral, it will be difficult to pull the gears over the shift keys. Hold the shift shaft assembly down when removing the gear cluster.

17. Grasp the gear cluster (29 through 35) and remove from the shift shaft assembly by lifting upward on the largest gear (29).
18. Remove the 36-tooth bevel gear (11) from the RH transaxle housing (27).
19. If the LH axle bearing (23) was not removed with the LH transaxle housing, remove the bearing (23), then remove the differential gear assembly (24) from the RH transaxle housing (27).
20. Remove the hex head cap screw (21) securing the shift arm (25) to the shift shaft assembly (14).
21. Slide the shift arm (25) out of the RH transaxle housing (27). Remove the O-ring (26) from the shift arm assembly (25). Discard the O-ring (26).
22. Remove the shift shaft assembly (14) and the spring wave washer (13). Note that any oil puddled in the RH housing will drain through the shift shaft opening when the shaft is removed.

23. Remove all remaining bearings (1, 12, and 23) from the RH and LH transaxle housings (27 and 28).
24. If not previously removed with the brake assembly, remove and discard the shift shaft seal (1, Fig. 5-33).
25. Remove the shift interlock assembly (see Fig. 5-36) from the RH transaxle housing as follows:



CAUTION

Use caution to avoid driving the spirol pin (9) into the transaxle housing when removing the interlock shift arm (10). With the transaxle disassembled, as it is now, the arm may rotate enough to allow the pin to clear the housing when being driven out. If the pin cannot clear the housing, it must be partially driven out and the protruding end bent away from the housing.

- a. Using a small drift punch, carefully tap the spirol pin (9) out of the interlock shift arm (10) and remove the arm from the interlock shift shaft (17). Discard the spirol pin.

- b. Remove the outer interlock shaft support (12) and flat washer (13) by removing the self-tapping screw (11).
- c. Remove the retaining ring (8) from the shift interlock shaft (17).
- d. Slide the second interlock shaft support (12) and the interlock shaft shim(s) (14 and 15, if used) from the interlock shaft (17).
- e. While holding down the shift interlock (2), remove the self-tapping screw (1), bell washer (7), and interlock shaft support (12) from inside the transaxle housing.
- f. While withdrawing the shift interlock/shift shaft (2 and 17) assembly from the transaxle housing, remove the detent ball (4) and detent spring (5) from the housing.
- g. Remove the shift interlock (2) from the interlock shaft (17) by removing the two socket head cap screws (3).
- h. Remove the O-ring (6) from the interlock shaft (17). Discard and replace the O-ring.

1. Self-Tapping Screw
2. Shift Interlock
3. Socket Head Cap Screw
4. Detent Ball
5. Detent Spring
6. O-Ring
7. Bell Washer
8. Retainer Ring
9. Spirol Pin
10. Interlock Shift Arm
11. Self-Tapping Screw
12. Interlock Shaft Support
13. Flat Washer
14. Interlock Shaft Support Shim
15. Interlock Shaft Support Shim
16. RH Transaxle Housing
17. Shift Interlock Shaft

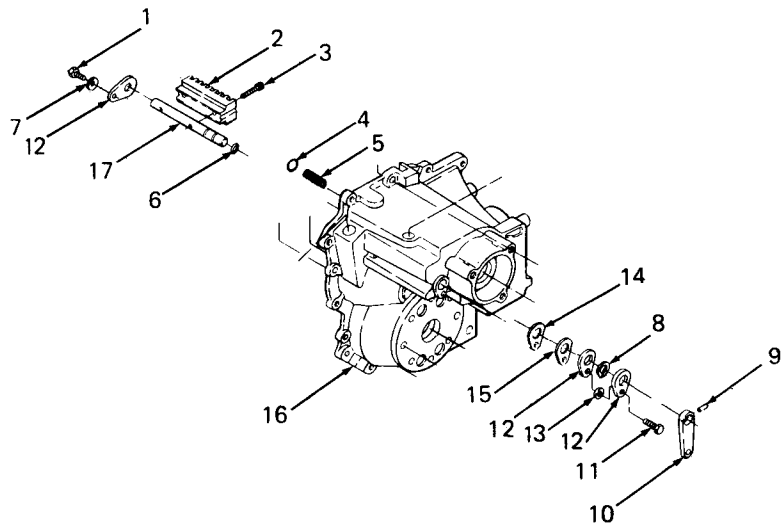


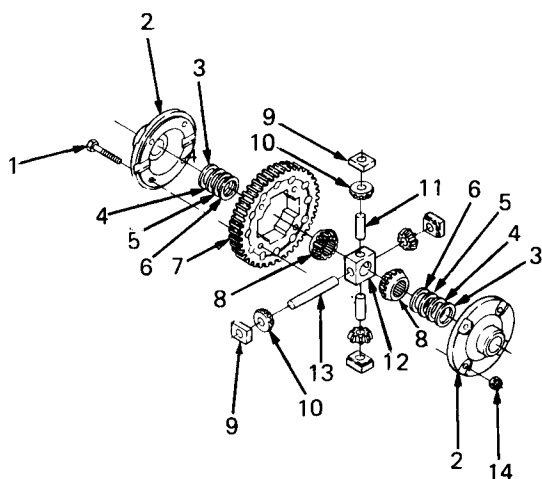
Figure 5-36. Interlock Shift Assembly (Models 2130, 2140 and 2160).



Removal of the shift interlock (2) from the shaft (17), followed by removal of the screw (11) and withdrawal of the shaft/arm (10) assembly from the outside of the housing, is an acceptable alternative *removal* procedure. However, the *Reassembly and shimming* procedure, described later in this paragraph (5-29.7), should be followed regardless of the procedure used to remove the interlock assembly.

5-29.3 Disassembly.

1. Disassemble the differential gear assembly (Fig. 5-37) as follows:
 - a. With differential assembly laying on the cover (2), remove the four hex cap screws (1) and lock nuts (14).



1. Hex Cap Screw
2. Differential Cover
3. Flat Washer
4. Flat Washer
5. Flat Washer
6. Flat Washer
7. Bull Gear, 60-Tooth
8. Differential Side Gear, 14-Tooth
9. Differential Thrust Block
10. Differential Pinion Gear, 10-Tooth
11. Cross Shaft
12. Differential Pinion Block
13. Cross Shaft
14. Hex Lock Nut

Figure 5-37. Differential Gear Assembly.



Flat washers (3 through 6) are shim washers of varying thickness. Generally, a single washer, having the required shim thickness, is positioned between the differential covers (2) and each of the two differential side gears (8).

- b. Remove the upper differential cover (2), upper flat washer (3, 4, 5 or 6), and 14- tooth differential side gear (8).
 - c. Lift the 60-tooth bull gear (7) off the differential pinion block assembly (9 through 13).
 - d. Grasp the differential pinion block assembly (9 through 13) in one hand, then carefully remove the assembly.
 - e. Inspect the pinion block components, as an assembly, for excessive wear, cracks, pitting, and other damage.
 - f. If necessary, separate the four differential thrust blocks (9), four 10-tooth differential pinion gears (10), two cross shafts (11), and one cross shaft (13) from the differential pinion block (12).
 - g. Remove the remaining (lower) 14-tooth differential side gear (8) and flat washer (3, 4, 5, or 6) from the (lower) differential cover (2).
2. Disassemble the shift shaft assembly (Fig. 5-38) as follows:



WARNING

The keyways of the shift shaft have sharp edges which can cause cuts to the skin. Use care when sliding parts off and on the shift shaft.



NOTE

As a guide for reassembly, observe the component orientation during disassembly.

- a. Remove the key shifter arm (6) and spacer (7) from the captured hex cap screw (8) by removing the hex center locknut (4) and flat washer (5).

- b. Slide the shift collar and keys to the neutral detent position on the right end of the shaft, then roll the shift key spring (9) off the spring boss of the three shift keys (10).

NOTE

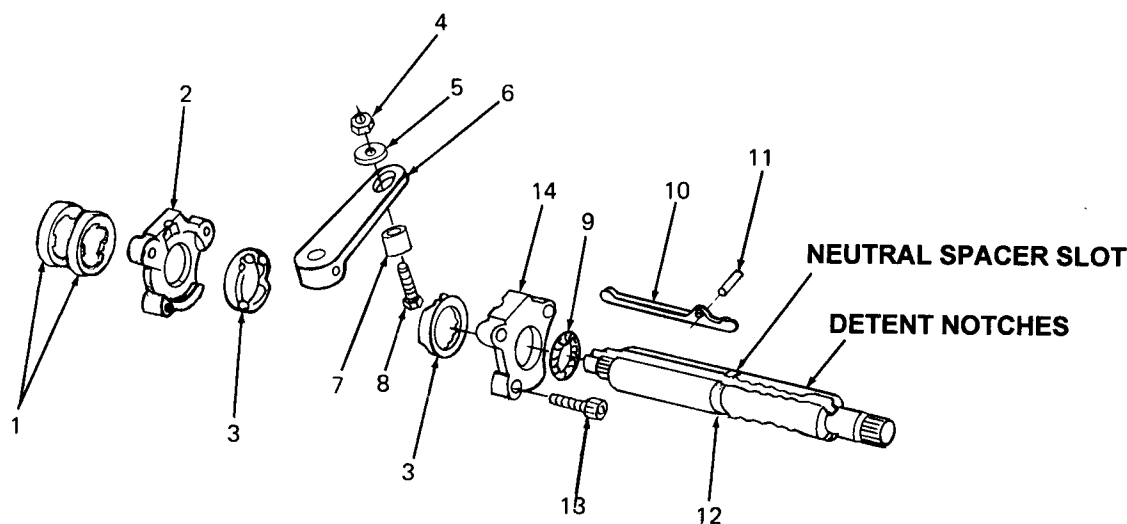
The following steps c. through e. apply only to the original design shift shaft (see paragraph 5-29.1), which should be replaced by the new style shaft. If the transaxle is being repaired per the instructions of Service Bulletin CC-288, no disassembly of the shaft is required.

- c. Remove the set screw from the neutral spacer and slide the spacer off the shaft.
- d. Slide the shift collar/shift key assembly off the left end of the shaft, and remove the keys and dowel pins.
- e. Remove the socket head cap screws to separate the shift collars, shift key spacers, and hex cap screw.

NOTE

The following steps f. through j. apply only to the new style shift shaft (12).

- f. Remove the socket head cap screws (13) that fasten the LH and RH shift collars (2 and 14) together. Separate the collars to remove the hex cap screw (8), then slide the LH shift collar and shift key spacer (3) to the left.
- g. Make certain the dowel pins (11) are centered in the "neutral" detent notches (see Fig. 5-38) of the shift shaft (12); then rotate the RH shift collar (14) until its side opening aligns with the end of the dowel pin that is to be removed, in the direction the pin is to be pushed from the shift key (10).
- h. While cocking the RH shift collar (14) and key spacer (3) so that the end of the dowel pin (11) is free from its spacer notch, lift and push the dowel pin out of the shift key (10). When removing the first dowel pin, it may be



1. Neutral Spacer
2. LH Shift Collar
3. Shift Key Spacer
4. Hex Center Locknut
5. Flat Washer
6. Key Shifter Arm
7. Spacer

8. Hex Head Cap Screw
9. Shift Key Spring
10. Shift Key
11. Dowel Pin
12. Shift Shaft
13. Socket Head Cap Screw
14. RH Shift Collar

Figure 5-38. Shift Shaft Assembly (Models 2130, 2140 and 2160).

necessary to pry the dowel pin end out of the spacer notch. Repeat this procedure (steps g. and h.) to remove the remaining two dowel pins.

- i. Once the three dowel pins have been removed, slide the RH shift collar (14) and shift keys as far toward the right as possible; then rotate each neutral spacer (1) to align its three internal teeth with the keyways of the shift shaft (12), and slide the spacers off the shift shaft.
- j. Slide the LH and RH shift collars (2 and 14), both shift key spacers (3), and the three shift keys (10) off the left end of the shift shaft (12).

5-29.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded or splined areas for damage.
2. Inspect all parts for cracks, scoring, distortion, corrosion, wear, or other damage.
3. Inspect the shift keys (10, Fig. 5-38) for nicks or wear on the gear engagement surfaces. The thrust faces of the keys should be flat, with no taper.
4. Inspect all gears for chipped or missing teeth, and for damaged or worn internal splines.
5. Inspect the recessed key engagement surfaces of the shift gears (29 through 34, Fig. 5-35) for tapered or rounded thrust surfaces.
6. Inspect the bearings (1, 12, and 23, Figure 5-35) for scoring, seizing, or excessive looseness indicating internal wear.
7. Inspect the keyways of the shift shaft (12, Fig. 5-38) for nicks or burrs.
8. Inspect the interlock shift arm (10, Fig. 5-36) for cracks or elongated holes.
9. Inspect the slotted spring pins (19, Fig. 5-35), currently in the lower (RH) transaxle housing (27, Fig. 5-35), for distortion or other damage.
10. Inspect the transaxle housings (27 and 28, Fig. 5-35) for cracks or other damage.
11. Inspect the shift key spring (9, Figure 5-38) for stretching, distortion, or other damage.
12. Inspect the shift interlock (2, Fig. 5-36) for broken or damaged engagement teeth.

5-29.5 Repair.

1. Deburr and dress damaged threads or splines.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace damaged or worn shift keys (10, Fig. 5-38).
4. Replace any shift gears (29 through 34, Fig. 5-35) having worn or tapered thrust surfaces.
5. Replace all chipped or damaged gears.
6. Install a new O-ring (26, Fig. 5-35) onto the end of the shift arm (25, Fig. 5-35).
7. Replace all worn or damaged ball bearings (1, 12, and 23, Fig. 5-35).
8. Replace a distorted or damaged slotted spring pin (19, Fig. 5-35).
9. Replace the O-ring (6, Figure 5-36) on the shift interlock shaft (17, Figure 5-36).
10. Replace a stretched, distorted, or otherwise damaged shift key spring (9, Figure 5-38).
11. Replace damaged or worn spring wave washers (10 and 13, Fig. 5-35).
12. Replace all other parts which cannot be repaired.

5-29.6 Reassembly.



WARNING

The keyways of the shift shaft have sharp edges which can cause cuts to the skin. Use care when sliding parts onto the shift shaft.



NOTE

For reassembly purposes, the distinguishing feature of the RH shift collar is its interlock engagement flange (Fig. 5-39). The detent notches and splines (for brake drum) are on the right hand end of the shift shaft.

1. Reassemble the shift shaft assembly (Fig. 5-38) as follows:
 - a. Install a shift key spacer (3) into the RH shift collar (14).

- b. Holding the gear engagement end of one shift key (10), hang the spacer/RH collar assembly in the collar notch of the key (10). Align the key slot of the spacer (3) with the dowel pin boss of the key.
- c. With a keyway facing upward, hold the shift shaft (12) in the other hand. Slide the key (with spacer and collar) into the keyway on the left end of the shift shaft (see Fig. 5-39). Placing your thumb on the spring boss of the key, position and hold the key/collar assembly on the splined shoulder at the left end of the shaft.
- d. While maintaining thumb pressure on the installed key (10), insert and hold the other two keys in the keyways of the shaft (12). Grasping the collar and keys, lift the collar over the larger shoulder of the shaft and slide the collar and keys fully to the right end of the shaft.
- e. Place the second shift key spacer (3) into the LH shift collar (2). Slide the assembly onto the shift shaft (12) until beyond the ends of the shift keys and to the right of the neutral slot.
- f. Place both neutral spacers (1) together, with the flat face of the three internal teeth touching, and the beveled face of the teeth facing outward.
- g. While holding the neutral spacers (1) together, align the internal teeth with the keyways of the shift shaft (12) and slide the spacers toward the neutral slot of the shaft. When aligned with the neutral slot of the shift shaft (12), rotate each spacer (1) 1/8 turn so the teeth lock in the neutral slot.
- h. Slide the RH collar/key assembly slightly leftward to position the gear engagement surface of the keys inside the neutral spacer (1). This will lock the neutral spacers onto the shaft, and also position the keys for installation of the dowel pins (11).
- i. Align the dowel pin bosses of the shift keys (10) with the "neutral" detent notches of the shaft (12) and the key slots of the spacer (3); then rotate the RH shift collar (14) so its side opening aligns with the dowel pin hole in one of the keys, in the direction from which the dowel pin (11) is to be inserted.

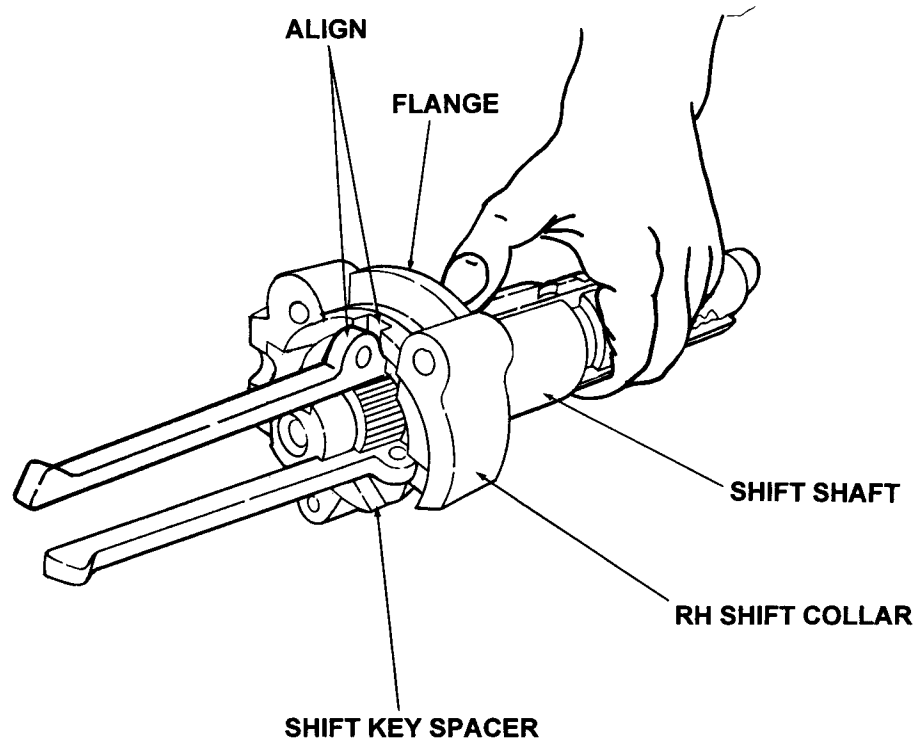


Figure 5-39. Installing Shift Keys (Models 2130, 2140 and 2160).

- j. Hold the aligned right shift key spacer (3) tightly against the RH shift collar (14) and push a dowel pin (11) into the hole of the shift key. Repeat this procedure (steps i. and j.) to install the remaining two dowel pins.

NOTE

When properly installed, the dowel pin (11) will sit within the recessed notch in the face of the shift key spacer (3).

- k. Place the head of the hex head cap screw (8) inside the hex recess of the RH shift collar (14).
 - l. Slide the LH and RH shift collars (2 and 14) together, capturing the hex head cap screw (8) in the recesses and half-circle notches of the shift collars. Install the three socket head cap screws (13) in the RH shift collar (14) and tighten to secure the shift collars together.
 - m. Roll the shift key spring (9) onto the end of the shift keys and position in the V notches of the keys (10).
 - n. Place the spacer (7) on the hex cap screw (8) protruding from the shift collar assembly.
 - o. With the shouldered hub of the key shifter arm (6) facing down toward the shift shaft, position the oblong hole of the arm onto the spacer and secure with the flat washer (5) and hex center locknut (4).
2. Reassemble the differential gear assembly (Fig. 5-37) as follows :

NOTE

If any items in the differential gear assembly (1 through 14) have been replaced, inspection will be necessary to determine the thickness of the shim washers needed to provide proper side play of the differential side gears (8). Four shim washers (3, 4, 5, and 6) of varying thickness are available. Use original shim washers (3, 4, 5, or 6) as a starting point. *Both* shim washers are normally the same thickness. In most cases, the existing shim washers will be re-used.

- a. Place one of the differential covers (2) on a flat surface, hub side down.

- b. Place the existing shim washer (3, 4, 5, or 6) into the center of the differential cover (2).
- c. Place one 14-tooth differential side gear (8), with the gear teeth facing upward, on the shim washer (3, 4, 5, or 6).
- d. If disassembled, assemble the cross shaft (13), two short cross shafts (11), four 10-tooth differential pinion gears (10), and four differential thrust blocks (9), onto the differential pinion block (12).

NOTE

Assemble each differential pinion gear (10) with the gear teeth facing inward. Assemble each differential thrust block (9) with the flat side against the pinion gear (10) and the beveled side outward.

- e. Grasp the differential pinion block assembly (9 through 13) in one hand, then carefully center the assembly on the differential cover (2). Ensure that the longer edge of each differential thrust block (9) rests on the differential cover (2).
- f. Aligning the rectangular internal recesses of the bull gear (7) with the differential thrust blocks (9), carefully place the 60-tooth bull gear (7) over the pinion block assembly (9 through 13) until it rests on the differential cover (2).
- g. Place the remaining 14-tooth differential side gear (8), with gear teeth facing downward, on the four differential pinion gears (10). Ensure that the teeth of the differential side gear (8) mesh with the teeth of the four differential pinion gears (10).
- h. Place the remaining shim washer (3, 4, 5, or 6) on the 14-tooth differential side gear (8) and install the second differential cover (2).
- i. Align the four mounting holes of each differential cover (2) with those of the 60-tooth bull gear (7). Ensure that each differential cover (2) is seated inside the shallow recess in each face of the 60-tooth bull gear (7).
- j. Secure both differential covers (2) and the 60-tooth bull gear (7) together using the four hex cap screws (1) and hex lock nuts (14). Torque the screws to 190-210 in. lbs.



CAUTION

Both differential side gears (8) should have nearly equal side play (approx. .010 to .015 in.). To check side play, insert a finger into one differential side gear (8), through the hole of the differential cover (2). Moving the side gear in and out, feel for a minimal side play of the gear (8). If there is no side play, replace *both* shim washers (3, 4, 5, or 6) with a thinner set. If the movement is excessive (greater than .015 inch), replace *both* shim washers (3, 4, 5, or 6) with a thicker set. Check the other side gear for nearly equal side play. An excessive variation could indicate wear of one of the covers and/or differential side gears. Disassemble and reinspect the component parts.

5-29.7 Installation.

1. Install the shift interlock assembly in the RH transaxle housing as follows (see Fig. 5-36):
 - a. Install the new O-ring (6) in the innermost groove of the interlock shaft (17).
 - b. After applying a small dab of Loctite 242 to the threads of the socket head cap screws (3), position the shift interlock (2) on the interlock shaft (17) and secure with the socket head cap screws.
 - c. Install and *hold* the detent spring (5) and ball (4) in the small hole adjacent to the interlock shaft hole of the transaxle housing.
 - d. Lubricate the O-ring (6) and partially insert the interlock shaft into the hole in the housing. Use care to avoid damage to the O-ring.
 - e. Align the shift interlock with the detent ball, then press and *hold* the interlock assembly fully into the transaxle housing.
 - f. While continuing to hold the interlock assembly, install the interlock shaft support (12) inside the housing and secure with the bell washer (7) and self-tapping screw (1).



NOTE

In most cases, the shim(s) removed from the interlock assembly during disassembly will be the correct thickness needed to shim the interlock when reassembling, regardless of whether com-

ponent parts have been replaced. *However, it is recommended that completion of the interlock installation be delayed until after the transaxle is completely assembled, and engagement of the interlock can be tested.*

2. Referring to Fig. 5-35, install the bearings (1, 12, and 23) into the corresponding holes of the RH transaxle housing (27).
3. Place the spring wave washer (13) on the end of the shift shaft (14) having splines at the extreme end. Insert the shift shaft assembly (14), with spring wave washer (13), into the bearing (12) installed in the RH transaxle housing (27).
4. Lubricate the new O-ring (26), then install the shift arm (25) through the corresponding bore of the RH transaxle housing and into the key shifter arm of the shift shaft assembly (14). Use care to prevent damage to the O-ring.
5. With the shift arm (25) pointing toward the right/rear and the shift shaft assembly shifted into the "neutral" position, align the holes of the shift arm (25) and the key shifter arm of the shift shaft assembly (14).
6. After applying Loctite 242 to the threads of the screw, secure the shift arm in the key shifter arm with the hex head cap screw (21).
7. Install the differential gear assembly (24) on the RH axle and/or bearing (23) in the RH transaxle housing (27). Place the remaining bearing (23) on the differential gear assembly (24).
8. Place the 36-tooth bevel gear (11) on top of the bearing (1) in the RH transaxle housing. Ensure that the teeth of the bevel gear (11) face upward.
9. With the shift keys in the "neutral" position, install the gears (29 through 35) on the shift shaft assembly (14) in order of descending diameter; the largest diameter gear (29) is installed first, and the smallest diameter gear (35) is installed last. The face of each gear (29 through 34) having the key engagement recesses must face upward.
10. Slide the flat washer (9), then the spring wave washer (10), onto the end of the drive shaft (8).
11. Holding the flat washer (9) and spring wave washer (10) on the drive shaft (8), insert the fine-splined end of the drive shaft (8) into the 36-tooth bevel gear (11).
12. Install the drive gears (3 through 7) then the flat washer (2), onto the drive shaft (8).

NOTE

The drive shaft (8) must spring up and down slightly when pressed. If it does not, check that the spring wave washer is installed. Re-install or replace the wave washer as necessary.

13. Insert the non-splined end of the 9-tooth output shaft (37) into the bearing (12) installed in the RH transaxle housing. Make certain the gear teeth of the shaft engage the differential bull gear.
14. Install the 44-tooth reduction gear (36) and ball bearing (12) on the 9-tooth output shaft (37).
15. Place a ball bearing (1) on both the drive shaft (8) and the shift shaft assembly (14).
16. Replace the dipstick (22) into the port of the RH transaxle housing (27).
17. Install the oil drain plug (15) into the threaded hole in the bottom of the LH transaxle housing (28).
18. Apply a 1/8 inch bead of ultra grey sealant on the mating surface of the RH transaxle housing (27).

NOTE

If the LH axle/axle housing was not removed prior to splitting the transaxle, hold the LH transaxle housing in position above the RH housing and insert the axle through the ball bearing (23), into the side gear of the differential assembly (24). It may be necessary to turn the axle to align the splines.

19. Aligning all mounting holes, lower the LH transaxle housing (28) onto the RH transaxle housing (27), then press together. If the LH axle was removed, use care to avoid displacing the ball bearing (23) that is resting on the differential assembly (24).
20. Install the fifteen self-tapping screws (18) to fasten the LH transaxle housing (28) to the RH housing (27). Tighten the screws (18) only until snug, do not completely tighten the screws now.
21. Carefully drive the two spring pins (19) up into the LH transaxle housing. If replaced, drive the new

spring pins into the proper holes (larger) at the top and bottom of the housings.

22. Install the two hex cap screws (16), four flat washers (17), and two top locknuts (20) in the two alignment through holes of the transaxle housings (27 and 28). Torque the screws to 90 - 120 inch-pounds.
23. In an alternating pattern, tighten, then torque the fifteen self-tapping screws (18) to 90 - 120 inch pounds.
24. Complete the installation of the shift interlock assembly (Fig. 5-36) as follows:
 - a. Move the shift arm (25, Fig. 5-35) fully rearward to shift the transaxle into the neutral speed setting. Using the shift arm to feel for detent, position the dowel pins (and shift collar) in the *center* of the detent notches (Fig. 5-38) of the shift shaft (12).
 - b. Slide the previously removed interlock shaft shims (14 and 15, Fig. 5-36) and inner shaft support (12) onto the shift interlock shaft (17), and hold tightly against the RH transaxle housing.
 - c. Inserting a small drift punch (or similar tool) into the pin hole of the interlock shaft, rotate the shaft in either direction to engage the shift interlock (2) with the shift collar flange. If the interlock cannot be engaged, pull the interlock shaft slightly outward from the transaxle housing until engagement without interference is possible.
 - d. Holding the shaft in this position, observe whether the retaining ring groove is *not* completely visible beyond the shaft support (and shims), or whether there is space between the support and ring groove.
 - e. Remove, add, or replace shims as necessary to position the inner shaft support at, or very near, the inside edge of the retaining ring groove.
 - f. Install the retaining ring (8) in the ring groove of the interlock shaft, and align the inner support and shim(s) with the screw hole in the transaxle housing. Retest the interlock engagement and adjust shims if necessary.
 - g. Insert the self-tapping screw (11) into the outer interlock shaft support (12), then the flat washer (13).

- h. While placing the outer shaft support on the interlock shaft, insert the self-tapping screw (with washer) through the inner support and support shim(s), and screw into the RH transaxle housing.
 - i. With the arm pointing downward, position the interlock shift arm (10) on the interlock shaft and secure with a new spirol pin (9).
25. Wrap or sleeve the splines of the shift shaft, then press the new shift shaft seal (1, Fig. 5-33) into the RH transaxle housing. Use care to prevent damage to the seal.
 26. If removed, install the axles and axle housings per paragraph 5-28.7.
 27. Install the input pinion, clutch assembly, and interlock linkage per paragraph 5-24.7.
 28. Install the brake assembly per paragraph 5-27.7.
 29. Install the transaxle assembly on the tractor per paragraph 5-26.7.

5-30 HYDROSTATIC TRANSAXLE (Models 2135, 2145, 2165, and 2185).

5-30.1 General. It is not necessary to remove the axle housings or axles prior to disassembly of the transaxle housing assembly internal components.

5-30.2 Removal.

1. Remove the transaxle from the tractor per paragraph 5-26.2 and remove the brake assembly from the transaxle per paragraph 5-27.2.



WARNING

Observe all applicable local and federal laws regulating the proper disposal of the drained oil.

2. If not previously removed, remove the oil drain plug (23, Fig. 5-40) from the bottom of the LH transaxle housing (21). Allow the oil to completely drain into a suitable container.
3. Remove the oil filter, hydro transmission, and input pinion from the transaxle per paragraph 5-25.2

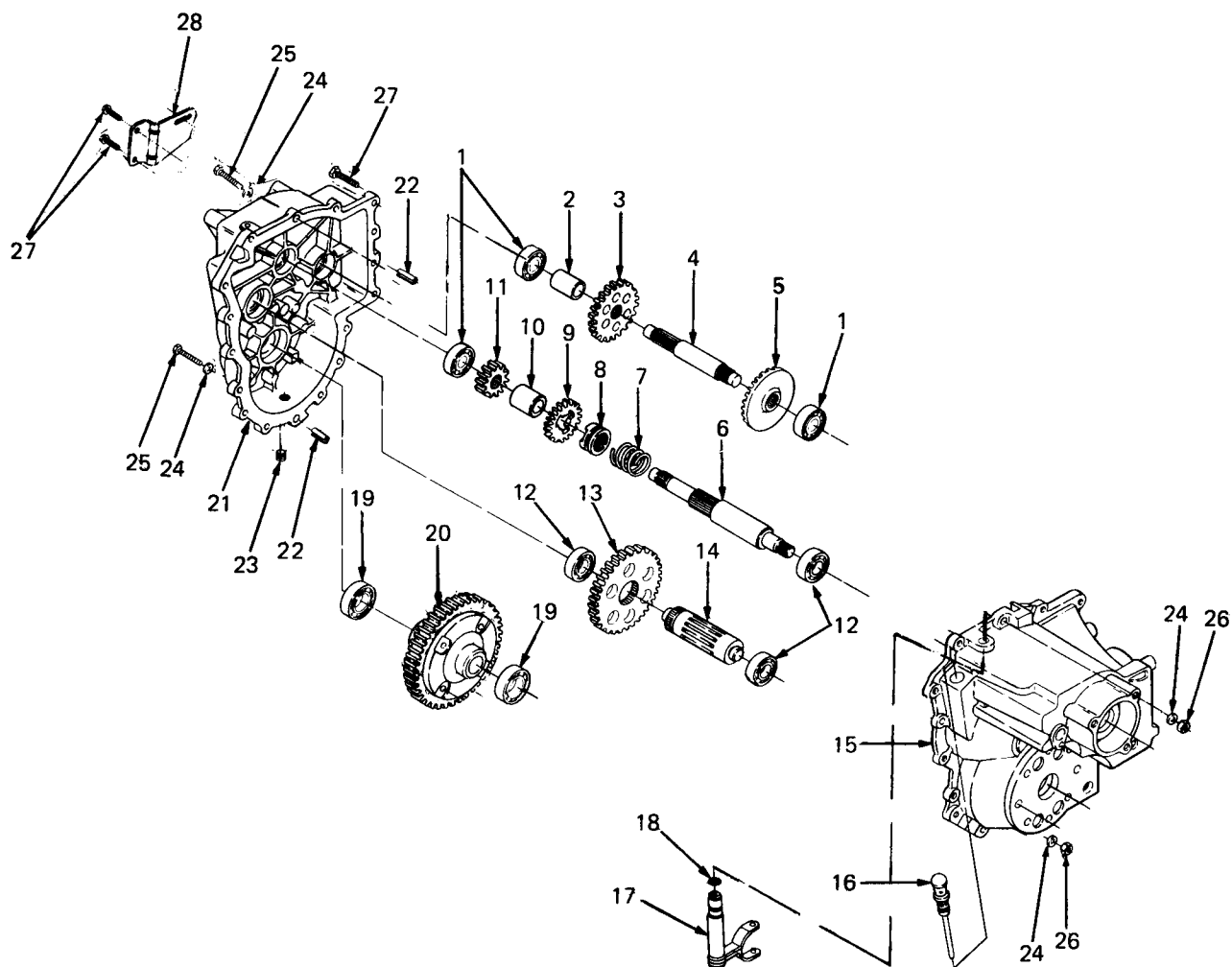
4. If the axle housings have *not* been previously removed, secure the transaxle in a bench vise (or equivalent device), with the shorter axle housing facing upward. If the axle housings *have* been previously removed, place the transaxle on a workbench, with the LH transaxle housing (21) facing upward. Support the housing using a wood block (or equivalent support).
5. Remove the two through hex cap screws (25), four flat washers (24), and two top locknuts (26) from the two alignment holes of the transaxle housings (15 and 21).
6. Using a drift punch (or equivalent tool) and a soft-headed mallet, drive both slotted spring pins (22) into the lower (RH) transaxle housing (15). It is not necessary to remove the slotted spring pins (22) completely.
7. Remove the two self-tapping hex screws (27) securing the neutral bracket (28) to the transaxle housings (15 and 21). Remove the neutral bracket (28), then remove the remaining 13 self-tapping hex screws (27) securing the LH transaxle housing (21) to the RH transaxle housing (15).



CAUTION

When separating the two transaxle housing halves, use care to avoid damage to the machined mating surfaces.

8. Using a nylon or wood dowel (or equivalent tool) and a soft-headed mallet, carefully tap the recessed knock-off areas of the LH transaxle housing (21), adjacent to the two alignment holes, to separate it from the RH transaxle housing (15).
9. Remove the LH transaxle housing (21). If the LH axle was not removed, lift the transaxle housing directly upward to free the axle from the differential gear assembly (20). Use care to avoid dropping the differential gear assembly.
10. Remove the oil dipstick (16) from the RH transaxle housing (15).
11. Remove the bearings (1) from the drive shaft (4) and the shifter shaft (6). Remove the bearing (12) from the 9-tooth output shaft (14). Remove the bearing (19) from the differential gear assembly (20). To aid reassembly, place the bearings in the corresponding holes of the removed LH transaxle housing.



- | | |
|---------------------------|--------------------------------|
| 1. Ball Bearing | 15. RH Transaxle Housing |
| 2. Spacer | 16. Oil Dipstick |
| 3. Drive Gear, 27-Tooth | 17. Shift Yoke Assembly |
| 4. Drive Shaft | 18. O-Ring |
| 5. Bevel Gear, 36-Tooth | 19. Ball Bearing |
| 6. Shifter Shaft | 20. Differential Gear Assembly |
| 7. Compression Spring | 21. LH Transaxle Housing |
| 8. Drive Collar | 22. Slotted Spring Pin |
| 9. Shift Gear, 18-Tooth | 23. Oil Drain Plug |
| 10. Spacer | 24. Flat Washer |
| 11. Spur Gear, 16-Tooth | 25. Hex Cap Screw |
| 12. Ball Bearing | 26. Hex Toplock Nut |
| 13. Spur Gear, 42-Tooth | 27. Self Tapping Screw |
| 14. Output Shaft, 9-Tooth | 28. Neutral Bracket |

Figure 5-40. Hydrostatic Transaxle (Models 2135, 2145, 2165 and 2185).

12. Remove the 42-tooth spur gear (13) from the 9-tooth output shaft (14).
13. Remove the spacer (2), then the 27-tooth drive gear (3), from the drive shaft (4).
14. Remove the 16-tooth spur gear (11), spacer (10), and 18-tooth shift gear (9) from the shifter shaft (6).
15. Remove the 9-tooth output shaft (14) and the bearing (12) from the RH transaxle housing (15).
16. Remove the differential gear assembly (20) from the RH transaxle housing (and RH axle, if not removed).
17. Remove the drive shaft (4) from the 36-tooth bevel gear (5), then remove the 36-tooth bevel gear (5) and the bearing (1) from the RH transaxle housing (15).
18. While rotating the shift yoke assembly (17) upward, slide the drive collar (8) from the shifter shaft (6).
19. Rotate the shift yoke assembly (17) to clear the shifter shaft (6), then slide the shift yoke assembly (17) out of the RH transaxle housing (15). Remove and discard the O-ring (18).
20. Remove the compression spring (7) from the shifter shaft (6).
21. Remove the shifter shaft (6) and the bearing (12) from the RH transaxle housing. Note that any oil puddled in the RH housing will drain through the shift shaft opening when the shaft is removed.
22. If not previously removed with the brake assembly, remove and discard the shift shaft seal (1, Fig. 5-33).
23. Remove the bearing (19) from the RH axle and/or RH transaxle housing (15).

5-30.3 Disassembly.

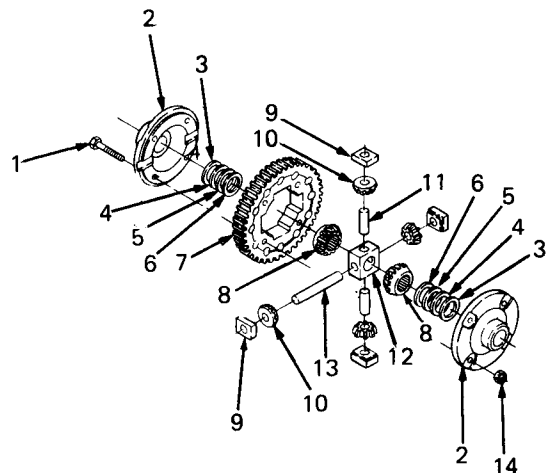
1. With differential assembly laying on the cover (2), remove the four hex cap screws (1) and lock nuts (14).



Flat washers (3 through 6) are shim washers of varying thickness. Generally, a single washer, having the required shim thickness, is positioned

between the differential covers (2) and each of the two differential side gears (8).

2. Remove the upper differential cover (2), upper flat washer (3, 4, 5 or 6), upper 14-tooth differential side gear (8).
3. Lift the 60-tooth bull gear (7) off the differential pinion block assembly (9 through 13).
4. Grasp the differential pinion block assembly (9 through 13) in one hand, then carefully remove the assembly.
5. Inspect the pinion block components, as an assembly, for excessive wear, cracks, pitting, and other damage.
6. If necessary, separate the four differential thrust blocks (9), four 10-tooth differential pinion gears (10), two cross shafts (11), and one cross shaft (13) from the differential pinion block (12).



1. Hex Cap Screw
2. Differential Cover
3. Flat Washer
4. Flat Washer
5. Flat Washer
6. Flat Washer
7. Bull Gear, 60-Tooth
8. Differential Side Gear, 14-Tooth
9. Differential Thrust Block
10. Differential Pinion Gear, 10-Tooth
11. Cross Shaft
12. Differential Pinion Block
13. Cross Shaft
14. Hex Lock Nut

Figure 5-41. Differential Gear Assembly.

7. Remove the remaining (lower) 14-tooth differential side gear (8) and flat washer (3, 4, 5, or 6) from the (lower) differential cover (2).

5-30.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded or splined areas for damage.
2. Inspect all parts for cracks, scoring, distortion, corrosion, wear, or other damage.
3. Inspect all gears for chipped, missing, or excessively worn teeth, and for damaged or worn internal splines.
4. Inspect the compression spring (7) for stretching, distortion, or other damaged.
5. Inspect the bearings (1, 12, and 19) for scoring, seizing, or excessive looseness, indicating internal wear.
6. Inspect the slotted spring pins (22), currently in the lower (RH) transaxle housing (15), for distortion or other damage.
7. Inspect the shift yoke (17) for distortion of the yoke arms and worn or missing pins.
8. Inspect the differential housings (15 and 21) for cracks or other damage.
9. Inspect the lugs of the drive collar (8) and the corresponding drive notches of the shift gear (9) for tapered or rounded thrust surfaces. Replace if excessively worn.

5-30.5 Repair.

1. Deburr and dress damaged threads or splines.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Replace a stretched, distorted, or otherwise damaged compression spring (7).
4. Replace an excessively worn or damaged bearing (1, 12, or 19).
5. Replace a distorted or damaged slotted spring pin (22).
6. Replace a cracked or damaged transaxle housing (15 or 21).
7. Remove all sealant from the mating surfaces of the transaxle housings (15 or 21), then clean all mating surfaces.

8. Replace any non-repairable component with a new component.

5-30.6 Reassembly.



If any items in the differential gear assembly (1 through 14) have been replaced, inspection will be necessary to determine the thickness of the shim washers needed to provide proper side play of the differential side gears (8). Four shim washers (3, 4, 5, and 6) of varying thickness are available. Use original shim washers (3, 4, 5, or 6) as a starting point. *Both* shim washers are normally the same thickness. In most cases, the existing shim washers will be re-used.

1. Place one of the differential covers (2) on a flat surface, hub side down.
2. Place the existing shim washer (3, 4, 5, or 6) into the center of the differential cover (2).
3. Place one 14-tooth differential side gear (8), with the gear teeth facing upward, on the shim washer (3, 4, 5, or 6).
4. If disassembled, assemble the cross shaft (13), two cross shafts (11), four 10-tooth differential pinion gears (10), and four differential thrust blocks (9), onto the differential pinion block (12).



Assemble each differential pinion gear (10) with the gear teeth facing inward. Assemble each differential thrust block (9) with the flat side inward, against the pinion gear (10), with the beveled side outward.

5. Grasp the differential pinion block assembly (9 through 13) in one hand, then carefully place the assembly on the differential cover (2). Ensure that the longer edge of each differential thrust block (9) rests on the differential cover (2).
6. Aligning the rectangular internal recesses of the bull gear (7) with the differential thrust blocks (9), carefully place the 60-tooth bull gear (7) over the pinion block assembly (9 through 13) until it rests on the differential cover (2).

7. Place the remaining 14-tooth differential side gear (8), with gear teeth facing downward, on the four differential pinion gears (10). Ensure that the teeth of the differential side gear (8) mesh with the teeth of the four differential pinion gears (10).
8. Place the remaining shim washer (3, 4, 5, or 6) on the differential side gear (8) and install the second differential cover (2).
9. Align the four mounting holes of each differential cover (2) with those of the 60-tooth bull gear (7). Ensure that each differential cover (2) is seated inside the shallow recess in each face of the 60-tooth bull gear (7).
10. Secure both differential covers (2) and the 60-tooth bull gear (7) together using the four hex cap screws (1) and hex lock nuts (14). Torque the screws to 190-210 in. lbs.



CAUTION

Both differential side gears (8) should have nearly equal side play (approx. .010 to .015 in.). To check side play, insert a finger into one differential side gear (8), through the hole of the differential cover (2). Moving the side gear in and out, feel for a minimal side play of the gear (8). If there is no side play, replace *both* shim washers (3, 4, 5, or 6) with a thinner set. If the movement is excessive (greater than .015 inch), replace *both* shim washers (3, 4, 5, or 6) with a thicker set. Check the other side gear for nearly equal side play. An excessive variation could indicate wear of one of the covers and/or differential side gears. Disassemble and reinspect the component parts.

5-30.7 Installation.

1. Install the bearings (1, 12, and 19) into the corresponding holes of the RH transaxle housing (15).
2. Install the shorter, single-splined end of the shifter shaft (6) into the corresponding bearing (12) installed in the RH transaxle housing (15).
3. Slide the compression spring (7) onto the shifter shaft (6).
4. Install a new O-ring (18) onto the shift yoke (17) and lubricate the O-ring.
5. From inside the RH transaxle housing (15), slide the shift yoke (17) shaft into the corresponding bore of the RH transaxle housing (15). Use care to prevent damage to the O-ring.
6. Rotate the shift yoke (17) slightly upward and away from the shift shaft (6).
7. With the drive lugs facing upward, slide the drive collar (8) partially onto the shifter shaft (6). While lowering the drive collar onto the shaft, rotate the shift yoke (17) to engage the pins of the yoke in the slot of the drive collar; then slide the drive collar (8) fully downward onto the compression spring (7).
8. Replace the oil dipstick (16) into the corresponding bore of the RH differential housing (15).
9. Place the 36-tooth bevel gear (5) on top of the bearing (1) in the RH transaxle housing. Ensure that the teeth of the bevel gear (5) face upward.
10. Install the shorter-splined end of the drive shaft (4) into the bevel gear (5).
11. Install the differential gear assembly (20) onto the RH axle and bearing (19) in the RH transaxle housing (15). If the axles were removed, position the differential assembly on the bearing (19) in the transaxle housing.
12. Install the non-splined end of the 9-tooth output shaft (14) into the bearing (12) installed in the RH transaxle housing (15). Ensure that the gear teeth of the output shaft (14) engage the teeth of the differential gear assembly (20).
13. With the recessed notches facing downward, slide the 18-tooth shift gear (9) onto the shifter shaft (6), then install the spacer (10) and 16 tooth spur gear (11) on the shaft (6).
14. Slide the 27-tooth drive gear (3) onto the drive shaft (4), engaging the teeth with those of the 18-tooth shift gear (9).
15. Slide the spacer (2) onto the drive shaft (4).
16. Slide the 42-tooth spur gear (13) onto the 9-tooth output shaft (14), engaging the teeth with those of the 16-tooth spur gear (11).
17. Position the ball bearing (19) on the hub of the differential gear assembly (20).
18. Install the bearings (1) onto the ends of the drive shaft (4) and shifter shaft (6). Install the bearing (12) onto the end of the 9-tooth output shaft (14).

19. Replace the oil drain plug (23) into the threaded hole in the bottom of the LH transaxle housing (21).
20. Apply a 1/8 inch bead of ultra grey sealant on the mating surface of the RH transaxle housing (15).
21. If the LH axle/axle housing was not removed prior to splitting the transaxle, hold the LH transaxle housing in position above the RH housing and insert the axle through the ball bearing (23), into the side gear of the differential assembly (24). It may be necessary to turn the axle to align the splines.
22. Aligning all mounting holes, lower the LH transaxle housing (21) onto the RH transaxle housing (15), then press together. If the LH axle was removed, use care to avoid displacing the ball bearing (19) that is resting on the differential assembly (20).
23. With the offset facing inward, position the neutral bracket (28) on the lower left front mounting holes of the of the transaxle. Secure with two self tapping hex screws (27), tightened finger tight only.
24. Install the remaining thirteen self tapping screws (27) to fasten the LH transaxle housing (21) to the RH housing (15). Tighten the screws (27) only until snug, DO NOT completely tighten the screws now.
25. Carefully drive the two spring pins (22) up into the LH transaxle housing. If replaced, drive the new spring pins into the proper holes (larger) at the top and bottom of the housings.
26. Install the two hex cap screws (25), four flat washers (24), and two top locknuts (26) in the two alignment through-holes of the differential housings (15 and 21). Torque the screws to 90-120 inch-pounds.
27. In an alternating pattern, tighten, then torque the fifteen self-tapping screws (27) to 90-120 inch pounds.
28. Wrap or sleeve the splines of the shift shaft (6), then press the new shift shaft seal (1, Fig. 5-33) into the RH transaxle housing. Use care to prevent damage to the seal.
29. If removed, install the axles and axle housings per paragraph 5-28.7.

30. Install the input pinion, hydro transmission, and oil filter per paragraph 5-25-7.
31. Install the brake assembly per paragraph 5-27.7
32. Install the transaxle assembly on the tractor per paragraph 5-26.7.

5-31 ENGINE AND MUFFLER REMOVAL (All Models).

5-31.1 General. This paragraph covers *only* the removal and installation of the engine. Refer to the appropriate Engine Service Manual, listed in Appendix A, for information regarding the disassembly, inspection and repair procedures necessary to service the engine.

5-31.1.1 Although different engine models are used, the basic removal procedure is the same for all tractor models. Figure 5-44 shows the engine and muffler mounting hardware for the Models 2130, 2135, 2140 and 2145, with the different fasteners of Models 2140 and 2145 shown in the insets. Figure 5-45 shows the Models 2160, 2165 and 2185.

5-31.2 Removal.



WARNING

Place the tractor on a firm and level surface and chock the wheels before beginning the engine removal procedures.



WARNING

Do not attempt to remove the engine or muffler when the engine is hot. If the tractor was recently operated, let the engine cool before beginning removal.

1. To prevent arcing, disconnect the battery per paragraph 5-4.2 or 5-5.2.
2. Remove the side panels per paragraph 5-3.2.
3. Remove the hood and grille as one assembly per paragraph 5-3.2.

NOTE

Prior to disconnecting the control cables from the engine, note the hole location of each cable before removing from the engine throttle and choke arms. Improper re-installation will affect engine performance.

4. Disconnect the throttle and choke cables from the engine by removing the screws and cable clamps (Fig. 5-42) securing the cables to the engine.
5. Disconnect all wire harness and battery connections (Fig. 5-43) from the engine per paragraph 5-4.2 or 5-5.2.

WARNING

Gasoline is very flammable. Remove all sources of ignition before disconnecting the fuel line. Use a suitable container to catch leaking fuel.

6. Disconnect the engine fuel line from the fuel filter. Plug or cap the fuel filter and secure in a position higher than the fuel tank (such as the top of bulk-head) to prevent fuel from leaking.

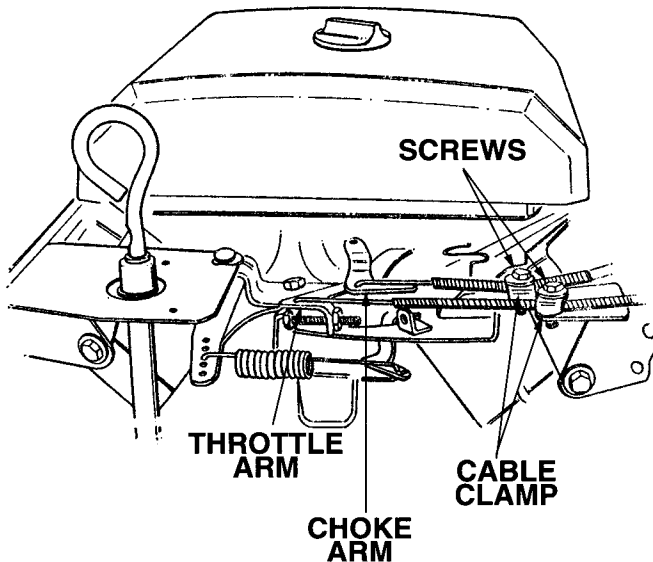


Figure 5-42. Engine Control Cables (Model 2185 shown).

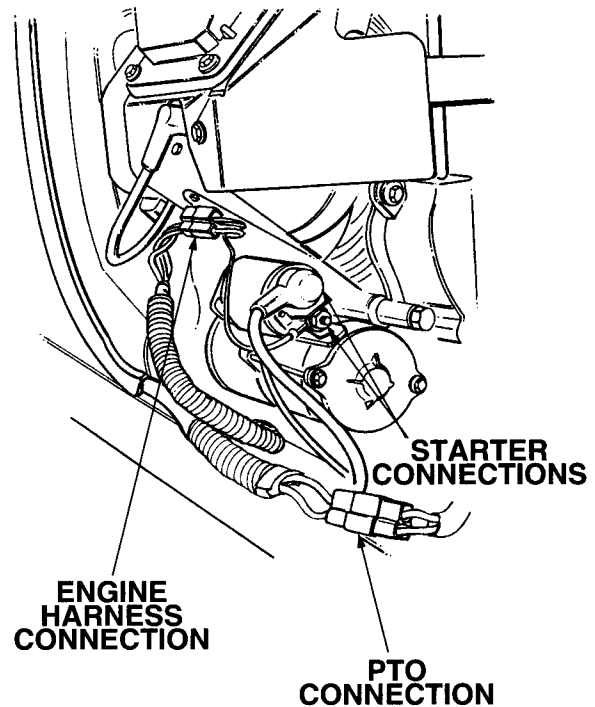


Figure 5-43. Wire Harness Connections (Model 2185 Shown).

7. Disconnect the drive shaft from the engine per paragraph 5-22.2 or 5-23.2.
8. Remove the muffler (1, Fig. 5-44 and 5-45) by removing the three hex flange top lock nuts (7). Where used, separate the spark arrestor (2) from the muffler.

NOTE

The following step 9. applies only to Model 2185.

9. Remove the LH and RH heat baffles (12 and 13, Fig. 5-45) from the engine and throttle control bracket by removing the truss mach. tapp screw (14), hex cap screws (16) and flat washers (15). Note the location of the fuel line clamp when removing the LH baffle.
10. Remove the exhaust tube (3, Fig. 5-44 and 5-45) and exhaust gasket(s) (4) by removing the socket hd. cap screws (6, Models 2140, 2145, 2160 and 2165) or the hex flange nuts (5, Models 2130, 2135 and 2185). Discard and replace the gasket(s).

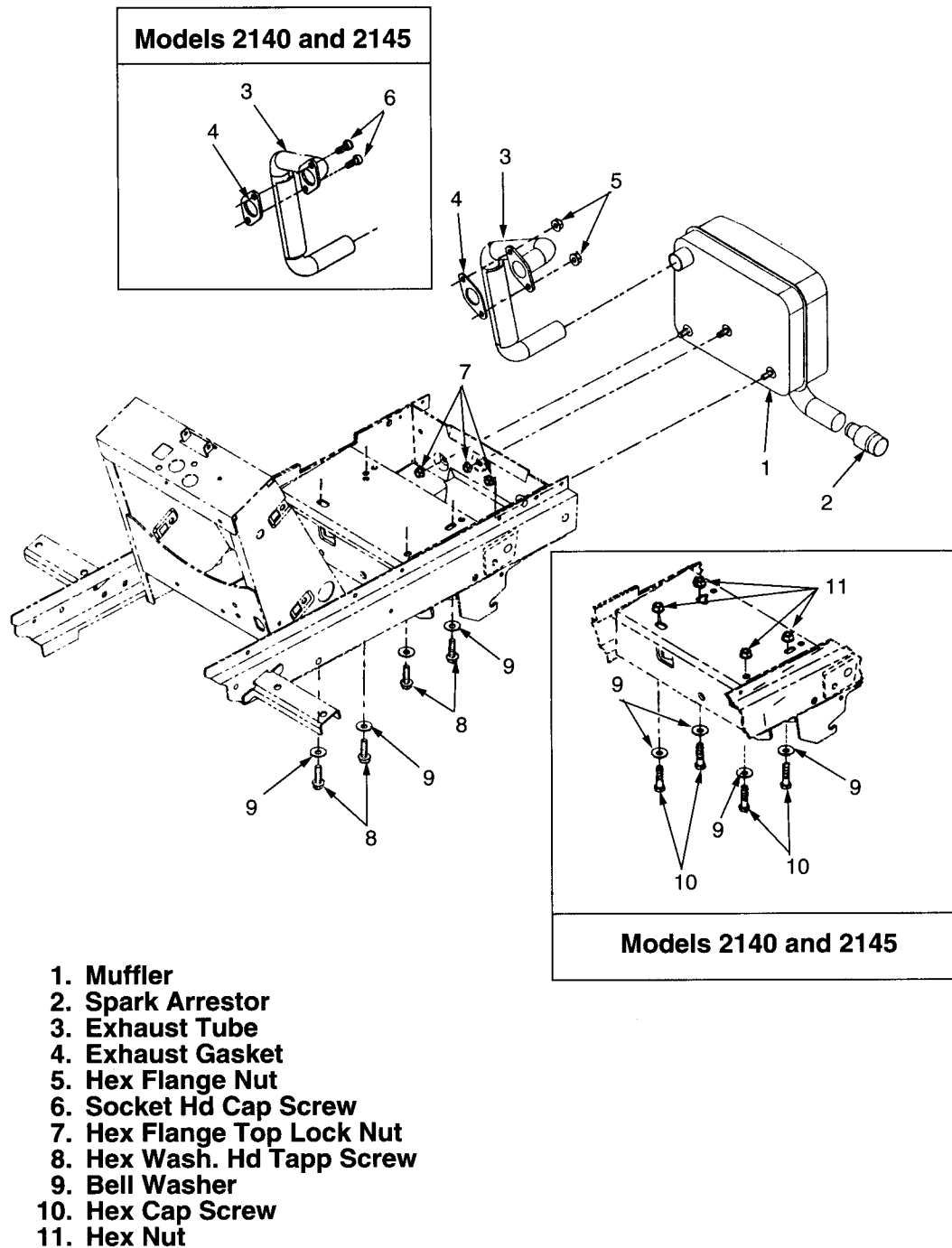
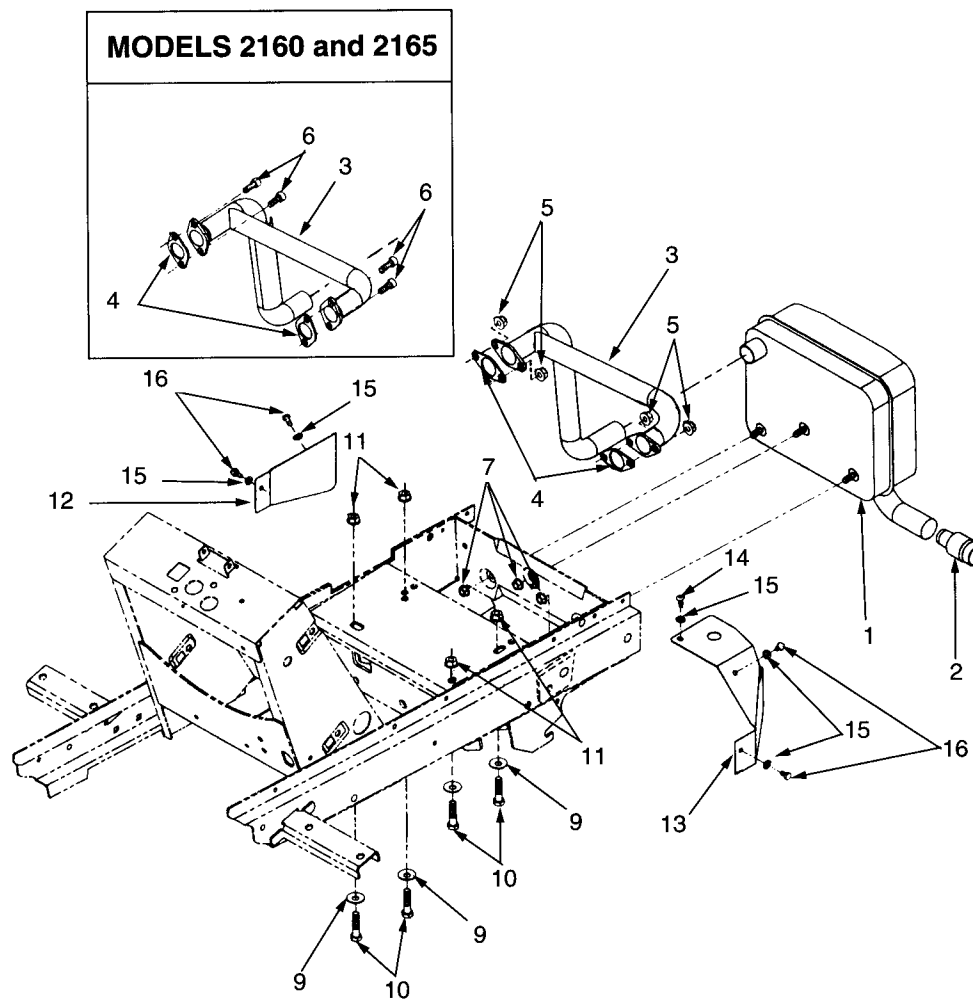


Figure 5-44. Engine and Muffler Mounting (Models 2130, 2135, 2140 and 2145).



1. Muffler
2. Spark Arrestor
3. Exhaust Tube
4. Exhaust Gasket
5. Hex Flange Nut
6. Socket Hd. Cap Screw
7. Hex Flange Top Lock Nut
8. Not used on these Models
9. Bell Washer
10. Hex Cap Screw
11. Hex Nut
12. LH Heat Baffle (Model 2185 only)
13. RH Heat Baffle (Model 2185 only)
14. Truss Mach. Tapp Screw (Model 2185 only)
15. Flat Washer (Model 2185 only)
16. Hex Cap Screw (Model 2185 only)

Figure 5-45. Engine and Muffler Mounting (Models 2160, 2165 and 2185).

NOTE

Removal of the PTO clutch in the following step 10. may be performed now or after removal of the engine.

11. Remove the PTO clutch from the engine per paragraph 5-6.2 or 5-7.2.
12. For Models 2130 and 2135, remove the hex wash. hd. tapp screws (8, Fig. 5-44) and bell washers (9) securing the engine to the frame. Discard the bell washers.
13. For Models 2140, 2145, 2160, 2165 and 2185, remove the hex nuts (11), hex cap screws (10) and bell washers (9) securing the engine to the frame. Discard the bell washers.

WARNING

Use a suitable lifting device, with a minimum capacity of 150 pounds, to lift the engine from the tractor.

14. After securing the lifting device to the lift bracket(s) of the engine, slide the engine forward to disengage the drive shaft and lift the engine from the tractor.

5-31.3 **Disassembly.** Refer to applicable Engine Service Manual.

5-31.4 **Inspection.** Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Check the muffler for spit seams, holes, corrosion or damage.
3. Check the exhaust tube for corrosion or damage.
4. Refer to Engine Service Manual for engine inspection information.

5-31.5 **Repair.**

1. Deburr and dress damaged threads.
2. Replace all unrepairable parts.
3. Refer to Engine Service Manual.

5-31.6 **Reassembly.** Refer to applicable Engine Service Manual.

5-31.7 **Installation.**

WARNING

Use a suitable lifting device, with a minimum capacity of 150 pounds, to install the engine in the tractor.

1. After securing the lifting device to the lift bracket(s) of the engine, lower the engine onto the engine mounting plate of the tractor. Align the drive shaft and slide the engine rearward to engage the drive shaft.
2. For Models 2130 and 2135, align the engine in the frame and secure with the hex wash. hd. tapp screws (8) and new bell washers (9). Torque the screws to 450 - 600 in. lbs.
3. For Models 2140, 2145, 2160, 2165 and 2185, align the engine with the frame and secure with the hex cap screws (10), hex nuts (11) and new bell washers (9). Torque the screws to 450 - 600 in. lbs.
4. Install the PTO clutch on the engine per paragraph 5-6.7 or 5-7.7.
5. Install the exhaust tube (3) and new exhaust gasket(s) (4) on the engine with the hex flange nuts (5, Models 2130, 2135 and 2185) or the socket hd. cap screws (6, Models 2140, 2145, 2160 and 2165).

NOTE

The following step 6. applies only to Model 2185.

6. Install the LH and RH heat baffles (12 and 13, Fig. 5-45) on the engine using the truss mach. tapp screw (14), hex cap screws (16) and flat washers (15). Make certain the fuel line clamp is installed on the lower left cap screw.
7. Install the muffler (and spark arrestor, if used) on the exhaust tube and frame, then secure with the three hex flange top lock nuts (7).
8. Connect the drive shaft to the engine per paragraph 5-22.7 or 5-23.7.



WARNING

Gasoline is very flammable. Remove all sources of ignition before connecting the fuel line. Never operate the tractor when leaking fuel. Locate the source of any fuel leaks and repair immediately.

9. Connect the engine fuel line to the fuel filter and check for leaks.
10. Connect the wire harness and battery connections to the engine per paragraph 5-4.7 or 5-5.7.
11. Insert the throttle and choke cables into the proper holes of throttle and choke arms of the engine as noted when removed. Install, but do not tighten, the cable clamps and screws.
12. Referring to Section 6 — Adjustments, adjust each cable and tighten the clamps.
13. Install the hood and grille assembly and adjust per paragraph 5-3.7.
14. Connect the battery per paragraph 5-4.7 or 5-5.7.
15. Install the side panels per paragraph 5-3.7.

5-32 FRAME (All Models).

5-32.1 General. Seldom will circumstances warrant replacement of the frame assembly, which would require complete disassembly of the tractor. The frame should be inspected yearly; however, most repairs can be accomplished with only partial disassembly. If a situation does occur requiring complete disassembly, remove all components per the applicable paragraphs of this Manual.

5-32.2 Removal.

1. Remove the drawbar plate (3, Fig. 5-46) from the rear of the frame by removing the four hex wash. sf. tapp screws (5).
2. Remove the front bumper (4) by removing the hex wash. hd. tapp screws (6).
3. Remove the latch spring (10) from the quick attach rod (2) and front frame plate.
4. Remove the quick attach rod (2) from the quick attach brackets on the bottom of the frame by re-

moving the hex flange lock nuts (9) and shoulder bolts (11).

5. Remove the front idler pulleys (13) and idler spacer (12) as follows:
 - a. Remove the hex flanged lock nut (8) from the through hex cap screw (7).
 - b. While withdrawing the hex cap screw (7), remove the idler pulleys (13) and idler spacer (12) from inside the frame.
6. Referring to the preceding paragraphs, remove all other components attached to the tractor frame.

5-32.3 Disassembly. No disassembly is required.

5-32.4 Inspection. Clean all parts prior to inspection.

1. Inspect all threaded areas for damage.
2. Inspect all parts for cracks, scoring, distortion, corrosion and wear.
3. Inspect the quick attach rod (2) for distortion, broken welds, or elongated holes.
4. Check the idler pulleys (13) for bent, dented or split sheaves.
5. Check the idler pulley bearings for binding, rough spots or excessive looseness, indicating internal wear.
6. Inspect the latch spring (10) for distortion or loss of tension, as indicated by irregular spacing between the coils.
7. Inspect the frame (1) assembly for cracked or broken welds.
8. Inspect the frame for distortion and for twisted frame rails.

5-32.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor surface damage or corrosion with a fine honing stone or emery cloth.
3. Where possible, reweld broken or cracked welds.
4. Where possible, straighten twisted frame rails using a long pry bar.
5. Replace all unrepairable parts.

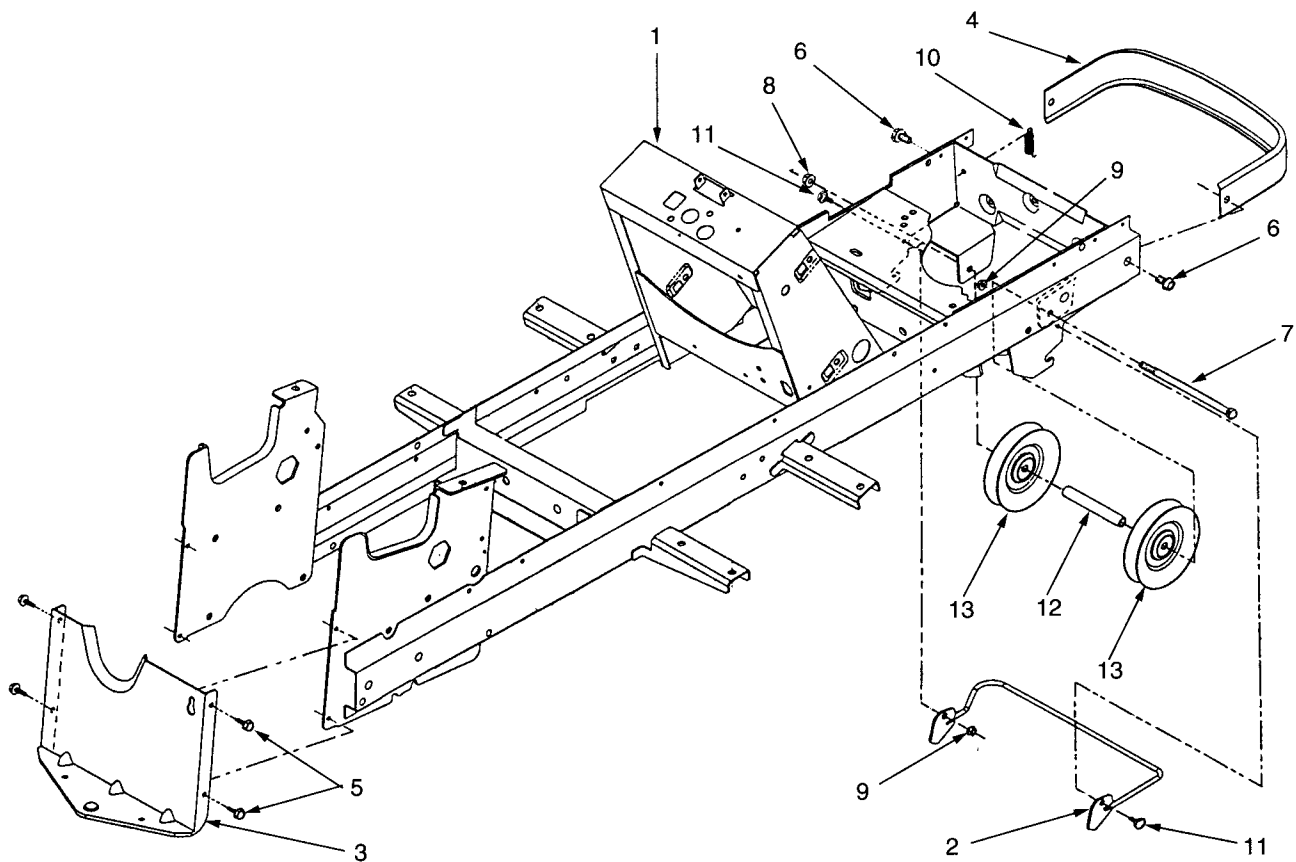
5-32.6 Reassembly. No reassembly is required.

5-32.7 Installation.

1. Install the front idler pulleys (13) and idler spacer (12) as follows:
 - a. Insert the hex cap screw (7) through the right frame bracket. With the longer hub of the pulleys facing outward (against frame brackets), install the idler pulleys and spacer on the screw and insert screw through the left frame bracket.
 - b. Secure the hex cap screw with the hex flanged lock nut (8). Tighten the nut to eliminate all side play, but do not over tighten.
2. Install the quick attach rod (2) onto the quick at-

tach brackets of the frame, using the shoulder bolts (11) and hex flange lock nuts (9).

3. Hook the latch spring (10) into the frame and onto the quick attach rod.
4. Slide the front bumper (4) into the frame channel and secure with the hex wash. hd. tapp screws (6).
5. Install the drawbar plate (3) on the outside of the rear frame using the hex wash. sf. tapp screws.
- Note: If removed, install the transaxle prior to the drawbar plate.
6. Install all previously removed components per the applicable preceding paragraphs.



1. Frame
2. Quick Attach Rod
3. Drawbar Plate
4. Bumper
5. Hex Wash. Sf. Tapp Screw
6. Hex Wash. Hd. Tapp Screw
7. Hex Cap Screw

8. Hex Flanged Lock Nut
9. Hex Flange Lock Nut
10. Latch Spring
11. Shoulder Bolt
12. Idler Spacer
13. Idler Pulley

Figure 5-46. Frame and Attachments (All Models).

5-33 38-INCH MOWER DECK (Tractor Models 2130 and 2135).

5-33.1 **General.** Tractor Models 2130 and 2135 are equipped with the 38 inch mowing deck. This is the only deck recommended for usage on these tractor models.

5-33.1.1 Additional information regarding V-belt failures and mowing deck operation can be found in Appendices F and G.

5-33.2 Removal.



WARNING

Engage the parking brake before removing the mower deck from the tractor. Let the engine cool if the tractor has been recently operated.



NOTE

Remove the mower deck from the tractor (see Owner's Manual for correct procedure) and thoroughly clean the entire deck before beginning any repair procedures. Remove the front lift rod/lift bracket (6 and 7, Fig. 5-47) assembly from the tractor frame.

1. Remove the RH belt cover (4, Fig. 5-47) from the deck by removing the hex nuts (19) and flat washers (20) from the hex cutting screws (13). Do not remove the cutting screws from the deck housing (1) unless necessary.
2. If not done previously, release the tension handle (1, Fig. 5-48) from the handle stop bracket (9, Fig. 5-47), and also remove the PTO belt (38, Fig. 5-48) from the PTO clutch.
3. Note the position of the handle stop bracket (9), then remove the stop bracket (9) and LH belt cover (3) from the deck by removing the hex nuts (19) and flat washers (20) from the hex cutting screws (13). Do not remove the cutting screws from the deck housing (1) unless necessary.
4. Rotate the tension handle (1, Fig. 5-48) rearward to remove the extension spring (4) from the tension handle and pulley pivot arm (2).
5. Pull the flat idler pulley (7, Fig. 5-48) away from the spindle V-belt (39) to release the tension and remove the V-belt from the deck.

6. Remove the extension spring (5, Fig. 5-48) from the idler arm (3) and shoulder bolt (19).
7. Remove the deck wheels (27, Fig. 5-47) from the deck housing by removing the hex flanged lock nuts (30), shoulder bolts (28) and flat washers (29).



WARNING

Never operate the mower deck without the deflector assembly (5, Fig. 5-47) installed and the deflector chute in the down position.

8. Remove the deflector assembly (5, Fig. 5-47) by removing the two hex cap screws (10), hex nuts (11) and bell washers (12).
9. Remove the cotter pin (31, Fig. 5-47) and withdraw the roller pin (33) to remove the deck roller (32).
10. Remove the extension skirt (8, Fig. 5-47) from the underside of the deck by removing the three hex sems nuts (17) and carriage bolts (18).
11. Remove the mounting plate (2, Fig. 5-47) and its assembled components (idler arms and pulleys) as one assembly. After noting the hole location of each, remove the following:
 - The hex cap screw (14, Fig. 5-47) and hex flange top lock nut (21).
 - The two carriage bolts (15) and hex flanged lock nuts (22).
 - The hex cap screw (16), spacer (23), and hex flanged lock nut (22).



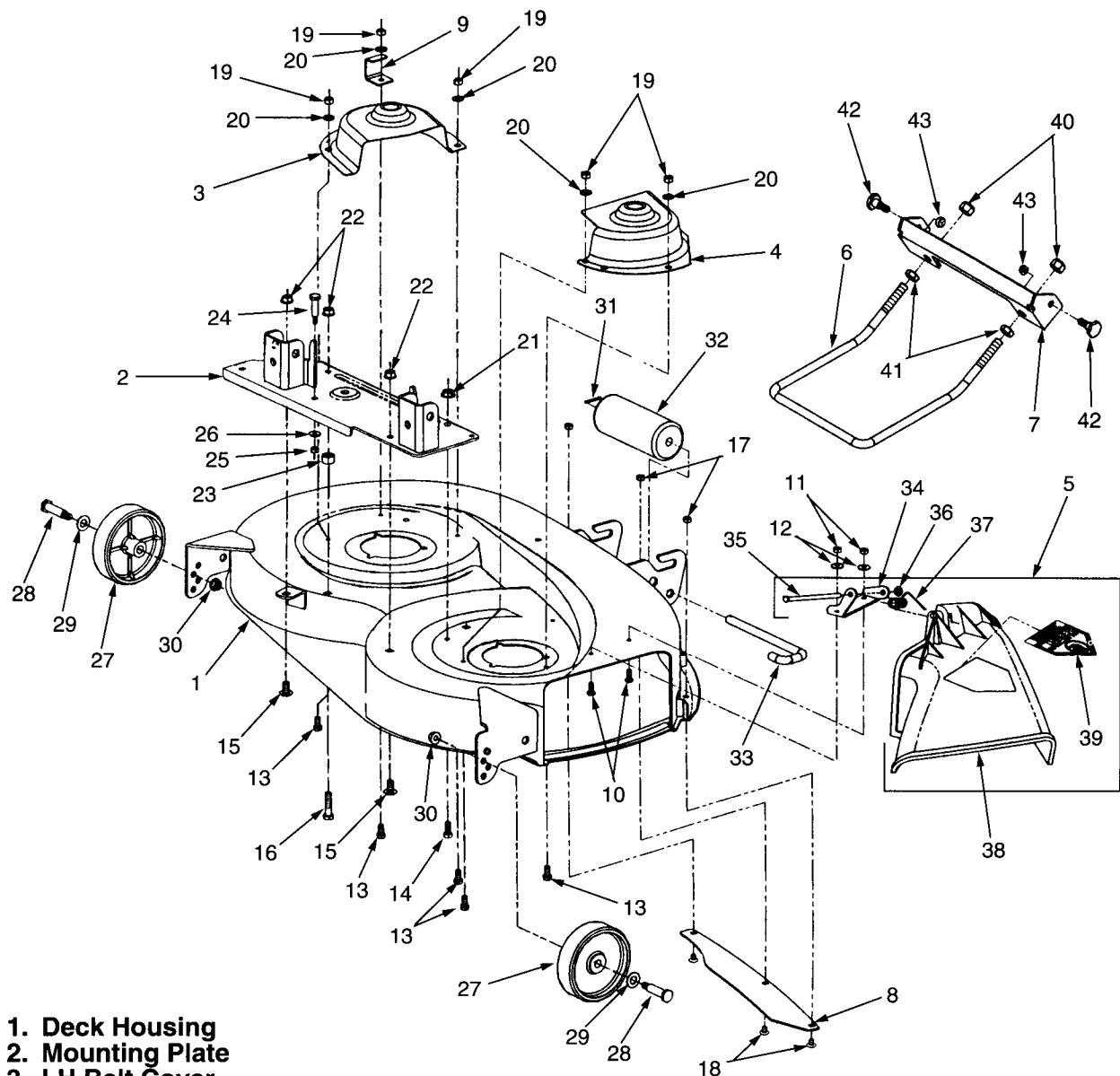
WARNING

Use care when handling the mower blades (29, Fig. 5-48). Sharp edges of the blades could cause cuts to the skin.



WARNING

When the hex nut (27, Fig. 5-48) is removed, the spindle shaft and V-pulley (25) is free to fall from the spindle assembly (35) when the deck is tipped or inverted to remove the blades. Use care to prevent these parts from falling, which could cause damage or injury.



- | | | |
|------------------------|-----------------------------|----------------------------|
| 1. Deck Housing | 20. Flat Washer | 32. Deck Roller |
| 2. Mounting Plate | 21. Hex Flange Top Lock Nut | 33. Roller Pin |
| 3. LH Belt Cover | 22. Hex Flanged Lock Nut | 34. Hinge Mtng. Bracket |
| 4. RH Belt Cover | 23. Spacer | 35. Hinge Pin |
| 5. Deflector Assembly | 24. Shoulder Bolt | 36. Speed Nut Cap |
| 6. Front Lift Rod | 25. Hex Nut | 37. Torsion Spring |
| 7. Front Lift Bracket | 26. Bell Washer | 38. Deflector Chute |
| 8. Extension Skirt | 27. Deck Wheel | 39. Danger Label |
| 9. Handle Stop Bracket | 28. Shoulder Bolt | 40. Hex Nylon Top Lock Nut |
| 10. Hex Cap Screw | 29. Flat Washer | 41. Hex Jam Nut |
| 11. Hex Nut | 30. Hex Flanged Lock Nut | 42. Shoulder Bolt |
| 12. Bell Washer | 31. Cotter Pin | 43. Hex Flanged Lock Nut |
| 13. Hex Cutting Screw | | |
| 14. Hex Cap Screw | | |
| 15. Carriage Bolt | | |
| 16. Hex Cap Screw | | |
| 17. Hex Sems Nut | | |
| 18. Carriage Bolt | | |
| 19. Hex Nut | | |

Figure 5-47. Deck and Attachments (Tractor Models 2130 and 2135).

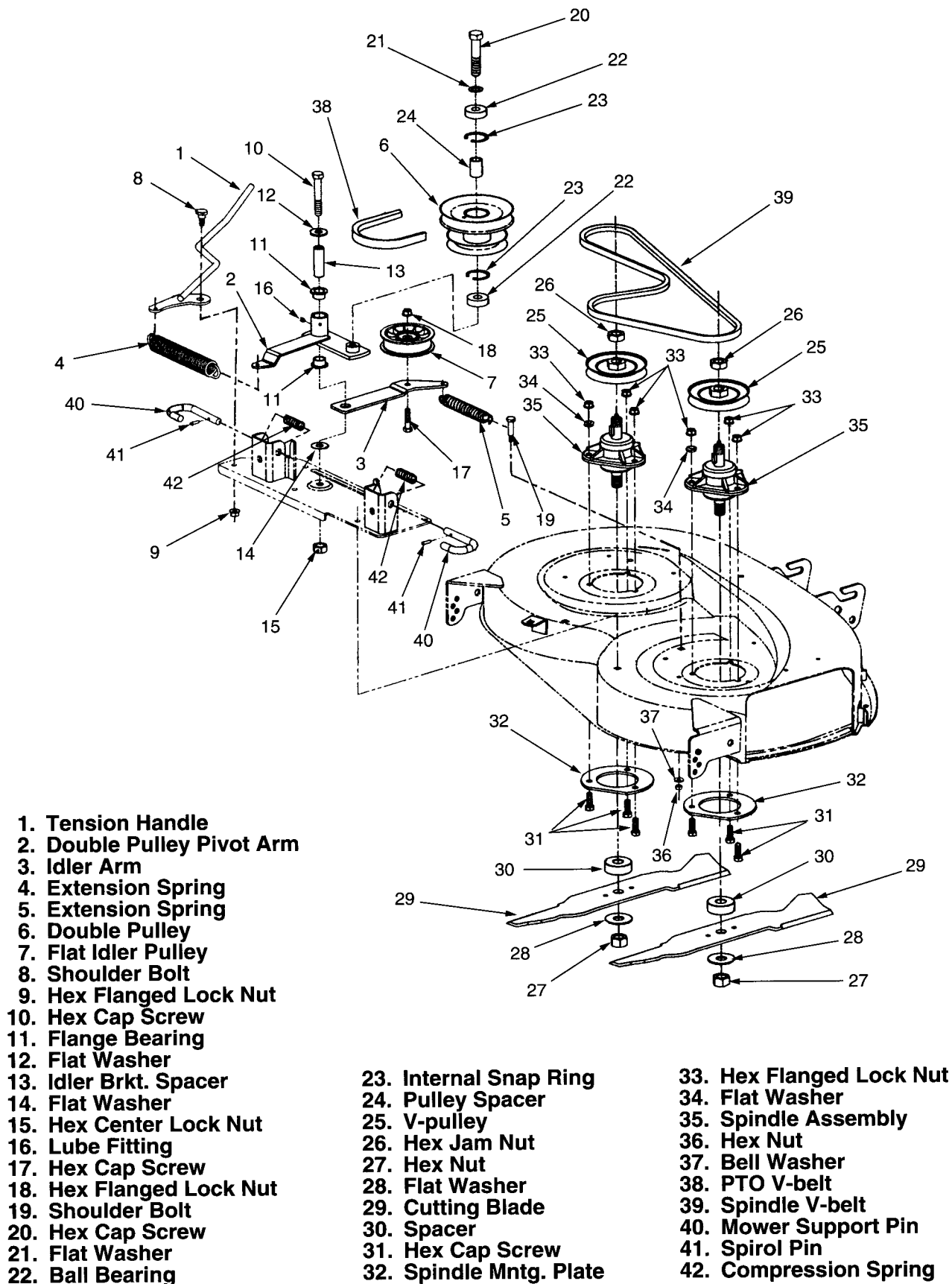


Figure 5-48. Deck Drive Components (Tractor Models 2130 and 2135).

NOTE

To prevent the spindle shaft from turning when removing the hex nut (27, Fig. 5-48) and/or hex jam nut (26), use a 1-1/4 inch wrench to hold the hex shaped hub of the V-pulley (25).

12. Remove the cutting blades (29, Fig. 5-48) and spacers (30) from the spindle assemblies (35) by removing the hex nuts (27) and flat washers (28).

WARNING

If the woodruff key is removed from the spindle shaft when removing the V-pulley (25, Fig. 5-48), the shaft will be free to fall from the spindle housing and may cause damage or injury.

13. Remove the hex jam nuts (26) and pull the V-pulleys (25) from the spindle shafts and woodruff keys.
14. Remove the spindle assemblies (35) and spindle mntg. plates (32) from the deck housing by removing the hex cap screws (31), hex flanged lock nuts (33) and flat washers (34).
15. If necessary, remove the shoulder bolt (19, Fig. 5-48), hex nut (36) and bell washer (37) from the deck housing.

5-33.3 Disassembly.

NOTE

Disassembly, inspection, and reassembly of the spindle assemblies (35, Fig. 5-48) are covered in paragraph 5-37.

1. Remove the tension handle (1, Fig. 5-48) from the mounting plate by removing the hex flanged lock nut (9) and shoulder bolt (8).
2. Remove the hex center lock nut (15, Fig. 5-48) and hex cap screw (10) to remove the upper flat washer [12 (.100 in. thk.)], double pulley pivot arm (2) assembly, idler arm (3) assembly, and lower flat washer [14 (.036 in. thk.)] from the mounting plate.

3. Remove the double pulley (6, Fig. 5-48) assembly from the pulley pivot arm (2) by removing the hex cap screw (20) and flat washer (21).
4. Disassemble the double pulley pivot arm (2) assembly as follows:
 - a. Slide the idler brkt. spacer (13) from the hub of the pivot arm.
 - b. If necessary press the flange bearings (11) from each end of the pivot arm hub. Discard the bearings and replace with new.
 - c. Remove the lube fitting (16), only if necessary, by pulling from the pivot arm hub. The lube fitting must be replaced if removed.
5. Disassemble the double pulley assembly (6) as follows:
 - a. Slide the ball bearing (22) from each end of the pulley hub and remove the pulley spacer (24).
 - b. Remove the internal snap rings (23) from inside the pulley hub.
6. Remove the flat idler pulley (7, Fig. 5-48) from the idler arm (3) by removing the hex flanged lock nut (18) and hex cap screw (17).
7. Using a small drift punch, drive the spiro pins (41, Fig. 5-48) out of the mower support pins (40), and remove the support pins and compression springs (42) from the mounting plate.
8. Remove the shoulder bolt (24, Fig. 5-47), hex nut (25), and bell washer (26) from the mounting plate.
9. Disassemble the front lift rod/ lift bracket (6 and 7, Fig. 5-47) assembly as follows:
 - a. After first marking the location of the hex jam nuts (41) on the threads of the lift rod (6), remove the hex nylon top lock nuts (40) to separate the lift rod from the front lift bracket (7).
 - b. Remove the shoulder bolts (42) and hex flanged lock nuts (43) from the front lift bracket.
 - c. Remove the hex jam nuts (41) from the front lift rod (6).

NOTE

The deflector assembly (5, Fig. 5-47) should not be disassembled unless absolutely necessary. To ensure correct reassembly, note the direction of the coil windings and the position of the spring ends before removing the torsion spring (37).

10. Disassemble the deflector assembly (5) as follows:
 - a. Twist the speed nut cap (36) off the hinge pin (35). Discard the speed nut.
 - b. While holding the assembly together, withdraw the hinge pin.
 - c. Separate the deflector chute (38) from the hinge mntg. bracket (34) and remove the torsion spring (37).

5-33.4 **Inspection.** Clean all parts prior to inspection.

1. Inspect the deck housing for cracked or broken welds.
2. Inspect the deck housing for distortion, stress cracks, corrosion, and excessive wear.
3. Inspect all threaded areas for damage.
4. Check the ball bearings and idler pulley bearing for binding or excessive play, indicating internal wear.
5. Inspect the pulleys for bent or split sheaves, and for damaged or worn keyways.
6. Inspect the flange bearings for wear or damage.
7. Inspect the V-belts for excessive wear or damage.
8. Check the cutting blades for wear or damage.
9. Inspect all springs for irregular coil spacings, indicating distortion or loss of tension.
10. Check for a loose or unreadable danger label (39, Fig. 5-47). Replace if either condition exists.
11. Inspect all other parts for wear, bends, cracks, and corrosion.

5-33.5 **Repair.**

1. Reweld broken welds, if possible.
2. Deburr and dress damaged threads.

3. Repair minor surface damage or corrosion.
4. Replace defective bearings, pulleys or V-belts.
5. Replace damaged or weak springs.
6. Replace an excessively distorted deck housing, mounting plate, belt cover, extension skirt, idler arm, or front lift rod/lift bracket.

5-33.6 **Reassembly.**

1. Reassemble the deflector assembly (5, Fig. 5-47) as follows:



CAUTION

When assembled correctly, the torsion spring (37) will hold the deflector chute in the down position. Before installing the new speed nut cap on the hinge pin (step f. below), check the spring tension by pulling the chute upward. Tension should be felt immediately and should increase as the chute is raised. If little or no tension is felt, the torsion spring is incorrectly installed, not properly loaded, or is worn and should be replaced.

- a. Secure the hinge mntg. bracket (34) by clamping in a vise, or by fastening it to the deck housing with the hex cap screws (10), bell washers (12) and hex nuts (11).
- b. Position the deflector chute (38) on the mntg. bracket (34) and insert the hinge pin (35) just through rear hole of the chute and mntg. bracket.
- c. Position the torsion spring (37) between the chute and mntg. bracket with the *short end* of the spring inserted into the hole toward the rear of the deflector chute. Push the hinge pin partially through the spring.
- d. Holding the assembly together, load the spring by turning the *free (long) end* in the same direction as the coil windings until positioned atop the mounting surface of the mntg. bracket (approximately 1/2 turn).
- e. While continuing to hold the assembly, push the hinge pin completely through the spring, mntg. bracket, and deflector chute. Check the spring tension as described above.
- f. Block the headed end of the hinge pin and push (tap) a new speed nut cap (36) onto the hinge pin.

2. Reassemble the front lift rod/lift bracket (6 and 7, Fig. 5-47) assembly as follows:
 - a. Screw the hex jam nuts (41) onto the front lift rod (6) to the positions marked when disassembling.
 - b. Install the shoulder bolts (42) in the front lift bracket (7) with the hex flanged lock nuts (43).
 - c. With the form (bend) in the rod pointing downward toward the bottom (notched) surface of the lift bracket, install the front lift rod in front lift bracket. The closed area of the rod should angle upward, if correctly installed.
 - d. Secure with the hex nylon top lock nuts (40). Do not tighten the top lock nuts (40) until making the final adjustment when installing and leveling the deck on the tractor.
3. Install the shoulder bolt (24, Fig. 5-47) in the proper hole of the mounting plate and secure with the bell washer (26) and hex nut (25).
4. Install the mower support pins (40, Fig. 5-48) in the hanger brackets of the mounting plate (2, Fig. 5-47) as follows:
 - a. Insert the support pin through the hole in the outer side of the hanger bracket.
 - b. Position the compression spring (42, Fig. 5-48) between the sides of the hanger bracket and push the support pin through the spring.
 - c. With the hole in the support pin positioned within the sides of the hanger bracket, compress the spring toward the outer side of the hanger bracket to expose the hole.
 - d. Block the support pin and drive the spirol pin (41, Fig. 5-48) into the hole of the support pin.
5. With the hub extension of the idler pulley facing downward and the offset of the idler arm upward, install the flat idler pulley (7, Fig. 5-48) on the idler arm (3) using the hex cap screw (17) and hex flanged lock nut (18).
6. Reassemble the double pulley (6, Fig. 5-48) assembly as follows:
 - a. Install the internal snap ring (23) in the ring groove at each end of the pulley hub.
 - b. Place the pulley spacer (24) inside the pulley hub and slide a ball bearing (22) into each end of the hub. A thin coat of Loctite bearing adhesive, applied to outside diameter of the bearings, may be used if desired.
7. Reassemble the double pulley pivot arm (2) assembly as follows:
 - a. If previously removed, use a protective sleeve and drive the new lube fitting (16) into the pivot arm hub.
 - b. Press a new flange bearing (11) into each end of the pivot arm hub.
 - c. Apply a thin coating of Cub Cadet 251H EP grease to the I.D. and O.D. of the idler brkt. spacer (13), then slide the spacer into the flange bearings.
8. With the larger pulley facing upward, install the double pulley assembly on the double pulley pivot arm using the hex cap screw (20) and flat washer (21).
9. In the following order, insert the hex cap screw (10, Fig. 5-48) through the .100 in. thk. flat washer (12), the pulley pivot arm (2) assembly, the idler arm (3) assembly, and the .036 in. thk. flat washer (14); then install on the mounting plate (2, Fig. 5-47) and secure with the hex center lock nut (15, Fig. 5-48).
10. Install the tension handle (1, Fig. 5-48) on the mounting plate (2, Fig. 5-47) with the shoulder bolt (8, Fig. 5-48) and hex flanged lock nut (9).

5-33.7 Installation.

1. If previously removed, install the shoulder bolt (19, Fig. 5-48) in the proper hole of the deck housing and secure with the bell washer (37) and hex nut (36).
2. Install the spindle assemblies (35, Fig. 5-48) on top of the deck housing and the spindle mntg. plates (32) from underneath. Secure with the hex cap screws (31), flat washers (34), and hex flanged lock nuts (33).



If removed with the V-pulleys (25, Fig. 5-48), tap the woodruff keys into the keyways of the spindle shafts.

3. Align the keyways of the V-pulleys (25) with the woodruff keys and install the pulleys on the spindle assemblies. Secure with the hex jam nuts (26). Torque the jam nuts to 50 to 60 ft-lbs.
4. Install the spacers (30, Fig. 5-48), cutting blades (29), and flat washers (28) onto the bottom of the spindle assemblies and secure with the hex nuts (27). Torque the hex nuts to 90 to 110 ft-lbs.
5. Install the mounting plate (2, Fig. 5-47) and its assembled components on the deck housing. In the hole locations noted during removal, secure the mounting plate as follows:
 - Place the spacer (23, Fig. 5-47) between the mounting plate and deck housing, and insert the hex cap screw (16) up through the deck housing, spacer and mounting plate. Secure with the hex flanged lock nut (22).
 - Insert the two carriage bolts (15) from the underside of the housing and secure with the hex flanged lock nuts (22).
 - Install the hex cap screw (14) and hex flange top lock nut (21).
6. Install the extension skirt (8, Fig. 5-47) on the underside of the deck housing using the three carriage bolts (18) and hex sems nuts (17).
7. Position the deck roller (32, Fig. 5-47) between the front deck brackets and insert the roller pin (33). Make certain the short end of the roller pin engages the rear hole in the right hand bracket. Secure with the cotter pin (31).
8. Install the deflector assembly (5) on the deck housing using the hex cap screws (10), bell washers (12), and hex nuts (11).
9. Slide the flat washers (29, Fig. 5-47) and deck wheels (27) onto the shoulder bolts (28) and install in the desired index hole of the deck housing brackets. Secure with the hex flange lock nuts (30).
10. Hook the extension spring (5, Fig. 5-48) into the idler arm (3) and onto the shoulder bolt (19).
11. Route the spindle V-belt (39, Fig. 5-48) around the V-pulleys (25) and lower pulley of the double pulley (6); then pull the flat idler pulley (7) away from the belt to tension the spring and set the belt in the idler pulley.
12. Rotate the tension handle (1, Fig. 5-48) rearward and hook the extension spring (4) into the top of the double pulley pivot arm (2) and bottom of the tension handle.
13. If previously removed, screw new hex cutting screws (13, Fig. 5-47) up into the deck housing.
14. Install the LH belt cover (3, Fig. 5-47) and the handle stop bracket (8) in the previously noted position. Secure with the flat washers (20) and hex nuts (19), tightened only until snug.
15. Rotate the tension handle forward to lock in the handle stop bracket. Adjust the stop bracket to align with the tension handle, and completely tighten the hex nuts (19).
16. Install the RH belt cover (4, Fig. 5-47) and secure with the flat washers (20) and hex nuts (19).
17. Apply Cub Cadet 251H EP to the lube fittings of the spindle assemblies and double pulley pivot arm.
18. Snap the front lift rod/lift bracket assembly into the quick attach brackets on the tractor frame.
19. Install the PTO V-belt on the PTO clutch of the tractor.
20. Install the mower deck on the tractor and check the deck leveling to make the final adjustment of the front lift rod/lift bracket assembly.



WARNING

Never operate the mower deck without the deflector assembly (5, Fig. 5-47) installed and the deflector chute in the down position.



NOTE

If the deflector assembly (5, Fig. 5-47) was re-assembled with the hinge mntg. bracket (34) fastened to the deck housing (see paragraph 5-33.6 step1), skip the following step 8.

5-34 42-INCH MOWER DECK (Tractor Models 2140 and 2145).

5-34.1 **General.** Tractor Models 2140 and 2145 are equipped with the 42 inch mowing deck. This is the only deck recommended for usage on these tractor models.

5-34.1.1 Additional information regarding V-belt failures and mowing deck operation can be found in Appendices F and G.

5-34.2 Removal.



WARNING

Engage the parking brake before removing the mower deck from the tractor. Let the engine cool if the tractor has been recently operated.



NOTE

Remove the mower deck from the tractor (see Owner's Manual for correct procedure) and thoroughly clean the entire deck before beginning any repair procedures. Remove the front lift rod/lift bracket (6 and 7, Fig. 5-49) assembly from the tractor frame.

1. Remove the RH belt cover (4, Fig. 5-49) from the deck by removing the hex nuts (19) and flat washers (20) from the hex cutting screws (14). Do not remove the cutting screws from the deck housing (1) unless necessary.
2. If not done previously, release the tension handle (1, Fig. 5-50) from the handle stop bracket (10, Fig. 5-49), and also remove the PTO belt (38, Fig. 5-50) from the PTO clutch.
3. Note the position of the handle stop bracket (10), then remove the stop bracket (10) and LH belt cover (3) from the deck by removing the hex nuts (19) and flat washers (20) from the hex cutting screws (14). Do not remove the cutting screws from the deck housing (1) unless necessary.
4. Rotate the tension handle (1, Fig. 5-50) rearward to remove the extension spring (4) from the tension handle and pulley pivot arm (2).
5. Pull the flat idler pulley (7, Fig. 5-50) away from the spindle V-belt (39) to release the tension and remove the V-belt from the deck.

6. Remove the extension spring (5, Fig. 5-50) from the idler arm (3) and shoulder bolt (19).
7. Pull the clevis pins w/detent ball (24, Fig. 5-49) from the wheel brackets of the deck housing and remove the deck axle/deck wheel (23 and 27, Fig. 5-49) assemblies.
8. Remove the deck wheels (27, Fig. 5-49) from the deck axles (23) by removing the shoulder bolts (25), flat washers (26), and bell washers (28).



WARNING

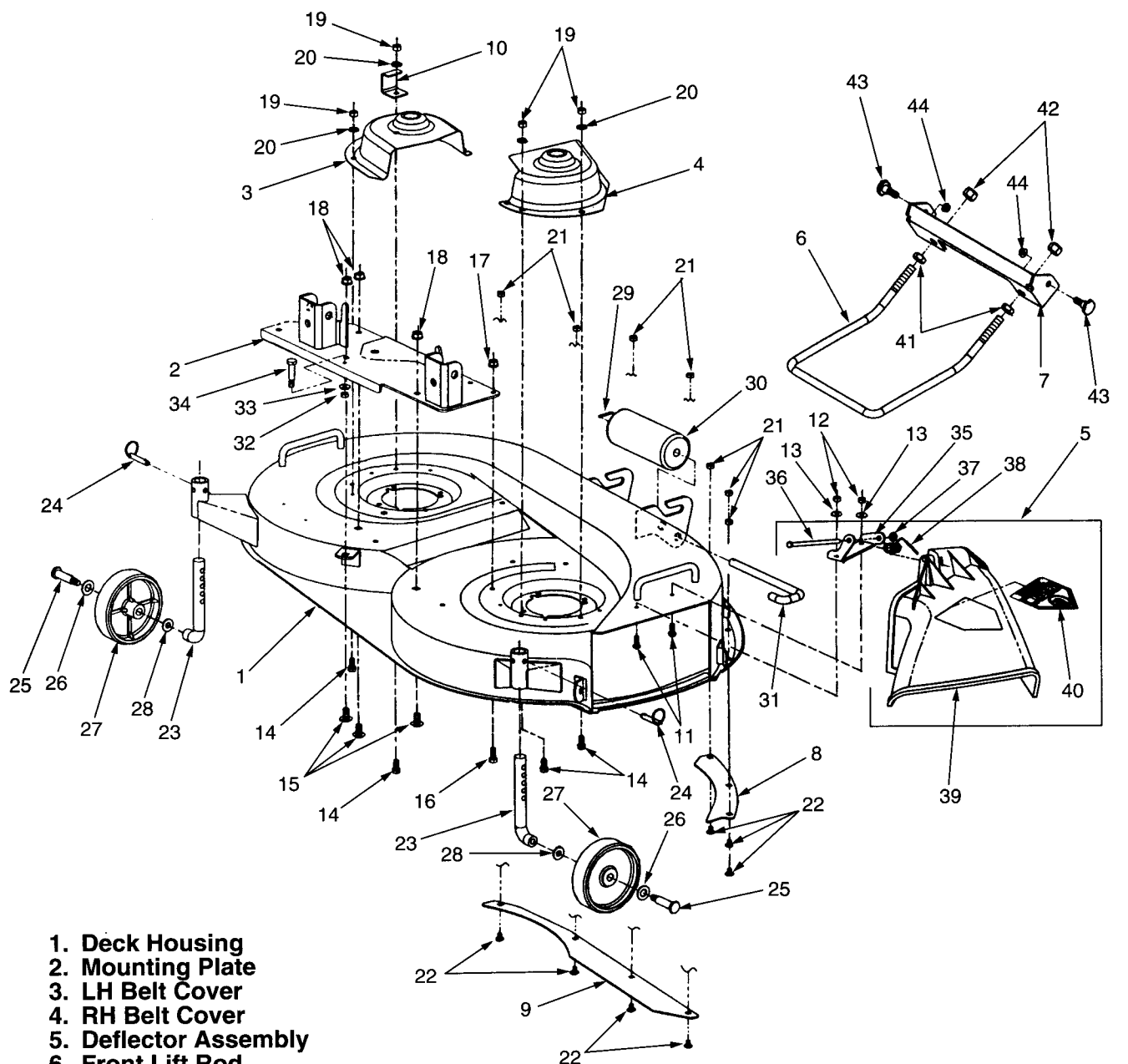
Never operate the mower deck without the deflector assembly (5, Fig. 5-49) installed and the deflector chute in the down position.

9. Remove the deflector assembly (5, Fig. 5-49) by removing the two hex cap screws (11), hex nuts (12) and bell washers (13).
10. Remove the cotter pin (29, Fig. 5-49) and withdraw the roller pin (31) to remove the deck roller (30).
11. Remove the short extension skirt (8, Fig. 5-49) from the underside of the deck housing by removing the three hex sems nuts (21) and carriage bolts (22).
12. Remove the long extension skirt (9, Fig. 5-49) from the underside of the deck housing by removing the four hex sems nuts (21) and carriage bolts (22).
13. Remove the mounting plate (2, Fig. 5-49) and its assembled components (idler arms and pulleys) as one assembly. After noting the hole location of each, remove the following:
 - The hex cap screw (16, Fig. 5-49) and hex flange top lock nut (17).
 - The three carriage bolts (15) and hex flanged lock nuts (18).



WARNING

Use care when handling the mower blades (29, Fig. 5-50). Sharp edges of the blades could cause cuts to the skin.



- 1. Deck Housing
- 2. Mounting Plate
- 3. LH Belt Cover
- 4. RH Belt Cover
- 5. Deflector Assembly
- 6. Front Lift Rod
- 7. Front Lift Bracket
- 8. Short Skirt
- 9. Extension Skirt
- 10. Handle Stop Bracket
- 11. Hex Cap Screw
- 12. Hex Nut
- 13. Bell Washer
- 14. Hex Cutting Screw
- 15. Carriage Bolt
- 16. Hex Cap Screw
- 17. Hex Flange Top Lock Nut
- 18. Hex Flanged Lock Nut
- 19. Hex Nut
- 20. Flat Washer

- 21. Hex Sems Nut
- 22. Carriage Bolt
- 23. Deck Axle
- 24. Clevis Pin w/Detent Ball
- 25. Shoulder Bolt
- 26. Flat Washer
- 27. Deck Wheel
- 28. Bell Washer
- 29. Cotter Pin
- 30. Deck Roller
- 31. Roller Pin
- 32. Hex Nut

- 33. Bell Washer
- 34. Shoulder Bolt
- 35. Hinge Mntg. Bracket
- 36. Hinge Pin
- 37. Speed Nut Cap
- 38. Torsion Spring
- 39. Deflector Chute
- 40. Danger Label
- 41. Hex Jam Nut
- 42. Hex Nylon Top Lock Nut
- 43. Shoulder Bolt
- 44. Hex Flanged Lock Nut

Figure 5-49. Deck and Attachments (Tractor Models 2140 and 2145).



WARNING

When the hex nut (27, Fig. 5-50) is removed, the spindle shaft, with V-pulley (25), is free to fall from the spindle assembly (35) when the deck is tipped or inverted to remove the blades. Use care to prevent these parts from falling, which could cause damage or injury.



NOTE

To prevent the spindle shaft from turning when removing the hex nut (27, Fig. 5-50) and/or hex jam nut (26), use a 1-1/4 inch wrench to hold the hex shaped hub of the V-pulley (25).

1. Remove the cutting blades (29, Fig. 5-50) and spacers (30) from the spindle assemblies (35) by removing the hex nuts (27) and flat washers (28).



WARNING

If the woodruff key is removed from the spindle shaft when removing the V-pulley (25, Fig. 5-50), the shaft will be free to fall from the spindle housing and may cause damage or injury.

2. Remove the hex jam nuts (26) and pull the V-pulleys (25) from the spindle shafts and woodruff keys.
3. Remove the spindle assemblies (35) and spindle mntg. plates (32) from the deck housing by removing the hex cap screws (31), hex flanged lock nuts (33) and flat washers (34).
4. If necessary, remove the shoulder bolt (19, Fig. 5-50), hex nut (36) and bell washer (37) from the deck housing.

5-34.3 Disassembly.



NOTE

Disassembly, inspection, and reassembly of the spindle assemblies (35, Fig. 5-50) are covered in paragraph 5-37.

1. Remove the tension handle (1, Fig. 5-50) from the mounting plate by removing the hex flanged lock nut (9) and shoulder bolt (8).

2. Remove the hex center lock nut (15, Fig. 5-50) and hex cap screw (10) to remove the upper flat washer [12 (.100 in. thk.)], double pulley pivot arm (2) assembly, idler arm (3) assembly, and lower flat washer [14 (.036 in. thk.)] from the mounting plate.
3. Remove the double pulley (6, Fig. 5-50) assembly from the pulley pivot arm (2) by removing the hex cap screw (20) and flat washer (21).
4. Disassemble the double pulley pivot arm (2) assembly as follows:
 - a. Slide the idler brkt. spacer (13) from the hub of the pivot arm.
 - b. If necessary press the flange bearings (11) from each end of the pivot arm hub. Discard the bearings and replace with new.
 - c. Remove the lube fitting (16), only if necessary, by pulling from the pivot arm hub. The lube fitting must be replaced if removed.
5. Disassemble the double pulley assembly (6) as follows:
 - a. Slide the ball bearing (22) from each end of the pulley hub and remove the pulley spacer (24).
 - b. Remove the internal snap rings (23) from inside the pulley hub.
6. Remove the flat idler pulley (7, Fig. 5-50) from the idler arm (3) by removing the hex flanged lock nut (18) and hex cap screw (17).
7. Using a small drift punch, drive the spirol pins (41, Fig. 5-50) out of the mower support pins (40), and remove the support pins and compression springs (42) from the mounting plate.
8. Remove the shoulder bolt (34, Fig. 5-49), hex nut (32), and bell washer (33) from the mounting plate.
9. Disassemble the front lift rod/ lift bracket (6 and 7, Fig. 5-49) assembly as follows:
 - a. After first marking the location of the hex jam nuts (41) on the threads of the lift rod (6), remove the hex nylon top lock nuts (42) to separate the lift rod from the front lift bracket (7).
 - b. Remove the shoulder bolts (43) and hex flanged lock nuts (44) from the front lift bracket.
 - c. Remove the hex jam nuts (41) from the front lift rod (6).

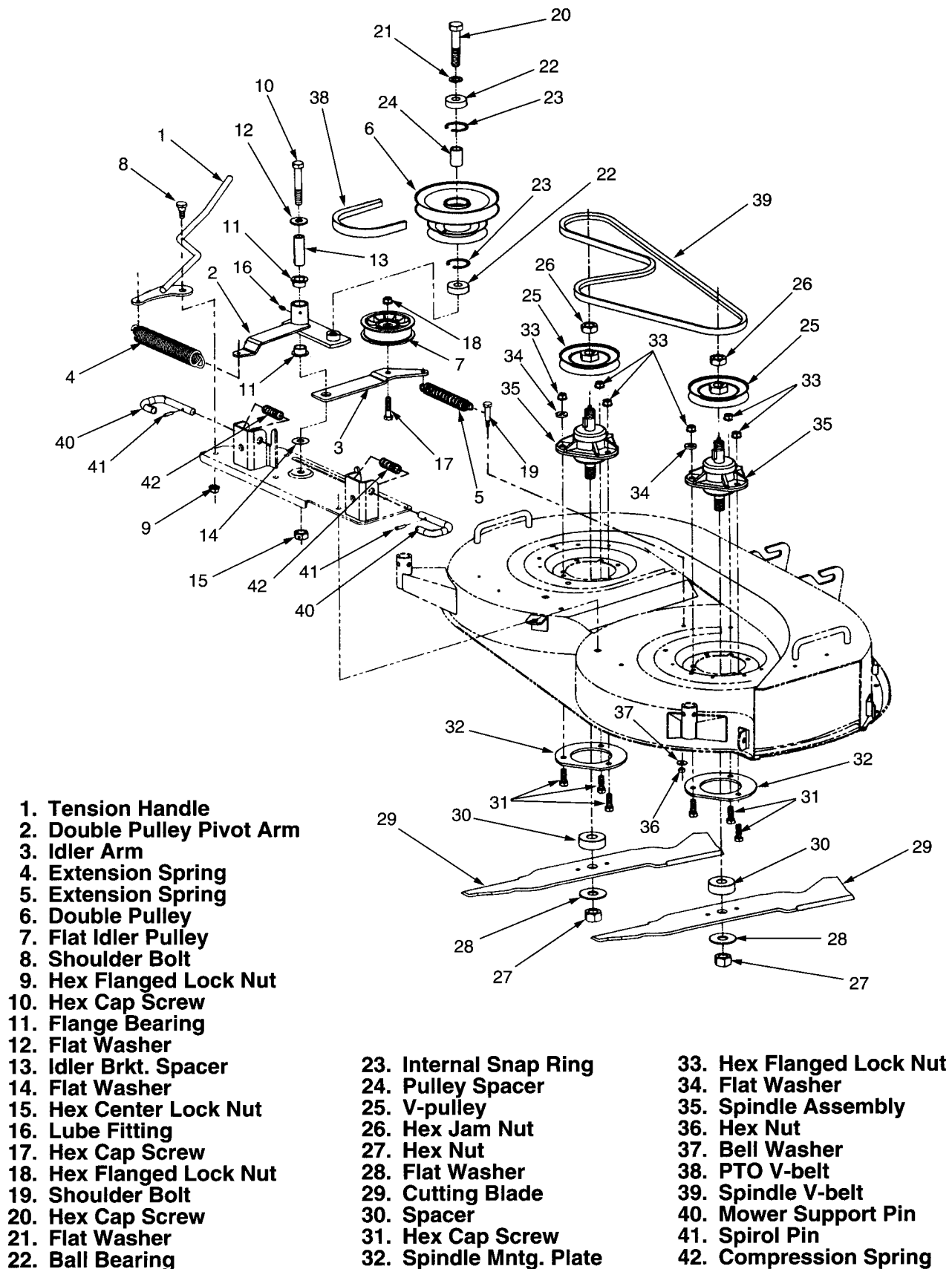


Figure 5-50. Deck Drive Components (Tractor Models 2140 and 2145).

NOTE

The deflector assembly (5, Fig. 5-49) should not be disassembled unless absolutely necessary. To ensure correct reassembly, note the direction of the coil windings and the position of the spring ends before removing the torsion spring (38).

1. Disassemble the deflector assembly (5) as follows:
 - a. Twist the speed nut cap (37) off the hinge pin (36). Discard the speed nut.
 - b. While holding the assembly together, withdraw the hinge pin.
 - c. Separate the deflector chute (39) from the hinge mntg. bracket (35) and remove the torsion spring (38).

5-34.4 Inspection. Clean all parts prior to inspection.

1. Inspect the deck housing for cracked or broken welds.
2. Inspect the deck housing for distortion, stress cracks, corrosion, and excessive wear.
3. Inspect all threaded areas for damage.
4. Check the ball bearings and idler pulley bearing for binding or excessive play, indicating internal wear.
5. Inspect the pulleys for bent or split sheaves, and for damaged or worn keyways.
6. Inspect the flange bearings for wear or damage.
7. Inspect the V-belts for excessive wear or damage.
8. Check the cutting blades for wear or damage.
9. Inspect all springs for irregular coil spacings, indicating distortion or loss of tension.
10. Check for a loose or unreadable danger label (40, Fig. 5-49). Replace if either condition exists.
11. Inspect all other parts for wear, bends, cracks, and corrosion.

5-34.5 Repair.

1. Reweld broken welds, if possible.
2. Deburr and dress damaged threads.

3. Repair minor surface damage or corrosion.
4. Replace defective bearings, pulleys or V-belts.
5. Replace damaged or weak springs.
6. Replace an excessively distorted deck housing, mounting plate, belt cover, extension skirt, idler arm, or front lift rod/lift bracket.

5-34.6 Reassembly.

1. Reassemble the deflector assembly (5, Fig. 5-49) as follows:



CAUTION

When assembled correctly, the torsion spring (38) will hold the deflector chute in the down position. Before installing the new speed nut cap on the hinge pin (step f. below), check the spring tension by pulling the chute upward. Tension should be felt immediately and should increase as the chute is raised. If little or no tension is felt, the torsion spring is either incorrectly installed, not properly loaded, or is worn and should be replaced.

- a. Secure the hinge mntg. bracket (35) by clamping in a vise, or by fastening it to the deck housing with the hex cap screws (11), bell washers (13) and hex nuts (12).
- b. Position the deflector chute (39) on the mntg. bracket (35) and insert the hinge pin (36) just through rear hole of the chute and mntg. bracket.
- c. Position the torsion spring (38) between the chute and mntg. bracket, with the *short end* of the spring inserted into the hole toward the rear of the deflector chute. Push the hinge pin partially through the spring.
- d. Holding the assembly together, load the spring by turning the *long spring end* in the same direction as the coil windings until it is positioned atop the mounting surface of the mntg. bracket (approximately 1/2 turn).
- e. While continuing to hold the assembly, push the hinge pin completely through the spring, mntg. bracket, and deflector chute. Check the spring tension as described above.
- f. Block the headed end of the hinge pin and push (tap) a new speed nut cap (37) onto the hinge pin.

2. Reassemble the front lift rod/lift bracket (6 and 7, Fig. 5-49) assembly as follows:
 - a. Screw the hex jam nuts (41) onto the front lift rod (6) to the positions marked when disassembling.
 - b. Install the shoulder bolts (43) in the front lift bracket (7) with the hex flanged lock nuts (44).
 - c. With the form (bend) in the rod pointing downward toward the bottom (notched) surface of the lift bracket, install the front lift rod in front lift bracket. The closed area of the rod should angle upward, if correctly installed.
 - d. Secure with the hex nylon top lock nuts (42). Do not tighten the top lock nuts (42) until making the final adjustment when installing and leveling the deck on the tractor.
3. Install the shoulder bolt (34, Fig. 5-49) in the proper hole of the mounting plate and secure with the bell washer (33) and hex nut (32).
4. Install the mower support pins (40, Fig. 5-50) in the hanger brackets of the mounting plate (2, Fig. 5-49) as follows:
 - a. Insert the support pin through the hole in the outer side of the hanger bracket.
 - b. Position the compression spring (42, Fig. 5-50) between the sides of the hanger bracket and push the support pin through the spring.
 - c. With the hole in the support pin positioned within the sides of the hanger bracket, compress the spring toward the outer side of the hanger bracket to expose the hole.
 - d. Block the support pin and drive the spirol pin (41, Fig. 5-50) into the hole of the support pin.
5. With the hub extension of the idler pulley facing downward and the offset of the idler arm upward, install the flat idler pulley (7, Fig. 5-50) on the idler arm (3) using the hex cap screw (17) and hex flanged lock nut (18).
6. Reassemble the double pulley (6, Fig. 5-50) assembly as follows:
 - a. Install the internal snap ring (23) in the ring groove at each end of the pulley hub.
 - b. Place the pulley spacer (24) inside the pulley hub and slide a ball bearing (22) into each end of the hub. A thin coat of Loctite bearing adhesive may be applied to outside diameter of the bearings, if desired.
7. Reassemble the double pulley pivot arm (2) assembly as follows:
 - a. If previously removed, use a protective sleeve and drive the new lube fitting (16) into the pivot arm hub.
 - b. Press a new flange bearing (11) into each end of the pivot arm hub.
 - c. Apply a thin coating of Cub Cadet 251H EP grease to the I.D. and O.D. of the idler brkt. spacer (13), then slide the spacer into the flange bearings.
8. With the larger pulley facing upward, install the double pulley assembly on the double pulley pivot arm using the hex cap screw (20) and flat washer (21).
9. In the following order, insert the hex cap screw (10, Fig. 5-50) through the .100 in. thk. flat washer (12), the pulley pivot arm (2) assembly, the idler arm (3) assembly, and the .036 in. thk. flat washer (14); then install on the mounting plate (2, Fig. 5-49) and secure with the hex center lock nut (15, Fig. 5-50).
10. Install the tension handle (1, Fig. 5-50) on the mounting plate (2, Fig. 5-49) with the shoulder bolt (8, Fig. 5-50) and hex flanged lock nut (9).

5-34.7 Installation.

1. If previously removed, install the shoulder bolt (19, Fig. 5-50) in the proper hole of the deck housing and secure with the bell washer (37) and hex nut (36).
2. Install the spindle assemblies (35, Fig. 5-50) on top of the deck housing and the spindle mntg. plates (32) from underneath. Secure with the hex cap screws (31), flat washers (34), and hex flanged lock nuts (33).



If removed with the V-pulleys (25, Fig. 5-50), tap the woodruff keys into the keyways of the spindle shafts.

3. Align the keyways of the V-pulleys (25) with the woodruff keys and install the pulleys on the spindle assemblies. Secure with the hex jam nuts (26). Torque the jam nuts to 50 to 60 ft-lbs.
4. Install the spacers (30, Fig. 5-50), cutting blades (29), and flat washers (28) onto the bottom of the spindle assemblies and secure with the hex nuts (27). Torque the hex nuts to 90 to 110 ft-lbs.
5. Install the mounting plate (2, Fig. 5-49) and its assembled components on the deck housing. In the hole locations noted during removal, secure the mounting plate as follows:
 - Insert the three carriage bolts (15) from the underside of the housing and secure with the hex flanged lock nuts (18).
 - Install the hex cap screw (16) and hex flange top lock nut (17).
6. Install the long extension skirt (9, Fig. 5-49) on the underside of the deck housing using the four carriage bolts (22) and hex sems nuts (21).
7. Install the short extension skirt (8, Fig. 5-49) on the underside of the deck housing using the three carriage bolts (22) and hex sems nuts (21).
8. Position the deck roller (30, Fig. 5-49) between the front deck brackets and insert the roller pin (31). Make certain the short end of the roller pin engages the rear hole in the right hand bracket. Secure with the cotter pin (29).
10. Slide the flat washers (26, Fig. 5-49), deck wheels (27), and bell washers (28) onto the shoulder bolts (25) and install in the deck axles (23). The crown (rounded surface) of the bell washer should be against the shoulder of the bolts.
11. Slide the deck axle/wheel assemblies into the wheel brackets of deck housing. To facilitate installation of the deck, position the axle/wheel assemblies perpendicular to the deck. Insert the clevis pins (24, Fig. 5-49) in the lowest hole of the axles, through the front to back holes of the deck wheel brackets.
12. Hook the extension spring (5, Fig. 5-50) into the idler arm (3) and onto the shoulder bolt (19).
13. Route the spindle V-belt (39, Fig. 5-50) around the V-pulleys (25) and lower pulley of the double pulley (6); then pull the flat idler pulley (7) away from the belt to tension the spring and set the belt in the idler pulley.
14. Rotate the tension handle (1, Fig. 5-50) rearward and hook the extension spring (4) into the top of the double pulley pivot arm (2) and bottom of the tension handle.
15. If previously removed, screw new hex cutting screws (14, Fig. 5-49) up into the deck housing.
16. Install the LH belt cover (3, Fig. 5-49) and the handle stop bracket (10) in the previously noted position. Secure with the flat washers (20) and hex nuts (19), tightened only until snug.
17. Rotate the tension handle forward to lock in the handle stop bracket. Adjust the stop bracket to align with the tension handle, and completely tighten the hex nuts (19).
18. Install the RH belt cover (4, Fig. 5-49) and secure with the flat washers (20) and hex nuts (19).
19. Apply Cub Cadet 251H EP grease to the lube fittings of the spindle assemblies and double pulley pivot arm.
20. Snap the front lift rod/lift bracket assembly into the quick attach brackets on the tractor frame.
21. Install the PTO V-belt on the PTO clutch of the tractor.
22. Install the mower deck on the tractor; check the deck leveling to make the final adjustment of the front lift rod/lift bracket assembly; and reposition the deck wheels.



WARNING

Never operate the mower deck without the deflector assembly (5, Fig. 5-49) installed and the deflector chute in the down position.



NOTE

If the deflector assembly (5, Fig. 5-49) was re-assembled with the hinge mntg. bracket (35) fastened to the deck housing (see paragraph 5-34.6 step1), skip the following step 9.

9. Install the deflector assembly (5) on the deck housing using the hex cap screws (11), bell washers (13), and hex nuts (12).

5-35 46-INCH MOWER DECK (Model 190-300).

5-35.1 **General.** Mower deck Model 190-300 is designed for usage on Tractor Models 2160, 2165, and 2185.

5-35.1.1 Additional information regarding V-belt failures and mowing deck operation can be found in Appendices F and G.

5-35.2 Removal.



WARNING

Engage the parking brake before removing the mower deck from the tractor. Let the engine cool if the tractor has been recently operated.



NOTE

Remove the mower deck from the tractor (see Owner's Manual for correct procedure) and thoroughly clean the entire deck before beginning any repair procedures. Remove the front lift rod/lift bracket (6 and 7, Fig. 5-51) assembly from the tractor frame.

1. If not done previously, release the tension handle (1, Fig. 5-52) from the handle stop bracket (15, Fig. 5-51), and also remove the PTO belt (38, Fig. 5-52) from the PTO clutch.
2. Remove the RH belt cover (4, Fig. 5-51) by removing the hex wash. tapp screw (19) and flat washer (20), and the hex nut (38) and flat washer (20) from the hex cutting screw (14). Do not remove the cutting screw from the deck housing (1) unless necessary.
3. Remove the LH belt cover (3, Fig. 5-51) by removing the hex wash. tapp screws (19) and flat washers (20).
4. Note the position of the handle stop bracket (15, Fig. 5-51), then remove the bracket from the deck by removing the hex nut (17) and flat washer (16) from the hex cutting screw (14). Do not remove the cutting screw from the deck housing (1) unless necessary.
5. Rotate the tension handle (1, Fig. 5-52) rearward to remove the extension spring (23) from the tension handle and pulley pivot arm (2).

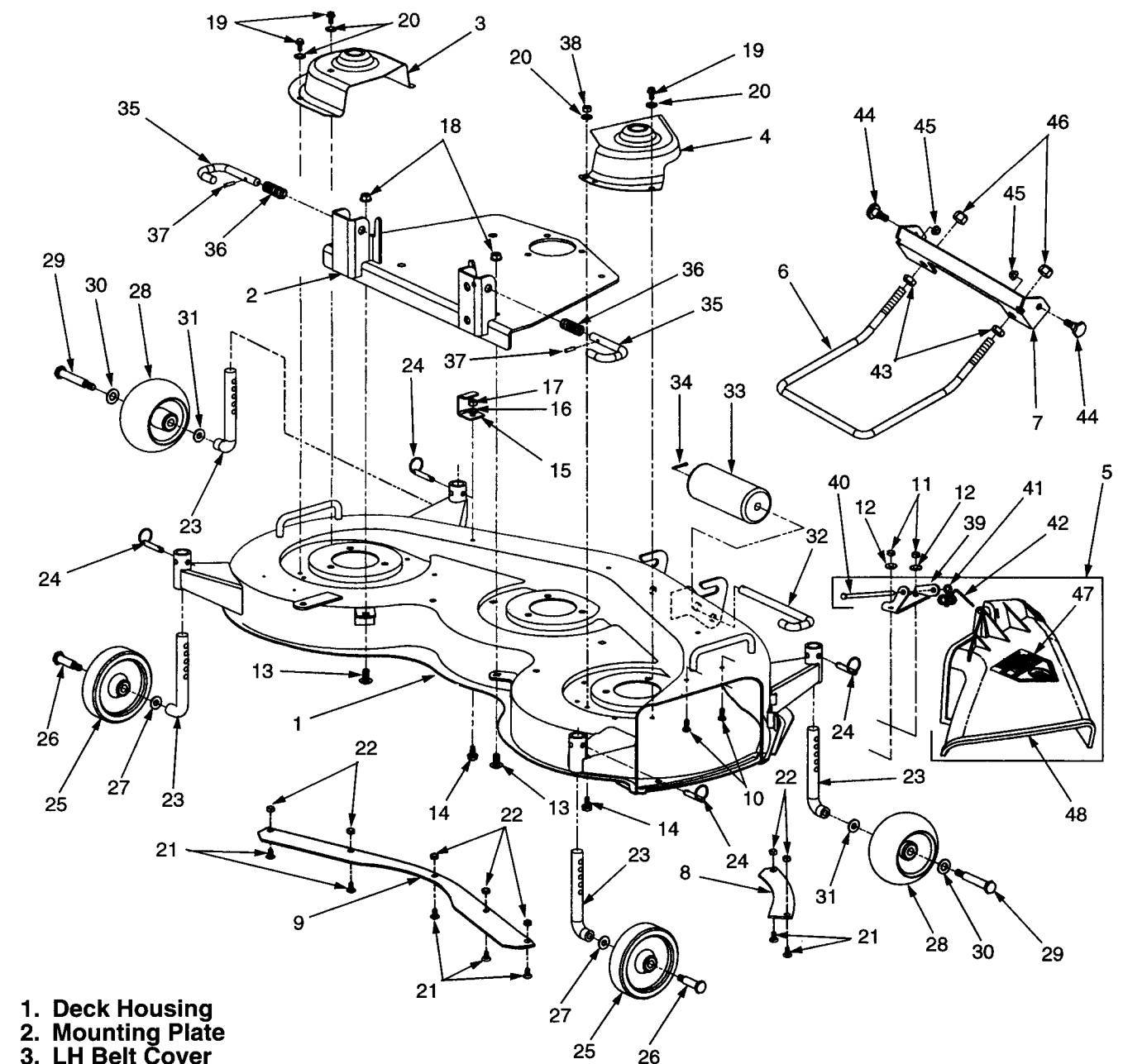
6. Remove the tension handle (1, Fig. 5-52) from the deck housing by removing the hex flanged lock nut (25) and shoulder bolt (24).
7. Pull the movable flat idler pulley (10, Fig. 5-52) and idler arm (3) away from the spindle V-belt (39) to release the tension and remove the V-belt from the deck.
8. Remove the extension spring (20, Fig. 5-52) from the idler arm (3) and hex cap screw (22).
9. Remove the idler arm (3, Fig. 5-52), flat idler pulley (10), and shoulder spacer (17) as an assembly by removing the hex flanged lock nut (19), hex cap screw (13), bell washer (16) and flat washer (18). Separate the shoulder spacer from the idler arm.
10. Remove the fixed flat idler pulley (10, Fig. 5-52) and spacer (12) from the mounting plate (2, Fig. 5-51) by removing the hex cap screw (13) and bell washer (14).
11. Remove the double pulley pivot arm (2, Fig. 5-52) and double pulley (26) from the mounting plate, as one assembly, by removing the hex center lock nut (9), hex cap screw (8), and flat washers (5).
12. Pull the clevis pins w/detent ball (24, Fig. 5-51) from each wheel bracket of the deck housing (1) and remove the four deck axle/wheel assemblies (23, 25 and 28).
 - a. Remove the deck wheels (25) from the axles by removing the shoulder bolts (26) and bell washers (27).
 - b. Remove the ball wheels (28) from the axles by removing the shoulder bolts (29), flat washers (30) and bell washers (31).



WARNING

Never operate the mower deck without the deflector assembly (5, Fig. 5-51) installed and the deflector chute in the down position.

13. Remove the deflector assembly (5, Fig. 5-51) by removing the two hex cap screws (10), hex nuts (11) and bell washers (12).
14. Remove the cotter pin (34, Fig. 5-51) and withdraw the roller pin (32) to remove the deck roller (33).



- 1. Deck Housing
- 2. Mounting Plate
- 3. LH Belt Cover
- 4. RH Belt Cover
- 5. Deflector Assembly
- 6. Front Lift Rod
- 7. Front Lift Bracket

- 8. RH Skirt
- 9. Center Skirt
- 10. Hex Cap Screw
- 11. Hex Nut
- 12. Bell Washer
- 13. Carriage Bolt
- 14. Hex Cutting Screw
- 15. Handle Stop Bracket
- 16. Flat Washer
- 17. Hex Nut
- 18. Hex Flanged Lock Nut
- 19. Hex Wash. Tapp Screw
- 20. Flat Washer

- 21. Carriage Bolt
- 22. Hex Sems Nut
- 23. Deck Axle
- 24. Clevis Pin w/Ball Detent
- 25. Deck Wheel
- 26. Shoulder Bolt
- 27. Bell Washer
- 28. Ball Wheel w/Lube Fitting
- 29. Shoulder Bolt
- 30. Flat Washer
- 31. Bell Washer
- 32. Roller Pin
- 33. Front Roller
- 34. Cotter Pin

- 35. Mower Support Pin
- 36. Compression Spring
- 37. Spiral Pin
- 38. Hex Nut
- 39. Hinge Mtg. Bracket
- 40. Hinge Pin
- 41. Speed Nut Cap
- 42. Torsion Spring
- 43. Hex Jam Nut
- 44. Shoulder Bolt
- 45. Hex Flanged Lock Nut
- 46. Hex Nylon Top Lock Nut
- 47. Danger Label
- 48. Deflector Chute

Figure 5-51. Deck and Attachments (Model 190 - 300 Mower Deck).

1. Tension Handle
2. Double Pulley Pivot Arm
3. Idler Arm
4. Flange Bearing
5. Flat Washer
6. Idler Bracket Spacer
7. Lube Fitting
8. Hex Cap Screw
9. Hex Center Lock Nut
10. Flat Idler Pulley
11. Hex Flanged Lock Nut
12. Spacer
13. Hex Cap Screw
14. Bell Washer
15. Center Cutting Blade (Short)
16. Bell Washer
17. Shoulder Spacer
18. Flat Washer
19. Hex Flanged Lock Nut
20. Extension Spring
21. Hex Nut
22. Hex Cap Screw
23. Extension Spring
24. Shoulder Bolt
25. Hex Flanged Lock Nut
26. Double Pulley
27. V-Pulley
28. Hex Jam Nut
29. Outer Cutting Blade (Long)
30. Spacer
31. Hex Nut
32. Flat Washer
33. Ball Bearing
34. Internal Snap Ring
35. Pulley Spacer
36. Hex Cap Screw
37. Flat Washer
38. PTO Belt
39. Spindle Belt
40. Hex Flanged Lock Nut
41. Hex Cap Screw
42. Flat Washer
43. Spindle Mounting Plate
44. Spindle Assembly

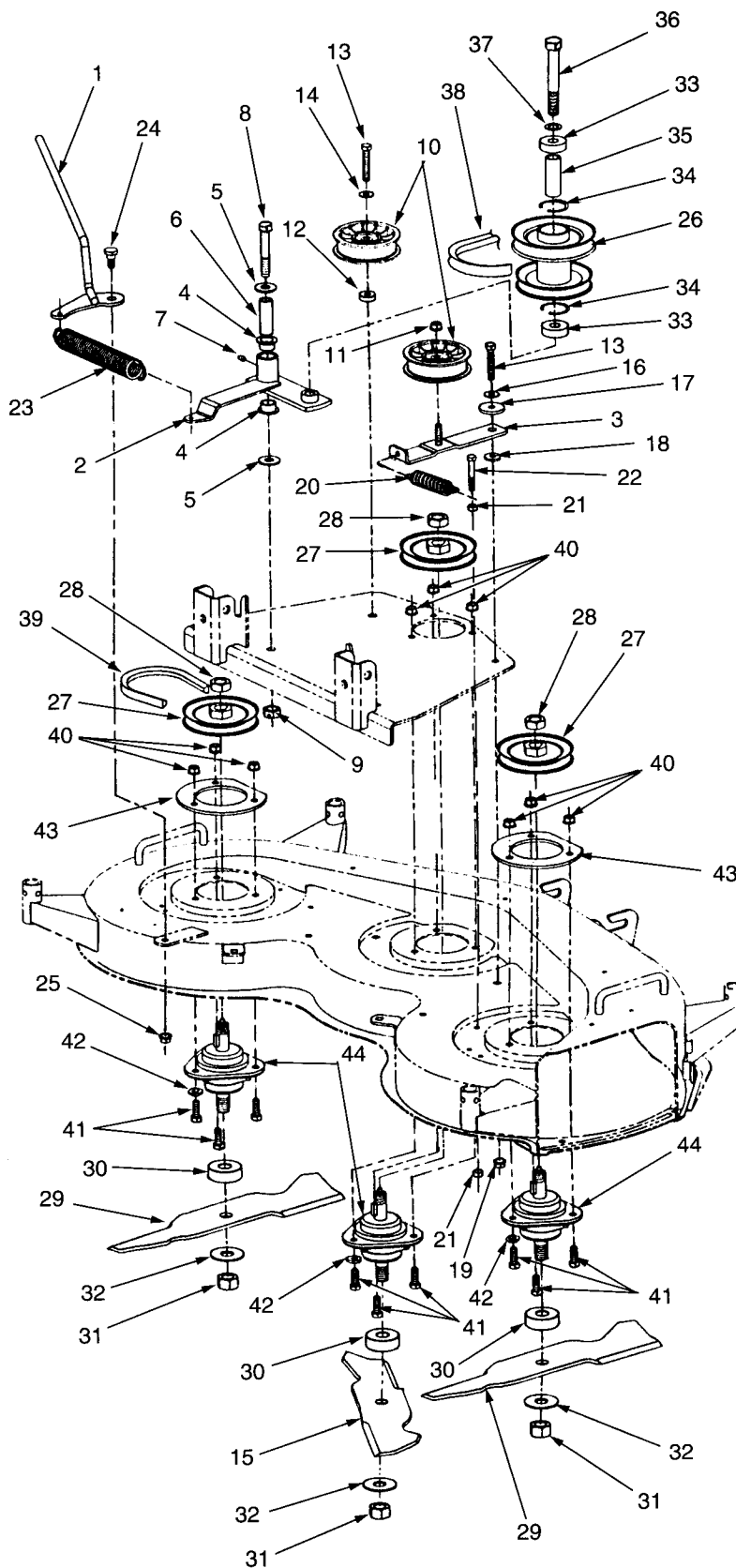


Figure 5-52. Deck Drive Components (Model 190 - 300 Mower Deck).

15. Remove the RH extension skirt (8, Fig. 5-51) from the underside of the deck housing by removing the two hex sems nuts (22) and carriage bolts (21).
16. Remove the center extension skirt (9, Fig. 5-51) from the underside of the deck housing by removing the five hex sems nuts (22) and carriage bolts (21).
17. Using a small drift punch, drive the spirol pins (37, Fig. 5-51) out of the mower support pins (35), and remove the support pins and compression springs (36) from the mounting plate.



WARNING

Use care when handling the mower blades (15 and 29, Fig. 5-52). Sharp edges of the blades could cause cuts to the skin.



WARNING

When the hex nut (31, Fig. 5-52) is removed, the spindle shaft, with V-pulley (27), is free to fall from the spindle assembly (44) when the deck is tipped or inverted to remove the blades. Use care to prevent these parts from falling, which could cause damage or injury.



NOTE

To prevent the spindle shaft from turning when removing the hex nut (31, Fig. 5-52) and/or hex jam nut (28), use a 1-1/4 inch wrench to hold the hex shaped hub of the V-pulley (27).

18. Remove the center cutting blade (15, Fig. 5-52) and spacer (30) from the spindle assembly (44) by removing the hex nut (31) and flat washer (32).



WARNING

If the woodruff key is removed from the spindle shaft when removing the V-pulley (27, Fig. 5-52), the shaft will be free to fall from the spindle housing and may cause damage or injury.

19. Remove the hex jam nut (28, Fig. 5-52) from the center spindle assembly (44) and pull the V-pulley (27) from the spindle shaft and woodruff key.
20. Remove the center spindle assembly (44, Fig. 5-52) from the mounting plate (2, Fig. 5-51) and deck housing (1) by removing the hex flanged lock nuts (40, Fig. 5-52), hex cap screws (41), and flat washers (42).
21. Remove the mounting plate (2, Fig. 5-51) from the deck housing (1) by removing the hex flanged lock nuts (18) and carriage bolts (13).
22. Carefully remove the outer cutting blades (29, Fig. 5-52) and spacers (30) by removing the hex nuts (31) and flat washers (32).
23. Remove the hex jam nuts (28, Fig. 5-52) from the outer spindle assemblies (44) and pull the V-pulleys (27) from the spindle shafts and keys.
24. Remove the outer spindle assemblies (44) and spindle mounting plates (43) from the deck housing by removing the hex flanged lock nuts (40, Fig. 5-52), hex cap screws (41), and flat washers (42).
25. If necessary, note the hole location and remove the hex cap screw (22, Fig. 5-52) and upper hex nut (21) from the deck housing by removing the lower hex nut (21).

5-35.3 Disassembly.



NOTE

Disassembly, inspection, and reassembly of the spindle assemblies (44, Fig. 5-52) are covered in paragraph 5-37.

1. Remove the flat idler pulley (10, Fig. 5-52) from the idler arm (3) by removing the hex flanged lock nut (11).
2. Remove the double pulley (26, Fig. 5-52) assembly from the pulley pivot arm (2) by removing the hex cap screw (36) and flat washer (37).
3. Disassemble the double pulley (26) assembly as follows:
 - a. Slide the ball bearing (33) from each end of the pulley hub and remove the pulley spacer (35).
 - b. Remove the internal snap rings (34) from inside the pulley hub.

4. Disassemble the double pulley pivot arm (2) assembly as follows:
 - a. Slide the idler brkt. spacer (6) from the hub of the pivot arm.
 - b. If necessary, press the flange bearings (4) from each end of the pivot arm hub. Discard and replace the bearings if removed.
 - c. Remove the lube fitting (7), only if necessary, by pulling from the pivot arm hub. The lube fitting must be replaced if removed.
5. Disassemble the front lift rod/ lift bracket (6 and 7, Fig. 5-51) assembly as follows:
 - a. After first marking the location of the hex jam nuts (43) on the threads of the lift rod (6), remove the hex nylon top lock nuts (46) to separate the lift rod from the front lift bracket (7).
 - b. Remove the shoulder bolts (44) and hex flanged lock nuts (45) from the front lift bracket.
 - c. Remove the hex jam nuts (43) from the front lift rod (6).

NOTE

The deflector assembly (5, Fig. 5-51) should not be disassembled unless absolutely necessary. To ensure correct reassembly, note the direction of the coil windings and the position of the spring ends before removing the torsion spring (42).

6. Disassemble the deflector assembly (5) as follows:
 - a. Twist the speed nut cap (41) off the hinge pin (40). Discard the speed nut.
 - b. While holding the assembly together, withdraw the hinge pin.
 - c. Separate the deflector chute (48) from the hinge mtg. bracket (39) and remove the torsion spring (42).

5-35.4 Inspection. Clean all parts prior to inspection.

1. Inspect the deck housing for cracked or broken welds.
2. Inspect the deck housing for distortion, stress cracks, corrosion, and excessive wear.

3. Inspect all threaded areas for damage.
4. Check the ball bearings and idler pulley bearings for binding or excessive play, indicating internal wear.
5. Inspect the pulleys for bent or split sheaves, and for damaged or worn keyways.
6. Inspect the flange bearings for wear or damage.
7. Inspect the shoulder spacer (17, Fig. 5-52) and idler arm (3) for wear to mating surfaces.
8. Inspect the V-belts for excessive wear or damage.
9. Check the cutting blades for wear or damage.
10. Inspect all springs for irregular coil spacings, indicating distortion or loss of tension.
11. Check for a loose or unreadable danger label (47, Fig. 5-51). Replace if either condition exists.
12. Inspect all other parts for wear, bends, cracks, and corrosion.

5-35.5 Repair.

1. Reweld broken welds, if possible.
2. Deburr and dress damaged threads.
3. Repair minor surface damage or corrosion.
4. Replace the shoulder spacer and/or idler arm if worn.
5. Replace defective ball bearings and idler pulleys.
6. Replace damaged or worn pulleys and/or V-belts.
7. Replace damaged or weak springs.
8. Replace an excessively distorted deck housing, mounting plate, belt cover, extension skirt, idler arm, front lift rod or lift bracket.

5-35.6 Reassembly.

1. Reassemble the deflector assembly (5, Fig. 5-51) as follows:



CAUTION

When assembled correctly, the torsion spring (42) will hold the deflector chute in the down position. Before installing the new speed nut cap on

the hinge pin (step f. below), check the spring tension by pulling the chute upward. Tension should be felt immediately and should increase as the chute is raised. If little or no tension is felt, the torsion spring is either incorrectly installed, not properly loaded, or is worn and should be replaced.

- a. Secure the hinge mtg. bracket (39) by clamping in a vise, or by fastening it to the deck housing with the hex cap screws (10), bell washers (12) and hex nuts (11).
 - b. Position the deflector chute (48) on the mtg. bracket (39) and insert the hinge pin (40) just through rear hole of the chute and mtg. bracket.
 - c. Position the torsion spring (42) between the chute and mtg. bracket, with the *short end* of the spring inserted into the hole toward the rear of the deflector chute. Push the hinge pin partially through the spring.
 - d. Holding the assembly together, load the spring by turning the *long spring end* in the same direction as the coil windings until it is positioned atop the mounting surface of the mtg. bracket (approximately 1/2 turn).
 - e. While continuing to hold the assembly, push the hinge pin completely through the spring, mtg. bracket, and deflector chute. Check the spring tension as described above.
 - f. Block the headed end of the hinge pin and push (tap) a new speed nut cap (41) onto the hinge pin.
2. Reassemble the front lift rod/lift bracket (6 and 7, Fig. 5-51) assembly as follows:
- a. Screw the hex jam nuts (43) onto the front lift rod (6) to the positions marked when disassembling.
 - b. Install the shoulder bolts (44) in the front lift bracket (7) with the hex flanged lock nuts (45).
 - c. With the form (bend) in the rod pointing downward toward the bottom (notched) surface of the lift bracket, install the front lift rod in the front lift bracket. The closed area of the rod should angle upward, if correctly installed.

- d. Secure with the hex nylon top lock nuts (46). Do not tighten the top lock nuts (46) until making the final adjustment when installing and leveling the deck on the tractor.

3. Reassemble the double pulley pivot arm (2, Fig. 5-52) assembly as follows:
- a. If previously removed, use a protective sleeve and drive the new lube fitting (7) into the pivot arm hub.
 - b. Press a new flange bearing (4) into each end of the pivot arm hub.
 - c. Apply a thin coating of Cub Cadet 251H EP grease to the I.D. and O.D. of the idler brkt. spacer (6), then slide the spacer into the flange bearings.
4. Reassemble the double pulley (26, Fig. 5-52) assembly as follows:
- a. Install the internal snap ring (34) in the ring groove at each end of the pulley hub.
 - b. Place the pulley spacer (35) inside the pulley hub and slide a ball bearing (33) into each end of the hub. A thin coat of Loctite bearing adhesive may be applied to outside diameter of the bearings, if desired.
5. With the larger diameter pulley facing upward, install the double pulley assembly on the double pulley pivot arm using the hex cap screw (36) and flat washer (37).
6. With the extended hub of the idler pulley facing downward, install the flat idler pulley (10, Fig. 5-52) on the idler arm (3) using the hex flanged lock nut (11).

5-35.7 Installation.

1. Insert the hex cap screw (22, Fig. 5-52), with upper hex nut (21), in the proper hole of the deck housing. Install the lower hex nut (21) flush with the end of the screw, and secure by tightening the upper nut against the top of the deck housing.



If removed with the V-pulleys (27, Fig. 5-52), tap the woodruff keys into the keyways of the spindle shafts.

2. Install the outer spindle assemblies (44) from underneath the deck housing. Position the spindle mounting plates (43) on top and secure with the hex cap screws (41), flat washers (42) and hex flanged lock nuts (40).
3. Align the keyways of the V-pulleys (27) with the woodruff keys and install the outer pulleys on the spindle assemblies. Secure with the hex jam nuts (28). Torque the jam nuts to 50 to 60 ft-lbs.
4. Install the spacers (30, Fig. 5-52), outer (longer) cutting blades (29), and flat washers (32) onto the bottom of the spindle assemblies and secure with the hex nuts (31). Torque the hex nuts to 90 to 110 ft-lbs.
5. Position the mounting plate (2, Fig. 5-51) on the deck housing and *loosely* secure with the two carriage bolts (13) and hex flanged lock nuts (18).
6. Install the center spindle assembly (44) from the underside of the deck housing. Align the spindle, deck housing, and mounting plate and secure with the hex cap screws (41), flat washers (42) and hex flanged lock nuts (40).
7. Tighten the hex flanged lock nuts (18) and carriage bolts (13) securing the rear of the mounting plate.
8. Align and install the center V-pulley (27) on the center spindle with the hex jam nut (28). Torque the nut to 50 to 60 ft-lbs.
9. Install the spacer (30), center (short) cutting blade (15), and flat washer (32) on the center spindle and secure with the hex nut (31). Torque the hex nut to 90 to 110 ft-lbs.
10. Install the mower support pins (35, Fig. 5-51) in the hanger brackets of the mounting plate (2, Fig. 5-51) as follows:
 - a. Insert the support pin through the hole in the outer side of the hanger bracket.
 - b. Position the compression spring (36, Fig. 5-51) between the sides of the hanger bracket and push the support pin through the spring.
 - c. With the hole in the support pin positioned within the sides of the hanger bracket, compress the spring toward the outer side of the hanger bracket to expose the hole.
 - d. Block the support pin and drive the spiral pin (37, Fig. 5-51) into the hole of the support pin.
11. Install the center extension skirt (9, Fig. 5-51) on the underside of the front edge of the deck housing with the five carriage bolts (21) and hex sems nuts (22).
12. Install the RH extension skirt (8, Fig. 5-51) on the deck housing with the two carriage bolts (21) and hex sems nuts (22).
13. Position the deck roller (33, Fig. 5-51) between the front deck brackets and insert the roller pin (32). Make certain the short end of the roller pin engages the rear hole in the right hand bracket. Secure with the cotter pin (34).



WARNING

Never operate the mower deck without the deflector assembly (5, Fig. 5-51) installed and the deflector chute in the down position.



NOTE

If the deflector assembly (5, Fig. 5-51) was re-assembled with the hinge mtg. bracket (39) fastened to the deck housing (see paragraph 5-35.6 step1), skip the following step 14.

14. Install the deflector assembly (5) on the deck housing using the hex cap screws (10), bell washers (12), and hex nuts (11).
15. Slide the flat washers (30, Fig. 5-51), ball wheels (28), and bell washers (27) onto the longer shoulder bolts (29) and install in the front deck axles (23). The crown (rounded surface) of the bell washer must be against the shoulder of the bolts.
16. Slide the deck wheels (25, Fig. 5-51) and bell washers (27) onto the shoulder bolts (26) and install in the rear deck axles (23). The crown (rounded surface) of the bell washer should be against the shoulder of the bolts.



NOTE

To facilitate later installation of the deck, position the deck axle/wheel assemblies perpendicular to the deck and in their highest settings when installing.

17. Slide the deck axle/wheel assemblies into the proper wheel brackets of deck housing, then insert the clevis pins (24, Fig. 5-51) in the lowest hole of the axles, through the front to back holes of the deck wheel brackets.
18. Insert the hex cap screw (8, Fig. 5-52) through the flat washer (5), pulley pivot arm/double pulley (2 and 26) assembly, and the second flat washer (5); then install on the mounting plate and secure with the hex center lock nut (9).
19. With the extended hub of the idler pulley facing downward, install the fixed flat idler pulley (10, Fig. 5-52) and spacer (12) on the mounting plate using the hex cap screw (13) and bell washer (14). The crown (rounded surface) of the bell washer must be against the head of the screw.
20. Apply a thin coating of Cub Cadet 251H EP grease to the outer surface of the shoulder spacer (17, Fig. 5-52) and insert into the idler arm (3).
21. Install the flat washer (18, Fig. 5-52) and idler arm/shoulder spacer assembly on the mounting plate using the hex cap screw (13), bell washer (16) and hex flanged lock nut (19).
22. Hook the extension spring (20, Fig. 5-52) to the idler arm (3) and hex cap screw (22).
23. Install the spindle belt (39, Fig. 5-52) as follows:
 - a. In a counterclockwise direction, route the belt as follows:
 - Around the double pulley, right spindle pulley, and center spindle pulley.
 - Around the left side of center pulley to the right side and behind the fixed idler pulley.
 - Around the left spindle pulley.
 - b. While pulling the movable idler pulley/idler arm to the left to tension the extension spring (20), route the section of belt between the left spindle pulley and double pulley around the front and right sides of the idler pulley.
 - c. If correctly installed, the back (flat) side of the belt will be against the idler pulleys, and the belt will be tensioned.
24. Install the tension handle (1, Fig. 5-52) on the deck housing (1, Fig. 5-51) with the shoulder bolt (24, Fig. 5-52) and hex flanged lock nut (25).
25. Rotate the tension handle (1, Fig. 5-52) rearward and hook the extension spring (23) into the top of the double pulley pivot arm (2) and bottom of the tension handle.
26. If previously removed, screw new hex cutting screws (14, Fig. 5-51) up into the deck housing.
27. Install the handle stop bracket (15, Fig. 5-51) in the previously noted position. Secure with the flat washer (16) and hex nut (17), tightened only until snug.
28. Rotate the tension handle forward to lock in the handle stop bracket. Adjust the stop bracket to align with the tension handle, then completely tighten the hex nut (17).
29. Install the LH belt cover (3, Fig. 5-51) with the two hex wash. tapp screws (19) and flat washers (20).
30. Install the RH belt cover (4, Fig. 5-51) using the hex wash. tapp screw (19), hex nut (38), and flat washers (20).
31. Apply Cub Cadet 251H EP grease to the lube fittings of the spindle assemblies, ball wheels, and the double pulley pivot arm.
32. Snap the front lift rod/lift bracket assembly into the quick attach brackets on the tractor frame.
33. Install the PTO V-belt on the PTO clutch of the tractor.
34. Install the mower deck on the tractor; check the deck leveling to make the final adjustment of the front lift rod/lift bracket assembly; and reposition the deck wheels.

5-36 48-INCH MOWER DECK (Model 190-301).

5-36.1 **General.** Mower deck Model 190-301 is designed for usage on Tractor Models 2160, 2165, and 2185.

5-36.1.1 Additional information regarding V-belt failures and mowing deck operation can be found in Appendices F and G.

5-36.1.2 Model 2160, 2165 and 2185 Tractors are standardly equipped with a RH lift assist rod and spring assembly (see Fig. 5-20). The 48 inch deck, Model 190-301, requires installation of a LH lift assist rod and spring assembly. Refer to paragraph 5-17 for information regarding these assemblies.

5-36.2 Removal.



WARNING

Engage the parking brake before removing the mower deck from the tractor. Let the engine cool if the tractor has been recently operated.



NOTE

Remove the mower deck from the tractor (see Owner's Manual for correct procedure) and thoroughly clean the entire deck before beginning any repair procedures. Remove the front lift rod/lift bracket (19 and 20, Fig. 5-53) assembly from the tractor frame.

1. If not done previously, release the tension handle (2, Fig. 5-54) from the handle stop bracket (17, Fig. 5-53), and also remove the PTO belt (42, Fig. 5-54) from the PTO clutch.
2. Remove the LH belt cover (5, Fig. 5-53) by removing the two thumb screws (31) and bell washers (32), then sliding the cover inward to separate the three locking tabs from the LH caster channel (7).
3. Note the position of the handle stop bracket (17, Fig. 5-53), then remove the bracket from the LH belt cover by removing the hex cap screw (34) and hex flange lock nut (35). Pull the button plug (33) from the cover.

4. Remove the RH belt cover (6, Fig. 5-53) by removing the two thumb screws (31) and bell washers (32); then sliding the cover inward to separate from the RH caster channel (8). Pull the button plug (33) from the cover.
5. Rotate the tension handle (2, Fig. 5-54) rearward to remove the extension spring (10) from the tension handle and pulley pivot arm (1).
6. Remove the tension handle (2, Fig. 5-54) from the deck housing by removing the hex flanged lock nut (12) and shoulder bolt (11).
7. Pull the movable flat idler pulley (14, Fig. 5-54) and idler arm (3) away from the spindle V-belt (43) to release the tension and remove the V-belt from the deck.
8. Remove the extension spring (29, Fig. 5-54) from the idler arm (3) and shoulder bolt (30).



WARNING

Never operate the mower deck without the deflector chute assembly (34, Fig. 5-53) installed and in the down position.



NOTE

To ensure correct re-installation of the deflector chute (24, Fig. 5-53), note the direction of the coil windings and the position of the spring ends before removing the hinge pin (26) and torsion spring (27).

9. Remove the deflector chute (24, Fig. 5-53) as follows:
 - a. Raise the deflector chute and slightly deflect the chute to access the rear end of the hinge pin (26).
 - b. Using a drift punch and mallet on the rearward end of the hinge pin, drive the pin partially out of the front end of the deflector chute.
 - c. Grasp the forward end of the hinge pin with a suitable tool (pliers, vise grips, etc).

- d. While holding the chute and torsion spring (27) in place, pull the hinge pin from the deflector chute.
 - e. Carefully lift the chute from the RH caster channel (8) and remove the torsion spring.
10. Pull the clevis pins w/detent ball (39, Fig. 5-53) from the rear of the LH and RH caster channels (7 and 8), and remove the rear deck axle/ball wheel assemblies (21 and 22).
 11. Remove the caster wheel assemblies (11, Fig. 5-53) as follows:
 - a. Remove the hex cap screw (42) and lock washer (43) from the front end of both the LH and RH caster channels (7 and 8).
 - b. Remove the four hex flanged lock nuts (40) and carriage bolts (41) fastening each caster channel to the deck housing and remove the LH and RH caster channels (7 and 8).
 - c. Pull the clevis pins w/detent ball (39) from the front casters (9) and slide the caster wheel assemblies (11) off the LH and RH caster spindles (2 and 3).



NOTE

For reassembly purposes, note the hex cap screw (22, Fig. 5-54) fastening the idler arm (3) to the mounting plate (4, Fig. 5-53) is the same hex cap screw (46, Fig. 5-53) that fastens the front right mounting tab of the rear inner baffle (14, Fig. 5-53) to the underside of the deck.

12. Remove the idler arm (3, Fig. 5-54), flat idler pulley (14), and shoulder spacer (20) as an assembly by removing the hex flanged lock nut (19), hex cap screw (22), and flat washer (21). Separate the shoulder spacer from the idler arm.

Legend For Figure 5-53.

- | | | |
|-------------------------------|------------------------------|----------------------------|
| 1. Deck Housing | 25. Roller Pin | 49. Hex Cap Screw |
| 2. LH Caster Spindle | 26. Hinge Pin | 50. Carriage Bolt |
| 3. RH Caster Spindle | 27. Torsion Spring | 51. Hex Flanged Lock Nut |
| 4. Mounting Plate | 28. Mower Support Pin | 52. Cotter Pin |
| 5. LH Belt Cover | 29. Compression Spring | 53. Hex Flanged Lock Nut |
| 6. RH Belt Cover | 30. Spiral Pin | 54. Carriage Bolt |
| 7. LH Caster Channel | 31. Thumb Screw | 55. Hex Nylon Top Lock Nut |
| 8. RH Caster Channel | 32. Bell Washer | 56. Hex Jam Nut |
| 9. Front Caster | 33. Button Plug | 57. Shoulder Bolt |
| 10. Caster Wheel Bracket | 34. Hex Cap Screw | 58. Hex Flanged Lock Nut |
| 11. Caster Wheel Assembly | 35. Hex Flange Top Lock Nut | 59. Shoulder Bolt |
| 12. Front Roller Bracket | 36. U-Nut | 60. Flat Washer |
| 13. Finger Guard | 37. Carriage Bolt | 61. Bell Washer |
| 14. Rear Inner Baffle | 38. Hex Flanged Lock Nut | 62. Step Shoulder Bolt |
| 15. Front Deck Baffle | 39. Clevis Pin w/Detent Ball | 63. Hex Flanged Lock Nut |
| 16. Mounting Strap | 40. Hex Flanged Lock Nut | 64. Hex Top Lock Nut |
| 17. Handle Stop Bracket | 41. Carriage Bolt | 65. Wave Washer |
| 18. Chute Deflector Stop | 42. Hex Cap Screw | 66. Flat Washer (Hdn) |
| 19. Front Lift Bracket | 43. Lock Washer | 67. Flange Bearing |
| 20. Front Lift Rod | 44. Carriage Bolt | 68. Flat Washer (Hdn) |
| 21. Rear Deck Axle | 45. Hex Flanged Lock Nut | 69. Lube Fitting |
| 22. Ball Wheel w/Lube Fitting | 46. Hex Cap Screw | 70. Danger Label |
| 23. Front Roller | 47. Hex Flanged Lock Nut | |
| 24. Deflector Chute | 48. Spacer | |

13. Remove the rear inner baffle (14, Fig. 5-53) from the underside of the deck by removing the three hex flanged lock nuts (45) and carriage bolts (44). Note the front/left carriage bolt also secures the mounting plate (4).
14. Remove the mounting plate (4, Fig. 5-53), double pulley pivot arm (1, Fig. 5-54), and double pulley (23, Fig. 5-54) as one assembly by removing the remaining two hex flanged lock nuts (45, Fig. 5-53) and carriage bolts (44).
15. Remove the fixed flat idler pulley (14, Fig. 5-54) and spacer (15) from the deck housing (1, Fig. 5-53) by removing the hex cap screw (16) and hex flanged lock nut (13).

NOTE

Some early production decks may not be equipped with the front deck baffle (15, Fig. 5-53), spacers (48), and hex cap screws (49). Refer to Service Bulletin CC-276.

16. Remove the LH caster spindle (2, Fig. 5-53), front deck baffle (15), and spacers (48) by removing the hex flanged lock nuts (47) and hex cap screws (49).
17. Note the location of the of the chute deflector stop (18, Fig. 5-53), then remove the RH caster spindle (3) and chute deflector stop (18) by removing the hex flanged lock nuts (51) and carriage bolts (50).
18. Remove the finger guard (13, Fig. 5-53) from the bottom of the deck housing by removing the three hex flanged lock nuts (51) and carriage bolts (50).
19. Pull the two U-nuts (36, Fig. 5-53) from each mounting strap (16).
20. Remove the two mounting straps (16, Fig. 5-53) from the deck housing by removing the hex flanged lock nuts (36) and carriage bolts (37).
21. Remove the cotter pin (52, Fig. 5-53) and withdraw the roller pin (25) to remove the front roller (23).
22. Remove the front roller bracket (12, Fig. 5-53) by removing the hex flanged lock nuts (53) and carriage bolts (54).



WARNING

Use care when handling the mower blades (32, Fig. 5-54). Sharp edges of the blades could cause cuts to the skin.



WARNING

When the hex nut (33, Fig. 5-54) is removed, the spindle shaft, with V-pulley (35), is free to fall from the spindle assembly (38) when the deck is tipped or inverted to remove the blades. Use care to prevent these parts from falling, which could cause damage or injury.



NOTE

To prevent the spindle shaft from turning when removing the hex nut (33, Fig. 5-54) and/or hex jam nut (36), use a 1-1/4 inch wrench to hold the hex shaped hub of the V-pulley (35).

23. Remove the cutting blades (32, Fig. 5-54) from the spindle assemblies (38) by removing the hex nuts (33) and flat washers (34).



WARNING

If the woodruff key is removed from the spindle shaft when removing the V-pulley (35, Fig. 5-54), the shaft will be free to fall from the spindle housing and may cause damage or injury.

24. Remove the hex jam nuts (36) and pull the V-pulleys (35) from the spindle shafts and woodruff keys.
25. Using care to prevent the spindle shaft from sliding through the spindle assembly, pull the woodruff keys from the shafts to remove the spacers (37, Fig. 5-54).
26. Remove the spindle assemblies (38) from the deck housing by removing the hex cap screws (40), hex flanged lock nuts (39) and flat washers (41).
27. If necessary, note the hole location and remove the shoulder bolt (30, Fig. 5-54) and hex flange lock nut (31) from the deck housing.

1. Double Pulley Pivot Arm
2. Tension Handle
3. Idler Arm
4. Flange Bearing
5. Hex Center Lock Nut
6. Idler Bracket Spacer
7. Flat Washer
8. Lube Fitting
9. Hex Cap Screw
10. Extension Spring
11. Shoulder Bolt
12. Hex Flanged Lock Nut
13. Hex Flanged Lock Nut
14. Flat Idler Pulley
15. Spacer
16. Hex Cap Screw
17. Hex Flanged Lock Nut
18. Hex Cap Screw
19. Hex Flanged Lock Nut
20. Shoulder Spacer
21. Flat Washer
22. Hex Cap Screw
23. Double Pulley
24. Hex Cap Screw
25. Flat Washer
26. Ball Bearing
27. Pulley Spacer
28. Internal Snap Ring
29. Extension Spring
30. Shoulder Bolt
31. Hex Flange Lock Nut
32. Cutting Blade
33. Hex Nut
34. Flat Washer
35. V-Pulley
36. Hex Jam Nut
37. Spacer
38. Blade Spindle Assembly
39. Hex Flanged Lock Nut
40. Hex Cap Screw
41. Flat Washer
42. PTO Belt
43. Spindle Belt

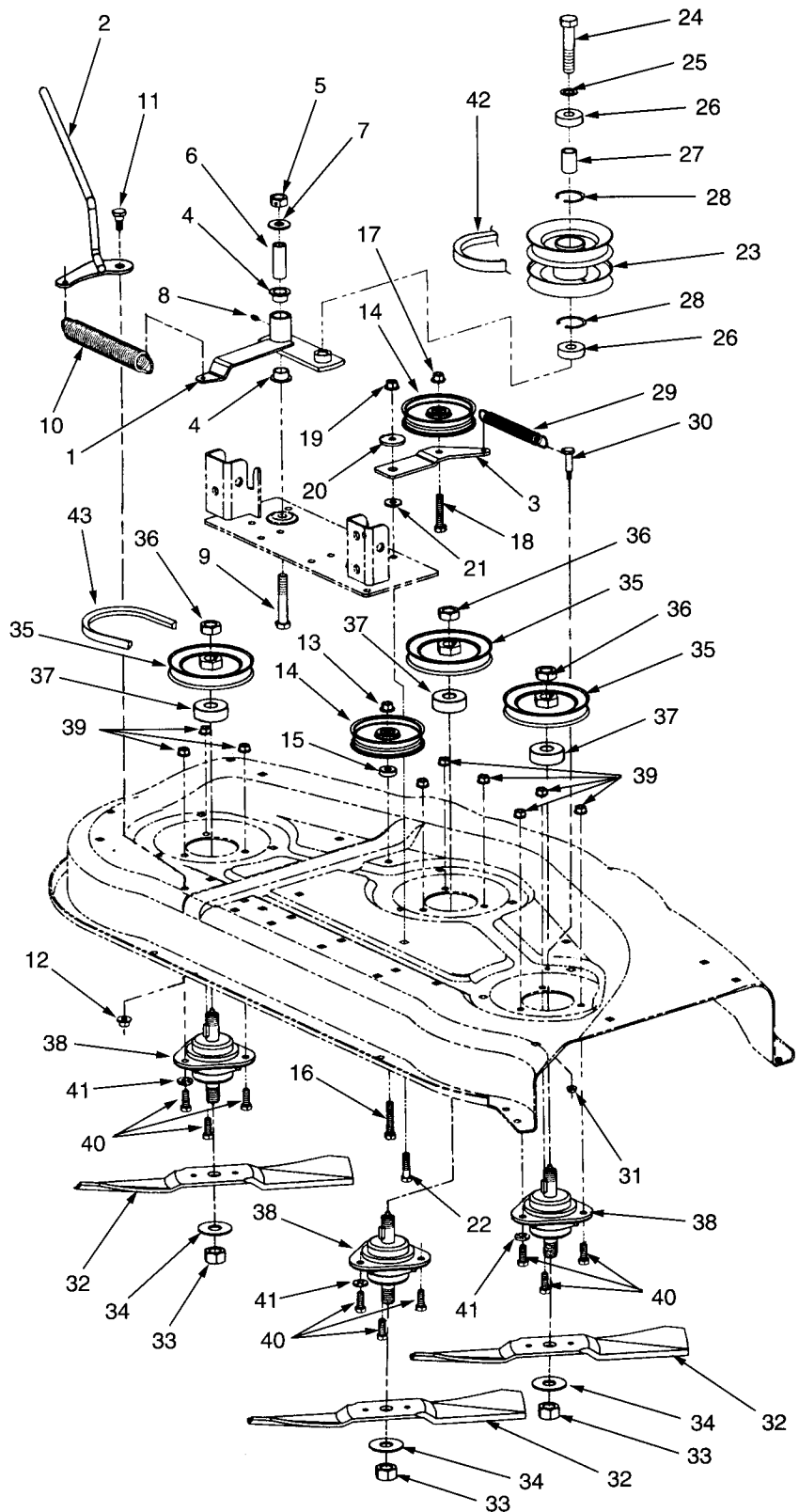


Figure 5-54. Deck Drive Components (Model 190 - 301 Mower Deck).

5-36.3 Disassembly.



Disassembly, inspection, and reassembly of the spindle assemblies (38, Fig. 5-54) are covered in paragraph 5-37.

1. Remove the ball wheels (22, Fig. 5-53) from the rear deck axles (21) by removing the shoulder bolts (59), flat washers (60) and bell washers (61).
2. Disassemble the caster wheel assemblies (11, Fig. 5-53) as follows:
 - a. Remove the ball wheel (22) and flat washer (60) from each caster wheel bracket (10) by removing the hex flanged lock nut (63) and step shoulder bolt (62).
 - b. Remove the top lock nut (64), wave washer (65) and hardened flat washer (66), then remove the caster wheel bracket (10) and large hardened washer (68) from the front caster (9).
 - c. If replacement is needed, drive the flange bearings (67) out of each end of the front caster tube. Discard the bearings
 - d. If necessary, pull the lube fitting (69) from the front caster tube. Discard the fitting if removed.
3. Disassemble the front lift rod/ lift bracket (20 and 19, Fig. 5-53) assembly as follows:
 - a. After first marking the location of the hex jam nuts (56) on the threads of the lift rod (20), remove the hex nylon top lock nuts (55) to separate the lift rod from the front lift bracket (19).
 - b. Remove the shoulder bolts (57) and hex flanged lock nuts (58) from the front lift bracket.
 - c. Remove the hex jam nuts (56) from the front lift rod (20).
4. As one assembly, remove the double pulley pivot arm (1, Fig. 5-54) and double pulley (23) from the mounting plate (4, Fig. 5-53) by removing the hex center lock nut (5), hex cap screw (9), and flat washer (7).
5. Remove the double pulley (23, Fig. 5-54) assembly from the pulley pivot arm (1) by removing the hex cap screw (24) and flat washer (25).
6. Disassemble the double pulley pivot arm (1) assembly as follows:
 - a. Slide the idler bracket spacer (6) from the hub of the pivot arm.
 - b. If necessary, press the flange bearings (4) from each end of the pivot arm hub. Discard the bearings and replace with new.
 - c. Remove the lube fitting (8), only if necessary, by pulling from the pivot arm hub. The lube fitting must be replaced if removed.
7. Disassemble the double pulley assembly (23) as follows:
 - a. Slide the ball bearing (26) from each end of the pulley hub and remove the pulley spacer (27).
 - b. Remove the internal snap rings (28) from inside the pulley hub.
8. Remove the flat idler pulley (14, Fig. 5-54) from the idler arm (3) by removing the hex flanged lock nut (17) and hex cap screw (18).
9. Using a small drift punch, drive the spirol pins (30, Fig. 5-53) out of the mower support pins (28), and remove the support pins and compression springs (29) from the mounting plate.

5-36.4 Inspection. Clean all parts prior to inspection.

1. Inspect all welded components for cracked, broken or poor welds.
2. Inspect the deck housing for distortion, stress cracks, corrosion, and excessive wear.
3. Inspect all threaded areas for damage.
4. Check the ball bearings and idler pulley bearings for binding or excessive play, indicating internal wear.
5. Inspect the pulleys for bent or split sheaves, and for damaged or worn keyways.
6. Inspect the flange bearings for wear or damage.
7. Inspect the shoulder spacer (20, Fig. 5-54) and idler arm (3) for wear to mating surfaces.
8. Inspect the V-belts for excessive wear or damage.

9. Check the cutting blades for wear or damage.
10. Inspect all springs for irregular coil spacings, indicating distortion or loss of tension.
11. Check for a loose or unreadable danger label (70, Fig. 5-53). Replace if either condition exists.
12. Check the ball wheels for wear and for missing or defective lube fittings.
13. Inspect all other parts for distortion, wear, bends, cracks, and corrosion.

5-36.5 Repair.

1. Reweld broken welds, if possible.
2. Deburr and dress damaged threads.
3. Repair minor surface damage or corrosion.
4. Replace the shoulder spacer and/or idler arm if worn.
5. Replace defective ball bearings and idler pulleys.
6. Replace damaged or worn pulleys and/or V-belts.
7. Replace damaged or weak springs.
8. Replace missing or defective lube fittings.
9. Replace damaged or worn flange bearings.
10. Replace an excessively distorted deck housing, mounting plate, belt cover, idler arm, caster channel, deck baffle, front lift rod and/or front lift bracket.

5-36.6 Reassembly.

1. Install the mower support pins (28, Fig. 5-53) in the hanger brackets of the mounting plate (4) as follows:
 - a. Insert the support pin (28) through the hole in the outer side of the hanger bracket.
 - b. Position the compression spring (29) between the sides of the hanger bracket and push the support pin through the spring.
 - c. With the hole in the support pin positioned within the sides of the hanger bracket, compress the spring toward the outer side of the hanger bracket to expose the hole.
- d. Block the support pin and drive the spirol pin (30) into the hole of the support pin.
2. With the extended hub of the idler pulley facing downward, install the flat idler pulley (14, Fig. 5-54) on the idler arm (3) using the hex cap screw (18) and hex flanged lock nut (17).
3. Reassemble the double pulley (23, Fig. 5-54) assembly as follows:
 - a. Install the internal snap ring (28) in the ring groove at each end of the pulley hub.
 - b. Place the pulley spacer (27) inside the pulley hub and slide a ball bearing (26) into each end of the hub. A thin coat of Loctite bearing adhesive may be applied to outside diameter of the bearings, if desired.
4. Reassemble the double pulley pivot arm (1, Fig. 5-54) assembly as follows:
 - a. If previously removed, use a protective sleeve and drive the new lube fitting (8) into the pivot arm hub.
 - b. Press a new flange bearing (4) into each end of the pivot arm hub.
 - c. Apply a thin coating of Cub Cadet 251H EP grease to the I.D. and O.D. of the idler brkt. spacer (6), then slide the spacer into the flange bearings.
5. With the wider (for 5/8" V-belt) pulley facing upward, install the double pulley assembly on the double pulley pivot arm using the hex cap screw (24) and flat washer (25).
6. Insert the hex cap screw (9, Fig. 5-54) up through the underside of the adapter plate and install the pulley pivot arm/double pulley assembly on the adapter plate. Secure with flat washer (7) and hex center lock nut (5).
7. Reassemble the front lift rod/lift bracket (20 and 19, Fig. 5-53) assembly as follows:
 - a. Screw the hex jam nuts (56) onto the front lift rod (20) to the positions marked when disassembling.
 - b. Install the shoulder bolts (57) in the front lift bracket (19) with the hex flanged lock nuts (58).

- c. With the form (bend) in the rod pointing downward toward the bottom (notched) surface of the lift bracket, install the front lift rod in the front lift bracket. The closed area of the rod should angle upward, if correctly installed.
 - d. Secure with the hex nylon top lock nuts (55). Do not tighten the top lock nuts (55) until making the final adjustment when installing and leveling the deck on the tractor.
8. Reassemble each caster wheel assembly (11, Fig. 5-53) as follows:
 - a. If previously removed, use a protective sleeve and drive the new lube fitting (69) into each front caster (9) tube.
 - b. Press the new flange bearing (67) into each end of the front caster (9) tube.
 - c. Slide the large hardened flat washer (68) onto the shaft of the caster wheel bracket (10).
 - d. With the clevis pin holes (in rear tube) of the caster (9) positioned downward, insert the caster wheel bracket (10) up through the bottom of the front caster tube.
 - e. Install the hardened flat washer (66), wave washer (65), and hex top lock nut (64). Tighten the lock nut only until the wave washer is slightly compressed.
 - f. Position the ball wheel (22) and flat washer (60) in the caster wheel bracket (10) and install the step shoulder bolt (62) and hex flanged lock nut (63).
 9. Slide the flat washers (60, Fig. 5-53), ball wheels (22), and bell washers (61) onto the shoulder bolts (59) and install in the rear deck axles (21). The crown (rounded surface) of the bell washer must be against the shoulder of the bolts.
- 5-36.7 Installation.**
1. If previously removed, install the shoulder bolt (30, Fig. 5-54) in the proper hole of the deck housing and secure with the hex flange lock nut (31).
 2. Slide the spacers (37, Fig. 5-54) onto the keyed end of the spindle shafts and tap the woodruff keys into keyways of the shafts.
 3. Install the spindle assemblies (38, Fig. 5-54) from the under side of the deck housing and secure with hex cap screws (40), flat washers (41), and hex flanged lock nuts (39).
 4. Align the keyways of the V-pulleys (35, Fig. 5-54) with the woodruff keys and install the pulleys on the spindle assemblies. Secure with the hex jam nuts (36). Torque the jam nuts to 50 to 60 ft-lbs.
 5. Install the cutting blades (32, Fig. 5-54), and flat washers (34) onto the bottom of the spindle assemblies and secure with the hex nuts (33). Torque the hex nuts to 90 to 110 ft-lbs.
 6. Install the front roller bracket (12, Fig. 5-53) on the deck housing with the carriage bolts (54) and hex flanged lock nuts (53).
 7. Position the front roller (23, Fig. 5-53) inside the roller bracket (12) and insert the roller pin (25). Make certain the short end of the roller pin engages the rear hole in the right hand side of the bracket. Secure with the cotter pin (52).
 8. Install the two mounting straps (16, Fig. 5-53) on the deck housing with the carriage bolts (37) and hex flanged lock nuts (38).
 9. With the flat surface of the U-nuts facing upward, push two U-nuts (36, Fig. 5-53) onto each mounting strap.
 10. Install the finger guard (13, Fig. 5-53) on the bottom of the deck housing using the three carriage bolts (50) and hex flanged lock nuts (51).
 11. Install the RH caster spindle (3, Fig. 5-53) on the deck housing as follows:
 - a. Insert and hold the two carriage bolts (50) up through the bottom of the caster spindle (3).
 - b. Install the caster spindle onto the underside of the front flange of the deck housing. Continue holding the carriage bolts
 - c. Position the chute deflector stop (18) on the *right* (outer) carriage bolt, with the finger of the deflector stop pointing toward the right.
 - d. Secure with the hex flanged lock nuts (51).
 12. Install the LH caster spindle (2, Fig. 5-53) and front deck baffle (15) on the deck housing as follows:

- a. Insert the hex cap screws (49) up through the bottom of the mounting flange of the deck baffle (15).
 - b. Slide the spacers (48), then the LH caster spindle, onto the hex cap screws.
 - c. With the front deck baffle positioned inside the front left corner of the deck, install the caster spindle onto the underside of the deck flange.
 - d. Secure with the hex flanged lock nuts (47).
13. With the extended hub of the idler pulley facing downward, install the fixed flat idler pulley (14, Fig. 5-54) and spacer (15) on the deck housing using the hex cap screw (16) and hex flanged lock nut (13).
 14. Position the mounting plate (4, Fig. 5-53) assembly on the deck housing and install the two **rear** carriage bolts (44) and hex flanged lock nuts (45). Make certain the two front holes remain aligned with the holes in the deck housing when tightening the rear lock nuts.
 15. Position the rear inner baffle (14, Fig. 5-53) on the underside of the deck housing. Secure the baffle's rear mounting tabs and front/left tab with three carriage bolts (44) and hex flanged lock nuts (45). Note the front left carriage bolt also secures the front left corner of the mounting plate.
 16. Apply a thin coating of Cub Cadet 251H EP grease to the outer surface of the shoulder spacer (20, Fig. 5-54) and insert into the idler arm (3) assembly.
 17. Install the flat washer (21, Fig. 5-54) and the idler arm/shoulder spacer assembly on the mounting plate using the hex cap screw (22) and hex flanged lock nut (19). Note the hex cap screw should also secure the front right mounting tab of the inner baffle (14).
 18. Install the caster wheel assemblies (11, Fig. 5-53) as follows:
 - a. Slide the caster wheel assemblies onto the LH and RH caster spindles (2 and 3).
 - Raise the right caster wheel to its highest setting and insert the clevis pin (39) through the front caster.
 - Rotate the left caster wheel assembly outward and raise to its highest position, then insert the clevis pin into the hole of the caster spindle (2) *below* the caster tube.
 - b. Position the LH and RH caster channels (7 and 8, Fig. 5-53) on the deck housing and secure each with four carriage bolts (41) and hex flanged lock nuts (40).
 - c. Install the hex cap screw (42, Fig. 5-53) and lock washer (43) in the front hole of both the LH and RH caster channels to secure the top of the caster spindles (2 and 3).
 19. Slide the rear deck wheel assemblies (21 and 22) up into the rear tubes of the caster channels. Position the wheels perpendicular to the deck and insert the clevis pins (24, Fig. 5-51) in the lowest hole of the axles, through the front to back holes of the caster tubes.
 20. Install the deflector chute (24, Fig. 5-53) assembly as follows:



WARNING

Never operate the mower deck without the deflector chute assembly (34, Fig. 5-53) installed and in the down position.



CAUTION

When installed correctly, the torsion spring (27) will hold the deflector chute in the down position. Before driving the hinge pin completely into the deflector, check the spring tension by pulling the deflector upward. Tension should be felt immediately and should increase as the chute is raised. If little or no tension is felt, the torsion spring is either incorrectly installed, not properly loaded, or is worn and should be replaced.



NOTE

To facilitate later installation of the deck, install the rear deck wheel assemblies and the left caster wheel assembly in the position that will allow the deck to be easily rolled underneath the tractor.

- a. Position the torsion spring (27) in the semi-circular channel of the deflector chute, with the **short spring end** pointing rearward and inserted into the rearmost of the two holes located near the center of the channel. Hold the spring in place.
 - b. While continuing to hold the spring and deflector together, load the spring by turning the **long spring end** in the same direction as the coil windings (toward the chute) until the spring end points directly away from the deflector chute (usually 1/2 to 3/4 turn). It will be necessary to deflect the **spring end** to clear the chute when turning it. Hold the **long spring end** in this loaded position.
 - c. While holding the spring in the loaded position, install the deflector chute onto the two hinge tabs of the RH caster channel. The **long spring end** should now be positioned on top of the deck housing.
 - d. Holding the chute and spring in position, insert the tapered end of the hinge pin (26) into the front end of the deflector chute.
 - e. Drive the pin through the deflector, hinge tabs, and spring. Test the deflector for proper operation.
21. Hook the extension spring (29, Fig. 5-54) to the idler arm (3) and shoulder bolt (30).
22. Install the spindle belt (43, Fig. 5-54) as follows:
- a. In a counterclockwise direction, route the belt as follows:
 - Around the double pulley, right spindle pulley, and center spindle pulley.
 - Around the left side of center pulley to the right side and behind the fixed idler pulley.
 - Around the left spindle pulley.
 - b. While pulling the movable idler pulley/idler arm to the left to tension the extension spring (29), route the section of belt between the left spindle pulley and double pulley around the front and right sides of the idler pulley.
 - c. If correctly installed, the back (flat) side of the belt will be against the idler pulleys, and the belt will be tensioned.
23. Install the tension handle (2, Fig. 5-54) on the deck housing with the shoulder bolt (11) and hex flanged lock nut (12).
24. Rotate the tension handle (2, Fig. 5-54) rearward and hook the extension spring (10) into the top of the double pulley pivot arm (1) and bottom of the tension handle.
25. Position the handle stop bracket (17, Fig. 5-53) on the LH belt cover (5) as noted during removal and secure with hex cap screw (34) and hex flange top lock nut (35).
26. After making certain the U-nuts (36, Fig. 5-53) are properly positioned on the mounting strap (16), insert the tabs of the LH belt cover (5) into the slots of the caster channel. Secure the cover to the mounting strap with the two thumb screws (31) and bell washers (32).
27. Rotate the tension handle forward to lock in the handle stop bracket. If necessary, reposition the stop bracket to align with the tension handle.
28. Ensure the proper positioning of the U-nuts (36) and install the RH belt cover (6). Secure the cover to the mounting strap with the two thumb screws (31) and bell washers (32).
29. Apply Cub Cadet 251H EP grease to the lube fittings of the spindle assemblies, ball wheels, front casters, and the double pulley pivot arm. Snap the button plugs (33) into the LH and RH belt covers.
30. Snap the front lift rod/lift bracket assembly into the quick attach brackets on the tractor frame.
31. Install the PTO V-belt on the PTO clutch of the tractor.
32. Install the mower deck on the tractor; check the deck leveling to make the final adjustment of the front lift rod/lift bracket assembly; and reposition the deck wheels.

5-37 MOWER DECK SPINDLE ASSEMBLY (All Models).

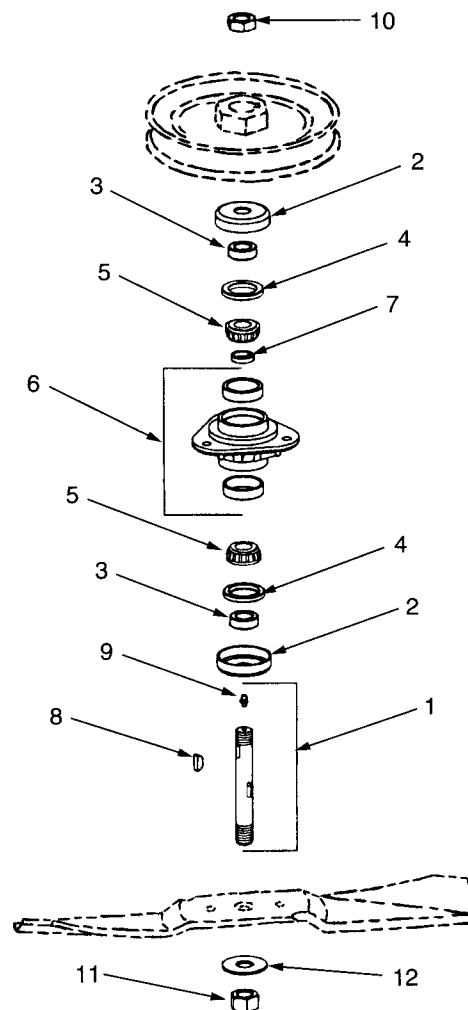
5-37.1 **General.** All the mower decks covered in this manual are equipped with identical spindle assemblies. A complete spindle assembly is available as Part No. 759-3665.

5-37.2 **Removal.** The spindle assembly can be rebuilt without being removed from the deck. However, it is recommended that the assemblies be removed to ensure a satisfactory overhaul.

1. Refer to the applicable paragraph (5-33; 5-34; 5-35; or 5-36) to remove the spindle assemblies from the mower deck.

5-37.3 **Disassembly.** Clean the exterior of the spindle assembly before beginning disassembly.

1. Remove the spindle shaft assembly (1, Fig. 5-55) by withdrawing from the top of the spindle housing (6).
2. If not previously removed, remove the woodruff key (8) from the spindle shaft.
3. If necessary only, remove the lube fitting (9) by pulling from the spindle shaft. The lube fitting must be replaced if removed.
4. Remove the spindle cup (2) from the top of the spindle housing and pull the seal spacer (3) from the center of the oil seal (4).



1. Spindle Shaft Assembly
2. Spindle Cup (Hdn)
3. Seal Spacer
4. Oil Seal
5. Bearing Cone
6. Spindle Housing w/ Bearing Races and Spacer
7. Bearing Spacer
8. Woodruff Key
9. Lube Fitting
10. Hex Jam Nut
11. Hex Nut
12. Flat Washer

Figure 5-55. Blade Spindle Assembly (All Mower Decks).

5. Using care to avoid damage to the spindle housing, pull the oil seal (4) from the top of the housing. Discard the seal.
6. Remove the bearing cone (5) and bearing spacer (7) from the top of housing.
7. Remove the spindle cup (2) and seal spacer (3) from the bottom of the housing.
8. Again using care to prevent damage, pull the bottom oil seal (4) from the housing.
9. Remove the bearing cone (5) from the bottom of the housing.

NOTE

Do not attempt to remove the bearing races and race spacer from the spindle housing. If replacement is necessary, order the spindle housing assembly.

5-37.4 Inspection. Clean all parts prior to inspection.

1. Inspect the spindle shaft (1) as follows:
 - a. Inspect the threads for damage.
 - b. Inspect for cracks and/or distortion of the shaft.
 - c. Examine the woodruff key and shaft keyway for damage and fit.
 - d. Apply Cub Cadet 251H EP grease through the lube fitting to test the fitting and ensure the lubrication passages are open. This will also flush out old lubricant.
2. Inspect the bearing spacer for wear.
3. Inspect the seal spacers for wear and for nicks or damage to the seal contact surfaces.
4. Inspect the bearing cones for cracked, worn, or binding roller bearings and for broken or bent roller bearing cages.
5. Inspect the spindle housing assembly. If any of the following problems exist, replace the spindle housing.
 - a. Bearing races fit loosely in the housing.
 - b. Bearing races are damaged or worn.
 - c. Housing is cracked or damaged.

5-37.5 Repair.

1. Deburr and dress damaged threads.
2. Repair minor surface damage and corrosion with a fine honing stone or emery cloth.
3. Replace a bent or damaged spindle shaft and woodruff key.
4. Replace damaged or worn bearing cones and seal spacers.
5. Replace the oil seals.
6. Pack the bearing cones with Cub Cadet 251H EP grease using a bearing packer. If a bearing packer is not available, refer to Figure 5-56 and pack the bearings by hand as follows:



WARNING

Wear rubber gloves to protect your skin when performing this procedure.

- a. Place approximately one tablespoon of 251 H EP grease in the palm of one hand.
- b. Holding the bearing vertically, scrape the outer roller cage (widest diameter) along the edge of the grease. Repeat until grease comes out the top of the bearing, between the roller cage and inner bearing race.
- c. Rotate the bearing and continue until the bearing is completely filled.



NOTE

This action will force grease into the cavities of the bearing, lubricating the areas between the bearing rollers and inner bearing race.

- d. Completely coat the outer surface of the bearing with grease.

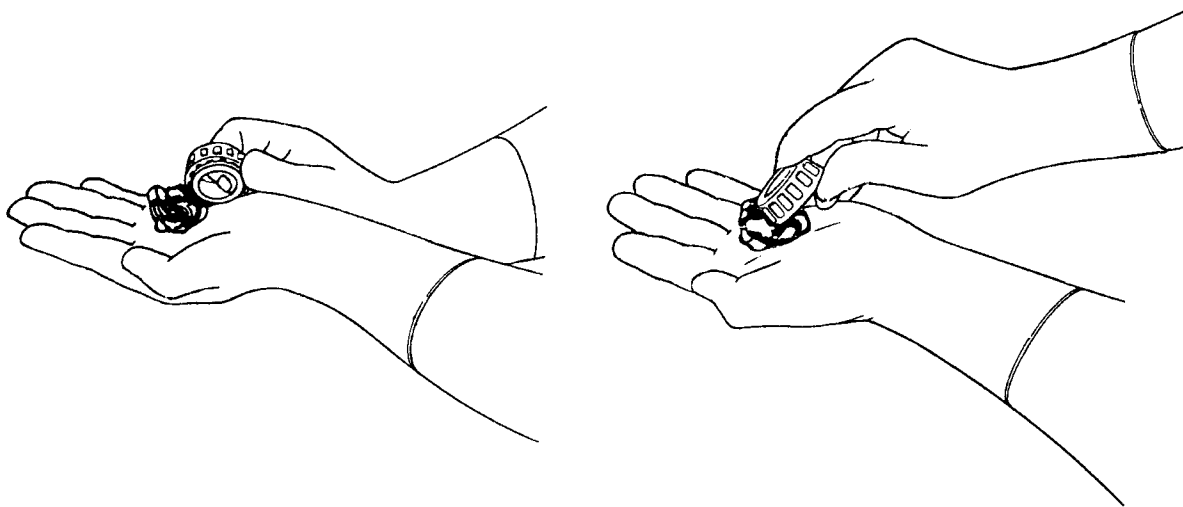


Figure 5-56. Hand Packing Bearing Cones With Grease.

5-37.6 Reassembly.



The direction from which the spindle assembly is mounted on the deck determines the top and bottom of the spindle housing. On deck Models 300 and 301, the assembly is mounted from underneath the deck; therefore the flat mounting surface of the housing is considered the top. On the 38 and 42 inch decks the assembly is mounted from the top; thus the conical shaped surface is considered the top. The lube fitting and keyway of the spindle shaft are **always** positioned at the top of the spindle assembly.

1. Install the bearing cone (5) in the bottom of the spindle housing.



CAUTION

The bottom oil seal (4) should be installed in the inverted position; that is, the inner seal lip positioned upward and the cupped seal body facing downward. Failure to install the seal this way could result in hydraulic lock if the spindle assembly is over lubricated.

2. In the inverted position, press the bottom oil seal into the spindle housing until flush with the bottom of the housing.

3. Lightly lubricate the outer surface of the seal spacer (3) and carefully press through the seal lip of the oil seal.
4. If removed, use a protective sleeve and drive the new lube fitting into the spindle shaft.
5. Slide the upper bearing cone (5) and bearing spacer (7) onto the bottom of the spindle shaft. The larger diameter of the tapered bearing cone goes toward the keyway of the shaft.
6. Insert the bottom of the spindle shaft into the top of the housing and through the lower bearing cone and seal spacer.
7. With the lip of the seal facing upward, press the upper oil seal into the spindle housing until flush with the top of the housing. Use care to prevent damage to the seal.
8. Lightly lubricate the outer surface of the seal spacer (3) and carefully press into the upper oil seal.
9. Install the upper and lower spindle cups (2).
10. Install the woodruff key (8) in the keyway of the shaft.

5-37.7 Installation.

1. Install the spindle assemblies on the deck per the applicable paragraph (5-33; 5-34; 5-35; or 5-36).
2. Lubricate the spindle assemblies with 251 H EP grease. Do not over lubricate.

